Borehole ID: KAFB-106085

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/27/2011
Date TD Reached: 6/29/2011
Date Completed: 7/8/2011

Ground Elevation AMSL (ft): 5317.3
Y Coordinate: 1475983.71
X Coordinate: 1542564.20

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.51
At End of Drilling: Not Recorded
After Drilling: 462.02

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT with Sand (ML); brown (7.5YR 5/4); dry; soft; nonplastic; 80% silt; 20% fine to coarse sand; angular; no odor.	ML		Hand augered. ***Note: no headspace requirement at this location.***
5					SILT (ML); brown (7.5YR 5/4); damp; firm; nonplastic; 95% silt; 5% fine to coarse sand; angular; no odor.		Cement Seal	Began drilling @ 0845 on 6/27/11.
10					Same as above (5 ft); strong brown (7.5YR 5/6); low plasticity.		Top of High Solids Bentonite Grout	
15					Same as above (5 ft); non to low plasticity; 90% silt; 5% fine to coarse sand; angular; 5% fine gravel to 1.5cm; angular.			Kelly down @ 0855. New 20' connection @ 0900. Resumed drilling @ 0900.
20					Same as above (5 ft); brown (7.5YR 4/4); 100% silt.			
25					SILT with Gravel (ML); brown (7.5YR 4/4); damp; firm; nonplastic; 75% silt; 15% fine gravel to 1cm; angular; 10% fine to coarse sand; angular; no odor.			
30								

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Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Sandy SILT (ML); brown (7.5YR 4/4); damp; firm; nonplastic; 70% silt; 30% fine to coarse sand; angular; trace gravel to 1cm; subrounded; no odor.			
35					SILT (ML); brown (7.5YR 4/3); damp; hard; low to medium plasticity; 100% silt; trace sand; subrounded; no odor.	ML		Kelly down @ 0915. New 20' connection @ 0921. Resumed drilling @ 0921.
40					Same as above (35 ft).			
45					Lean CLAY (CL); strong brown (7.5YR 4/6); damp; hard; medium to high plasticity; 100% clay; no odor.	CL	High Solids Bentonite Grout	
50					SILT (ML); brown (7.5YR 4/4); damp; hard; low plasticity; 100% silt; no odor.			
55					SILT (ML); brown (7.5YR 4/3); damp; hard; low to medium plasticity; 100% silt; trace fine to coarse sand; angular; no odor.	ML		Kelly down @ 0957. New 20' connection @ 1005. Resumed drilling @ 1015.
60								

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

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At End of Drilling: Not Recorded
After Drilling: 462.02

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT (ML); strong brown (7.5YR 5/6); damp; hard; non to low plasticity; 100% silt; no odor.			
65					Same as above (60 ft); brown (7.5YR 5/3).	ML		
70					Lean CLAY (CL); brown (7.5YR 4/3); damp; hard; medium to high plasticity; 100% clay; no odor.	CL		
75					SILT (ML); brown (7.5YR 4/3); damp; hard; low to medium plasticity; 100% silt; no odor.		High Solids Bentonite Grout	Kelly down @ 1059. New 20' connection @ 1108. Resumed drilling @ 1108.
80					Same as above (75 ft).	ML		
85					Same as above (75 ft); non to low plasticity.			
90								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT (ML); strong brown (7.5YR 5/6); damp; hard; non to low plasticity; 100% silt; no odor.			
95					Same as above (90 ft); 95% silt; 5% fine to coarse sand; subrounded; no odor.	ML		Kelly down @ 1135. New 20' connection @ 1142. Resumed drilling @ 1232.
100					No cuttings returned.			Added water while drilling to prevent cyclone and hose from clogging.
105					Poorly graded GRAVEL (GP); brown (10YR 4/3); damp; dense; 95% fine gravel to 2cm; rounded; 5% silt and clay; no odor. Note: gravel is composed of basalt.	GP	High Solids Bentonite Grout	
110					Poorly graded GRAVEL with Silt (GP-GM); brown (10YR 4/3); damp; dense; 90% fine gravel to 3.5cm; subrounded; 10% silt; no odor. Note: gravel is composed of basalt.	GP-GM		
115					SILT (ML); brown (7.5YR 4/4); damp; hard; nonplastic; 90% silt; 10% fine to coarse sand; no odor.	ML		Kelly down @ 1250. New 20' connection @ 1256. Resumed drilling @ 1256.
120								

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Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Lean CLAY (CL); brown (7.5YR 4/4); damp; hard; medium to high plasticity; 100% clay; no odor.	CL		
125					No cuttings returned.			
130					SILT (ML); brown (7.5YR 4/4); damp; hard; non to low plasticity; 100% silt; no odor.	ML		
135					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 85% fine to coarse sand; subrounded; 15% fine gravel; subangular; no odor. Note: some sand is volcanic tuff.	SW	High Solids Bentonite Grout	Approximate Top of Santa Fe Group. Kelly down @ 1318. New 20' connection @ 1325. Resumed drilling @ 1325.
140					No cuttings returned.			
145					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 85% fine to coarse sand; subrounded; 15% fine gravel; subangular; no odor. Note: some sand is volcanic tuff.	SW		
150								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 85% fine to coarse sand; rounded; 15% fine gravel to 2cm; subangular; abundant tuff; no odor.			
155					Same as above (150 ft).			Kelly down @ 1344. New 20' connection @ 1348. Resumed drilling @ 1348.
160					Same as above (150 ft).			
165					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 90% fine to coarse sand; subrounded to rounded; 10% fine gravel to 1.5cm; subrounded; abundant tuff; no odor.	SW	High Solids Bentonite Grout	
170					Same as above (165 ft).			
175					Same as above (165 ft); 95% fine to coarse sand; 5% fine gravel to 2cm; rounded; trace silt and clay.			Kelly down @ 1406. New 5' connection @ 1412. Resumed drilling @ 1412.
180								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); damp; dense; 80% fine to coarse sand; subrounded; 20% fine gravel to 2cm; subrounded; no odor.			Kelly down @ 1420. Total depth with 11-3/4" casing. Resumed drilling with 9-5/8" casing @ 1636.
185					Same as above (180 ft); 65% fine to coarse sand; subrounded; 35% fine gravel to 3cm; subrounded.			
190					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 95% fine to coarse sand; rounded; 5% fine gravel to 2cm; subrounded; no odor.	SW		
195					Same as above (190 ft); 90% fine to coarse sand; 10% fine gravel to 2cm; subrounded; no odor.		High Solids Bentonite Grout	Kelly down @ 1645. New 20' connection @ 1651. End of 6/27/11. Resumed drilling @ 0824 on 6/28/11.
200					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 95% fine sand; rounded; 5% silt and clay; no odor.	SP		
205					Well graded SAND (SW); light yellowish brown (10YR 6/4); damp; dense; 95% fine to coarse sand; rounded; 5% gravel to 2cm; subangular; abundant volcanic tuff; no odor.	SW		
210								

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210					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 90% fine to coarse sand; rounded; 10% gravel to 3cm; subrounded; no odor.	SW		
215					Same as above (210 ft); 95% fine to coarse sand; 5% gravel; subrounded; no odor.			Kelly down @ 0831. New 20' connection @ 0837. Resumed drilling @ 0837.
220					Same as above (210 ft); 90% fine to coarse sand; 10% fine gravel to 1.5cm; rounded; no odor.			
225					Same as above (210 ft)		High Solids Bentonite Grout	
230					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 95% fine to medium sand; rounded; trace coarse sand; 5% fine gravel to 2cm; subrounded; no odor.	SP		
235					Same as above (230 ft); 100% fine to medium sand; rounded; trace coarse sand; trace fine gravel.			Kelly down @ 0844. New 20' connection @ 0851. Resumed drilling @ 0851.
240								

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240					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 100% fine to medium sand; rounded; no odor.			
245					Same as above (240 ft).	SP		
250					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 100% fine to coarse sand; subangular to subrounded; no odor.			
255					Same as above (250 ft); trace fine gravel to 1cm; no odor.	SW	High Solids Bentonite Grout	Kelly down @ 0900. New 20' connection @ 0905. Resumed drilling @ 0905.
260					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 100% fine sand; rounded; trace silt and clay; no odor.	SP		
265					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 85% fine to coarse sand; rounded; 15% fine gravel; subrounded; no odor.	SW		
270								

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270					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 85% fine to coarse sand; rounded; 15% fine gravel to 2cm; subrounded; no odor.			
275					Same as above (270 ft).	SW		Kelly down @ 0912. New 20' connection @ 0919. Resumed drilling @ 0919.
280					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 95% fine to medium sand; rounded; 5% fine gravel; subrounded; no odor.	SP		
285					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 90% fine to coarse sand; rounded; 10% fine gravel to 1cm; rounded; no odor.		High Solids Bentonite Grout	
290					Same as above (285 ft); 100% fine to coarse sand; subangular to subrounded; trace fine gravel to 1cm; no odor.	SW		
295					Silty GRAVEL (GM); dark brown (10YR 3/3); damp; dense; 65% fine gravel; subangular to subrounded; 5% fine sand; 30% silt; nonplastic; no odor. Note: gravel is composed of basalt.	GM		Kelly down @ 0944. New 20' connection @ 0950. Resumed drilling @ 0950.
300								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded GRAVEL (GP); brown (10YR 4/3); damp; dense; 100% fine gravel to 2cm; angular. Note: gravel is composed of basalt.	GP		Added water continously to regain circulation.
305					Same as above (300 ft).			
310					Same as above (300 ft).			
315					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 95% fine to coarse sand; subangular to subrounded; 5% fine gravel to 2cm; subangular; no odor.	SW	High Solids Bentonite Grout	Kelly down @ 1012. New 20' connection @ 1020. Resumed drilling @ 1040.
320					Same as above (315 ft); 100% fine to coarse sand; subangular.			
325					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 80% fine to coarse sand; rounded; 20% fine gravel to 2cm; rounded.			
330								

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330					Poorly graded GRAVEL (GP); brown (10YR 4/3); damp; dense; 100% fine gravel to 3cm; angular; no odor. Note: gravel is composed of basalt, sandstone, and chert.			
335					Same as above (330 ft); 90% gravel; 10% coarse sand.			Kelly down @ 1058. New 20' connection @ 1105. Resumed drilling @ 1105.
340					Same as above (330 ft).	GP		
345					Same as above (330 ft).		High Solids Bentonite Grout	
350					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 55% fine to coarse sand; subrounded; 45% fine gravel; subrounded; no odor. Note: gravel is composed of basalt, sandstone, and chert.	SW		
355					Poorly graded GRAVEL (GP); brown (10YR 4/3); damp; dense; 90% fine gravel to 3cm; angular; 10% coarse sand; no odor. Note: gravel is composed of basalt, sandstone, and chert.	GP		Kelly down @ 1124. New 20' connection @ 1135. Resumed drilling @ 1135.
360								

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360								
					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 70% fine to coarse sand; subrounded; 30% fine gravel to 2cm; subrounded; no odor.	SW		
365								
					No cuttings returned.			
370								
					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 70% fine to coarse sand; subrounded; 30% fine gravel to 2cm; subrounded; no odor.	SW	High Solids Bentonite Grout	Kelly down @ 1155. New 20' connection @ 1334. Resumed drilling @ 1334.
375								
					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 100% fine to coarse sand; subrounded; no odor.			
380								
					No cuttings returned.			
385								
					No cuttings returned.			
390								

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Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/27/2011
Date TD Reached: 6/29/2011
Date Completed: 7/8/2011

Ground Elevation AMSL (ft): 5317.3
Y Coordinate: 1475983.71
X Coordinate: 1542564.20

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.51
At End of Drilling: Not Recorded
After Drilling: 462.02

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					No cuttings returned.			
395					No cuttings returned.		High Solids Bentonite Grout	Kelly down @ 1401. New 20' connection @ 1407. Resumed drilling @ 1407.
400					Poorly graded SAND (SP); brown (10YR 4/3); damp; dense; 95% fine to medium sand; rounded; 5% silt and clay; no odor.	SP	Top of Bentonite Seal	
405					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 85% fine to coarse sand; subrounded; 15% fine gravel to 3cm; subrounded; no odor.	SW		
410					Same as above (405 ft).			
415					No cuttings returned.			Kelly down @ 1436. New 20' connection @ 1451. Resumed drilling @ 1451.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 12:01 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106085

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/27/2011
Date TD Reached: 6/29/2011
Date Completed: 7/8/2011

Ground Elevation AMSL (ft): 5317.3
Y Coordinate: 1475983.71
X Coordinate: 1542564.20

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.51
At End of Drilling: Not Recorded
After Drilling: 462.02

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); damp; dense; 75% fine gravel; rounded; 25% fine to coarse sand; no odor.	GP		
425					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 60% fine to coarse sand; rounded; 40% fine gravel to 1cm; rounded; no odor.	SW	Bentonite Seal	
430					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 100% fine to medium sand; trace coarse sand; rounded; no odor.	SP	5" Schedule 80 PVC Riser	
435					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 95% fine to coarse sand; rounded; 5% fine gravel; rounded; no odor.		Top of 20/40 Sand	Kelly down @ 1535. New 20' connection @ 1546. Resumed drilling @ 1546.
440					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 55% fine to coarse sand; rounded; 45% fine gravel to 1cm; rounded; no odor.	SW	Top of 10/20 Sand	
445					Same as above (440 ft).		Top of 5" Schedule 80 PVC 0.010" Slot Screen	
450								

Borehole ID: KAFB-106085

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
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Project Number: 140705

Date Started: 6/27/2011
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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

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At End of Drilling: Not Recorded
After Drilling: 462.02

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded GRAVEL (GP); brown (10YR 4/3); damp; dense; 90% fine gravel to 2cm; subrounded; 10% fine to coarse sand; no odor.			
455					Same as above (450 ft).			Kelly down @ 1620. New 20' connection @ 1645. End of 6/28/11. Resumed drilling @ 0807 on 6/29/11.
460					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); wet; dense; 80% fine gravel to 1cm; subrounded; 20% medium to coarse sand; subangular; no odor. Note: gravel is composed of basalt and quartz.			
465					Same as above (460 ft).	GP		
470					Same as above (460 ft); trace clay nodules.			
475					Same as above (460 ft).		Bottom of Screen	Kelly down @ 0853. New 20' connection @ 0904. Resumed drilling @ 0904.
480							Sump	

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Borehole ID: KAFB-106085

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND (SW); brown (10YR 4/3); wet; dense; 100% fine to coarse sand; subrounded; no odor.		Bottom of Sump	
485					Well graded SAND with Gravel (SW); brown (10YR 4/3); wet; dense; 70% fine to coarse sand; subrounded to rounded; 30% fine gravel to 2cm; subrounded; no odor.	SW		
490					Same as above (485 ft); gravel to 1cm; rounded.		Bottom of Filter Pack	
495					No cuttings returned.		Native Backfill	
500								Total depth = 498 ft. Reached @ 1010 on 6/29/11.
505								Water added during drilling (gallons) = Not Recorded Water added after drilling (gallons) = 500
510								Water added during construction (gallons) = 40

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 12:01 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106085

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After Drilling: 462.02

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510								Kelly down: TD the joint and ready to make new connection.
515								
520								
525								
530								
535								
540								

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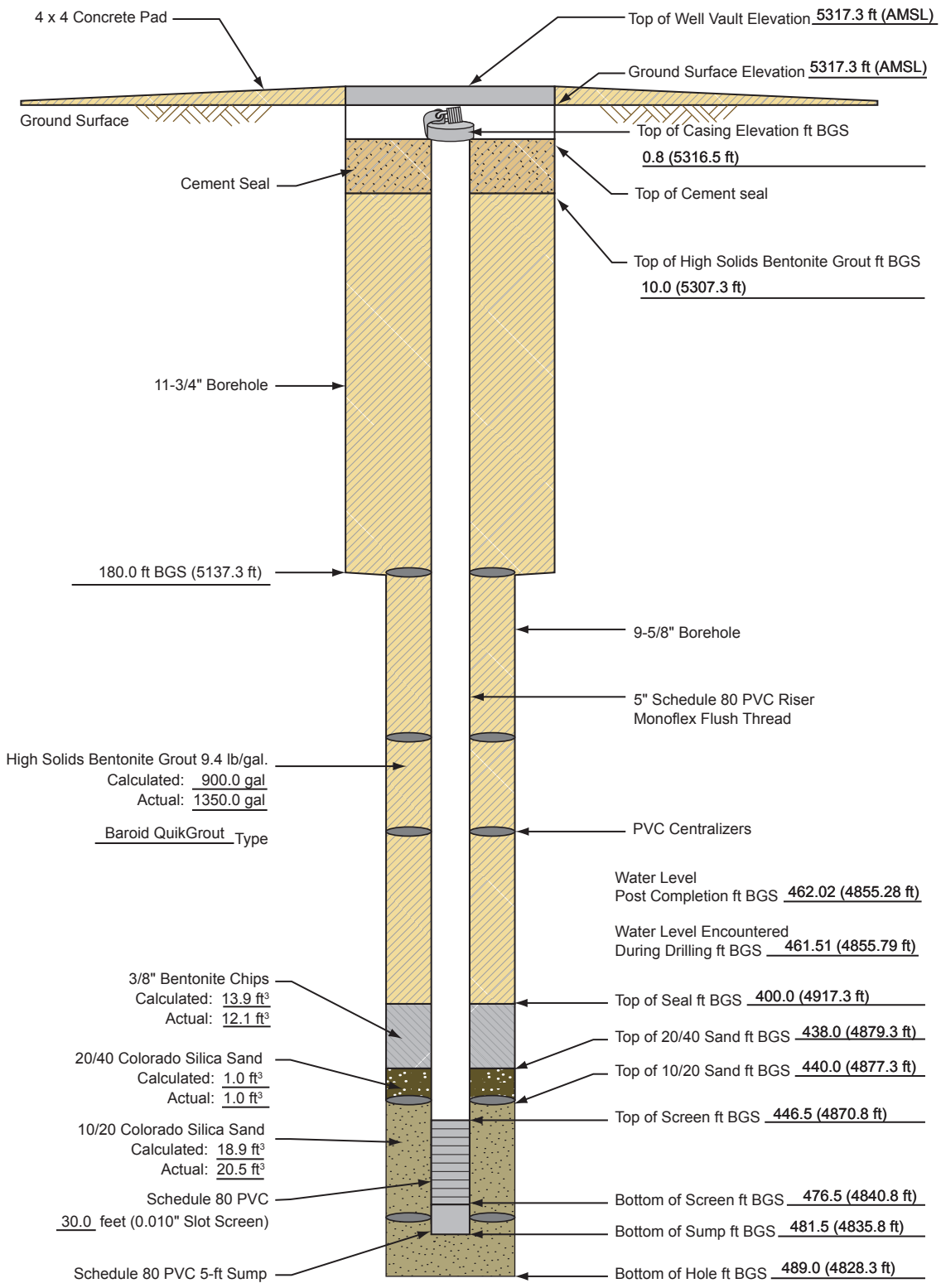
Monitoring Well Completion Diagram KAFB-106085

Installation Start Date/Time: 7/6/2011 @ 08:00
Installation End Date/Time: 7/8/2011 @ 12:00



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106085

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: GW-20

Well/Piez. No.: 106085

Personnel: G. Peacock

Date Installed: 7/8/11

Date: 7/18/11

Csg. Diameter (I.D.): 5"

Samplers: G. Peacock

Total Depth (ft. BGL): 481.5

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 7/18/11

Depth to Water Before Developing Well (ft. BGL): 462.02

				Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column:	19.48	feet	=	559.70	gal.	*	1	=	559.70

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2 - r_c^2) * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 559.70 gallons

Depth Purging From: 480.2 feet

Time Purging Begins: 1200, 7/18/11

Weather: Partly Cloudy, 90's

Screened Interval (ft BGL): 446.5 - 476.5

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 500 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
7/18/2011	0950	--	55	23.03	7.17	0.469	>1000	Bailed
7/18/2011	1200	462.88	165	23.00	7.11	0.490	>1000	Begin Pumping
7/18/2011	1218	462.97	265	21.81	5.30	0.493	11.60	Continue Pumping
7/18/2011	1229	463.00	315	21.70	5.00	0.494	12.90	Continue Pumping
7/18/2011	1240	463.03	365	21.53	4.87	0.495	3.34	Continue Pumping
7/18/2011	1250	463.04	415	21.52	4.79	0.495	2.87	Continue Pumping
7/18/2011	1300	463.05	465	21.61	4.86	0.495	1.49	Continue Pumping
7/18/2011	1310	463.05	515	21.51	4.85	0.495	1.00	Stop Pumping; Total Removed

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/20/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5317.7
Y Coordinate: 1475970.56
X Coordinate: 1542551.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT (ML); brown (7.5YR 4/3); damp; soft; nonplastic; 90% silt; 10% fine to coarse sand; angular; no odor.			Hand augered. ***Note: no headspace requirement at this location.***
5					Same as above (0 ft); 95% silt; 5% fine to coarse sand; no odor.		Cement Seal	Began drilling @ 0845 on 6/20/11.
10					Same as above (0 ft); brown (7.5YR 5/4).	ML	Top of High Solids Bentonite Grout	
15					Same as above (0 ft).			
20					SILT (ML); brown (7.5YR 4/4); damp; stiff; low to medium plasticity; 100% silt; trace coarse sand; no odor.			Kelly down @ 0854. New 20' connection @ 0901. Resumed drilling @ 0901.
25					Lean CLAY (CL); strong brown (7.5YR 4/4); damp; stiff; medium to high plasticity; 90% clay; 10% fine gravel to 1cm; rounded; no odor.	CL		
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
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Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT (ML); brown (7.5YR 5/4); damp; stiff; low to medium plasticity; 90% silt; 5% fine gravel to 1cm; rounded; 5% fine to coarse sand; angular; no odor.			
35					SILT (ML); brown (7.5YR 5/4); damp; stiff; medium plasticity; 100% silt; trace coarse sand; subangular; no odor.	ML		
40					Lean CLAY (CL); brown (7.5YR 5/4); damp; very stiff; medium to high plasticity; 100% clay; no odor.			Kelly down @ 0914. New 20' connection @ 0922. Resumed drilling @ 0922.
45					Same as above (40 ft).	CL	High Solids Bentonite Grout	
50					Same as above (40 ft).			
55					SILT (ML); brown (7.5YR 5/4); damp; stiff; low plasticity; 100% silt; trace fine to coarse sand; no odor.	ML		
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
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Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT (ML); brown (7.5YR 5/4); damp; stiff; non to low plasticity; 100% silt; trace fine sand; no odor.	ML	High Solids Bentonite Grout	Kelly down @ 0945. New 20' connection @ 1012. Resumed drilling @ 1012. Flange blew off; repaired and replaced.
65					Same as above (60 ft); brown (7.5YR 4/4).			
70					Same as above (60 ft); nonplastic; 90% silt; 10% fine to coarse sand; trace fine gravel to 1cm; no odor.			
75					Same as above (60 ft).			
80					Same as above (60 ft); low plasticity; 100% silt; trace fine to coarse sand; no odor.			Kelly down @ 1356. New 20' connection @ 1408. Resumed drilling @ 1409.
85					Same as above (60 ft).			
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT (ML); brown (7.5YR 5/4); damp; stiff; low plasticity; 100% silt; no odor.			
95					Same as above (90 ft); yellowish brown (10YR 5/4).	ML		
100					Well graded SAND (SW); brown (10YR 5/3); damp; dense; 100% fine to coarse sand; subrounded; no odor.	SW		Kelly down @ 1435. New 20' connection @ 1446. Resumed drilling @ 1446.
105					Silty SAND (SM); yellowish brown (10YR 5/4); damp; dense; 65% fine to coarse sand; 35% silt; no odor.	SM	High Solids Bentonite Grout	
110					SILT (ML); brown (7.5YR 5/4); damp; stiff; non to low plasticity; 95% silt; 5% gravel; no odor.			
115					Same as above (110 ft); low plasticity.	ML		
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT (ML); brown (7.5YR 5/4); damp; stiff; low plasticity; 100% silt; no odor.	ML		Kelly down @ 1502. End of 6/20/11. New 20' connection @ 0855 on 6/21/11. Resumed drilling @ 0855.
125					Same as above (120 ft).			
					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 100% fine to coarse sand; rounded; trace silt and clay; no odor. Note: volcanic tuff to 3cm; rounded.	SW		Approximate top of Santa Fe Group.
130					Same as above (126 ft).			
135					Same as above (126 ft); trace gravel.		High Solids Bentonite Grout	
140					Same as above (126 ft).			Kelly down @ 0919. New 20' connection @ 0925. Resumed drilling @ 0926.
145					Well graded SAND with Silt (SW-SM); brown (10YR 4/3); damp; dense; 80% fine to coarse sand; rounded; 10% fine gravel; rounded; 10% silt; no odor. Note: volcanic tuff.	SW-SM		
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Silty SAND (SM); brown (10YR 4/3); damp; dense; 70% fine to coarse sand; rounded; 10% fine gravel to 2cm; rounded; 20% silt; no odor. Note: sand is volcanic tuff.	SM		
155					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 95% fine to coarse sand; rounded; 5% fine gravel to 1.5cm; rounded; no odor. Note: sand is volcanic tuff.	SW		
160					Well graded SAND with Silt and Gravel (SW-SM); brown (10YR 4/3); damp; dense; 75% fine to coarse sand; rounded; 15% fine gravel to 1cm; rounded; 10% silt; no odor.	SW-SM		Kelly down @ 0946. New 20' connection @ 0951. Resumed drilling @ 0951.
165					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 100% fine to coarse sand; trace fine gravel; trace silt and clay; no odor.	SW	High Solids Bentonite Grout	
170					Same as above (165 ft); no gravel.			
175					Same as above (165 ft); subrounded sand.			
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 90% fine to coarse sand; rounded; 10% fine gravel to 1cm; subrounded; no odor.			Total depth with 11-3/4" casing @ 1030. New 20' connection @ 1423. Resumed drilling with 9-5/8" casing @ 1424.
185					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 75% fine to coarse sand; rounded; 25% fine gravel to 2cm; subrounded; no odor.	SW		
190					Same as above (185 ft); 85% fine to coarse sand; rounded; 15% fine gravel to 2cm; rounded; no odor.			
195					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); damp; dense; 85% fine gravel to 2.5cm; subrounded; 15% fine to coarse sand; no odor. Note: gravel is composed of basalt.		High Solids Bentonite Grout	
200					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); damp; dense; 80% fine gravel to 2cm; subrounded; 15% fine to coarse sand; 5% silt and clay; no odor. Note: gravel is composed of basalt.	GP		Kelly down @ 1432. New 20' connection @ 1501. Resumed drilling @ 1501.
205					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 100% fine sand; rounded; no odor. Note: sand is volcanic tuff.	SP		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/20/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5317.7
Y Coordinate: 1475970.56
X Coordinate: 1542551.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); brown (10YR 5/3); damp; dense; 90% fine to coarse sand; subrounded; 10% fine gravel to 2.5cm; subrounded; no odor.			
215					Same as above (210 ft); 100% fine to coarse sand; trace gravel.			
220					Same as above (210 ft).	SW		Kelly down @ 1509. New 20' connection @ 1514. Resumed drilling @ 1514.
225					Same as above (210 ft); 90% fine to coarse sand; rounded; 10% fine gravel to 1cm; rounded; no odor.		High Solids Bentonite Grout	
230					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 100% fine to medium sand; rounded; trace fine gravel; no odor. Note: sand is volcanic tuff.			
235					Same as above (230 ft); trace coarse sand.	SP		
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/20/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5317.7
Y Coordinate: 1475970.56
X Coordinate: 1542551.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 100% fine to medium sand; rounded; no odor. Note: sand is volcanic tuff.	SP		Kelly down @ 1521. New 20' connection @ 1526. Resumed drilling @ 1526.
245					Well graded SAND (SW); brown (10YR 5/3); damp; dense; 100% fine to coarse sand; subrounded; no odor.	SW		
250					Same as above (245 ft).			
255					Same as above (245 ft).		High Solids Bentonite Grout	
260					Silty SAND (SM); brown (10YR 4/3); damp; dense; 70% fine to coarse sand; rounded; 5% fine gravel; rounded; 25% silt; no odor.	SM		Kelly down @ 1532. New 20' connection @ 1541. Resumed drilling @ 1541.
265					Well graded SAND with Silt and Gravel (SW-SM); brown (10YR 4/3); damp; dense; 65% fine to coarse sand; subrounded; 25% fine gravel; rounded; 10% silt; no odor.	SW-SM		
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/20/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5317.7
Y Coordinate: 1475970.56
X Coordinate: 1542551.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 90% fine to coarse sand; subrounded; 10% fine gravel; subrounded; no odor.	SW		
275					Same as above (270 ft); 95% fine to coarse sand; rounded; 5% fine gravel to 2cm; rounded; no odor.			
280					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); damp; dense; 55% fine gravel to 3cm; rounded; 45% fine to coarse sand; rounded; trace silt and clay; no odor. Note: gravel is composed of basalt.	GP		Kelly down @ 1546. New 20' connection @ 1552. Resumed drilling @ 1552.
285					Same as above (280 ft).		High Solids Bentonite Grout	
290					Same as above (280 ft).			
295					Same as above (280 ft); 75% gravel; 25% fine to coarse sand; trace silt.			
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/20/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5317.7
Y Coordinate: 1475970.56
X Coordinate: 1542551.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 95% fine to coarse sand; subrounded; 5% fine gravel; rounded; no odor.	SW	High Solids Bentonite Grout	Kelly down @ 1600. New 20' connection @ 1607. Resumed drilling @ 1607.
305					Same as above (300 ft); 100% fine to coarse sand.			
310					Same as above (300 ft); 90% fine to coarse sand; rounded; 10% fine gravel to 1cm; subrounded; no odor.			
315					Same as above (300 ft); 100% fine to coarse sand; subrounded.			
320					Same as above (300 ft); 90% fine to coarse sand; rounded; 10% fine gravel to 1cm; subrounded; no odor.			Kelly down @ 1613. New 20' connection @ 1618. Resumed drilling @ 1618.
325					Same as above (300 ft); 95% fine to coarse sand; rounded; 5% fine gravel; subrounded; trace silt nodules; no odor.			
330								

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/20/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5317.7
Y Coordinate: 1475970.56
X Coordinate: 1542551.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 85% fine to coarse sand; subrounded; 15% fine gravel to 2cm; rounded; no odor.			
335					Same as above (330 ft).	SW		
340					Poorly graded GRAVEL (GP); brown (10YR 4/3); damp; dense; 95% gravel to 2cm; rounded; 5% coarse sand; no odor. Note: gravel is composed of basalt.			Kelly down @ 1625. New 20' connection @ 1630. Resumed drilling @ 1630.
345					Same as above (340 ft); 90% fine gravel; rounded; 10% fine to coarse sand.		High Solids Bentonite Grout	
350					Same as above (340 ft); 95% fine gravel; subrounded; 5% coarse sand.	GP		
355					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); damp; dense; 80% fine gravel to 2cm; subrounded; 20% medium to coarse sand; subrounded; no odor. Note: gravel is composed of basalt.			
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/20/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5317.7
Y Coordinate: 1475970.56
X Coordinate: 1542551.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); damp; dense; 60% fine gravel to 3cm; rounded; 40% fine to coarse sand; rounded; no odor. Note: gravel is composed of basalt.	GP		Kelly down @ 1645. New 20' connection @ 1648. Resumed drilling @ 1648.
365					Same as above (360 ft).	GP		End of 6/21/11 @ 1700. Resumed drilling @ 0830 on 6/22/11.
370					Same as above (360 ft); very dark grayish brown (10YR 3/2); 85% fine gravel to 1cm; subrounded; 15% coarse sand.	GP		
375					No cuttings returned.		High Solids Bentonite Grout	
380					Well graded SAND with Gravel (SW); dark brown (10YR 3/3); damp; dense; 85% fine to coarse sand; rounded; 15% fine gravel; rounded; no odor.	SW		Kelly down @ 0837. New 20' connection @ 0842. Resumed drilling @ 0842.
385					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 100% fine to medium sand; rounded; no odor.	SP		
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/20/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5317.7
Y Coordinate: 1475970.56
X Coordinate: 1542551.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 100% fine to medium sand; rounded; trace coarse sand; no odor.			
395					Same as above (390 ft).	SP		
400					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 100% fine to coarse sand; rounded; no odor.			Kelly down @ 0900. New 20' connection @ 0905. Resumed drilling @ 0905.
405					Same as above (400 ft); 90% fine to coarse sand; rounded; 10% fine gravel to 1.5cm; rounded; no odor.		High Solids Bentonite Grout	
410					Same as above (400 ft); 100% fine to coarse sand; subrounded.	SW		
415					Same as above (400 ft).			
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/20/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5317.7
Y Coordinate: 1475970.56
X Coordinate: 1542551.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); damp; dense; 80% fine gravel to 1cm; rounded; 20% medium to coarse sand; rounded; no odor. Note: gravel is composed of basalt.	GP		Kelly down @ 0927. New 20' connection @ 0937. Resumed drilling @ 0937.
425					No cuttings returned.			
430					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 85% fine to coarse sand; rounded; 15% fine gravel to 2cm; rounded.	SW	High Solids Bentonite Grout	
435					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 60% fine to coarse sand; rounded; 40% fine gravel; rounded; no odor. Note: gravel is composed of basalt.			
440					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); damp; dense; 60% fine gravel; rounded; 40% fine to coarse sand; no odor. Note: gravel is composed of basalt.	GP	Top of Bentonite Seal	Kelly down @ 1005. New 20' connection @ 1010. Resumed drilling @ 1020.
445					Same as above (440 ft); 80% fine gravel; rounded; 20% fine to coarse sand; rounded.			
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/20/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5317.7
Y Coordinate: 1475970.56
X Coordinate: 1542551.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					No cuttings returned.			
455					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); damp; dense; 85% fine gravel to 3cm; rounded; 15% fine to coarse sand; rounded; no odor. Note: gravel is composed of basalt.	GP	Bentonite Seal	
460					Same as above (455 ft); 70% fine gravel to 3cm; rounded; 30% fine to coarse sand; trace silt and clay.		5" Schedule 80 PVC Riser	Kelly down @ 1055. New 20' connection @ 1106. Resumed drilling @ 1106.
465					Well graded SAND with Gravel (SW); brown (10YR 4/3); wet; dense; 75% fine to coarse sand; rounded; 25% fine gravel to 2cm; rounded; no odor.	SW		
470					Well graded SAND (SW); brown (10YR 4/3); wet; dense; 100% fine to coarse sand; subrounded; trace silt and clay; no odor.		Top of 20/40 Sand Top of 10/20 Sand	
475					Same as above (470 ft).		Top of 5" Schedule 80 PVC 0.010" Slot Screen	
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Date TD Reached: 6/22/2011
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); wet; dense; 75% fine gravel to 2cm; subrounded; 25% fine to coarse sand; slight odor. Note: gravel is basalt.	GP		Kelly down @ 1148. New 20' connection @ 1455. Resumed drilling @ 1455.
485					Same as above (480 ft); slight odor. Note: gravel is composed of sandstone and basalt.			
490					Same as above (480 ft); 85% fine gravel; rounded; 15% coarse sand; no odor. Note: gravel is composed of sandstone, basalt, chert, and quartz.		Bottom of Screen Sump	
495					Same as above (480 ft); 70% fine gravel to 2cm; rounded; 30% fine to coarse sand; no odor. Note: gravel is composed of sandstone, basalt, chert, and quartz.		Bottom of Sump Bottom of Filter Pack	
500					Same as above (480 ft); 85% fine gravel; rounded; 15% fine to coarse sand; no odor.			Kelly down @ 1545. New 20' connection @ 1558. Resumed drilling @ 1558.
505					Same as above (480 ft); 65% fine gravel to 3.5cm; rounded; 35% fine to coarse sand; no odor.		Native Backfill	
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106086

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 470.00
At End of Drilling: Not Recorded
After Drilling: 462.10

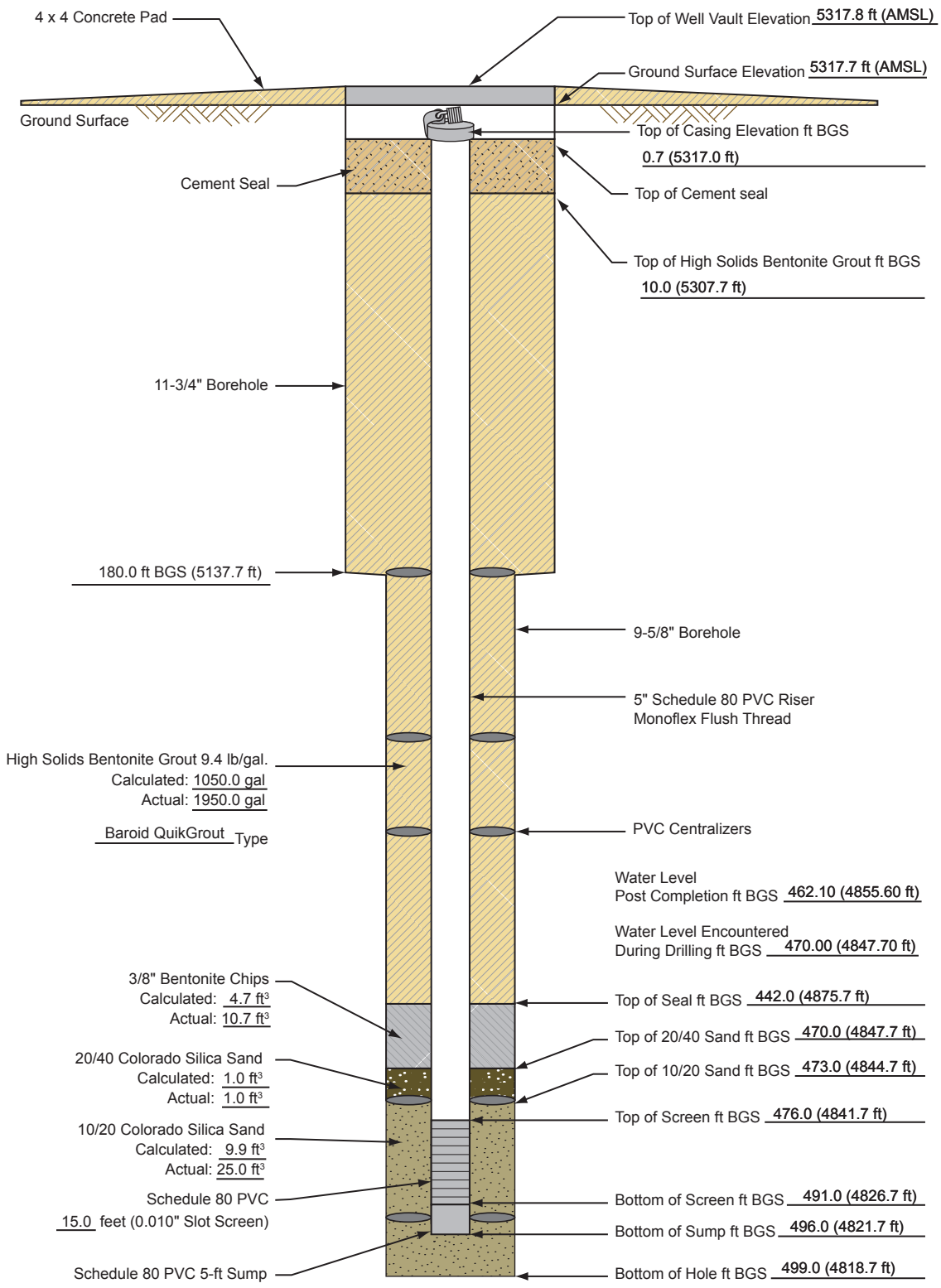
Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510								
515					Well graded SAND (SW); brown (10YR 4/3); wet; dense; 90% fine to coarse sand; subangular to subrounded; 10% fine sand; subrounded; no odor.	SW	Native Backfill	
					Well graded SAND with Gravel (SW); brown (10YR 4/3); wet; dense; 60% fine to coarse sand; 40% fine gravel to 4cm; rounded; no odor.			
520								Total depth = 518 ft. Reached @ 1650 on 6/22/11.
								Water added during drilling (gallons) = 0
525								Water added after drilling (gallons) = 500
								Water added during construction (gallons) = 40
530								Kelly down: TD the joint and ready to make new connection.
535								
540								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:59 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106086

Installation Start Date/Time: 6/23/2011 @ 08:00
Installation End Date/Time: 6/26/2011 @ 09:45



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106086

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: GW-20

Well/Piez. No.: 106086

Personnel: G. Peacock

Date Installed: 6/26/11

Date: 7/15/11

Csg. Diameter (I.D.): 5"

Samplers: G. Peacock

Total Depth (ft. BGL): 496

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 7/15/11

Depth to Water Before Developing Well (ft. BGL): 462.2

	Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 33.8 feet	= 556.91 gal.	*	1	=	556.91

V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2 - r_c^2) * L_s * $Ø_s$ * 7.48)+(H_2O added during drilling/installation) = 556.91 gallons

Depth Purging From: 496.3 feet

Time Purging Begins: 1037, 7/15/11

Weather: Clear, 90's

Screened Interval (ft BGL): 476 - 491

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 500 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
7/15/2011	0840	--	55	22.24	6.50	0.430	>1000	Bailed
7/15/2011	1037	463.20	165	21.47	7.03	0.408	>1000	Begin Pumping
7/15/2011	1046	463.25	215	21.50	6.53	0.402	424.00	Continue Pumping
7/15/2011	1055	463.25	265	21.39	5.82	0.402	188.00	Continue Pumping
7/15/2011	1106	463.25	315	21.22	5.34	0.402	133.00	Continue Pumping
7/15/2011	1125	463.24	415	21.23	5.14	0.400	80.50	Continue Pumping
7/15/2011	1144	463.24	515	21.29	4.66	0.398	53.60	Continue Pumping
7/15/2011	1204	463.24	615	21.13	5.16	0.396	34.50	Stop Pumping; Total Removed

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Borehole ID: KAFB-106087

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/8/2011
Date TD Reached: 6/16/2011
Date Completed: 6/19/2011

Ground Elevation AMSL (ft): 5317.0
Y Coordinate: 1476003.09
X Coordinate: 1542551.20

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.00
At End of Drilling: Not Recorded
After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Silty SAND (SM); reddish brown (5YR 5/4); dry; very loose; 75% very fine sand; trace gravel; subangular to subrounded; 25% silt; cohesive.	SM		Hand augered. ***Note: no headspace reaquirement at this location.***
5					Same as above (0 ft).			Spud @ 0856 on 6/8/11.
10					Same as above (0 ft).			
15					Same as above (0 ft).		Cement Seal	Kelly down @ 0909. New 20' connection @ 0926.
20					Same as above (0 ft); 80% fine to very coarse sand; 20% silt.			
25					Silty GRAVEL (GM); reddish brown (5YR 5/4); dry; very loose; 80% fine to coarse gravel; subangular to subrounded; 20% silt; cohesive. Note: gravel is composed of quartz and sandstone.	GM		
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106087

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Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30								
					Silty GRAVEL (GM); reddish brown (5YR 5/4); dry; very loose; 85% fine to coarse gravel; subangular to subrounded; 15% silt; cohesive. Note: gravel is composed of quartz and sandstone.	GM	Top of High Solids Bentonite Grout
35								
					SILT (ML); reddish brown (5YR 4/3); dry; soft; 90% silt and clay; low plasticity; 10% fine to very coarse sand; subangular to subrounded.	ML		Kelly down @ 0948. New 20' connection @ 1020.
40					Same as above (35 ft).			
45					Same as above (35 ft).			
50								
					Silty SAND (SM); reddish brown (5YR 4/3); dry; loose; 75% fine to very coarse sand; subangular to subrounded; 25% silt; cohesive.	SM		
55					Same as above (50 ft).			Kelly down @ 1246. New 20' connection @ 1308.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Hole Diameter Lower (in.): 9-5/8
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At End of Drilling: Not Recorded
After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); reddish brown (5YR 4/3); dry; loose to medium dense; 80% fine to very coarse sand; subangular to subrounded; 20% silt; low plasticity; cohesive.			
65					Same as above (60 ft).			
70					Same as above (60 ft).			
75					Same as above (60 ft); no coarse sand.	SM	High Solids Bentonite Grout	Kelly down @ 1342. New 20' connection @ 1450.
80					Same as above (60 ft); no coarse sand.			
85					Same as above (60 ft); no coarse sand.			
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Well graded SAND (SW); brown (7.5YR 4/4); dry; medium dense; 100% fine to very coarse sand; subangular to subrounded; trace silt and clay; noncohesive.			
95					Same as above (90 ft).	SW		Kelly down @ 1520. New 20' connection @ 1551.
100					Silty SAND (SM); strong brown (7.5YR 4/6); dry; medium dense; 80% fine sand; subrounded; 20% silt and clay; low plasticity; cohesive.			
105					Same as above (100 ft).		High Solids Bentonite Grout	
110					Same as above (100 ft).	SM		
115					Same as above (100 ft).			Kelly down @ 1625. End of 6/8/11. New 20' connection @ 0840 on 6/9/11.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
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At End of Drilling: Not Recorded
After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Silty GRAVEL (GM); brown (7.5YR 5/3); dry; dense; 80% fine to coarse gravel; subangular to subrounded; 20% silt; slightly cohesive. Note: gravel is composed of quartz and sandstone.			
125					Same as above (120 ft).	GM		
130					Well graded GRAVEL (GW); brown (7.5YR 4/2); dry; dense; 100% fine to coarse gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz and sandstone.			
135					Same as above (130 ft).		High Solids Bentonite Grout	Kelly down @ 0920. New 20' connection @ 0935.
140					Same as above (130 ft).	GW		
145					Same as above (130 ft).			
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

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After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Well graded GRAVEL (GW); brown (7.5YR 4/2); dry; dense to very dense; 100% fine to coarse gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz and sandstone.	GW		
155					Same as above (150 ft).			Kelly down @ 1005. New 20' connection @ 1038.
160					Well graded SAND (SW); brown (7.5YR 4/3); dry; very dense; 100% fine to very coarse sand; subangular to subrounded; trace silt and clay; noncohesive. Same as above (157 ft).	SW		
165					Same as above (157 ft).		High Solids Bentonite Grout	
170					Same as above (157 ft).			
175					Same as above (157 ft).			Kelly down @ 1107. New 5' connection @ 1120.
180								

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At Time of Drilling: 461.00
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Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded GRAVEL (GW); dark reddish brown (5YR 3/4); dry; very loose; 100% fine to coarse gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz and sandstone.	GW		Total depth with 11-3/4" casing @ 1128 on 6/9/11. New connection with 9-5/8" casing @ 1539 on 6/14/11. Driller injected 300 gallons of water.
185					Same as above (180 ft).			
190					Same as above (180 ft).			
195					Same as above (180 ft).		High Solids Bentonite Grout	
200					Poorly graded SAND (SP); strong brown (7.5YR 5/6); dry; very loose; 95% fine sand; 5% gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz.	SP		Kelly down @ 1544. New 20' connection @ 1552.
205					Same as above (200 ft).			
210								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND (SP); strong brown (7.5YR 4/6); dry; very loose; 95% medium sand; 5% gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz and sandstone.	SP	High Solids Bentonite Grout	
215					Same as above (210 ft).			
220					Same as above (210 ft).			Kelly down @ 1558. New 20' connection @ 1604.
225					Same as above (210 ft).			
230					Same as above (210 ft); no gravel.			
235					Same as above (210 ft); no gravel.			
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Hole Diameter Lower (in.): 9-5/8
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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); strong brown (7.5YR 4/6); dry; very loose; 100% medium sand; subangular to subrounded; trace silt and clay; noncohesive.			Kelly down @ 1608. New 20' connection @ 1614.
245					Same as above (240 ft); 5% very coarse sand.	SP		
250					Well graded SAND (SW); brown (7.5YR 4/4); dry; very loose; 100% fine to very coarse sand; subangular to subrounded; trace silt and clay; noncohesive.			
255					Same as above (250 ft).	SW	High Solids Bentonite Grout	
260					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; very loose; 100% fine sand; subangular to subrounded; trace silt and clay; noncohesive.			Kelly down @ 1620. New 20' connection @ 1627.
265					Same as above (260 ft); 2% gravel.	SP		
270								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; very loose; 100% fine to very coarse sand; subangular to subrounded; trace silt and clay; noncohesive.			
275					Same as above (270 ft).	SW		
280					Same as above (270 ft).			Kelly down @ 1634. New 20' connection @ 1638.
285					Well graded GRAVEL (GW); yellowish brown (10YR 5/4); dry; very loose to loose; 100% fine to coarse gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz, feldspars, and sandstone.		High Solids Bentonite Grout	
290					Same as above (285 ft).	GW		
295					Same as above (285 ft).			
300								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); strong brown (7.5YR 4/6); dry; loose; 99% fine to very coarse sand; 1% gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz.			Kelly down @ 1645. End of 6/14/11. New 20' connection @ 0827 on 6/15/11.
305					Same as above (300 ft); increased fine sand content; no gravel.	SW		
310					Poorly graded SAND (SP); strong brown (7.5YR 4/6); dry; loose; 98% fine sand; 2% gravel; subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz.			
315					Same as above (310 ft); grading coarser.	SP	High Solids Bentonite Grout	
320					Well graded SAND (SW); strong brown (7.5YR 4/6); dry; loose; 100% fine to very coarse sand; subangular to subrounded; trace silt and clay; noncohesive.			Kelly down @ 0838. New 20' connection @ 0845.
325					Same as above (320 ft); grading finer.	SW		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 98% fine sand; 2% gravel; subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz.			
335					Same as above (330 ft).	SP		
340					Same as above (330 ft).			Kelly down @ 0859. New 20' connection @ 0908.
345					Well graded SAND (SW); brown (7.5YR 5/2); dry; loose; 97% fine to very coarse sand; 3% gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz.		High Solids Bentonite Grout	
350					Same as above (345 ft).	SW		
355					Same as above (345 ft).			
360								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); brown (7.5YR 5/2); dry; loose; 100% fine to very coarse sand; subangular to subrounded; trace silt and clay; noncohesive.	SW		Kelly down @ 0922. New 20' connection @ 0933.
365					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; loose; 93% medium sand; 7% coarse sand; subrounded; trace silt and clay; noncohesive.	SP		
370					Well graded SAND (SW); brown (7.5YR 5/2); dry; loose; 100% fine to very coarse sand; subangular to subrounded; trace silt and clay; noncohesive.	SW		
375					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; loose; 93% medium sand; 7% coarse sand; subrounded; trace silt and clay; noncohesive.	SP	High Solids Bentonite Grout	
380					Same as above (375 ft); 1% coarse sand.			Kelly down @ 0950. New 20' connection @ 1042.
385					Same as above (375 ft); 1% coarse sand.			
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); pale brown (10YR 6/3); dry; loose; 100% fine sand; subrounded; trace silt and clay; noncohesive.			
395					Poorly graded SAND (SP); pale brown (10YR 6/3); dry; loose; 100% coarse sand; subangular to subrounded; trace silt and clay; noncohesive.			
400					Same as above (395 ft).			Kelly down and new 20' connection @ 1107.
405					Same as above (395 ft).	SP	High Solids Bentonite Grout	
410					Same as above (395 ft); very coarse sand.			
415					Same as above (395 ft); 95% medium sand; 5% very coarse sand.			
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106087

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/8/2011
Date TD Reached: 6/16/2011
Date Completed: 6/19/2011

Ground Elevation AMSL (ft): 5317.0
Y Coordinate: 1476003.09
X Coordinate: 1542551.20

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.00
At End of Drilling: Not Recorded
After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; dense; 100% coarse sand; trace gravel; subangular; trace silt and clay; noncohesive. Note: gravel is composed of quartz and sandstone.			Kelly down @ 1136. New 20' connection @ 1150.
425					Same as above (420 ft); no gravel.	SP		
430					Same as above (420 ft); no gravel.			
435					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 100% fine to coarse sand; subangular; trace silt and clay; noncohesive.		High Solids Bentonite Grout	
440					Same as above (435 ft); 10% gravel.	SW		Kelly down @ 1217. New 20' connection @ 1339.
445					Same as above (435 ft); 10% gravel.			
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106087

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/8/2011
Date TD Reached: 6/16/2011
Date Completed: 6/19/2011

Ground Elevation AMSL (ft): 5317.0
Y Coordinate: 1476003.09
X Coordinate: 1542551.20

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.00
At End of Drilling: Not Recorded
After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; very dense; 100% fine to very coarse sand; subangular; trace silt and clay; noncohesive.			
455					Same as above (450 ft).			
460					Same as above (450 ft).	SW		Kelly down @ 1414. New 20' connection @ 1422.
465					Same as above (450 ft).		High Solids Bentonite Grout	
470					Well graded GRAVEL (GW); dark grayish brown (10YR 4/2); dry; very dense; 100% fine to coarse gravel; subangular; trace silt and clay; noncohesive. Note: gravel is quartz and sandstone.			
475					Same as above (470 ft).	GW		
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106087

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/8/2011
Date TD Reached: 6/16/2011
Date Completed: 6/19/2011

Ground Elevation AMSL (ft): 5317.0
Y Coordinate: 1476003.09
X Coordinate: 1542551.20

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.00
At End of Drilling: Not Recorded
After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; very dense; 100% fine to very coarse sand; subangular to subrounded; trace silt and clay; noncohesive.	SW		Kelly down @ 1532. End of 6/15/11. New 20' connection @ 0926 on 6/16/11.
485					Same as above (480 ft).			
490					Same as above (480 ft).			
495					Same as above (480 ft).		High Solids Bentonite Grout	
500					Same as above (480 ft).			Kelly down @ 0953. New 20' connection @ 1036.
505					Same as above (480 ft).			
510							Top of Bentonite Seal	

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106087

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/8/2011
Date TD Reached: 6/16/2011
Date Completed: 6/19/2011

Ground Elevation AMSL (ft): 5317.0
Y Coordinate: 1476003.09
X Coordinate: 1542551.20

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.00
At End of Drilling: Not Recorded
After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Well graded SAND (SW); yellowish brown (10YR 5/4); wet; very dense; 100% fine to very coarse gravel; subangular to subrounded; trace silt and clay; noncohesive.			
515					Same as above (510 ft); 5% gravel. Note: gravel is composed of quartz and sandstone.	SW		
520					Same as above (510 ft).		Bentonite Seal	Kelly down @ 1103. New 20' connection @ 1117.
525					Well graded GRAVEL (GW); grayish brown (10YR 5/2); saturated; very dense; 100% fine to coarse gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz and sandstone.			
530					Same as above (525 ft).	GW	5" Schedule 80 PVC Riser	
535					Same as above (525 ft).			
540								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106087

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/8/2011
Date TD Reached: 6/16/2011
Date Completed: 6/19/2011

Ground Elevation AMSL (ft): 5317.0
Y Coordinate: 1476003.09
X Coordinate: 1542551.20

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.00
At End of Drilling: Not Recorded
After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Well graded GRAVEL (GW); grayish brown (10YR 5/2); saturated; very dense; 100% fine to coarse gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is composed of quartz and sandstone.	GW	Bentonite Seal; Top of 20/40 Sand; Top of 10/20 Sand	Kelly down @ 1144. New 20' connection @ 1304.
545					Same as above (540 ft).	GW	Top of 5" Schedule 80 PVC 0.010" Slot Screen	
550					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); saturated; very dense; 100% fine sand; subrounded; trace silt and clay; noncohesive.	SP		
555					Well graded GRAVEL (GW); grayish brown (10YR 5/2); saturated; very dense; 100% fine to coarse gravel; subangular to subrounded; trace silt and clay; noncohesive. Note: gravel is quartz and sandstone.	GW		
560					Well graded SAND (SW); grayish brown (10YR 5/2); saturated; very dense; 99% fine to very coarse sand; 1% gravel; subangular to subrounded; trace silt and sand; noncohesive. Note: gravel is quartz and sandstone.	SW	Bottom of Screen; Sump	Kelly down @ 1338. New 10' connection @ 1403.
565					Poorly graded SAND (SP); 100% fine sand.	SP	Bottom of Sump	
570					Well graded SAND (SW); grayish brown (10YR 5/2); saturated; very dense; 99% fine to very coarse sand; 1% gravel; subangular to subrounded; trace silt and sand; noncohesive. Note: gravel is	SW	Bottom of Filter Pack	

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:54 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106087

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/8/2011
Date TD Reached: 6/16/2011
Date Completed: 6/19/2011

Ground Elevation AMSL (ft): 5317.0
Y Coordinate: 1476003.09
X Coordinate: 1542551.20

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.00
At End of Drilling: Not Recorded
After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
570					quartz and sandstone.			Kelly down @ 1419. New 20' connection @ 1504.
					Well graded SAND (SW); light brownish gray (10YR 6/2); saturated; very dense; 99% fine to very coarse sand; 1% gravel; subangualr to subrounded; trace silt and clay; noncohesive.			
575					Same as above (570 ft).			
580					Same as above (570 ft).	SW	Native Backfill	
585					Same as above (570 ft).			
590								Total depth = 590 ft. Reached @ 1543 on 6/16/11.
595								Water added during drilling (gallons) = 300
								Water added after drilling (gallons) = 1175
600								Water added during

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Borehole ID: KAFB-106087

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
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Date Started: 6/8/2011
Date TD Reached: 6/16/2011
Date Completed: 6/19/2011

Ground Elevation AMSL (ft): 5317.0
Y Coordinate: 1476003.09
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 461.00
At End of Drilling: Not Recorded
After Drilling: 460.78

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Diane Oshlo

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
600								construction (gallons) = 0
								Spud: started drilling from surface.
605								Kelly down: TD the joint and ready to make new connection.
610								
615								
620								
625								
630								

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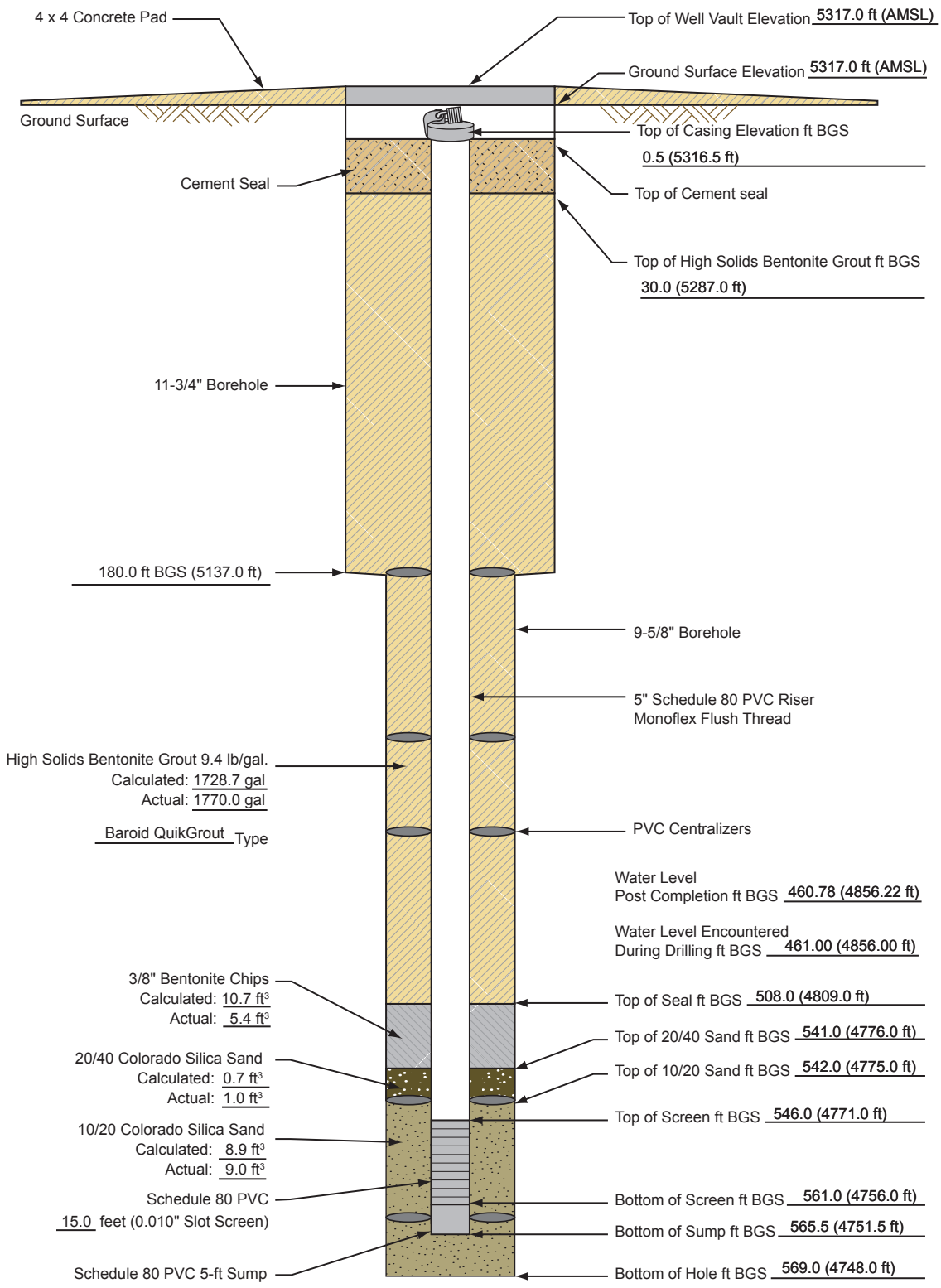
Monitoring Well Completion Diagram KAFB-106087

Installation Start Date/Time: 6/16/2011 @ 15:43
Installation End Date/Time: 6/19/2011 @ 12:20



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106087

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: GW-20

Well/Piez. No.: 106087

Personnel: G. Peacock

Date Installed: 6/16/11

Date: 7/14/11

Csg. Diameter (I.D.): 5"

Samplers: G. Peacock

Total Depth (ft. BGL): 565.53

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 7/14/11

Depth to Water Before Developing Well (ft. BGL): 461.5

			Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 104.03 feet	=	1305.17	gal.	*	1	=	1305.17

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2 - r_c^2) * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1305.17 gallons

Depth Purging From: 564.6 feet

Time Purging Begins: 1155, 7/14/11

Weather: Partly Cloudy, 90's

Screened Interval (ft BGL): 546 - 560.53

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1175 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)**	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
7/14/2011	0852	--	20	21.40	7.15	0.341	>1000	Begin Bailing
7/14/2011	1155	--	110	21.50	7.23	0.313	>1000	Bailed; Begin Pumping; Tagger is Stuck
7/14/2011	1211	--	210	21.22	5.76	0.308	64.90	Continue Pumping
7/14/2011	1230	461.82	310	21.21	5.58	0.306	31.70	Continue Pumping
7/14/2011	1250	461.82	410	21.27	5.41	0.305	51.90	Continue Pumping
7/14/2011	1310	461.82	510	21.36	5.35	0.304	46.50	Continue Pumping
7/14/2011	1329	461.82	610	21.24	5.53	0.303	30.40	Continue Pumping
7/14/2011	1408	461.82	810	21.42	5.27	0.303	23.70	Continue Pumping
7/14/2011	1446	461.82	1010	21.17	5.57	0.302	23.00	Continue Pumping
7/14/2011	1525	461.82	1210	21.37	5.86	0.303	40.20	Stop Pumping; Total Removed

Notes:
** Well casing it too wet to get water level tagger to the water table. Water level measurements will be made from 106085 (22 ft. away).
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/24/2011
Date TD Reached: 5/31/2011
Date Completed: 6/3/2011

Ground Elevation AMSL (ft): 5324.3
Y Coordinate: 1475764.82
X Coordinate: 1543228.93

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded.			Hand augured. ***Note: no headspace requirement at this location.***
5					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 70% fine to coarse sand; 5% gravel to 5mm; angular to subrounded; 25% silt.			Began drilling @ 1120 on 5/24/11. Driller added water for dust suppression.
10					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 55% very fine to medium sand; 5% coarse to very coarse sand; 40% silt.			
15					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 55% fine to coarse sand; 15% very coarse sand; 30% silt.	SM	Cement Seal	New 20' connection @ 1140. Resumed drilling @ 1153.
20					Silty SAND with Gravel (SM); yellowish red (5YR 4/6); moist; loose; 50% very fine to very coarse sand; 15% gravel to 1.2cm; subangular to subrounded; 35% silt.			
25					Silty SAND with Gravel (SM); reddish brown (5YR 4/3); moist; loose; 60% sand; well graded; 20% gravel to 1.5cm; angular to subangular; 20% silt.			
30								

Borehole ID: KAFB-106088

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Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					No description recorded.			Geologist missed description.
35					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 55% fine to medium sand; 5% coarse sand; 40% silt.		Cement Seal	New 20' connection @ 1210. Resumed drilling @ 1300.
40					Silty SAND with Gravel (SM); brown (7.5YR 4/4); moist; loose; 70% sand; well graded; 15% gravel to 1.8cm; angular to subrounded; 15% silt.	SM	Top of High Solids Bentonite Grout	
45					No description recorded.			Geologist missed description.
50					No description recorded.			
55					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 45% very fine to medium sand; 10% coarse to very coarse sand; 45% silt.	SM		New 20' connection @ 1310. Resumed drilling @ 1330.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/24/2011
Date TD Reached: 5/31/2011
Date Completed: 6/3/2011

Ground Elevation AMSL (ft): 5324.3
Y Coordinate: 1475764.82
X Coordinate: 1543228.93

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND with Gravel (SM); yellowish red (5YR 4/6); moist; loose; 30% very fine to medium sand; 20% coarse to very coarse sand; 20% gravel to 1.5cm; subangular to rounded; 30% silt.			
65					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 60% very fine to coarse sand; 40% silt.	SM		
70					Same as above (65 ft).			
75					Clayey SAND (SC); reddish brown (5YR 4/4); moist; loose; 60% fine to medium sand; 10% coarse to very coarse sand; 30% clay; nonplastic.	SC	High Solids Bentonite Grout	New 20' connection @ 1345. Resumed drilling @ 1520.
80					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 55% very fine to medium sand; 45% silt.			
85					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 70% sand; well graded; 10% gravel to 1cm; subangular to subrounded; 20% silt.	SM		
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/24/2011
Date TD Reached: 5/31/2011
Date Completed: 6/3/2011

Ground Elevation AMSL (ft): 5324.3
Y Coordinate: 1475764.82
X Coordinate: 1543228.93

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 55% very fine to medium sand; 35% silt; 10% clay.			
95					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 55% very fine to medium sand; 45% silt.			New 20' connection @ 1530. Resumed drilling @ 1535.
100					Same as above (95 ft).	SM		
105					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 50% very fine to medium sand; 10% coarse sand; 40% silt.		High Solids Bentonite Grout	
110					Clayey SAND (SC); reddish brown (5YR 4/4); moist; loose; 55% fine to coarse sand; 35% clay; 10% silt; low plasticity.	SC		
115					Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 4/4); moist; loose; 85% fine to very coarse sand; 5% gravel to 1cm; subangular to subrounded; 10% silt.	SP-SM		New 20' connection @ 1550. Cleaned out cyclone. Resumed drilling @ 1610.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/24/2011
Date TD Reached: 5/31/2011
Date Completed: 6/3/2011

Ground Elevation AMSL (ft): 5324.3
Y Coordinate: 1475764.82
X Coordinate: 1543228.93

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					No cuttings returned.			
125					Silty SAND (SM); strong brown (7.5YR 4/6); moist; loose; 70% very fine to fine sand; 30% silt.			
130					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 55% fine to medium sand; 45% silt.	SM		
135					Clayey SAND (SC); strong brown (7.5YR 4/6); moist; loose; 60% fine to medium sand; 40% clay; low plasticity.	SC	High Solids Bentonite Grout	New 20' connection @ 1630. Resumed drilling @ 1635.
140					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 90% fine to medium sand; 10% coarse sand.	SP		
145					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 75% sand; well graded; 10% gravel to 5mm; subrounded to rounded; 15% silt; pumice clasts.	SM		
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 65% sand; well graded; 10% gravel to 5mm; subangular to subrounded; 25% clay; low to medium plasticity.	SC		
155					Silty SAND (SM); strong brown (7.5YR 4/6); moist; loose; 80% fine to very coarse sand; 20% silt; pumice clasts.	SM		New 20' connection @ 1655. End of 5/24/11. Resumed drilling @ 0850 on 5/25/11.
160					Well graded SAND with Gravel (SW); reddish brown (5YR 5/3); moist; loose; 85% sand; 15% gravel to 1cm; subrounded to rounded; pumice clasts.	SW		
165					Well graded SAND (SW); reddish brown (5YR 5/3); moist; loose; 100% sand; pumice clasts.		High Solids Bentonite Grout	
170					Well graded SAND with Gravel (SW); reddish brown (5YR 5/3); moist; loose; 85% sand; 15% gravel to 1cm; angular to subrounded.			
175					Well graded SAND (SW); reddish brown (5YR 5/3); moist; loose; 100% sand.			New connection @ 0905. Resumed drilling @ 0915.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/24/2011
Date TD Reached: 5/31/2011
Date Completed: 6/3/2011

Ground Elevation AMSL (ft): 5324.3
Y Coordinate: 1475764.82
X Coordinate: 1543228.93

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); light brown (7.5YR 6/4); dry; loose; 90% fine to coarse sand; 10% very coarse sand.	SP		
185					Well graded SAND (SW); brown (7.5YR 5/3); moist; loose; 100% sand.	SW		Driller added water for dust supression.
190					Clayey SAND (SC); brown (7.5YR 4/3); moist; loose; 55% very fine to medium sand; 45% clay; nonplastic.	SC		
195					No cuttings returned.		High Solids Bentonite Grout	
200					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 95% fine to coarse sand; 5% very coarse sand. Note: very coarse sand is predominantly pumice clasts.	SP		Total depth with 11-3/4" casing @ 0945. New connection and resumed drilling with 9-5/8" casing @ 1450.
205					Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 70% very fine to very coarse sand; 30% clay; nonplastic.	SC		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/24/2011
Date TD Reached: 5/31/2011
Date Completed: 6/3/2011

Ground Elevation AMSL (ft): 5324.3
Y Coordinate: 1475764.82
X Coordinate: 1543228.93

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Clayey SAND with Gravel (SC); brown (7.5YR 4/4); moist; loose; 50% sand; well graded; 15% gravel to 1cm; subangular to rounded; 35% clay; nonplastic.	SC		
215					Well graded SAND with Gravel (SW); moist; loose; 70% sand; 30% gravel to 3cm; subangular to rounded.	SW		New 20' connection @ 1510. Resumed drilling @ 1515.
220					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; loose; 100% fine to medium sand.	SP		
225					Same as above (218 ft).		High Solids Bentonite Grout	
230					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); moist; loose; 60% sand; 40% gravel to 3cm; subangular to subrounded.	SW		
235					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; loose; 80% fine to very coarse sand; 20% gravel to 1cm; subrounded to rounded.	SP		New 20' connection @ 1520. Resumed drilling @ 1530.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/24/2011
Date TD Reached: 5/31/2011
Date Completed: 6/3/2011

Ground Elevation AMSL (ft): 5324.3
Y Coordinate: 1475764.82
X Coordinate: 1543228.93

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND with Gravel (SW); reddish brown (5YR 4/4); moist; loose; 60% sand; 40% gravel to 2cm; subangular to subrounded.			
245					Well graded SAND (SW); light brown (7.5YR 6/3); moist; loose; 90% sand; 10% gravel to 1cm; subrounded to rounded.	SW		
250					Well graded SAND (SW); light brown (7.5YR 6/3); moist; loose; 100% sand. Note: coarse to very coarse sand is predominantly pumice.			
255					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 100% medium to coarse sand. Note: coarse sand is predominantly pumice.		High Solids Bentonite Grout	New 20' connection @ 1535. Resumed drilling @ 1555.
260					Poorly graded SAND (SP); reddish brown (5YR 5/3); dry; loose; 85% fine to medium sand; 15% coarse sand.	SP		
265					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 85% fine to coarse sand; 10% very coarse sand; 5% gravel to 1.5cm; subangular to subrounded.			
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/24/2011
Date TD Reached: 5/31/2011
Date Completed: 6/3/2011

Ground Elevation AMSL (ft): 5324.3
Y Coordinate: 1475764.82
X Coordinate: 1543228.93

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Well graded SAND with Gravel (SW); moist; loose; 70% sand; 30% gravel to 8mm; angular to subrounded.	SW		Bit chatter.
275					Clayey SAND (SC); low plasticity; lense.	SC		
					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 90% medium to coarse sand; 5% gravel to 1cm; subangular; 5% clay.	SP		New 20' connection @ 1625. End of 5/25/11. Resumed drilling @ 0905 on 5/31/11.
280								
					Silty SAND with Gravel (SM); very dark brown (7.5YR 5/2); moist; loose; 65% sand; well graded; 20% gravel to 1.5cm; angular to subrounded; 15% silt; no odor.	SM		
285					Same as above (280 ft); dark brown (7.5YR 3/2).		High Solids Bentonite Grout	
290								
					Poorly graded SAND with Gravel (SP); dark brown (7.5YR 3/4); moist; loose; 80% fine to coarse sand; 20% gravel to 3.5cm; subangular to rounded.	SP		
295					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 95% fine to coarse sand; 5% gravel to 2.5cm; subangular to subrounded.			New 20' connection @ 0935. Resumed drilling @ 0945.
300								

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Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
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Project Number: 140705

Date Started: 5/24/2011
Date TD Reached: 5/31/2011
Date Completed: 6/3/2011

Ground Elevation AMSL (ft): 5324.3
Y Coordinate: 1475764.82
X Coordinate: 1543228.93

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to medium sand.			
305					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/3); moist; loose; 75% fine to very coarse sand; 25% gravel to 2.5cm; subangular to rounded.	SP		
310					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; loose; 70% fine to very coarse sand; 30% gravel to 2cm; angular to subrounded.			
315					Poorly graded GRAVEL with Sand (GP); moist; loose; 70% gravel to 2cm; angular to rounded; 30% fine to very coarse sand. Note: gravel is predominantly quartzite and feldspars.	GP	High Solids Bentonite Grout	New connection @ 1000. Resumed drilling @ 1007.
320					Poorly graded SAND (SP); brown (7.5YR 4/3); moist; loose; 100% fine to medium sand.			
325					Same as above (320 ft); 100% fine to coarse sand.	SP		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/24/2011
Date TD Reached: 5/31/2011
Date Completed: 6/3/2011

Ground Elevation AMSL (ft): 5324.3
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X Coordinate: 1543228.93

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND with Gravel (SP); moist; loose; 85% very fine to very coarse sand; 15% gravel to 1cm; subangular to subrounded.			
335					Poorly graded SAND with Gravel (SP); moist; loose; 60% medium to very coarse sand; 40% gravel to 1.7cm; subrounded to rounded.	SP		
340					Poorly graded SAND with Gravel (SP); dry; loose; 60% medium to very coarse sand; 40% gravel to 2.5cm; subangular to subrounded.			Driller added water for dust supression.
345					Clayey SAND (SC); reddish brown (5YR 4/4); moist; loose; 80% medium to coarse sand; 20% clay; low plasticity.	SC	High Solids Bentonite Grout	
350					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/3); moist; loose; 70% medium to very coarse sand; 30% gravel to 1.5cm; subangular to subrounded.	SP		
355					Poorly graded GRAVEL with Sand (GP); brown (7.5YR 4/3); moist; loose; 70% gravel to 2cm; subangular to rounded; 30% medium to very coarse sand.	GP		New 20' connection and resumed drilling @ 1043.
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

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Project Location: KAFB, Albuquerque, NM
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Project Number: 140705

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

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After Drilling: 468.74

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Drilling Method: Air Rotary Casing Hammer
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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 85% fine to medium sand; 10% very coarse sand; 5% gravel to 1.8cm; subangular.			
365					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; loose; 80% medium to very coarse sand; 20% gravel to 2.5cm; angular to subrounded.	SP		
370					Poorly graded SAND (SP); brown (7.5YR 4/3); moist; loose; 100% fine to very coarse sand.			
375					Well graded SAND (SW); brown (7.5YR 5/3); moist; loose; 100% sand.	SW	High Solids Bentonite Grout	New 20' connection @ 1055. Resumed drilling @ 1105.
380					Poorly graded SAND (SP); moist; loose; 95% medium to coarse sand; 5% gravel to 1.5cm; subangular.			
385					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/3); moist; loose; 85% fine to very coarse sand; 15% gravel to 5mm; angular to subrounded.	SP		
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 476.00
At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); brown (7.5YR 4/3); moist; loose; 100% fine to coarse sand.	SP		
395					Poorly graded SAND (SP); moist; loose; 85% fine to coarse sand; 10% very coarse sand; 5% gravel to 2.5cm; subangular to rounded.			New 20' connection @ 1125. Resumed drilling @ 1140.
400					No cuttings returned.			
405					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 85% very fine to fine sand; 15% silt.	SM	High Solids Bentonite Grout	
410					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 4/4); moist; loose; 90% very fine to fine sand; 10% silt.	SP-SM		
415					Well graded SAND (SW); brown (7.5YR 4/4); moist; loose; 100% sand.	SW		New 20' connection @ 1200. Resumed drilling @ 1310.
420								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); brown (7.5YR 4/4); moist; loose; 100% sand.	SW	High Solids Bentonite Grout	
425					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 100% fine to medium sand.	SP	Top of Bentonite Seal	
430					Well graded SAND (SW); brown (7.5YR 5/3); moist; loose; 100% sand.	SW		
435					Poorly graded GRAVEL with Sand (GP); dry; loose; 60% gravel to 2.5cm; subangular to subrounded; 40% fine to very coarse sand. Note: gravel is quartzite, quartz, feldspars, and granite.	GP		New 20' connection @ 1330. Resumed drilling @ 1335.
440					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; loose; 95% fine to very coarse sand; 5% gravel to 1cm; angular to rounded.	SP	5" Schedule 80 PVC Riser	
445					Poorly graded GRAVEL with Sand (GP); dry; loose; 70% gravel to 1.5cm; angular to rounded; 30% fine to very coarse sand.	GP		
450								

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

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At End of Drilling: Not Recorded
After Drilling: 468.74

Drillling Contractor: WDC Drilling
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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); brown (7.5YR 4/3); moist; loose; 100% medium to coarse sand.		Bentonite Seal	Hammer not firing consistently.
455					Same as above (450 ft).		Top of 20/40 Sand; Top of 10/20 Sand	New 20' connection @ 1420. Resumed drilling @ 1430.
460					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to medium sand.	SP	Top of 5" Schedule 80 PVC 0.010" Slot Screen	
465					Same as above (460 ft); brown (7.5YR 5/3).			
470					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); moist; loose; 70% sand; 30% gravel to 2cm; subangular to rounded.			
475					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); moist; loose; 85% sand; 15% gravel to 1cm; subangular to subrounded.	SW		New 20' connection @ 1450. Resumed drilling @ 1510.
480								

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Borehole ID: KAFB-106088

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
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At End of Drilling: Not Recorded
After Drilling: 468.74

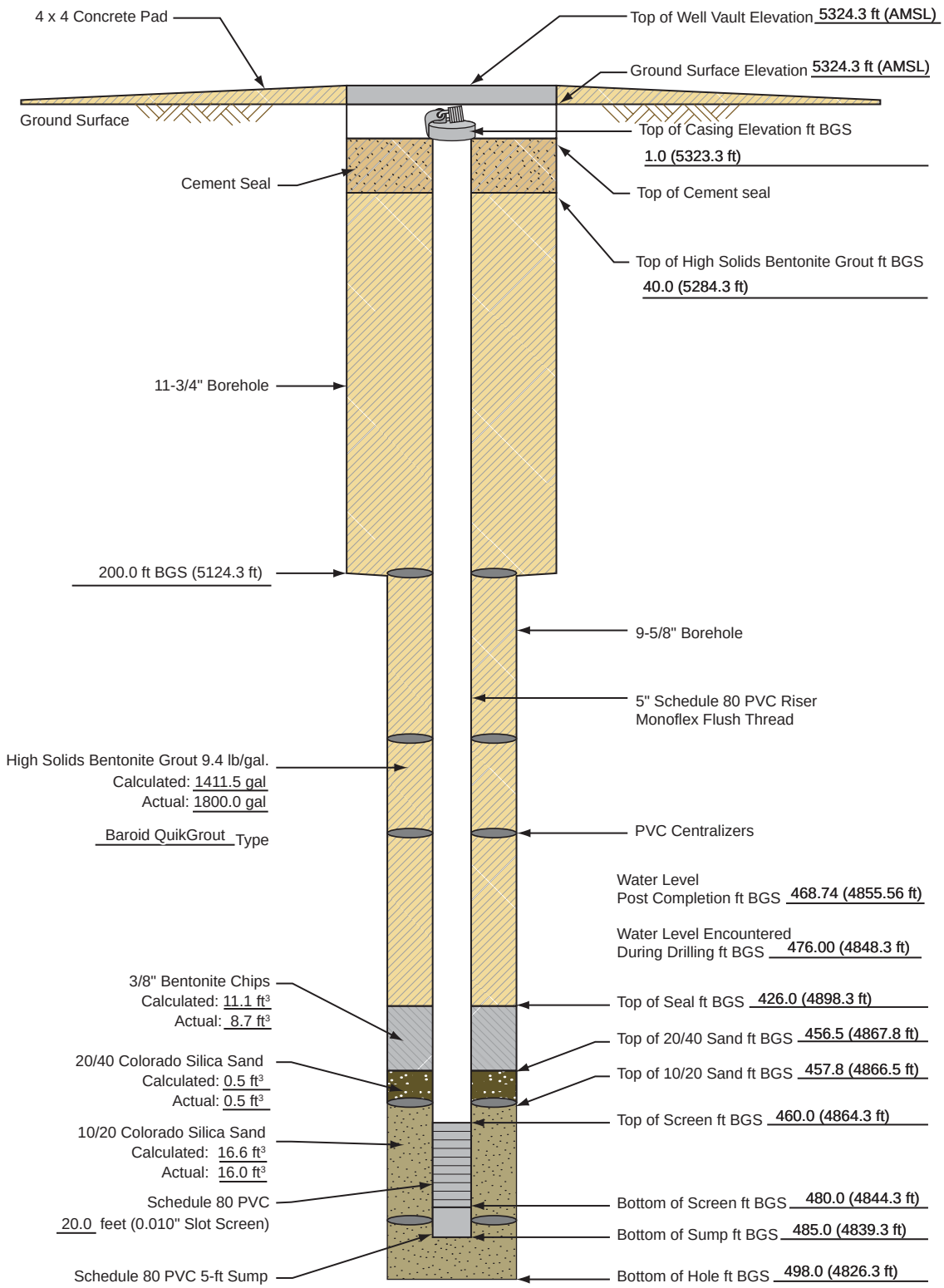
Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Poorly graded GRAVEL (GP); dry; loose; 90% gravel to 2cm; angular to subrounded; 10% very coarse sand.		Bottom of Screen Sump	
485					Poorly graded GRAVEL with Sand (GP); wet; loose; 70% gravel to 3cm; subangular to rounded; 30% coarse to very coarse sand.	GP	Bottom of Sump	
490					Poorly graded SAND with Gravel (SP); wet; loose; 70% coarse to very coarse sand; 30% gravel to 8mm; angular to subrounded.			
495					Poorly graded SAND (SP); wet; loose; 90% medium to very coarse sand; 10% gravel to 2cm; subrounded.	SP		
500								Total depth = 498 ft. Reached @ 1530 on 5/31/11. Water added during drilling (gallons) = 0
505								Water added after drilling (gallons) = 550
510								Water added during construction (gallons) = Not recorded.

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 10:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106088

Installation Start Date/Time: 6/1/2011 @ 09:00
Installation End Date/Time: 6/3/2011 @ 15:25



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106088

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106088

Personnel: V. Bracht

Date Installed: 6/2/11

Date: 6/14/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 485

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 6/14/11 - 6/15/11

Depth to Water Before Developing Well (ft. BGL): 468.8; 467.81 (TOC)

Vol. (V) Purge Factor Volume to Purge

Height of Water Column: 16.2 feet = 574.85 gal. * 1 = 574.85

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 574.85 gallons

Depth Purging From: 477 feet

Time Purging Begins: 0820, 6/15/11

Weather: Warm, Sunny, Breezy

Screened Interval (ft BGL): 460 - 480

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 550 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/14/2011	1223	467.81	5	21.60	7.53	1.656	135.00	Bailed, Muddy on Bottom, but Clears Up
6/14/2011	1240	--	50	--	--	--	--	Bailed, Water is Brown
6/14/2011	1245	--	--	--	--	--	--	Begin Swabbing
6/14/2011	1300	--	--	--	--	--	--	Stop Swabbing
6/14/2011	1320	--	100	--	--	--	--	Bailed
6/15/2011	0820	467.85	--	--	--	--	--	Begin Pumping at 4.3 GPM
6/15/2011	0825	468.60	--	20.89	7.79	1.807	53.20	Continue Pumping, Clear
6/15/2011	0835	468.60	143	22.05	7.95	1.783	6.00	Continue Pumping, Clear
6/15/2011	0845	468.67	186	22.32	8.06	1.784	2.37	Continue Pumping, Clear
6/15/2011	0855	468.68	229	22.57	8.07	1.791	1.61	Continue Pumping, Clear

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106088

Project Number: 140705

Samplers: V. Bracht

Date: 6/15/11

Checked By:

Time Start: 1223, 6/14/11

Time Finish: 1035, 6/15/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/15/2011	0905	468.68	270	22.72	8.01	1.788	1.01	Continue Pumping, Clear
6/15/2011	0915	468.69	315	23.00	8.02	1.788	0.71	Continue Pumping, Clear
6/15/2011	0925	468.71	360	23.59	8.06	1.791	2.85	Continue Pumping, Clear
6/15/2011	0935	468.71	400	23.59	8.05	1.788	1.11	Continue Pumping, Clear
6/15/2011	0945	468.72	445	24.12	8.10	1.792	1.22	Continue Pumping, Clear
6/15/2011	0955	468.73	480	21.90	7.78	1.784	1.14	Continue Pumping, Clear
6/15/2011	1005	468.73	530	21.85	7.69	1.784	2.42	Continue Pumping, Clear
6/15/2011	1015	468.73	575	22.47	7.96	1.787	1.11	Continue Pumping, Clear
6/15/2011	1025	468.72	620	22.30	7.93	1.786	0.83	Continue Pumping, Clear
6/15/2011	1035	468.72	660	22.07	7.91	1.783	0.59	Stop Pumping, Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded.			Water knifed to 6 ft.
								Note: no headspace requirement at this location.
5					No description recorded.			Began drilling @ 0920 on 5/19/11.
10					Silty SAND (SM); yellowish red (5YR 5/6); dry; loose; 65% very fine to fine sand; 5% gravel to 20mm; subrounded; 30% silt. Note: caliche coating on gravel.	SM	Cement Seal	
15					Clayey SAND (SC); reddish brown (2.5YR 4/4); moist; loose; 60% very fine to fine sand; 40% clay; nonplastic.	SC		New 20' connection @ 0940. Resumed drilling @ 0955.
20					Silty SAND with Gravel (SM); yellowish red (5YR 4/6); moist; loose; 30% fine sand; 20% medium to very coarse sand; 15% gravel to 10mm; angular to rounded; 35% silt.		Top of High Solids Bentonite Grout	
25					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 60% very fine to medium sand; 40% silt.	SM		
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
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Ground Elevation AMSL (ft): 5323.6
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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 60% very fine to medium sand; 40% silt.	SM		
35					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 60% fine to medium sand; 5% gravel to 10mm; subangular to subrounded; 35% silt.			New 20' connection @ 1005. Resumed drilling @ 1015.
40					Well graded SAND with Silt and Gravel (SW-SM); moist; loose; 70% sand; 20% gravel to 15mm; angular to subrounded; 10% silt.	SW-SM		
45					Clayey SAND (SC); yellowish red (5YR 4/6); moist; loose; 55% very fine to medium sand; 5% very coarse sand; 30% clay; 10% silt; nonplastic.	SC	High Solids Bentonite Grout	
50					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 55% very fine to fine sand; 45% silt.	SM		
55					Clayey SAND with Gravel (SC); yellowish red (5YR 5/6); moist; loose; 70% sand; well graded; 15% gravel to 10mm; angular to subangular; 15% clay; nonplastic.	SC		New 20' connection @ 1030. Resumed drilling @ 1040.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Clayey SAND (SC); reddish brown (5YR 4/4); moist; loose; 55% very fine to medium sand; 45% clay; low plasticity.			
65					Clayey SAND (SC); reddish brown (5YR 4/3); moist; loose; 50% very fine to medium sand; 5% gravel to 12mm; angular to rounded; 30% clay; 15% silt; low plasticity.	SC		
70					Silty SAND (SM); yellowish red (5YR 5/6); moist; loose; 50% very fine to medium sand; 10% very coarse sand; 40% silt.			
75					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 50% fine to medium sand; 10% coarse to very coarse sand; 30% silt; 10% clay.		High Solids Bentonite Grout	New 20' connection @ 1055. Resumed drilling @ 1100.
80					Same as above (75 ft).	SM		
85					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 60% very fine to very coarse sand; 10% gravel to 10mm; angular to subangular; 30% silt.			
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Silty SAND with Gravel (SM); brown (7.5YR 4/4); moist; loose; 55% very fine to very coarse sand; 15% gravel to 25mm; angular to subrounded; 30% silt.			
95					Silty SAND (SM); strong brown (7.5YR 5/6); moist; loose; 70% very fine to fine sand; 30% silt.			New 20' connection and resumed drilling @ 1115.
100					Silty SAND (SM); strong brown (7.5YR 5/6); moist; loose; 67% very fine to fine sand; 3% gravel to 10mm; angular to subangular; 30% silt.	SM		
105					Same as above (100 ft); rounded gravel.		High Solids Bentonite Grout	
110					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 4/4); moist; loose; 80% very fine to coarse sand; 10% gravel to 5mm; angular to subrounded; 10% silt.			
115					Same as above (110 ft).	SP-SM		New 20' connection @ 1125. Resumed drilling @ 1135.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 50% very fine to coarse sand; 5% gravel to 5mm; subangular to subrounded; 30% clay; 15% silt.	SC		
125					Silty SAND (SM); strong brown (7.5YR 4/6); moist; loose; 67% very fine to fine sand; 3% gravel to 15mm; rounded; 30% silt.	SM		
130					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 55% fine to medium sand; trace gravel; 35% silt; 10% clay.	SM		
135					Same as above (130 ft).	SM	High Solids Bentonite Grout	New 20' connection @ 1150. Resumed drilling @ 1155.
140					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to coarse sand.	SP		
145					Clayey SAND with Gravel (SC); brown (7.5YR 4/3); moist; loose; 60% fine to coarse sand; 15% gravel to 15mm; subrounded to rounded; 25% clay; low to medium plasticity. Note: gravel is predominantly pumice.	SC		
150								

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Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
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Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					No cuttings returned.			
155					No cuttings returned.			Cleaned out cyclone @ 1210. New 20' connection and resumed drilling @ 1220.
160					No cuttings returned.			Cleaned out cyclone and hose.
165					No cuttings returned.		High Solids Bentonite Grout	
170					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/3); moist; loose; 85% fine to very coarse sand; 15% gravel to 10mm; subangular to rounded.			
175					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 100% fine to coarse sand.	SP		New 20' connection @ 1315. Resumed drilling @ 1350.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND with Gravel (SP); moist; loose; 70% fine to coarse sand; 10% very coarse sand; 20% gravel to 10mm; angular to subrounded.			
185					Poorly graded SAND (SP); moist; loose; 80% fine to coarse sand; 10% very coarse sand; 10% gravel to 8mm; subangular to subrounded.	SP		
190					No cuttings returned.			Cuttings packed in behind bit.
195					No cuttings returned.		High Solids Bentonite Grout	Cyclone clogged.
200					Poorly graded SAND (SP); moist; loose; 100% medium to coarse sand.	SP		End of 5/19/11. Total depth with 11-3/4" casing. Resumed drilling with 9-5/8" casing @ 1005 on 5/20/11. Rachel Daly, geologist, started logging.
205					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 90% fine to very coarse sand; 10% fine gravel; subrounded; no odor.	SW		
					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; loose; 90% medium sand; 10% coarse	SP		
210						SW		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					sand; subrounded; no odor.			
					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 100% very fine to very coarse sand; subrounded; no odor.	SW		
					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); 95% fine to medium sand; 5% coarse sand; subrounded; no odor.	SP		Kelly down @ 1021. Resumed drilling @ 1030.
215								
220								
					Well graded SAND with Clay (SW-SC); brown (10YR 4/3); moist; loose; 85% fine to very coarse sand; 5% gravel to 5mm; subrounded; 10% clay nodules; no odor.	SW-SC		
225							High Solids Bentonite Grout	
					Poorly graded SAND with Gravel (SP); brown (10YR 4/3); moist; loose; 80% fine to medium sand; 5% coarse sand; 15% gravel to 2cm; subrounded; no odor.	SP		
230								
					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 95% fine to very coarse sand; 5% gravel to 1.5cm; subrounded; no odor.			
235					Same as above (230 ft).	SW		Kelly down @ 1044. Resumed drilling @ 1050.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
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Ground Elevation AMSL (ft): 5323.6
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X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); gray (10YR 5/1); dry; loose; 100% fine to coarse sand; subrounded; no odor.	SW		
245					Same as above (240 ft).			
250					Poorly graded SAND (SP); brown (10YR 5/3); moist; loose; 95% fine to medium sand; 5% coarse sand; rounded; no odor.	SP		
255					Same as above (247 ft).		High Solids Bentonite Grout	Kelly down @ 1058. Resumed drilling @ 1106.
260					Same as above (247 ft).			
265					Same as above (247 ft).			
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

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Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
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At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Lean CLAY with Sand (CL); dark grayish brown (10YR 4/2); moist; soft; low to medium plasticity; 85% clay; 10% fine to coarse sand; 5% gravel to 1cm; subrounded; no odor.	CL		
275					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; loose; 90% fine to medium sand; 10% coarse sand; subrounded; no odor.	SP		Kelly down @ 1117. Resumed drilling @ 1143.
280					Well graded SAND (SW); dark grayish brown (10YR 4/2); moist; loose; 100% very fine to very coarse sand; trace gravel to 5mm; subrounded; no odor.	SW		
285					Same as above (280 ft).		High Solids Bentonite Grout	
290					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 95% fine to medium sand; 5% gravel to 2cm; subrounded; no odor.	SP		
295					Well graded SAND with Gravel (SW); brown (10YR 4/3); moist; loose; 85% very fine to very coarse sand; 15% fine gravel to 1cm; subrounded; no odor.	SW		Kelly down @ 1150. Resumed drilling @ 1157.
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; loose; 85% very fine to very coarse sand; 15% gravel to 1cm; subrounded; no odor.	SW		
305					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 100% fine to very coarse sand; trace gravel to 1cm; subrounded.	SW		
310					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; loose; 80% fine to very coarse sand; 20% gravel to 1cm; subrounded; no odor.	SW		
315					Same as above (310 ft); 60% fine to very coarse sand; 40% gravel.	SW	High Solids Bentonite Grout	Kelly down @ 1205. Resumed drilling @ 1214.
320					Poorly graded SAND with Gravel (SP); dark grayish brown (10YR 4/2); moist; loose; 85% fine to medium sand; 15% gravel to 2cm; subangular; no odor.	SP		
325					Well graded SAND (SW); brown (10YR 4/3); moist; dense; 90% fine to very coarse sand; 10% gravel to 2cm; subrounded; no odor.	SW		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND (SW); brown (10YR 4/3); moist; dense; 100% fine to coarse sand; no odor.	SW		
335					Poorly graded SAND (SP); brown (10YR 4/3); moist; dense; 90% fine to medium sand; 10% coarse sand; rounded; no odor.	SP		Kelly down @ 1224. Resumed drilling @ 1335.
340					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 95% fine to medium sand; 5% coarse sand; subrounded; no odor.	SP		
345					Well graded SAND (SW); brown (10YR 4/3); moist; dense; 100% fine to very coarse sand; trace gravel; subrounded; no odor.	SW	High Solids Bentonite Grout	
350					Same as above (345 ft); 95% sand; 5% gravel.	SW		
355					Well graded GRAVEL with Sand (GW); gray (10YR 5/1); dry; loose; 80% gravel to 2cm; subrounded; 20% coarse sand; no odor.	GW		Kelly down @ 1350. Resumed drilling @ 1357.
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded GRAVEL with Sand (GW); gray (10YR 5/1); dry; loose; 60% gravel to 1cm; subrounded; 40% coarse sand; no odor.	GW		Driller added water to prevent sandlock.
365					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 95% fine to very coarse sand; 5% fine gravel to 5mm; subrounded; no odor.	SW		Driller added water to prevent sandlock.
370					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 90% fine to medium sand; 10% coarse sand; trace gravel; subrounded; no odor.	SP		
375					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 95% fine to very coarse sand; 5% fine gravel to 5mm; subrounded; no odor.	SW	High Solids Bentonite Grout	Kelly down @ 1415. Resumed drilling @ 1425.
380					Same as above (375 ft).			
385					Poorly graded GRAVEL with Sand (GP); dark grayish brown (10YR 4/2); moist; dense; 80% fine gravel to 1cm; 20% fine to very coarse sand; subrounded; no odor.	GP		
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); brown (10YR 4/4); moist; dense; 100% fine to very coarse sand; trace gravel to 1cm; subrounded; no odor.			
395					Same as above (390 ft).	SW		Kelly down @ 1442. Resumed drilling @ 1450.
400					Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 95% fine to medium sand; 5% coarse sand; rounded; no odor.			
405					Same as above (400 ft).		High Solids Bentonite Grout	
410					Same as above (400 ft).	SP		
415					Same as above (400 ft); 90% fine to medium sand; 10% coarse sand.			Kelly down @ 1510. Resumed drilling @ 1515.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 90% fine to medium sand; 10% coarse sand; subrounded; no odor.			
425					Same as above (420 ft).	SP		
430					Well graded SAND (SW); brown (10YR 5/3); moist; dense; 100% fine to coarse sand; subrounded; no odor.			
435					Same as above (430 ft).	SW	High Solids Bentonite Grout	Kelly down @ 1535. Resumed drilling @ 1545.
440					Same as above (430 ft).			
445					Poorly graded SAND (SP); grayish brown (10YR 5/2); moist; dense; 90% fine to medium sand; 10% coarse sand; subrounded; no odor.	SP	Top of Bentonite Seal	
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); grayish brown (10YR 5/2); moist; dense; 90% fine to medium sand; 10% coarse sand; subrounded; no odor.			
455					Same as above (450 ft).		Bentonite Seal	Kelly down @ 1600. Resumed drilling @ 1615.
460					Same as above (450 ft).	SP		
465					Same as above (450 ft).		5" Schedule 80 PVC Riser	
470								
					Well graded SAND (SW); brown (10YR 4/3); moist; dense; 100% very fine to very coarse sand; subrounded; no odor.	SW		
475					Same as above (470 ft).			Kelly down @ 1649. End of 5/20/11. Resumed drilling @ 0830 on 5/21/11.
					Poorly graded GRAVEL (GP); gray (10YR 5/1); moist; loose; 100% gravel to 3cm; rounded; no odor.	GP	Top of 20/40 Sand Top of 10/20 Sand	
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded GRAVEL with Sand (GW); brown (10YR 4/3); wet; loose; 60% gravel to 1.5cm; subrounded; 40% coarse to very coarse sand; no odor.		Top of 5" Schedule 80 PVC 0.010" Slot Screen	
485					Same as above (480 ft).	GW		
490					Well graded SAND (SW); brown (10YR 4/3); wet; dense; 100% very fine to very coarse sand; subrounded; no odor.	SW		
495					Well graded GRAVEL (GW); brown (10YR 4/3); wet; loose; 90% gravel to 1.5cm; rounded; 10% coarse sand; no odor.	GW	Bottom of Screen Sump	Kelly down @ 0858. Resumed drilling @ 0919.
500					Well graded SAND with Gravel (SW); brown (10YR 4/3); wet; dense; 80% fine to very coarse sand; 20% gravel to 1.5cm; subrounded; no odor.	SW	Bottom of Sump	
505					Poorly graded GRAVEL (GP); brown (10YR 4/3); wet; loose; 90% gravel to 4cm; subrounded; 10% medium sand; no odor.	GP		
510					Well graded SAND (SW); brown (10YR 4/3); wet; dense; 95% fine to very coarse sand; 5% gravel to 1.5cm; subrounded.	SW		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106089

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/19/2011
Date TD Reached: 5/21/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5323.6
Y Coordinate: 1475796.39
X Coordinate: 1543221.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 447.50
At End of Drilling: Not Recorded
After Drilling: 468.28

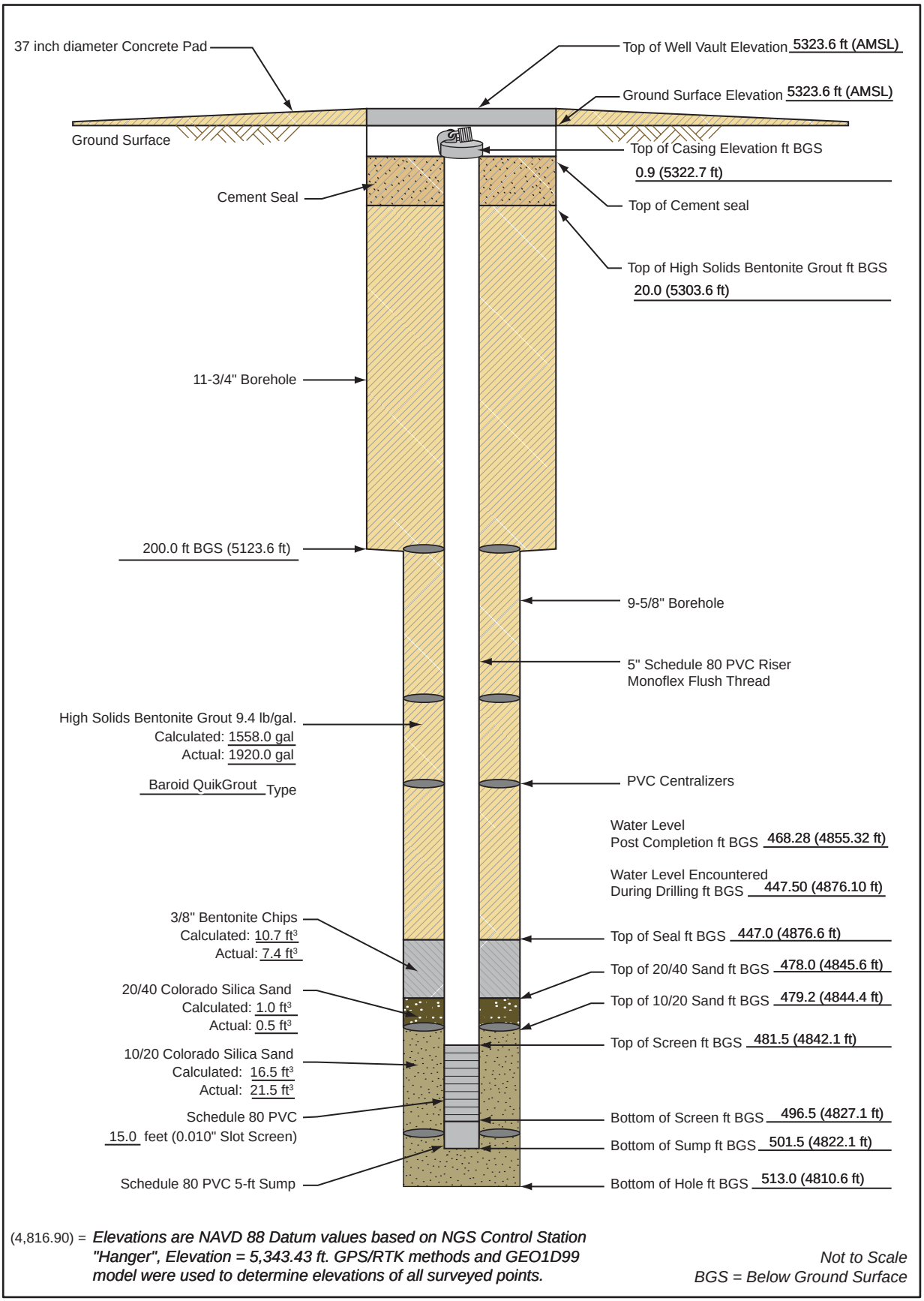
Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye/Rachel Daly

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Well graded SAND (SW); brown (10YR 4/3); wet; dense; 95% fine to very coarse sand; 5% gravel to 1.5cm; subrounded.	SW	Bottom of Filter Pack	
515					Same as above (510 ft).		Native Backfill	
520								Total depth = 518 ft. Reached @ 0919 on 5/21/11.
525								Water added during drilling (gallons) = Not reocrded
530								Water added after drilling (gallons) = 800
535								Water added during construction (gallons) = Not recorded
540								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:42 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106089

Installation Start Date/Time: 5/21/2011 @ 12:00
Installation End Date/Time: 5/23/2011 @ 11:00



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106089

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106089

Personnel: V. Bracht

Date Installed: 5/23/11

Date: 6/15/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 501.5

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 6/15/11 - 6/16/11

Depth to Water Before Developing Well (ft. BGL): 468.54; 467.57 (TOC)

				Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column:	32.96	feet	=	855.10	gal.	* 1	=	855.10

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2-r_c^2) * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 855.10 gallons

Depth Purging From: 493.3 feet

Time Purging Begins: 1450, 6/15/11

Weather: Sunny, Breezy, Warm

Screened Interval (ft BGL): 481.5 - 496.5

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 800 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/15/2011	0845	467.57	5	21.67	7.97	1.714	117.00	Begin Bailing, Water is Cloudy
6/15/2011	0855	--	50	--	--	--	--	Stop Bailing
6/15/2011	0857	--	--	--	--	--	--	Begin Swabbing
6/15/2011	0905	--	--	--	--	--	--	Stop Swabbing
6/15/2011	0920	--	75	20.42	8.11	1.719	Out of Range	Continue Bailing, Light Brown
6/15/2011	0935	--	150	20.44	7.91	1.685	Out of Range	Continue Bailing, Light Brown
6/15/2011	0955	--	250	20.68	7.85	1.672	>1000	Bailed, Cloudy
6/15/2011	1450	467.52	--	--	--	--	--	Pump On at 4.8 GPM
6/15/2011	1455	Problems w/tape	300	32.50	7.74	1.702	51.90	Continue Pumping, Cloudy
6/15/2011	1505	Problems w/tape	350	33.43	6.84	1.670	66.30	Continue Pumping, Cloudy

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106089

Project Number: 140705

Samplers: V. Bracht

Date: 6/15/11

Checked By:

Time Start: 0845, 6/15/11

Time Finish: 0935, 6/16/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/15/2011	1515	Problems w/tape	390	23.84	6.07	1.649	2.63	Continue Pumping, Clear
6/15/2011	1518	Problems w/tape	440	--	--	--	--	Pump Off, Attempt to Free Tape that is Stuck
6/15/2011	1545	Problems w/tape	--	--	--	--	--	Pump On, Tape is Still Stuck
6/15/2011	1550	Problems w/tape	--	23.44	7.86	1.655	3.07	Continue Pumping, Clear
6/15/2011	1600	Problems w/tape	490	25.26	7.07	1.654	12.80	Continue Pumping, Slightly Cloudy
6/15/2011	1610	Problems w/tape	538	23.44	7.15	1.651	11.30	Continue Pumping, Fairly Clear
6/15/2011	1620	Problems w/tape	586	23.64	7.16	1.653	0.94	Pump Off, Clear
6/16/2011	0830	467.55	--	--	--	--	--	Pump On at 5 GPM
6/16/2011	0835	468.29	--	21.53	7.57	1.655	6.15	Continue Pumping, Clear
6/16/2011	0845	468.30	640	22.35	7.53	1.654	3.64	Continue Pumping, Clear
6/16/2011	0855	468.30	690	24.51	7.74	1.670	1.89	Continue Pumping, Clear
6/16/2011	0905	468.31	740	23.30	7.76	1.643	0.85	Continue Pumping, Clear
6/16/2011	0915	468.31	790	24.00	7.90	1.649	0.75	Continue Pumping, Clear
6/16/2011	0925	468.32	840	23.44	7.97	1.654	0.64	Continue Pumping, Clear
6/16/2011	0935	468.32	890	23.38	7.90	1.645	0.58	Pump Off, Clear, Total Removed

Was well sampled after development? YES ____ NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND with Gravel (SM); red (2.5YR 4/6); moist; loose; 50% very fine to coarse sand; 20% gravel to 15mm; angular to subangular; 30% silt.	SM	Top of High Solids Bentonite Grout	End of 5/12/11 @ 1700. Resumed drilling @ 0830 on 5/13/11. Cleaned out casing hammer @ 0835. New 20' connection and resumed drilling @ 0915.
35					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 50% very fine to medium sand; 10% coarse sand; 5% gravel to 5mm; subangular; 35% silt.			
40					Well graded SAND with Silt and Gravel (SW-SM); moist; loose; 75% sand; 15% gravel to 10mm; angular to subrounded; 10% silt.	SW-SM		
45					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 55% very fine to medium sand; 5% coarse sand; 40% silt.	SM		
50					Silty SAND (SM); dark reddish brown (5YR 3/3); moist; loose; 55% very fine to medium sand; 5% gravel to 8mm; subrounded to rounded; 40% silt.			
55					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 60% very fine to medium sand; 10% coarse sand; trace gravel to 5mm; 30% silt.			New 20' connection @ 0930. Resumed drilling @ 0935.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 65% very fine to medium sand; 5% coarse sand; 25% silt; 5% clay.			
65					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 57% very fine to medium sand; 10% coarse sand; 3% gravel to 5mm; subrounded to rounded; 30% silt.			
70					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 80% fine to medium sand; 20% silt.			
75					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 50% very fine to medium sand; 10% coarse sand; 40% silt.	SM	High Solids Bentonite Grout	New 20' connection @ 0950. Resumed drilling @ 1005.
80					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 85% very fine to medium sand; 15% silt.			
85					Silty SAND (SM); strong brown (7.5YR 4/6); moist; loose; 65% fine to medium sand; 10% coarse sand; 5% gravel to 8mm; subangular to rounded; 20% silt.			
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Silty SAND (SM); strong brown (7.5YR 4/6); moist; loose; 40% very fine to medium sand; 10% coarse sand; 10% gravel to 10mm; angular to subrounded; 30% silt; 10% clay.			
95					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 60% very fine to fine sand; 40% silt.	SM		New 20' connection @ 1015. Resumed drilling @ 1022.
100					Silty SAND (SM); strong brown (7.5YR 5/6); moist; loose; 85% fine to medium sand; 15% silt.			
105					Clayey SAND (SC); yellowish red (5YR 4/6); moist; loose; 80% fine to coarse sand; 5% gravel to 5mm; subrounded; 15% clay; nonplastic.	SC	High Solids Bentonite Grout	
110					Well graded SAND with Clay (SW-SC); reddish brown (5YR 4/4); moist; loose; 90% sand; 10% clay; nonplastic.	SW-SC		
115					Poorly graded SAND with Clay (SP-SC); reddish brown (5YR 4/4); moist; loose; 85% fine to coarse sand; 5% gravel to 10mm; subangular to rounded; 10% clay; nonplastic.	SP-SC		New 20' connection @ 1040. Cleaned out cyclone @ 1047. Resumed drilling @ 1055.
120								

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Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					No cuttings returned.			
125					Silty SAND (SM); yellowish red (5YR 5/6); moist; loose; 80% very fine to fine sand; 5% coarse sand; 15% silt.			
130					Silty SAND (SM); strong brown (7.5YR 5/6); moist; loose; 60% very fine to fine sand; 40% silt.	SM		
135					No description recorded.		High Solids Bentonite Grout	Geologist decided sample was not representative; very low air flow. New 20' connection @ 1120. Resumed drilling @ 1130. Rig lost hydraulic power @1135. Resumed drilling @ 1200.
140					Well graded SAND with Clay and Gravel (SW-SC); brown (7.5YR 5/4); moist; loose; 70% sand; 20% gravel to 10mm; subrounded to rounded; 10% clay.	SW-SC		
145					No cuttings returned.			
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					No cuttings returned.			Cyclone hose clogged.
155					Poorly graded SAND with Clay and Gravel (SP-SC); brown (7.5YR 5/4); moist; loose; 70% very fine to very coarse sand; 20% gravel to 5mm; angular to subrounded; 10% clay.	SP-SC		New 20' connection @ 1220. Resumed drilling @ 1230.
160					Well graded SAND with Gravel (SW); brown (7.5YR 5/6); moist; loose; 80% sand; 15% gravel to 10mm; subrounded to rounded; 5% clay. Note: contains pumice fragments.	SW		
165					Poorly graded SAND (SP); brown (7.5YR 5/6); moist; loose; 100% very fine to very coarse sand. Note: contains pumice fragments.	SP	High Solids Bentonite Grout	
170					Same as above (165 ft).			
175					Well graded SAND with Gravel (SW); brown (7.5YR 5/6); moist; loose; 80% sand; 20% gravel to 10mm; subangular to rounded.	SW		New 20' connection @ 1245. Resumed drilling @ 1253.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; loose; 100% fine to medium sand.	SP		
185					Well graded SAND with Gravel (SW); moist; loose; 85% sand; 15% gravel to 8mm; rounded to well rounded. Note: gravel is predominantly pumice.	SW		
190					No cuttings returned.			Cyclone hose clogged.
195					No cuttings returned.		High Solids Bentonite Grout	Cyclone hose clogged. New 20' connection and resumed drilling @ 1435.
200					Well graded SAND with Gravel (SW); dry; loose; 85% sand; 15% gravel to 8mm; subangular to subrounded.			End of 5/13/11 @ 1450. Resumed drilling @ 0945 on 5/14/11.
205					Same as above (200 ft).	SW		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 90% fine to very coarse sand; 10% gravel to 10mm; subrounded. Note: contains pumice fragments.			
215					Same as above (210 ft).	SP		New 20' connection @ 1000. Resumed drilling @ 1010.
220					Well graded SAND with Gravel (SW); moist; loose; 60% sand; 40% gravel to 25mm; subangular to subrounded; well graded. Note: gravel is composed of quartzite, pumice, basalt, and chert.	SW		
225					Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; loose; 100% fine to coarse sand.		High Solids Bentonite Grout	
230					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/3); moist; loose; 85% fine to very coarse sand; 15% gravel to 10mm; angular to subrounded.	SP		
235					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 90% fine to very coarse sand; 10% gravel to 10mm; subangular to subrounded.			New 20' connection @ 1020. Resumed drilling @ 1027.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); dry; loose; 85% medium to very coarse sand; 15% gravel to 10mm; subangular to subrounded.			
245					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; loose; 60% medium to very coarse sand; 40% gravel to 25mm; subrounded to rounded. Note: gravel is composed of quartzite, felsic pegmatite, chert, and volcanics.			Driller added water to cyclone for dust suppression.
250					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 100% medium to coarse sand; well sorted.	SP		
255					Same as above (250 ft); 100% fine to coarse sand.		High Solids Bentonite Grout	New 20' connection @ 1038. Resumed drilling @ 1046.
260					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 100% medium to very coarse sand; trace gravel to 4mm.			
265					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 90% medium to very coarse sand; 10% gravel to 20mm; angular to subrounded.			
270					Clayey SAND (SC); reddish brown (5YR 4/3); moist; dense; 60% fine to very coarse sand; 40% clay; low plasticity.	SC		

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Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Clayey SAND (SC); reddish brown (5YR 4/3); moist; dense; 60% fine to very coarse sand; 40% clay; low plasticity.			
275					Clayey SAND with Gravel (SC); reddish brown (5YR 4/3); moist; dense; 40% sand; well graded; 30% gravel to 15mm; subrounded to rounded; 30% clay; low plasticity.			New 20' connection @ 1100. Resumed drilling @ 1110.
280					Clayey SAND with Gravel (SC); moist; medium dense; 50% sand; well graded; 20% gravel to 5mm; subangular to rounded; 30% clay; low plasticity.			
285					Clayey SAND with Gravel (SC); dark reddish gray (5YR 4/2); moist; medium dense; 40% sand; well graded; 30% gravel to 15mm; subangular to subrounded; 30% clay; medium plasticity.	SC	High Solids Bentonite Grout	
290					Clayey SAND (SC); reddish brown (5YR 4/3); moist; loose; 65% fine to medium sand; 15% coarse sand; 20% clay; medium plasticity.			
295					Clayey SAND with Gravel (SC); moist; loose; 60% sand; well graded; 20% gravel to 20mm; subangular to rounded; 20% clay; low to medium plasticity.			New 20' connection @ 1115. Resumed drilling @ 1120.
300								

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Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
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Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 85% fine to coarse sand; 5% very coarse sand; 10% gravel to 20mm; subangular to subrounded.			
305					Same as above (300 ft).	SP		
310					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; loose; 70% fine to very coarse sand; 30% gravel to 20mm; subangular to subrounded.			
315					Clayey SAND with Gravel (SC); brown (7.5YR 4/4); moist; loose; 50% sand; well graded; 30% gravel to 10mm; angular to subrounded; 20% clay; nonplastic.	SC	High Solids Bentonite Grout	New 20' connection @ 1130. Resumed drilling @ 1135.
320					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); dry; loose; 85% medium to coarse sand; 15% gravel to 25mm; subangular to subrounded.	SP		
325					Poorly graded GRAVEL with Sand (GP); brown (7.5YR 4/3); moist; loose; 70% gravel to 25mm; subangular to rounded; 30% sand; well graded. Note: gravel is composed of quartzite and granite.	GP		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
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Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330								
					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); moist; loose; 85% sand; 15% gravel to 5mm; subrounded to rounded.	SW		
335								
					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 95% medium to very coarse sand; 5% gravel to 25mm; subrounded.	SP		New 20' connection and resumed drilling @ 1150.
340								
					Clayey SAND with Gravel (SC); dark brown (7.5YR 3/3); moist; loose; 55% sand; well graded; 30% gravel to 15mm; angular to rounded; 15% clay.	SC		
345								
					Well graded SAND with Gravel (SW); moist; loose; 85% sand; 15% gravel to 5mm; subangular to rounded.	SW	High Solids Bentonite Grout	
350								
					Poorly graded SAND (SP); strong brown (7.5YR 4/6); moist; medium dense; 100% medium to very coarse sand.	SP		
355								
					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 90% medium to very coarse sand; 10% gravel to 25mm; subrounded to rounded.			New 20' connection @ 1205. Resumed drilling @ 1255.
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
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Ground Elevation AMSL (ft): 5322.9
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X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); dry; medium dense; 85% fine to very coarse sand; 15% gravel to 8mm; angular to subrounded.	SP		Driller added water to cyclone for dust suppression.
365					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; medium dense; 75% medium to coarse sand; 10% very coarse sand; 15% gravel to 20mm; subangular to rounded.			
370					Well graded SAND with Gravel (SW); moist; medium dense; 85% sand; 15% gravel to 5mm; subrounded to rounded.	SW		
375					Poorly graded SAND with Gravel (SP); dark brown (7.5YR 3/3); moist; medium dense; 80% medium to very coarse sand; 20% gravel to 25mm; subangular to subrounded.	SP	High Solids Bentonite Grout	New 20' connection @ 1315. Resumed drilling @ 1327.
380					Well graded SAND (SW); brown (7.5YR 4/4); dry; medium dense; 100% sand.	SW		
385					Well graded SAND with Silt and Gravel (SW-SM); dark brown (7.5YR 3/4); dry; dense; 75% sand; 15% gravel to 8mm; angular to subrounded; 10% silt.	SW-SM		
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND with Silt and Gravel (SW-SM); dark brown (7.5YR 3/4); dry; dense; 75% sand; 15% gravel to 8mm; angular to subrounded; 10% silt.	SW-SM		Rig chatter, advancing very slowly.
395					No cuttings returned.			New 20' connection @ 1345. Resumed drilling @ 1435.
400					Silty SAND (SM); brown (7.5YR 4/4); moist; medium dense; 60% fine to medium sand; 40% silt.	SM		
405					Poorly graded SAND with Clay (SP-SC); strong brown (7.5YR 4/6); moist; medium dense; 90% fine to medium sand; 10% clay; low plasticity.	SP-SC	High Solids Bentonite Grout	
410					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; medium dense; 95% very fine to coarse sand; 5% clay; low plasticity.	SP		
415					Clayey SAND (SC); brown (7.5YR 4/4); moist; medium dense; 70% sand; well graded; 30% clay; low plasticity.	SC		New 20' connection @ 1450. Resumed drilling @ 1515.
420								

Borehole ID: KAFB-106090

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Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND with Gravel (SP); strong brown (7.5YR 4/6); moist; medium dense; 75% fine to coarse sand; 10% very coarse sand; 15% gravel to 8mm; subrounded.			
425					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; medium dense; 100% fine to very coarse sand.			
430					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; dense; 80% fine to very coarse sand; 20% gravel to 10mm; angular to subrounded.	SP		
435					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; dense; 100% fine to very coarse sand.		High Solids Bentonite Grout	New 20' connection and resumed drilling @ 1550.
440					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; dense; 90% very fine to very coarse sand; 10% gravel to 10mm; subangular to rounded.			
445					Clayey SAND with Gravel (SC); brown (7.5YR 4/3); moist; dense; 70% sand; well graded; 15% gravel to 10mm; angular to rounded; 15% clay.	SC		
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					No cuttings returned.			Driller added water to remove blockage.
455					Silty SAND (SM); brown (7.5YR 4/4); damp; dense; 80% fine to medium sand; 20% silt.	SM		End of 5/14/11 @ 1615. New 20' connection and resumed drilling @ 0845.
460					Clayey SAND (SC); strong brown (7.5YR 4/6); moist; dense; 85% fine to medium sand; 15% clay; non to low plasticity.	SC		
465					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; dense; 95% medium to very coarse sand; 5% gravel to 8mm; subrounded to rounded.	SP	High Solids Bentonite Grout	
470					Poorly graded SAND (SP); strong brown (7.5YR 4/6); moist to damp; 90% fine to very coarse sand; 10% gravel to 10mm; angular to subrounded.			
475					Well graded SAND with Gravel (SW); dark brown (7.5YR 3/4); moist to damp; 85% sand; 15% gravel to 5mm; angular to subrounded.	SW		New 20' connection @ 0905. Resumed drilling @ 1020.
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Poorly graded GRAVEL with Sand (GP); damp; dense; 85% gravel to 25mm; angular to subrounded; 15% medium to very coarse sand. Note: gravel is composed of quartzite, pegmatitic and granitic clasts, and volcanics.			Cuttings are damp, but not saturated.
485					Poorly graded GRAVEL (GP); wet; dense; 100% gravel to 15mm; angular to subangular. Note: gravel is composed of quartzite, pegmatitic and granitic clasts, and volcanics.	GP		
490					Poorly graded GRAVEL with Sand (GP); wet; dense; 55% gravel to 10mm; angular to subrounded; 45% coarse to very coarse sand.			
495					Poorly graded SAND with Gravel (SP); wet; dense; 55% medium to very coarse sand; 45% gravel to 12mm; subangular to subrounded; well graded.	SP	High Solids Bentonite Grout	New 20' connection @ 1055. Resumed drilling @ 1100.
500					Poorly graded GRAVEL with Sand (GP); wet; dense; 60% gravel to 30mm; subrounded to rounded; 40% sand; well graded.			
505					Poorly graded GRAVEL with Sand (GP); dark brown (7.5YR 3/3); wet; dense; 70% gravel to 20mm; subangular to rounded; 30% sand; well graded.	GP		
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/6/11 09:34 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					No cuttings returned.		Top of Bentonite Seal	Cyclone hose clogged. Once cleared, silty sand was observed.
515					Poorly graded SAND (SP); brown (7.5YR 4/4); damp; dense; 100% medium to very coarse sand.	SP		New 20' connection @ 1135. Resumed drilling @ 1145.
520					Same as above (515 ft).			
					Silty SAND (SM); lense.	SM		
525					Poorly graded SAND (SP); brown (7.5YR 4/4); damp; dense; 100% medium to very coarse sand.	SP		
530					No cuttings returned.			Cyclone hose clogged. Once cleared, clayey sand was observed.
535					Clayey SAND (SC); brown (7.5YR 4/4); wet; dense; 70% fine to coarse sand; 30% clay; nonplastic.	SC	5" Schedule 80 PVC Riser	
540					Poorly graded SAND (SP); wet; dense; 97% medium to very coarse sand; 3% gravel to 12mm; subangular to subrounded.	SP		New connection and resumed drilling @ 1320.

Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 4/3); saturated; dense; 85% very fine to fine sand; 5% gravel to 10mm; subrounded; 10% silt.	SP-SM		
545					Poorly graded GRAVEL with Sand (GP); wet; dense; 80% gravel to 25mm; angular to subrounded; 20% medium to very coarse sand. Note: gravel is composed of quartz, quartzite; feldspar; and chert.	GP	Bentonite Seal	Drive head split @ 1330. Repaired and resumed drilling @ 1425.
550					No cuttings returned.		Top of 20/40 Sand Top of 10/20 Sand	
555					Poorly graded SAND with Gravel (SP); strong brown (7.5YR 4/6); wet; dense; 70% medium to very coarse sand; 30% gravel to 20mm; subrounded to rounded.	SP	Top of 5" Schedule 80 PVC 0.010" Slot Screen	
560					Poorly graded SAND with Gravel (SP); saturated; dense; 55% medium to very coarse sand; 45% gravel to 15mm; angular to rounded; well graded.			
565					Poorly graded SAND with Gravel (SP); saturated; dense; 75% fine to coarse sand; 10% very coarse sand; 15% gravel to 10mm; angular to subrounded.			
570								

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Borehole ID: KAFB-106090

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/12/2011
Date TD Reached: 5/16/2011
Date Completed: 5/23/2011

Ground Elevation AMSL (ft): 5322.9
Y Coordinate: 1475824.28
X Coordinate: 1543216.11

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 467.00
At End of Drilling: Not Recorded
After Drilling: 466.54

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
570					Poorly graded GRAVEL with Sand (GP); wet; dense; 80% gravel to 15mm; angular to subrounded; 20% coarse to very coarse sand.	GP	Bottom of Screen; Sump	
575					No cuttings returned.		Bottom of Sump; Bottom of Filter Pack	
580					Well graded SAND with Gravel (SW); saturated; dense; 80% sand; 20% gravel to 5mm; angular to subangular.	SW	Native Backfill	
585					Poorly graded SAND with Gravel (SP); saturated; dense; 85% medium to very coarse sand; 15% gravel to 15mm; subangular to rounded.	SP		
590								Total depth = 587 ft. Reached @ 1133 on 5/16/11.
595								Water added during drilling (gallons) = 0
600								Water added after drilling (gallons) = 925
								Water added during construction (gallons) = Not recorded.

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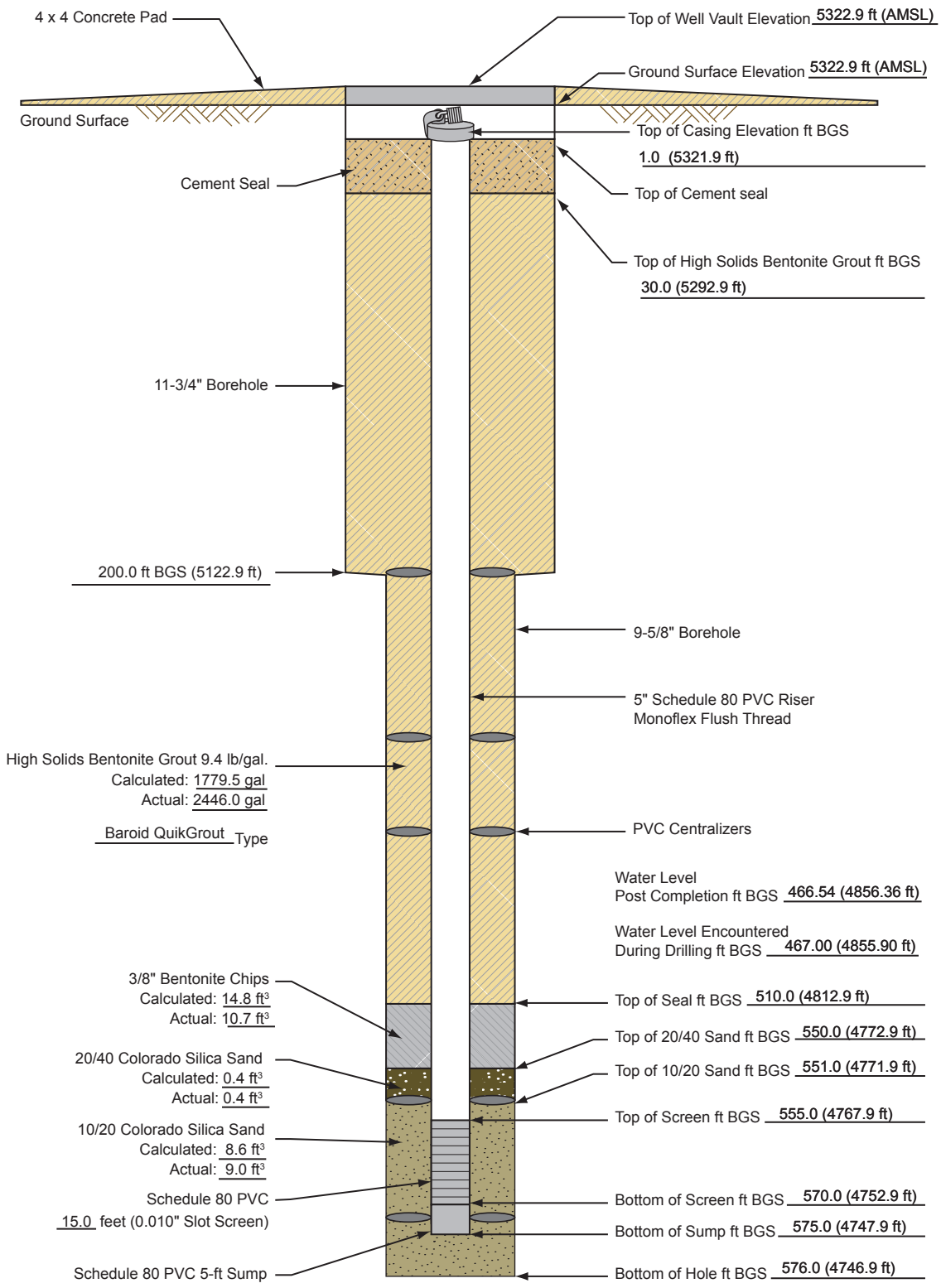
Monitoring Well Completion Diagram KAFB-106090

Installation Start Date/Time: 5/16/2011 @ 15:30
Installation End Date/Time: 5/23/2011 @ 15:30



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106090

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106090

Personnel: V. Bracht

Date Installed: 5/18/11

Date: 6/16/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 575

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 6/16/11 - 6/17/11

Depth to Water Before Developing Well (ft. BGL): 467.35; 466.20 (TOC)

			Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column:	107.65	feet	=	1059.37	gal.	*	1	= 1059.37

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1059.37 gallons

Depth Purging From: 567 feet

Time Purging Begins: 1455, 6/16/11

Weather: Sunny, Breezy, Warm

Screened Interval (ft BGL): 555 - 570

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 925 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/16/2011	1240	466.20	5	21.80	7.19	1.563	50.50	Begin Bailing, Water Muddy but Clears Up
6/16/2011	1250	--	50	--	--	--	--	Bailed
6/16/2011	1255	--	--	--	--	--	--	Begin Swabbing
6/16/2011	1310	--	--	--	--	--	--	Stop Swabbing
6/16/2011	1325	--	100	--	--	--	--	Bailed
6/16/2011	1455	466.18	--	--	--	--	--	Pump On, 5 GPM
6/16/2011	1500	466.84	--	35.15	8.41	1.680	>1000	Continue Pumping, Light Brown
6/16/2011	1510	466.81	150	25.24	8.31	1.464	Out of Range	Continue Pumping, Light Brown
6/16/2011	1520	466.53	200	23.60	7.35	1.438	147.00	Continue Pumping, Cloudy
6/16/2011	1530	466.58	250	23.14	7.04	1.432	144.00	Continue Pumping, Cloudy

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106090

Project Number: 140705

Samplers: V. Bracht

Date: 6/16/11

Checked By:

Time Start: 1240, 6/16/11

Time Finish: 1000, 6/17/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/16/2011	1540	466.59	300	23.09	6.89	1.425	122.00	Continue Pumping, Cloudy
6/16/2011	1550	466.65	350	22.97	6.85	1.418	145.00	Continue Pumping, Cloudy
6/16/2011	1600	466.63	400	23.10	6.88	1.414	150.00	Continue Pumping, Cloudy
6/16/2011	1610	466.65	450	22.76	6.93	1.414	128.00	Continue Pumping, Cloudy
6/16/2011	1620	466.66	500	22.58	6.95	1.410	165.00	Continue Pumping, Cloudy
6/16/2011	1630	466.64	550	22.85	7.04	1.411	126.00	Pump Off, Cloudy
6/17/2011	0805	466.28	--	--	--	--	--	Pump On
6/17/2011	0810	466.58	--	19.81	8.10	1.486	110.00	Continue Pumping, Cloudy
6/17/2011	0820	466.79	600	21.98	7.83	1.521	30.90	Continue Pumping, Slightly Cloudy
6/17/2011	0830	466.75	650	22.31	7.93	1.505	7.04	Continue Pumping, Clear
6/17/2011	0840	466.75	690	22.60	7.99	1.500	2.72	Continue Pumping, Clear
6/17/2011	0850	466.79	725	22.47	7.97	1.496	2.72	Continue Pumping, Clear
6/17/2011	0900	466.75	775	22.71	7.91	1.493	2.08	Continue Pumping, Clear
6/17/2011	0910	466.79	825	22.79	7.88	1.492	1.82	Continue Pumping, Clear
6/17/2011	0920	466.79	875	23.33	8.01	1.492	1.27	Continue Pumping, Clear

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106090

Project Number: 140705

Samplers: V. Bracht, C. LaChance

Date: 6/17/11

Checked By:

Time Start: 1240, 6/16/11

Time Finish: 1000, 6/17/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/17/2011	0930	466.79	925	23.79	8.04	1.493	1.19	Continue Pumping, Clear
6/17/2011	0940	466.79	965	23.77	8.06	1.492	1.65	Continue Pumping, Clear
6/17/2011	0950	466.76	1015	23.88	8.04	1.494	1.81	Continue Pumping, Clear
6/17/2011	1000	466.66	1065	23.95	8.02	1.490	1.65	Pump Off, Clear, Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); brown (7.5YR 4/4); moist; soft; low plasticity; 60% silt; 40% very fine to coarse sand to 4mm.			Hand augered. ***Note: no headspace requirement at this location.***
5					Same as above (0 ft).			Began drilling @ 0952 on 5/31/11.
					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; soft; low plasticity; 85% silt; 15% fine to coarse sand to 4mm.	ML		
10								Bolt broke off of flange.
15					Silty SAND (SM); brown (7.5YR 4/4); moist; very loose; 70% fine to coarse sand; trace fine gravel to 8mm; subrounded; 30% silt.		Cement Seal	New 20' connection @ 1008. Resumed driling @ 1255.
20					Same as above (15 ft); 85% sand; 15% silt.	SM		
25					Silty SAND with Gravel (SM); brown (7.5YR 4/4); moist; very loose; 50% fine to coarse sand; 20% very fine gravel to 1.3cm; subrounded; 30% silt.			
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 11:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); brown (7.5YR 4/4); moist; very loose; 70% fine to coarse sand; trace fine gravel to 8mm; subrounded; 30% silt.	SM	Top of High Solids Bentonite Grout	
35					SILT with Sand (ML); brown (7.5YR 4/4); moist; medium stiff; low plasticity; 85% silt; 15% fine to coarse sand; trace fine gravel to 2cm.	ML		New 20' connection @ 1312. Resumed drilling @ 1318.
40					Same as above (35 ft).			
45					Same as above (35 ft); 75% silt; 25% sand.			
50					Same as above (35 ft); 80% silt; 20% sand.			
55					Same as above (35 ft); 75% silt; 25% sand; trace fine gravel to 3cm.			New 20' connection @ 1330. Resumed drilling @ 1338.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 11:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; medium stiff; low plasticity; 85% silt; 15% very fine to medium sand to 1mm. Note: contains trace caliche.	ML		
65					Same as above (60 ft); brown (7.5YR 4/4); low to medium plasticity; 75% silt; 10% clay; 15% sand.			
70					Lean CLAY (CL); brown (7.5YR 4/3); moist; stiff; medium plasticity; 100% clay with minor silt.	CL		
					Poorly graded SAND (SP); lense.	SP		
75					SILT with Sand (ML); brown (7.5YR 4/4); moist; medium stiff; low to medium plasticity; 80% silt; 5% clay; 15% very fine to fine sand to 0.5mm.		High Solids Bentonite Grout	New 20' connection @ 1352. Resumed drilling @ 1400.
80					Same as above (73 ft).	ML		
85					Same as above (73 ft). Note: contains trace caliche.			
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 11:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT with Sand (ML); brown (7.5YR 4/4); moist; medium stiff; low to medium plasticity; 80% silt; 5% clay; 15% very fine to fine sand to 0.5mm.			Paused drilling to clean out cyclone @ 1413. Resumed drilling @ 1423.
95					Same as above (90 ft); 75% silt; 10% clay; 15% sand.	ML		New 20' connection @ 1433. Resumed drilling @ 1441.
100					SILT with Sand (ML); strong brown (7.5YR 5/6); moist; stiff; low plasticity; 85% silt; 15% very fine to fine sand to 0.5mm.			
					Poorly graded SAND (SP); lense.	SP		
105					SILT with Sand (ML); strong brown (7.5YR 5/6); moist; stiff; low plasticity; 85% silt; 15% very fine to fine sand to 0.5mm. Note: contains trace caliche.		High Solids Bentonite Grout	
110					Same as above (103 ft).	ML		
115					Same as above (103 ft).			Paused drilling to clean out cyclone hose @ 1458. Resumed drilling @ 1518. New 20' connection @ 1524. Resumed drilling @ 1529.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 11:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; stiff; low plasticity; 85% silt; 15% very fine to fine sand to 0.5mm.	ML		
125					Lean CLAY (CL); brown (7.5YR 5/3); damp; stiff; medium plasticity; 100% clay.	CL		
					Poorly graded SAND (SP); brown (10YR 5/3); dry; medium dense; 100% very fine to medium sand to 1mm; rounded.	SP		Approximate top of Santa Fe Group.
130					Same as above (127 ft).	SP		
135					Same as above (127 ft); sand to 2mm.	SP	High Solids Bentonite Grout	New 5' connection @ 1545. Resumed drilling @ 1558.
140					Well graded SAND (SW); brown (10YR 5/3); moist; medium dense; 100% very fine to coarse sand to 4mm; rounded.	SW		Total depth with 11-3/4" casing. End of 5/31/11. Resumed drilling with 9-5/8" casing @ 0946 on 6/1/11.
145					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; medium dense; 100% fine to medium sand; trace fine gravel to 1cm; rounded.	SP		
150								

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Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
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Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Clayey SAND (SC); brown (10YR 5/3); moist; medium dense; 80% fine to very coarse sand; trace fine gravel to 9mm; rounded; 20% clay.	SC		
155					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; medium dense; 100% fine to medium sand to 2mm; rounded.	SP		New 20' connection @ 0956. Resumed drilling @ 1003.
160					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; loose; 95% very fine to very coarse sand; 5% gravel to 1.8cm; rounded.			
165					Same as above (160 ft); 100% sand; trace gravel.	SW	High Solids Bentonite Grout	
170					Same as above (160 ft).			
175					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 100% fine sand to 0.5mm; rounded.	SP		New 20' conneciton @ 1009. Resumed drilling.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 11:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Silty SAND (SM); brown (10YR 5/3); damp; loose; 85% fine to coarse sand; trace fine gravel to 6mm; rounded; 15% silt with minor clay.	SM		
185					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 100% very fine to very coarse sand; trace fine gravel to 1.2cm.	SW		
190					Same as above (185 ft); grading coarser; fine gravel to 4.2cm.			
195					Poorly graded SAND (SP); brown (10YR 5/3); moist; loose; 100% fine sand to 0.5mm; rounded.	SP	High Solids Bentonite Grout	New 20' connection @ 1020. Resumed drilling @ 1028.
200					Well graded SAND (SW); brown (10YR 5/3); damp; dense; 100% very fine to very coarse sand; trace fine gravel to 6mm; rounded; trace clay nodules.	SW		
205					Sandy lean CLAY (CL); dark yellowish brown (10YR 4/4); damp; stiff; medium plasticity; 70% clay; 30% fine to medium sand to 1mm.	CL		
210					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 95% fine to very coarse sand; 5% fine gravel to 1.5cm; subrounded.	SW		

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Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 95% fine to very coarse sand; 5% fine gravel to 1.5cm; subrounded.			
215					Same as above (210 ft); grading finer.	SW		New 20' connection @ 1035. Resumed drilling @ 1041.
220					Poorly graded SAND (SP); brown (10YR 5/3); moist; loose; 100% fine to medium sand to 2mm; subrounded.			
225					Same as above (220 ft); 95% sand; 5% clay.	SP	High Solids Bentonite Grout	
230					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 90% fine to very coarse sand; 10% gravel to 2.8cm; subrounded.	SW		
235					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; medium dense; 100% very fine to fine sand to 0.5mm; rounded.	SP		New 20' connection and resumed drilling @ 1055.
240								

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Client: US Army Corps of Engineers
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Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
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Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; medium dense; 100% very fine to fine sand to 0.5mm; rounded.			
245					Same as above (240 ft).	SP		
250					Same as above (240 ft); grading coarser; 100% fine to medium sand to 1mm.			
255					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 95% fine to very coarse sand; 5% fine gravel to 1cm; rounded.	SW	High Solids Bentonite Grout	New 20' connection @ 1105. Resumed drilling @ 1256.
260					Poorly graded SAND (SP); yellowish brown (10YR 5/6); moist; loose; 100% very fine to fine sand to 0.5mm; rounded.			
265					Same as above (260 ft); grading coarser.	SP		
270								

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Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND (SP); yellowish brown (10YR 5/6); moist; loose; 100% very fine to medium sand to 1mm; rounded.	SP		
275					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; medium dense; 85% fine to very coarse sand; 15% fine gravel to 1.9cm; rounded.	SW		New 20' connection @ 1304. Resumed drilling @ 1308.
280					Same as above (275 ft).			
285					Silty SAND (SM); dark yellowish brown (10YR 4/4); moist; dense; 80% fine to medium sand; trace fine gravel to 1cm; rounded; 20% silt.	SM	High Solids Bentonite Grout	
290					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; dense; 100% fine to very coarse sand to 4.8mm; rounded.	SW		
295					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; dense; 75% fine to very coarse sand; 25% fine gravel to 3cm; rounded.			New 20' connection @ 1315. Resumed drilling @ 1320.
300								

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Borehole ID: KAFB-106091

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Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; dense; 75% fine to very coarse sand; 25% fine gravel to 3cm; rounded.	SW		
305					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; dense; 100% fine to very coarse sand to 4.8mm; rounded.			
310					Same as above (305 ft); 95% sand; 5% fine gravel to 1.5cm.			
315					Same as above (305 ft); 95% sand; 5% fine gravel to 1.5cm.		High Solids Bentonite Grout	New 20' connection @ 1326. Resumed drilling @ 1457.
320					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; medium dense; 100% fine to medium sand to 1mm.	SP		
325					Same as above (320 ft).			
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 11:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; medium dense; 100% fine to medium sand to 1mm.	SP		
335					Well graded SAND with Clay (SW-SC); yellowish brown (10YR 5/4); damp; dense; 85% fine to very coarse sand; 5% fine gravel to 2.1cm; rounded; 10% clay.	SW-SC		New connection @ 1506. Resumed drilling @ 1514.
340					Well graded SAND with Gravel (SW); brown (10YR 5/3); dry; dense; 85% very fine to very coarse sand; 15% fine gravel to 2.3cm; subangular to subrounded.	SW		
345					Well graded SAND (SW); brown (10YR 5/3); dry; dense; 100% very fine to very coarse sand; trace fine gravel to 2.3cm; subangular to subrounded.		High Solids Bentonite Grout	
350					Same as above (345 ft); grading finer.			
355					Well graded SAND with Gravel (SW); brown (10YR 5/3); dry; dense; 85% very fine to very coarse sand; 15% fine gravel to 2.3cm; subangular to subrounded.			
360								

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Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
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Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; medium dense; 100% very fine to medium sand to 1mm; subrounded.			New connection and resumed drilling @ 1530.
365					Same as above (360 ft); grading coarser.	SP		
370					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; medium dense; 100% very fine to coarse sand to 4mm; rounded.			
375					Same as above (370 ft).	SW	High Solids Bentonite Grout	New 20' connection @ 1536. Resumed drilling @ 1543.
380					Poorly graded SAND (SP); brown (10YR 5/3); dry; dense; 100% fine to medium sand to 2mm; subrounded.	SP		
385					Lean CLAY (CL); brown (7.5YR 4/4); moist; very stiff; medium plasticity; 100% clay.	CL		
390					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; dense; 100% very fine sand to 0.2mm; rounded.	SP		

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; dense; 100% very fine sand to 0.2mm; rounded.	SP		
395					Same as above (390 ft); grading coarser.			New 20' connection @ 1556. Resumed drilling @ 1602.
400					Same as above (390 ft).			
405					Same as above (390 ft); 100% fine to medium sand to 1mm.		High Solids Bentonite Grout	
410					Same as above (390 ft); 100% fine to medium sand to 1mm.			
415					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; dense; 95% fine to very coarse sand; 5% fine gravel to 1.6cm; subrounded.	SW		New 20' connection @ 1611. Resumed drilling @ 1617.
420							Top of Bentonite Seal	

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Borehole ID: KAFB-106091

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
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After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; dense; 100% fine to medium sand to 1mm; subrounded.	SP		
425					Same as above (420 ft).			
430					Well graded SAND (SW); brown (10YR 5/3); moist; dense; 100% fine to very coarse sand; trace fine gravel to 1cm; subrounded.	SW	Bentonite Seal	
435					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; dense; 100% very fine to fine sand to 0.5mm; rounded.	SP	5" Schedule 80 PVC Riser	New 20' connection @ 1629. Resumed drilling @ 1636.
440					Same as above (435 ft).			
445					Same as above (435 ft).		Top of 20/40 Sand	
450								

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Borehole ID: KAFB-106091

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Project Number: 140705

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Ground Elevation AMSL (ft): 5314.3
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; dense; 95% very fine to fine sand to 0.5mm; rounded; 5% silt.	SP	Top of 10/20 Sand	
455					Well graded SAND with Silt (SW-SM); dark yellowish brown (10YR 4/4); moist; dense; 90% fine to very coarse sand; trace fine gravel to 8mm; subrounded; 10% silt with minor clay.	SW-SM	Top of 5" Schedule 80 PVC 0.010" Slot Screen	New 20' connection @ 1648. End of 6/1/11. Resumed drilling @ 0822 on 6/2/11.
460					Same as above (455 ft).			
465					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; dense; 95% fine to very coarse sand; 5% fine gravel to 4cm; rounded.	SW		
470					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); wet; dense; 95% medium sand; 5% coarse sand; trace fine gravel to 1.5cm; rounded.	SP	Bottom of Screen	
475					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); wet; dense; 70% fine to very coarse sand; 30% fine gravel to 2.4cm; rounded.	SW	Sump	New 20' connection @ 0835. Resumed drilling @ 0839.
480					Poorly graded SAND (SP); dark	SP	Bottom of Sump	

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Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					yellowish brown (10YR 4/4); wet; dense; 95% medium sand; 5% fine gravel to 2.6cm; rounded.	SP	Bottom of Filter Pack	
485					Same as above (479 ft); trace fine gravel.			
490					Same as above (479 ft); no gravel.		Native Backfill	
495					Same as above (479 ft); no gravel.			
500					Poorly graded SAND with Gravel (SP); dark yellowish brown (10YR 4/4); wet; dense; 60% medium sand; 40% fine gravel to 1cm; rounded.			Total depth = 500 ft. Reached @ 0853 on 6/2/11.
505								Water added during drilling (gallons) = 300 Water added after drilling (gallons) = 900
510								Water added during

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/15/11 11:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106091

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/31/2011
Date TD Reached: 6/2/2011
Date Completed: 6/4/2011

Ground Elevation AMSL (ft): 5314.3
Y Coordinate: 1476816.91
X Coordinate: 1543010.99

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 465.00
At End of Drilling: Not Recorded
After Drilling: 459.90

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510								construction (gallons) = 200
515								
520								
525								
530								
535								
540								

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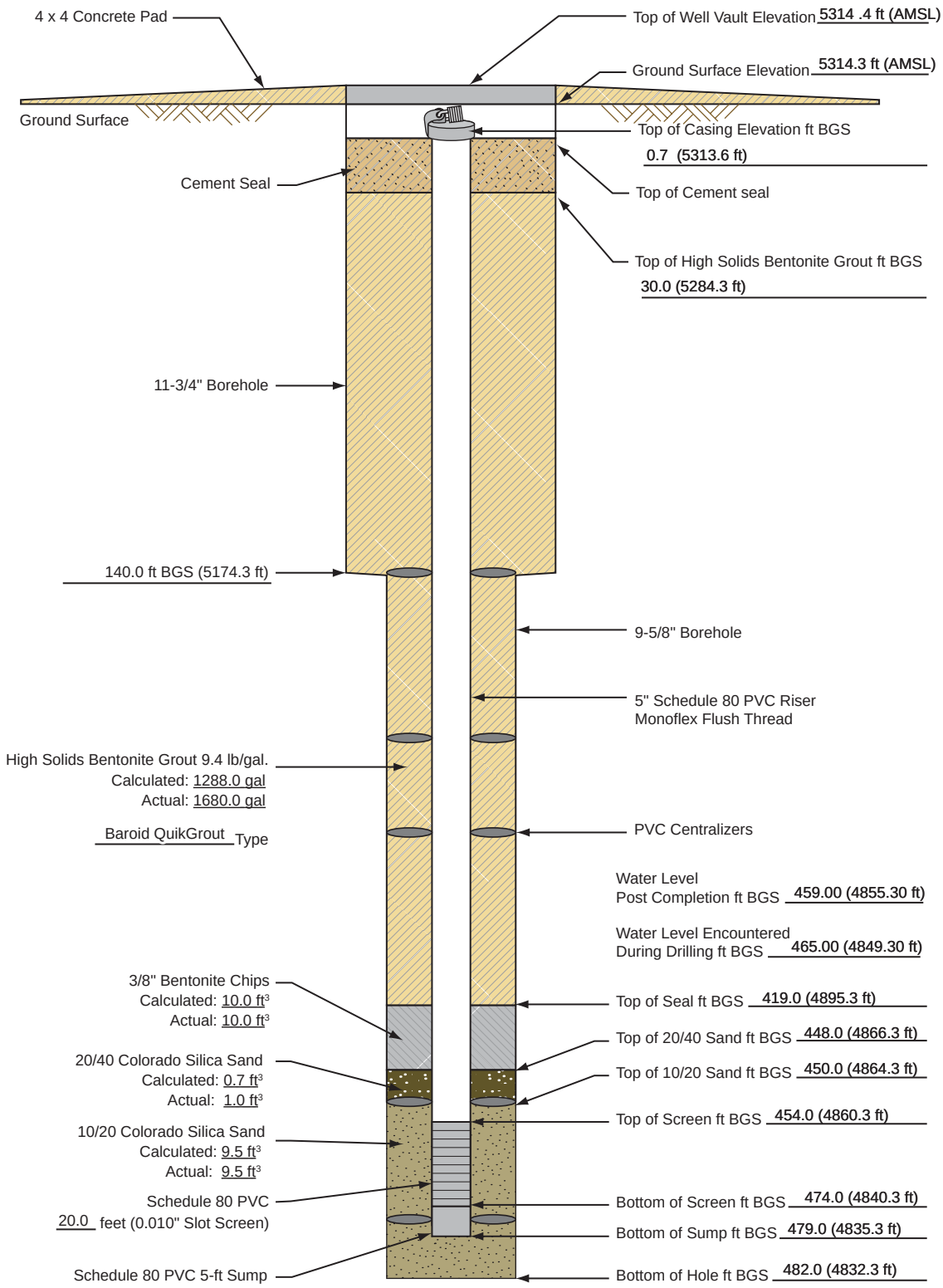
Monitoring Well Completion Diagram KAFB-106091

Installation Start Date/Time: 6/02/2011 @ 12:30
Installation End Date/Time: 6/04/2011 @ 14:15



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106091

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106091

Personnel: V. Bracht

Date Installed: 6/4/11

Date: 6/9/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 479

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 6/9/11 and 6/14/11

Depth to Water Before Developing Well (ft. BGL): 459.23; 458.40 (TOC)

				Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column:	19.77	feet	=	1229.08	gal.	* 1	=	1229.08

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1229.08 gallons

Depth Purging From: 472 feet

Time Purging Begins: 1415, 6/9/11

Weather: Sunny, Breezy, Warm

Screened Interval (ft BGL): 454 - 474

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1200 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/9/2011	1015	458.40	10	21.31	7.02	1.576	57.40	Begin Bailing, Slightly Cloudy, Product Odor
6/9/2011	1035	--	100	20.53	7.09	1.789	Out of Range	Continue Bailing, Light Brown, Product Odor
6/9/2011	1055	--	160	20.79	7.85	1.735	Out of Range	Continue Bailing, Light Brown, Product Odor
6/9/2011	1115	--	225	20.42	7.42	1.673	Out of Range	Continue Bailing, Light Brown, Product Odor
6/9/2011	1120	--	250	--	--	--	--	Stop Bailing
6/9/2011	1120	--	--	--	--	--	--	Swabbed 15 Minutes
6/9/2011	1415	458.36	--	--	--	--	--	Begin Pumping
6/9/2011	1420	458.94	--	25.26	7.93	1.770	67.50	Continue Pumping, Cloudy, Product Odor
6/9/2011	1430	458.97	300	24.15	6.91	1.770	12.50	Continue Pumping, Fairly Clear, Product Odor
6/9/2011	1440	458.99	350	24.81	7.22	1.775	2.02	Continue Pumping, Clear

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106091

Project Number: 140705

Samplers: V. Bracht

Date: 6/9/11

Checked By:

Time Start: 1015, 6/9/11

Time Finish: 1015, 6/14/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/9/2011	1450	458.99	400	24.42	7.08	1.768	1.10	Continue Pumping, Clear, Product Odor
6/9/2011	1500	459.00	450	25.16	7.25	1.767	0.87	Continue Pumping, Clear, Product Odor
6/9/2011	1510	459.00	500	23.70	7.18	1.763	0.93	Continue Pumping, Clear, Product Odor
6/9/2011	1520	459.00	550	23.44	7.06	1.768	0.83	Continue Pumping, Clear, Product Odor
6/9/2011	1530	459.01	600	23.67	7.23	1.765	0.84	Continue Pumping, Clear, Product Odor
6/9/2011	1540	459.01	650	23.48	7.30	1.761	0.69	Continue Pumping, Clear, Product Odor
6/9/2011	1550	459.02	700	23.40	7.38	1.760	0.65	Continue Pumping, Clear, Product Odor
6/9/2011	1600	459.02	750	23.13	7.42	1.761	0.62	Continue Pumping, Clear, Product Odor
6/9/2011	1610	459.02	800	23.06	7.48	1.760	0.68	Continue Pumping, Clear, Product Odor
6/9/2011	1620	459.02	850	23.47	7.48	1.765	0.57	Continue Pumping, Clear, Product Odor
6/9/2011	1630	459.03	900	22.80	7.68	1.763	0.65	Stop Pumping, Clear, Product Odor
6/14/2011	0900	458.60	--	--	--	--	--	Begin Pumping at 5 GMP
6/14/2011	0905	459.05	--	19.90	7.70	1.801	7.49	Continue Pumping, Clear, Product Odor
6/14/2011	0915	459.13	950	22.09	7.77	1.773	1.72	Continue Pumping, Clear, Product Odor
6/14/2011	0925	459.12	1000	22.13	7.87	1.774	1.24	Continue Pumping, Clear, Product Odor

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106091

Project Number: 140705

Samplers: V. Bracht

Date: 6/14/11

Checked By:

Time Start: 1015, 6/9/11

Time Finish: 1015, 6/14/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/14/2011	0935	459.12	1050	22.06	7.92	1.781	1.40	Continue Pumping, Clear, Product Odor
6/14/2011	0945	459.15	1100	22.16	7.94	1.775	0.52	Continue Pumping, Clear, Product Odor
6/14/2011	0955	459.16	1150	22.20	7.93	1.777	0.45	Continue Pumping, Clear, Product Odor
6/14/2011	1005	459.17	1200	21.90	7.96	1.778	0.60	Continue Pumping, Clear, Product Odor
6/14/2011	1015	459.18	1250	22.17	7.94	1.780	0.52	Stop Pumping, Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 5/3); dry; loose; 90% very fine to medium sand; 10% silt.	SP-SM		Hand augered. ***Note: no headspace requirement at this location.***
5					Sandy SILT (ML); brown (7.5YR 4/4); moist; soft; low plasticity; 60% silt with minor clay; 40% very fine to very coarse sand; trace fine gravel to 2cm.	ML		Began drilling @ 1520 on 5/20/11.
10					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); dry; very loose; 85% very fine to very coarse sand; 15% fine gravel to 1.5cm; subangular to subrounded.	SW		
15					Same as above (10 ft).		Cement Seal	Possible fill for sewer.
20					Same as above (10 ft).			
25					Same as above (10 ft); gravel to 2cm.			
30								

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Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); dry; very loose; 85% very fine to very coarse sand; 15% fine gravel to 1.5cm; subangular to subrounded.	SW	Top of High Solids Bentonite Grout	
35					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 90% very fine to very coarse sand; 10% fine to medium gravel to 2.5cm.			
40					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; loose; 80% very fine to very coarse sand; 20% fine to medium gravel to 2.5cm; subangular.			
45					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 90% very fine to very coarse sand; 10% fine to medium gravel to 2.5cm.			
50					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; soft; low plasticity; 85% silt; 15% very fine to medium sand to 2mm.	ML		
55					Same as above (50 ft); dry; 80% silt; 20% sand.			
60								

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Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; soft; low plasticity; 85% silt; 15% very fine to medium sand; trace gravel to 1.5cm.	ML		
65					Same as above (60 ft); no gravel.			
70					Same as above (60 ft); no gravel.			
75					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; stiff; medium plasticity; 100% clay; trace sand to 2mm.	CL	High Solids Bentonite Grout	
80					Same as above (74 ft).			
85					Same as above (74 ft).			End of 5/20/11. Resumed drilling @ 0810 on 5/21/11.
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; stiff; medium plasticity; 100% clay; trace sand to 2mm.			Cyclone clogged. Cleared @ 0854.
95					Same as above (90 ft).			Driller added water.
100					Lean CLAY with Sand (CL); light yellowish brown (10YR 6/4); moist; firm; medium plasticity; 80% clay; 18% very fine to coarse sand; 2% fine to medium gravel; subrounded.			
105					Same as above (99 ft).	CL	High Solids Bentonite Grout	
110					Same as above (99 ft); sand grading finer; no gravel.			
115					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; stiff; medium plasticity; 100% clay; trace sand to 2mm.			
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Lean CLAY with Sand (CL); light yellowish brown (10YR 6/4); moist; firm; medium plasticity; 80% clay; 18% very fine to coarse sand; 2% fine to medium gravel; subrounded.	CL		Driller added water from 120-150'.
125					Same as above (120 ft); increased silt content; trace gravel to 2cm; subrounded.			
130					Sandy SILT (ML); pale brown (10YR 6/3); moist; 70% silt; 30% very fine to coarse sand to 3mm; subrounded.	ML		
135					Same as above (130 ft); sand grading finer.		High Solids Bentonite Grout	
140					Sandy SILT (ML); pale brown (10YR 6/3); moist; stiff; 60% silt; 30% very fine to coarse sand; 10% fine gravel to 2cm; subangular.			Total depth with 11-3/4" casing. Resumed drilling with 9-5/8" casing @ 1250.
145					Same as above (140 ft).			
150					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; medium dense; 100% fine to medium sand.	SP		

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Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; medium dense; 100% fine to medium sand. Note: grading coarser than 146'.	SP		
155					Poorly graded SAND with Silt (SP-SM); pale brown (10YR 6/3); moist; medium dense; 90% fine to medium sand; 10% silt and clay.	SP-SM		
160					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; medium dense; 100% fine to medium sand.	SP		
165					Same as above (160 ft); grading coarser; subangular.		High Solids Bentonite Grout	
170					Same as above (160 ft); grading coarser.			
175					Same as above (160 ft).			
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; medium dense; 100% fine to medium sand.	SP		
185					Same as above (180 ft).	SP		
190					Same as above (180 ft).	SP		
195					Same as above (180 ft); grading coarser; 1% gravel to 2.5cm; subangular.	SP	High Solids Bentonite Grout	
200					Same as above (180 ft).	SP		Removed all of 11-3/4" casing. End of 5/21/11.
205					Well graded SAND with Clay (SW-SC); yellowish brown (10YR 6/4); dry; loose; 90% fine to coarse sand; trace fine gravel; 10% clay; medium plasticity.	SW-SC		Resumed drilling on 5/22/11.
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); yellowish brown (10YR 6/4); dry; loose; 100% fine to coarse sand; trace fine gravel.			
215					Well graded SAND (SW); pale brown (10YR 6/3); dry; medium dense; 100% fine to coarse sand to 2mm; subangular.			
220					Same as above (216 ft).	SW		
225					Same as above (216 ft).		High Solids Bentonite Grout	
230					Poorly graded SAND (SP); pale brown (10YR 6/3); dry; medium dense; 100% very fine sand.			
235					Same as above (230 ft).	SP		
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); pale brown (10YR 6/3); dry; medium dense; 100% very fine sand.			
245					Same as above (240 ft).			
250					Same as above (240 ft); grading coarser to fine sand.			
255					Same as above (240 ft); grading coarser to fine to medium sand; subrounded.	SP	High Solids Bentonite Grout	
260					Same as above (240 ft); grading coarser to fine sand.			
265					Same as above (240 ft).			
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Well graded SAND (SW); brown (10YR 5/3); dry; medium dense; 100% very fine to very coarse sand to 2mm; subangular.			
275					Same as above (270 ft); 90% fine to very coarse sand; 10% fine gravel to 2cm.	SW		
280					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; medium dense; 90% fine sand; 10% fine gravel to 3cm; subrounded.			
285					Same as above (280 ft); 100% fine to medium sand.	SP	High Solids Bentonite Grout	
290					Well graded SAND with Gravel (SW); pale brown (10YR 6/3); dry; medium dense; 70% fine to coarse sand; 30% fine gravel to 1.5cm; subangular.			
295					Same as above (290 ft); gravel to 4cm; subangular to subrounded.	SW		
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300								
					Well graded SAND with Gravel (SW); pale brown (10YR 6/3); dry; medium dense; 85% fine to coarse sand; 15% gravel to 2cm; subangular.	SW		
305								
					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; medium dense; 100% very fine to medium sand to 3mm; subangular.	SP		
310								
					Poorly graded SAND with Gravel (SP); gray (10YR 6/1); dry; dense; 60% very fine to coarse sand; 40% fine gravel.			
315								
					Well graded SAND (SW); light yellowish brown (10YR 6/4); moist; loose to medium dense; 95% very fine to coarse sand; subrounded; 5% fine gravel to 1.5cm; subangular.	SW	High Solids Bentonite Grout	
320								
					Same as above (315 ft).			
325								
					Poorly graded SAND (SP); light yellowish brown (10YR 6/4); dry; loose; 95% very fine to medium sand; 5% gravel to 2cm; subrounded.	SP		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); light yellowish brown (10YR 6/4); dry; loose; 95% very fine to medium sand; 5% gravel to 2cm; subrounded. Note: grading coarser than 325'.			
335					Same as above (330 ft); very fine sand.	SP		
340					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; medium dense to dense; 80% fine to coarse sand; subrounded; 15% fine to coarse gravel to 3cm; subrounded.			
345					Same as above (340 ft); grayish brown (10YR 5/2).		High Solids Bentonite Grout	
350					Same as above (340 ft); 75% sand; 25% gravel.	SW		
355					Same as above (340 ft).			
360					Same as above (340 ft); light yellowish brown (10YR 6/4).			

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); light yellowish brown (10YR 6/4); moist; medium dense to dense; 100% fine to coarse sand; subrounded.	SW		
365					Same as above (360 ft); brown (10YR 5/3); 5% gravel.			
370					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose to medium dense; 100% very fine to medium sand to 2mm; subangular.	SP		
375					Same as above (370 ft); grading coarser.		High Solids Bentonite Grout	
380					Same as above (370 ft).			
385					Same as above (370 ft); very fine sand.			
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose to medium dense; 100% very fine to medium sand to 2mm; subangular.	SP		
395					Same as above (390 ft); 5% silt and clay.			
400					Lean CLAY (CL); brown (10YR 4/3); moist; firm; 90% clay; 10% fine to very coarse sand to 2mm; subrounded.	CL		
405					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; loose to medium dense; 100% very fine to coarse sand to 3mm; subangular.	SW	High Solids Bentonite Grout	
410					Same as above (405 ft).			
415					Same as above (405 ft).			
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; loose to medium dense; 100% very fine to coarse sand to 3mm; subangular.	SW	High Solids Bentonite Grout	
425					Same as above (420 ft); grading finer.			
430					Same as above (420 ft).			
435					Gravelly lean CLAY (CL); brown (10YR 5/3); moist; medium stiff; medium plasticity; 65% clay; 35% medium gravel to 2.5cm; subangular.	CL	Top of Bentonite Seal	
440					Poorly graded SAND (SP); light yellowish brown (10YR 6/4); moist; loose; 100% very fine to fine sand; subangular.	SP		
445					Same as above (440 ft).			
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); gray (10YR 5/1); moist; loose; 100% very fine to fine sand; subangular; no odor. Note: grading coarser than 445'.	SP		
455					Well graded SAND (SW); gray (10YR 5/1); dry; loose; 95% very fine to very coarse sand to 3mm; 5% fine gravel to 1cm; subrounded; no odor.	SW	Bentonite Seal	
460					Poorly graded SAND (SP); light yellowish brown (10YR 6/4); moist; loose; 100% very fine to fine sand; subangular; no odor.	SP	5" Schedule 80 PVC Riser	
465					Well graded SAND (SW); gray (10YR 5/1); dry; loose; 95% very fine to very coarse sand to 3mm; 5% fine gravel to 1cm; subrounded; no odor.	SW		
470					Same as above (465 ft); no odor.		Top of 20/40 Sand Top of 10/20 Sand	
475					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; medium dense; 85% fine to very coarse sand; subangular; 15% fine gravel to 3.5cm; subrounded; no odor.		Top of 5" Schedule 80 PVC 0.010" Slot Screen	
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND with Gravel (SW); brown (10YR 5/3); wet; medium dense; 85% very fine to coarse sand; subangular; 15% fine gravel to 3.5cm; subrounded; no odor.	SW		
485					Poorly graded SAND with Silt (SP-SM); brown (10YR 5/3); wet; medium dense; 90% very fine to medium sand to 1mm; subrounded; 10% silt; no odor.	SP-SM		
490					Poorly graded SAND (SP); brown (10YR 5/3); wet; medium dense; 95% very fine to medium sand to 1mm; subrounded; 5% silt; no odor.	SP	Bottom of Screen Sump Bottom of Sump	
495					Poorly graded SAND with Silt (SP-SM); brown (10YR 5/3); wet; dense; 90% very fine to medium sand to 1mm; subrounded; 10% silt; no odor.	SP-SM		Difficult drilling. Driller added water.
500					Well graded SAND with Gravel (SW); brown (10YR 5/3); 85% medium to very coarse sand; 15% gravel to 3.5cm; subrounded.	SW		
505					Poorly graded SAND (SP); brown (10YR 5/3); wet; dense; 100% coarse sand to 4mm; subangular.	SP		
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106092

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/20/2011
Date TD Reached: 5/22/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476799.08
X Coordinate: 1543042.08

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.00
At End of Drilling: Not Recorded
After Drilling: 458.92

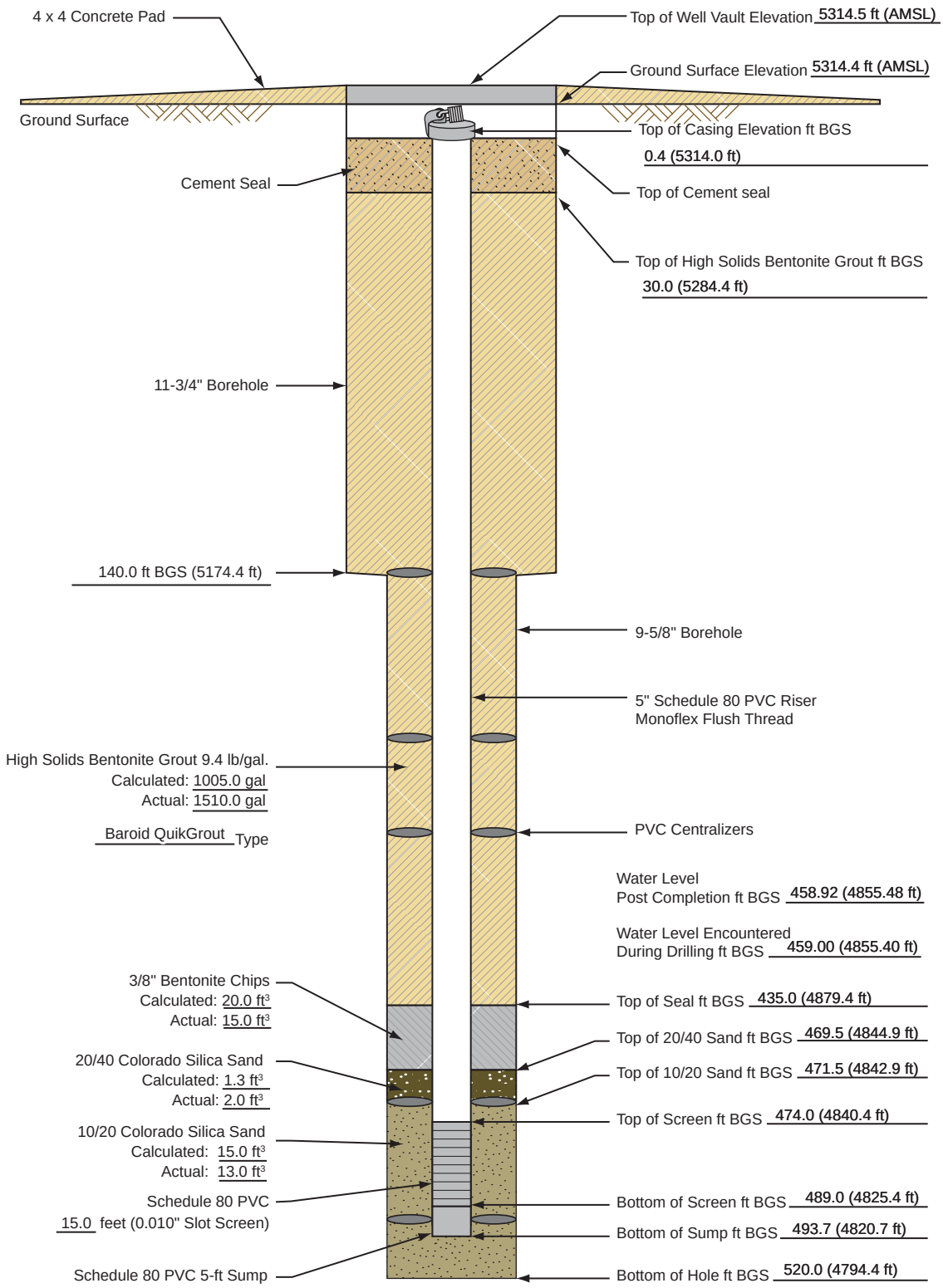
Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Tim O'Conner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510								
515					Poorly graded SAND (SP); brown (10YR 5/3); wet; dense; 95% fine to medium sand; subangular; 5% silt.	SP	Filter Pack	
520					Poorly graded SAND (SP); brown (10YR 5/3); wet; dense; 100% medium to coarse sand to 4mm; subangular.			
525								Total depth = 520 ft. Reached @ 1529 on 5/22/11. Water added during drilling (gallons) = 400
530								Water added after drilling (gallons) = 800
535								Water added during construction (gallons) = Not recorded.
540								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 7/5/11 17:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106092

Installation Start Date/Time: 5/23/2011 @ 9:00
Installation End Date/Time: 5/24/2011 @ 16:50



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106092

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106092

Personnel: V. Bracht

Date Installed: 5/24/11

Date: 6/8/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 493.68

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 6/8/11

Depth to Water Before Developing Well (ft. BGL): 459.37; 458.8 (TOC)

				Vol. (V)	Purge Factor	Volume to Purge		
Height of Water Column:	34.31	feet	=	1242.12	gal.	* 1	=	1242.12

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1242.12 gallons

Depth Purging From: 482 feet

Time Purging Begins: 1115, 6/8/11

Weather: Sunny, Warm, Breezy

Screened Interval (ft BGL): 474 - 487

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1200 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/8/2011	0845	458.80	10	21.69	7.26	1.606	217.00	Begin Bailing, Water is Cloudy, Product Odor
6/8/2011	0905	--	50	--	--	--	--	Stop Bailing, Bailed 4 Times Total
6/8/2011	0910	--	--	--	--	--	--	Begin Swabbing
6/8/2011	0925	--	--	--	--	--	--	Finish Swabbing
6/8/2011	0930	--	100	--	--	--	--	Bailing
6/8/2011	1115	458.78	--	--	--	--	--	Begin Pumping
6/8/2011	1120	458.40	--	25.31	7.50	1.659	Out of Range	Continue Pumping, Brown
6/8/2011	1130	458.46	150	21.82	7.01	1.604	248.00	Continue Pumping, Cloudy
6/8/2011	1140	458.49	200	21.76	6.57	1.604	120.00	Continue Pumping, Cloudy, Product Odor
6/8/2011	1150	458.48	250	21.90	6.27	1.600	62.70	Continue Pumping, Cloudy, Product Odor

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106092

Project Number: 140705

Samplers: V. Bracht

Date: 6/8/11

Checked By:

Time Start: 0845, 6/8/11

Time Finish: 1530, 6/8/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/8/2011	1200	458.48	300	21.71	6.19	1.599	30.70	Continue Pumping, Cloudy
6/8/2011	1210	458.48	350	22.40	6.17	1.599	15.20	Continue Pumping, Fairly Clear
6/8/2011	1220	458.47	400	22.92	6.22	1.608	8.63	Continue Pumping, Clear, Product Odor
6/8/2011	1230	458.49	450	22.99	6.25	1.604	5.97	Continue Pumping, Clear, Product Odor
6/8/2011	1240	458.49	500	22.55	6.38	1.607	5.33	Continue Pumping, Clear, Product Odor
6/8/2011	1250	458.48	550	22.59	6.46	1.609	3.98	Continue Pumping, Clear, Product Odor
6/8/2011	1300	458.48	600	23.39	6.53	1.604	3.70	Continue Pumping, Clear, Product Odor
6/8/2011	1310	458.48	650	22.44	6.48	1.610	2.91	Continue Pumping, Clear, Product Odor
6/8/2011	1320	458.48	700	22.68	6.65	1.603	2.59	Continue Pumping, Clear, Product Odor
6/8/2011	1330	458.48	750	22.27	6.67	1.597	2.90	Continue Pumping, Clear, Product Odor
6/8/2011	1340	458.48	800	23.42	6.91	1.603	2.05	Continue Pumping, Clear, Product Odor
6/8/2011	1350	458.47	850	23.59	7.14	1.595	1.95	Continue Pumping, Clear, Product Odor
6/8/2011	1400	458.43	900	24.14	7.31	1.602	2.20	Continue Pumping, Clear, Product Odor
6/8/2011	1410	458.43	950	24.55	7.50	1.592	1.64	Continue Pumping, Clear, Product Odor
6/8/2011	1420	458.41	1000	22.98	7.54	1.603	2.96	Continue Pumping, Clear, Product Odor

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106092

Project Number: 140705

Samplers: V. Bracht

Date: 6/8/11

Checked By:

Time Start: 0845, 6/8/11

Time Finish: 1530, 6/8/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/8/2011	1430	458.39	1050	24.50	7.63	1.600	7.23	Continue Pumping, Clear, Product Odor
6/8/2011	1440	458.39	1075	24.80	7.72	1.597	1.49	Continue Pumping, Clear, Product Odor
6/8/2011	1450	458.41	1100	24.88	7.75	1.599	1.15	Continue Pumping, Clear, Product Odor
6/8/2011	1500	458.41	1125	23.64	7.72	1.600	6.50	Continue Pumping, Clear, Product Odor
6/8/2011	1510	458.43	1175	23.94	7.73	1.592	1.29	Continue Pumping, Clear, Product Odor
6/8/2011	1520	458.42	1225	23.71	7.76	1.607	1.30	Continue Pumping, Clear, Product Odor
6/8/2011	1530	458.42	1275	23.52	7.74	1.599	0.98	Stop Pumping, Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Poorly graded SAND (SP); brown (7.5YR 5/3); dry; very loose; 90% very fine to medium sand; 5% coarse sand; 5% fine gravel to 1.5cm; rounded.	SP		Hand augered. ***Note: no headspace requirement at this location.***
5					Sandy SILT (ML); brown (7.5YR 4/4); moist; soft; low plasticity; 60% silt with minor clay; 40% very fine to very coarse sand; trace fine gravel to 1.2cm.	ML		Began drilling @ 1009 on 5/15/11.
10					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); dry; very loose; 85% very fine to very coarse sand; 15% fine gravel to 1cm; subangular to subrounded.	SW		
15					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; very loose; 90% very fine to very coarse sand; 5% fine gravel to 1cm; subangular to subrounded; 5% silt.		Cement Seal	New 20' connection and resumed drilling @ 1026.
20					Same as above (15 ft).			Added water to cyclone for dust suppression.
25					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); dry; very loose; 85% very fine to very coarse sand; 15% fine gravel to 1cm; subangular to subrounded.			
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); dry; very loose; 80% very fine to very coarse sand; 20% fine gravel to 1cm; subangular to subrounded.	SW	Cement Seal	
35					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; very loose; 100% very fine to very coarse sand; trace fine gravel.		Top of High Solids Bentonite Grout	New 20' connection @ 1049. Resumed drilling @ 1059.
40					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; soft; low plasticity; 85% silt; 15% very fine to medium sand to 2mm.	ML		
45					Same as above (40 ft).			
50					Same as above (40 ft); 80% silt; 20% sand.			
55					Same as above (40 ft); 80% silt; 20% sand.			New 20' connection @ 1107. Resumed drilling @ 1113.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; soft; low plasticity; 85% silt; 15% very fine to medium sand to 2mm.	ML		
65					Lean CLAY (CL); brown (7.5YR 5/4); moist; stiff; medium to high plasticity; 100% clay; trace sand to 2mm.	CL		
70					Same as above (64 ft).			
75					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; loose; 100% very fine to very coarse sand to 4.8mm; subrounded.	SW	High Solids Bentonite Grout	New 20' connection @ 1126. Resumed drilling @ 1133.
80					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; medium stiff; low plasticity; 85% silt; 15% very fine to medium sand to 1mm.	ML		
85					Same as above (79 ft); minor clay.			
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
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Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; medium stiff; low plasticity; 85% silt; 15% very fine to medium sand to 1mm.			
95					Same as above (90 ft); 5% clay. Note: some caliche fragments present.			New 20' connection @ 1146. Resumed drilling @ 1153
100					Same as above (90 ft).			
105					Same as above (90 ft); 80% silt; 20% very fine to medium sand to 2mm.	ML	High Solids Bentonite Grout	
110					Same as above (90 ft); 80% silt; 20% very fine to medium sand to 2mm.			
115					Same as above (90 ft); trace clay nodules.			Driller added ~100 gallons of water. New connection @ 1208. Stopped to fill water truck. Resumed drilling @ 1334.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
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Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT with Sand (ML); light yellowish brown (10YR 6/4); wet; stiff; low plasticity; 85% silt; 15% very fine to medium sand to 1mm.			
125					Same as above (120 ft); pale brown (10YR 6/3); trace clay nodules.	ML		
130					No cuttings returned.			
135					Silty GRAVEL (GM); pale brown (10YR 6/3); wet; medium dense; 75% fine gravel to 3.5cm; rounded; 5% fine sand; 20% silt; trace clay.	GM	High Solids Bentonite Grout	Added ~150 gallons of water.
140					Well graded SAND (SW); pale brown (10YR 6/3); wet; dense; 95% fine to very coarse sand; 5% fine gravel to 1.3cm; rounded.	SW		Total depth with 11-3/4" casing @ 1356. Resumed drilling with 9-5/8" casing @ 1618.
145					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; medium dense; 100% fine to medium sand; trace coarse sand to 3mm; subrounded.	SP		Geologist, Tim O'Connor, started logging.
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; medium dense; 100% fine to medium sand; trace coarse sand to 2mm; subrounded.			
155					Same as above (150 ft); grading finer.			
160					Same as above (150 ft); grading coarser.			
165					Same as above (150 ft).	SP	High Solids Bentonite Grout	
170					Same as above (150 ft); trace silt and clay.			
175					Same as above (150 ft).			New connection @ 1645. Damage to top of head seal, end of 5/15/11.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
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Project Name: KAFB BFF SWMU ST-106 and SS-111
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Date Started: 5/15/2011
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Ground Elevation AMSL (ft): 5314.4
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; medium dense; 100% fine to medium sand; trace coarse sand to 2mm; subrounded.			Resumed drilling @ 1300 on 5/16/11.
185					Same as above (180 ft).	SP		
190					Well graded SAND (SW); brown (10YR 5/3); dry; loose; 100% fine to very coarse sand to 6mm; subangular.			
195					Well graded SAND with Gravel (SW); brown (10YR 5/3); dry; very loose; 85% very fine to coarse sand; 15% gravel to 1.7cm; subrounded.	SW	High Solids Bentonite Grout	
200					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; loose; 100% very fine to fine sand to 1mm; subangular.			
205					Same as above (200 ft).	SP		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
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Date Started: 5/15/2011
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Ground Elevation AMSL (ft): 5314.4
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); pale brown (10YR 6/3); dry to moist; loose; 100% sand; trace gravel to 1.7cm; subrounded.	SW		
215					Poorly graded SAND (SP); pale brown (10YR 6/3); 100% very fine sand; trace gravel to 7mm; subangular.	SP		
220					Same as above (215 ft); trace gravel to 3cm.			
225					Same as above (215 ft).		High Solids Bentonite Grout	
230					Same as above (215 ft); grading coarser.			
235					Same as above (215 ft); dark grayish brown (2.5Y 4/2); no gravel.			
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); light yellowish brown (2.5Y 6/3); 100% very fine sand; trace gravel to 7mm; subangular.			
245					Same as above (240 ft); pale brown (10YR 6/3).			
250					Same as above (240 ft); pale brown (10YR 6/3).			
255					Same as above (240 ft); pale brown (10YR 6/3); grading coarser.	SP	High Solids Bentonite Grout	
260					Same as above (240 ft); pale brown (10YR 6/3).			
265					Same as above (240 ft); pale brown (10YR 6/3).			
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Date Started: 5/15/2011
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Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Well graded SAND (SW); pale brown (10YR 6/3); dry; loose; 100% fine to very coarse sand to 7mm; angular to subangular.	SW		
275					Poorly graded SAND (SP); light yellowish brown (10YR 6/4); dry; loose; 100% very fine to fine sand; subangular.	SP		
280					Same as above (275 ft); grading coarser.			
285					Same as above (275 ft).		High Solids Bentonite Grout	
290					Same as above (275 ft); trace gravel to 3cm; subrounded.			
295					Well graded SAND (SW); brown (10YR 5/3); dry; loose; 90% fine to very coarse sand; subangular; 10% gravel to 1.5cm.	SW		
300								

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); brown (10YR 5/3); dry; loose; 90% fine to very coarse sand; subangular; 10% gravel to 3.75cm; subrounded.	SW		
305					Poorly graded SAND (SP); light yellowish brown (10YR 6/4); dry; loose; 95% very fine to fine sand; 5% gravel to 3cm; subrounded.			
310					Same as above (305 ft).	SP		
315					Same as above (305 ft); grading coarser.		High Solids Bentonite Grout	
320					Well graded SAND (SW); light yellowish brown (10YR 6/4); dry; loose; 100% fine to very coarse sand to 2.5cm; subrounded.			
325					Same as above (320 ft); grading finer.	SW		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Date Started: 5/15/2011
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Ground Elevation AMSL (ft): 5314.4
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); light yellowish brown (10YR 6/4); dry; loose; 95% very fine to fine sand; 5% gravel to 2cm; subrounded.	SP		
335					Well graded SAND (SW); light yellowish brown (10YR 6/4); dry; loose; 90% very fine to very coarse sand; subrounded; 10% fine gravel to 2cm; subrounded.			
340					Same as above (335 ft).			
345					Well graded SAND with Gravel (SW); light yellowish brown (10YR 6/4); dry; loose; 80% very fine to very coarse sand; 20% gravel to 3cm; subangular.	SW	High Solids Bentonite Grout	
350					Well graded SAND (SW); light yellowish brown (10YR 6/4); dry; loose; 90% very fine to very coarse sand; subrounded; 10% fine gravel to 2cm; subrounded.			
355					Same as above (350 ft).			
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
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Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); light yellowish brown (10YR 6/4); dry; loose; 90% very fine to very coarse sand; subrounded; 10% fine gravel to 2cm; subrounded.			
365					Same as above (360 ft).	SW		
370					Poorly graded SAND (SP); brown (10YR 4/3); dry to moist; loose; 100% very fine to medium sand to 2mm; subangular.			
375					Same as above (370 ft).		High Solids Bentonite Grout	
380					Same as above (370 ft).	SP		End of 5/16/11 @ 1700.
385					Same as above (370 ft).			Resumed drilling @ 0818 on 5/17/11.
390					Lean CLAY (CL); brown (10YR 4/3); moist; stiff; medium plasticity; 95% clay; 5% very fine sand.	CL		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
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Project Name: KAFB BFF SWMU ST-106 and SS-111
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Ground Elevation AMSL (ft): 5314.4
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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Lean CLAY (CL); brown (10YR 4/3); moist; stiff; medium plasticity; 95% clay; 5% very fine sand.	CL		
395					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 100% very fine to fine sand; subangular.	SP		
400					Same as above (395 ft); very fine to coarse sand.			
405					Same as above (395 ft); fine sand.		High Solids Bentonite Grout	
410					Same as above (395 ft); dark yellowish brown (10YR 4/4); medium sand.			
415					Same as above (395 ft); medium to very coarse sand; angular to subangular.			
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); very pale brown (10YR 7/3); dry; loose; 100% very fine to fine sand; subangular.	SP		
425					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 100% very fine to very coarse sand; subangular; trace fine gravel.			
430					Well graded SAND with Gravel (SW); gray (10YR 5/1); dry; loose; 60% very fine to coarse sand; 40% gravel to 2.5cm; angular to subangular.	SW		
435					Same as above (430 ft); very fine gravel to 6mm.		High Solids Bentonite Grout	
440					Poorly graded SAND (SP); yellowish brown (10YR 5/6); dry; loose; 100% very fine to fine sand; angular to subangular.	SP		
445					Same as above (440 ft).			
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); gray (10YR 5/1); dry; loose; 100% very fine to fine sand; trace coarse sand; angular to subangular.			
455					Same as above (450 ft); grayish brown (10YR 5/2); no coarse sand.			
460					Same as above (450 ft); fine to coarse sand.	SP		
465					Same as above (450 ft); brown (10YR 5/3); moist; no coarse sand; trace gravel to 1.5cm.		High Solids Bentonite Grout	
470					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; medium dense; 85% fine to very coarse sand; subangular; 15% fine gravel to 1.4cm.			
475					Well graded SAND (SW); brown (10YR 5/3); moist; medium dense; 100% fine to very coarse sand; subangular.	SW		
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND (SW); brown (10YR 5/3); moist; medium dense; 90% fine to very coarse sand; subangular; 10% fine gravel to 1.4cm.	SW		
485					Poorly graded SAND with Silt (SP-SM); brown (10YR 5/3); wet; dense; 90% very fine to medium sand to 1mm; subrounded; 10% silt.	SP-SM		Driller added water down borehole.
490					Same as above (485 ft); very dense; 5% fine gravel to 2cm; subrounded; grading coarser.			Driller added 400 gallons of water. Very difficult drilling.
495					Same as above (485 ft).		High Solids Bentonite Grout	Driller added 400 gallons of water.
500					Same as above (485 ft).			Driller added 500 gallons of water.
505					Poorly graded SAND (SP); brown (10YR 5/3); wet; dense; 100% coarse sand to 4mm; angular.	SP	Top of Bentonite Seal	Driller added 500 gallons of water.
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Poorly graded SAND (SP); brown (10YR 5/3); wet; dense; 100% coarse sand to 4mm; angular.			
515					Poorly graded SAND with Gravel (SP); brown (10YR 5/3); wet; dense; 85% coarse sand; angular; 15% fine gravel to 1.5cm.	SP	Bentonite Seal	
520					Silty SAND (SM); brown (10YR 5/3); wet; dense; 75% fine to medium sand; 5% fine gravel to 2cm; subrounded; 20% silt.			
525					Same as above (520 ft); no gravel.		5" Schedule 80 PVC Riser	
530					Same as above (520 ft); grading coarser.	SM		
535					Same as above (520 ft).			Driller added 500 gallons of water.
540							Top of 20/40 Sand	

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Silty SAND (SM); brown (10YR 5/3); wet; dense; 80% fine to medium sand; 20% silt.		Top of 10/20 Sand	
545					Silty SAND (SM); brown (10YR 5/3); wet; dense; 75% fine to medium sand; 5% fine gravel to 2cm; subrounded; 20% silt.		Top of 5" Schedule 80 PVC 0.010" Slot Screen	Driller added 500 gallons of water.
550					Same as above (545 ft).			
555					Silty SAND with Gravel (SM); brown (10YR 5/3); wet; dense; 65% fine to medium sand; 15% fine gravel to 2.5cm; subangular; 20% silt.	SM		
560					Silty SAND (SM); brown (10YR 5/3); wet; dense; 80% fine to medium sand; 20% silt.		Bottom of Screen Sump Bottom of Sump	
565					Silty SAND (SM); brown (10YR 5/3); wet; dense; 75% fine to medium sand; 5% fine gravel to 2cm; subrounded; 20% silt.			
570								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
570					Silty SAND (SM); brown (10YR 5/3); wet; dense; 75% fine to medium sand; 5% fine gravel to 2cm; subrounded; 20% silt.			
575					Same as above (570 ft).			
580					Silty SAND with Gravel (SM); brown (10YR 5/3); wet; dense; 65% fine to medium sand; 15% fine gravel to 3cm; subrounded; 20% silt.			
585					Silty SAND (SM); brown (10YR 5/3); wet; dense; 70% fine to medium sand; 10% fine gravel to 2cm; subrounded; 20% silt.	SM	Filter Pack	
590					Silty SAND (SM); brown (10YR 5/3); wet; dense; 75% fine to medium sand; 5% fine gravel to 2cm; subrounded; 20% silt.			
595					Same as above (590 ft).			
600								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106093

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/15/2011
Date TD Reached: 5/17/2011
Date Completed: 5/24/2011

Ground Elevation AMSL (ft): 5314.4
Y Coordinate: 1476829.02
X Coordinate: 1543042.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 459.18
At End of Drilling: Not Recorded
After Drilling: 459.12

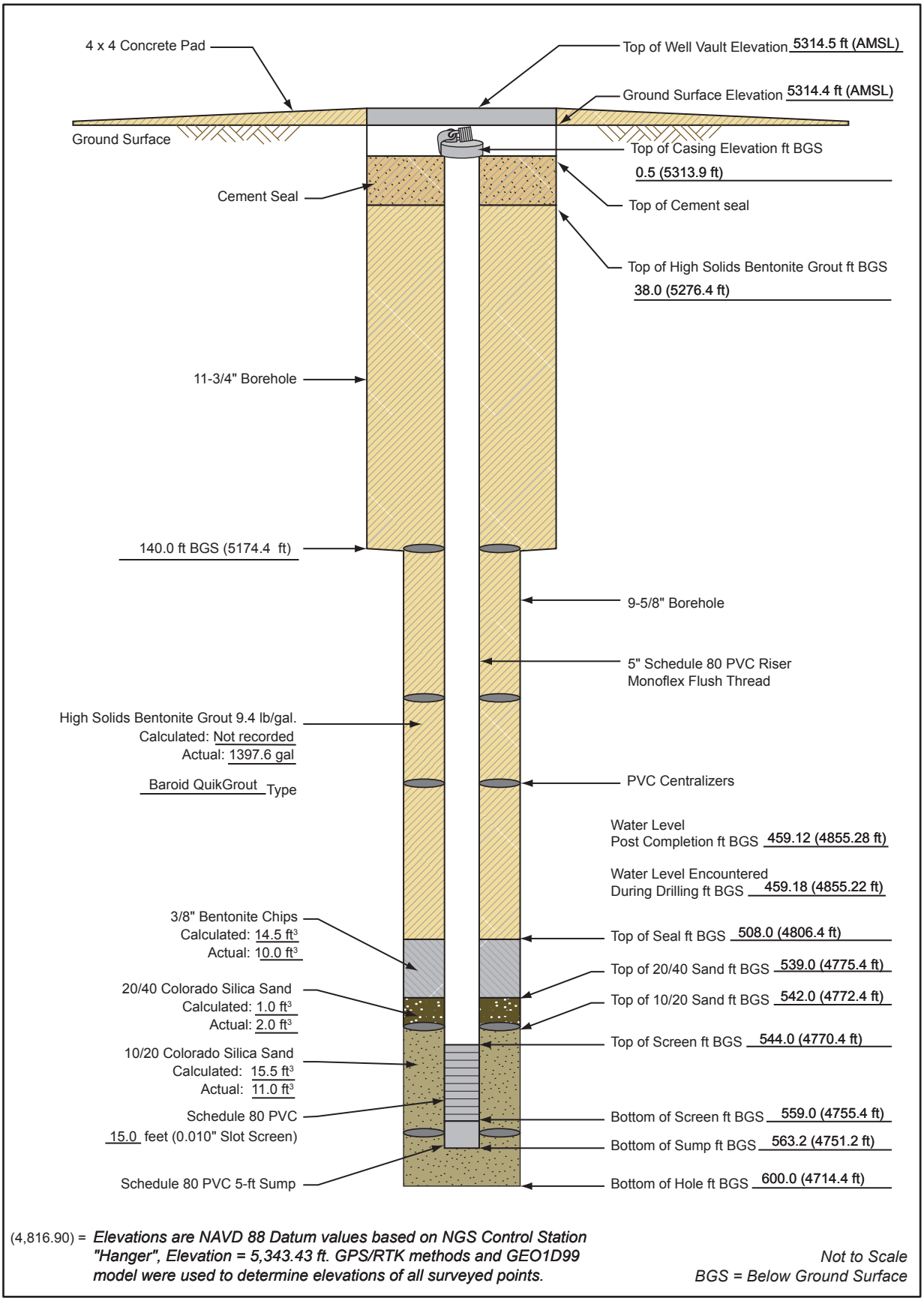
Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert/Tim O'Connor

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
600								Total depth = 600 ft. Reached @ 1526 on 5/17/11.
605								Water added during drilling (gallons) = 3050
610								Water added after drilling (gallons) = 1000
615								Water added during construction (gallons) = Not recorded.
620								
625								
630								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/22/11 16:16 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106093

Installation Start Date/Time: 5/18/2011 @ 10:30
Installation End Date/Time: 5/24/2011 @ 16:12



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106093

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106093

Personnel: V. Bracht

Date Installed: 5/20/11

Date: 6/8/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 563.23

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 6/8/11 - 6/9/11

Depth to Water Before Developing Well (ft. BGL): 459.3; 458.7 (TOC)

			Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 103.93 feet	=	1113.95	gal.	*	1	=	1113.95

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1113.95 gallons

Depth Purging From: 556 feet

Time Purging Begins: 0955, 6/9/11

Weather: Sunny, Breezy, Warm

Screened Interval (ft BGL): 544 - 557

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1000 gallons added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/8/2011	1230	458.70	10	22.46	6.27	1.322	--	Begin Bailing, Water is Cloudy
6/8/2011	1253	--	50	21.35	6.33	1.325	Out of Range	Continue Bailing, Brown
6/8/2011	1305	--	100	20.77	6.52	1.233	Out of Range	Continue Bailing, Brown
6/8/2011	1325	--	175	21.37	6.66	1.225	Out of Range	Continue Bailing, Light Brown
6/8/2011	1415	--	275	22.63	7.83	1.439	>1000	Continue Bailing, Light Brown
6/8/2011	1455	--	375	21.89	8.05	1.294	>1000	Continue Bailing, Light Brown
6/8/2011	1515	--	475	21.67	7.83	1.237	790.00	Continue Bailing, Very Cloudy
6/8/2011	1525	--	525	--	--	--	--	Stop Bailing
6/9/2011	0955	458.48	--	--	--	--	--	Begin Pumping
6/9/2011	1000	459.48	575	20.36	6.93	1.280	21.70	Continue Pumping, Slightly Cloudy

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106093

Project Number: 140705

Samplers: V. Bracht

Date: 6/8/11

Checked By:

Time Start: 1230, 6/8/11

Time Finish: 1150, 6/9/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/9/2011	1010	459.49	625	21.30	7.04	1.290	2.31	Continue Pumping, Clear
6/9/2011	1020	459.51	675	21.29	7.07	1.290	1.18	Continue Pumping, Clear
6/9/2011	1030	459.52	700	21.30	7.07	1.283	0.78	Continue Pumping, Clear
6/9/2011	1040	459.51	750	22.28	6.92	1.282	2.71	Continue Pumping, Clear
6/9/2011	1050	459.52	800	23.31	7.26	1.288	1.36	Continue Pumping, Clear
6/9/2011	1100	459.52	850	21.59	7.46	1.290	1.09	Continue Pumping, Clear
6/9/2011	1110	459.52	900	21.65	7.30	1.286	0.80	Continue Pumping, Clear
6/9/2011	1120	459.52	950	21.72	7.24	1.289	0.86	Continue Pumping, Clear
6/9/2011	1130	459.49	1000	21.70	7.30	1.287	0.80	Continue Pumping, Clear
6/9/2011	1140	459.51	1050	21.92	7.42	1.288	0.41	Continue Pumping, Clear
6/9/2011	1150	459.50	1125	22.05	7.52	1.289	0.50	Stop Pumping, Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Clayey SAND (SC); strong brown (7.5YR 5/6); moist; loose; 80% medium to coarse sand; subangular to rounded; 20% clay as coating on sand; medium plasticity; no odor.	SC		Hand augered. ***Note: no headspace requirement at this location.***
5					Lean CLAY with Sand (CL); reddish brown (5YR 4/4); moist; soft; medium plasticity; 85% clay nodules; 15% medium to coarse sand with pumice; subrounded to rounded; no odor.	CL		Spud @ 1005 on 6/19/11.
10					SILT (ML); yellowish red (5YR 4/6); moist; soft; low to medium plasticity; 75% silt; 20% clay; 5% sand with pumice; no odor.	ML	Cement Seal	
15					SILT (ML); yellowish red (5YR 5/6); moist; soft; low plasticity; 75% silt; 15% clay; 10% medium to coarse sand; trace pumice; no odor.			New 20' connection @ 1140. Resumed drilling @ 1145.
20					Lean CLAY (CL); reddish brown (5YR 4/4); moist; soft; medium plasticity; 80% clay; 15% silt; 5% medium to coarse sand; trace pumice; no odor.	CL		
25					SILT (ML); strong brown (7.5YR 5/6); moist; 90% silt; 5% clay; 5% fine to medium sand; no odor.	ML		
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Sandy SILT (ML); strong brown (7.5YR 5/6); slightly moist; medium stiff; low plasticity; 60% silt; 10% clay; 30% medium to coarse sand; subangular to subrounded; no odor.		Top of High Solids Bentonite Grout	
35					Same as above (30 ft); no odor.	ML		New 20' connection @ 1222. Resumed drilling @ 1227.
40					Sandy SILT (ML); strong brown (7.5YR 4/6); slightly moist; medium stiff; low plasticity; 60% silt; 40% medium to coarse sand; angular to subrounded; no odor.			No recovery @ 1235; hose clogged. Circulation restored and resumed drilling @ 1335.
45					Silty SAND with Gravel (SM); strong brown (7.5YR 5/6); slightly moist; 30% fine to coarse sand; subangular to rounded; 30% gravel to 1in; angular to subrounded; 30% silt; 10% clay; no odor. Note: gravel is granite and metamorphic.	SM		
50					SILT (ML); strong brown (7.5YR 5/6); slightly moist; 90% silt; 5% clay; 5% sand; no odor.	ML		
55					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; soft to medium stiff; medium plasticity; 100% clay; no odor.	CL		New 20' connection @ 1357. Resumed drilling @ 1402.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT (ML); strong brown (7.5YR 5/6); moist; soft; low plasticity; 80% silt; 20% clay nodules; trace sand; no odor.			
65					SILT (ML); strong brown (7.5YR 5/8); slightly moist; 100% silt; trace sand; no odor.	ML		
70					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; soft; low plasticity; 100% clay; no odor.	CL		Injected water to clean out clay and silt.
75					No cuttings returned.		High Solids Bentonite Grout	New 20' connection @ 1548. Resumed drilling @ 1554.
80					Lean CLAY (CL); strong brown (7.5YR 5/6); saturated; soft; 90% clay; 10% silt; no odor.			Resumed injecting water.
85					Same as above (80 ft); saturated; no odor.	CL		
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Lean CLAY (CL); brown (7.5YR 5/4); saturated; soft; 85% clay; 5% silt; 10% sand; no odor.	CL		Continued injecting water.
95					Well graded SAND (SW); yellowish brown (10YR 5/6); wet; 100% fine to coarse sand; subrounded to rounded; trace clay; no odor.	SW		New 20' connection @ 1625. Resumed drilling @ 1630.
100					Clayey SAND (SC); dark yellowish brown (10YR 4/4); saturated; 55% fine to coarse sand; subangular to rounded; 45% clay; soft; low plasticity; no odor.	SC		
105					Lean CLAY (CL); brown (7.5YR 5/4); saturated; soft; 90% clay; 10% very fine to fine sand; no odor.	CL	High Solids Bentonite Grout	
110					Lean CLAY (CL); brown (7.5YR 5/4); saturated; soft; 100% clay; no odor.			
115					Lean CLAY (CL); brown (7.5YR 5/4); saturated; soft to medium stiff; medium plasticity; 80% clay nodules; 20% silt; no odor.			
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Lean CLAY (CL); brown (7.5YR 5/4); saturated; soft to stiff; high plasticity; 100% clay nodules; no odor.			Continued injecting water.
125					Same as above (120 ft); no odor.			
130					Lean CLAY (CL); brown (7.5YR 5/4); saturated; soft; 90% clay; 10% silt; no odor.			End of 6/19/11 @ 1730. New 20' connection @ 0735 on 6/20/11. Resumed drilling @ 0744. Continued injecting water.
135					Sandy lean CLAY (CL); brown (7.5YR 5/4); saturated; soft; 70% clay; 30% fine sand; subrounded to rounded; no odor.	CL	High Solids Bentonite Grout	
140					Lean CLAY with Sand (CL); brown (7.5YR 5/4); saturated; soft; 80% clay; 20% fine sand; subrounded to rounded; no odor.			
145					Sandy lean CLAY (CL); brown (7.5YR 5/4); saturated; soft; 70% clay; 30% fine sand; subrounded to rounded; no odor.			
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Lean CLAY (CL); brown (7.5YR 5/4); saturated; soft; 90% clay; 5% silt; 5% sand; no odor.	CL		Continued injecting water downhole.
155					Clayey GRAVEL (GC); light brown (7.5YR 6/4); saturated; 70% gravel to 0.5in; angular to subrounded; 30% clay as coating on gravel; soft; no odor. Note: gravel is granite and metamorphic.	GC		New 20' connection @ 0915. Resumed drilling @ 0920.
160					Clayey GRAVEL (GC); light brown (7.5YR 6/4); saturated; 80% gravel to 0.75in; angular to subrounded; 20% clay as coating on gravel; soft; no odor.	GC		
165					Sandy lean CLAY (CL); brown (7.5YR 5/4); saturated; soft; 60% clay; 40% very fine to fine sand; subrounded to rounded; no odor.	CL	High Solids Bentonite Grout	
170					Clayey SAND (SC); brown (7.5YR 5/4); saturated; 70% fine to coarse sand; subangular to subrounded; 30% clay; soft; trace gravel; no odor.	SC		
175					Clayey SAND (SC); brown (7.5YR 5/4); saturated; 55% fine to medium sand; subrounded to rounded; 45% clay; soft; trace gravel; no odor.	SC		
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; 100% fine to medium sand; subrounded to rounded; slight sweet odor.	SP		Total depth with 11-3/4" casing @ 1100. End of 6/20/11. Resumed drilling with 9-5/8" casing @ 0735 on 6/21/11.
185					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; 100% fine to coarse sand; subangular to rounded; slight sweet odor.	SW		
190					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; 75% fine to medium sand; 25% coarse sand; slight sweet odor.	SW		
195					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; 100% fine to coarse sand; subrounded to rounded; no odor. Note: abundant pumice.	SW	High Solids Bentonite Grout	New 20' connection @ 0857. Resumed drilling @ 0902.
200					Clayey SAND (SC); brown (7.5YR 5/4); wet; 60% fine to medium sand; subrounded to rounded; 10% gravel to 0.25in; subrounded to rounded; 30% clay; soft; low plasticity; no odor.	SC		
205					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; 100% fine to coarse sand; subangular to rounded; slight sweet odor.	SW		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded GRAVEL with Clay and Sand (GP-GC); yellowish brown (10YR 5/4); moist; 60% gravel to 0.5in; subangular to rounded; 30% fine to coarse sand; subrounded to rounded; 10% clay as coating on gravel; slight sweet odor.	GP-GC		
215					Clayey SAND with Gravel (SC); strong brown (7.5YR 4/6); wet; 50% fine to coarse sand; subrounded to rounded; 20% gravel to 0.75in; subrounded to rounded; 30% clay; soft; low plasticity; slight sweet odor. Note: gravel is metamorphic.	SC		New 20' connection @ 0910. Resumed drilling @ 0915.
220					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; 100% fine to medium sand; subrounded to rounded; trace gravel; trace clay; slight sweet odor.	SP		
225					Well graded GRAVEL with Sand (GW); yellowish brown (10YR 5/4); moist; 70% gravel to 1.5in; subrounded to rounded; 30% fine to coarse sand; subangular to rounded; trace clay; slight sweet odor. Note: gravel is metamorphic.	GW	High Solids Bentonite Grout	
230					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); moist; 60% fine to coarse sand; subangular to rounded; 40% gravel to 0.75in; subrounded to rounded; abundant pumice; no odor. Note: gravel is granite and metamorphic.	SW		
235					Well graded GRAVEL with Sand (GW); yellowish brown (10YR 5/4); moist; 70% gravel to 2in; subrounded to rounded; 25% fine to coarse sand; subangular to rounded; 5% clay; slight sweet odor. Note: gravel is metamorphic.	GW		New 20' connection @ 0926. Resumed drilling @ 0930.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; 100% fine to medium sand; trace coarse sand; subrounded to rounded; trace gravel; trace pumice; slight sweet odor.	SP	High Solids Bentonite Grout	New 20' connection @ 0940. Resumed drilling @ 0945.
245					Poorly graded SAND (SP); brown (10YR 5/3); moist; 100% fine sand; trace medium sand; trace gravel; rounded; slight sweet odor.			
250					Same as above (245 ft); yellowish brown (10YR 5/4); 90% fine sand; 10% medium sand; trace pumice; slight sweet odor.			
255					Same as above (245 ft); pale brown (10YR 6/3); trace medium to coarse sand; trace pumice; slight sweet odor.			
260					Same as above (245 ft); yellowish brown (10YR 5/4); slight sweet odor.			
265					Same as above (245 ft); 75% fine sand; 25% medium to coarse sand; subrounded to rounded; slight sweet odor.			
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; soft; low to medium plasticity; 90% clay; 10% fine sand; subangular to rounded; no odor.			
275					Same as above (270 ft); soft to stiff; low plasticity; no odor.	CL		New 20' connection @ 0957. Resumed drilling @ 1002.
280					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; 100% very fine to fine sand; rounded; trace clay; slight sweet odor.			
285					Same as above (280 ft); pale brown (10YR 6/3); 80% very fine to fine sand; 20% medium to coarse sand; subrounded to rounded; slight sweet odor.		High Solids Bentonite Grout	
290					Same as above (280 ft); yellowish brown (10YR 5/4); subangular to rounded sand; slight sweet odor.	SP		
295					Same as above (280 ft); pale brown (10YR 6/3); dry; subrounded to rounded sand; slight sweet odor.			New 20' connection @ 1020. Resumed drilling @ 1023.
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded SAND (SP); yellowish brown (10YR 5/4); slightly moist; 80% very fine to fine sand; 20% medium to coarse sand; subrounded to rounded; slight sweet odor.	SP		
305					Same as above (300 ft); dry; 100% very fine to fine sand; trace medium sand; subrounded to rounded; slight sweet odor.			
310					Well graded GRAVEL with Sand (GW); yellowish brown (10YR 5/4); slightly moist; 75% gravel to 1in; angular to subrounded; 25% fine to coarse sand; subangular to rounded; slight sweet odor. Note: gravel is granite and metamorphic.	GW		
315					Well graded GRAVEL with Sand (GW); various colors; dry; 85% gravel to 1.5in; angular to subrounded; 15% fine to coarse sand; subangular to rounded; slight sweet odor. Note: gravel is granite and metamorphic.		High Solids Bentonite Grout	New 20' connection @ 1056. Resumed drilling @ 1101.
320					Well graded GRAVEL (GW); yellowish brown (10YR 5/4); dry; 95% gravel to 1.5in; angular to subrounded; 5% fine to coarse sand; subangular to rounded; slight sweet odor.			
325					Well graded SAND (SW); yellowish brown (10YR 5/4); slightly moist; 100% fine to coarse sand; subangular to rounded; slight sweet odor.	SW		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); brown (10YR 5/3); dry; 80% very fine to fine sand; 20% medium sand; subrounded to rounded; slight sweet odor.	SP		
335					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; 100% fine to coarse sand; subangular to rounded; no odor.	SW		New 20' connection @ 1233. Resumed drilling @ 1237.
340					Well graded SAND with Gravel (SW); brown (10YR 5/3); dry; 60% fine to coarse sand; subangular to rounded; 40% gravel to 1in; angular to subrounded; slight sweet odor. Note: gravel is granite with metamorphic.			
345					Well graded SAND (SW); various colors; dry; 50% fine to medium sand; 50% coarse sand; angular to rounded; slight sweet odor.		High Solids Bentonite Grout	
350					Well graded SAND with Gravel (SW); grayish brown (10YR 5/2); dry; 70% fine to coarse sand; angular to rounded; 30% gravel to 1in; subangular to rounded; no odor. Note: gravel is granite and metamorphic.			
355					Well graded SAND (SW); various colors; dry; 100% fine to coarse sand; angular to subrounded; slight sweet odor.			New 20' connection @ 1308. Resumed drilling @ 1312.
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); dry; 65% fine to coarse sand; angular to subrounded; 35% gravel to 1in; subangular to rounded; slight sweet odor. Note: gravel is granite and metamorphic.			
365					Well graded SAND (SW); various colors; slightly moist; 100% fine to coarse sand; angular to rounded; slight sweet odor.	SW		
370					Well graded SAND with Gravel (SW); brown (10YR 5/3); 55% fine to coarse sand; angular to rounded; 45% gravel to 0.75in; angular to subrounded; slight sweet odor. Note: gravel is granite and metamorphic.			
375					Poorly graded SAND with Clay (SP-SC); brown (10YR 5/3); dry; 90% fine to medium sand; subangular to rounded; 10% clay; soft; low plasticity; no odor.	SP-SC	High Solids Bentonite Grout	New 20' connection @ 1332. Resumed drilling @ 1336.
380					Poorly graded SAND (SP); pale brown (10YR 6/3); dry; 90% fine sand; 10% medium sand; trace coarse sand; subrounded to rounded; no odor.			
385					Poorly graded SAND (SP); brown (10YR 5/3); dry; 100% very fine to fine sand; subrounded to rounded; no odor.	SP		
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); brown (10YR 5/3); dry; 100% fine to medium sand; trace coarse sand; subangular to rounded; no odor.			
395					Same as above (390 ft); slight sweet odor.	SP		New 20' connection @ 1407. Resumed drilling @ 1412.
400					Well graded SAND (SW); grayish brown (10YR 5/2); dry; 100% fine to coarse sand; subangular to rounded; trace gravel; slight sweet odor.			
405					Same as above (400 ft); brown (10YR 5/3); slight sweet odor.	SW	High Solids Bentonite Grout	
410					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; 100% very fine to fine sand; subrounded to rounded; slight odor.	SP		
415					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; 100% fine to coarse sand; subangular to rounded; slight sweet odor.	SW		New 20' connection @ 1439. Resumed drilling @ 1443.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					No cuttings returned.			
425					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; 100% fine to coarse sand; subangular to rounded; no odor.			
430					Well graded SAND with Gravel (SW); various colors; dry; 70% fine to coarse sand; angular to subrounded; 30% gravel to 0.25in; angular to subangular; slight odor. Note: gravel is granite and metamorphic.	SW	High Solids Bentonite Grout	
435					Lean CLAY with Gravel (CL); gray (2.5Y 5/1); dry; stiff; low plasticity; 80%; clay nodules; 20% gravel to 1in; angular to subrounded; trace coarse sand; slight sweet odor. Note: gravel is granite and metamorphic.			New 20' connection @ 1508. Resumed drilling @ 1515.
440					Lean CLAY (CL); yellowish brown (10YR 5/6); moist; soft; low to medium plasticity; 100% clay; slight sweet odor.	CL	Top of Bentonite Seal	
445					SILT (ML); yellowish brown (10YR 5/4); moist; 100% silt; trace clay; slight sweet odor.	ML		
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:58 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND (SW); brown (10YR 5/3); slightly moist; 100% fine to coarse sand; subangular to rounded; slight sweet odor.			
455					Well graded SAND (SW); yellowish brown (10YR 5/4); slightly moist; 90% fine to coarse sand; subangular to rounded; 10% gravel to 0.75in; angular to subrounded; slight sweet odor. Note: gravel is metamorphic.	SW		New 20' connection @ 1543. Resumed drilling @ 1548.
460					Poorly graded SAND (SP); brown (10YR 5/3); slightly moist; 80% fine sand; 20% medium to coarse sand; subangular to rounded; slight sweet odor.		Bentonite Seal	
465					Same as above (460 ft); dry; no odor.	SP		
470					Well graded GRAVEL (GW); dry; 100% gravel to 1in; subangular to rounded; no odor. Note: gravel is granite and metamorphic; clay coating on gravel - light brownish gray (10YR 6/2).	GW	5" Schedule 80 PVC Riser	
475					Well graded SAND (SW); brown (10YR 5/3); dry; 100% fine to coarse sand; subangular to rounded; slight sweet odor.	SW	Top of 20/40 Sand	New 20' connection @ 1615. Resumed drilling @ 1620.
480								

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Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded GRAVEL with Sand (GW); light brownish gray (10YR 6/2); dry; 70% gravel to 1in; subangular to rounded; 30% fine to coarse sand; subangular to rounded; strong sweet odor. Note: gravel is granite and metamorphic.	GW	Top of 10/20 Sand	
485					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; 80% fine to coarse sand; subangular to rounded; 20% gravel to 1in; subangular to subrounded; strong sweet odor. Note: gravel is metamorphic.	SW	Top of 5" Schedule 80 PVC 0.010" Slot Screen	Driller noted strong odor.
490					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; 80% fine sand; 15% medium sand; 5% coarse sand; subrounded to rounded; strong sweet odor.	SP		
495					Well graded SAND with Gravel (SW); brown (10YR 4/3); wet; 60% fine to coarse sand; subangular to rounded; 40% gravel to 2in; subrounded to rounded; sweet odor. Note: gravel is granite and metamorphic.	SW		End of 6/21/11. New 20' connection @ 0925 on 6/22/11. Resumed drilling @ 0929.
500					No cuttings returned.			
505					Well graded SAND (SW); yellowish brown (10YR 5/4); wet; 100% fine to coarse sand; subangular to subrounded; sweet odor.	SW	Bottom of Screen Sump Bottom of Sump	
510								

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Borehole ID: KAFB-106094

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/19/2011
Date TD Reached: 6/22/2011
Date Completed: 6/26/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1474712.29
X Coordinate: 1542109.87

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.62
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510								
					Clayey SAND (SC); brown (10YR 4/3); saturated; 55% very fine to fine sand; subrounded to rounded; 45% clay; soft; no odor.	SC		
515					Clayey SAND (SC); brown (10YR 4/3); saturated; 70% fine to medium sand; subangular to rounded; 30% clay; soft; sweet odor.		Bottom of Filter Pack Native Backfill	
520								Total depth = 520 ft. Reached @ 1010 on 6/22/11.
525								Water added during drilling (gallons) = Not recorded.
								Water added after drilling (gallons) = 100
530								Water added during construction (gallons) = 40
								Spud: started drilling from surface.
535								
540								

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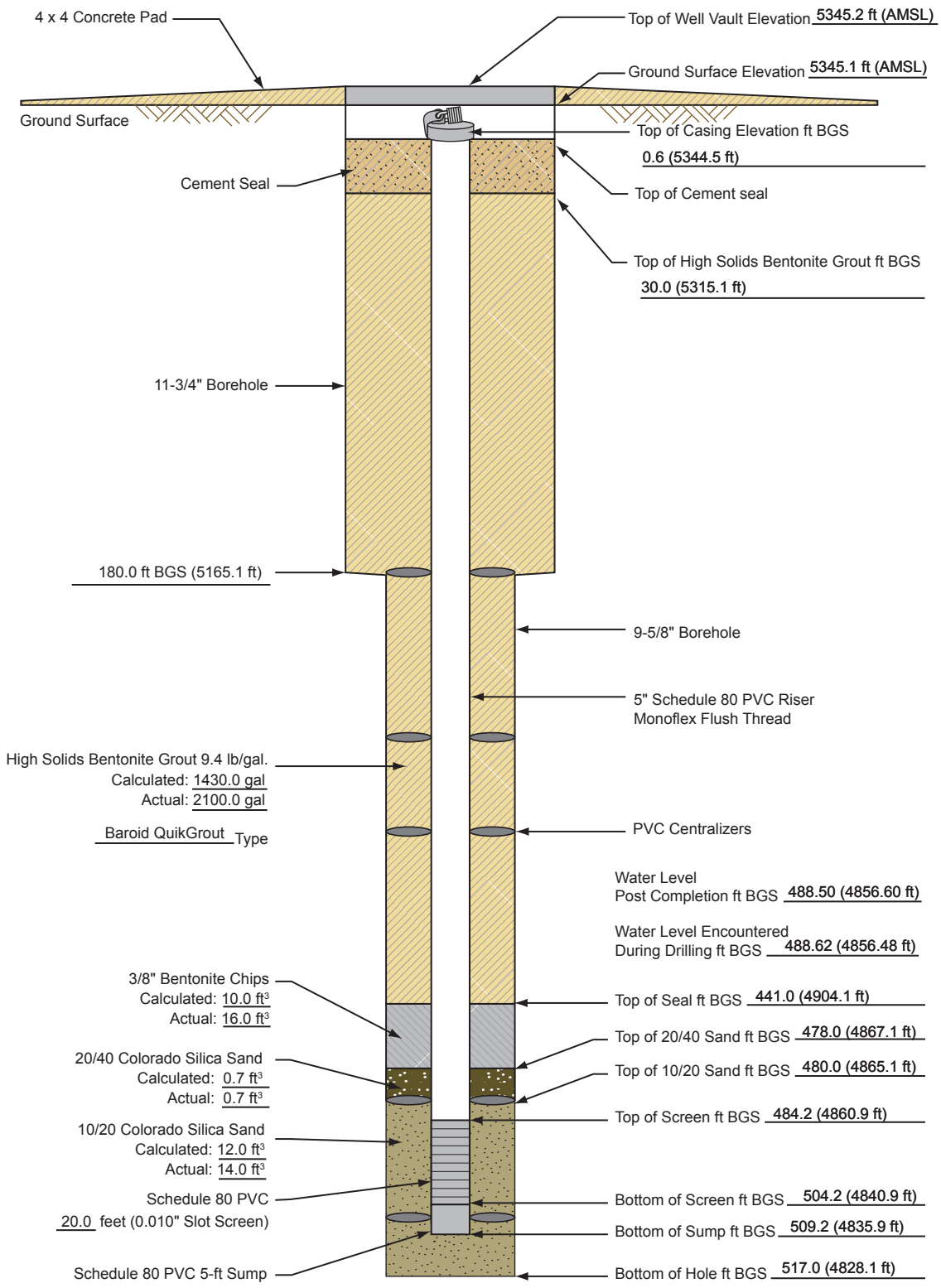
Monitoring Well Completion Diagram KAFB-106094

Installation Start Date/Time: 6/22/2011 @ 12:45
Installation End Date/Time: 6/26/2011 @ 14:00



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106094

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106094

Personnel: V. Bracht

Date Installed: 6/26/11

Date: 7/6/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 509.2

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 7/6/11

Depth to Water Before Developing Well (ft. BGL): 488.85, 488.14 (TOC)

				Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column:	20.35	feet	=	148.89	gal.	* 1	=	148.89

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2 - r_c^2) * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 148.89 gallons

Depth Purging From: 500 feet

Time Purging Begins: 1215, 7/6/11

Weather: Sunny, Breezy, Warm

Screened Interval (ft BGL): 484.2 - 504.2

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 100 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
7/6/2011	0950	488.14	5	21.14	6.10	0.454	Out of Range	Begin Bailing; Water is Muddy Brown; Product Odor
7/6/2011	1000	--	15	--	--	--	--	Bailed
7/6/2011	--	--	--	--	--	--	--	Swabbed 15 Minutes
7/6/2011	1215	488.21	--	--	--	--	--	Begin Pumping at 5 GPM
7/6/2011	1220	489.04	--	32.39	6.79	0.524	>1000	Continue Pumping; Light Brown; Slight Odor
7/6/2011	1225	489.04	40	21.70	7.00	0.449	>1000	Continue Pumping; Brown; Slight Odor
7/6/2011	1230	489.05	65	21.98	6.17	0.451	373.00	Continue Pumping; Light Brown
7/6/2011	1235	489.05	90	22.32	5.71	0.457	30.80	Continue Pumping; Slightly Cloudy; Faint Odor
7/6/2011	1240	489.19	115	22.28	5.68	0.460	14.70	Continue Pumping; Mostly Clear; Faint Odor
7/6/2011	1245	489.20	140	22.33	5.53	0.459	11.10	Continue Pumping; Clear; Faint Odor

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106094

Project Number: 140705

Samplers: V. Bracht

Date: 7/6/11

Checked By:

Time Start: 0950, 7/6/11

Time Finish: 1300, 7/6/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
7/6/2011	1250	489.20	165	22.16	5.44	0.460	5.60	Continue Pumping; Clear; Faint Odor
7/6/2011	1255	489.21	190	22.24	5.51	0.460	3.44	Continue Pumping; Clear; Odor
7/6/2011	1300	489.22	215	22.34	5.51	0.461	2.32	Stop Pumping; Clear; Odor; Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); yellowish red (5YR 4/6); dry to moist; 70% silt; 30% medium to coarse sand with pumice; subangular to subrounded; no odor.			Hand augered. ***Note: no headspace requirement at this location.***
5					SILT (ML); yellowish red (5YR 5/6); dry to moist; soft; medium to high plasticity; 70% silt; 30% clay nodules; trace coarse sand; no odor.			Began drilling @ 1640 on 6/7/11.
10					SILT (ML); yellowish red (5YR 4/6); dry to moist; 80% silt; 10% clay; 10% medium to coarse sand; subangular to rounded; no odor.	ML		
15					SILT (ML); yellowish red (5YR 5/6); dry to moist; 100% silt; trace medium to coarse sand; no odor.		Cement Seal	New 20' connection @ 1707. Resumed drilling @ 1714.
20					Lean CLAY (CL); reddish brown (5YR 4/4); dry to moist; soft; low to medium plasticity; 60% clay nodules; 30% silt; 10% coarse sand with trace pumice; subangular to rounded; no odor.			
25					Lean CLAY (CL); reddish brown (5YR 4/4); moist; soft; medium to high plasticity; 100% clay nodules; trace silt; trace fine sand; no odor.	CL		
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT with Sand (ML); strong brown (7.5YR 5/8); dry to moist; stiff; low plasticity; 70% silt; 10% clay nodules; 20% medium to coarse sand with pumice; subangular to subrounded.			
35					SILT (ML); yellowish red (5YR 5/6); dry to moist; soft; low plasticity; 80% silt; 10% clay; 10% medium to coarse sand; subangular to subrounded; no odor.		Cement Seal	End of 6/7/11. New 20' connection @ 0730 on 6/8/11. Resumed drilling @ 0738.
40					SILT (ML); strong brown (7.5YR 5/6); dry to moist; 90% silt; 10% medium to coarse sand; subangular to subrounded; no odor.		Top of High Solids Bentonite Grout	
45					Same as above (40 ft); strong brown (7.5YR 4/6); no odor.	ML		
50					SILT (ML); strong brown (7.5YR 5/8); dry to moist; 100% silt; no odor.			
55					Same as above (50 ft); strong brown (7.5YR 5/6); moist; no odor.			New 20' connection @ 0820. Resumed drilling @ 0826.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT (ML); strong brown (7.5YR 5/8); moist; soft; low plasticity; 90% silt; 10% clay; trace sand; no odor.	ML		
65					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; soft; low to medium plasticity; 60% clay; 40% silt; no odor.	CL		
70					SILT (ML); yellowish red (5YR 5/6); moist; soft; low to medium plasticity; 90% silt; 10% clay; no odor.	ML		
75					SILT (ML); strong brown (7.5YR 5/6); dry to moist; stiff; low plasticity; 70% silt; 20% clay nodules; 10% coarse sand with pumice; subangular to subrounded; no odor.	ML	High Solids Bentonite Grout	New 20' connection @ 0855. Resumed drilling @ 0900.
80					Lean CLAY (CL); strong brown (7.5YR 5/6); dry to moist; stiff; low plasticity; 70% clay nodules; 25% silt; 5% coarse sand; subangular to subrounded; no odor.	CL		
85					SILT (ML): yellowish red (5YR 5/6); dry to moist; stiff; low plasticity; 80% silt; 20% clay nodules; no odor.	ML		
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); brown (10YR 5/3); dry to moist; 100% fine to very fine sand; trace medium sand; subrounded to rounded; no odor.	SP		
95					Well graded SAND with Gravel (SW); brown (10YR 5/3); dry to moist; 50% fine to coarse sand; subangular to rounded; 50% gravel to 0.5in; subangular to subrounded; trace clay nodules; no odor. Note: gravel is granite and metamorphic.	SW		New 20' connection @ 0925. Resumed drilling @ 0936.
100					SILT (ML); strong brown (7.5YR 5/8); dry to moist; soft; low to medium plasticity; 80% silt; 20% clay; no odor.	ML		
105					SILT (ML); reddish yellow (7.5YR 6/6); dry to moist; no odor.		High Solids Bentonite Grout	
110					SILT (ML); strong brown (7.5YR 5/8); dry to moist; 90% silt; 5% clay; 5% fine sand with pumice fragments; no odor.			
115					SILT (ML); strong brown (7.5YR 5/8); moist; soft; low plasticity; 75% silt; 20% clay; 5% medium to coarse sand with pumice; no odor.			New 20' connection @ 1005. Resumed drilling @ 1008.
120								

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Lean CLAY (CL); strong brown (7.5YR 5/6); moist; soft; low to medium plasticity; 75% clay; 20% silt; 5% medium to coarse sand with pumice; no odor.			
125					Lean CLAY (CL); strong brown (7.5YR 5/6); dry to moist; stiff; low to medium plasticity; 100% clay; no odor.	CL		
130					Same as above (125 ft); dry; no odor.			
135					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; 75% fine sand; 20% medium sand; 5% coarse sand; subrounded to rounded; slight sweet odor.	SP	High Solids Bentonite Grout	New 20' connection @ 1050. Resumed drilling @ 1053.
140					Lean CLAY with Sand (CL); strong brown (7.5YR 4/6); moist; soft; medium plasticity; 80% clay nodules; 20% medium to coarse sand with pumice; subangular to subrounded; slight sweet odor.	CL		
145					Clayey SAND (SC); strong brown (7.5YR 5/6); dry to moist; 60% fine to coarse sand; subangular to rounded; 30% clay; medium stiff; low to medium plasticity; 10% silt; slight sweet odor.	SC		Discharge hose clogged and air leaked out of top seal on hammer box @ 1100. Restored air flow and resumed drilling @ 1150.
150								

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Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
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Date Started: 6/7/2011
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Well graded SAND with Clay (SW-SC); yellowish brown (10YR 5/4); dry to moist; 90% fine to coarse sand with abundant pumice; subangular to rounded; 10% clay; slight sweet odor.	SW-SC		
155					Clayey SAND (SC); yellowish brown (10YR 4/6); moist; 70% fine to coarse sand; subangular to rounded; 30% clay nodules; soft to medium stiff; low to medium plasticity; slight sweet odor.	SC		New 20' connection @ 1215. Resumed drilling @ 1220.
160					Same as above (155 ft); slight sweet odor.	SC		
165					Same as above (155 ft); 75% sand; 25% clay; slight sweet odor.	SC	High Solids Bentonite Grout	
170					Poorly graded SAND (SP); brown (10YR 5/3); dry to moist; 100% very fine to fine sand; trace medium to coarse sand; subrounded to rounded; trace clay; slight sweet odor.	SP		
175					Sandy lean CLAY (CL); brown (7.5YR 5/4); dry to moist; stiff; medium plasticity; 70% clay nodules; 20% medium to coarse sand; angular to subrounded; 10% gravel to 0.125in; angular to subrounded; trace pumice; slight sweet odor. Note: gravel is granite and	CL		New 5' connection @ 1400. End of 6/8/11.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
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Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					metamorphic.			Total depth with 11-5/8" casing. New connection @ 1130 on 6/9/11. Resumed drilling @ 1143.
					Well graded SAND (SW); pale brown (10YR 6/3); dry; 85% fine to coarse sand; subangular to rounded; 10% gravel to 0.25in; subangular to rounded; 5% clay; slight sweet odor.			
185					Well graded SAND (SW); brown (10YR 5/3); dry; 90% fine to coarse sand; subangular to rounded; 5% gravel to 1in; subangular to subrounded; 5% clay nodules; soft; low to medium plasticity; slight sweet odor.	SW		
190					Well graded SAND (SW); pale brown (10YR 6/3); dry; 80% fine to medium sand; 20% coarse; subangular to rounded; trace gravel; trace clay; slight sweet odor.			
195					Clayey SAND (SC); yellowish brown (10YR 5/4); moist; 80% fine to medium sand; subangular to rounded; 20% clay nodules; hard to very stiff; low plasticity; slight sweet odor.	SC	High Solids Bentonite Grout	New 20' connection @ 1245. Resumed drilling @ 1248.
200					Poorly graded SAND with Clay (SP-SC); yellowish brown (10YR 5/4); moist; 70% fine sand; 20% medium sand with trace pumice; trace gravel; 10% clay nodules; soft to stiff; low to medium plasticity; slight sweet odor.	SP-SC		
205					Well graded SAND with Clay (SW-SC); yellowish brown (10YR 5/6); moist; 90% fine to coarse sand; subangular to rounded; 10% clay nodules; soft to stiff; low to medium plasticity; slight sweet odor.	SW-SC		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND with Gravel (SW); grayish brown (10YR 5/2); dry; 80% fine to coarse sand; subangular to rounded; 20% gravel to 0.25in; angular to subrounded; trace clay; no odor. Note: gravel is granite and metamorphic.	SW		
215					Well graded SAND with Gravel (SW); brown (10YR 5/3); dry to moist; 80% fine to coarse sand; subangular to rounded; 20% gravel to 1.5in; subrounded to rounded; slight sweet odor. Note: gravel is metamorphic.			New 20' connection @ 1305. Resumed drilling @ 1312.
220					Well graded SAND with Gravel (SW); light brownish gray (10YR 6/2); dry; 85% fine to coarse sand; subangular to rounded; 15% gravel to 0.75in; subangular to subrounded; slight sweet odor. Note: gravel is granite and metamorphic.			
225					Well graded SAND (SW); pale brown (10YR 6/3); moist; 100% fine to coarse sand; subrounded to rounded; abundant pumice; slight sweet odor.		High Solids Bentonite Grout	
230					Poorly graded SAND (SP); light brownish gray (10YR 6/2); dry; 90% very fine to fine sand; trace medium to coarse sand; angular to subrounded; 10% gravel to 0.75in; angular to subrounded; slight sweet odor. Note: gravel is metamorphic.	SP		
235					Well graded GRAVEL with Sand (GW); various colors; dry; 85% gravel to 1in; angular to subrounded; 15% fine to coarse sand; subangular to subrounded; no odor.	GW		New 20' connection @ 1332. Resumed drilling @ 1339.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded GRAVEL with Sand (GW); various colors; dry; 70% gravel to 1in; angular to subrounded; 30% fine to coarse sand; subangular to subrounded; no odor. Note: gravel is granite and metamorphic.	GW		
245					Well graded SAND (SW); light brownish gray (10YR 6/2); dry; 100% fine to coarse sand; angular to rounded; trace gravel; no odor.	SW		
250					Poorly graded SAND (SP); light brownish gray (10YR 6/2); dry to moist; 100% very fine to fine sand with pumice; subrounded to rounded; trace gravel; slight sweet odor.	SP		
255					Same as above (250 ft); moist; slight sweet odor.		High Solids Bentonite Grout	New 20' connection @ 1357. Resumed drilling @ 1402.
260					Same as above (250 ft); pale brown (10YR 6/3); moist; trace pumice; slight sweet odor.			
265					Well graded SAND (SW); brown (10YR 5/3); dry; 90% very fine to coarse sand; subangular to rounded; 10% gravel to 0.25in; angular to subrounded; no odor. Note: gravel is granite and metamorphic.	SW		
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					SILT (ML); brown (7.5YR 5/4); moist; trace pumice; sweet odor.	ML		
275					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; soft; medium to high plasticity; 100% clay nodules; slight sweet odor.	CL		End of 6/9/11. New 20' connection @ 0820 on 6/14/11. Resumed drilling @ 0825.
280					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; 80% fine sand; 20% medium sand; subrounded to rounded; trace pumice; slight sweet odor.	SP		
285					Well graded SAND (SW); brown (10YR 4/3); wet; 100% fine to coarse sand; subangular to subrounded; slight sweet odor.	SW	High Solids Bentonite Grout	Added water to cyclone.
290					Clayey SAND (SC); brown (7.5YR 4/4); dry; 60% fine to coarse sand; subanglular to rounded; 40% clay nodules; soft to stiff; low to medium plasticity; slight sweet odor.	SC		
295					Poorly graded SAND (SP); brown (10YR 5/3); dry; 100% very fine to fine sand; subrounded to rounded; slight sweet odor.	SP		New 20' connection @ 0850. Resumed drilling @ 0900.
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded GRAVEL with Sand (GW); pale brown (10YR 6/3); dry; 70% gravel to 1.5in; subrounded to rounded; 30% fine to coarse sand; subrounded to rounded; slight sweet odor. Note: gravel is granite and metamorphic.	GW		
305					Well graded GRAVEL (GW); various colors; wet; 85% gravel to 1.5in; subangular to subrounded; 10% coarse sand; angular to subrounded; 5% clay; no odor. Note: gravel is granite and metamorphic.			Added water to cyclone.
310					SILT (ML); yellowish brown (10YR 5/8); moist; 90% silt; 10% fine sand; rounded; trace pumice; no odor.	ML		
315					Well graded GRAVEL with Clay and Sand (GW-GC); dark yellowish brown (10YR 4/4); wet; 70% gravel to 2in; subangular to rounded; 20% very fine to fine sand; rounded; 10% clay; soft; low to medium plasticity; slight sweet odor. Note: gravel is granite and metamorphic.	GW-GC	High Solids Bentonite Grout	New 20' connection @ 0920. Resumed drilling @ 0924. Added water to cyclone.
320					Well graded GRAVEL with Sand (GW); various colors; 80% gravel to 1in; angular to subrounded; 20% fine to coarse sand; angular to rounded; trace silt and clay; slight sweet odor. Note: gravel is granite and metamorphic.	GW		
325					Poorly graded SAND (SP); brown (10YR 5/3); wet; 90% fine sand; 10% medium sand; subrounded to rounded; slight sweet odor.	SP		Added water to cyclone.
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330								
					Well graded SAND (SW); brown (10YR 4/3); dry; 100% fine to coarse sand; angular to rounded; slight sweet odor.	SW		
335								
					Poorly graded SAND (SP); brown (10YR 4/3); dry; 90% fine sand; 10% medium to coarse sand; subangular to rounded; trace gravel; slight sweet odor.	SP		New 20' connection @ 0945. Resumed drilling @ 0950.
340								
					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); wet; 100% fine sand; subrounded to rounded; slight sweet odor.	SP		Added water to cyclone.
345								
					Well graded SAND with Silt (SW-SM); dark yellowish brown (10YR 4/4); wet; 80% fine to coarse sand; angular to rounded; 10% gravel to 0.125in; angular to subrounded; 10% silt and clay; slight sweet odor.	SW-SM	High Solids Bentonite Grout	Added water to cyclone.
350								
					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); wet; 90% very fine to medium sand; trace coarse sand; subangular to rounded; 10% silt; slight sweet odor.	SW-SM		Added water to cyclone.
355								
					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); wet; 80% fine to coarse sand; subangular to rounded; 15% gravel to 1in; subangular to rounded; 5% clay; slight sweet odor. Note: gravel is metamorphic.	SW		New 20' connection @ 1005. Resumed drilling @ 1012. Added water to cyclone.
360								

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded GRAVEL (GW); various colors; dry; 90% gravel to 1in; angular to subrounded; 10% coarse sand; subangular to subrounded; no odor. Note: gravel is granite and metamorphic.	GW		
365					Well graded GRAVEL with Silt and Sand (GW-GM); brown (10YR 4/3); wet; 60% gravel to 1.5in; subangular to subrounded; 30% fine to coarse sand; subrounded to rounded; 10% silt and clay; slight sweet odor. Note: gravel is granite and metamorphic.	GW-GM		Added water to cyclone.
370					Poorly graded GRAVEL with Sand (GP); various colors; moist; 50% gravel to 0.5in; angular to subrounded; 50% medium to coarse sand; subangular to subrounded; slight sweet odor. Note: gravel is granite and metamorphic.	GP		
375					Well graded SAND (SW); brown (10YR 4/3); dry; 90% very fine to coarse sand; angular to rounded; 10% gravel to 0.25in; angular to subangular; no odor. Note: gravel is granite and metamorphic.	SW	High Solids Bentonite Grout	New 20' connection @ 1033. Resumed drilling @ 1038.
380					Same as above (375 ft); 100% very fine to coarse sand; trace gravel; slight sweet odor.			
385					Same as above (375 ft); 100% very fine to coarse sand; slight sweet odor.			
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); yellowish brown (10YR 5/4); wet; 100% very fine to medium sand; subangular to rounded; slight sweet odor.	SP		Added water to cyclone.
395					Poorly graded SAND (SP); dark yellowish brown (10YR 3/4); wet; 80% fine sand; 20% medium sand; trace coarse sand; subrounded to rounded; slight sweet odor.	SP		New 20' connection @ 1054. Resumed drilling @ 1100. Added water to cyclone.
400					Clayey SAND (SC); dark yellowish brown (10YR 4/4); wet; 85% fine to medium sand; subrounded to rounded; 15% clay; soft; low to medium plasticity; slight sweet odor.	SC		Added water to cyclone.
405					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; 100% very fine to fine sand; trace medium sand; rounded; slight sweet odor.	SP	High Solids Bentonite Grout	Added water to cyclone.
410					Same as above (405 ft); wet; slight sweet odor.	SP		Added water to cyclone.
415					Same as above (405 ft); dry; slight sweet odor.	SP		New 20' connection @ 1117. Resumed drilling @ 1122.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); brown (10YR 4/3); wet; 80% fine sand; 20% medium sand; trace coarse sand; trace gravel; subrounded to rounded; slight sweet odor.	SP		Added water to cyclone.
425					Well graded SAND (SW); dark yellowish brown (10YR 4/4); wet; 100% fine to coarse sand; subangular to rounded; slight sweet odor.	SW		Added water to cyclone.
430					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); wet; 80% fine to coarse sand; subangular to rounded; 20% gravel to 0.25in; angular to subrounded; trace clay; slight sweet odor.	SW		Added water to cyclone.
435					Silty GRAVEL with Sand (GM); brown (10YR 5/3); moist; 70% gravel to 1.75in; angular to subrounded; 15% fine to coarse sand; subangular to rounded; 15% silt; slight sweet odor. Note: gravel is granite and metamorphic.	GM	High Solids Bentonite Grout	New 20' connection @ 1140. Resumed drilling @ 1145.
440					Lean CLAY (CL); strong brown (7.5YR 5/6); moist; soft to medium stiff; low to medium plasticity; 100% clay; slight sweet odor.	CL		
445					SILT (ML); light brown (7.5YR 6/4); moist; 100% silt; trace clay; trace sand; slight sweet odor.	ML		
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Silty SAND (SM): dark yellowish brown (10YR 4/4); dry; 60% very fine to medium sand; subangular to rounded; 40% silt; trace clay; slight sweet odor.	SM		
455					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; 100% fine to medium sand; subangular to rounded; slight sweet odor.	SP	High Solids Bentonite Grout	New 20' connection @ 1205. Resumed drilling @ 1211.
460					Same as above (455 ft); 100% very fine to fine sand; trace medium sand; subrounded to rounded; slight sweet odor.		Top of Bentonite Seal	
465					Well graded SAND with Clay (SW-SC); brown (10YR 4/3); moist; 90% fine to coarse sand; subangular to rounded; 10% clay; soft; low plasticity; slight sweet odor.	SW-SC		Added water to cyclone.
470					Clayey SAND (SC); brown (10YR 4/3); damp; 80% fine to coarse sand; angular to rounded; 20% clay as coating on sand; soft; low to medium plasticity; slight sweet odor.	SC		Added water to cyclone.
475					Well graded SAND (SW); brown (10YR 4/3); dry; 100% fine to coarse sand; angular to rounded; slight sweet odor.	SW		New 20' connection @ 1228. Resumed drilling @ 1325.
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; 80% fine to coarse sand; angular to rounded; 20% gravel to 0.25in; angular to subangular; strong sweet odor. Note: gravel is granite and metamorphic.		Bentonite Seal	Added water to cyclone.
485					Well graded SAND (SW); brown (10YR 5/3); slightly moist; 50% fine sand; 25% medium sand; 25% coarse sand; subangular to rounded; sweet odor.	SW	5" Schedule 80 PVC Riser	
490					Well graded SAND (SW); brown (10YR 5/3); damp; 100% fine to coarse sand; subangular to rounded; strong sweet odor.		Native Backfill	
495					Well graded SAND with Clay and Gravel (SW-SC); dark yellowish brown (10YR 4/4); saturated; 60% fine to coarse sand; subangular to rounded; 30% gravel to 0.75in; subangular to subrounded; 10% clay; sweet odor. Note: gravel is granite and metamorphic.	SW-SC	Top of 20/40 Sand	Stopped drilling to wait for water table to equilibrate @ 1350. New 20' connection @ 1545. Resumed drilling @ 1550.
500					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); saturated; 60% fine to coarse sand; subangular to rounded; 40% gravel to 1.5in; subrounded to rounded; trace clay; sweet odor. Note: gravel is granite and metamorphic.		Top of 10/20 Sand	
505					Same as above (500 ft); 70% sand; 30% gravel to 1.5in; trace clay; sweet odor.	SW	Top of 5" Schedule 80 PVC 0.010" Slot Screen	
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
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Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); saturated; 60% fine to coarse sand; subangular to rounded; 40% gravel to 1.5in; subrounded to rounded; trace clay; sweet odor. Note: gravel is granite and metamorphic.	SW		
515					Poorly graded SAND with Clay (SP-SC); yellowish brown (10YR 5/4); saturated; 90% fine to medium sand; subrounded to rounded; 10% clay; soft; low plasticity; sweet odor.	SP-SC	Bottom of Screen	New 20' connection @ 1600. Resumed drilling @ 1605.
520					Poorly graded SAND (SP); yellowish brown (10YR 5/4); saturated; 100% fine sand; subrounded to rounded; sweet odor.	SP	Sump Bottom of Sump	
525					Well graded SAND (SW); yellowish brown (10YR 5/4); wet; 100% fine to coarse sand; angular to rounded; slight sweet odor.	SW		
530					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); wet; 70% gravel to 0.25in; subangular to rounded; 30% fine to coarse sand; subangular to rounded; trace clay; slight sweet odor. Note: gravel is granite and metamorphic.	GP	Bottom of Filter Pack	
535					Poorly graded SAND (SP); yellowish brown (10YR 5/4); wet; 80% fine sand; 20% medium to coarse sand; subrounded to rounded; slight sweet odor.	SP	Native Backfill	
540								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106095

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/7/2011
Date TD Reached: 6/14/2011
Date Completed: 6/24/2011

Ground Elevation AMSL (ft): 5344.6
Y Coordinate: 1474736.75
X Coordinate: 1542095.12

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.00
At End of Drilling: Not Recorded
After Drilling: 488.37

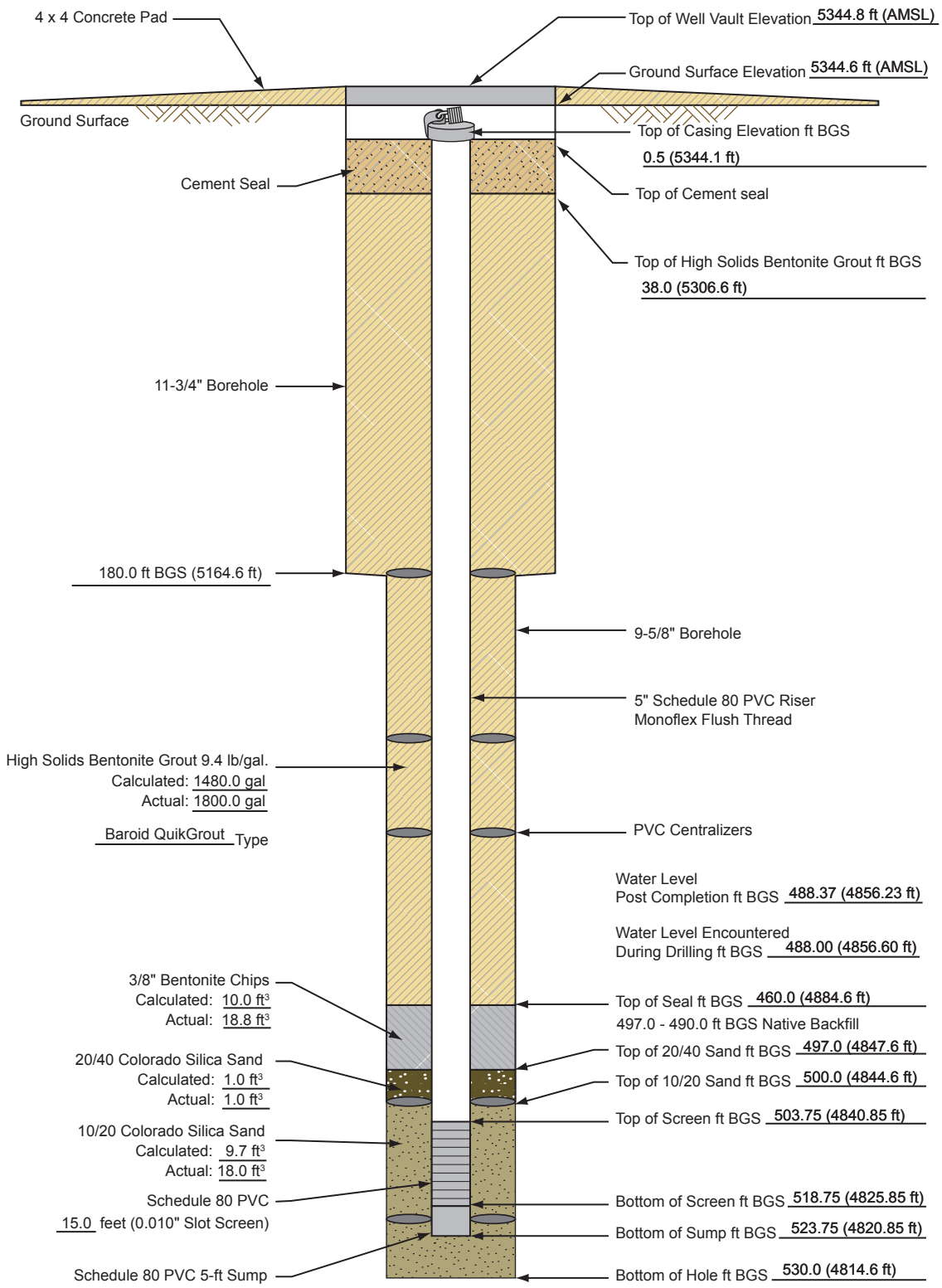
Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540								Total depth = 540 ft. Reached @ 1625 on 6/14/11.
545								Water added during drilling (gallons) = 0
								Water added after drilling (gallons) = 600
550								Water added during construction (gallons) = 40
555								
560								
565								
570								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:53 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106095

Installation Start Date/Time: 6/16/2011 @ 11:10
Installation End Date/Time: 6/24/2011 @ 14:00



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106095

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106095

Personnel: V. Bracht

Date Installed: 6/16/11

Date: 7/7/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 523.75

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 7/7/11

Depth to Water Before Developing Well (ft. BGL): 488.37, 487.70 (TOC)

	Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 35.38 feet =	659.28 gal.	*	1	=	659.28

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2 - r_c^2) * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 659.28 gallons

Depth Purging From: 519 feet

Time Purging Begins: 1023, 7/7/11

Weather: Breezy, Sunny, Warm

Screened Interval (ft BGL): 503.75 - 518.75

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 600 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
7/7/2011	0805	487.70	--	--	--	--	--	Begin Swabbing
7/7/2011	0815	--	--	--	--	--	--	Stop Swabbing
7/7/2011	0820	--	5	21.26	7.86	0.391	Out of Range	Begin Bailing; Water is Muddy Brown
7/7/2011	0830	--	15	--	--	--	--	Bailed
7/7/2011	1023	487.74	--	--	--	--	--	Begin Pumping at 5.5 GPM
7/7/2011	1025	488.27	--	25.18	6.59	0.403	Out of Range	Continue Pumping; Muddy
7/7/2011	1035	488.26	70	22.79	5.00	0.378	351.00	Continue Pumping; Cloudy
7/7/2011	1045	488.27	125	23.35	4.44	0.374	25.20	Continue Pumping; Slightly Cloudy
7/7/2011	1055	488.24	175	23.69	4.30	0.376	12.90	Continue Pumping; Fairly Clear
7/7/2011	1105	488.23	225	23.75	4.32	0.376	11.80	Continue Pumping; Clear

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106095

Project Number: 140705

Samplers: V. Bracht

Date: 7/7/11

Checked By:

Time Start: 0805, 7/7/11

Time Finish: 1330, 7/7/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
7/7/2011	1115	488.23	275	23.90	4.29	0.377	7.65	Continue Pumping; Clear
7/7/2011	1125	488.23	315	23.21	4.27	0.378	7.73	Continue Pumping; Clear
7/7/2011	1135	488.23	360	23.52	4.23	0.377	6.81	Continue Pumping; Clear
7/7/2011	1145	488.22	410	23.87	4.33	0.377	6.84	Pump Off; Clear
7/7/2011	1235	--	--	--	--	--	--	Pump On at 5 GPM
7/7/2011	1240	488.29	--	29.40	7.10	0.382	408.00	Continue Pumping; Cloudy
7/7/2011	1250	488.19	485	24.10	4.66	0.378	7.64	Continue Pumping; Clear
7/7/2011	1300	488.18	535	24.39	5.01	0.380	2.54	Continue Pumping; Clear
7/7/2011	1310	488.17	585	24.68	5.24	0.379	2.35	Continue Pumping; Clear
7/7/2011	1320	488.17	635	24.33	5.39	0.380	2.08	Continue Pumping; Clear
7/7/2011	1330	488.18	685	24.19	5.65	0.380	1.98	Stop Pumping; Clear; Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT (ML); brown (7.5YR 5/4); dry; soft; nonplastic; 100% silt; trace fine to coarse sand; no odor.			Hand augered. ***Note: no headspace requirement at this location.***
5					Same as above (0 ft).			Began drilling @ 0810 on 5/25/11.
					Same as above (0 ft); medium plasticity.			
10					Same as above (0 ft).			
15					SILT (ML); strong brown (7.5YR 4/6); dry; soft; low plasticity; 100% silt; no odor.	ML	Cement Seal	
20					SILT (ML): brown (7.5YR 5/4); dry; soft; nonplastic; 100% silt; trace fine to coarse sand; angular to subangular; no odor.			Kelly down @ 0844. New 20' connection @ 0852. Resumed drilling @ 0852.
25					Same as above (20 ft); strong brown (7.5YR 4/6); non to low plasticity.			
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT (ML); brown (7.5YR 5/4); dry; soft; nonplastic; 100% silt; trace fine to coarse sand; no odor.		Top of High Solids Bentonite Grout	
35					Same as above (30 ft); strong brown (7.5YR 5/6); trace coarse sand; angular; trace fine gravel; subrounded; no odor.			Kelly down @ 0917. New 20' connection @ 0924. Resumed drilling @ 0926.
40					Same as above (30 ft); non to low plasticity; trace coarse sand; subangular.			
45					Same as above (30 ft).	ML		
50					Same as above (30 ft).			
55					SILT (ML); strong brown (7.5YR 5/6); dry; soft; low plasticity; 100% silt; no odor.			Kelly down @ 0953. New 20' connection @ 1000. Resumed drilling @ 1001.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Lean CLAY (CL); brown (7.5YR 4/3); damp; soft; medium to high plasticity; 100% clay; no odor.	CL		
65					SILT (ML); strong brown (7.5YR 5/6); damp; soft; non to low plasticity; 100% silt; trace gravel; subangular; no odor.	ML		
70					Same as above (65 ft); brown (7.5YR 5/4); nonplastic; 95% silt; 5% fine sand; no odor.			
75					SILT (ML); strong brown (7.5YR 4/6); damp; soft; low plasticity; 95% silt; 5% fine sand; angular; no odor.		High Solids Bentonite Grout	Kelly down @ 1025. New 20' connection @ 1039. Resumed drilling @ 1040.
80					SILT (ML); light brown (7.5YR 6/4); damp; soft; nonplastic; 95% silt; 5% coarse sand; angular; no odor.			
85					No cuttings returned.			
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT (ML); light brown (7.5YR 6/4); dry; soft; nonplastic; 95% silt; 5% coarse sand; angular; no odor.	ML		
95					Lean CLAY (CL); yellowish brown (10YR 5/6); saturated; stiff; low plasticity; 80% clay nodules; 20% silt; no odor.	CL		Kelly down @ 1140. End of 5/25/11. New 20' connection @ 0950 on 5/31/11. Resumed drilling @ 0952. J. Langley (geologist) began logging.
100					Lean CLAY with Gravel (CL); yellowish brown (10YR 5/6); saturated; soft; medium to high plasticity; 85% clay; 15% gravel to 0.25in; angular to subangular; no odor. Note: gravel is composed of granite and pumice.			Poor recovery - added water downhole to wash out clays/fines. Note: added water increased plasticity of cuttings.
105					Lean CLAY (CL); yellowish brown (10YR 5/6); saturated; soft; medium to high plasticity; 90% clay; 10% silt; no odor.		High Solids Bentonite Grout	
110					Same as above (105 ft); saturated; medium stiff; high plasticity; 90% clay nodules; 10% silt; trace coarse sand; no odor.			
115					Same as above (105 ft); saturated; soft; high plasticity; 90% clay; 10% silt; no odor.			New 20' connection @ 1045. Resumed drilling @ 1048.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Lean CLAY (CL); yellowish brown (10YR 5/6); saturated; soft; high plasticity; 90% clay nodules; 10% silt; no odor.			Continued adding water downhole.
125					Lean CLAY (CL); yellowish brown (10YR 5/6); saturated; soft; high plasicity; 100% clay; no odor.			
130					Same as above (125 ft); 100% clay; some nodules are pale brown (10YR 6/3); no odor.			
135					Lean CLAY (CL); yellowish brown (10YR 5/6); saturated; soft to stiff; high plasticity; 80% clay; 10% silt; 10% fine sand; trace coarse sand with pumice; no odor.	CL	High Solids Bentonite Grout	New 20' connection @ 1130. Resumed drilling @ 1140.
140					Lean CLAY (CL); yellowish brown (10YR 5/6); saturated; soft; high plasticity; 90% clay; 10% silt; no odor.			
145					Lean CLAY (CL); yellowish brown (10YR 5/6); saturated; soft; high plasticity; 85% clay; 15% silt; trace sand; no odor.			
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Lean CLAY with Gravel (CL); yellowish brown (10YR 5/4); saturated; soft; high plasticity; 70% clay; 20% gravel to 0.75in; angular to subangular; 10% fine sand; no odor. Note: gravel is granite and metamorphic.	CL		Continued adding water downhole.
155					Well graded SAND (SW); brown (10YR 5/3); wet; 100% fine to coarse sand; subangular to rounded; no odor.	SW		Approximate top of Santa Fe Group.
160					Well graded SAND with Clay (SW-SC); dark yellowish brown (10YR 4/4); wet; 90% fine to coarse sand; subangular to rounded; 10% clay; soft; no odor.	SW-SC		New 10' connection @ 1340. Resumed drilling @ 1400.
165					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; 100% fine to coarse sand; subangular to rounded; trace clay; no odor.	SW	High Solids Bentonite Grout	
170					Poorly graded SAND (SP); yellowish brown (10YR 5/6); wet; 100% fine sand; trace coarse sand; subrounded to rounded; trace silt; no odor.	SP		
175					Well graded SAND with Silt (SW-SM); yellowish brown (10YR 5/6); wet; 90% fine to coarse sand; subangular to rounded; 10% silt; trace pumice; no odor.	SW-SM		New 5' connection @ 1130.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
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X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded GRAVEL with Sand (GP); yellowish brown (10YR 5/4); moist; 70% gravel to 0.25in; subangular to rounded; 30% fine to coarse sand; subangular to rounded; no odor. Note: gravel is granite, pumice, and metamorphic.	GP		Total depth with 11-3/4" casing @ 1440. End of 5/31/11. Resumed drilling with 9-5/8" casing @ 1110 on 6/2/11.
185					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/6); moist; 60% fine to coarse sand; 40% gravel to 0.25in; subangular to rounded; no odor. Note: gravel is granite, pumice, and metamorphic.	SW		
190					Well graded SAND (SW); yellowish brown (10YR 5/6); moist; 100% fine to coarse sand; subangular to rounded; no odor.			
195					Poorly graded SAND (SP); dark yellowish brown (10YR 4/6); moist; 100% very fine sand; trace medium sand; subrounded to rounded; no odor.	SP	High Solids Bentonite Grout	New 20' connection @ 1230.
200					Well graded SAND (SW); yellowish brown (10YR 5/6); moist; 50% fine sand; 50% medium to coarse sand; subrounded to rounded; trace pumice; trace clay; no odor.	SW		
205					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; 100% fine to coarse sand with abundant pumice; subrounded to rounded; trace gravel; no odor.			
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
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Ground Elevation AMSL (ft): 5345.3
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X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Gravel (SP); yellowish brown (10YR 5/4); moist; 80% fine to medium sand; trace coarse sand; subrounded to rounded; 20% gravel to 0.5in; subrounded to rounded; no odor. Note: gravel is granite and metamorphic.	SP		
215					Poorly graded GRAVEL with Sand (GP); yellowish brown (10YR 5/4); moist; 60% gravel to 0.5in; subangular to rounded; 40% fine to coarse sand; subangular to rounded; no odor. Note: gravel is granite and metamorphic.	GP		New 20' connection @ 1310.
220					Well graded GRAVEL (GW); various colors; moist; 100% gravel to 1in; subangular to rounded; silt and clay coating; slight sweet odor. Note: gravel is granite and metamorphic.	GW		
225					Poorly graded SAND (SP); brown (10YR 5/3); moist; 100% very fine to fine sand; subrounded to rounded; no odor.	SP	High Solids Bentonite Grout	
230					Well graded SAND (SW); light brownish gray (10YR 6/2); slightly moist; 95% fine to coarse sand; subrounded to rounded; 5% gravel to 0.125in; subangular to rounded; slight sweet odor. Note: gravel is metamorphic.	SW		
235					Clayey GRAVEL with Sand (GC); dark yellowish brown (10YR 3/4); wet; 60% gravel to 1.75in; subangular to subrounded; 20% fine to coarse sand; subrounded to rounded; 20% clay; soft; high plasticity; slight sweet odor. Note: gravel is metamorphic.	GC		New 20' connection @ 1335. Added water to cyclone.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded GRAVEL with Sand (GW); dark yellowish brown (10YR 4/4); wet; 70% gravel to 2in; subangular to rounded; 25% fine to coarse sand; subangular to rounded; 5% clay; no odor. Note: gravel is granite and metamorphic.	GW		Continued adding water to cyclone.
245					Clayey SAND (SC); brown (10YR 4/3); saturated; 70% fine to coarse sand; subrounded to rounded; 30% clay; soft; high plasticity; no odor.	SC		
250					Poorly graded SAND (SP); grayish brown (10YR 5/2); slightly moist; 100% very fine to fine sand; subrounded to rounded; no odor.	SP		
255					Clayey SAND (SC); yellowish brown (10YR 5/4); moist; 75% very fine to fine sand; trace medium sand; subrounded to rounded; 25% clay; soft; medium to high plasticity; sweet odor.	SC	High Solids Bentonite Grout	New 20' connection @ 1410.
260					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); wet; 100% very fine to fine sand; subrounded to rounded; trace clay; slight sweet odor.	SP		
265					Same as above (260 ft); wet; trace gravel to 0.75in; no odor.			
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					SILT (ML); light brown (7.5YR 6/4); dry; soft; low plasticity; 90% silt; 10% clay nodules; trace fine to coarse sand; no odor.	ML		Stopped adding water to cyclone.
275					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; 100% very fine sand; subrounded to rounded; trace gravel to 0.125in; no odor.	SP		New 20' connection @ 1455. Added water to cyclone.
280					Poorly graded SAND with Clay (SP-SC); brown (10YR 5/3); wet; 90% fine sand; trace medium to coarse sand; subrounded to rounded; 10% clay; soft; low plasticity; slight sweet odor.	SP-SC		
285					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); dry; 65% fine to coarse sand; subangular to rounded; 35% gravel to 0.5in; angular to subrounded; no odor. Note: gravel is granite and metamorphic.	SW	High Solids Bentonite Grout	
290					Well graded SAND (SW); various colors; slightly moist; 40% fine to medium sand; 60% coarse sand; angular to rounded; slight sweet odor.	SW		Paused drilling to replace hydraulic hoses @ 1610.
295					Clayey SAND with Gravel (SC); brown (10YR 5/3); moist; 40% fine to coarse sand; subangular to rounded; 40% gravel to 0.75in; angular to subrounded; 20% clay nodules; soft; medium plasticity; slight sweet odor. Note: gravel is granite and metamorphic.	SC		New 20' connection @ 1620. Resumed drilling @ 1655. Added water to cyclone.
300								

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; 100% fine to medium sand; trace coarse sand; subrounded to rounded; no odor.			Continued adding water to cyclone.
305					Well graded SAND with Gravel (SW); pale brown (10YR 6/3); slightly moist; 60% fine to coarse sand; angular to rounded; 40% gravel to 1in; angular to subrounded; no odor. Note: gravel is granite and metamorphic.	SW		
310					Well graded SAND (SW); various colors; dry; 100% fine to coarse sand; angular to subrounded; no odor.			End of 6/2/11 @ 1755. Resumed drilling @ 0805 on 6/3/11. Added water to cyclone.
315					Poorly graded SAND with Gravel (SP); various colors; wet; 80% coarse sand; 20% medium to fine sand; subangular to subrounded; gravel to 0.5in; angular to subrounded; no odor. Note: gravel is granite and metamorphic.		High Solids Bentonite Grout	New 20' connection @ 0840. Resumed drilling @ 0847.
320					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; 100% very fine to fine sand; subrounded to rounded; no odor.	SP		Added water to cyclone.
325					Well graded SAND (SW); brown (10YR 5/3); dry; 100% fine to coarse sand; angular to rounded; no odor.	SW		Stopped adding water to cyclone.
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); brown (10YR 5/3); dry; 90% very fine to fine sand; 10% medium to coarse sand; subangular to rounded; no odor.	SP		
335					Well graded SAND (SW); dark yellowish brown (10YR 4/6); dry; 100% fine to coarse sand; angular to subrounded; no odor.	SW		New 20' connection @ 1000. Resumed drilling.
340					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; 100% very fine to fine sand; trace medium to coarse sand; subrounded to rounded; no odor.	SP		
345					Well graded SAND (SW); brown (10YR 5/3); slightly moist; 100% fine to coarse sand; angular to rounded; no odor.	SW	High Solids Bentonite Grout	
350					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; 70% fine to coarse sand; angular to rounded; 30% gravel to 0.75in; angular to subrounded; no odor. Note: gravel is granite and metamorphic.	SW		
355					Well graded GRAVEL with Sand (GW); various colors; dry; 70% gravel to 1in; angular to subrounded; 30% fine to coarse sand; angular to rounded; no odor. Note: gravel is granite and metamorphic.	GW		New 20' connection @ 1100. Resumed drilling @ 1125.
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360								
365					Poorly graded GRAVEL (GP); various colors; dry; 90% gravel to 0.5in; angular to subrounded; 10% fine to medium sand; subrounded to rounded; no odor. Note: gravel is granite and metamorphic.	GP		
370					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 3/4); dry; 70% very fine to coarse sand; subangular to rounded; 30% gravel to 0.25in; subangular to rounded; no odor. Note: gravel is granite and metamorphic.	SW		
375					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; 80% very fine to fine sand; 20% medium sand; subrounded to rounded; no odor.	SP		Stopped drilling @ 1145. Ran out of casing.
380					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; 65% fine to coarse sand; subangular to rounded; 35% gravel to 0.25in; angular to subangular; no odor. Note: gravel is granite and metamorphic.	SW	High Solids Bentonite Grout	New 20' connection @ 1505. Resumed drilling @ 1510.
385					Poorly graded SAND (SP); dark yellowish brown (10YR 3/4); dry; 100% very fine to fine sand; trace medium to coarse sand; subrounded to rounded; no odor.	SP		
390					Same as above (380 ft); dry; 70% very fine to fine sand; 30% medium to coarse sand; trace gravel; subrounded to rounded; no odor.			

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; 100% very fine to fine sand; trace medium to coarse sand; subrounded to rounded; no odor.	SP		
395					Poorly graded SAND with Silt (SP-SM); dark yellowish brown (10YR 4/4); wet; 90% fine to medium sand; trace coarse sand; subangular to rounded; 10% silt; slight sweet odor.	SP-SM		New 20' connection @ 1600. Resumed drilling @ 1603.
400					Same as above (395 ft); wet; 90% very fine to fine sand; subrounded to rounded; 10% silt; slight sweet odor.			Added water to cyclone.
405					Poorly graded SAND (SP); brown (10YR 4/3); dry; 100% very fine to fine sand; trace medium to coarse sand; subrounded to rounded; no odor.	SP	High Solids Bentonite Grout	Stopped adding water to cyclone.
410					Same as above (405 ft); dark yellowish brown (10YR 3/4); dry; 100% very fine to medium sand; subangular to rounded; no odor.			
415					Well graded SAND (SW); dark yellowish brown (10YR 3/4); dry; 100% fine to coarse sand; angular to rounded; no odor.	SW		New 20' connection @ 1630. Resumed drilling @ 1635.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); dark yellowish brown (10YR 3/4); dry; 100% fine sand; subrounded to rounded; no odor.			
425					Same as above (420 ft); no odor	SP		
430					Well graded SAND (SW); various colors; dry; 100% fine to coarse sand; subangular to rounded; slight sweet odor.	SW		
435					Clayey GRAVEL with Sand (GC); dark yellowish brown (10YR 4/4); dry; 60% gravel to 1in; angular to rounded; 20% fine to coarse sand; subangular to rounded; 20% clay nodules; soft; high plasticity; slight sweet odor. Note: gravel is granite to metamorphic.	GC	High Solids Bentonite Grout	New 20' connection @ 1700. Resumed drilling @ 1710.
440					SILT (ML); strong brown (7.5YR 5/6); moist; 80% silt; 10% clay; 10% gravel to 1.5in; slight sweet odor. Note: gravel is metamorphic.	ML		
445					Silty SAND (SM); strong brown (7.5YR 5/6); moist; 80% very fine to fine sand; subrounded to rounded; 20% silt; slight sweet odor.	SM		
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); dark yellowish brown (10YR 3/4); dry; 100% very fine to medium sand; subangular to rounded; slight sweet odor.			Stopped drilling @ 1735. End of 6/3/11.
455					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; 100% fine sand; trace medium sand; subrounded to rounded; slight sweet odor.			New 20' connection @ 0810 on 6/4/11. Resumed drilling @ 0820.
460					Same as above (455 ft); slight sweet odor.	SP		
465					Same as above (455 ft); dry; slight sweet odor.		High Solids Bentonite Grout	
470					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; 100% fine to coarse sand; subangular to rounded; no odor.			
475					Well graded SAND with Gravel (SW); brown (10YR 4/3); moist; 50% fine to coarse sand; angular to rounded; 50% gravel to 0.75in; angular to subrounded; no odor. Note: gravel is metamorphic and granitic.	SW		New 20' connection @ 0910. Resumed drilling. Added water to cyclone.
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; 50% fine to coarse sand; angular to rounded; 50% gravel to 0.5in; angular to subrounded; slight sweet odor. Note: gravel is metamorphic and granitic.	SW		Stopped adding water to cyclone.
485					Well graded GRAVEL (GW); various colors; dry; 90% gravel to 1in; angular to subrounded; 10% fine to coarse sand; subangular to rounded; slight sweet odor. Note: gravel is granite and metamorphic.	GW		
490					Well graded SAND (SW); brown (10YR 4/3); wet; 90% fine to coarse sand; subangular to rounded; 10% gravel to 0.5in; subangular to subrounded; strong sweet odor. Note: gravel is metamorphic.	SW		First strong odor of fuel.
495					Poorly graded SAND (SW); dark yellowish brown (10YR 4/6); wet; 100% fine sand; trace medium sand; subrounded to rounded; strong sweet odor.	SP	High Solids Bentonite Grout	New 20' connection @ 1130. Resumed drilling @ 1132.
500					Same as above (495 ft); dark yellowish brown (10YR 3/4); sweet odor.			
505					Same as above (495 ft); dark yellowish brown (10YR 4/4); wet; 80% fine sand; 20% medium sand; sweet odor.			
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; 70% medium sand; 20% fine sand; 10% coarse sand; subrounded to rounded; sweet odor.	SW	High Solids Bentonite Grout	
515					Well graded SAND with Silt (SW-SM); dark yellowish brown (10YR 3/6); saturated; 80% fine to coarse sand; subangular to rounded; 10% gravel to 1in; angular to subangular; 10% silt; slightly sweet odor. Note: gravel is metamorphic.	SW-SM	Top of Bentonite Seal	New 20' connection @ 1240. Resumed drilling @ 1247.
520					Silty SAND (SM); dark yellowish brown (10YR 3/6); saturated; 85% fine sand; subrounded to rounded; 10% silt; 5% clay; no odor.	SM		
525					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); wet; 100% fine sand; subrounded to rounded; slight sweet odor.	SP	Native Backfill	
530					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); wet; 80% fine to coarse sand; subangular to rounded; 20% gravel to 0.25in; subangular to subrounded; no odor. Note: gravel is granite and metamorphic.	SW	Bentonite Seal	
535					Well graded SAND (SW); brown (10YR 4/3); wet; 100% fine to coarse sand; subangular to rounded; slight sweet odor.		Native Backfill	New 20' connection @ 1340. Resumed drilling @ 1348.
540							Bentonite Seal	

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					No cuttings returned.		Bentonite Seal	
545					No cuttings returned.		Native Backfill	Minimal air flow; possible cyclone blockage.
550					Clayey SAND (SC); dark yellowish brown (10YR 3/6); saturated; 70% very fine to fine sand; subrounded to rounded; 30% clay; soft, medium plasticity; no odor.	SC	5" Schedule 80 PVC Riser	Air flow restored.
555					Silty SAND (SM); brown (10YR 4/3); saturated; 70% very fine to fine sand; 30% silt; no odor.	SM	Bentonite Seal	
560					Well graded SAND with Silt and Gravel (SW-SM); dark yellowish brown (10YR 3/6); saturated; 75% fine to coarse sand; subangular to rounded; 15% gravel to 2in; subangular to subrounded; 10% silt; no odor. Note: gravel is limestone and metamorphic.	SW-SM		New 20' connection @ 1425. Resumed drilling @ 1430.
565					Well graded SAND (SW); dark yellowish brown (10YR 3/4); saturated; 90% fine to coarse sand; subangular to rounded; 10% gravel to 0.75in; angular to subrounded; no odor. Note: gravel is metamorphic.	SW	Native Backfill	
570					Silty SAND (SM); brown (10YR 4/3); saturated; 85% very fine to fine sand; trace medium to coarse sand; subrounded to rounded; 15% silt; no odor.	SM	Top of 20/40 Sand	

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
570					Clayey GRAVEL with Sand (GC); dark yellowish brown (10YR 4/4); saturated; 60% gravel to 1.5in; subangular to rounded; 25% fine to coarse sand; subangular to rounded; 15% clay nodules; soft to very stiff; low plasticity; no odor. Note: gravel is granite and metamorphic.	GC	Top of 10/20 Sand	
575					Silty SAND with Gravel (SM); brown (10YR 4/3); saturated; 70% very fine to fine sand; trace medium to coarse sand; rounded; 15% gravel to 2.5in; subangular to rounded; 10% silt; 5% clay; no odor. Note: gravel is granite and metamorphic.	SP	Top of 5" Schedule 80 PVC 0.010" Slot Screen	New 20' connection @ 1510. Resumed drilling @ 1513.
580					Well graded SAND with Gravel (SW); brown (10YR 4/3); saturated; 75% fine to coarse sand; subangular to rounded; 20% gravel to 1in; subangular to rounded; 5% silt; no odor. Note: gravel is granite and metamorphic.	SW		
585					Well graded SAND with Silt (SW-SM); brown (10YR 4/3); saturated; 90% very fine to coarse sand; angular to rounded; 10% silt; no odor.	SW-SM		
590					Poorly graded SAND with Silt (SP-SM); brown (10YR 4/3); saturated; 90% very fine to medium sand; subrounded to rounded; trace gravel to 0.75in; 10% silt; no odor.	SP-SM	Bottom of Screen Sump	
595					Same as above (590 ft); 90% very fine to fine sand; trace medium to coarse sand; 10% silt; no odor.		Bottom of Sump	New 20' connection @ 1545. Resumed drilling @ 1550.
600								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
600					Poorly graded SAND with Silt (SP-SM); brown (10YR 4/3); saturated; 90% very fine to medium sand; subrounded to rounded; trace gravel to 0.75in; 10% silt; no odor.	SP-SM		
605					Well graded SAND (SW); brown (10YR 5/3); saturated; 100% very fine to coarse sand; subangular to rounded; trace gravel to 0.25in; no odor.			
610					Same as above (605 ft); no odor.	SW	Bottom of Filter Pack	
615					Well graded SAND with Gravel (SW); brown (10YR 4/3); saturated; 70% fine to coarse sand; subangular to rounded; 25% gravel to 1in; angular to rounded; 5% silt; no odor. Note: gravel is granite and metamorphic.		Native Backfill	
620								Total depth = 620 ft. Reached @ 1620 on 6/4/11.
625								Water added during drilling (gallons) = Not recorded. Water added after drilling (gallons) = 360.
630								Water added during

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:48 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106096

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/25/2011
Date TD Reached: 6/4/2011
Date Completed: 6/7/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1474709.90
X Coordinate: 1542080.18

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 488.54
At End of Drilling: Not Recorded
After Drilling: 488.50

Drillling Contractor: Yellow Jacket
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock/Jason Langley

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
630								construction (gallons) = 0
								Kelly down: TD the joint and ready to make new connection.
635								
640								
645								
650								
655								
660								

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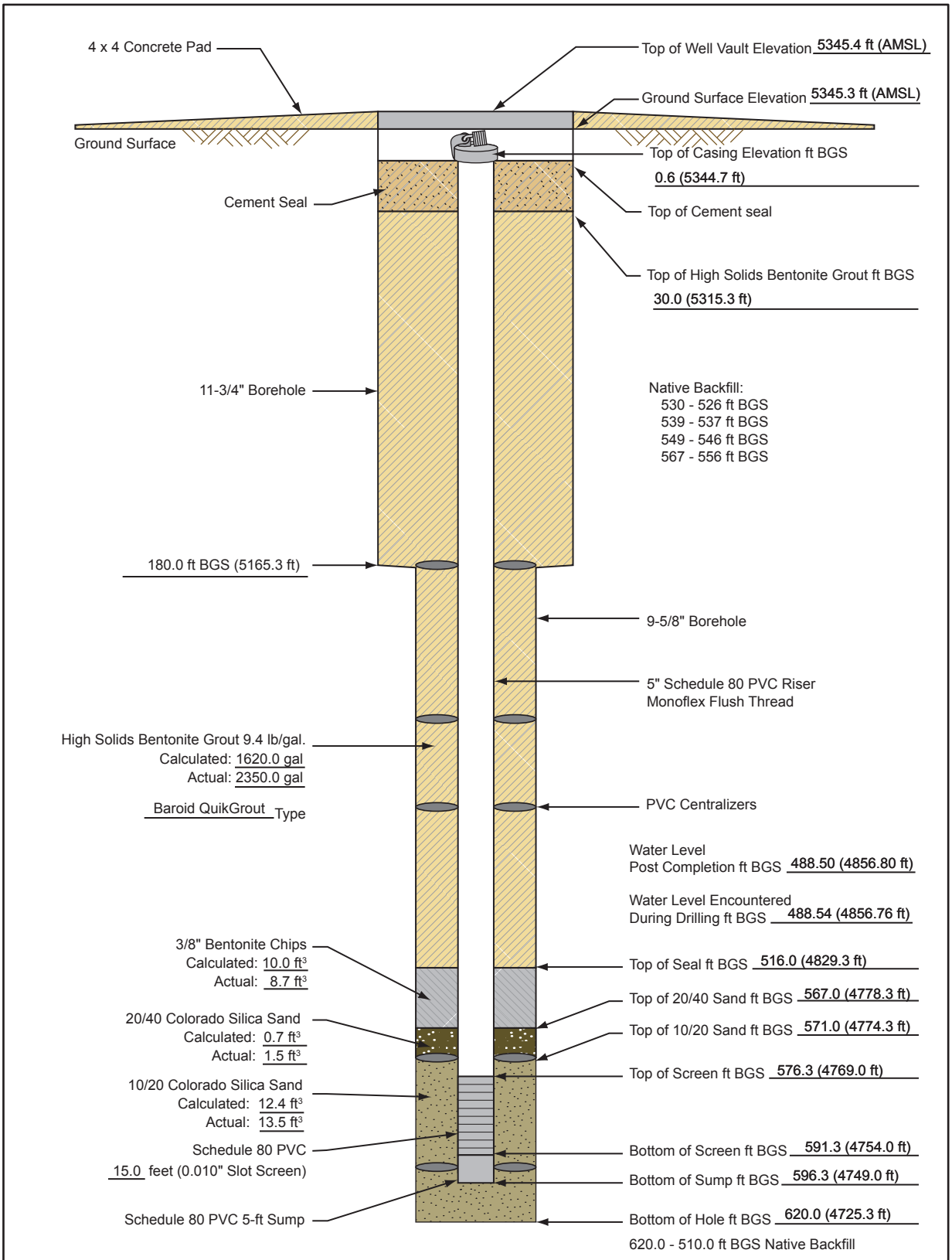
Monitoring Well Completion Diagram KAFB-106096

Installation Start Date/Time: 6/5/2011 @ 10:45
Installation End Date/Time: 6/7/2011 @ 13:45



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106096

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: GW-23

Well/Piez. No.: 106096

Personnel: G. Peacock

Date Installed: 6/5/11

Date: 7/8/11

Csg. Diameter (I.D.): 5"

Samplers: G. Peacock

Total Depth (ft. BGL): 596.3

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 7/8/11

Depth to Water Before Developing Well (ft. BGL): 489

				Vol. (V)	Purge Factor	Volume to Purge		
Height of Water Column:	107.3	feet	=	495.24	gal.	* 1	=	495.24

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2 - r_c^2) * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 495.24 gallons

Depth Purging From: 586 feet

Time Purging Begins: 1156, 7/8/11

Weather: Sunny, 100's

Screened Interval (ft BGL): 576.3 - 591.3

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 360 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
7/8/2011	0842	--	21	21.27	7.60	0.459	>1000	Bailed
7/8/2011	1156	489.50	28	33.95	6.98	0.505	546.00	Begin Pumping
7/8/2011	1204	489.60	78	27.83	5.22	0.323	594.00	Continue Pumping
7/8/2011	1213	489.60	128	24.31	4.74	0.312	31.80	Continue Pumping
7/8/2011	1221	489.60	178	23.90	4.63	0.308	19.60	Continue Pumping
7/8/2011	1231	489.60	228	24.10	4.92	0.307	12.60	Continue Pumping
7/8/2011	1240	489.58	278	24.06	5.19	0.305	10.40	Continue Pumping
7/8/2011	1249	489.60	328	23.12	5.65	0.304	10.60	Continue Pumping
7/8/2011	1306	489.60	428	23.94	6.97	0.305	10.30	Continue Pumping
7/8/2011	1315	489.60	478	23.92	6.65	0.306	6.65	Stop Pumping
7/8/2011	1315	--	488	--	--	--	--	Total Removed

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); brown (7.5YR 4/3); moist; soft; nonplastic; 70% silt; 30% fine to medium sand; trace fine gravel to 1.5cm.	ML		Hand augered. ***Note: no headspace requirement at this location.***
5					Same as above (0 ft); light brown (7.5YR 6/3); dry; low plasticity.			Began drilling @ 1427 on 4/18/11.
10					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 60% very fine to coarse sand; trace fine gravel to 1.2cm; 40% silt.	SM	Cement Seal	
15					Same as above (10 ft).			New 20' connection @ 1434. Resumed drilling @ 1440.
20					SILT with Sand (ML); strong brown (7.5YR 4/6); dry; stiff; low plasticity; 85% silt; 15% very fine to coarse sand to 4mm.	ML		
25					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 60% very fine to coarse sand; trace fine gravel to 1.2cm; 40% silt.	SM		
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 55% very fine to coarse sand; 5% fine gravel to 4.5cm; 40% silt.	SM	Top of High Solids Bentonite Grout	
35					SILT with Sand (ML); strong brown (7.5YR 4/6); dry; stiff; low plasticity; 75% silt; 25% very fine to fine sand to 0.5mm.	ML		New 20' connection @ 1448. Resumed drilling @ 1459.
40					Sandy lean CLAY (CL); reddish brown (5YR 5/4); dry; very stiff; medium plasticity; 60% clay; 10% silt; 30% fine to coarse sand; trace fine gravel to 1cm.	CL		
45					Same as above (40 ft).	CL		
50					Sandy lean CLAY with Gravel (CL); reddish brown (5YR 5/4); dry; very stiff; medium plasticity; 50% clay; 30% fine to coarse sand; 20% fine gravel to 1.3cm.	CL		
					SILT (ML); lense.	ML		
55					Silty SAND (SM); brown (7.5YR 5/4); dry; dense; 70% very fine to very coarse sand; trace fine gravel to 1.1cm; 30% silt.	SM		New 20' connection @ 1510. Resumed drilling @ 1516.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); brown (7.5YR 4/4); moist; very stiff; low plasticity; 75% silt; 10% clay; 15% very fine sand to 0.1mm.	ML		
65					Same as above (60 ft); 85% silt; trace clay.			
70					Same as above (60 ft); 85% silt; trace clay.			
75					Same as above (60 ft).		High Solids Bentonite Grout	New 20' connection @ 1524. Resumed drilling @ 1530.
80					Lean CLAY (CL); reddish brown (5YR 4/4); moist; very stiff; medium plasticity; 90% clay; 10% silt.	CL		
85					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; stiff; low plasticity; 85% silt; 15% fine to medium sand to 1mm. Same as above (83 ft); brown (7.5YR 5/4).	ML		
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Silty SAND (SM); brown (7.5YR 5/4); dry; medium dense; 85% very fine to fine sand to 0.5mm; rounded; 15% silt.	SM		
95					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 5/4); dry; medium dense; 90% fine to medium sand to 2mm; rounded; 10% silt.	SP-SM		New 20' connection @ 1542. Resumed drilling @ 1551.
100					Poorly graded SAND (SP); brown (10YR 5/3); dry; medium dense; 100% medium sand to 1mm; rounded.	SP		
105					SILT with Sand (ML); brown (7.5YR 5/4); moist; stiff; medium plasticity; 75% silt; 10% clay; 15% fine to medium sand to 1mm.	ML	High Solids Bentonite Grout	
110					Same as above (105 ft); 70% silt; 15% lean clay; 15% sand.			
115					Silty SAND (SM); brown (7.5YR 5/4); dry; medium dense; 85% fine sand to 0.5mm; rounded; 15% silt.	SM		New 20' connection @ 1600. Top rubber seal came out on hammer.
120								

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Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					No cuttings returned.			Cleaned out cyclone. Resumed drilling @ 1650.
125					No cuttings returned.			
130					Lean CLAY (CL); brown (7.5YR 4/4); moist; very stiff; medium plasticity; 90% clay; 5% silt; 5% very fine sand to 0.5mm.			Cyclone hose clogged @ 1708. End of 4/18/11. Resumed drilling @ 0800 on 4/19/11.
135					Same as above (130 ft).	CL	High Solids Bentonite Grout	New 20' connection @ 0820. Stopped to fix top head water leak. Resumed drilling @ 0908.
140					No cuttings returned.			Added water to keep cyclone from clogging, ensure cutting return, and prevent plugging bottom of hole.
145					Sandy SILT (ML); brown (10YR 5/3); wet; very stiff; low plasticity; 60% silt; 40% very fine to fine sand to 0.5mm.	ML		
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
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Date Started: 4/18/2011
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Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Silty SAND (SM); brown (7.5YR 5/3); wet; medium dense; 60% very fine to coarse sand to 3mm; subrounded; 40% silt.	SM		
155					SILT with Sand (ML); pale brown (10YR 6/3); wet; stiff; low plasticity; 75% silt; 25% fine to medium sand to 1mm.	ML		Added ~100 gallons of water to prevent clogging. New 20' connection @ 0921. Resumed drilling @ 0927.
160					Silty SAND (SM); brown (10YR 5/3); wet; medium dense; 70% fine to very coarse sand to 4.8mm; subrounded; 30% silt with minor clay nodules.	SM		
165					Well graded SAND (SW); pale brown (10YR 6/3); wet; medium dense; 90% fine to very coarse sand; 5% fine gravel to 7mm; 5% silt.	SW	High Solids Bentonite Grout	Approximate top of Santa Fe Group.
170					Same as above (165 ft).			
175					Same as above (165 ft).			Added ~100 gallons of water. New 20' connection @ 0937. Resumed drilling.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Silty SAND (SM); yellowish brown (10YR 5/6); wet; medium dense; 70% fine to coarse sand to 4mm; subrounded; 30% silt.	SM		
185					Poorly graded GRAVEL with Sand (GP); grayish brown (10YR 5/2); wet; dense; 85% fine gravel to 1.3cm; subrounded; 15% medium to very coarse sand. Note: gravel is granite fragments, quartz, and feldspars.	GP		
190					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); wet; medium dense; 90% fine to coarse sand; trace fine gravel to 6mm; subrounded; 10% silt.	SW-SM		
195					Same as above (190 ft); grading coarser.		High Solids Bentonite Grout	Added ~100 gallons of water. New 5' connection @ 1007. Resumed drilling @ 1023.
200					Same as above (190 ft); grading coarser.			Total depth with 11-3/4" casing @ 1026. Resumed drilling with 9-5/8" casing @ 1409.
205					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 95% very fine to very coarse sand; 5% fine gravel to 1.8cm; subrounded to rounded; trace fines.	SW		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 100% fine to medium sand to 0.5mm; rounded.	SP		
215					Same as above (210 ft).			New 20' connection @ 1418. Resumed drilling @ 1430.
220					Same as above (210 ft); pumice grains.			
225					Same as above (210 ft); trace coarse sand to 3mm; pumice grains.		High Solids Bentonite Grout	
230					Same as above (210 ft); trace coarse sand to 2mm; pumice grains.			
235					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 100% very fine to very coarse sand to 4.8mm; rounded.	SW		New 20' connection @ 1438. End of 4/19/11.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 100% very fine to very coarse sand to 4.8mm; rounded.	SW		Resumed drilling @ 0806 on 4/20/11.
245					Lean CLAY with Sand (CL); light olive brown (2.5Y 5/3); moist; stiff; medium plasticity; 80% clay; 20% fine to coarse sand; trace fine gravel to 4cm.	CL		
					Poorly graded SAND (SP); brown (10YR 5/3); moist; loose; 100% fine to medium sand to 1mm; rounded.			
250					Same as above (247 ft).			
255					Same as above (247 ft).	SP	High Solids Bentonite Grout	New 20' connection @ 0815. Resumed drilling @ 0829.
260					Same as above (247 ft); 100% fine sand to 0.5mm.			Drive head came out of casing @ 0832. Resumed drilling @ 0911.
265					Same as above (247 ft).			
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; medium dense; 95% very fine to coarse sand to 4mm; subrounded to rounded; 5% clay nodules.			
275					Same as above (270 ft).	SW		New 20' connection @ 0919. Fixed sand line and tightened casing. Resumed drilling @ 0948.
280					Lean CLAY (CL); yellowish brown (10YR 5/4); moist; stiff; medium to high plasticity; 95% clay; 5% fine sand to 0.5mm.	CL		
285					Poorly graded SAND (SP); brown (10YR 4/3); dry; medium dense; 100% fine to medium sand to 2mm; rounded.		High Solids Bentonite Grout	
290					Same as above (284 ft).	SP		
295					Sandy lean CLAY (CL); brown (10YR 5/3); moist; very stiff; medium plasticity; 65% clay; 30% fine to coarse sand; 5% fine gravel to 1.2cm; rounded.	CL		New 20' connection @ 1001. Resumed drilling@ 1013.
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); brown (10YR 4/3); dry; medium dense; 95% very fine to coarse sand; 5% fine gravel to 1.4cm; rounded.	SW		
305					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; medium dense; 90% medium sand; 10% fine gravel to 2cm; rounded.	SP		
310					Poorly graded SAND with Gravel (SP); dark yellowish brown (10YR 4/4); damp; medium dense; 60% medium sand; 40% fine gravel to 2cm; rounded.			
315					Well graded SAND (SW); brown (10YR 5/3); moist; medium dense; 100% very fine to very coarse sand to 4.8mm; rounded.	SW	High Solids Bentonite Grout	New 20' connection @ 1024. Resumed drilling @ 1038.
320					Sandy lean CLAY (CL); lense.	CL		
					Well graded SAND (SW); brown (10YR 5/3); damp; medium dense; 100% very fine to very coarse sand to 4.8mm; rounded.			
325					Same as above (321 ft); moist.	SW		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND (SW); brown (10YR 5/3); moist; medium dense; 100% very fine to very coarse sand to 4.8mm; rounded.	SW		
335					Same as above (330 ft); grading finer.	SW		New 20' connection @ 1044. Resumed drilling @ 1055.
340					Same as above (330 ft).	SW		
345					Same as above (330 ft).	SW	High Solids Bentonite Grout	
350					Poorly graded SAND (SP); yellowish brown (10YR 5/6); damp; dense; 100% medium sand to 1mm; rounded.	SP		
					Same as above (347 ft).	SP		
355					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; dense; 90% fine to very coarse sand; 10% fine gravel to 1.2cm; rounded.	SW		New 20' connection. Resumed drilling @ 1113.
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; dense; 100% fine to very coarse sand; rounded.			
					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); damp; dense; 85% fine to very coarse sand; 15% fine gravel to 4.8cm; rounded.			
365					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; dense; 95% fine to very coarse sand; 5% fine gravel to 1.2cm; rounded.			
370					Same as above (365 ft); 90% sand; 10% gravel.	SW		
375					Same as above (365 ft); grading coarser; no gravel.		High Solids Bentonite Grout	New 20' connection @ 1122. Resumed drilling @ 1228.
380					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; dense; 100% fine to medium sand to 2mm; rounded.			
385					Same as above (380 ft); grading coarser.	SP		
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; dense; 95% very fine to very coarse sand; 5% fine gravel to 2cm; rounded.			
395					Same as above (390 ft); moist.			New 20' connection @ 1236. Resumed drilling @ 1244.
400					Same as above (390 ft); moist.			
405					Same as above (390 ft); moist; grading coarser.	SW	High Solids Bentonite Grout	
410					Same as above (390 ft); grading finer.			
415					Same as above (390 ft).			New 20' connection @ 1251. Resumed drilling @ 1302.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); brown (10YR 4/3); moist; medium dense; 100% very fine to medium sand to 2mm; rounded.	SP	High Solids Bentonite Grout	New 20' connection @ 1309. Resumed drilling @ 1322.
425					Same as above (420 ft); grading coarser.			
430					Same as above (420 ft).			
435					Same as above (420 ft); grading finer.			
440					Same as above (420 ft); trace coarse sand to 3mm.			
445					Same as above (420 ft).			
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); brown (10YR 4/3); moist; medium dense; 100% very fine to medium sand to 2mm; rounded.	SP		
455					Same as above (450 ft).			New 20' connection. Resumed drilling @ 1338.
460					Sandy lean CLAY (CL); lense.	CL		
					Poorly graded SAND (SP); brown (10YR 4/3); moist; medium dense; 100% very fine to medium sand to 2mm; rounded.	SP	High Solids Bentonite Grout	
465					Well graded SAND (SW); brown (10YR 4/3); damp; medium dense; 90% very fine to very coarse sand; 5% fine gravel to 1.5cm; 5% lean clay; rounded.	SW		
470					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; medium dense; 100% very fine to medium sand to 2mm; rounded; trace fines.	SP	Top of Bentonite Seal	
475					Same as above (470 ft); 10% coarse sand to 4.8mm; trace fine gravel to 1.1cm.			New 20' connection @ 1349. Resumed drilling @ 1358.
480					Well graded SAND (SW); lense.	SW		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106097

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/18/2011
Date TD Reached: 4/20/2011
Date Completed: 4/27/2011

Ground Elevation AMSL (ft): 5347.7
Y Coordinate: 1474735.72
X Coordinate: 1541706.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; dense; 100% fine to medium sand to 1mm; rounded.			
485					Same as above (480 ft).	SP		
490					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 100% very fine to very coarse sand; trace fine gravel to 2cm; rounded.		Bentonite Seal	
495					Same as above (490 ft); 5% fine gravel.		5" Schedule 80 PVC Riser	New 20' connection @ 1410. Resumed drilling @ 1418.
500					Same as above (490 ft); wet.	SW	Top of 20/40 Sand	
505					Same as above (490 ft); wet.		Top of 10/20 Sand Top of 5" Schedule 80 PVC 0.010" Slot Screen	
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Project Location: KAFB, Albuquerque, NM
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Ground Elevation AMSL (ft): 5347.7
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Well graded SAND (SW); brown (10YR 4/3); wet; dense; 100% very fine to very coarse sand; trace fine gravel to 2cm; rounded.	SW		
515					Same as above (510 ft).			New 20' connection @ 1433. Resumed drilling @ 1443.
520					Same as above (510 ft); damp.		Bottom of Screen Sump	
525					Poorly graded SAND with Gravel (SP); brown (10YR 5/3); wet; dense; 80% medium to coarse sand; 20% fine gravel to 1.7cm; rounded.	SP	Bottom of Sump Bottom of Filter Pack	
530					Same as above (525 ft).			
					Poorly graded GRAVEL (GP); lense.	GP		
535					Poorly graded SAND with Gravel (SP); brown (10YR 5/3); wet; dense; 80% medium to coarse sand; 20% fine gravel to 1.7cm; rounded. Same as above (533 ft); gravel to 3cm.	SP	Native Backfill	
540								

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Project Location: KAFB, Albuquerque, NM
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 490.47

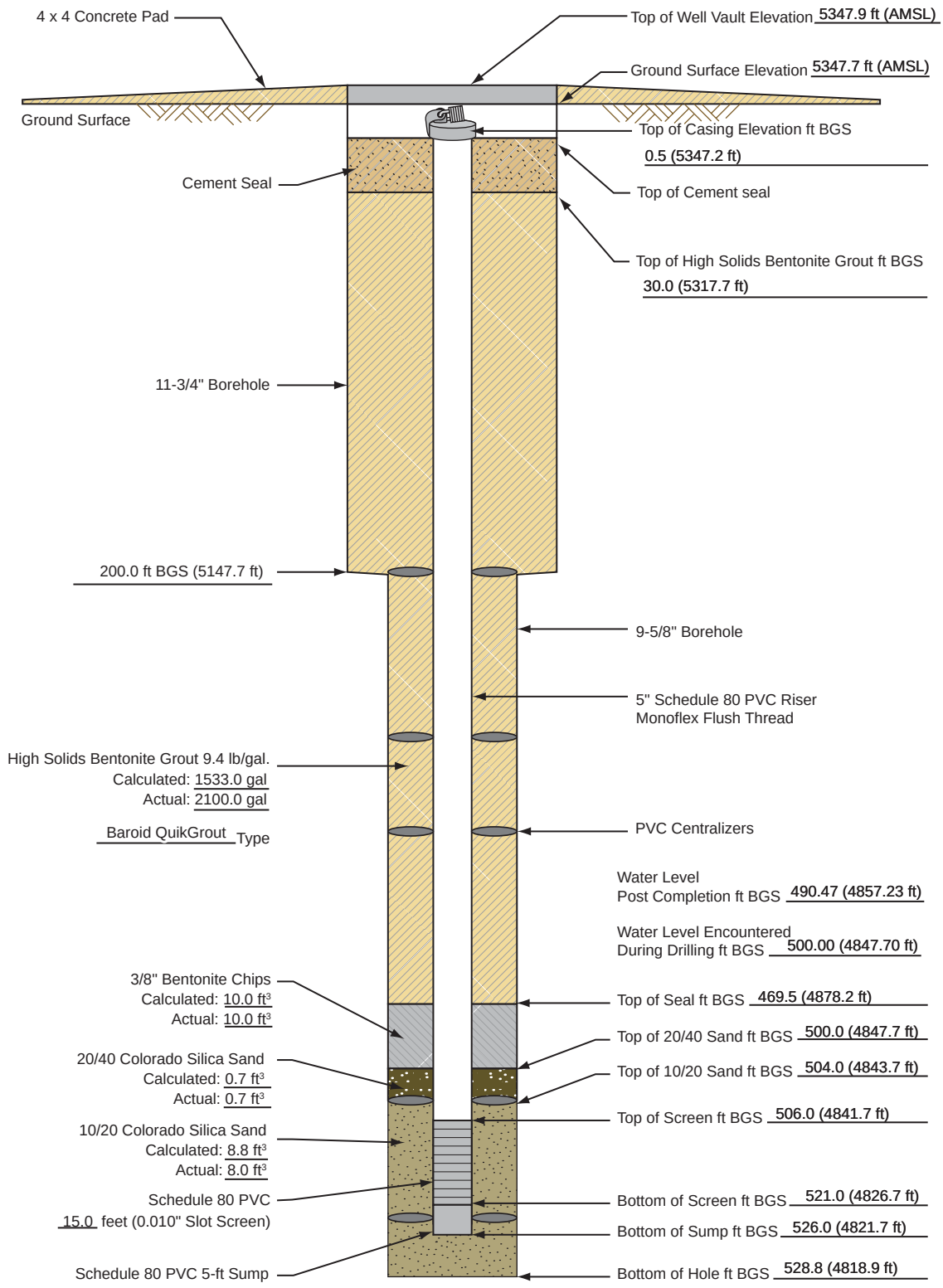
Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Poorly graded SAND (SP); brown (10YR 5/3); wet; dense; 100% medium sand to 2mm.	SP		Total depth = 540 ft. Reached @ 1458 on 4/20/11.
545								Water added during drilling (gallons) = 300
								Water added after drilling (gallons) = 1200
550								Water added during construction (gallons) = 30
555								
560								
565								
570								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 14:37 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106097

Installation Start Date/Time: 4/21/2011 @ 08:00
Installation End Date/Time: 4/27/2011 @ 11:00



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106097

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106097

Personnel: A. Willmore

Date Installed: 4/27/11

Date: 4/30/11

Csg. Diameter (I.D.): 5"

Samplers: A. Willmore

Total Depth (ft. BGL): 526

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 4/30/11

Depth to Water Before Developing Well (ft. BGL): 490.48

				Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column:	35.52	feet	=	1543.32	gal.	*	1	=	1543.32

V=(B * r_c^2 * L_c * 7.48)+(B * $(r_w-r_c)^2$ * L_s * $Ø_s$ * 7.48)+(H_2O added during drilling/installation) = 1543.32 gallons

Depth Purging From: 490.51 feet

Time Purging Begins: 1150, 4/30/11

Weather: Clear, 70's

Screened Interval (ft BGL): 506-521

Equipment Nos.: **pH Meter:** YSI 100258 **EC Meter**: YSI 100258 **Turbidity Meter**: 2100P

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1500 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
4/30/2011	0945	490.50	50	21.06	9.04	0.398	Out of Range	Begain Bailing
4/30/2011	1010	490.50	130	20.42	8.62	0.387	Out of Range	Stop Bailing
4/30/2011	1150	490.51	130	20.62	8.11	0.352	Out of Range	Begin Pumping
4/30/2011	1210	490.51	232	20.75	7.93	0.358	Out of Range	Continue Pumping, Cloudy
4/30/2011	1230	490.51	335	20.31	7.89	0.363	170	Continue Pumping, Cloudy
4/30/2011	1250	490.51	437	20.14	7.87	0.364	125.3	Continue Pumping, Cloudy
4/30/2011	1310	490.51	540	19.96	7.85	0.365	91.2	Continue Pumping, Clear
4/30/2011	1330	490.51	642	20.80	7.85	0.364	63.2	Continue Pumping, Clear
4/30/2011	1350	490.51	745	21.39	7.87	0.365	54.3	Continue Pumping, Clear
4/30/2011	1410	490.51	848	21.60	7.88	0.365	50.4	Continue Pumping, Clear

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106097

Project Number: 140705

Samplers: A. Willmore

Date: 4/30/11

Checked By:

Time Start: 0945, 4/30/11

Time Finish: 1630, 4/30/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
4/30/2011	1430	490.51	950	21.63	7.88	0.365	20.2	Continue Pumping, Clear
4/30/2011	1450	490.51	1053	21.65	7.88	0.364	18.5	Continue Pumping, Clear
4/30/2011	1510	490.51	1155	21.66	7.86	0.363	12.5	Continue Pumping, Clear
4/30/2011	1530	490.51	1258	21.10	7.86	0.363	10.1	Continue Pumping, Clear
4/30/2011	1550	490.51	1360	21.15	7.86	0.363	9.4	Continue Pumping, Clear
4/30/2011	1610	490.51	1463	21.14	7.86	0.363	5.78	Continue Pumping, Clear
4/30/2011	1630	490.51	1565	21.03	7.86	0.365	4.12	Stop Pumping
4/30/2011	1630	--	1565	--	--	--	--	Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106098

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/13/2011
Date TD Reached: 4/15/2011
Date Completed: 4/17/2011

Ground Elevation AMSL (ft): 5348.0
Y Coordinate: 1474764.94
X Coordinate: 1541702.94

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT with Sand (ML); brown (7.5YR 5/4); dry; soft; nonplastic; 75% silt; 25% very fine to coarse sand to 4mm.			Hand augered. ***Note: no headspace requirement at this location.***
5					Same as above (0 ft); pink (7.5YR 7/3); trace fine gravel to 2.5cm.			Began drilling @ 0851 on 4/13/11.
10					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; soft; low plasticity; 85% silt; 15% very fine to medium sand to 1mm.			
15					Same as above (10 ft).	ML	Cement Seal	New connection @ 0859. Resumed drilling @ 0906.
20					Same as above (10 ft); trace clay nodules.			
25					Sandy SILT (ML); strong brown (7.5YR 4/6); dry; soft; nonplastic; 60% silt; 40% very fine to very coarse sand; trace fine gravel to 4cm.			
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:54 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106098

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/13/2011
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Ground Elevation AMSL (ft): 5348.0
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); brown (7.5YR 5/4); dry; loose; 70% well graded, very fine to very coarse sand; trace fine gravel to 8mm; rounded; 30% silt.	SM		
35					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; stiff; low plasticity; 75% silt; 25% very fine to very coarse sand; trace fine gravel to 9mm.	ML	Cement Seal	New connection @ 0914. Resumed drilling @ 0921.
40					Lean CLAY with Sand (CL); brown (7.5YR 5/4); moist; very stiff; medium plasticity; 70% clay; 15% silt; 15% fine to medium sand to 1mm.	CL	Top of High Solids Bentonite Grout	
45					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; stiff; low plasticity; 65% silt; 10% clay; 25% fine to coarse sand to 3mm.	ML		
50					Same as above (45 ft); no clay.	ML		
55					Sandy SILT (ML); brown (7.5YR 5/4); moist; very stiff; low plasticity; 60% silt; 5% clay; 35% fine to very coarse sand; trace fine gravel to 1mm.	ML		New connection @ 0931. Resumed drilling @ 0943.
60								

Borehole ID: KAFB-106098

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Project Number: 140705

Date Started: 4/13/2011
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Date Completed: 4/17/2011

Ground Elevation AMSL (ft): 5348.0
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Lean CLAY with Sand (CL); brown (7.5YR 5/4); moist; very stiff; medium plasticity; 80% clay; 5% silt; 15% fine to medium sand to 1mm.	CL		
65					Sandy SILT (ML); brown (7.5YR 4/4); moist; stiff; low plasticity; 50% silt; 10% clay; 40% fine to coarse sand to 4mm.	ML		
70					Same as above (65 ft); no clay.	ML		
75					Same as above (65 ft); no clay; 40% fine sand.	ML	High Solids Bentonite Grout	New connection @ 0950. Resumed drilling @ 0956.
80					Lean CLAY (CL); brown (7.5YR 5/4); moist; very stiff; medium plasticity; 100% clay.	CL		
85					Sandy SILT (ML); brown (7.5YR 5/4); moist; stiff; nonplastic; 60% silt; 40% fine to coarse sand to 3mm.	ML		
90								

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Borehole ID: KAFB-106098

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Project Location: KAFB, Albuquerque, NM
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At Time of Drilling: 491.10
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Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT with Sand (ML); brown (7.5YR 5/4); moist; stiff; low plasticity; 75% silt; 10% clay nodules; 15% fine sand to 0.5mm.	ML		
95					Poorly graded SAND with Silt (SP-SM); strong brown (7.5YR 5/6); moist; loose; 90% medium sand to 2mm; rounded; 10% silt.	SP-SM		
100					Same as above (95 ft).			
105					SILT with Sand (ML); brown (7.5YR 5/4); moist; medium stiff; low plasticity; 75% silt; 25% fine to medium sand to 1mm.	ML	High Solids Bentonite Grout	
110					Same as above (105 ft); 5% clay; 20% sand.			
115					No cuttings returned.			Cyclone clogged @ 1030.
120								

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Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					No cuttings returned.			Resumed drilling @ 1059. Hose remained clogged, detatched and cleaned out @ 1105. Resumed drilling @ 1120.
125					Lean CLAY with Sand (CL); strong brown (7.5YR 4/6); moist; very stiff; medium plasticity; 80% clay; 20% very fine sand to 0.2mm.			
130					Same as above (125 ft); 85% clay; 15% sand.	CL		
135					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; very stiff; medium plasticity; 90% clay; 10% very fine sand to 0.2mm.		High Solids Bentonite Grout	New connection @ 1133. Resumed drilling @ 1142.
140					Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 100% fine to medium sand to 1mm; rounded.	SP		
145					Well graded SAND with Silt (SW-SM); brown (7.5YR 4/4); moist; dense; 90% fine to very coarse sand to 4mm; rounded; 10% silt with minor clay.	SW-SM		
150								

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Date Started: 4/13/2011
Date TD Reached: 4/15/2011
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Ground Elevation AMSL (ft): 5348.0
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; dense; 100% fine to coarse sand to 4mm; rounded; trace fines.	SW		
155					Sandy lean CLAY (CL); brown (10YR 5/3); moist; very stiff; low plasticity; 70% clay; 30% medium to coarse sand to 4mm.	CL		New connection @ 1153. Resumed drilling @ 1230.
160					Poorly graded SAND (SP); brown (10YR 5/3); moist; medium dense; 100% fine to medium sand to 2mm; rounded.	SP		
165					Same as above (158 ft); 5% clay nodules.		High Solids Bentonite Grout	
170					Same as above (158 ft).			
175					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; dense; 100% fine to coarse sand to 4mm; rounded; trace fines.	SW		
180								

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Borehole ID: KAFB-106098

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
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Drillling Contractor: WDC Drilling
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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; dense; 100% fine to coarse sand to 4mm; rounded; trace fines.	SW		Resumed drilling @ 1252.
185					Same as above (180 ft); moist; predominantly pumice fragments.			
190					Same as above (180 ft); moist; grading finer.			
195					Same as above (180 ft); moist.		High Solids Bentonite Grout	New connection @ 1304. Resumed drilling @ 1321.
200					Same as above (180 ft); moist; 5% silt.			Total depth with 11-3/4" casing @ 1323. End of 4/13/11. Resumed drilling with 9-5/8" casing @ 0840 on 4/14/11.
205					Same as above (180 ft); moist; 5% fine gravel to 7mm.			
210								

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After Drilling: 490.55

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; dense; 90% fine to coarse sand; rounded; 10% fine gravel to 2.6cm; trace fines.	SW		
215					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; dense; 100% fine sand to 0.5mm; rounded.	SP		New connection @ 0849. Resumed drilling @ 1214.
220					Same as above (215 ft); 100% medium sand to 1mm.			
225					Well graded SAND (SW); brown (10YR 5/3); damp; medium dense; 100% very fine to very coarse sand to 4.5mm; rounded.	SW	High Solids Bentonite Grout	
230					Same as above (225 ft); trace fine gravel.			
235					Poorly graded SAND (SP); brown (10YR 5/3); damp; medium dense; 100% fine to medium sand to 1mm; rounded.	SP		New connection @ 1219. Resumed drilling @ 1225.
240								

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At End of Drilling: Not Recorded
After Drilling: 490.55

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Drilling Method: Air Rotary Casing Hammer
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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); brown (10YR 4/3); damp; loose; 100% fine to coarse sand to 3mm; subrounded.	SW		
245					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; loose; 85% fine to coarse sand to 3mm; subrounded; 15% fine gravel to 1.7cm.			
250					Well graded SAND (SW); brown (10YR 4/3); damp; loose; 100% fine to coarse sand to 3mm; subrounded; trace fine gravel to 2.5cm.			
255					Same as above (250 ft); no gravel.		High Solids Bentonite Grout	New connection @ 1229. Resumed drilling @ 1237.
260					Poorly graded SAND (SP); yellowish brown (10YR 5/4); damp; medium dense; 100% very fine to medium sand to 2mm; subrounded.	SP		
265					Same as above (260 ft).			
270								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND (SP); yellowish brown (10YR 5/4); damp; medium dense; 95% very fine to medium sand to 2mm; subrounded; 5% silt.	SP		
275					Clayey SAND (SC); yellowish brown (10YR 5/4); damp; dense; 70% fine to medium sand to 2mm; rounded; 30% clay.	SC		
280					Lean CLAY (CL); brown (10YR 5/3); damp; very stiff; medium plasticity; 100% clay.	CL		
285					Same as above (280 ft).		High Solids Bentonite Grout	
290					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; dense; 95% medium sand to 1mm; subrounded; 5% silt and clay.	SP		
295					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); damp; dense; 90% fine to very coarse sand to 4.8mm; rounded; 10% silt with minor clay.	SW-SM		
300								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded SAND (SP); brown (10YR 4/3); dry; dense; 95% very fine to medium sand to 1mm; subrounded; 5% silt.	SP		
305					Poorly graded SAND with Silt (SP-SM); brown (10YR 4/3); dry; dense; 90% very fine to coarse sand to 3mm; subrounded; 10% silt.	SP-SM		
310					Well graded SAND with Gravel (SW); brown (10YR 4/3); moist; dense; 80% fine to very coarse sand; 20% fine gravel to 2.6cm; rounded. Same as above (308 ft); 5% clay.	SW		
315					Well graded SAND with Silt (SW-SM); brown (10YR 4/3); moist; dense; 85% very fine to coarse sand; 5% fine gravel to 2.3cm; rounded; 10% silt.		High Solids Bentonite Grout	New connection @ 1336. Resumed drilling @ 1343.
320					Same as above (315 ft).	SW-SM		
325					Well graded SAND with Silt and Gravel (SW-SM); brown (10YR 4/3); moist; dense; 75% very fine to coarse sand; 15% fine gravel to 2.3cm; rounded; 10% silt.			
330					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; dense; 100% very fine to coarse sand; trace fine gravel to 2.4cm; rounded.	SW		

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; dense; 100% very fine to coarse sand; trace fine gravel to 2.4cm; rounded.			
335					Same as above (330 ft).	SW		New connection @ 1352. Resumed drilling @ 1405.
340					Poorly graded SAND (SP); brown (10YR 5/3); dry; very dense; 100% very fine to medium sand to 1mm; subrounded; trace silt and clay.			
345					Same as above (340 ft); finer.		High Solids Bentonite Grout	
350					Same as above (340 ft).	SP		
355					Same as above (340 ft); coarser sand to 2mm.			
360								

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Hole Diameter Lower (in.): 9-5/8
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Drilling Method: Air Rotary Casing Hammer
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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; medium dense; 85% fine to very coarse sand; 15% fine gravel to 2.4cm; rounded.	SW		Resumed drilling @ 1425.
365					Same as above (360 ft); gravel grading finer to 1cm.			
370					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; medium dense; 90% fine to very coarse sand; 10% fine gravel to 2.4cm; rounded.			
375					Same as above (370 ft).		High Solids Bentonite Grout	New connection @ 1432.
380					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; dense; 100% medium sand to 1mm; rounded; trace fines.	SP		
385					Same as above (378 ft); 100% fine to medium sand.			
390								

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Date Completed: 4/17/2011

Ground Elevation AMSL (ft): 5348.0
Y Coordinate: 1474764.94
X Coordinate: 1541702.94

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; dense; 100% medium sand to 1mm; rounded; trace fines.			
395					Same as above (390 ft).			New connection @ 1450. Resumed drilling @ 1501.
400					Same as above (390 ft).	SP		
405					Same as above (390 ft).		High Solids Bentonite Grout	
410					Same as above (390 ft); 100% very fine sand.			
415					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 95% fine to very coarse sand; 5% fine gravel to 1cm; rounded. Same as above (412 ft).	SW		New connection @ 1513.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:54 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106098

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/13/2011
Date TD Reached: 4/15/2011
Date Completed: 4/17/2011

Ground Elevation AMSL (ft): 5348.0
Y Coordinate: 1474764.94
X Coordinate: 1541702.94

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); brown (10YR 5/3); moist; very dense; 100% fine to medium sand to 1mm; subrounded.			
425					Same as above (420 ft).			
430					Same as above (420 ft).			
435					Same as above (420 ft); damp.	SP	High Solids Bentonite Grout	New connection @ 1534. Resumed drilling @ 1540.
440					Same as above (420 ft); sand to 2mm.			
445					Same as above (420 ft); damp.			
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:54 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106098

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/13/2011
Date TD Reached: 4/15/2011
Date Completed: 4/17/2011

Ground Elevation AMSL (ft): 5348.0
Y Coordinate: 1474764.94
X Coordinate: 1541702.94

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); brown (10YR 5/3); damp; very dense; 100% fine to medium sand to 1mm; subrounded.	SP		
455					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 100% very fine to very coarse sand to 4mm; rounded; trace fines.	SW		New connection @ 1552. Resumed drilling @ 1558.
460					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; dense; 100% very fine to medium sand to 1mm; rounded.	SP		
465					Same as above (460 ft).	SP	High Solids Bentonite Grout	
470					Same as above (460 ft); grading finer.	SP		
475					Well graded SAND (SW); brown (10YR 5/3); moist; dense; 95% fine to very coarse sand; 5% fine gravel to 1cm; rounded.	SW		New connection @ 1620. Resumed drilling @ 1626.
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:54 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106098

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/13/2011
Date TD Reached: 4/15/2011
Date Completed: 4/17/2011

Ground Elevation AMSL (ft): 5348.0
Y Coordinate: 1474764.94
X Coordinate: 1541702.94

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Poorly graded SAND (SP); brown (10YR 5/3); dry; very dense; 100% very fine to medium sand to 2mm; subrounded.			
485					Same as above (480 ft).		High Solids Bentonite Grout	
490					Same as above (480 ft).			
495					Same as above (480 ft).	SP	Top of Bentonite Seal	New connection @ 1646. End of 4/14/11. Resumed drilling @ 0853 on 4/15/11.
500					Same as above (480 ft); damp; 100% medium sand.			
505					Same as above (480 ft); damp.			
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:54 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106098

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/13/2011
Date TD Reached: 4/15/2011
Date Completed: 4/17/2011

Ground Elevation AMSL (ft): 5348.0
Y Coordinate: 1474764.94
X Coordinate: 1541702.94

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Poorly graded SAND (SP); brown (10YR 5/3); wet; very dense; 100% medium sand to 2mm; subrounded.	SP		
515					Well graded SAND (SW); brown (10YR 5/3); wet; very dense; 95% fine to very coarse sand; 5% fine gravel to 7mm; rounded.		Bentonite Seal	New connection @ 0921. Resumed drilling @ 0927.
520					Same as above (513 ft).		5" Schedule 80 PVC Riser	
525					Same as above (513 ft).	SW	Top of 20/40 Sand	
							Top of 10/20 Sand	
530					Same as above (513 ft); 10% fine gravel; 5% silt with minor clay.		Top of 5" Schedule 80 PVC 0.010" Slot Screen	
535					Same as above (513 ft); no gravel.			New connection @ 0958. Resumed drilling @ 1004.
540								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:54 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106098

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/13/2011
Date TD Reached: 4/15/2011
Date Completed: 4/17/2011

Ground Elevation AMSL (ft): 5348.0
Y Coordinate: 1474764.94
X Coordinate: 1541702.94

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Well graded SAND (SW); brown (10YR 5/3); wet; very dense; 95% fine to very coarse sand; 5% fine gravel to 7mm; rounded; grading finer than 513'.			
545					Same as above (540 ft); grading coarser.	SW	Bottom of Screen Sump	Bit temporarily plugged.
550					Same as above (540 ft).		Bottom of Sump	
555					Poorly graded SAND (SP); brown (10YR 4/3); moist; very dense; 95% very fine to fine sand to 0.5mm; rounded; 5% silt.			New connection @ 1037. Resumed drilling @ 1052. Cyclone hose detached from hammer @ 1100. Flange replaced, hose reattached, resumed drilling @ 1237.
560					Same as above (554 ft); 95% medium sand to 1mm; 5% silt.	SP	Bottom of Filter Pack Native Backfill	
565					No cuttings returned.			
570								

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Borehole ID: KAFB-106098

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/13/2011
Date TD Reached: 4/15/2011
Date Completed: 4/17/2011

Ground Elevation AMSL (ft): 5348.0
Y Coordinate: 1474764.94
X Coordinate: 1541702.94

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 491.10
At End of Drilling: Not Recorded
After Drilling: 490.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
570					Well graded SAND (SW); brown (10YR 5/3); wet; dense; 95% very fine to coarse sand to 4mm; rounded; 5% silt and clay.			Added ~50 gallons of water.
575					Well graded SAND with Gravel (SW); brown (10YR 5/3); wet; dense; 70% very fine to coarse sand; 30% fine gravel to 3cm; subrounded.	SW	Native Backfill	
580					Well graded SAND (SW); brown (10YR 5/3); wet; dense; 95% very fine to coarse sand to 4mm; rounded; 5% fine gravel; trace silt and clay.			Total depth = 580 ft. Reached @ 1254 on 4/15/11.
585								Water added during drilling (gallons) = 50
								Water added after drilling (gallons) = 1020
590								Water added during construction (gallons) = Not recorded.
595								
600								

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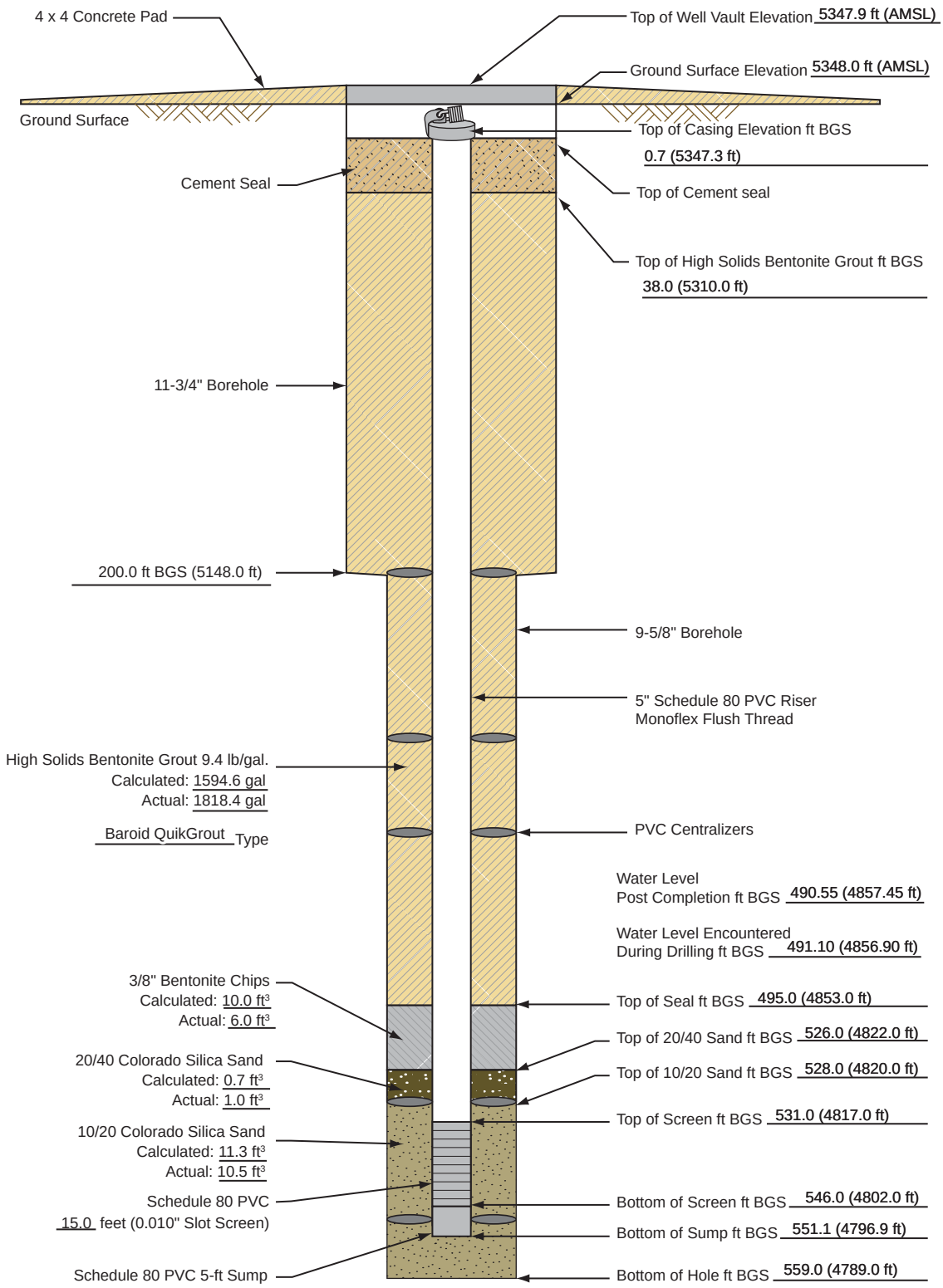
Monitoring Well Completion Diagram KAFB-106098

Installation Start Date/Time: 4/16/2011 @ 08:00
Installation End Date/Time: 4/17/2011 @ 13:45



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106098

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106098

Personnel: A. Willmore, V. Bracht

Date Installed: 4/17/11

Date: 5/1/11-5/2/11

Csg. Diameter (I.D.): 5"

Samplers: A. Willmore, V. Bracht

Total Depth (ft. BGL): 551.1

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 5/1/11

Depth to Water Before Developing Well (ft. BGL): 490.48

			Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 60.62	feet	=	1139.65	gal.	* 1	=	1139.65

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1139.65 gallons

Depth Purging From: 539 feet

Time Purging Begins: 1045, 5/2/11

Weather: Cloudy, Cold

Screened Interval (ft BGL): 531-546

Equipment Nos.: **pH Meter:** YSI 100258 **EC Meter**: YSI 100258 **Turbidity Meter**: 2100P

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1070 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
5/1/2011	1452	490.48	5	18.06	8.42	0.370	Out of Range	Begin Bailing
5/1/2011	1545	--	15	18.01	7.89	0.342	Out of Range	Continue Bailing, Brown, Sheen
5/2/2011	1045	490.57	--	--	--	--	--	Begin Pumping
5/2/2011	1050	491.05	--	15.28	7.17	0.366	51.2	Continue Pumping, Cloudy
5/2/2011	1100	491.04	75	17.38	7.96	0.358	176	Continue Pumping, Cloudy
5/2/2011	1110	491.04	125	17.32	7.88	0.351	8.88	Continue Pumping, Clear
5/2/2011	1120	491.05	175	18.59	7.92	0.349	4.33	Continue Pumping, Clear
5/2/2011	1130	491.06	225	18.49	7.85	0.348	2.59	Continue Pumping, Clear
5/2/2011	1140	491.06	275	18.23	7.81	0.346	2.03	Continue Pumping, Clear
5/2/2011	1150	491.06	325	19.74	7.19	0.342	3.09	Continue Pumping, Clear

Notes:

* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #

Where:

B=3.14

$Ø_s$= porosity of the sand pack

r_c= radius of the well casing and screen in feet

L_c= length of water column inside the casing and screen in feet

r_w= radius of the well bore in feet

L_s= length of saturated portion of the sand pack in feet

7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106098

Project Number: 140705

Samplers: A. Willmore, V. Bracht

Date: 5/2/11

Checked By:

Time Start: 1452, 5/1/11

Time Finish: 1422, 5/2/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
5/2/2011	1200	491.05	375	19.59	7.84	0.345	1.31	Continue Pumping, Clear
5/2/2011	1210	491.05	425	19.08	7.67	0.344	0.91	Continue Pumping, Clear
5/2/2011	1220	491.05	475	16.94	7.48	0.341	1.45	Continue Pumping, Clear
5/2/2011	1230	491.05	525	17.80	7.78	0.342	1.10	Continue Pumping, Clear
5/2/2011	1240	491.04	575	18.66	7.74	0.343	1.18	Continue Pumping, Clear
5/2/2011	1250	491.04	625	20.01	7.85	0.343	0.75	Continue Pumping, Clear
5/2/2011	1300	491.04	675	18.78	7.61	0.342	0.67	Continue Pumping, Clear
5/2/2011	1310	491.04	725	17.03	7.44	0.345	0.57	Continue Pumping, Clear
5/2/2011	1320	491.04	775	19.05	7.81	0.341	0.51	Continue Pumping, Clear
5/2/2011	1330	491.04	825	20.28	7.92	0.344	0.50	Continue Pumping, Clear
5/2/2011	1340	491.04	875	19.70	7.66	0.342	0.46	Continue Pumping, Clear
5/2/2011	1350	491.02	925	18.30	7.71	0.344	0.54	Continue Pumping, Clear
5/2/2011	1400	491.02	975	19.38	6.89	0.339	0.56	Continue Pumping, Clear
5/2/2011	1405	491.03	1000	20.22	7.91	0.343	0.47	Continue Pumping, Clear
5/2/2011	1410	491.03	1025	20.31	7.94	0.342	0.56	Continue Pumping, Clear
5/2/2011	1420	491.02	1075	19.75	7.76	0.342	0.48	Continue Pumping, Clear
5/2/2011	1422	--	--	--	--	--	--	Stop Pumping
5/2/2011	1422	490.52	1075	--	--	--	--	Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded; fill.			Hand augered.
					Sandy SILT (ML); light brown (7.5YR 6/3); dry; soft; low plasticity; 70% silt; 30% very fine to medium sand to 2mm.			***Note: no headspace requirement at this location.***
5					Same as above (2 ft); reddish brown (5YR 5/4).			Began drilling @ 1555 on 5/3/11.
10					Same as above (2 ft); strong brown (7.5YR 4/6).			
15					Same as above (2 ft); strong brown (7.5YR 4/6).	ML	Cement Seal	New 20' connection @ 1605. Resumed drilling @ 1610.
20					Same as above (2 ft); strong brown (7.5YR 4/6); 10% silt as hard nodules.			
25					Same as above (2 ft); strong brown (7.5YR 4/6); 10% silt as hard nodules.			
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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X Coordinate: 1541014.75

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; very soft; low plasticity; 85% silt; 15% very fine sand to 0.1mm.			
35					Same as above (30 ft); trace coarse sand to 3mm.		Cement Seal	New 20' connection @ 1628. Resumed drilling @ 1638.
40					Same as above (30 ft); 80% silt; 5% clay; 15% very fine sand.	ML	Top of High Solids Bentonite Grout	
45					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; very soft; low plasticity; 80% silt; 15% very fine to very coarse sand; 5% fine gravel to 1.5cm.			
50					Same as above (45 ft); 75% silt; 20% sand; 5% fine gravel.			
55					Silty SAND with Gravel (SM); brown (7.5YR 5/4); dry; loose; 70% fine to very coarse sand; 15% fine gravel to 2cm; subangular; 15% silt.	SM		New 20' connection @ 1644. End of 5/3/11. Resumed drilling @ 0802 on 5/4/11.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); strong brown (7.5YR 4/6); dry; soft; low plasticity; 85% silt; trace clay; 15% very fine sand to 0.08mm.			
65					Same as above (60 ft).	ML		
70					Same as above (60 ft); 80% silt; 5% clay; 15% sand.			
75					Lean CLAY (CL); reddish brown (5YR 5/4); dry; stiff; medium plasticity; 100% clay.	CL	High Solids Bentonite Grout	New 20' connection @ 0814. Resumed drilling @ 0821.
80					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; soft; low plasticity; 85% silt; 15% very fine sand to 0.08mm.			
85					Same as above (75 ft).	ML		
90					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 95% very fine to medium sand; 5% coarse sand to 4mm; rounded.	SP		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
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X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 95% very fine to medium sand; 5% coarse sand to 4mm; rounded.	SP		
95					Sandy SILT (ML); brown (7.5YR 5/4); moist; medium stiff; low plasticity; 70% silt; 30% very fine to coarse sand to 3mm.	ML		New 20' connection @ 0827. Resumed drilling @ 0834.
100					SILT with Sand (ML); strong brown (7.5YR 5/6); moist; medium stiff; low plasticity; 85% silt; 15% very fine sand to 0.1mm.			
105					Same as above (100 ft).		High Solids Bentonite Grout	
110					Same as above (100 ft); trace clay.			
115					Same as above (100 ft); trace clay.			New 20' connection @ 0845. Resumed drilling @ 0917.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					No cuttings returned.			
125					Lean CLAY (CL); brown (7.5YR 4/3); moist; very stiff; medium plasticity; 100% clay.	CL		
130					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; medium dense; 100% very fine to medium sand to 2mm; subrounded.	SP		
					Same as above (125 ft).			
135					Clayey SAND (SC); brown (7.5YR 4/4); moist; medium dense; 80% very fine to very coarse sand; well graded; trace fine gravel to 8mm; subrounded; 20% clay.	SC		
140					Well graded SAND (SW); dark yellowish brown (7.5YR 4/4); moist; loose; 95% very fine to very coarse sand; trace fine gravel to 8mm; subrounded; 5% clay.	SW	High Solids Bentonite Grout	New 5' connection @ 0931. Resumed drilling @ 0941.
145					Poorly graded SAND (SP); brown (10YR 5/3); dry; loose; 100% very fine to medium sand to 1mm; subangular to subrounded.	SP		Total depth with 11-3/4" casing @ 0943. Resumed drilling with 9-5/8" casing @ 1616.
					SILT (ML); lense.	ML		
150					Poorly graded SAND (SP); brown (10YR 5/3); dry; loose; 100% very fine to medium sand to 1mm; subangular to subrounded.	SP		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Well graded SAND (SW); brown (10YR 5/3); dry; loose; 95% very fine to very coarse sand; 5% fine gravel to 2.1cm; subrounded.	SW		
155					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; loose; 100% fine sand to 0.5mm; subrounded.	SP		New 20' connection @ 1625. Resumed drilling @ 1631.
160					Same as above (154 ft); 100% fine to medium sand to 2mm.	SP		
165					Same as above (154 ft); 100% fine to medium sand; trace fine gravel to 1.2cm.	SP	High Solids Bentonite Grout	
170					Well graded SAND (SW); brown (10YR 5/3); moist; medium dense; 100% very fine to very coarse sand; trace fine gravel to 2mm; subrounded.	SW		
175					Same as above (170 ft); 95% sand; 5% fine gravel.	SW		New 20' connection @ 1637. Resumed drilling @ 1646.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); brown (10YR 5/3); moist; medium dense; 100% very fine to medium sand to 1mm; rounded.	SP		
185					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; medium dense; 100% very fine to very coarse sand; trace fine gravel to 9mm; subrounded.	SW		
190					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; medium dense; 100% fine sand to 0.5mm; rounded.			
195					Same as above (190 ft).		High Solids Bentonite Grout	New 20' connection @ 1652. End of 5/4/11. Resumed drilling @ 0807 on 5/5/11.
200					Same as above (190 ft); 100% fine to medium sand; trace coarse sand to 4mm.	SP		
205					Same as above (190 ft); 100% fine to medium sand; trace coarse sand to 4mm.			
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); brown (10YR 5/3); moist; medium dense; 100% fine to very coarse sand; trace fine gravel to 7mm; rounded.	SW		
215					Same as above (210 ft); grading coarser; 5% fine gravel to 1.3cm.			New 20' connection @ 0813. Resumed drilling @ 0819.
220					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; medium dense; 100% fine to medium sand to 1mm; subrounded to rounded.	SP		
					Same as above (217 ft); 100% fine sand to 0.5mm.			
225					Well graded SAND (SW); brown (10YR 5/3); damp; medium dense; 100% very fine to very coarse sand to 4.8mm; subrounded.	SW	High Solids Bentonite Grout	
230					Poorly graded SAND (SP); brown (10YR 5/3); moist; medium dense; 100% fine to medium sand to 2mm; subrounded.	SP		
235					Well graded SAND (SW); brown (10YR 5/3); moist; medium dense; 95% very fine to very coarse sand; 5% fine gravel to 1.8cm; rounded.	SW		
					Same as above (232 ft); no gravel.			New 20' connection @ 0828. Resumed drilling @ 0837.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); brown (10YR 5/3); moist; medium dense; 100% very fine to very coarse sand; trace fine gravel to 1.8cm; rounded.			
245					Same as above (240 ft).	SW		
250					Poorly graded SAND (SP); brown (10YR 5/3); moist; medium dense; 100% very fine to medium sand to 1mm; rounded.			
255					Same as above (250 ft).		High Solids Bentonite Grout	New 20' connection @ 0846. Resumed drilling @ 0853.
260					Same as above (250 ft); trace silt and clay.	SP		
265					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; dense; 85% very fine to very coarse sand; 15% fine gravel to 1.2cm; rounded.	SW		
270								

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Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; dense; 85% very fine to very coarse sand; 15% fine gravel to 1.9cm; rounded.			
275					Well graded SAND (SW); brown (10YR 5/3); moist; dense; 100% very fine to very coarse sand; trace fine gravel to 1.6cm; rounded.	SW		New 20' connection @ 0902. Resumed drilling @ 0906.
280					Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 100% fine to medium sand; trace fine gravel to 1cm; rounded.	SP		
285					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; dense; 85% very fine to very coarse sand; 15% fine gravel to 2.3cm; rounded.		High Solids Bentonite Grout	
290					Same as above (285 ft).	SW		
295					Same as above (285 ft).			New 20' connection @ 0915. Stopped drilling to load remaining pipe. Resumed drilling @ 1045.
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
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Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded GRAVEL (GP); brown (10YR 5/3); dry; very dense; 90% fine gravel to 1.2cm; 10% very coarse sand; subangular to subrounded; trace silt and clay.	GP		
305					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); dry; very dense; 85% very fine to very coarse sand; 15% fine gravel to 2.9cm; rounded. Note: contains granitic fragments. Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; very dense; 100% sand.	SW		
310					Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 90% fine to medium sand; 5% very coarse sand; 5% gravel to 5cm; subrounded.			
315					Same as above (310 ft); grading coarser; no gravel.	SP	High Solids Bentonite Grout	New 20' connection @ 1055. Resumed drilling @ 1103.
320					Well graded SAND (SW); brown (10YR 5/3); moist; very dense; 95% very fine to very coarse sand; 5% fine gravel to 1cm; subangular to subrounded.			
325					Well graded SAND with Gravel (SW); brown (10YR 5/3); moist; very dense; 80% very fine to very coarse sand; 20% fine gravel to 1.5cm; subangular to subrounded.	SW		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
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Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND (SW); brown (10YR 5/3); moist; very dense; 95% very fine to very coarse sand; 5% fine gravel to 1cm; subangular to subrounded. Note: grading finer than 320'.	SW		
335					Poorly graded SAND (SP); brown (10YR 5/3); moist; very dense; 100% fine sand to 0.5mm; subrounded.	SP		New 20' connection @ 1116. 9-5/8" casing pushed 11-3/4" casing down. Stopped to pull 11-3/4" casing. Resumed drilling @ 1433.
340					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); moist; very dense; 85% very fine to very coarse sand; 15% fine gravel to 2.2cm; subrounded; trace silt and clay.	SW		
345					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; very dense; 100% very fine to very coarse sand; trace silt and clay.		High Solids Bentonite Grout	
350					Same as above (345 ft).			
355					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); moist; very dense; 85% very fine to very coarse sand; 15% fine gravel to 2.2cm; subrounded; trace silt and clay.			New 20' connection @ 1443.
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; very dense; 100% medium sand to 2mm; subrounded.	SP	High Solids Bentonite Grout	New 20' connection @ 1458. Resumed drilling @ 1507.
365					Same as above (360 ft); 100% fine to medium sand.			
370					Same as above (360 ft); 100% fine sand.			
375					Same as above (360 ft); 100% fine sand.			
380					Same as above (360 ft); 100% fine to medium sand.			
385					Same as above (360 ft); 100% fine to medium sand.			
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Date Started: 5/3/2011
Date TD Reached: 5/10/2011
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; dense; 95% very fine to very coarse sand; 5% fine gravel to 2mm; rounded.	SW		
395					Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 100% fine to medium sand to 2mm; rounded.	SP		New 20' connection @ 1513. Resumed drilling @ 1525.
400					Same as above (393 ft); 5% coarse sand to 4.8mm.			
405					Same as above (393 ft).		High Solids Bentonite Grout	
410					Same as above (393 ft).			
415					Same as above (393 ft).			New 20' conneciton @ 1531. Resumed drilling @ 1540.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Client: US Army Corps of Engineers
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Ground Elevation AMSL (ft): 5342.8
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 100% fine to medium sand to 2mm; rounded.	SP		
425					Same as above (420 ft).			
430					Same as above (420 ft).			
435					Same as above (420 ft).		High Solids Bentonite Grout	New 20' connection @ 1549. Resumed drilling @ 1557.
440					Same as above (420 ft).			
445					No cuttings returned.			Too fine for screen, switched to bucket collection.
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; very dense; 100% very fine sand; trace medium sand to 1mm; rounded.	SP		
455					Same as above (450 ft).			New 20' connection @ 1606. End of 5/5/11. Resumed drilling @ 0844 on 5/10/11.
					Well graded SAND (SW); brown (10YR 4/3); wet; very dense; 95% very fine to very coarse sand; trace fine gravel to 1cm; rounded; 5% silt.	SW	High Solids Bentonite Grout	
460								
465					Poorly graded SAND (SP): dark yellowish brown (10YR 4/4); damp; dense; 90% medium sand; 5% fine gravel to 8mm; rounded; 5% silt; trace clay nodules.	SP	Top of Bentonite Seal	
470					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; dense; 90% very fine to very coarse sand; 5% fine gravel to 9mm; rounded; 5% silt and clay.	SW		
475					Same as above (470 ft).			New 20' connection @ 0859. Resumed drilling @ 0913.
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; dense; 95% medium sand; 5% coarse sand to 4mm; subangular to subrounded.	SP	Bentonite Seal	
485					Same as above (480 ft).			
490					Well graded SAND (SW); brown (10YR 5/3); damp; dense; 90% fine to very coarse sand; 10% fine gravel to 1.7cm; subrounded.	SW	5" Schedule 80 PVC Riser	
495					Well graded SAND with Gravel (SW); brown (10YR 5/3); wet; dense; 85% fine to very coarse sand; 15% fine gravel to 1.7cm; subrounded.		Top of 20/40 Sand Top of 10/20 Sand	New 20' connection @ 0924. Resumed drilling @ 0932.
500					Poorly graded SAND (SP); brown (10YR 4/3); wet; very dense; 95% fine to medium sand to 2mm; subrounded; 5% clay nodules.	SP	Top of 5" Schedule 80 PVC 0.010" Slot Screen	
505					Same as above (500 ft); damp.			
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Poorly graded SAND (SP); brown (10YR 4/3); wet; very dense; 95% fine to medium sand; 5% fine gravel to 8mm; subrounded.	SP		Rate of penetration decreased.
515					Well graded SAND (SW); brown (10YR 5/3); wet; very dense; 95% fine to very coarse sand; 5% fine gravel to 1cm; subrounded.	SW	Bottom of Screen Sump	New 10' connection @ 1000. Resumed drilling @ 1301.
520					No cuttings returned.		Bottom of Sump	Injected water to re-establish cutting returns.
525					No cuttings returned.		Bottom of Filter Pack	Added approximately 100 gallons of water. New connection @ 1316. Resumed drilling @ 1324.
530					Well graded SAND (SW); brown (10YR 5/3); wet; very dense; 95% fine to very coarse sand; 5% fine gravel to 1cm; subrounded.	SW		
535					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); wet; very dense; 100% medium sand to 2mm; rounded.		Native Backfill	
540					Same as above (530 ft).	SP		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106099

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 5/3/2011
Date TD Reached: 5/10/2011
Date Completed: 5/13/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474353.33
X Coordinate: 1541014.75

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 495.00
At End of Drilling: Not Recorded
After Drilling: 485.17

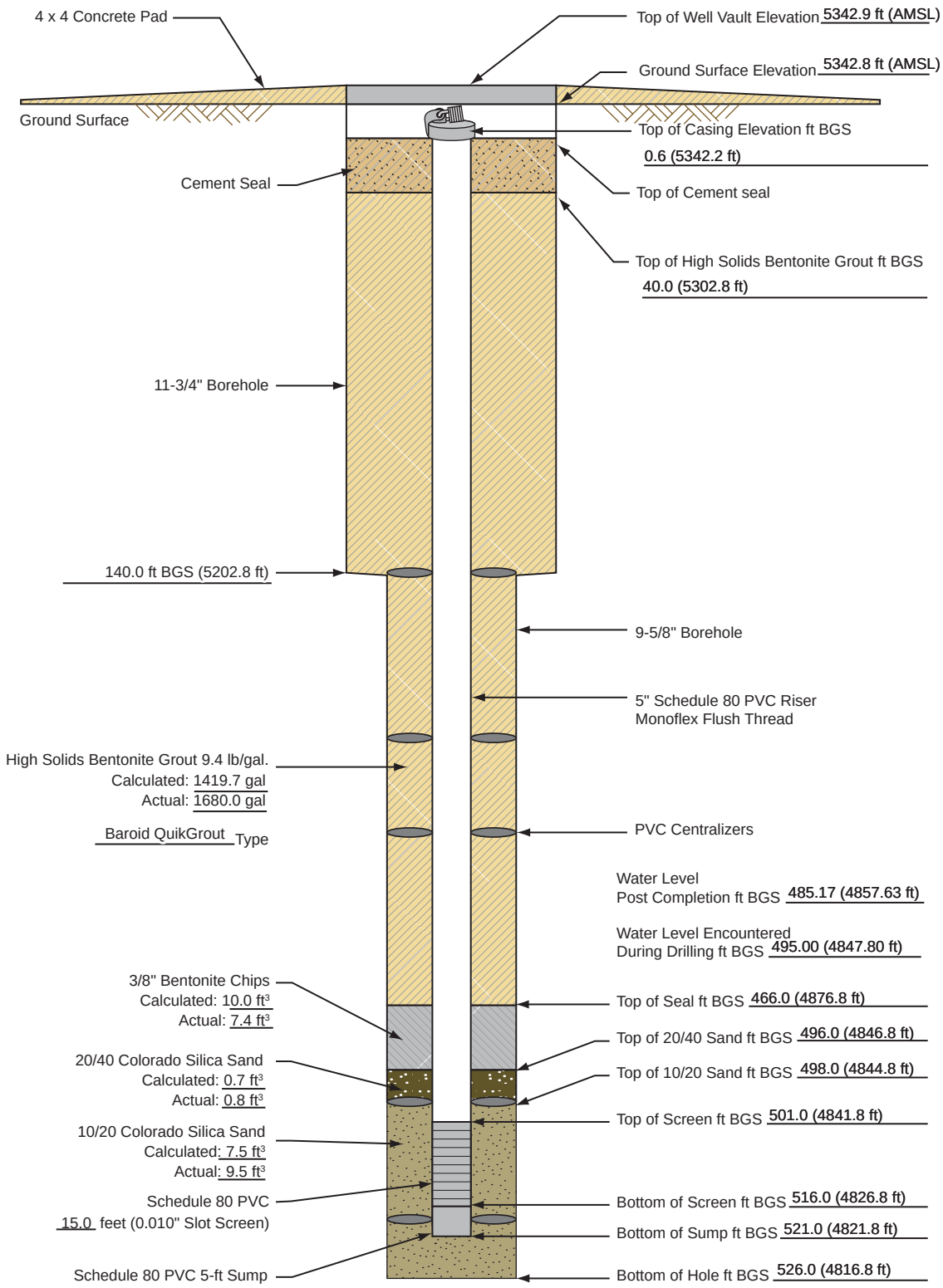
Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); wet; very dense; 100% medium sand to 2mm; rounded.			Added approximately 100 gallons of water.
545					Same as above (540 ft); 100% fine to medium sand.	SP	Native Backfill	
550					Same as above (540 ft); trace fine gravel to 1.5cm.			Total depth = 550 ft. Reached @ 1347 on 5/10/11.
555								Water added during drilling (gallons) = 200
								Water added after drilling (gallons) = 1450
560								Water added during construction (gallons) = 30
565								
570								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 6/17/11 10:59 - Y:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106099

Installation Start Date/Time: 5/11/2011 @ 08:00
Installation End Date/Time: 5/13/2011 @ 12:45



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106099

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106099

Personnel: V. Bracht

Date Installed: 5/12/11

Date: 5/21/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 521

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 5/21/11 - 5/22/11

Depth to Water Before Developing Well (ft. BGL): 485.31, 484.65 (TOC)

			Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 35.69 feet	=	1693.79 gal.	*	1	=	1693.79

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1693.79 gallons

Depth Purging From: 514 feet

Time Purging Begins: 1135, 5/21/11

Weather: Sunny, Warm

Screened Interval (ft BGL): 501 - 516

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1650 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
5/21/2011	0915	484.65	6	18.94	7.06	1.558	Out of Range	Begin Bailing, Dark Brown/Muddy
5/21/2011	0920	--	12	--	--	--	--	Continue Bailing
5/21/2011	0925	--	--	--	--	--	--	Stop Bailing, Begin Swabbing
5/21/2011	0945	--	--	--	--	--	--	Stop Swabbing
5/21/2011	1135	484.68	--	--	--	--	--	Begin Pumping at 4.5 GPM
5/21/2011	1140	484.58	--	22.52	7.82	1.581	Out of Range	Continue Pumping, Dark Brown
5/21/2011	1150	485.15	57	21.18	7.47	1.492	Out of Range	Continue Pumping, Lighter Brown
5/21/2011	1155	--	--	--	--	--	--	Pump Shuts Off Momentarily
5/21/2011	1200	--	--	--	--	--	--	Continue Pumping
5/21/2011	1203	--	--	--	--	--	--	Generator Stops, Pump Shuts Off

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTU
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106099

Project Number: 140705

Samplers: V. Bracht

Date: 5/21/11

Checked By:

Time Start: 0915, 5/21/11

Time Finish: 1330, 5/22/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
5/21/2011	1213	--	--	--	--	--	--	Pump On
5/21/2011	1217	485.15	--	22.74	7.68	1.472	>1000	Continue Pumping, Brown
5/21/2011	1230	485.15	124	22.34	7.34	1.453	80.50	Continue Pumping, Cloudy
5/21/2011	1240	485.19	169	21.83	7.29	1.443	50.10	Continue Pumping, Slightly Cloudy
5/21/2011	1250	485.19	214	21.95	7.28	1.437	48.10	Continue Pumping, Slightly Cloudy
5/21/2011	1300	485.19	259	21.91	7.30	1.431	34.40	Continue Pumping, Slightly Cloudy
5/21/2011	1310	485.19	304	22.11	7.34	1.427	33.90	Continue Pumping, Slightly Cloudy
5/21/2011	1320	485.18	349	22.33	7.39	1.427	21.20	Continue Pumping, Slightly Cloudy
5/21/2011	1330	485.19	394	22.39	7.49	1.426	17.80	Continue Pumping, Slightly Cloudy
5/21/2011	1340	485.19	439	22.35	7.56	1.422	15.80	Continue Pumping, Slightly Cloudy
5/21/2011	1350	485.17	484	22.38	7.64	1.419	10.20	Continue Pumping, Almost Clear
5/21/2011	1400	485.17	529	22.34	7.70	1.416	6.16	Continue Pumping, Clear
5/21/2011	1410	485.15	574	22.57	7.75	1.414	4.40	Continue Pumping, Clear
5/21/2011	1420	485.15	619	22.38	7.79	1.415	3.89	Continue Pumping, Clear
5/21/2011	1430	--	664	--	--	--	--	Generator Acting Up, Pump Off

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106099

Project Number: 140705

Samplers: V. Bracht

Date: 5/21/11

Checked By:

Time Start: 0915, 5/21/11

Time Finish: 1330, 5/22/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
5/21/2011	1440	--	--	--	--	--	--	Pump On
5/21/2011	1442	484.05	--	22.41	8.23	1.417	90.60	Continue Pumping, Cloudy
5/21/2011	1450	--	700	--	--	--	--	Pump Off Due to Generator Problems
5/21/2011	1452	--	--	--	--	--	--	Pump On
5/21/2011	1457	483.55	--	21.70	7.94	1.404	88.10	Continue Pumping, Cloudy
5/21/2011	1500	--	725	--	--	--	--	Generator Shuts Pump Off
5/21/2011	1505	--	--	--	--	--	--	Pump On
5/21/2011	1512	485.05	--	21.56	8.03	1.421	17.80	Continue Pumping, Slightly Cloudy
5/21/2011	1520	485.05	765	22.58	7.93	1.414	7.27	Continue Pumping, Clear
5/21/2011	1525	--	787	--	--	--	--	Generator Shuts Pump Off
5/21/2011	1527	--	--	--	--	--	--	Pump On
5/21/2011	1530	485.00	--	21.80	8.02	1.407	19.50	Continue Pumping, Slightly Cloudy
5/21/2011	1540	NR	832	22.23	7.91	1.419	3.56	Pump Goes Off, Clear
5/21/2011	1548	--	--	--	--	--	--	Pump On
5/21/2011	1552	485.00	--	21.08	7.92	1.414	6.11	Continue Pumping, Clear

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106099

Project Number: 140705

Samplers: V. Bracht

Date: 5/21/11

Checked By:

Time Start: 0915, 5/21/11

Time Finish: 1330, 5/22/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
5/21/2011	1558	--	859	--	--	--	--	Pump/Generator Shuts Off
5/22/2011	0843	484.70	--	--	--	--	--	Pump On
5/22/2011	0850	485.08	--	19.59	7.86	1.386	46.50	Continue Pumping, Slightly Cloudy
5/22/2011	0900	485.10	934	20.75	7.96	1.426	2.24	Continue Pumping, Clear
5/22/2011	0910	485.09	979	20.82	8.01	1.420	1.87	Continue Pumping, Clear
5/22/2011	0920	485.09	1024	20.92	8.03	1.414	1.45	Continue Pumping, Clear
5/22/2011	0930	485.10	1069	20.83	7.98	1.413	1.30	Continue Pumping, Clear
5/22/2011	0940	485.10	1114	20.78	7.97	1.410	1.26	Continue Pumping, Clear
5/22/2011	0950	485.10	1159	20.94	7.99	1.410	1.27	Continue Pumping, Clear
5/22/2011	1000	485.11	1204	20.93	7.99	1.411	1.68	Continue Pumping, Clear
5/22/2011	1010	485.11	1249	21.14	8.01	1.411	1.37	Continue Pumping, Clear
5/22/2011	1020	485.11	1294	21.31	8.00	1.409	1.13	Continue Pumping, Clear
5/22/2011	1030	485.11	1339	21.49	8.02	1.409	1.08	Continue Pumping, Clear
5/22/2011	1040	485.11	1384	21.58	8.00	1.409	1.13	Continue Pumping, Clear
5/22/2011	1050	485.11	1429	21.77	8.00	1.409	0.95	Continue Pumping, Clear

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106099

Project Number: 140705

Samplers: V. Bracht

Date: 5/22/11

Checked By:

Time Start: 0915, 5/21/11

Time Finish: 1330, 5/22/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
5/22/2011	1100	485.11	1474	21.65	8.01	1.411	0.92	Continue Pumping, Clear
5/22/2011	1110	485.11	1519	22.06	8.06	1.411	0.91	Continue Pumping, Clear
5/22/2011	1120	485.11	1564	22.38	8.05	1.409	0.92	Continue Pumping, Clear
5/22/2011	1130	485.11	1609	22.52	8.02	1.412	0.90	Continue Pumping, Clear
5/22/2011	1140	485.12	1654	22.79	8.02	1.410	1.07	Continue Pumping, Clear
5/22/2011	1150	485.11	1699	22.91	7.98	1.408	1.02	Continue Pumping, Clear
5/22/2011	1200	485.11	1744	22.92	7.99	1.411	0.83	Stop Pumping, Clear
5/22/2011	1325	--	1750	--	--	--	--	Bailing
5/22/2011	1330	--	1756	--	--	--	--	Bailing

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106100

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/28/2011
Date TD Reached: 4/30/2011
Date Completed: 5/3/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); brown (7.5YR 4/2); moist; soft; low plasticity; 60% silt; 10% clay; 30% fine to medium sand; trace fine gravel to 1.2cm.			Hand augered. ***Note: no headspace requirement at this location.***
5					Same as above (0 ft); brown (7.5YR 5/3); 5% clay.			Began drilling @ 1517 on 4/28/11.
10					Same as above (0 ft); strong brown (7.5YR 5/6); no clay; 30% very fine to medium sand; no gravel.	ML		
15					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; soft; low plasticity; 80% silt; trace clay nodules; 20% very fine to coarse sand to 4mm.		Cement Seal	New 20' connection @ 1527. Resumed drilling.
20					Sandy SILT (ML); strong brown (7.5YR 5/6); moist; soft; low plasticity; 70% silt; 30% very fine to medium sand.			
25					Silty SAND (SM); brown (7.5YR 5/4); dry; loose; 70% very fine to very coarse sand to 4.8mm; subangular to subrounded; 30% silt.	SM		
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106100

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/28/2011
Date TD Reached: 4/30/2011
Date Completed: 5/3/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; soft; low plasticity; 75% silt; 25% very fine to coarse sand; trace fine gravel to 1cm.			
35					Same as above (30 ft).	ML	Cement Seal	New 20' connection @ 1548. Resumed drilling @ 1600.
40					Same as above (30 ft); 85% silt; 15% very fine to fine sand.			
45					Silty SAND (SM); yellowish brown (10YR 5/4); moist; loose; 60% very fine to very coarse sand; trace fine gravel to 1.5cm; subrounded; 30% silt; 10% clay.	SM	Top of High Solids Bentonite Grout	
50					Silty SAND with Gravel (SM); yellowish brown (10YR 5/4); dry; loose; 60% fine to very coarse sand; 20% fine gravel to 2cm; subrounded; 20% silt.			
55					Sandy SILT (ML); strong brown (7.5YR 5/6); moist; soft; low plasticity; 60% silt; 40% very fine to coarse sand to 4mm.	ML		New 20' connection. Resumed drilling @ 1618.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106100

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/28/2011
Date TD Reached: 4/30/2011
Date Completed: 5/3/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; medium stiff; low plasticity; 80% silt; 20% very fine to fine sand to 0.5mm.	ML		
65					Same as above (60 ft).			
70					Same as above (60 ft); 5% clay nodules.			
75					Sandy SILT (ML); strong brown (7.5YR 5/6); dry; medium stiff; low plasticity; 60% silt; 40% very fine to coarse sand to 3mm.		High Solids Bentonite Grout	New 20' connection @ 1628. Resumed drilling @ 1639.
80					Same as above (75 ft).			
85					Silty SAND (SM); brown (7.5YR 5/4); moist; medium dense; 80% very fine to medium sand to 2mm; rounded; 20% silt.	SM		
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106100

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/28/2011
Date TD Reached: 4/30/2011
Date Completed: 5/3/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); brown (10YR 5/3); dry; loose; 95% very fine to medium sand to 2mm; subrounded; 5% silt.			
95					Same as above (90 ft).	SP		New 20' connection @ 1646. Resumed drilling @ 1657.
100					SILT with Sand (ML); brown (7.5YR 4/4); moist; soft; low plasticity; 85% silt; 15% very fine sand to 0.1mm.			
105					Same as above (100 ft).	ML	High Solids Bentonite Grout	
110					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; stiff; low to medium plasticity; 70% clay; 20% silt; 10% very fine sand to 0.08mm.			Cyclone and hose clogged @ 1705. End of 4/28/11. Resumed drilling @ 0806 on 4/29/11.
115					Same as above (110 ft).	CL		New 20' connection @ 0818. Resumed drilling @ 0828.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106100

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/28/2011
Date TD Reached: 4/30/2011
Date Completed: 5/3/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Lean CLAY (CL); strong brown (7.5YR 4/6); moist; stiff; low to medium plasticity; 70% clay; 20% silt; 10% very fine sand to 0.08mm.	CL		
125					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; medium dense; 100% very fine to fine sand to 0.5mm; rounded.	SP		Approximate top of Santa Fe Group.
130					Same as above (124 ft); 100% very fine to medium sand to 2mm.			
135					Same as above (124 ft); 100% very fine to medium sand to 2mm.		High Solids Bentonite Grout	New 20' connection @ 0843. Resumed drilling @ 0853.
140					Same as above (124 ft); 100% very fine to medium sand to 2mm.			
145					Same as above (124 ft); 100% very fine to medium sand to 2mm.			
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106100

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/28/2011
Date TD Reached: 4/30/2011
Date Completed: 5/3/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; medium dense; 100% very fine to medium sand to 2mm; rounded; trace fine gravel to 1.2cm.	SP		
155					Same as above (150 ft); no gravel.			New 20' connection @ 0907. Compressor stopped working properly @ 0910. Retrieved additional compressor @ 0947. Resumed drilling @ 1001.
160					Same as above (150 ft); no gravel.			
165					Same as above (150 ft); no gravel.		High Solids Bentonite Grout	
170					Same as above (150 ft); no gravel.			Hammer pulled off of casing, reattached and resumed drilling @ 1015.
175					Same as above (150 ft); increasing very fine sand; no gravel.			New connection @ 1021. Resumed drilling.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; medium dense; 100% very fine to medium sand to 1mm; subrounded.			
185					Same as above (180 ft); moist; trace coarse sand; trace fine gravel to 6mm. Note: gravel is pumice.			
190					Same as above (180 ft).			
195					Same as above (180 ft); trace clay nodules.	SP	High Solids Bentonite Grout	
200					Same as above (180 ft); trace fine gravel to 8mm.			
205					Same as above (180 ft).			
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106100

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Project Number: 140705

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Lean CLAY with Sand (CL); yellowish brown (10YR 5/4); moist; stiff; medium plasticity; 85% clay; 15% very fine to medium sand to 2mm.	CL		
215					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; medium dense; 95% very fine to medium sand; 5% coarse sand to 4mm; rounded.	SP		New 20' connection @ 1546. Resumed drilling @ 1552.
220					Same as above (213 ft); 5% fine gravel to 1.6cm.			
225					Same as above (213 ft).		High Solids Bentonite Grout	
230					Same as above (213 ft); trace fine gravel to 1.5cm.			
235					Same as above (213 ft); trace fine gravel to 1.5cm.			New 20' connection @ 1558. Resumed drilling @ 1614.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106100

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Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/28/2011
Date TD Reached: 4/30/2011
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Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); brown (10YR 5/3); moist; medium dense; 100% very fine to medium sand to 1mm; subrounded.			
245					Same as above (240 ft).			
250					Same as above (240 ft).	SP		
255					Same as above (240 ft).		High Solids Bentonite Grout	New 20' connection @ 1623. Resumed drilling @ 1632.
260					Well graded SAND (SW); brown (10YR 5/4); moist; medium dense; 95% very fine to very coarse sand; 5% fine gravel to 1cm; rounded.			
265					Same as above (260 ft).	SW		
270								

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Project Number: 140705

Date Started: 4/28/2011
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Date Completed: 5/3/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Well graded SAND (SW); brown (10YR 5/4); moist; medium dense; 95% very fine to very coarse sand; 5% fine gravel to 1cm; rounded.	SW		
					Sandy lean CLAY (CL); lense.	CL		
275					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 100% very fine to medium sand; trace coarse sand to 4mm; rounded.	SP		New 20' connection. Resumed drilling @ 1645.
280					Well graded SAND (SW); brown (10YR 5/3); moist; medium dense; 100% very fine to very coarse sand to 4mm; rounded.			
285					Same as above (280 ft).		High Solids Bentonite Grout	
290					Same as above (280 ft).	SW		
295					Same as above (280 ft).			New 20' connection @ 1652. End of 4/29/11. Resumed drilling @ 0942 on 4/30/11.
300								

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Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/28/2011
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Date Completed: 5/3/2011

Ground Elevation AMSL (ft): 5342.8
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X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); dry; dense; 70% very fine to very coarse sand; 30% fine gravel to 3cm; rounded.	SW	High Solids Bentonite Grout	New 20' connection @ 0953. Chain slipped off of hammer, stopped to fix. Resumed drilling @ 1045.
305					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 100% very fine to very coarse sand; trace gravel.			
310					Same as above (305 ft).			
315					Same as above (305 ft); 5% fine gravel to 1.9cm.			
320					Same as above (305 ft).			
325					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); dry; dense; 80% very fine to very coarse sand; 20% fine gravel to 1.6cm.			
330								

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 100% very fine to very coarse sand; trace gravel.	SW		
335					Poorly graded SAND (SP); brown (10YR 5/3); moist; medium dense; 100% very fine to medium sand to 2mm; rounded.	SP		New 20' connection @ 1051. Resumed drilling @ 1100.
340					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; dense; 80% very fine to very coarse sand; 20% fine gravel to 1.5cm; subrounded to rounded; trace fines.	SW		
345					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; dense; 90% very fine to very coarse sand; 10% fine gravel to 1.5cm; subrounded to rounded; trace fines.		High Solids Bentonite Grout	
350					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; dense; 85% very fine to very coarse sand; 15% fine gravel to 1.5cm; subrounded to rounded; trace fines.			
355					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; dense; 95% very fine to very coarse sand; 5% fine gravel to 1.5cm; subrounded to rounded; trace fines.			New 20' connection @ 1107. Resumed drilling @ 1115.
360								

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Project Number: 140705

Date Started: 4/28/2011
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Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; medium dense; 100% fine to medium sand to 2mm; subrounded to rounded.	SP		
365					Well graded SAND (SW); brown (10YR 4/3); moist; medium dense; 95% very fine to very coarse sand; 5% fine gravel to 1.4cm; subrounded.	SW		
370					Same as above (365 ft).			
375					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; medium dense; 100% fine sand to 0.5mm; rounded.	SP	High Solids Bentonite Grout	New 20' connection @ 1120. Resumed drilling @ 1127.
380					Same as above (373 ft).			
385					Clayey SAND with Gravel (SC); brown (7.5YR 4/4); damp; medium dense; 65% fine to very coarse sand; 15% fine gravel to 1.8cm; subrounded; 20% clay.	SC		
390					Lean CLAY (CL); lense.	CL		

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Borehole ID: KAFB-106100

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/28/2011
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Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474327.75
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); brown (10YR 5/3); moist; medium dense; 100% fine sand to 0.5mm; rounded.			
395					Same as above (390 ft); 100% fine to medium sand to 2mm.			New 20' connection @ 1135. Resumed drilling @ 1258.
400					Same as above (390 ft); 100% fine to medium sand to 2mm.	SP		
405					Same as above (390 ft); 100% fine to medium sand to 2mm; trace fine gravel to 2cm.		High Solids Bentonite Grout	
410					Same as above (390 ft); 100% fine to medium sand to 2mm.			
415					Well graded SAND (SW); brown (10YR 5/3); dry; dense; 100% very fine to coarse sand to 4mm; subangular to subrounded.	SW		New 20' connection @ 1307. Resumed drilling @ 1316.
420								

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); brown (10YR 5/3); dry; dense; 100% very fine to coarse sand to 4mm; subangular to subrounded.	SW		
425					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; dense; 100% fine sand to 0.5mm; rounded.	SP		
430					Well graded SAND (SW); brown (10YR 5/3); damp; dense; 100% very fine to coarse sand to 4mm; rounded.	SW		
435					Poorly graded SAND (SP); yellowish brown (10YR 5/6); moist; dense; 100% fine sand to 0.5mm; rounded.		High Solids Bentonite Grout	New 20' connection @ 1327. Resumed drilling @ 1334.
440					Same as above (435 ft).	SP		
445					Same as above (435 ft); 100% medium sand; trace fine gravel to 1.8cm.			
450								

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND (SW); brown (10YR 4/3); moist; dense; 95% very fine to very coarse sand; 5% fine gravel to 1cm; rounded.	SW		
455					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; dense; 95% fine to medium sand; 5% coarse sand; trace fine gravel to 9mm; rounded.	SP		New 20' connection @ 1344. Resumed drilling @ 1353.
460					Well graded SAND (SW); brown (10YR 5/3); moist; dense; 95% very fine to very coarse sand; 5% fine gravel to 1cm; rounded.	SW		
465					No cuttings returned.		High Solids Bentonite Grout	
470					Well graded SAND (SW); brown (10YR 5/3); moist; dense; 95% very fine to very coarse sand; 5% fine gravel to 1cm; rounded; grading finer than 460'.	SW		
475					Same as above (470 ft); damp; 10% fine gravel.			New 20' connection @ 1406. Resumed drilling @ 1414.
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

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At End of Drilling: Not Recorded
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Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND (SW); brown (10YR 5/3); moist; dense; 100% very fine to very coarse sand.			
485					Same as above (480 ft).		High Solids Bentonite Grout	
490					Same as above (480 ft); 5% fine gravel to 1.5cm.	SW	Top of Bentonite Seal	
495					Same as above (480 ft); 5% fine gravel to 3.2cm.			New 20' connection @ 1424. Resumed drilling @ 1429.
500					Poorly graded SAND (SP); yellowish brown (10YR 5/4); damp; dense; 100% fine to medium sand; trace fine gravel to 4.3cm; rounded.			
505					Same as above (500 ft).	SP		
510								

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Hole Diameter Lower (in.): 9-5/8
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At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Well graded SAND (SW); dark yellowish brown (10YR 4/4); wet; dense; 90% very fine to very coarse sand; 10% fine gravel to 2.5cm; rounded.	SW	Bentonite Seal	
515					Same as above (510 ft); 5% gravel.		5" Schedule 80 PVC Riser	New 20' connection @ 1442. Resumed drilling @ 1451.
520					Silty SAND (SM); dark yellowish brown (10YR 4/4); damp; dense; 80% fine to medium sand to 1mm; rounded; 20% silt.	SM	Top of 20/40 Sand	
					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; dense; 100% fine to very coarse sand; 4.8mm; rounded.		Top of 10/20 Sand	
525					Same as above (520 ft).		Top of 5" Schedule 80 PVC 0.010" Slot Screen	
530					Same as above (520 ft); grading coarser.	SW		
535					Same as above (520 ft); 5% fine gravel to 1.3cm.			New 20' connection @ 1505. Resumed drilling @ 1516.
540								

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Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; dense; 100% fine to very coarse sand; 4.8mm; rounded.	SW	Bottom of Screen; Sump	
545					Same as above (540 ft); grading coarser.		Bottom of Sump; Bottom of Filter Pack	
550					Silty SAND (SM); dark yellowish brown (10YR 4/4); wet; very dense; 80% fine to medium sand to 1mm; rounded; 20% silt.	SM		
555					Well graded SAND (SW); brown (10YR 5/3); wet; very dense; 100% fine to very coarse sand to 4.8mm; subrounded to rounded.	SW	Native Backfill	New 10' connection @ 1540. Resumed drilling @ 1551.
560					Poorly graded SAND with Silt (SP-SM); dark yellowish brown (10YR 4/4); wet; very dense; 90% fine to medium sand to 1mm; rounded; 10% silt.	SP-SM		
565					Well graded SAND (SW); brown (10YR 5/3); wet; dense; 100% fine to very coarse sand to 4.8mm; subrounded.	SW		
570								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106100

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 4/28/2011
Date TD Reached: 4/30/2011
Date Completed: 5/3/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1474327.75
X Coordinate: 1541028.01

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 500.00
At End of Drilling: Not Recorded
After Drilling: 485.50

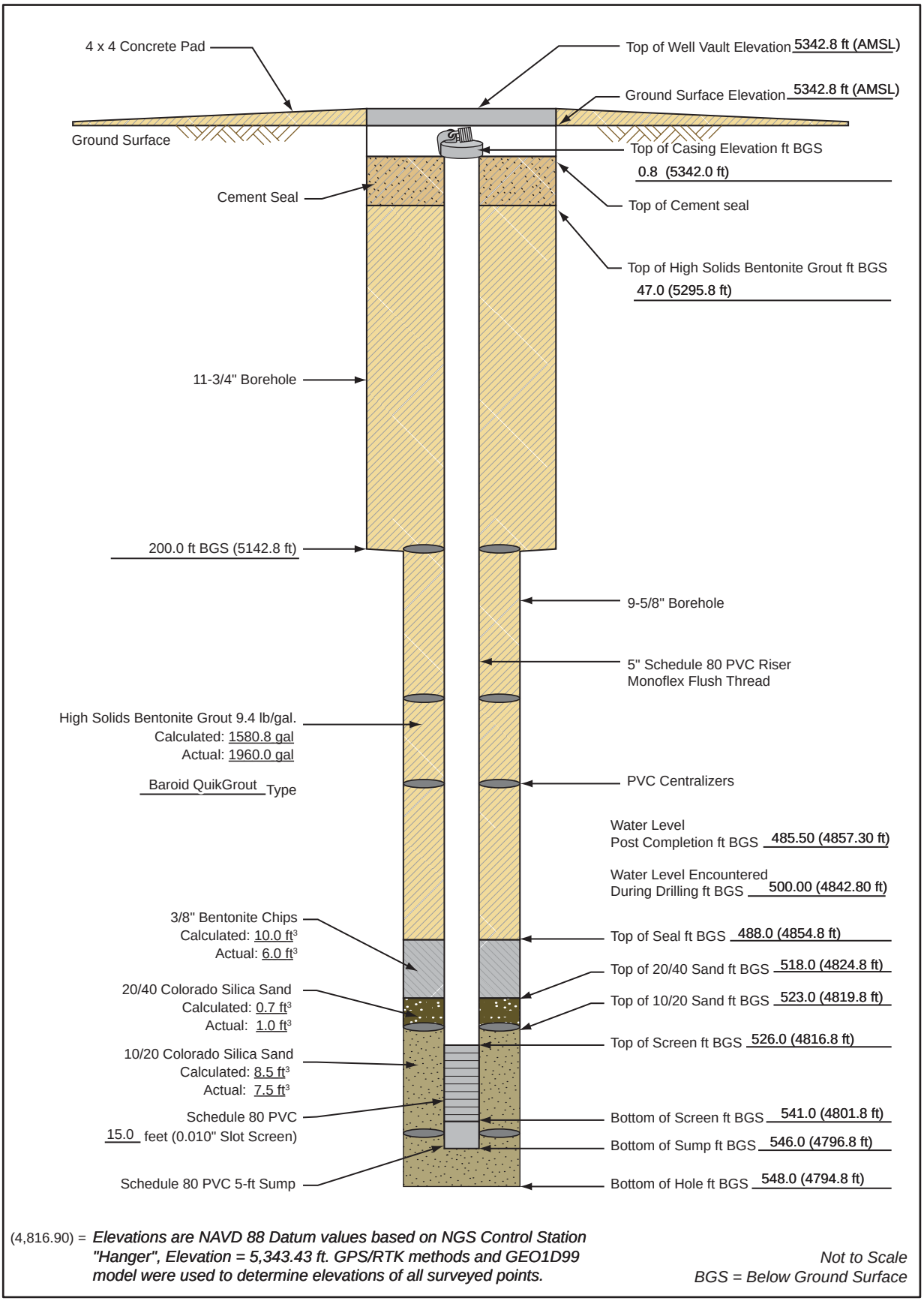
Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
570								
					Poorly graded SAND with Silt (SP-SM); dark yellowish brown (10YR 4/4); wet; very dense; 90% fine to medium sand to 1mm; rounded; 10% silt.	SP-SM		Total depth = 570 ft. Reached @ 1557 on 4/30/11.
								Water added during drilling (gallons) = 0
575								
								Water added after drilling (gallons) = 1250
580								Water added during construction (gallons) = Not recorded
585								
590								
595								
600								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 5/31/11 10:38 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106100

Installation Start Date/Time: 5/1/2011 @ 8:00
Installation End Date/Time: 5/3/2011 @ 10:00



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106100

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106100

Personnel: A. Willmore

Date Installed: 5/3/11

Date: 5/14/11

Csg. Diameter (I.D.): 5"

Samplers: A. Willmore

Total Depth (ft. BGL): 546

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 5/14/11-5/15/11

Depth to Water Before Developing Well (ft. BGL): 485.35

			Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column:	60.65 feet	=	1319.65 gal.	*	1	=	1319.65

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1319.65 gallons

Depth Purging From: 512 feet

Time Purging Begins: 0815, 5/15/11

Weather: Clear, 80's

Screened Interval (ft BGL): 526-541

Equipment Nos.: **pH Meter:** YSI 100258 **EC Meter**: YSI 100258 **Turbidity Meter**: LVE 2818

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1250 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
5/14/2011	1530	--	5	20.22	9.09	0.501	Out of Range	Begin Bailing, Brown
5/14/2011	1540	--	30	21.04	8.42	0.492	Out of Range	Continue Bailing, Brown
5/14/2011	1545	--	40	20.16	8.86	0.390	Out of Range	Stop Bailing, Brown
5/15/2011	0815	485.35	40	19.44	8.81	0.371	Out of Range	Begin Pumping, Brown
5/15/2011	0830	485.61	130	18.97	8.24	0.360	135	Continue Pumping, Cloudy
5/15/2011	0845	485.61	220	19.49	8.14	0.356	42.10	Continue Pumping, Clear
5/15/2011	0900	485.61	310	19.68	8.12	0.357	7.01	Continue Pumping, Clear
5/15/2011	0915	485.61	400	20.03	8.09	0.355	6.93	Continue Pumping, Clear
5/15/2011	0930	485.61	490	19.68	8.05	0.357	7.01	Continue Pumping, Clear
5/15/2011	0945	485.61	580	20.00	8.07	0.358	7.42	Continue Pumping, Clear

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106100

Project Number: 140705

Samplers: A. Willmore

Date: 5/15/11

Checked By:

Time Start: 1530, 5/14/11

Time Finish: 1145, 5/15/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
5/15/2011	1000	485.61	670	20.08	8.05	0.357	7.01	Continue Pumping, Clear
5/15/2011	1015	485.61	760	20.25	8.06	0.357	7.92	Continue Pumping, Clear
5/15/2011	1030	485.61	850	20.40	8.06	0.357	6.02	Continue Pumping, Clear
5/15/2011	1045	485.61	940	20.62	8.07	0.357	7.42	Continue Pumping, Clear
5/15/2011	1100	485.61	1030	20.81	8.06	0.357	6.91	Continue Pumping, Clear
5/15/2011	1115	485.61	1120	20.84	8.04	0.356	7.47	Continue Pumping, Clear
5/15/2011	1130	485.61	1210	20.86	8.05	0.356	3.89	Continue Pumping, Clear
5/15/2011	1145	485.61	1300	20.89	8.04	0.355	2.74	Stop Pumping, Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT (ML); red (2.5YR 5/6); dry to moist; very stiff to hard; 65% silt; 30% clay; 5% very fine to fine sand; no odor.	ML		Hand augered. ***Note: No headspace requirement at this location.***
5					Same as above (0 ft); no odor.			Began drilling @ 1443 on 02/15/2011. Injected water into cyclone for dust suppression.
10					Same as above (0 ft); trace coarse sand; subangular; no odor.		Cement Seal	
15					Lean CLAY with Sand (CL); light reddish brown (2.5YR 6/4); dry to moist; very stiff; 70% clay; 15% silt; 15% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; no odor.	CL		
20					Same as above (15 ft); light reddish brown (2.5YR 7/4); no odor.			Kelly down @ 1530. New connection @ 1539. Resumed drilling @ 1540.
25					SILT with Sand (ML); light reddish brown (2.5YR 6/4); dry; very stiff; 85% silt with minor clay; 15% fine sand; no odor.	ML		
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 12:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT (ML); light reddish brown (2.5YR 6/4); dry to moist; very stiff; 65% silt; 30% clay; 5% fine sand; trace medium to coarse sand; subrounded; no odor.			No cuttings returned past 32', still have circulation. Regained cuttings at 34'.
35					SILT with Sand (ML); reddish brown (2.5YR 5/4); dry to moist; very stiff; 85% silt with trace clay; 15% fine to medium sand; trace coarse sand; subangular to subrounded; no odor.	ML	Cement Seal	
40					Silty SAND (SM); pale red (2.5YR 6/2); dry; dense to very dense; 85% very fine to coarse sand; angular to subangular; 15% silt; no odor.	SM		Kelly down @ 1559. New connection @ 1611. Resumed drilling @ 1613.
45					Silty SAND with Gravel (SM); reddish brown (2.5YR 5/4, based on fines); moist; dense to very dense; 70% coarse sand; trace fine to medium sand; angular; 15% fine gravel to 5mm; angular to subangular; 15% silt with minor clay; coarse sand and gravel dominantly granitic composition; no odor.		Top of High Solids Bentonite Grout	Rig chatter @ 45'.
50					SILT (ML); red (2.5YR 5/8); dry to moist; very stiff; 90% silt with minor clay; 10% very fine to fine sand; no odor.	ML		
55					SILT with Sand (ML); red (2.5YR 5/8); dry to moist; very stiff; 85% silt with minor clay; 15% very fine to fine sand; trace medium to coarse sand; subangular; no odor.			
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 12:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Lean CLAY (CL); red (2.5YR 5/8); dry; very stiff; medium plasticity; 95% clay with minor silt; 5% very fine to fine sand; no odor.			Kelly down @ 1629. New connection @ 1639. Resumed drilling @ 1641.
65					Lean CLAY (CL); reddish brown (2.5YR 5/3); dry; very stiff; low plasticity; 70% clay; 30% silt; trace very fine to fine sand; no odor.	CL		
70					Same as above (65 ft); clay mainly as nodules; no odor.			
75					SILT with Sand (ML); light reddish brown (2.5YR 6/4); dry; very stiff; 75% silt with trace clay; 25% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; no odor.	ML	High Solids Bentonite Grout	
80					Poorly graded SAND (SP); light gray (5YR 7/1); moist; dense to very dense; 95% very fine to fine sand; 5% silt; no odor.			Kelly down @ 1706. End of 02/15/11. New connection @ 0759 on 02/16/11. Resumed drilling @ 0800 on 02/16/11. Driller injected water for dust suppression.
85					Same as above (79 ft); no odor.	SP		
90								

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Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); pinkish gray (5YR 6/2); dry to moist; dense to very dense; 95% fine to medium sand; subrounded; 5% silt; pumice present; no odor.	SP		Rig chatter below 90', breif discharge of fine to coarse gravel; angular to subangular.
					SILT with Sand (ML); yellowish red (5YR 5/6); moist; very stiff; 80% silt; 5% clay; 15% fine sand; no odor.	ML		
95					Lean CLAY (CL); reddish brown (2.5YR 5/4); moist; very stiff; low to medium plasticity; 95% clay; 5% very fine to fine sand; no odor.	CL		
					SILT (ML); yellowish red (5YR 5/6); moist; stiff to very stiff; 90% silt; 5% clay; 5% very fine to fine sand; no odor.	ML		
100								Kelly down @ 0817. New connection @ 0832. Resumed drilling @ 0835. Stopped advancing @ 0845 due to minor mechanical problems. Resumed drilling @ 0915.
105					Sandy lean CLAY (CL); yellowish red (5YR 5/6); moist; very stiff; low plasticity; 55% clay; 15% silt; 30% very fine to fine sand; trace medium sand; subangular to subrounded.	CL	High Solids Bentonite Grout	
110					Same as above (105 ft); no odor.			
115					Same as above (105 ft); no odor.			
120					Poorly graded SAND with Clay (SP-SC); pale red (2.5YR 6/2); dry to moist; dense to very dense; 90% very fine to fine sand; trace medium sand; subangular;	SP-SC		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 12:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					10% clay as nodules; no odor. Note: likely top of Santa Fe Group. Sand was proceeded by a thin lense of light brown (7.5YR 6/3) lean clay; appeared as nodules.	SP-SC		Kelly down @ 0944. New connection @ 1006. Resumed drilling @ 1009.
125					Poorly graded SAND (SP); pale red (2.5YR 6/2); dry; dense; 95% very fine to medium sand; subangular to subrounded; 5% silt; no odor.			
130					Same as above (125 ft); 95% very fine to fine sand; 5% silt; no odor.	SP		
135					Same as above (125 ft); 95% fine to medium sand; subrounded to subangular; 5% silt; no odor.		High Solids Bentonite Grout	
140					Well graded SAND with Clay and Gravel (SW-SC); brown (7.5YR 6/3); moist; dense; 75% very fine to coarse sand; subrounded to subangular; 15% fine to coarse gravel to 3cm; angular to subangular; 10% clay; no odor.	SW-SC		Kelly down @ 1029. New connection @ 1045. Resumed drilling @ 1049.
145					Well graded SAND (SW); pale red (2.5YR 6/2); dry to moist; dense; 85% very fine to coarse sand; subangular to subrounded; 10% fine to coarse gravel; angular to subangular; 5% silt with minor clay; no odor.	SW		
150					Poorly graded SAND (SP); pale red (2.5YR 6/2); dry to moist; dense; 95% very fine to fine sand; 5% silt; no odor.	SP		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 12:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND (SP); pale red (2.5YR 6/2); dry to moist; dense; 100% fine to medium sand; subangular to subrounded; no odor; sand dominantly intermediate to mafic composition with some quartz and feldspar; minor pumice fragments. Same as above (150 ft); no odor.	SP		
155								
160					Silty SAND (SM); brown (7.5YR 5/4); moist; dense; 80% very fine to medium sand; trace coarse sand; subrounded to subangular; 20% silt with trace clay; no odor.	SM		Kelly down @ 1122. New connection @ 1432. Resumed drilling @ 1434.
165					Silty SAND (SM); light reddish brown (5YR 6/3); moist; dense to very dense; 80% very fine to fine sand; trace medium sand; subrounded; 20% silt; no odor.		High Solids Bentonite Grout	
170					Well graded SAND (SW); light reddish brown (5YR 6/3); moist; dense to very dense; 100% fine to coarse sand; subrounded to subangular; trace fine gravel to 12mm; no odor.	SW		
175					Same as above (170 ft); no gravel; no odor.			
180					Clayey SAND with Gravel (SC); reddish	SC		

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Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					brown (5YR 4/3); moist; dense to very dense; 65% fine to coarse sand; subrounded to subangular; 15% fine gravel to 12mm; subrounded to subangular; 20% clay as nodules and as coating on gravel; low plasticity; no odor.	SC		Kelly down @ 1502. New connection @ 1520. Resumed drilling @ 1522.
185					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); moist; very dense; 100% fine sand; no odor.	SP		
190					Well graded SAND (SW); light reddish gray (2.5YR 7/1); moist; very dense; 100% fine to coarse sand; subangular to subrounded; no odor.	SW		Lost cutting returns at 188'; driller stopped advancing to clean hole and discharge hose. Discharge was clayey sand to clayey gravel, but could not determine if cuttings are representative due to collection in discharge hose.
195					Same as above (190 ft); slightly finer; no odor.		High Solids Bentonite Grout	
200					Same as above (190 ft); slightly coarser; no odor.			Kelly down @ 1435. Total depth of 11-3/4" casing. End of 02/16/11. New connection @ 1238 on 02/17/11. Resumed drilling @ 1239 on 02/17/11.
205					Poorly graded SAND (SP); weak red (2.5YR 5/2); moist; medium dense; 95% very fine to fine sand; 5% silt; no odor.	SP		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 12:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND (SP); weak red (2.5YR 5/2); moist; medium dense; 100% very fine to medium sand; subrounded to subangular; no odor.	SP		
215					Same as above (210 ft); 95% very fine to fine sand; trace medium sand; subrounded to subangular; 5% silt; no odor.			
220					Silty SAND (SM); reddish brown (5YR 5/4); moist; medium dense; 75% very fine to coarse sand; subrounded to subangular; 5% fine gravel to 15mm; subrounded; 20% silt with trace clay; silty/clayey coating on gravel; no odor.	SM		Kelly down @ 1246. New connection @ 1254. Resumed drilling @ 1255. Did not have to hammer casing 200-225'. Began driving casing below 225'.
225					Same as above (218 ft); no odor.		High Solids Bentonite Grout	
230					Well graded SAND with Silt (SW-SM); pale red (2.5YR 7/2); dry to moist; dense; 90% very fine to coarse sand; subrounded to subangular; 10% silt with trace clay; no odor.	SW-SM		
235					Silty SAND (SM); pale red (2.5YR 7/2); dry to moist; dense; 85% very fine to medium sand; trace coarse sand; subrounded to subangular; 15% silt with trace clay; no odor.	SM		
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 12:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Silty SAND (SM); pale red (2.5YR 7/2); dry to moist; dense; 85% very fine to medium sand; trace coarse sand; subrounded to subangular; 15% silt with trace clay; no odor.	SM		Kelly down @ 1305. New connection @ 1316. Resumed drilling @ 1320.
245					Lean CLAY (CL); reddish brown (5YR 5/3); moist; very stiff to hard; medium plasticity; 95% clay; 5% silt; no odor.	CL		
250					Silty SAND (SM); reddish brown (5YR 5/3); moist; dense to very dense; 85% very fine to medium sand; subrounded; 15% silt with minor clay; no odor.	SM		
255					Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 5/3); moist; dense to very dense; 90% very fine to fine sand; subrounded; 10% silt; no odor.	SP-SM	High Solids Bentonite Grout	
260					Same as above (250 ft); no odor.			
265					Well graded SAND with Silt (SW-SM); reddish brown (5YR 5/3); moist; dense to very dense; 90% very fine to coarse sand; subrounded; 10% silt; no odor.	SW-SM		Kelly down @ 1334. New connection @ 1343. Resumed drilling @ 1344.
270					Well graded SAND with Gravel (SW); reddish brown (5YR 5/3); moist; dense; 80% fine to coarse sand; subrounded to subangular; 15% fine to coarse gravel to 2.5cm; subrounded; 5% silt with minor clay; no odor.	SW		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 12:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106101

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Project Number: 140705

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Ground Elevation AMSL (ft): 5337.2
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X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; dense to very dense; 95% very fine to fine sand; trace medium sand; subrounded; 5% silt; no odor. Note: cobbles to 10cm noted from discharge at 274'.	SP		
275					Silty SAND (SM); reddish brown (5YR 5/3); moist; dense to very dense; 80% very fine to fine sand; 20% silt; no odor.	SM		
280					GRAVEL (GW); lense.	GW		Kelly down @ 1356. New connection @ 1407. Resumed drilling @ 1407.
					Well graded SAND (SW); pale red (2.5YR 7/2); moist; dense; 90% very fine to coarse sand; subrounded to subangular; 5% fine gravel to 12mm; subrounded; 5% silt; no odor.	SW		
285							High Solids Bentonite Grout	
290					Lean CLAY (CL); brown (7.5YR 5/3); moist; stiff; medium plasticity; 95% clay; 5% fine to medium sand; subrounded to subangular; no odor.	CL		
295					Clayey SAND with Gravel (SC); brown (7.5YR 5/3); moist; dense to very dense; 70% very fine to coarse sand; subangular to subrounded; 15% fine gravel to 15mm; subangular to subrounded; 15% clay with minor silt; no odor.	SC		
300					Sandy lean CLAY (CL); reddish brown (7.5YR 4/3); moist; stiff; low plasticity; 70% clay with trace silt; 30% very fine to	CL		

Borehole ID: KAFB-106101

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Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
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Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					fine sand; no odor.			
					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; dense; 95% very fine to medium sand; subangular to subrounded; 5% silt; no odor.	SP		Kelly down @ 1417. New connection @ 1426. Resumed drilling @ 1426.
305					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; dense; 100% fine to coarse sand; subangular to subrounded; no odor.			
310					Same as above (305 ft); 100% very fine to coarse sand; subangular to subrounded; no odor.	SW		
315					Same as above (305 ft); 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.		High Solids Bentonite Grout	
320					Well graded GRAVEL (GW); pale red (2.5YR 7/2); dry; dense; 95% fine to coarse gravel; angular to subrounded; 5% coarse sand; angular to subrounded; no odor.	GW		Kelly down @ 1438. New connection @ 1449. Resumed drilling @ 1452.
325					Well graded SAND with Gravel (SW); pinkish gray (5YR 7/2); dry to moist; dense; 80% very fine to coarse sand; subrounded to subangular; 15% fine to coarse gravel to 5cm; subrounded; 5% clay with minor silt, mainly as coating on coarse sand and gravel; no odor.	SW		
330								

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Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Gravel (SW); pinkish gray (5YR 7/2); dry to moist; dense; 80% very fine to coarse sand; subrounded to subangular; 15% fine gravel to 18mm; subrounded; 5% fines; no odor.	SW		
335					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; dense; 95% very fine to coarse sand; subrounded to subangular; 5% fine gravel to 15mm; subrounded; no odor.			Sand/gravel discharge preceeded by heavy dust.
340					Poorly graded SAND with Gravel (SP); pale red (2.5YR 7/2); dry; dense; 85% medium to coarse sand; subangular to subrounded; 15% fine gravel to 12mm; subrounded to subangular; no odor.	SP		Kelly down @ 1506. New conection @ 1515. Resumed drilling @ 1516. Stopped drilling @ 1524 due to hammer not firing. Resumed drilling @ 1529.
345					Silty SAND with Gravel (SM); reddish brown (5YR 4/3); moist; dense to very dense; 65% very fine to medium sand; trace coarse sand; subrounded to subangular; 15% coarse gravel to 7.5cm; subrounded; 20% silt with trace clay; no odor. Same as above (340 ft); fine gravel to 15mm; subrounded; no odor.	SM	High Solids Bentonite Grout	
350					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense; 95% very fine to coarse sand; subangular; 5% silt; no odor.	SW		
355					Well graded SAND with Silt (SW-SM); reddish brown (5YR 4/3); moist; dense; 90% very fine to coarse sand; subangular to subrounded; 10% silt with trace clay; no odor.	SW-SM		
360								Kelly down @ 1538. End of 2/17/11.

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Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND with Silt (SW-SM); strong brown (7.5YR 5/8); moist; dense; 90% very fine to coarse sand; subangular to subrounded; 10% silt with trace clay; no disernable odor; appears hydrocarbon stained.	SW-SM		New connection @ 1117 on 2/18/11. Resumed drilling @ 1150 on 2/18/11. No PID readings at either discharge or well head. Sample leaves slight oily residue on hands.
365					Well graded SAND (SW); brown (7.5YR 4/3); moist; very dense; 100% very fine to coarse sand; subrounded to subangular; no odor; less hydrocarbon staining.	SW		
370					Same as above (365 ft); less coarse fraction; no odor; apppears hydrocarbon stained.			
375					Silty SAND (SM); brown (7.5YR 5/3); dry to moist; very dense; 80% very fine to fine sand; trace medium to coarse sand; subrounded to subangular; 20% silt; no odor; appears hydrocarbon stained (minor).	SM	High Solids Bentonite Grout	
380					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; very dense; 95% very fine to fine sand; 5% silt; no odor; no visible hydrocarbon staining.	SP		Kelly down @ 1211. New connection @ 1224. Resumed drilling @ 1224.
385					Well graded SAND (SW); light reddish brown (5YR 6/3); moist; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		
390								

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Ground Elevation AMSL (ft): 5337.2
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); light reddish brown (5YR 6/3); dry to moist; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		
395					Silty GRAVEL (GM); reddish brown (5YR 4/3); dry to moist; dense; 80% fine to coarse gravel to 5cm; subrounded to subangular; 5% very fine to coarse sand; subrounded to subangular; 15% silt with minor clay as coating on gravel; no odor.	GM		Kelly down @ 1238. New connection @ 1247. Resumed drilling @ 1248. Driller injected water into cyclone for dust suppression.
400								
405					Well graded SAND with Silt (SW-SM); weak red (2.5YR 5/2); moist; very dense; 90% very fine to coarse sand; subrounded; 10% silt; no odor.	SW-SM	High Solids Bentonite Grout	
410					Silty SAND (SM); weak red (2.5YR 5/2); moist; very dense; 70% very fine to fine sand; 30% silt with trace clay; no odor.	SM		
415					Well graded SAND (SW); pale red (2.5R 5/2); dry to moist; very dense; 95% very fine to coarse sand; subangular; 5% silt; no odor.	SW		
420								

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Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
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Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; dense to very dense; 95% very fine to fine sand; 5% silt; no odor.			Kelly down @ 1305. New connection @ 1312. Resumed drilling @ 1312.
425					Same as above (420 ft); no odor.	SP		
430					Well graded SAND (SW); reddish brown (5YR 5/3); moist; dense to very dense; 95% very fine to coarse sand; subrounded to subangular; 5% silt; no odor.	SW		
435					Poorly graded SAND (SP); reddish brown (5YR 5/3); dry to moist; dense to very dense; 95% very fine to fine sand; trace medium sand; subrounded to subangular; 5% silt; no odor.		High Solids Bentonite Grout	
440					Same as above (435 ft); trace medium to coarse sand; subangular to subrounded; trace fine to coarse gravel to 3cm; subrounded; no odor.	SP		Kelly down @ 1328. New connection @ 1338. Resumed drilling @ 1343.
445					Same as above (435 ft); no odor.			
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 12:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND (SW); reddish brown (5YR 5/3); dry to moist; dense; 90% very fine to coarse sand; subangular to subrounded; 5% fine to coarse gravel to 3cm; subrounded; 5% silt; no odor.		High Solids Bentonite Grout Top of Bentonite Seal	
455					Same as above (450 ft); no odor.	SW		
460					Same as above (450 ft); slight decrease in medium to coarse sand; no odor.			Kelly down @ 1358. New connection @ 1404. Resumed drilling @ 1405.
465					Poorly graded SAND (SP); reddish brown (5YR 5/3); dry to moist; dense; 100% fine to medium sand; trace coarse sand; subangular to subrounded; no odor.			Very dusty discharge, majority of fines being blown out.
470					Same as above (465 ft); no odor.	SP		
475					Well graded SAND (SW); reddish brown (5YR 5/3); dry to moist; dense; 100% fine to coarse sand; subangular; no odor.	SW		
480								

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

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At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND (SW); reddish brown (5YR 5/3); dry to moist; dense; 100% fine to coarse sand; subangular; no odor.	SW	Bentonite Seal	Kelly down @ 1423. New connection @ 1443. Resumed drilling @ 1443.
485					Sandy lean CLAY (CL); brown (7.5YR 5/3); dry to moist; stiff; low to medium plasticity; 70% clay as nodules, some desicated with waxy texture; 30% very fine to fine sand; no odor.	CL	5" Schedule 80 PVC Riser	Water encountered during drilling = 485.0'.
490					SILT (ML); reddish brown (5YR 4/4); dry to moist; stiff; 90% silt with trace clay; 10% very fine to fine sand; no odor.	ML		
495					Poorly graded SAND (SP); pale red (2.5YR 6/2); dry; dense; 95% very fine to fine sand; 5% silt; no odor.	SP	Top of 20/40 Sand Top of 10/20 Sand	
500					Same as above (490 ft); light reddish brown (2.5YR 6/3); moist; no odor.	SP	Top of 5" Schedule 80 PVC 0.010" Slot Screen	Initial heavy discharge of water and wet cuttings when air was turned on at 495'. Once casing storage was evacuated, cuttings were very moist to nearly saturated. No free water is being discharged.
505					Well graded SAND (SW); reddish brown (2.5YR 6/3); wet; dense; 95% very fine to coarse sand; angular to subangular; 5% fine gravel to 15mm; angular to subangular; no odor.	SW		Kelly down @ 1506 on 02/18/11. New connection @ 0908 on 02/19/11. Resumed drilling @ 0913 on 02/19/11.
					Same as above (500 ft); moist to wet; no odor.	SW		
510					Poorly graded SAND (SP); reddish brown (2.5YR 6/3); moist to wet; dense; 100% fine to medium sand; trace very fine and coarse sand; subangular; no	SP		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 12:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					odor.	SP	Bottom of Screen; Sump	
515					Well graded SAND (SW); reddish brown (2.5YR 6/3); moist to wet; dense; 100% fine to coarse sand; trace very fine sand; subangular to subrounded; trace fine gravel to 10mm; subangular to subrounded; no odor.	SW	Bottom of Sump	Inital discharge at 515' is wet with free water and heavy fines. Kelly down @ 0942. New 5' connection @ 0954. Resumed drilling @ 0956.
520					Well graded SAND with Gravel (SW); reddish brown (2.5YR 6/3); wet; dense; 85% very fine to coarse sand; subangular to subrounded; 15% fine to coarse gravel to 3cm; subrounded; no odor. Same as above (516 ft); 15% fine gravel to 19mm; subrounded to subangular; no odor.	SW	Native Backfill	Total depth = 520 ft. Reached @ 1007 on 02/19/11.
525								Water added during drilling (gallons) = 0
530								Water added during construction (gallons) = 900
535								Kelly down: TD the joint and ready to make new connection.
540								

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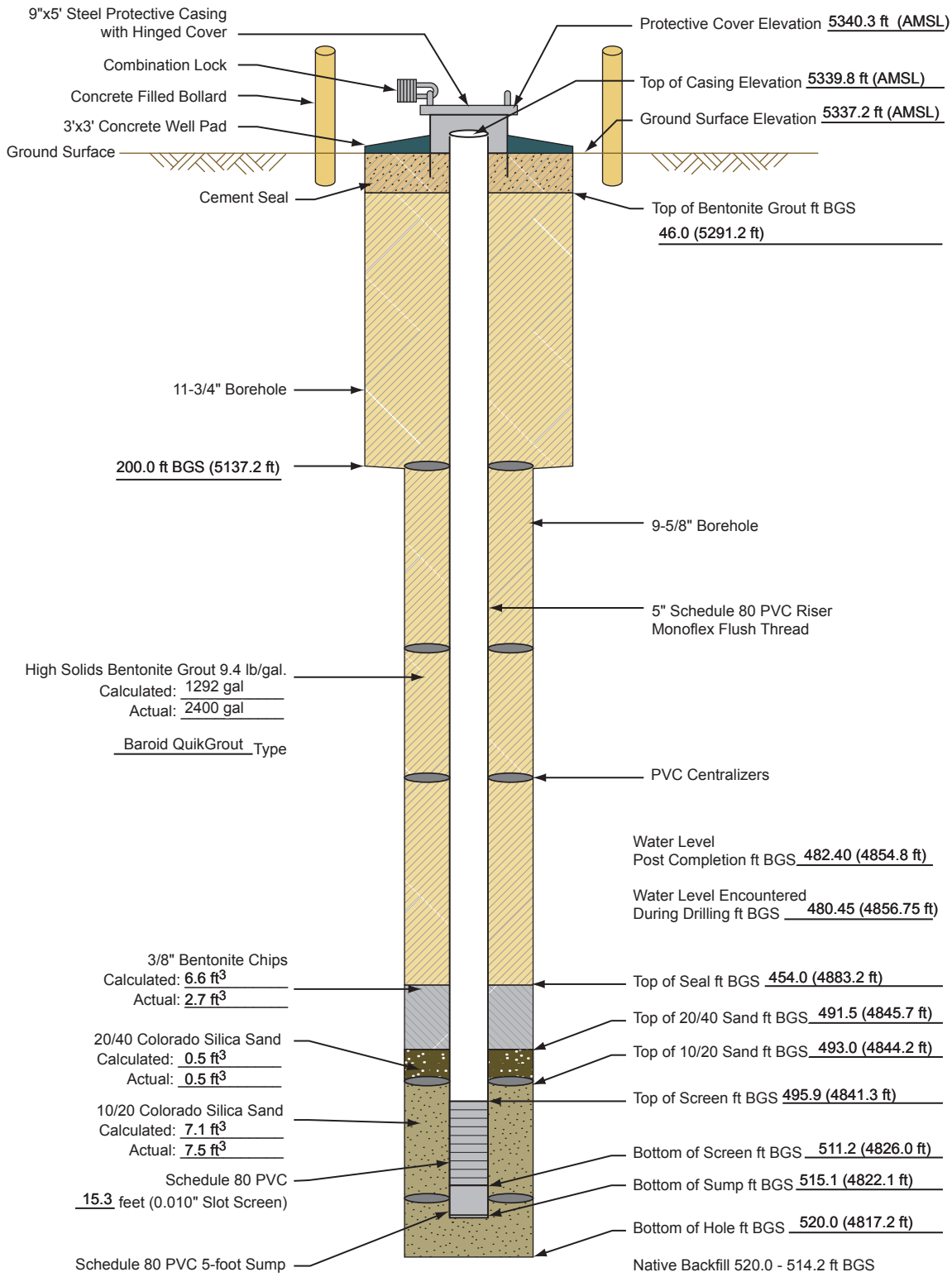
Monitoring Well Completion Diagram KAFB-106101

Installation Start Date/Time: 2/19/2011 @ 9:00
Installation End Date/Time: 2/21/2011 @ 14:34



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106101

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106101

Personnel: D. Flores, A. Trujillo

Date Installed: 2/21/11

Date: 3/16/11

Csg. Diameter (I.D.): 5"

Samplers: D. Flores, A. Trujillo

Total Depth (ft. BGL): 520.0

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 3/16/11-3/17/11

Depth to Water Before Developing Well (ft. BGL): 482.19

			Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column:	37.81	feet	= 941.6	gal.	* 1	=	941.6

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 941.6 gallons

Depth Purging From: 506 feet

Time Purging Begins: 1028, 3/17/11

Weather: Sunny

Screened Interval (ft BGL): 495.9-511.12

Equipment Nos.: **pH Meter:** YSI 100258 **EC Meter**: YSI 100258 **Turbidity Meter**: LVE 2818

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 900 gallons of water added during dirlling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
3/16/2011	1508	--	5	22.11	7.66	0.645	>2000	Begin Bailing/Initial Reading
3/16/2011	1524	--	25	19.89	7.65	0.785	>2000	Dark and Muddy
3/16/2011	1534	--	45	19.35	7.68	0.813	>2000	Dark and Muddy
3/16/2011	1539	--	55	19.12	7.71	0.823	>2000	Continue Bailing, Muddy
3/16/2011	1600	--	--	--	--	--	>2000	Begin Surging
3/16/2011	1620	--	60	19.98	7.97	0.441	>2000	Muddy
3/16/2011	1632	--	80	19.60	7.89	0.823	>2000	Light Brown
3/17/2011	1028	483.50	--	--	--	--	--	Begin Pumping, 5 GPM
3/17/2011	1037	484.15	95	20.20	7.59	0.737	9.99	Continue Pumping, Cloudy
3/17/2011	1047	481.27	145	20.68	7.59	0.693	6.70	Continue Pumping, Clear

Notes:

* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #

Where:

B=3.14

$Ø_s$= porosity of the sand pack

r_c= radius of the well casing and screen in feet

L_c= length of water column inside the casing and screen in feet

r_w= radius of the well bore in feet

L_s= length of saturated portion of the sand pack in feet

7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106101

Project Number: 140705

Samplers: D. Flores, A. Trujillo

Date: 3/17/11

Checked By:

Time Start: 1508, 3/16/11

Time Finish: 1327, 3/17/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
3/17/2011	1057	484.27	195	20.70	7.60	0.682	2.8	Continue Purging
3/17/2011	1107	484.25	245	20.68	7.61	0.685	2.2	Continue Purging, Clear
3/17/2011	1117	484.25	295	20.71	7.61	0.685	1.9	Continue Purging, Clear
3/17/2011	1127	484.25	345	20.78	7.60	0.683	2.0	Continue Purging, Clear
3/17/2011	1137	484.25	395	20.81	7.62	0.685	1.6	Continue Purging, Clear
3/17/2011	1147	484.25	445	20.80	7.62	0.686	1.1	Continue Purging, Clear
3/17/2011	1157	484.25	495	20.84	7.59	0.683	1.1	Continue Purging, Clear
3/17/2011	1207	484.25	545	20.81	7.63	0.684	1.0	Continue Purging, Clear
3/17/2011	1217	484.25	595	20.84	7.63	0.679	1.1	Continue Purging, Clear
3/17/2011	1227	484.25	645	20.90	7.62	0.681	1.3	Continue Purging, Clear
3/17/2011	1237	484.22	695	20.73	7.63	0.678	1.9	Continue Purging, Clear
3/17/2011	1247	484.22	745	20.84	7.63	0.676	0.8	Continue Purging, Clear
3/17/2011	1257	484.22	795	20.71	7.63	0.676	0.9	Continue Purging, Clear
3/17/2011	1307	484.23	845	20.71	7.65	0.674	1.0	Continue Purging, Clear
3/17/2011	1317	484.23	895	20.72	7.63	0.673	1.0	Continue Purging, Clear
3/17/2011	1327	484.23	945	20.70	7.65	0.676	0.9	Stop Purging
3/17/2011	1327	484.23	945	20.70	7.65	0.676	0.9	Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Clayey SAND (SC); light reddish brown (2.5YR 7/3); dry; medium dense to dense; 60% very fine to fine sand; 25% clay; 15% silt; trace caliche nodules; no odor.	SC		Hand augered. ***Note: no headspace requirement at this location***
5					Same as above (0 ft); light reddish brown (2.5YR 6/3); no odor.			Spud @ 1307 on 2/22/11.
10					Sandy lean CLAY (CL); red (2.5YR 4/6); dry; medium stiff to stiff; medium plasticity; 70% clay with minor silt; 30% very fine to fine sand; trace medium to coarse sand; subangular; no odor.	CL	Cement Seal	
15					Lean CLAY (CL); red (2.5YR 4/6); moist; stiff; medium plasticity; 95% clay; 5% very fine to fine sand; no odor.			Driller began injecting potable water into cyclone for dust suppression.
20					Same as above (16 ft); no odor.			Kelly down @ 1323. New connection @ 1331. Resumed drilling @ 1332.
25					SILT (ML); red (2.5YR 5/6); dry to moist; stiff; 90% silt with trace clay; 10% very fine to fine sand; trace medium to coarse sand; subangular; no odor.	ML		
30					Lean CLAY (CL); red (2.5YR 5/6); dry to moist; stiff; medium plasticity; 90% clay; 10% very fine to fine sand; no odor.	CL		

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Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
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Ground Elevation AMSL (ft): 5337.3
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X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Sandy lean CLAY (CL); red (2.5YR 5/6); dry to moist; stiff; low plasticity; 70% clay; 30% very fine to coarse sand; subangular; no odor.	CL	Cement Seal	
35					Same as above (30 ft); no odor.	CL	Top of High Solids Bentonite Grout	Bit packing off.
40					Same as above (30 ft); no odor.	CL		Kelly down @ 1356. New connection @ 1405. Resumed drilling @1405.
45					SILT with Sand (ML); light reddish brown (2.5YR 6/4); dry; stiff to very stiff; 85% silt; 15% very fine to fine sand; no odor.	ML		
50					No cuttings returned.			Discharge clogged, attempted to clear @ 1420. Discharge cleared, resumed advancing @ 1425. No cuttings returned without surging air. Regained returns at 52'.
55					Sandy SILT (ML); light red (2.5YR 6/6); dry; stiff to very stiff; 70% silt; 30% very fine to coarse sand; subangular; no odor. SILT (ML); red (2.5YR 4/6); moist; very stiff; 70% silt; 30% clay; no odor.	ML		
60					Lean CLAY (CL); red (2.5YR 4/6); moist; very stiff; low plasticity; 70% clay; 30% silt; no odor.	CL		

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Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT (ML); red (2.5YR 4/6); dry to moist; stiff to very stiff; 95% silt; 5% very fine to fine sand; no odor.	ML		Kelly down @ 1439. New connection @ 1449. Resumed drilling @ 1450.
65					Same as above (60 ft); no odor.			
					SILT with Sand (ML); red (2.5YR 4/6); dry; stiff to very stiff; 80% silt; 20% very fine to fine sand; trace coarse sand; subangular; no odor.			
70					No cuttings returned.			
75					Lean CLAY (CL); reddish brown (2.5YR 4/4); moist; very stiff; medium plasticity; 95% clay; 5% very fine to fine sand; no odor.	CL	High Solids Bentonite Grout	
80					Same as above (73 ft); low to medium plasticity; 90% clay with minor silt; 10% very fine to fine sand; no odor.			Kelly down @ 1517. New connection @ 1613. Resumed drilling @ 1616. Stopped advancing due to plugged discharge hose @ 1623. Resumed drilling @ 1643.
85					Same as above (73 ft); 90% clay with minor silt; 10% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; no odor.			
					SILT with Sand (ML); light reddish brown (2.5YR 6/4); dry to moist; very stiff; 75% silt with trace clay; 25% very fine to	ML		
90								End of 2/22/11 @ 1712.

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Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
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Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
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X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					medium sand; subangular to subrounded; no odor.	ML		Resumed driling @ 0825 on 2/23/11. Driller added water to cyclone for dust suppression.
95					No cuttings returned.			Discharge may be clogged.
100					Lean CLAY (CL); reddish brown (2.5YR 5/3); dry to moist; very stiff; low plasticity; 65% clay; 30% silt; 5% very fine to fine sand; no odor. Note: may not be representative - high % of clay may be from inside discharge.	CL		Kelly down @ 0839. New connection @ 0947. Resumed drilling @ 0948. Stopped advancing @ 0952, clearing cyclone and discharge hose. Discharge hose cleared @ 1026. Resumed advancing.
105					SILT (ML); reddish brown (2.5YR 5/3); dry to moist; very stiff; 95% silt with trace clay; 5% very fine to fine sand.	ML	High Solids Bentonite Grout	
110					Lean CLAY (CL); reddish brown (2.5YR 5/3); dry to moist; very stiff; low plasticity; 65% clay nodules; 30% silt; 5% very fine to fine sand; no odor.	CL		
115					Same as above (109 ft); no odor.			
120					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to fine sand; trace medium to coarse sand; subangular to	SP		Likely top of Sante Fe Group.

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Project Number: 140705

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Ground Elevation AMSL (ft): 5337.3
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					subrounded; 5% silt; no odor.			Kelly down @ 1049. New connection @ 1058. Resumed drilling @ 1102.
					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% fine to medium sand; trace coarse sand; subangular to subrounded; 5% silt; no odor.			
125					Same as above (120 ft); 95% very fine to fine sand; trace medium sand; subangular to subrounded; 5% silt; no odor.	SP		
130					Clayey SAND (SC); reddish brown (5YR 4/3); dry to moist; very dense; 75% very fine to coarse sand; subangular; 25% clay with minor silt; no odor.	SC		
					SILT (ML); light reddish brown (2.5YR 4/3); dry to moist; very stiff; 85% silt; 15% clay; no odor.	ML		
135					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% very fine to fine sand; 5% silt; no odor.		High Solids Bentonite Grout	
140					Same as above (133 ft); 95% very fine to medium sand; subangular to subrounded; 5% silt; no odor.	SP		Kelly down @ 1122. New connection @ 1133. Resumed drilling @ 1133.
145					Same as above (133 ft); trace pumice clasts; rounded; no odor.			
150								

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Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
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Ground Elevation AMSL (ft): 5337.3
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X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% very fine to fine sand; 5% silt; trace pumice; no odor.			
155					Same as above (150 ft); 100% fine sand; trace medium to coarse sand; subangular to subrounded; trace pumice; no odor.	SP		
160					Well graded SAND (SW); pale red (2.5YR 7/2); dry; very dense; 100% very fine to coarse sand; subangular to subrounded; no odor.			Kelly down @ 1152. New connection @ 1204. Resumed drilling @ 1239.
165					Same as above (160 ft); 95% sand; 5% fine gravel to 15mm; subangular to subrounded; higher abundance of pumice fragments than 155'; oxidized and abraded; no odor.	SW	High Solids Bentonite Grout	
170					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense to very dense; 100% fine to medium sand; subangular to subrounded; higher abundance of pumice fragments than 155'; oxidized and abraded; no odor.	SP		
175					Silty SAND (SM); brown (7.5YR 5/3); dry to moist; dense; 75% very fine to medium sand; trace coarse; subangular to subrounded; 25% silt with minor clay; no odor.	SM		
180					Poorly graded SAND (SP); pale red	SP		

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Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					(2.5YR 7/2); dry; dense to very dense; 100% very fine to fine sand; trace medium sand; subangular to subrounded; no odor.	SP		Kelly down @ 1253. New connection @ 1311. Resumed drilling @ 1311.
185					Same as above (179 ft); 95% very fine to fine sand; 5% silt; no odor.	SP		
190					Same as above (179 ft); no odor.	SP		
195					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; dense to very dense; 90% very fine to coarse sand; subrounded; 5% fine gravel to 10mm; 5% silt; no odor.	SW	High Solids Bentonite Grout	
200					SILT (ML); brown (7.5YR 5/3); dry to moist; stiff to very stiff; 75% silt; 25% clay; no odor.	ML		Kelly down @ 1328. New 5' connection @ 1338. Resumed drilling @ 1342.
205					Lean CLAY (CL); brown (7.5YR 5/3); dry to moist; stiff; low plasticity; 70% clay; 30% silt; trace very fine to fine sand; no odor.	CL		Kelly down @ 1345, TD 11-3/4" casing. Switched to 9-5/8" casing, new connection @ 1718. Resumed drilling @ 0743 on 2/24/11.
210					Same as above (205 ft); medium plasticity; 95% clay; 5% silt; no odor.	CL		

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Silty SAND (SM); pale red (2.5YR 7/2); dry; dense; 75% very fine to fine sand; trace medium sand; subrounded; 25% silt; no odor.	SM		Casing followed bit without using hammer.
215					Silty SAND with Gravel (SM); reddish brown (5YR 4/3); moist; dense; 70% very fine to coarse sand; subangular to subrounded; 15% fine gravel to 15mm; subrounded; 15% silt with minor clay as coating on gravel and coarse sand; no odor.			
220					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense; 90% very fine to fine sand; 5% fine to coarse gravel to 3cm; subrounded; 5% silt with trace clay as coating on gravel; no odor.	SP		Kelly down @ 0807. New connection @ 0816. Resumed drilling.
225					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; trace coarse gravel with clay coating; no odor.	SW	High Solids Bentonite Grout	
230					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense; 95% very fine to fine sand; 5% silt; no odor.	SP		Driller began injecting water into cyclone for dust suppression.
235					Poorly graded SAND with Silt (SP-SM); pale red (2.5YR 7/2); dry; dense; 90% very fine sand; trace fine sand; 10% silt; no odor.	SP-SM		
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106102

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Ground Elevation AMSL (ft): 5337.3
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X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					SILT (ML); reddish brown (2.5YR 5/4); dry to moist; stiff to very stiff; 70% silt; 30% clay; trace very fine to fine sand; no odor.	ML		Kelly down @ 0831. New connection @ 0837. Resumed drilling @ 0838.
245					Silty SAND (SM); light reddish brown (2.5YR 6/3); dry to moist; dense to very dense; 75% very fine to fine sand; 25% silt; no odor.	SM		Began driving casing below 245'.
250					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		
255					Same as above (250 ft); no odor.		High Solids Bentonite Grout	
260					Poorly graded SAND (SP); reddish brown (5YR 4/4); dry to moist; dense to very dense; 100% fine to medium sand; trace very fine sand; subrounded; no odor.	SP		Kelly down @ 0901. New connection @ 0913. Resumed drilling @ 0914.
265					Same as above (260 ft); 95% sand; 5% fine gravel to 10mm; subrounded; no odor.			
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND with Gravel (SP); pale red (2.5YR 7/2); dry; dense to very dense; 80% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; 15% fine to coarse gravel to 3cm; subrounded; 5% silt with clay as coating on gravel; no odor.	SP		
275					Same as above (270 ft); no odor.			
280					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to coarse sand; subrounded; trace fine gravel to 10mm; subrounded; 5% silt; no odor.	SW		Kelly down @ 0927. New connection @ 0933. Resumed drilling @ 0934.
285					Same as above (279 ft); no gravel; no odor.		High Solids Bentonite Grout	
290					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense to very dense; 95% medium to coarse sand; subangular to subrounded; trace very fine to fine sand; 5% fine gravel to 15mm; subrounded; no odor. Poorly graded SAND with Gravel (SP); pale red (2.5YR 7/2); dry; dense to very dense; 85% very fine to fine sand; 15% fine to coarse gravel to 2cm; subangular to subrounded; no odor.	SP		
295					Clayey SAND (SC); brown (7.5YR 5/3); moist; very dense; 80% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; 5% fine to coarse gravel to 3cm; subrounded; 15% clay with minor silt; no odor.	SC		
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); reddish brown (5YR 4/4); dry to moist; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		Kelly down @ 0950. New connection @ 1000. Resumed drilling @ 1005.
305					Poorly graded SAND (SP); reddish brown (2.5YR 5/4); dry to moist; very dense; 95% very fine to fine sand; trace medium to coarse sand; subrounded; 5% silt; no odor.	SP		
310					Well graded SAND (SW); pale red (2.5YR 7/2); dry; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		
315					Well graded SAND with Gravel (SW); pale red (2.5YR 7/2); dry to moist; very dense; 80% very fine to coarse sand; subangular to subrounded; 15% fine to coarse gravel to 2cm; subangular to subrounded; 5% silt with clay as coating on gravel; no odor		High Solids Bentonite Grout	
320					Same as above (315 ft); no odor.			Kelly down @ 1021. New connection and resumed drilling.
325					Well graded SAND (SW); pale red (2.5YR 7/2); dry; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.			
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330								
335					Well graded GRAVEL with Sand (GW); pale red (2.5YR 7/2); dry; dense to very dense; 80% fine to coarse gravel to 2.5cm; subangular to subrounded; 15% very fine to coarse sand; subangular to subrounded; 5% silt with clay as coating on gravel; no odor.	GW		
340					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor. Note: brief discharge of gravel at base of interval.	SW		
345					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to fine sand; 5% silt; no odor.	SP		Kelly down @ 1053. New connection @ 1102. Resumed drilling @ 1102.
350					Same as above (340 ft); 95% very fine to fine sand; trace medium to coarse sand; subrounded; 5% silt; no odor.		High Solids Bentonite Grout	Stopped drilling to reconnect air hose to casing hammer @1118. Resumed drilling @ 1152.
355					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; dense to very dense; 90% very fine to coarse sand; subangular to subrounded; 5% fine gravel to 15mm; subrounded; 5% silt; no odor.	SW		
360					Same as above (350 ft); no odor.			

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Silty SAND (SM); light reddish brown (2.5YR 6/3); dry to moist; dense; 85% very fine to fine sand; 15% silt; no odor.	SM		Kelly down @ 1200. New connection @ 1211. Resumed drillling @ 1214.
365					Poorly graded SAND (SP); light reddish brown (2.5YR 6/3); dry to moist; dense to very dense; 100% fine to medium sand; trace very fine sand; subrounded; no odor.	SP		
370					Well graded SAND (SW); light reddish brown (2.5YR 6/3); moist; dense to very dense; 100% very fine to coarse sand; subangular to subrounded; no odor.	SW		
375					Same as above (370 ft); pale red (2.5YR 7/2); dry to moist.		High Solids Bentonite Grout	
380					Same as above (370 ft); no odor.			Kelly down @ 1232. New connection @ 1239. Resumed drilling @ 1242.
385					Same as above (370 ft); increasing abundance of medium to coarse sand; no odor.			
390					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 100% very fine to medium sand; trace coarse sand; subangular to subrounded; no odor.	SP		

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Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 100% very fine to medium sand; trace coarse sand; subangular to subrounded; no odor.	SP		
395					Well graded SAND (SW); pale red (2.5YR 7/2); dry; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		
400					Same as above (395 ft); no odor.			Kelly down @ 1312. New connection @ 1315. Resumed drilling @ 1316.
405					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 100% very fine to fine sand; no odor.	SP	High Solids Bentonite Grout	
410					Well graded SAND (SW); pale red (2.5YR 7/2); dry; very dense; 100% very fine to coarse sand; subangular to subrounded; trace fine gravel to 15mm; subangular; no odor.	SW		
415					Same as above (410 ft); no odor.			
420					Silty SAND (SM); pale red (2.5YR 7/2); moist; very dense; 80% very fine to fine sand; 20% silt; no odor.	SM		

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Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Silty SAND (SM); pale red (2.5YR 7/2); dry to moist; very dense; 80% very fine to fine sand; 20% silt; no odor.	SM		Kelly down @ 1351. New connection @ 1358. Resumed drilling @ 1359.
425					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 95% very fine to fine sand; 5% silt; no odor. Brief discharge of fine to coarse gravel to 5cm; subrounded.	SP		
430					Same as above (425 ft); dry; 95% very fine to medium sand; subangular to subrounded; 5% silt; no odor.			
435					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% medium to coarse sand; subangular to subrounded; trace very fine to fine sand; 5% fine gravel to 15mm; no odor.		High Solids Bentonite Grout	
440					Poorly graded SAND with Silt (SP-SM); pinkish gray (5YR 6/2); dry; very dense; 90% very fine to fine sand; 10% silt; trace limestone fragments; no odor.	SP-SM		Kelly down @ 1437. New connection @ 1445. Resumed drilling @ 1448.
445					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% very fine to fine sand; 5% silt; no odor.	SP		
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% very fine to fine sand; trace medium sand; subrounded; 5% silt; no odor.	SP		
455					Same as above (450 ft); no odor.			
460					Same as above (450 ft); 100% fine to medium sand; trace coarse sand; subangular to subrounded; no odor.			Kelly down @ 1516 on 2/24/11. New connection @ 0821 on 3/1/11. Resumed drilling @ 0833 on 3/1/11. Driller began injecting water into cyclone for dust suppression.
465					Same as above (450 ft); trace fine gravel to 5mm; subrounded; no odor.		High Solids Bentonite Grout	
470					Well graded GRAVEL with Sand (GW); pale red (2.5YR 7/2); moist; very dense; 70% fine to coarse gravel to 7.5cm; subrounded; 30% fine to coarse sand; subangular to subrounded; no odor.	GW		
475					Poorly graded SAND (SP); pale red (2.5YR 7/2); moist; dense to very dense; 95% fine to medium sand; trace coarse sand; subangular to subrounded; 5% fine gravel to 10mm; subrounded; no odor.	SP		
480					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense to very dense; 90% very fine to coarse sand; subangular to subrounded; 10% fine to coarse gravel to 2cm; subangular to subrounded; no odor.	SW		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to coarse sand; subangular to subrounded; 5% fine to coarse gravel to 3cm; subangular to subrounded; no odor.	SW	High Solids Bentonite Grout; Top of Bentonite Seal	Kelly down @ 0902. New connection @ 0911. Resumed drilling @ 0912.
					Poorly graded SAND (SP); pale red (2.5YR 7/2); moist; very dense; 100% very fine to fine sand; no odor. Note: sandy clay; dark brown (7.5YR 3/4) with clay nodules at 484'.	SP		
485					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% fine to coarse gravel to 5cm; subrounded; no odor.	SW		Dusty dry discharge from 480-497'. Kelly down.
490					SILT with Sand (ML); light reddish brown (5YR 6/4); dry to moist; very dense; 80% silt; 20% very fine to fine sand; no odor.	ML		
					Silty SAND (SM); light reddish brown (5YR 6/4); dry to moist; very dense; 70% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; 10% fine to coarse gravel to 7.5cm; subrounded; 20% silt; no odor.	SM		
495					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 90% very fine to medium sand; trace coarse sand; subangular to subrounded; 5% fine to coarse gravel to 5cm; subrounded; 5% silt; no odor. Same as above (495 ft); wet; no odor.	SP		Kelly down @ 0941. New connection @ 1107. Resumed drilling @ 1146.
500								
505					Well graded SAND (SW); weak red (2.5YR 5/2); moist; very dense; 95% very fine to coarse sand; subangular; 5% fine gravel to 18mm; subangular to subrounded; no odor.	SW		
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Poorly graded SAND (SP); weak red (2.5YR 5/2); wet; very dense; 95% very fine to medium sand; subangular to subrounded; 5% fine to coarse gravel to 5cm; subangular to subrounded; no odor.	SP	Bentonite Seal	
515					Well graded SAND (SW); weak red (2.5YR 5/2); moist; very dense; 95% fine to coarse sand; subangular to subrounded; trace very fine sand; 5% fine to coarse gravel to 7.5cm; subangular to subrounded; trace cobbles to 15cm; no odor.	SW	5" Schedule 80 PVC Riser Top of 20/40 Sand Top of 10/20 Sand	
520					Poorly graded SAND (SP); weak red (2.5YR 5/2); wet; very dense; 95% fine to medium sand; trace very fine and coarse sand; subangular to subrounded; 5% fine to coarse gravel to 5cm; subangular to subrounded; no odor.		Top of 5" Schedule 80 PVC 0.010" Slot Screen	Kelly down @ 1214. New connection @ 1246. Resumed drilling @ 1252.
525					Same as above (520 ft); moist; 100% very fine to fine sand; no odor.	SP		
530					Same as above (520 ft); 100% very fine to medium sand; trace coarse sand; subangular to subrounded; trace fine gravel to 12mm; subangular to subrounded; no odor.			
535					Well graded SAND (SW); weak red (2.5YR 5/2); wet; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% fine gravel to 12mm; subrounded; no odor.	SW	Bottom of Screen Sump	
540								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Poorly graded SAND with Gravel (SP); weak red (2.5YR 5/2); wet; very dense; 85% medium to coarse sand; angular to subangular; trace very fine to fine sand; 15% fine to coarse gravel to 5cm; subangular; no odor.		Bottom of Sump	Kelly down @ 1328. New connection @ 1340. Resumed drilling @ 1343. Heavy discharge of water when air was turned on after connection. Heavy discharge likely washed fine-grained material out of sample at 540'.
545					Poorly graded SAND (SP); weak red (2.5YR 5/2); wet; very dense; 100% very fine to medium sand; subangular to subrounded; no odor.	SP	Bottom of Filter Pack	
550							Native Backfill	Total Depth = 550 ft. Reached @ 1418 on 3/1/11.
555								Water added during drilling (gallons) = 0
								Water added after drilling (gallons) = 1,000
560								Water added during construction (gallons) = Not Recorded
								Spud: started drilling from surface.
565								Kelly down: TD the joint and ready to make new connection.
570								

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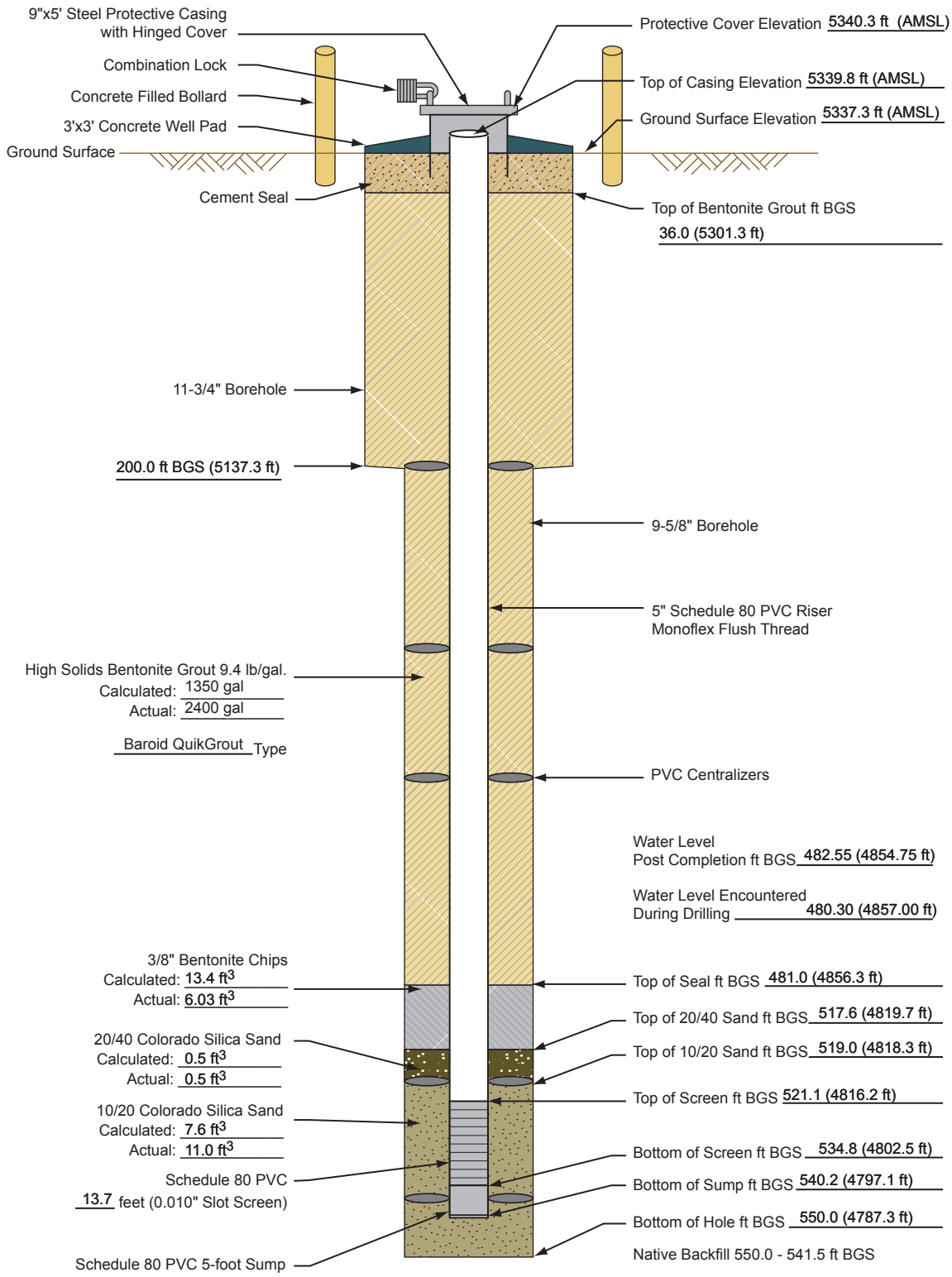
Monitoring Well Completion Diagram KAFB-106102

Installation Start Date/Time: 3/22/2011 @ 7:59
Installation End Date/Time: 3/3/2011 @ 17:20



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106102

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106102

Personnel: D. Flores, A. Trujillo

Date Installed: 3/3/11

Date: 3/16/11

Csg. Diameter (I.D.): 5"

Samplers: D. Flores, A. Trujillo

Total Depth (ft. BGL): 541.50

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 3/16/11-3/19/11

Depth to Water Before Developing Well (ft. BGL): 482.52

			Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 58.98	feet	=	1064.95	gal.	* 1	=	1064.95

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1064.95 gallons

Depth Purging From: 530 feet

Time Purging Begins: 1027, 3/19/11

Weather: Sunny

Screened Interval (ft BGL): 521.08-534.84

Equipment Nos.: **pH Meter:** YSI 100258 **EC Meter**: YSI 100258 **Turbidity Meter**: LVE 2818

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1000 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
3/16/2011	1000	--	10	--	--	--	--	Begin Bailing
3/16/2011	1009	--	20	19.74	8.10	0.412	>2000	Initial Reading
3/16/2011	1042	--	30	19.87	7.98	0.365	>2000	Continue Bailing, Muddy
3/16/2011	1100	--	--	--	--	--	--	Bailer Came Up Sandy
3/19/2011	1423	--	40	--	--	--	--	Sandy, Muddy brown
3/19/2011	0903	482.96	50	--	--	--	--	Continue Bailing, Muddy
3/19/2011	1027	483.58	50	--	--	--	--	Begin Pumping, 10 GPM
3/19/2011	1035	484.20	70	19.57	7.81	0.392	1000+	Continue Pumping
3/19/2011	1100	484.13	170	24.45	7.91	0.382	119	Continue Pumping
3/19/2011	1120	484.11	270	24.09	7.97	0.384	53	Continue Pumping

Notes:

* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #

Where:

B=3.14

$Ø_s$= porosity of the sand pack

r_c= radius of the well casing and screen in feet

L_c= length of water column inside the casing and screen in feet

r_w= radius of the well bore in feet

L_s= length of saturated portion of the sand pack in feet

7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106102

Project Number: 140705

Samplers: D. Flores, A. Trujillo

Date: 3/19/11

Checked By:

Time Start: 1000, 3/16/11

Time Finish: 1415, 3/19/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
3/19/2011	1140	484.10	370	24.01	8.01	0.394	35	Continue Pumping
3/19/2011	1200	484.07	470	24.21	7.99	0.379	29	Continue Pumping
3/19/2011	1220	484.06	570	23.07	7.98	0.361	31	Continue Pumping
3/19/2011	1240	484.08	670	22.73	8.00	0.353	14	Continue Pumping
3/19/2011	1300	484.07	770	21.54	8.04	0.347	13	Continue Pumping
3/19/2011	1325	484.05	870	22.72	8.01	0.349	11	Continue Pumping
3/19/2011	1350	484.04	970	23.12	8.01	0.344	7	Continue Pumping
3/19/2011	1415	484.01	1070	22.91	8.00	0.347	6	Stop Pumping
3/19/2011	1415	484.01	1070	22.91	8.00	0.347	6	Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded.			Hand augered. ***Note: no headspace requirement at this location.***
5					Silty SAND with Gravel (SM); light reddish brown (2.5YR 6/4); dry; loose; 70% very fine to medium sand; 15% gravel to 10mm; subangular to angular; 15% silt. Note: caliche coating on gravel.			Began drilling @ 1445 on 6/16/11.
10					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 60% very fine to fine sand; 20% medium to coarse sand; 20% silt.	SM		
15					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 55% very fine to fine sand; 15% medium sand; 30% silt.		Cement Seal	T. Valentine took over drilling (oversight by L. Aylmer). Resumed drilling @ 1505.
20					Clayey SAND (SC); yellowish red (5YR 4/6); moist; loose; 70% fine to very coarse sand; 5% gravel to 8mm; angular to subangular; 15% clay; 10% silt.	SC		
25					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 60% very fine to very coarse sand; 10% gravel to 10mm; subangular to subrounded; 20% silt; 10% clay. Note: caliche coating on gravel.	SM		
30								

Borehole ID: KAFB-106103

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Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 60% very fine to very coarse sand; 10% gravel to 10mm; angular to subrounded; 30% silt.	SM	Top of High Solids Bentonite Grout	
35					Same as above (30 ft).			New 20' connection @ 1520. Resumed drilling @ 1530.
40					Well graded SAND with Gravel (SW); reddish brown (5YR 4/4); moist; loose; 80% sand; 20% gravel to 20mm; angular to subrounded.	SW		
45					Silty SAND with Gravel (SM); yellowish red (5YR 4/6); moist; loose; 40% very fine to medium sand; 20% gravel to 20mm; subangular to subrounded; 40% silt.	SM		
50					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 60% very fine to fine sand; 40% silt.			
55					Silty SAND (SM); red (2.5YR 4/6); moist; loose; 60% fine to coarse sand; 25% silt; 15% clay.			New 20' connection @ 1545. Resumed drilling @ 1555.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 60% very fine to fine sand; 10% medium to very coarse sand; 30% silt.	SM		
65					Clayey SAND (SC); reddish brown (5YR 4/4); moist; loose; 60% fine to medium sand; 40% clay; low plasticity.	SC		
70					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 70% fine to medium sand; 10% coarse sand; 20% silt.			
75					Same as above (70 ft).	SM	High Solids Bentonite Grout	New 20' connection @ 1608. Resumed drilling @ 1613.
80					Clayey SAND (SC); yellowish red (5YR 4/6); moist; loose; 85% fine to coarse sand; 15% clay; non to low plasticity.	SC		
85					Silty SAND (SM); yellowish brown (5YR 4/6); moist; loose; 65% fine to medium sand; 15% coarse to very coarse sand; 5% gravel to 5mm; angular to subangular; 15% silt.	SM		
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
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X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 70% fine to medium sand; 10% coarse sand; 20% silt.			
95					Silty SAND with Gravel (SM); moist; loose; 70% fine to very coarse sand; 15% gravel to 12mm; angular to subangular; 15% silt.			New 20' connection @ 1625. Resumed drilling @ 1630.
100					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 50% very fine to medium sand; 5% coarse sand; 45% silt.	SM		
105					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 50% very fine to fine sand; 20% medium sand; 30% silt.		High Solids Bentonite Grout	
110					No cuttings returned.			
115					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 45% fine to coarse sand; 5% very coarse sand; 5% gravel to 5mm; angular; 35% silt; 10% clay.	SM		New 20' connection @ 1642. Resumed drilling @ 1647.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120								
					Clayey SAND (SC); moist; loose; 85% well graded sand; 15% clay; nonplastic.	SC		
125								
					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 70% very fine to medium sand; 30% silt.	SM		
130								
					Silty SAND (SM); yellowish brown (5YR 4/6); moist; loose; 50% very fine to fine sand; 10% medium sand; 40% silt.			
135							High Solids Bentonite Grout	New 20' connection @ 1700. End of 6/16/11. Resumed drilling @ 0825 on 6/17/11.
					Silty SAND (SM); yellowish brown (5YR 4/6); moist; loose; 55% very fine to fine sand; 45% silt.			
140								
					No cuttings returned.			Cyclone hose blocked; cleaned cyclone.
145								
					Poorly graded SAND with Clay (SP-SC); yellowish red (5YR 4/6); moist; loose; 90% medium to very coarse sand; 10% clay; nonplastic.	SP-SC		
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
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Ground Elevation AMSL (ft): 5328.5
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND with Clay (SP-SC); yellowish red (5YR 4/6); moist; loose; 90% medium to very coarse sand; 10% clay; nonplastic.	SP-SC		
155					Clayey SAND (SC); reddish brown (5YR 4/4); moist; loose; 55% medium to very coarse sand; 45% clay; nonplastic.	SC		New 20' connection @ 0905. Resumed drilling @ 0915.
160					Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 4/4); moist; loose; 80% medium to very coarse sand; 10% gravel to 12mm; angular to subrounded; 10% silt. Note: pumice fragments.	SP-SM		
165					Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 4/4); moist; loose; 90% fine to coarse sand; 10% silt. Note: medium to coarse sand is predominantly pumice.		High Solids Bentonite Grout	
170					Poorly graded SAND (SP); reddish brown (5YR 4/3); moist; loose; 85% fine to coarse sand; 10% very coarse sand; 5% gravel to 15mm; subangular to subrounded. Note: pumice fragments.	SP		
175					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 85% very fine to very coarse sand; 15% silt. Note: medium to very coarse sand is predominantly pumice.	SM		New 20' connection @ 0935. Resumed drilling @ 0945.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; loose; 100% very fine to coarse sand. Note: pumice fragments.	SP		
185					Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; loose; 100% very fine to coarse sand. Note: pumice fragments.			
190					Well graded SAND with Silt (SW-SM); reddish brown (5YR 5/4); moist; loose; 90% sand; 10% silt. Note: pumice fragments.	SW-SM		
195					Silty SAND (SM); brown (7.5YR 5/3); moist; loose; 85% very fine to medium sand; 15% silt.	SM	High Solids Bentonite Grout	New 5' connection @ 1005.
200					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 60% very fine to medium sand; 10% coarse to very coarse sand; 10% gravel to 8mm; subangular to subrounded; 20% silt. Note: pumice fragments.			Total depth with 11-3/4" casing. Resumed drilling with 9-5/8" casing @ 1405.
205					Poorly graded SAND with Silt and Gravel (SP-SM); reddish brown (5YR 5/4); moist; loose; 75% very fine to coarse sand; 15% gravel to 15mm; subangular to subrounded; 10% silt. Note: pumice fragments.	SP-SM		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
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Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
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Ground Elevation AMSL (ft): 5328.5
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X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210								
					Well graded SAND with Gravel (SW); moist; loose; 70% sand; 30% gravel to 25mm; angular to subrounded.	SW		
215								
					Poorly graded GRAVEL with Sand (GP); moist; loose; 80% gravel to 20mm; angular to subrounded; 20% coarse to very coarse sand. Note: gravel consists of quartz, quartzite, feldspar, granite, and basalt.	GP		New connection and resumed drilling @ 1415.
220								
					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 5/3); moist; loose; 80% very fine to very coarse sand; 10% gravel to 12mm; subangular to rounded; 10% silt.	SP-SM		
225								
					Clayey GRAVEL with Sand (GC); moist; loose; 40% well graded sand; 40% gravel to 30mm; subangular to subrounded; 20% clay. Note: clay is greenish gray (GLEY1 6/1 10Y).	GC	High Solids Bentonite Grout	
230								
					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 70% very fine to fine sand; 30% silt.	SM		
235								
					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); moist; loose; 80% very fine to very coarse sand; 20% gravel to 8mm; subangular to rounded.	SP		Resumed drilling @ 1445.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND with Clay and Gravel (SP-SC); moist; loose; 50% very fine to very coarse sand; 40% gravel to 32mm; angular to subrounded; 10% clay.	SP-SC		
245					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 90% fine to very coarse sand; 10% gravel to 15mm; subangular to subrounded.			
250					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); moist; loose; 85% fine to very coarse sand; 15% gravel to 10mm; subangular to rounded.			
255					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 90% fine to coarse sand; 10% gravel to 20mm; subangular to subrounded.	SP	High Solids Bentonite Grout	
260					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to coarse sand.			
265					Poorly graded SAND (SP); brown (7.5YR 4/3); moist; loose; 95% fine to very coarse sand; 5% gravel to 25mm; subangular to subrounded.			
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND (SP); brown (7.5YR 4/3); moist; loose; 100% fine to medium sand.	SP		
275					Well graded SAND (SW); brown (7.5YR 5/3); moist; loose; 100% sand.	SW		
280					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 100% fine to medium sand.			
285					Same as above (280 ft).		High Solids Bentonite Grout	
290					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; loose; 80% very fine to very coarse sand; 20% gravel to 10mm; subangular to subrounded.	SP		
295					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); dry; loose; 100% fine to coarse sand.			New 20' connection @ 1520. Resumed drilling @ 1530.
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

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Project Number: 140705

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Hole Diameter Lower (in.): 9-5/8
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At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Clayey SAND with Gravel (SC); brown (7.5YR 4/4); moist; loose; 50% very fine to very coarse sand; 30% gravel to 20mm; subangular to rounded; 20% clay; nonplastic.	SC		
305					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 82% medium to coarse sand; 15% very coarse sand; 3% gravel to 15mm; subrounded.	SP		
310					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 70% fine to coarse sand; 20% very coarse sand; 10% gravel to 10mm; subangular to subrounded.			
315					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to medium sand.		High Solids Bentonite Grout	New 20' connection @ 1545. Resumed drilling @ 1552.
320					Poorly graded GRAVEL with Sand (GP); dry; dense; 80% gravel to 20mm; angular to subrounded; 20% medium to very coarse sand. Note: gravel is composed of quartz, quartzite, chert, feldspar, and granite.	GP		
325					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; medium dense; 100% medium to very coarse sand.	SP		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; medium dense; 90% fine to very coarse sand; 10% gravel to 7mm; subangular to subrounded.			
335					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); dry; medium dense; 85% very fine to fine sand; 10% medium to very coarse sand; 5% gravel to 8mm; subangular to subrounded.	SP		New 20' connection @ 1615. End of 6/17/11. Resumed drilling @ 0820 on 6/18/11.
340					Well graded SAND with Gravel (SW); dry; medium dense; 85% sand; 15% gravel to 20mm; angular to subrounded.			
345					Well graded SAND with Gravel (SW); dry; medium dense; 70% sand; 30% gravel to 15mm; angular to subrounded.	SW	High Solids Bentonite Grout	
350					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; medium dense; 97% medium to very coarse sand; 3% gravel to 10mm; angular to subangular.	SP		
355					Clayey SAND (SC); brown (7.5YR 5/4); moist; medium dense; 70% well graded sand; 10% gravel to 15mm; angular to subrounded; 20% clay; nonplastic. Note: clay is red (2.5YR 4/6).	SC		New 20' connection @ 0840. Resumed drilling @ 0845.
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); moist; medium dense; 85% medium to very coarse sand; 15% gravel to 10mm; subangular to subrounded.	SP		
365					Well graded SAND with Gravel (SW); brown (7.5YR 5/4); moist; medium dense; 60% sand; 40% gravel to 15mm; angular to subrounded.	SW		
370					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; medium dense; 90% very fine to very coarse sand; 10% gravel to 10mm; angular to subangular.	SP		
375					Poorly graded GRAVEL with Sand (GP); dry; medium dense; 70% gravel to 10mm; angular to rounded; 20% coarse to very coarse sand; 10% fine to medium sand.	GP	High Solids Bentonite Grout	New 20' connection @ 0905. Resumed drilling @ 0915.
380					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); dry; medium dense; 60% fine to medium sand; 20% coarse to very coarse; 20% gravel to 10mm; angular to subrounded.	SP		
385					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 70% very fine to fine sand; 30% medium to coarse sand.			Hammer misfiring @ 0920.
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; loose; 100% fine to coarse sand.			
395					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 70% fine to medium sand; 20% coarse to very coarse sand; 10% gravel to 10mm; angular to subrounded.			Hammer would not fire @ 0940. Completed repairs @ 1000. New 20' connection @ 1005. Resumed drilling @ 1010.
400					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); dry; medium dense; 80% medium to very coarse sand; 20% gravel to 10mm; angular to rounded.			
405					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 90% fine to medium sand; 10% coarse sand.	SP	High Solids Bentonite Grout	
410					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 85% very fine to fine sand; 15% medium to coarse sand.			Problems with hammer. Began repairs @ 1035. Resumed drilling @ 1130.
415					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 100% fine to medium sand.			New connection @ 1135. Resumed drilling @ 1150.
420								

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Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND with Clay (SP-SC); brown (7.5YR 5/4); dry; medium dense; 85% fine to coarse sand; 5% gravel to 10mm; subangular to subrounded; 10% clay; nonplastic.	SP-SC		
425					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 100% fine to very coarse sand.	SP		
430					Same as above (425 ft).	SP		
435					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 95% fine to very coarse sand; 5% gravel to 12mm; angular to subrounded.	SP	High Solids Bentonite Grout	Resumed drilling @ 1310.
440					Well graded SAND (SW); brown (7.5YR 5/4); dry; medium dense; 100% sand.	SW		
445					Same as above (440 ft); grading coarser.	SW		
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:57 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded GRAVEL with Sand (GP); dry; medium dense; 70% gravel to 12mm; angular to subrounded; 30% medium to very coarse sand.	GP	High Solids Bentonite Grout; Top of Bentonite Seal	
455					Poorly graded SAND with Gravel (SP); dark brown (7.5YR 3/4); moist; medium dense; 75% medium to very coarse sand; 20% gravel to 15mm; angular to subrounded; 5% clay and silt.	SP		New 20' connection @ 1330. Broken rocker on hammer. Resumed drilling @ 1500.
460					Well graded SAND (SW); brown (7.5YR 5/4); dry; medium dense; 100% sand.	SW		
465					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 90% very fine to fine sand; 10% medium to coarse sand.	SP		
470					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; medium dense; 100% fine to medium sand.			Encountered groundwater while drilling @ 1515.
475					Poorly graded SAND (SP); reddish brown (5YR 4/4); moist; medium dense; 90% fine to medium sand; 10% coarse sand.		5" Schedule 80 PVC Riser	New 20' connection @ 1525. Repaired hammer.
480								

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Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Poorly graded SAND (SP); reddish brown (5YR 5/4); damp; medium dense; 100% fine to coarse sand.	SP	Bentonite Seal; Top of 20/40 Sand; Top of 10/20 Sand	
485					Same as above (480 ft).	SP	Top of 5" Schedule 80 PVC 0.010" Slot Screen	
490					Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/4); damp; medium dense; 60% fine to coarse sand; 10% very coarse sand; 30% gravel to 15mm; angular to subrounded.	SP		
495					Silty SAND with Gravel (SM); reddish brown (5YR 4/4); damp; medium dense; 50% fine to very coarse sand; 20% gravel to 10mm; angular to subrounded; 30% silt.	SM		New connection @ 1640. End of 6/18/11. Resumed drilling @ 0850 on 6/19/11.
500					Silty SAND with Gravel (SM); reddish brown (5YR 4/3); saturated; medium dense; 50% very fine to very coarse sand; 20% gravel to 20mm; angular to subrounded; 30% silt.	SM	Bottom of Screen; Sump	
505					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/3); saturated; medium dense; 65% fine to very coarse sand; 30% gravel to 15mm; angular to subrounded; 5% clay and silt.	SP	Bottom on Sump	
510								

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Borehole ID: KAFB-106103

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/16/2011
Date TD Reached: 6/19/2011
Date Completed: 6/21/2011

Ground Elevation AMSL (ft): 5328.5
Y Coordinate: 1475686.43
X Coordinate: 1543685.98

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 471.00
At End of Drilling: Not Recorded
After Drilling: 473.33

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					No cuttings returned.			
515					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); wet; medium dense; 60% medium to very coarse sand; 40% gravel to 15mm; angular to subrounded.	SP	Bottom of Filter Pack Native Backfill	
520								Total depth = 520 ft. Reached @ 0930 on 6/19/11. Water added during drilling (gallons) = 0
525								Water added after drilling (gallons) = 795
530								Water added during construction (gallons) = 40
535								
540								

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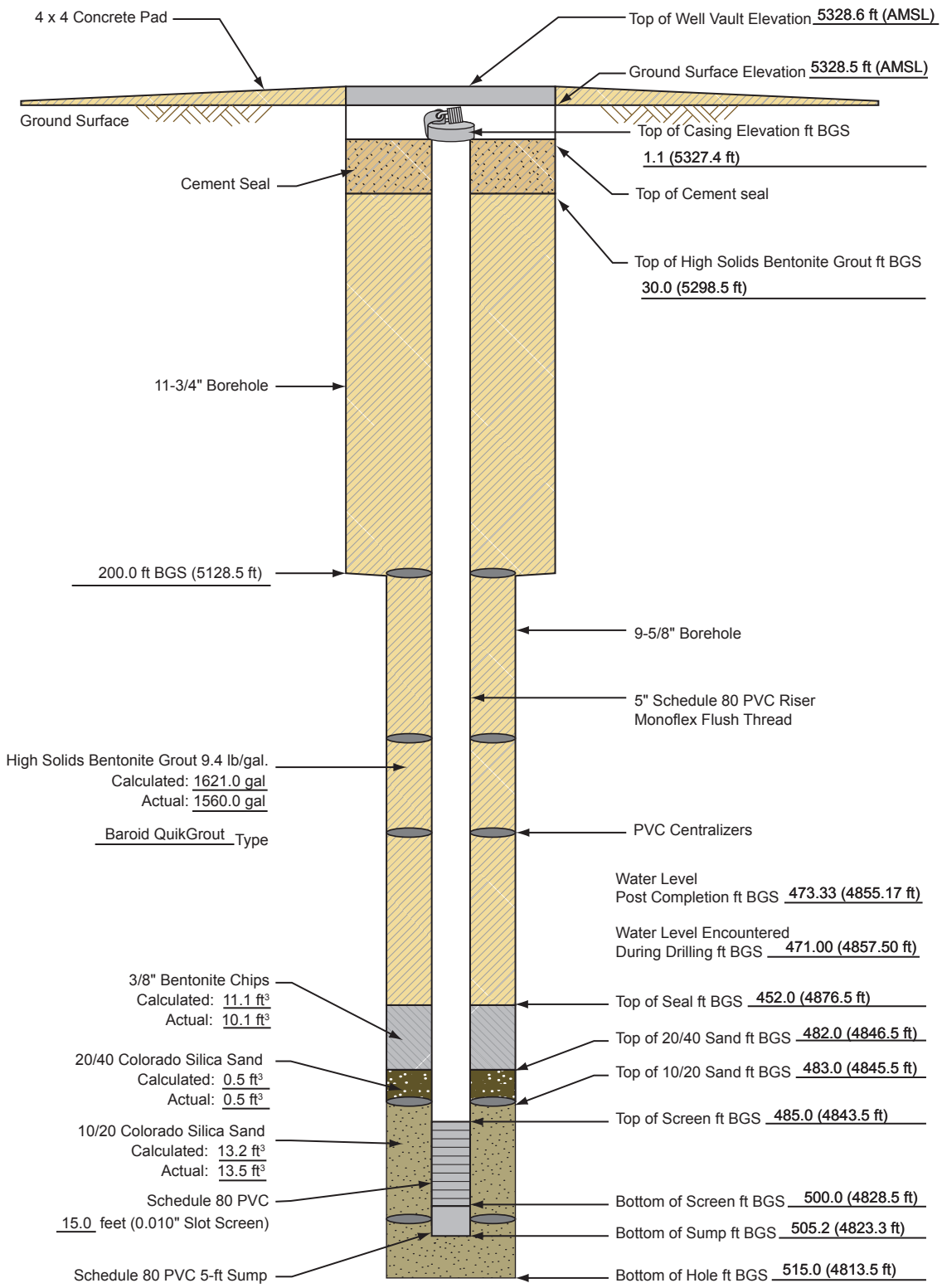
Monitoring Well Completion Diagram KAFB-106103

Installation Start Date/Time: 6/19/2011 @ 11:30
Installation End Date/Time: 6/21/2011 @ 10:15



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106103

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106103

Personnel: V. Bracht

Date Installed: 6/21/11

Date: 6/23/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 505.2

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 6/23/11 - 6/24/11

Depth to Water Before Developing Well (ft. BGL): 473.45, 472.25 (TOC)

			Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 31.75	feet	=	849.03	gal. *	1	=	849.03

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 849.03 gallons

Depth Purging From: 500.3 feet

Time Purging Begins: 1450, 6/23/11

Weather: Sunny, Breezy, Warm

Screened Interval (ft BGL): 485 - 500

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 795 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/23/2011	0940	472.25	6	21.49	7.56	1.993	Out of Range	Begin Bailing; Water is Brown
6/23/2011	1000	--	100	21.86	6.58	1.849	Out of Range	Continue Bailing; Brown
6/23/2011	1020	--	175	21.20	7.84	1.839	Out of Range	Continue Bailing; Light Brown
6/23/2011	1035	--	250	--	--	--	--	Bailed
6/23/2011	1315	--	--	--	--	--	--	Begin Swabbing
6/23/2011	1330	--	--	--	--	--	--	Stop Swabbing
6/23/2011	1345	--	270	--	--	--	--	Bailed
6/23/2011	1450	472.30	--	--	--	--	--	Begin Pumping at 4 GPM
6/23/2011	1455	472.50	--	27.50	7.31	1.873	Out of Range	Continue Pumping; Light Brown
6/23/2011	1505	472.71	310	22.24	6.59	1.821	416.00	Continue Pumping; Cloudy

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106103

Project Number: 140705

Samplers: V. Bracht

Date: 6/23/11

Checked By:

Time Start: 0940, 6/23/11

Time Finish: 1220, 6/24/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/23/2011	1515	472.71	350	22.56	6.29	1.816	159.00	Continue Pumping; Cloudy
6/23/2011	1525	472.72	450	22.69	6.25	1.807	96.70	Continue Pumping; Cloudy
6/23/2011	1535	472.70	500	24.29	6.33	1.815	57.80	Continue Pumping; Cloudy
6/23/2011	1545	472.71	550	28.30	6.56	1.828	38.70	Continue Pumping; Cloudy
6/23/2011	1555	472.71	600	24.05	6.43	1.814	23.00	Continue Pumping; Slightly Cloudy
6/23/2011	1605	472.71	625	22.35	6.25	1.808	14.40	Continue Pumping; Fairly Clear
6/23/2011	1615	472.71	675	21.98	6.14	1.804	8.10	Continue Pumping; Clear
6/23/2011	1625	472.70	700	21.97	6.12	1.806	5.52	Pump Off; Water is Clear
6/24/2011	1135	472.33	--	--	--	--	--	Pump On at 4.3 GPM
6/24/2011	1140	472.80	--	21.80	8.40	0.332	50.80	Continue Pumping; Slightly Cloudy
6/24/2011	1150	472.82	750	24.73	8.47	0.333	9.64	Continue Pumping; Clear
6/24/2011	1200	472.81	790	24.96	8.38	0.333	1.81	Continue Pumping; Clear
6/24/2011	1210	472.81	830	25.08	8.38	0.334	1.07	Continue Pumping; Clear
6/24/2011	1220	472.81	870	26.38	8.67	0.335	0.88	Stop Pumping; Clear; Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106104

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/4/2011
Date TD Reached: 6/8/2011
Date Completed: 6/15/2011

Ground Elevation AMSL (ft): 5328.1
Y Coordinate: 1475704.13
X Coordinate: 1543662.31

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 475.00
At End of Drilling: Not Recorded
After Drilling: 472.79

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded.			Hand augered. ***Note: no headspace requirement at this location.***
5					No description recorded.			Began drilling @ 1300 on 6/4/11.
10					Silty SAND with Gravel (SM); light reddish brown (2.5YR 6/4); dry; loose; 55% very fine to very coarse sand; 30% gravel to 8mm; angular to subrounded; 15% silt. Note: caliche coating on gravel.	SM		
15					Silty SAND (SM); reddish brown (2.5YR 5/4); dry; loose; 60% very fine to medium sand; 40% silt.		Cement Seal	
20					Clayey SAND (SC); reddish brown (2.5YR 4/4); dry; loose; 70% fine to coarse sand; 30% clay; nonplastic.	SC		
25					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; loose; 70% fine to very coarse sand; 30% silt.	SM		
30								

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Borehole ID: KAFB-106104

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/4/2011
Date TD Reached: 6/8/2011
Date Completed: 6/15/2011

Ground Elevation AMSL (ft): 5328.1
Y Coordinate: 1475704.13
X Coordinate: 1543662.31

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 475.00
At End of Drilling: Not Recorded
After Drilling: 472.79

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; loose; 55% fine to very coarse sand; 5% gravel to 8mm; angular to subrounded; 40% silt.		Top of High Solids Bentonite Grout	
35					Same as above (30 ft).	SM		
40					Poorly graded SAND with Silt and Gravel (SP-SM); moist; loose; 60% medium to very coarse sand; 30% gravel to 15mm; angular to subrounded; 10% silt.	SP-SM		
45					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; loose; 60% very fine to medium sand; 40% silt.	SM		
50					No description recorded.			
55					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; loose; 55% very fine to fine sand; 45% silt.	SM		
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:49 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106104

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/4/2011
Date TD Reached: 6/8/2011
Date Completed: 6/15/2011

Ground Elevation AMSL (ft): 5328.1
Y Coordinate: 1475704.13
X Coordinate: 1543662.31

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 475.00
At End of Drilling: Not Recorded
After Drilling: 472.79

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; loose; 50% very fine to medium sand; 5% coarse sand; 45% silt.			
65					Same as above (60 ft); 60% very fine to medium sand; 40% silt.			
70					Silty SAND (SM); reddish brown (2.5YR 5/3); moist; loose; 60% very fine to medium sand; 40% silt.			
75					Silty SAND (SM); reddish brown (2.5YR 5/4); moist; loose; 50% very fine to medium sand; 5% coarse sand; 5% gravel to 5mm; angular to subangular; 40% silt.	SM	High Solids Bentonite Grout	
80					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; loose; 60% fine to coarse sand; 40% silt.			
85					Same as above (80 ft); 55% very fine to medium sand; 45% silt.			
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:49 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; loose; 60% fine to medium sand; 10% coarse to very coarse sand; 30% silt.			
95					Same as above (90 ft); 70% fine to coarse sand; 30% silt.			
100					Silty SAND (SM); reddish brown (2.5YR 5/4); moist; loose; 60% fine to coarse sand; 30% silt; 10% clay.			
105					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; loose; 55% very fine to medium sand; 45% silt.	SM	High Solids Bentonite Grout	
110					Same as above (105 ft).			
115					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; loose; 65% very fine to medium sand; 5% coarse to very coarse sand; 30% silt.			
120								

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At End of Drilling: Not Recorded
After Drilling: 472.79

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 80% medium to coarse sand; 15% very coarse sand; 5% gravel to 10mm; subrounded.	SP		End of 6/4/11. Resumed drilling @ 0920 on 6/5/11.
125					Clayey SAND (SC); reddish brown (5YR 4/4); moist; loose; 60% fine to medium sand; 40% clay; low plasticity.	SC		
130					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 60% very fine to medium sand; 40% silt.	SM		
135					Same as above (130 ft); 70% very fine to medium sand; 30% silt.		High Solids Bentonite Grout	New 20' connection @ 0940. Resumed drilling @ 0947.
140					No cuttings returned.			Cyclone full, cuttings did not make it to the surface @ 1005.
145					No cuttings returned.			Began adding water. Hammer lost strength @ 1050.
150								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					No cuttings returned.			
155					No cuttings returned.			New connection @ 1150. Repaired hammer. Resumed drilling @ 1615.
160					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 90% fine to medium sand; 10% coarse sand.	SP		
165					Well graded SAND with Gravel (SW); brown (7.5YR 5/4); moist; loose; 85% sand; 15% gravel to 8mm; subrounded to rounded. Note: coarse sand and gravel are predominantly pumice.	SW	High Solids Bentonite Grout	
170					Well graded SAND (SW); brown (7.5YR 5/4); moist; loose; 90% sand; 10% gravel to 8mm; subrounded to rounded. Note: contains pumice fragments.			
175					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); moist; loose; 85% medium to coarse sand; 15% gravel to 1cm; subrounded to rounded. Note: contains pumice fragments.	SP		
180								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); moist; loose; 85% sand; 15% gravel to 12mm; subangular to subrounded. Note: contains pumice fragments.	SW		
185					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; medium dense; 100% fine to coarse sand.	SP		End of 6/5/11. Resumed drilling @ 0845 on 6/6/11.
190					Well graded SAND (SW); light reddish brown (5YR 6/3); moist; medium dense; 100% very fine to very coarse sand.	SW		Paused drilling to change out hammer switch @ 0920. Resumed drilling @ 0945.
195					Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; medium dense; 100% fine to coarse sand.	SP	High Solids Bentonite Grout	Replaced hammer switch @ 0950.
200					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 80% fine to coarse sand; 20% very coarse sand.			
205					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 67% fine to coarse sand; 3% gravel to 1.2cm; 30% silt.	SM		
210								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Silt and Gravel (SP-SM); moist; loose; 60% fine to very coarse sand; 30% gravel to 3cm; subangular to subrounded; 10% silt.	SP-SM		
215					Poorly graded GRAVEL with Sand (GP); reddish brown (5YR 4/4); moist; loose; 60% gravel to 3cm; angular to subrounded; 40% fine to very coarse sand; well graded.	GP		New 20' connection and resumed drilling @ 1540.
220					Poorly graded GRAVEL with Sand (GP); moist; loose; 70% gravel to 2cm; angular to rounded; 30% sand; well graded. Note: gravel is composed of granite, quartzite, and basalt.	CL		
225					Lean CLAY (CL); greenish gray (GLEY1 10Y 6/1).	GP	High Solids Bentonite Grout	
230					Poorly graded GRAVEL with Sand (GP); moist; loose; 70% gravel to 2cm; angular to rounded; 30% sand; well graded. Note: gravel is composed of granite, quartzite, and basalt. Poorly graded SAND with Silt (SP-SM); brown (7.5YR 4/4); moist; loose; 90% very fine to medium sand; 10% silt.	SP-SM		
235					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 100% very fine to medium sand. Same as above (230 ft); 100% very fine to coarse sand.	SP		New 20' connection and resumed drilling @ 1600.
240								

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After Drilling: 472.79

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); moist; loose; 85% sand; 15% gravel to 2cm; angular to subrounded.	SW		
245					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to medium sand.	SP		
250					Well graded SAND (SW); brown (7.5YR 5/4); moist; loose; 100% sand.	SW		
255					Well graded SAND with Clay and Gravel (SW-SC); brown (7.5YR 4/4); moist; loose; 60% sand; 30% gravel to 1.5cm; subangular to subrounded; 10% clay.	SW-SC	High Solids Bentonite Grout	New 20' connection and resumed drilling @ 1627.
260					Well graded SAND with Gravel (SW); brown (7.5YR 5/4); moist; loose; 80% sand; 20% gravel to 1cm; subrounded to rounded.	SW		
265					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; loose; 80% fine to very coarse sand; 20% gravel to 1cm; subrounded to rounded. Note: coarse sand is composed of pumice.	SP		
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:49 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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At End of Drilling: Not Recorded
After Drilling: 472.79

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 100% fine to coarse sand.			
275					Same as above (270 ft); 90% fine to medium sand; 10% coarse sand.	SP		End of 6/6/11. New 20' connection and resumed drilling @ 0950 on 6/7/11.
280					Poorly graded SAND (SP); reddish brown (5YR 4/3); moist; loose; 95% fine to coarse sand; 5% gravel to 2cm; subangular to subrounded.			
285					Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 67% fine to coarse sand; 10% very coarse sand; 3% gravel to 8mm; subangular to subrounded; 20% clay; low plasticity.	SC	High Solids Bentonite Grout	
					Lean CLAY (CL); brown (7.5YR 5/3); moist; hard; low plasticity; 90% clay; 10% very fine to fine sand.	CL		
290					Well graded SAND with Gravel (SW); brown (7.5YR 5/4); moist; loose; 70% sand; 30% gravel to 1.5cm; angular to subrounded.			New 20' connection @ 1020. Resumed drilling @ 1025.
295					Well graded SAND with Gravel (SW); brown (7.5YR 5/4); moist; loose; 75% sand; 25% gravel to 1cm; angular to subrounded.	SW		
300								

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300								
305					Clayey GRAVEL with Sand (GC); moist; loose; 50% gravel to 3cm; subangular to subrounded; 25% sand; well graded; 25% clay; low plasticity. Note: gravel is composed of granite, quartzite, and basalt.	GC		
310					Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 50% medium to very coarse sand; 10% gravel to 20mm; subrounded to rounded; 40% clay; non to low plasticity.	SC		
315					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to coarse sand.	SP	High Solids Bentonite Grout	New 20' connection @ 1040. Repaired hammer. Resumed drilling @ 1120.
320					Same as above (310 ft); 100% fine to medium sand.	SP		
325					Poorly graded GRAVEL with Sand (GP); dry; loose; 70% gravel to 3cm; angular to rounded; 30% sand; well graded.	GP		
330					Poorly graded SAND with Gravel (SP); dry; loose; 60% medium to very coarse sand; 40% gravel to 1.5cm; angular to rounded.	SP		

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 100% fine to coarse sand.			
335					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% very fine to medium sand.	SP		New 20' connection and resumed drilling @ 1215.
340					Well graded SAND with Gravel (SW); dry; loose; 70% sand; 30% gravel to 2cm; angular to subrounded.	SW		
345					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); dry; loose; 80% medium to very coarse sand; 20% gravel to 1cm; subangular to subrounded.		High Solids Bentonite Grout	
350					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); dry; loose; 85% very fine to very coarse sand; 15% gravel to 2cm; subangular to subrounded.	SP		
355					Same as above (350 ft); 80% sand; 20% gravel.			New 20' connection @ 1240. Resumed drilling @ 1355.
360								

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360					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); dry; loose; 70% sand; 30% gravel to 8mm; angular to rounded.	SW		
365					Poorly graded GRAVEL with Sand (GP); dry; loose; 80% gravel to 3cm; angular to rounded; 20% medium to very coarse sand. Note: gravel is composed of granite, quartzite, felspars, and basalt.	GP		
370					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/3); moist; loose; 70% medium to very coarse sand; 30% gravel to 1.5cm; angular to rounded.	SP		
375					Well graded SAND (SW); brown (7.5YR 4/3); moist; loose; 95% sand; 5% gravel to 5mm; angular to subrounded.	SW	High Solids Bentonite Grout	New 20' connection and resumed drilling @ 1455.
380					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); dry; loose; 85% sand; 15% gravel to 1cm; angular to subrounded.			
385					Well graded SAND with Gravel (SW); brown (7.5YR 5/2); dry; loose; 75% sand; 25% gravel to 1cm; angular to subrounded.			
390								

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390					Well graded SAND with Gravel (SW); brown (7.5YR 5/2); dry; loose; 85% sand; 15% gravel to 1.5cm; angular to subrounded.	SW		
395					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 70% very fine to medium sand; 20% coarse to very coarse sand; 10% gravel to 2cm; angular to subrounded.	SP		New 20' connection and resumed drilling @ 1517.
400					Well graded SAND with Gravel (SW); dry; loose; 60% sand; 40% gravel to 2cm; angular to rounded.	SW		
405					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 97% very fine to medium sand; 3% clay.	SP	High Solids Bentonite Grout	
410					Clayey SAND (SC); dark reddish brown (7.5YR 3/4); moist; loose; 55% very fine to coarse sand; 45% clay; nonplastic.	SC		
415					Sandy lean CLAY (CL); dark reddish brown (7.5YR 3/4); dry; soft; low to medium palsticity; 50% clay; 40% very fine to fine sand; 10% medium to coarse sand.	CL		New 20' connection @ 1535. Resumed drilling @ 1545.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:49 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

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Hole Diameter Lower (in.): 9-5/8
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Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% very fine to medium sand.	SP		
425					No description recorded.			Geologist missed description. Changed roll off bins.
430					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 100% very fine to very coarse sand.	SP		
435					Clayey SAND with Gravel (SC); brown (7.5YR 4/3); moist; loose; 40% sand; well graded; 20% gravel to 1cm; angular to subrounded; 40% clay; nonplastic.	SC	High Solids Bentonite Grout	New 20' connection and resumed drilling @ 1610.
440					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; loose; 100% fine to coarse sand.	SP		
445					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; loose; 90% fine to very coarse sand; 10% gravel to 1cm; subangular to rounded.			
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:49 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106104

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/4/2011
Date TD Reached: 6/8/2011
Date Completed: 6/15/2011

Ground Elevation AMSL (ft): 5328.1
Y Coordinate: 1475704.13
X Coordinate: 1543662.31

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 475.00
At End of Drilling: Not Recorded
After Drilling: 472.79

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); dry; loose; 70% sand; 30% gravel to 2cm; angular to subrounded.			
455					Same as above (450 ft).	SW		New 20' connection and resumed drilling @ 1635.
460					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 95% fine to coarse sand; 5% gravel to 3cm; subrounded.		High Solids Bentonite Grout	
465					Poorly graded SAND (SP); light brown (7.5YR 6/3); dry; loose; 100% fine to medium sand.	SP		End of 6/7/11. Resumed drilling @ 0840 on 6/8/11.
470					Same as above (465 ft).			Hammer would not fire. Resumed drilling @ 0935.
475					Lean CLAY with Sand (CL); reddish brown (2.5YR 4/4); moist; firm; nonplastic; 80% clay; 20% medium to coarse sand.	CL		
480					Poorly graded SAND (SP); brown (7.5YR 4/4); damp; medium dense; 100% fine to coarse sand.	SP	Top of Bentonite Seal	New 20' connection and resumed drilling @ 1235.

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:49 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106104

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/4/2011
Date TD Reached: 6/8/2011
Date Completed: 6/15/2011

Ground Elevation AMSL (ft): 5328.1
Y Coordinate: 1475704.13
X Coordinate: 1543662.31

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 475.00
At End of Drilling: Not Recorded
After Drilling: 472.79

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Poorly graded SAND (SP); yellowish red (5YR 5/6); saturated; medium dense; 100% fine to coarse sand.	SP		
485					Poorly graded SAND (SP); brown (7.5YR 4/4); damp; medium dense; 100% fine to very coarse sand.	SP	Bentonite Seal	
490					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); damp; medium dense; 80% medium to very coarse sand; 20% gravel to 1.8cm; subangular to subrounded.	SP		
495					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); damp; medium dense; 70% medium to very coarse sand; 30% gravel to 2cm; subangular to subrounded.	SP	5" Schedule 80 PVC Riser	New 20' connection @ 1255. Resumed drilling @ 1300.
500					Poorly graded GRAVEL with Sand (GP); wet; medium dense; 70% gravel to 2.5cm; angular to subrounded; 30% medium to very coarse sand. Note: gravel is composed of quartzite, chert, and basalt.	GP		
505					Poorly graded GRAVEL with Sand (GP); wet; medium dense; 80% gravel to 2cm; angular to subrounded; 20% coarse to very coarse sand.	GP	Top of 20/40 Sand Top of 10/20 Sand	Possible that some sand may have been caught in cyclone.
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:49 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106104

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/4/2011
Date TD Reached: 6/8/2011
Date Completed: 6/15/2011

Ground Elevation AMSL (ft): 5328.1
Y Coordinate: 1475704.13
X Coordinate: 1543662.31

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 475.00
At End of Drilling: Not Recorded
After Drilling: 472.79

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Poorly graded GRAVEL with Sand (GP); wet; medium dense; 85% gravel to 1cm; angular to subangular; 15% coarse to very coarse sand.	GP	Top of 5" Schedule 80 PVC 0.010" Slot Screen	Possible that some sand may have been caught in cyclone.
515					Poorly graded SAND (SP); brown (7.5YR 4/4); wet; medium dense; 90% medium to coarse sand; 10% very coarse sand.	SP		New connection @ 1330. Resumed drilling @ 1336.
520					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 5/4); wet; medium dense; 90% fine to medium sand; 10% silt.	SP-SM		
525					No description recorded.		Bottom of Screen Sump	Geologist missed description while securing roll off for transport.
530					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 5/4); wet; medium dense; 90% fine to very coarse sand; 10% silt.		Bottom of Sump	
535					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 4/4); wet; medium dense; 90% fine to coarse sand; 10% silt.	SP-SM		
540								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:49 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106104

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 6/4/2011
Date TD Reached: 6/8/2011
Date Completed: 6/15/2011

Ground Elevation AMSL (ft): 5328.1
Y Coordinate: 1475704.13
X Coordinate: 1543662.31

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 475.00
At End of Drilling: Not Recorded
After Drilling: 472.79

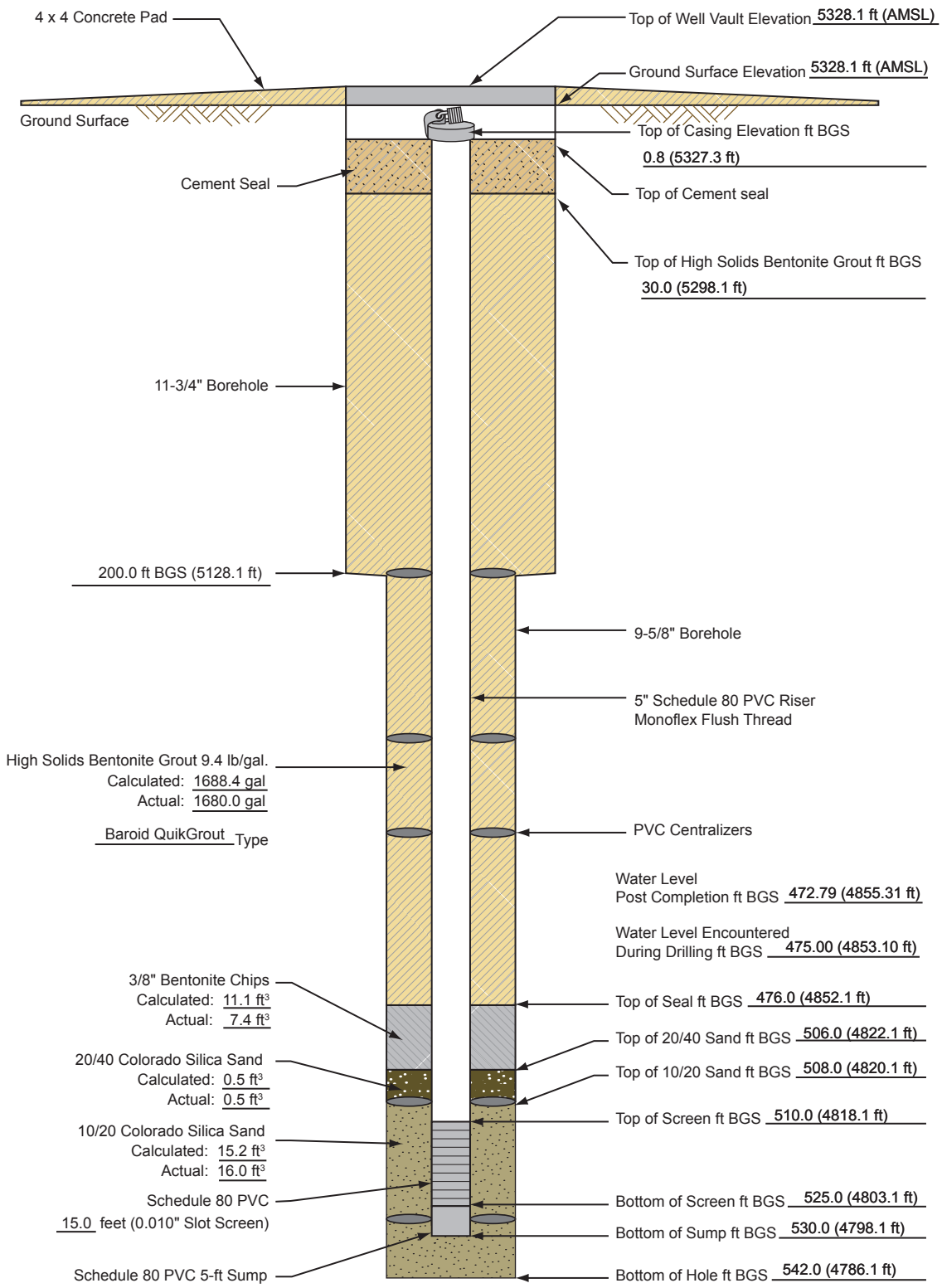
Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Poorly graded SAND with Silt (SP-SM); wet; medium dense; 80% fine to coarse sand; 10% very coarse sand; 10% silt.	SP-SM	Bottom of Filter Pack	
545					Poorly graded SAND (SP); wet; medium dense; 90% medium to very coarse sand; 10% gravel to 8mm; subrounded to rounded.	SP	Native Backfill	
550					Poorly graded SAND with Gravel (SP); wet; medium dense; 85% medium to very coarse sand; 15% gravel to 1.5cm; subangular to subrounded.			
555					Clayey SAND (SC); reddish brown (5YR 4/4); wet; medium dense; 85% fine to coarse sand; 15% clay; nonplastic.	SC		
560								Total depth = 557 ft. Reached @ 1600 on 6/8/11.
565								Water added during drilling (gallons) = 0
570								Water added after drilling (gallons) = 630
								Water added during construction (gallons) = 0

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 9/27/11 11:49 - X:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106104

Installation Start Date/Time: 6/9/2011 @ 09:57
Installation End Date/Time: 6/15/2011 @ 10:20



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106104

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: GW-27

Well/Piez. No.: 106104

Personnel: V. Bracht

Date Installed: 6/15/11

Date: 6/22/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 530

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 6/22/11 - 6/23/11

Depth to Water Before Developing Well (ft. BGL): 472.88, 472.00 (TOC)

	Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 58 feet	= 711.03 gal.	*	1	=	711.03

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2 - r_c^2) * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 711.03 gallons

Depth Purging From: 524.4 feet

Time Purging Begins: 0910, 6/23/11

Weather: Sunny, Breezy, Warm

Screened Interval (ft BGL): 510 - 525

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 630 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/22/2011	1420	472.00	6	21.69	7.94	2.103	Out of Range	Begin Bailing; Water is Very Muddy
6/22/2011	1445	--	90	--	--	--	--	Bailed
6/22/2011	1445	--	--	--	--	--	--	Begin Swabbing
6/22/2011	1500	--	--	--	--	--	--	Stop Swabbing
6/22/2011	1520	--	175	21.48	7.37	1.936	Out of Range	Continue Bailing; Light Brown
6/22/2011	1530	--	215	--	--	--	--	Bailed
6/23/2011	0910	472.12	--	--	--	--	--	Begin Pumping at 4.2 GPM
6/23/2011	0915	473.00	--	20.74	7.77	1.963	560.00	Continue Pumping; Cloudy
6/23/2011	0925	473.00	260	21.12	7.59	1.887	10.70	Continue Pumping; Fairly Clear
6/23/2011	0935	473.01	300	21.82	7.62	1.873	3.62	Continue Pumping; Clear

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106104

Project Number: 140705

Samplers: V. Bracht

Date: 6/23/11

Checked By:

Time Start: 1420, 6/22/11

Time Finish: 1115, 6/23/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
6/23/2011	0945	473.01	340	22.06	7.67	1.857	3.55	Continue Pumping; Clear
6/23/2011	0955	473.01	385	22.23	7.64	1.843	4.39	Continue Pumping; Clear
6/23/2011	1005	473.01	425	21.90	7.69	1.853	8.12	Continue Pumping; Clear
6/23/2011	1015	473.01	465	22.49	7.91	1.834	5.41	Continue Pumping; Clear
6/23/2011	1025	473.01	510	21.61	7.49	1.823	5.99	Continue Pumping; Clear
6/23/2011	1035	473.01	550	22.11	7.72	1.829	4.29	Continue Pumping; Clear
6/23/2011	1045	473.01	590	22.22	7.73	1.823	3.64	Continue Pumping; Clear
6/23/2011	1055	473.01	635	22.36	7.74	1.820	3.33	Continue Pumping; Clear
6/23/2011	1105	473.01	675	21.94	7.65	1.820	2.64	Continue Pumping; Clear
6/23/2011	1115	473.01	715	21.75	7.64	1.815	2.45	Stop Pumping; Clear; Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT (ML); brown (7.5YR 5/3); damp; soft; nonplastic; 95% silt; 5% fine sand; angular; no odor.			Hand augered. ***Note: no headspace requirement at this location.***
5					Same as above (0 ft).			Began drilling @ 1255 on 8/11/11.
10					Same as above (0 ft); 100% silt; trace fine to coarse sand; no odor.	ML		
15					Same as above (0 ft); brown (7.5YR 4/4); non to low plasticity; trace gravel; angular.		Cement Seal	Kelly down @ 1314. New 20' connection @ 1323. Resumed drilling @ 1324.
20					Same as above (0 ft); trace clay nodules.			
25					Silty SAND (SM); brown (10YR 5/3); dry; dense; 75% fine to coarse granitic sand; angular; trace gravel; angular; 25% silt; no odor.	SM		
30							Top of High Solids Bentonite Grout	

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); brown (10YR 4/3); damp; dense; 75% fine to coarse granitic sand; angular; trace gravel; angular; 25% silt; no odor.			
35					Same as above (30 ft); 70% fine to coarse sand; subangular; 5% fine gravel; subangular; 25% silt; no odor.	SM		Kelly down @ 1340. New 20' connection @ 1352. Resumed drilling @ 1352.
40					Well graded SAND with Silt (SW-SM); brown (10YR 4/3); damp; dense; 85% fine to coarse sand; subrounded; 5% fine gravel to 1cm; subrounded; 10% silt;	SW-SM		
45					Sandy SILT (ML); brown (7.5YR 5/3); damp; firm; nonplastic; 60% silt; 35% fine to coarse sand; 5% gravel to 3.5cm; subangular; no odor.	ML	High Solids Bentonite Grout	
50					Silty SAND (SM); dark yellowish brown (10YR 4/6); damp; dense; 65% fine to coarse sand; angular to subangular; 35% silt; no odor.			
55					Same as above (50 ft).	SM		Kelly down @ 1425. New 20' connection @ 1442. Resumed drilling @ 1442.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); dark yellowish brown (10YR 4/6); moist; dense; 60% fine to coarse sand; subangular; 40% silt; no odor.	SM		
65					Same as above (60 ft); 85% fine to coarse sand; subrounded to rounded; 15% silt; no odor.			Added water for dust suppression.
70					Poorly graded GRAVEL (GP); grayish brown (10YR 5/2); dry; very dense; 95% fine gravel to 2cm; rounded; 5% sand; no odor. Note: clay coating on gravel.	GP		
75					Well graded GRAVEL (GW); grayish brown (10YR 5/2); dry; dense; 95% fine to coarse gravel to 6cm; 5% sand; no odor. Note: gravel is composed of basalt.	GW	High Solids Bentonite Grout	Kelly down @ 1525. New 20' connection @ 1535. Resumed drilling @ 1536. Bit chatter.
80					No cuttings returned.			
85					Well graded GRAVEL (GW); grayish brown (10YR 5/2); dry; dense; 95% fine to coarse gravel to 6cm; 5% sand; no odor. Note: gravel is composed of basalt.	GW		
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Well graded GRAVEL (GW); brown (10YR 4/3); dry; very dense; 95% fine to coarse gravel to 5cm; 5% sand; no odor. Note: gravel is coated with clay and is composed of basalt.			
95					Same as above (90 ft); 90% gravel; 10% sand.	GW		Kelly down @ 1600. New 20' connection @ 1607. Resumed drilling @ 1607.
100					No cuttings returned.			
105					Well graded SAND with Gravel (SW); pale brown (10YR 6/3); dry; very dense; 80% fine to coarse sand; angular; 20% fine gravel; angular; no odor. Note: sand and gravel is composed of granite.		High Solids Bentonite Grout	
110					Same as above (105 ft).	SW		
115					Well graded GRAVEL with Sand (GW); light brownish gray (10YR 6/2); dry; very dense; 55% fine to coarse gravel to 5cm; angular; 45% fine to coarse granitic sand; angular; no odor.	GW		Kelly down @ 1625. New 20' connection @ 1632. Resumed drilling @ 1642.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					No cuttings returned.			
125					Well graded SAND (SW); pale brown (10YR 6/3); dry; very dense; 100% fine to coarse granitic sand; angular; trace fine gravel to 5mm; angular; no odor.			
130					Same as above (125 ft); trace clay nodules.	SW		
135					No cuttings returned.		High Solids Bentonite Grout	Kelly down @ 1657. End of 8/11/11. New 20' connection @ 0931 on 8/12/11. Resumed drilling @ 0931.
140					No cuttings returned.			
145					Silty GRAVEL (GM); brown (10YR 4/3); dry; dense; 70% fine gravel; angular; 30% silt; no odor. Note: gravel is composed of granite.	GM		
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Well graded SAND (SW); brown (10YR 5/3); dry; dense; 100% fine to coarse granitic sand; angular; trace gravel.	SW		
155					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); dry; dense; 60% fine gravel to 3.5cm; angular; 40% fine to coarse sand; angular; no odor. Note: gravel is composed of granite and basalt.	GP		Kelly down @ 0957. New 20' connection @ 1028. Resumed drilling @ 1028.
160					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 95% fine to coarse granitic sand; angular; 5% fine gravel; angular; no odor.			
165					Same as above (160 ft).		High Solids Bentonite Grout	
170					Same as above (160 ft); subangular to subrounded sand; volcanic tuff and volcanic sand.	SW		Approximate top of Santa Fe Group.
175					Same as above (160 ft); rounded.			Kelly down @ 1045. New 20' connection @ 1108. Resumed drilling @ 1109.
180								

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Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; subrounded to rounded; volcanic tuff; no odor.			
185					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; dense; 80% fine to coarse sand; subangular to subrounded; 20% fine gravel to 5mm; subangular to subrounded; no odor.			
190					Same as above (185 ft); gravel to 1cm.	SW		
195					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; rounded; trace gravel; rounded; no odor.		High Solids Bentonite Grout	Kelly down @ 1132. New 5' connection @ 1147. Resumed drilling @ 1147.
200					No cuttings returned.			Total depth with 11-3/4" casing. Resumed drilling with 9-5/8" casing @ 1615.
205					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 55% fine to coarse sand; rounded; 45% fine gravel to 3cm; rounded; no odor.	SW		
210								

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Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
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Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND with Gravel (SW); brown (10YR 43); damp; dense; 60% fine to coarse sand; rounded; 40% fine gravel to 3cm; subrounded to rounded; no odor.	SW		
215					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 100% fine to medium sand; rounded; volcanic tuff; no odor.	SP		Kelly down @ 1624. New 20' connection @ 1630. Resumed drilling @ 1631.
220					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 95% fine to coarse sand; rounded; 5% fine gravel to 1cm; rounded; no odor.			
225					Same as above (220 ft); pale brown (10YR 6/3).		High Solids Bentonite Grout	
230					Same as above (220 ft).	SW		
235					Same as above (220 ft); brown (10YR 5/3).			Kelly down @ 1637. New 20' connection @ 1643. Resumed drilling @ 1643.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); brown (10YR 5/3); damp; dense; 100% fine to coarse sand; rounded; no odor.	SW		
245					Same as above (240 ft); 95% fine to coarse sand; 5% fine gravel; rounded.			
250					Silty SAND (SM); pinkish gray (7.5YR 6/2); damp; dense; 70% fine sand; rounded; 30% silt; no odor.	SM		
255					SILT (ML); brown (7.5YR 5/3); damp; firm; low to medium plasticity; 100% silt; no odor.	ML	High Solids Bentonite Grout	Kelly down @ 1650. New 20' connection @ 1700. End of 8/12/11. Resumed drilling @ 0853 on 8/15/11.
260					Same as above (255 ft).			
265					Same as above (255 ft).			
270								

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Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					No cuttings returned.			
275					No cuttings returned.			Kelly down @ 0912. New 20' connection @ 0926. Resumed drilling @ 0926.
280					SILT with Sand (ML); brown (7.5YR 4/4); damp; firm; non to low plasticity; 80% silt; 20% fine to coarse sand; rounded; no odor.	ML		
285					Silty SAND (SM); brown (7.5YR 4/4); 60% fine to coarse sand; rounded; 40% silt; no odor.	SM	High Solids Bentonite Grout	
290					Well graded SAND (SW); brown (10YR 5/3); damp; dense; 95% fine to coarse sand; rounded; trace gravel; 5% silt and clay; no odor.			
295					Same as above (290 ft).	SW		Kelly down @ 0941. New 20' connection @ 0951. Resumed drilling @ 0951.
300								

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Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 95% fine to coarse sand; subangular to subrounded; 5% silt and clay; no odor.	SW		
305					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); damp; dense; 90% fine to coarse sand; subrounded; 10% silt; no odor.	SW-SM		
310					Same as above (305 ft).			
315					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 100% fine to coarse sand; subangular to subrounded; trace silt and clay; no odor.	SW	High Solids Bentonite Grout	Kelly down @ 1014. New 20' connection @ 1023. Resumed drilling @ 1023.
320					Same as above (315 ft); 95% fine to coarse sand; rounded; 5% silt and clay.			
325					Same as above (315 ft).			
330								

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Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; dense; 85% fine to coarse sand; subrounded; 15% fine gravel; rounded; no odor.			
335					Same as above (330 ft); 75% fine to coarse sand; 25% fine gravel to 2cm; rounded; trace clay nodules; no odor.			Kelly down @ 1043. New 20' connection @ 1133. Resumed drilling @ 1134.
340					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 90% fine to coarse sand; rounded; 10% fine gravel to 2.5cm; rounded; no odor.			
345					Well graded SAND with Gravel (SW); brown (10YR 4/3); damp; dense; 55% fine to coarse sand; subrounded; 45% fine gravel; rounded; no odor.	SW	High Solids Bentonite Grout	
350					Well graded SAND (SW); brown (10YR 4/3); damp; dense; 100% fine to coarse sand; subangular to subrounded; trace silt and clay; no odor.			
355					Same as above (350 ft).			Kelly down @ 1155. New 20' connection @ 1320. Resumed drilling @ 1320.
360								

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Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; subrounded to rounded; trace fine gravel; no odor.	SW	High Solids Bentonite Grout	Kelly down @ 1344. New 20' connection @ 1354. Resumed drilling @ 1354.
365					Well graded SAND with Gravel (SW); dark grayish brown (10YR 4/2); dry; dense; 75% fine to coarse sand; subrounded; 25% fine gravel to 2cm; rounded; trace clay nodules; no odor.			
370					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 100% fine to coarse sand; subangular; no odor.			
375					Well graded SAND with Gravel (SW); dark grayish brown (10YR 4/2); dry; dense; 75% fine to coarse sand; subrounded; 25% fine gravel to 2cm; rounded; trace clay nodules; no odor.			
380					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 100% fine to coarse sand; subangular; no odor.			
385					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; dense; 60% fine to coarse sand; subangular; 40% fine gravel to 2.5cm; subrounded; no odor.			
390								

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Borehole ID: KAFB-106105

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 95% fine to coarse sand; subrounded; 5% fine gravel; rounded; no odor.	SW		
395					Poorly graded SAND (SP); brown (10YR 5/3); dry; dense; 100% fine to medium sand; no odor.	SP		Kelly down @ 1409. New 20' connection @ 1424. Resumed drilling @ 1424.
400					Well graded SAND (SW); brown (10YR 5/3); dry; dense; 95% fine to coarse sand; subangular to subrounded; 5% silt and clay; no odor.			
405					Same as above (400 ft).	SW	High Solids Bentonite Grout	Flange cracked in three places. End of 8/15/11. Replaced flange on 8/16/11.
410					Poorly graded SAND (SP); brown (10YR 5/3); dry; dense; 100% fine sand; rounded; trace silt and clay; no odor.	SP		
415					Same as above (410 ft); 100% fine to medium sand; trace coarse sand.			Kelly down @ 1012. New 20' connection @ 1035. Resumed drilling @ 1037.
420					Well graded SAND (SW); brown (10YR 5/3); dry; dense; 100% fine to coarse sand; subrounded to rounded; no odor.	SW		

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Borehole ID: KAFB-106105

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Project Number: 140705

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Date TD Reached: 8/17/2011
Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); brown (10YR 5/3); dry; dense; 100% fine to coarse sand; subrounded to rounded; no odor.	SW		
425					Poorly graded SAND (SP); brown (10YR 4/3); dry; dense; 100% fine to medium sand; subrounded; no odor.	SP	High Solids Bentonite Grout	
430					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 90% fine to coarse sand; subrounded; 10% fine gravel; subrounded; no odor.			
435					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; dense; 80% fine to coarse sand; subrounded; 20% fine gravel to 1cm; rounded; no odor.		Top of Bentonite Seal	Kelly down @ 1120. New 20' connection @ 1136. Resumed drilling @ 1136.
440					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; subrounded; trace silt and clay; no odor.	SW		
445					Same as above (440 ft).			
450								

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Borehole ID: KAFB-106105

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Project Number: 140705

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Date Completed: 8/19/2011

Ground Elevation AMSL (ft): 5322.0
Y Coordinate: 1477850.05
X Coordinate: 1543379.58

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; subrounded; trace gravel; no odor.	SW		
455					Poorly graded SAND (SP); brown (10YR 5/3); dry; dense; 100% fine to medium sand; rounded; trace silt and clay; no odor.	SP	Bentonite Seal; 5" Schedule 80 PVC Riser	Kelly down @ 1225. New 20' connection @ 1333. Resumed drilling @ 1333.
460					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; dense; 80% fine to coarse sand; subrounded; 20% fine gravel; rounded; no odor.			
465					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 95% fine to coarse sand; subrounded; 5% fine gravel to 1cm; subrounded; no odor.			
470					Same as above (465 ft).	SW	Native Backfill	
475					Well graded SAND with Gravel (SW); brown (10YR 5/3); dry; dense; 70% fine to coarse sand; rounded; 30% fine gravel to 2cm; subrounded; trace silt nodules; no odor.		Bentonite Seal	Kelly down @ 1407. New 20' connection @ 1432. Resumed drilling @ 1432.
480								

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Borehole ID: KAFB-106105

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Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/11/2011
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Ground Elevation AMSL (ft): 5322.0
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 480.00
At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					No cuttings returned.		Top of 20/40 Sand; Top of 10/20 Sand; Top of 5" Schedule 80 PVC 0.010" Slot Screen	
485					Well graded SAND with Gravel (SW); brown (10YR 4/3); moist; dense; 75% fine to coarse sand; rounded; 25% fine gravel to 1.5cm; rounded; no odor.	SW		
490					Lean CLAY (CL); olive (5Y 5/4); damp; firm; medium to high plasticity; 95% clay; 5% fine gravel.	CL		
495					Poorly graded GRAVEL with Sand (GP); grayish brown (10YR 5/2); damp; dense; 60% fine gravel to 3cm; rounded; 40% medium to coarse sand; rounded; no odor. Note: gravel is composed of basalt.	GP	Bottom of Screen	Kelly down @ 1620. New 20' connection @ 1604. Resumed drilling @ 1604.
500					Well graded SAND with Silt (SW-SM); brown (10YR 4/3); wet; dense; 85% fine to coarse sand; rounded; 5% fine gravel; rounded; 10% silt; no odor.	SW-SM	Sump; Bottom of Sump	
505					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); wet; dense; 80% fine gravel; subrounded; 20% medium to coarse sand; no odor. Note: gravel is composed of basalt, quartz, mudstone, and metamorphics.	GP		
510								

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
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At End of Drilling: Not Recorded
After Drilling: 469.00

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510								
					Well graded SAND with Gravel (SW); brown (10YR 4/3); wet; dense; 80% fine to coarse sand; rounded; 20% fine gravel; rounded; no odor.	SW	Filter Pack	
515					No cuttings returned.			End of 8/16/11. Resumed drilling @ 0927 on 8/17/11. Total depth = 517 ft. Reached @ 1029 on 8/17/11.
520								Water added during drilling (gallons) = 0
525								Water added after drilling (gallons) = 600
530								Water added during construction (gallons) = 40
535								Kelly down: TD the joint and ready to make new connection.
540								

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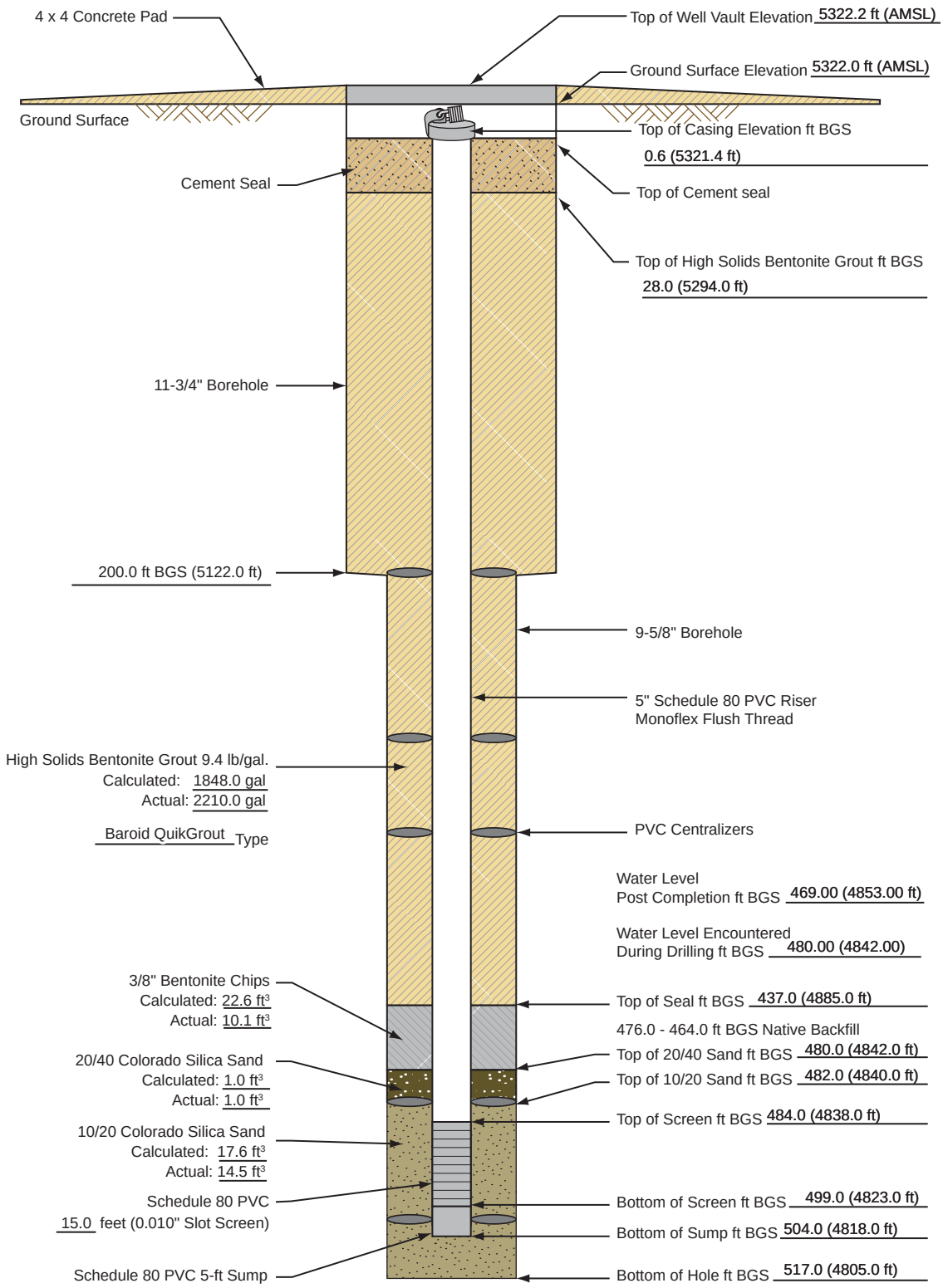
Monitoring Well Completion Diagram KAFB-106105

Installation Start Date/Time: 8/17/2011 @ 12:00
Installation End Date/Time: 8/19/2011 @ 16:30



** Sand had to be blown out and replaced*

(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106105

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: GW-28

Well/Piez. No.: 106105

Personnel: V. Bracht

Date Installed: 8/19/11

Date: 9/19/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 504

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 9/19/11 - 9/20/11

Depth to Water Before Developing Well (ft. BGL): 469.80, 469.15 (TOC)

	Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 34.2 feet	= 655.86 gal.	*	1	=	655.86

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2 - r_c^2) * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 655.86 gallons

Depth Purging From: 495.7 feet

Time Purging Begins: 0915, 9/20/11

Weather: Sunny, Warm

Screened Interval (ft BGL): 484 - 499

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 600 gallons of water added during drilling/well installation activites

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
9/19/2011	1030	469.15	5	19.82	5.79	0.486	293.00	Begin Bailing; Water is Cloudy
9/19/2011	1050	--	50	--	--	--	--	Bailed
9/19/2011	1130	--	--	--	--	--	--	Begin Swabbing
9/19/2011	1155	--	--	--	--	--	--	Stop Swabbing; Begin Bailing
9/19/2011	1230	--	100	--	--	--	--	Bailed
9/19/2011	1625	469.00	--	--	--	--	--	Begin Pumping
9/19/2011	1650	--	--	--	--	--	--	Pump Not Producing; Shut Off
9/20/2011	0915	469.10	--	--	--	--	--	Begin Pumping at 4 GPM
9/20/2011	0920	469.75	--	18.91	6.69	0.426	75.40	Continue Pumping; Cloudy
9/20/2011	0930	469.73	150	20.41	6.19	0.417	8.04	Continue Pumping; Clear

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106105

Project Number: 140705

Samplers: V. Bracht

Date: 9/20/11

Checked By:

Time Start: 1030, 9/19/11

Time Finish: 1200, 9/20/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
9/20/2011	0940	469.73	180	20.46	6.29	0.415	2.24	Continue Pumping; Clear
9/20/2011	0950	469.74	220	20.59	6.44	0.414	1.49	Continue Pumping; Clear
9/20/2011	1000	469.75	250	20.63	6.50	0.413	1.21	Continue Pumping; Clear
9/20/2011	1010	469.74	290	20.71	6.52	0.413	1.03	Continue Pumping; Clear
9/20/2011	1020	469.74	330	20.72	6.54	0.412	0.91	Continue Pumping; Clear
9/20/2011	1030	469.75	370	20.89	6.80	0.414	0.98	Continue Pumping; Clear
9/20/2011	1040	469.74	410	20.87	6.56	0.414	0.79	Continue Pumping; Clear
9/20/2011	1050	469.74	440	20.94	6.53	0.414	0.77	Continue Pumping; Clear
9/20/2011	1100	469.74	480	20.91	6.49	0.414	0.56	Continue Pumping; Clear
9/20/2011	1110	469.75	520	20.99	6.51	0.413	1.18	Continue Pumping; Clear
9/20/2011	1120	469.75	560	21.05	6.50	0.414	0.67	Continue Pumping; Clear
9/20/2011	1130	469.75	600	21.40	5.55	0.414	0.58	Continue Pumping; Clear
9/20/2011	1140	469.74	640	21.43	6.27	0.414	0.61	Continue Pumping; Clear
9/20/2011	1150	469.74	680	21.52	6.67	0.414	0.67	Continue Pumping; Clear
9/20/2011	1200	469.73	720	21.39	6.81	0.414	0.50	Stop Pumping; Clear; Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Fill; no description recorded.			Air knifed. ***Note: no headspace requirement at this location.***
5					Fill; no description recorded.		Cement Seal	Began drilling @ 1515 on 7/28/11.
10					Silty SAND with Gravel (SM); yellowish red (5YR 4/6); moist; very loose; 65% fine to coarse sand; 15% gravel to 15mm; angular to rounded; 20% silt.			
15					Silty SAND (SM); yellowish red (5YR 4/6); moist; very loose; 50% very fine to medium sand; 5% coarse to very coarse sand; 5% gravel to 10mm; angular to subangular; 30% silt; 10% clay.		Top of High Solids Bentonite Grout	New 20' connection @ 1523. Resumed drilling @ 1537.
20					Silty SAND (SM); dark reddish brown (5YR 3/4); moist; very loose; 55% very fine to fine sand; 45% silt.	SM		
25					Silty SAND (SM); reddish brown (5YR 4/4); moist; very loose; 80% very fine to very coarse sand; 20% silt.			Driller added water to cyclone for dust suppression.
30								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Poorly graded SAND with Gravel (SP); saturated; very loose; 70% medium to very coarse sand; 30% gravel to 8mm; angular to subangular.	SP		Fine sand may have stuck to cyclone wall.
35					Silty SAND (SM); reddish brown (5YR 4/4); damp; very loose; 65% very fine to very coarse sand; 5% gravel to 15mm; subangular; 30% silt.	SM		New 20' connection @ 1555. Resumed drilling @ 1610. Bit chatter.
40					Poorly graded SAND with Gravel (SP); saturated; very loose; 80% medium to very coarse sand; 20% gravel to 15mm; angular.	SP		Fine sand may have stuck to cyclone wall. Bit chatter.
45					Well graded SAND with Gravel (SW); yellowish red (5YR 4/6); saturated; medium dense; 70% sand; 30% gravel to 15mm; angular to subrounded.	SW	High Solids Bentonite Grout	Bit chatter.
50					Well graded SAND with Gravel (SW); saturated; medium dense; 80% sand; 15% gravel to 30mm; angular to subrounded; 5% silt and clay.	SW		
55					Well graded SAND with Silt (SW-SM); yellowish red (5YR 4/6); moist; loose; 90% sand; 10% silt.	SW-SM		New 20' connection and resumed drilling @ 1645.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60								
65					Silty SAND (SM); brown (7.5YR 4/3); moist; loose; 75% very fine to coarse sand; 5% gravel to 20mm; angular to subrounded; 20% silt.	SM		
70					Poorly graded SAND with Silt and Gravel (SP-SM); brown (7.5YR 4/3); moist; loose; 75% fine to very coarse sand; 15% gravel to 10mm; subangular to subrounded; 10% silt.	SP-SM		
75					Poorly graded SAND with Clay and Gravel (SP-SC); dark brown (7.5YR 3/4); moist; loose; 75% fine to very coarse sand; 15% gravel to 12mm; subangular to subrounded; 10% clay; nonplastic.	SP-SC		
80					Poorly graded SAND with Gravel (SP); dry; loose; 85% coarse to very coarse sand; 15% gravel to 12mm; angular to subangular.	SP	High Solids Bentonite Grout	End of 7/28/11. New 20' connection and resumed drilling @ 0830 on 7/29/11.
85					Poorly graded SAND (SP); strong brown (7.5YR 4/6); moist; medium dense; 95% medium to coarse sand; 5% silt and clay.			Bit chatter.
90					Well graded SAND with Silt (SW-SM); brown (7.5YR 4/4); moist; medium dense; 90% sand; 10% silt.	SW-SM		Bit chatter.

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND with Gravel (SP); moist; medium dense; 85% coarse to very coarse sand; 15% gravel to 10mm; angular.	SP		Bit chatter.
95					Poorly graded GRAVEL (GP); moist; medium dense; 95% gravel to 30mm; subangular to subrounded; 5% very coarse sand. Note: gravel is composed of limestone and granite.	GP		New 20' connection and resumed drilling @ 0858. Bit chatter.
100					No cuttings returned.			Bit chatter. Added water.
105					No cuttings returned.		High Solids Bentonite Grout	Bit chatter.
110					Poorly graded GRAVEL with Sand (GP); wet; medium dense; 80% gravel to 20mm; angular to subangular; 20% very coarse sand.	GP		
115					Poorly graded GRAVEL (GP); wet; medium dense; 90% gravel to 15mm; angular to subangular; 10% very coarse sand.			New 20' connection @ 0827. Resumed drilling @ 0935.
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					No cuttings returned.			Bit chatter.
125					Poorly graded GRAVEL with Sand (GP); wet; medium dense; 85% gravel to 15mm; angular; 15% coarse to very coarse sand.	GP		
130					Clayey GRAVEL with Sand (GC); brown (7.5YR 5/4); wet; medium dense; 65% gravel to 50mm; subangular to subrounded; 15% medium to very coarse sand; 20% clay; nonplastic.	GC		Added water to maintain cutting circulation.
135					Lean CLAY with Sand (CL); brown (7.5YR 5/4); saturated; soft; 75% clay; 20% very fine to very coarse sand; 5% gravel to 8mm; angular.	CL	High Solids Bentonite Grout	New 20' connection @ 0956. Resumed drilling @ 1015. Too wet to determine plasticity.
140					Clayey GRAVEL (GC); brown (7.5YR 5/4); saturated; medium dense; 80% gravel to 15mm; angular to subangular; 20% clay.	GC		
145					Silty SAND (SM); brown (7.5YR 4/4); saturated; medium dense; 57% fine to very coarse sand; 3% gravel to 15mm; subangular; 40% silt.	SM		
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND with Gravel (SP); wet; loose; 80% medium to very coarse sand; 20% gravel to 8mm; angular to subangular.			
155					Poorly graded SAND with Gravel (SP); wet; loose; 70% coarse to very coarse sand; 30% gravel to 15mm; angular to subrounded.	SP		New 20' connection @ 1035. Resumed drilling @ 1047.
160					Poorly graded SAND with Gravel (SP); wet; medium dense; 85% coarse to very coarse sand; 15% gravel to 15mm; angular.			
165					Clayey SAND with Gravel (SC); brown (7.5YR 5/4); saturated; medium dense; 65% very fine to very coarse sand; 15% gravel to 20mm; angular to subrounded; 20% clay.	SC	High Solids Bentonite Grout	
170					Poorly graded SAND with Gravel (SP); wet; medium dense; 60% coarse to very coarse sand; 40% gravel to 10mm; angular to rounded.			
175					Same as above (170 ft).	SP		New 20' connection @ 1108. Resumed drilling @ 1120.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Silty SAND (SM); brown (7.5YR 4/4); saturated; medium dense; 85% very fine to coarse sand; 15% silt.	SM		
185					Same as above (180 ft).	SM		
190					Same as above (180 ft).	SM		
195					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 4/4); saturated; medium dense; 90% very fine to coarse sand; 10% silt.	SP-SM	High Solids Bentonite Grout	End of 7/29/11. New 20' connection and resumed drilling @ 1030 on 8/1/11.
200					Poorly graded SAND (SP); strong brown (7.5YR 4/6); moist; loose; 100% fine to coarse sand.	SP		
205					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 90% fine to coarse sand; 10% gravel to 5mm; angular to subangular.	SP		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to very coarse sand. Note: 2mm pumice clasts; well rounded.			
215					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to medium sand.			New 20' connection @ 1038. Resumed drilling @ 1050.
220					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); moist; loose; 70% fine to very coarse sand; 30% gravel to 15mm; subrounded.			
225					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 90% medium to very coarse sand; 10% gravel to 30mm; subangular to subrounded.	SP	High Solids Bentonite Grout	
230					Same as above (225 ft).			
235					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; loose; 85% medium to very coarse sand; 15% gravel to 20mm; subangular to rounded.			New 20' connection and resumed drilling @ 1108.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 85% medium to coarse sand; 15% very coarse sand.			
245					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; loose; 100% fine to medium sand.	SP		
250					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; loose; 100% fine to coarse sand.			
255					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 55% very fine to fine sand; 45% silt.	SM	High Solids Bentonite Grout	New 20' connection @ 1125. Resumed drilling @ 1135.
260					Clayey SAND with Gravel (SC); moist; loose; 45% very fine to fine sand; 15% gravel to 8mm; angular; 40% clay; nonplastic.			
265					Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 50% very fine to very coarse sand; 10% gravel to 5mm; angular; 40% clay; nonplastic.	SC		
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 55% very fine to fine sand; 45% clay; nonplastic.	SC		
275					Poorly graded SAND with Clay (SP-SC); brown (7.5YR 4/4); moist; loose; 85% fine to very coarse sand; 5% gravel to 8mm; subangular to subrounded; 10% clay.	SP-SC		New 20' connection @ 1148. Resumed drilling @ 1238.
280					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 57% fine to coarse sand; 3% gravel to 20mm; subrounded to rounded; 40% silt.	SM		
285					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 90% fine to coarse sand; 5% very coarse sand; 5% gravel to 15mm; subangular to subrounded.	SP	High Solids Bentonite Grout	
290					Clayey SAND with Gravel (SC); brown (7.5YR 5/4); moist; loose; 70% very fine to very coarse sand; 15% gravel to 15mm; subangular to subrounded; 15% clay; low plasticity.	SC		
295					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 90% fine to medium sand; 10% coarse sand.	SP		New 20' connection and resumed drilling @ 1300.
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); moist; loose; 70% medium sand to very coarse sand; 30% gravel to 20mm; subangular to subrounded.	SP		
305					No description recorded.			
310					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; loose; 90% fine to very coarse sand; 10% gravel to 25mm; subangular to subrounded.	SP		
315					Poorly graded GRAVEL with Sand (GP); brown (7.5YR 4/4); dry; loose; 70% gravel to 25mm; angular to subrounded; 30% very fine to very coarse sand. Note: gravel is composed of granite, quartzite, quartz, and basalt.	GP	High Solids Bentonite Grout	New 20' connection @ 1318. Resumed drilling @ 1639.
320					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); dry; loose; 80% fine to coarse sand; 5% very coarse sand; 15% gravel to 20mm; subangular to subrounded.	SP		
325					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 97% fine to very coarse sand; 3% gravel to 10mm; subangular to subrounded.			
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 95% medium to very coarse sand; 5% gravel to 20mm; angular to subrounded.			
335					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; loose; 90% very fine to very coarse sand; 10% gravel to 15mm; angular to subrounded.	SP		End of 8/1/11. New 20' connection and resumed drilling @ 0910 on 8/2/11.
340					Well graded SAND (SW); brown (7.5YR 5/4); dry; loose; 95% sand; 5% gravel to 8mm; angular to subrounded.	SW		Bit chatter.
345					Poorly graded GRAVEL with Sand (GP); moist; medium dense; 70% gravel to 20mm; angular to subrounded; 30% well graded sand.	GP	High Solids Bentonite Grout	
350					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 99% medium to coarse sand; 1% gravel to 30mm; subrounded to rounded.			
355					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 100% fine to medium sand.	SP		New 20' connection @ 0930. Resumed drilling @ 1040.
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:44 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); brown (7.5YR 4/4); dry; medium dense; 100% sand.			
365					Well graded SAND (SW); brown (7.5YR 4/4); moist; medium dense; 90% sand; 10% gravel to 10mm; angular to subrounded.	SW		
370					Well graded SAND (SW); brown (7.5YR 4/4); dry; medium dense; 95% sand; 5% gravel to 8mm; angular to subrounded.			
375					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; medium dense; 97% very fine to very coarse sand; 3% gravel to 12mm; angular to subangular.		High Solids Bentonite Grout	New 20' connection @ 1053. Resumed drilling @ 1104.
380					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; medium dense; 100% very fine to coarse sand.	SP		
385					Same as above (380 ft).			
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; medium dense; 100% medium to very coarse sand; trace gravel to 15mm; subrounded.			
395					Same as above (390 ft); fine to coarse sand; no gravel.			New 20' connection @ 1123. Resumed drilling @ 1133.
400					Poorly graded SAND (SP); light brown (7.5YR 6/4); dry; medium dense; 100% fine to medium sand.		High Solids Bentonite Grout	
405					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 100% fine to medium sand.	SP		
410					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; medium dense; 100% fine to coarse sand.		Top of Bentonite Seal	
415					Same as above (410 ft).			New 20' connection @ 1150. Resumed drilling @ 1313.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 100% fine to coarse sand.	SP		
425					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; medium dense; 100% fine to very coarse sand.	SP	Bentonite Seal	
430					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 100% fine to coarse sand.	SP		
435					Same as above (430 ft); very fine to medium sand.	SP	5" Schedule 80 PVC Riser	New 20' connection @ 1327. Resumed drilling @ 1345.
440					Well graded SAND (SW); brown (7.5YR 4/4); dry; medium dense; 99% sand; 1% gravel to 8mm; angular.	SW		
445					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; medium dense; 99% fine to coarse sand; 1% gravel to 20mm; subrounded.	SP	Top of 20/40 Sand	
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 97% fine to medium sand; 3% gravel to 20mm; subangular to subrounded.		Top of 10/20 Sand	
455					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; medium dense; 100% fine to coarse sand.	SP	Top of 5" Schedule 80 PVC 0.010" Slot Screen	New 20' connection @ 1403. Resumed drilling @ 1409. Added 45 gallons of water.
460					Well graded SAND (SW); brown (7.5YR 4/4); damp; medium dense; 100% sand.	SW		
465					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; medium dense; 100% fine to coarse sand.			
470					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; medium dense; 100% medium to coarse sand.	SP		
475					Poorly graded SAND (SP); brown (7.5YR 4/4); damp; medium dense; 100% medium to very coarse sand.			New 20' connection and resumed drilling @ 1444.
480								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106106

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 7/28/2011
Date TD Reached: 8/3/2011
Date Completed: 8/10/2011

Ground Elevation AMSL (ft): 5321.9
Y Coordinate: 1477874.49
X Coordinate: 1543381.41

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: 468.60
At End of Drilling: Not Recorded
After Drilling: 467.49

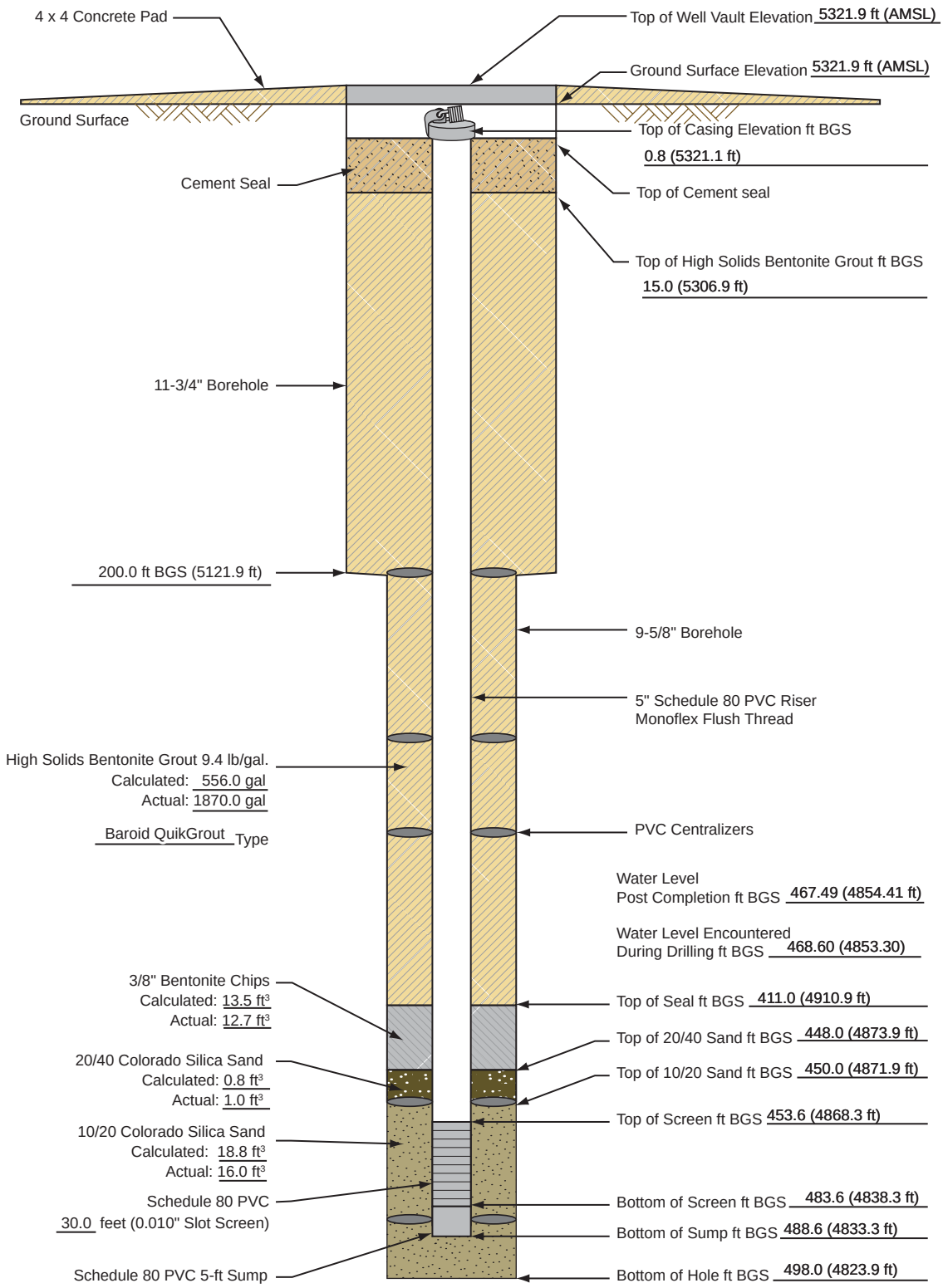
Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480								
					Poorly graded GRAVEL with Sand (GP); brown (7.5YR 4/4); damp; medium dense; 80% gravel to 15mm; subangular to rounded; 20% coarse to very coarse sand.	GP	Bottom of Screen	
485								
					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); damp; medium dense; 55% fine to very coarse sand; 45% gravel to 15mm; subangular to rounded.	SP	Sump Bottom of Sump	
490								
					No cuttings returned.			Good air circulation.
495								
					Poorly graded SAND (SP); saturated; medium dense; 100% fine to coarse sand.	SP	Bottom of Filter Pack Native Backfill	Chain guide for hammer fell out. End of 8/2/11. Resumed drilling on 8/3/11.
500								Total depth = 499 ft. Reached @ 1000 on 8/3/11.
								Water added during drilling (gallons) = 45
505								Water added after drilling (gallons) = 1515
								Water added during construction (gallons) = 40
510								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Monitoring Well Completion Diagram KAFB-106106

Installation Start Date/Time: 8/4/2011 @ 08:05
Installation End Date/Time: 8/10/2011 @ 12:00



** Sand had to be blown out and replaced*

(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106106

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: GW-28

Well/Piez. No.: 106106

Personnel: V. Bracht

Date Installed: 8/10/11

Date: 9/21/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 488.6

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 9/21/11

Depth to Water Before Developing Well (ft. BGL): 469.99, 469.19 (TOC)

			Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 18.61	feet	=	1615.95	gal. *	1	=	1615.95

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2 - r_c^2) * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1615.95 gallons

Depth Purging From: 479 feet

Time Purging Begins: 1125, 9/21/11

Weather: Partly Cloudy

Screened Interval (ft BGL): 453.6 - 483.6

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1560 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
9/21/2011	0845	469.19	10	18.97	6.81	0.463	Out of Range	Begin Bailing; Water is Brown
9/21/2011	0910	--	50	--	--	--	--	Bailed
9/21/2011	0915	--	--	--	--	--	--	Begin Swabbing
9/21/2011	0930	--	--	--	--	--	--	Stop Swabbing
9/21/2011	1125	--	--	--	--	--	--	Begin Pumping at 5.3 GPM
9/21/2011	1130	469.89	--	21.75	7.04	0.463	996.00	Continue Pumping; Cloudy
9/21/2011	1150	469.90	155	22.68	6.78	0.460	5.76	Continue Pumping; Clear
9/21/2011	1205	469.94	235	22.31	6.73	0.462	2.16	Continue Pumping; Clear
9/21/2011	1220	469.95	315	22.38	6.20	0.460	3.74	Continue Pumping; Clear
9/21/2011	1235	469.95	395	22.87	6.61	0.460	0.99	Continue Pumping; Clear

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106106

Project Number: 140705

Samplers: V. Bracht

Date: 9/21/11

Checked By:

Time Start: 0845, 9/21/11

Time Finish: 1620, 9/21/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
9/21/2011	1250	469.95	475	23.75	7.07	0.463	1.07	Continue Pumping; Clear
9/21/2011	1305	469.96	555	23.46	6.58	0.461	0.66	Continue Pumping; Clear
9/21/2011	1320	469.96	635	22.00	6.63	0.460	0.59	Continue Pumping; Clear
9/21/2011	1335	469.95	715	23.09	6.80	0.461	0.72	Continue Pumping; Clear
9/21/2011	1350	469.95	795	22.14	6.95	0.461	2.51	Continue Pumping; Clear
9/21/2011	1405	469.95	875	20.59	7.63	0.461	0.50	Continue Pumping; Clear
9/21/2011	1420	469.94	955	20.51	7.57	0.460	0.54	Continue Pumping; Clear
9/21/2011	1435	469.94	1035	20.42	7.49	0.460	0.51	Continue Pumping; Clear
9/21/2011	1450	469.93	1115	20.44	7.46	0.460	0.48	Continue Pumping; Clear
9/21/2011	1505	469.93	1195	20.42	7.46	0.460	0.46	Continue Pumping; Clear
9/21/2011	1520	469.91	1275	20.39	7.32	0.460	1.03	Continue Pumping; Clear
9/21/2011	1535	469.90	1355	20.63	7.40	0.461	0.94	Continue Pumping; Clear
9/21/2011	1550	469.91	1435	20.61	7.44	0.461	0.46	Continue Pumping; Clear
9/21/2011	1605	469.91	1515	20.56	7.55	0.461	0.61	Continue Pumping; Clear
9/21/2011	1620	469.93	1595	20.29	7.57	0.460	0.42	Stop Pumping; Clear
9/21/2011	1620	--	1615	--	--	--	--	Total Removed; 20 Gals in Flow-Through

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Fill; no description recorded.			Air knifed.
								Note: no headspace requirement at this location.
5					No description recorded.			Began drilling @ 1643 on 8/22/11.
10					Silty SAND (SM); red (2.5YR 4/6); dry; loose; 50% very fine to medium sand; 5% gravel to 12mm; angular to subangular; 45% silt.	SM		
15					Sandy SILT (ML); red (2.5YR 4/8); dry; loose; 70% silt; 30% very fine to fine sand.	ML	Cement Seal	End of 8/22/11. Resumed drilling @ 0915 on 8/23/11.
20					Silty SAND (SM); reddish brown (2.5YR 4/4); dry; loose; 60% very fine to medium sand; 40% silt.	SM		
25					Poorly graded SAND with Gravel (SP); reddish brown (2.5YR 4/4); dry; loose; 60% medium to very coarse sand; 40% gravel to 20mm; angular to subangular. Same as above (22 ft).	SP		
30								

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Poorly graded GRAVEL with Sand (GP); reddish brown (2.5YR 5/4); dry; loose; 60% gravel to 10mm; angular to subangular; 40% coarse to very coarse sand. Note: gravel is composed of granite and limestone.	GP	Top of High Solids Bentonite Grout	Added water to cyclone for dust suppression.
35					Poorly graded GRAVEL with Sand (GP); reddish brown (2.5YR 5/4); dry; loose; 60% gravel to 20mm; angular to subrounded; 40% coarse to very coarse sand. Note: gravel is composed of granite and limestone.			New 20' connection @ 0955. Resumed drilling @ 1007. Bit chatter.
40					Poorly graded SAND with Gravel (SP); reddish brown (2.5YR 4/4); dry; loose; 60% medium to very coarse sand; 40% gravel to 20mm; angular to subangular.	SP		
45					Poorly graded SAND (SP); dark reddish brown (5YR 3/4); dry; loose; 85% fine to medium sand; 10% coarse sand; 5% silt and clay.			Bit chatter.
50					Well graded SAND with Gravel (SW); reddish brown (5YR 4/4); dry; loose; 85% sand; 15% gravel to 18mm; angular to subangular.	SW		Bit chatter.
55					Poorly graded SAND (SP); reddish brown (5YR 4/4); dry; loose; 100% medium to coarse sand.	SP		New 20' connection @ 1045. Resumed drilling @ 1053.
60								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 4/4); dry; loose; 85% very fine to medium sand; 5% coarse sand; 10% silt.	SP-SM		Added water to cyclone for dust suppression.
65					Poorly graded GRAVEL with Sand (GP); dry; loose; 80% gravel to 20mm; angular to subrounded; 15% coarse to very coarse sand; 5% silt and clay. Note: gravel is composed of granite, limestone, and sandstone.	GP		Bit chatter, difficult to advance.
70					Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/4); dry; loose; 65% coarse to very coarse sand; 35% gravel to 12mm; angular to subangular.	SP		
75					Poorly graded SAND with Silt and Gravel (SP-SM); reddish brown (2.5YR 4/4); dry; loose; 70% very fine to very coarse sand; 20% gravel to 10mm; angular to subrounded; 10% silt.	SP-SM	High Solids Bentonite Grout	New 20' connection @ 1120. Resumed drilling @ 1135.
80					Poorly graded SAND with Silt and Gravel (SP-SM); reddish brown (2.5YR 4/4); 70% very fine to very coarse sand; 20% gravel to 20mm; angular to subrounded; 10% silt.			
85					Poorly graded SAND (SP); reddish brown (5YR 4/4); dry; loose; 75% very fine to medium sand; 10% coarse to very coarse sand; 10% gravel to 8mm; subangular; 5% silt and clay.	SP		
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); reddish brown (5YR 4/4); dry; loose; 65% very fine to medium sand; 20% coarse to very coarse sand; 10% gravel to 15mm; angular to subangular; 5% silt and clay.	SP		
95					Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 4/4); 75% very fine to medium sand; 10% coarse to very coarse sand; 5% gravel to 4mm; angular; 10% silt.	SP-SM		New 20' connection @ 1155. Resumed drilling @ 1305.
100					Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/4); dry; loose; 80% fine to very coarse sand; 20% gravel to 20mm; angular to subangular.	SP		
105					Well graded SAND (SW); reddish brown (5YR 4/4); dry; loose; 100% sand.	SW	High Solids Bentonite Grout	
110					Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/4); dry; loose; 75% fine to very coarse sand; 25% gravel to 30mm; angular to subangular.	SP		
115					Well graded SAND with Gravel (SW); reddish brown (5YR 3/4); dry; loose; 85% sand; 15% gravel to 20mm; angular to subangular.	SW		New 20' connection @ 1327. Resumed drilling @ 1333.
120								

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Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Well graded SAND with Gravel (SW); reddish brown (5YR 4/4); dry; loose; 80% sand; 20% gravel to 25mm; angular to subrounded.	SW		
125					Well graded SAND with Gravel (SW); reddish brown (5YR 4/4); dry; loose; 70% sand; 30% gravel to 30mm; angular to subrounded.			
130					Silty SAND with Gravel (SM); light reddish brown (5YR 6/4); dry; loose; 65% very fine to very coarse sand; 20% gravel to 12mm; subangular to subrounded; 15% silt.	SM		
135					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 100% medium to very coarse sand.	SP	High Solids Bentonite Grout	New 20' connection @ 1355. Resumed drilling @ 1400.
140					Sandy SILT with Gravel (ML); brown (7.5YR 4/4); dry; soft; 55% silt; 25% very fine to fine sand; 5% medium sand; 15% gravel to 10mm; subangular to rounded.	ML		Added water to cyclone for dust suppression.
145					Clayey GRAVEL with Sand (GC); brown (7.5YR 4/4); wet; loose; 40% gravel to 15mm; subangular to subrounded; 20% fine to coarse sand; 40% clay; nonplastic.	GC		
150								

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Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150								
					Poorly graded GRAVEL with Sand (GP); brown (7.5YR 5/4); saturated; medium dense; 60% gravel to 5mm; angular; 35% coarse to very coarse sand; 5% silt and clay.	GP		
155								
					No description recorded.			New 20' connection @ 1415. Resumed drilling @ 1423. Geologist missed sample interval.
160								
					Poorly graded SAND with Clay and Gravel (SP-SC); brown (7.5YR 4/4); moist; medium dense; 70% fine to coarse sand; 20% gravel to 25mm; subangular to rounded; 10% clay; nonplastic.	SP-SC		
165								
					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to coarse sand.	SP	High Solids Bentonite Grout	
170								
					Same as above (165 ft).			
175								
					Same as above (165 ft); 90% fine to coarse sand; 10% very coarse sand.			New 20' connection @ 1440. Resumed drilling @ 1448.
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 85% fine to coarse sand; 5% very coarse sand; 10% gravel to 8mm; subrounded to rounded.			
185					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 95% fine to coarse sand; 5% very coarse sand.			
190					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 90% fine to medium sand; 5% coarse to very coarse sand; 5% gravel to 8mm; subrounded to rounded.	SP		
195					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); moist; loose; 70% fine to medium sand; 15% coarse to very coarse sand; 15% gravel to 8mm; subangular to rounded.		High Solids Bentonite Grout	New 20' connection and resumed drilling @ 1503.
200					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 80% fine to medium sand; 20% coarse to very coarse sand.			End of 8/23/11. Total depth using 11-3/4" casing. Resumed drilling with 9-5/8" casing @ 1100 on 8/24/11.
205					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); dry; loose; 85% sand; 15% gravel to 10mm; angular to subrounded.	SW		
210								

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Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
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Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
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X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210								
					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); dry; loose; 75% sand; 25% gravel to 15mm; subangular to rounded.	SW		
215								
					Poorly graded SAND (SP); strong brown (7.5YR 4/6); dry; loose; 95% fine to coarse sand; 5% gravel to 20mm; subrounded to rounded.	SP		New 20' connection @ 1113. Resumed drilling @ 1126.
220								
					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; loose; 85% fine to coarse sand; 10% very coarse sand; 5% gravel to 8mm; subangular to subrounded.			
225							High Solids Bentonite Grout	
					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; loose; 80% fine to coarse sand; 10% very coarse sand; 10% gravel to15 mm; subangular to rounded.			
230								
					Clayey SAND (SC); brown (7.5YR 4/4); dry; loose; 70% fine to coarse sand; 5% very coarse sand; 10% gravel to 10mm; subangular to subrounded; 15% clay; nonplastic.	SC		
235								
					Poorly graded SAND with Clay and Gravel (SP-SC); brown (7.5YR 5/4); dry; loose; 70% fine to coarse sand; 5% very coarse sand; 15% gravel to 15mm; subrounded to rounded; 10% clay; nonplastic.	SP-SC		New 20' connection @ 1135. Resumed drilling @ 1145.
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/3); wet; loose; 55% medium to very coarse sand; 45% gravel to 20mm; angular to subrounded.	SP		Added water to cyclone for dust suppression.
245					Clayey SAND (SC); brown (7.5YR 4/4); saturated; loose; 70% fine to medium sand; 30% clay; nonplastic.	SC		
250					Poorly graded SAND (SP); brown (7.5YR 5/2); saturated; loose; 95% fine to coarse sand; 5% silt and clay.	SP		
255					Poorly graded SAND (SP); brown (7.5YR 4/4); saturated; loose; 95% fine to coarse sand; 5% silt and clay.	SP	High Solids Bentonite Grout	New 20' connection @ 1152. Resumed drilling @ 1257. Added water to cyclone for dust suppression.
260					Clayey SAND with Gravel (SC); brown (7.5YR 5/4); saturated; medium dense; 45% fine to very coarse sand; 15% gravel to 10mm; angular to subrounded; 40% clay; non to low plasticity.	SC		
265					No cuttings returned.			
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
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Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					No cuttings returned.			
275					No cuttings returned.			New 20' connection @ 1316. Resumed drilling @ 1325.
280					Poorly graded SAND (SP); brown (7.5YR 4/4); saturated; loose; 95% medium to coarse sand; 5% very coarse sand.			
285					Same as above (280 ft); 90% fine to coarse sand; 10% very coarse sand.		High Solids Bentonite Grout	
290					Poorly graded SAND (SP); brown (7.5YR 4/3); damp; loose; 90% very fine to very coarse sand; 10% gravel to 15mm; subangular to rounded.	SP		
295					Poorly graded SAND (SP); brown (7.5YR 4/4); saturated; loose; 95% fine to very coarse sand; 5% silt and clay.			New 20' connection @ 1335. Resumed drilling @ 1342.
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
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Project Number: 140705

Date Started: 8/22/2011
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Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300								
305					Clayey SAND with Gravel (SC); damp; loose; 40% very fine to very coarse sand; 20% gravel to 18mm; subrounded to rounded; 40% clay; low plasticity.	SC		
310					Poorly graded SAND with Gravel (SP); moist; loose; 75% very fine to very coarse sand; 20% gravel to 25mm; subrounded to rounded; 5% silt and clay.	SP		
315					No description recorded.			
320					No description recorded.		High Solids Bentonite Grout	Lightning, end of 8/24/11. Resumed drilling @ 0830 on 8/25/11.
325					Clayey SAND (SC); brown (7.5YR 5/4); moist; loose; 70% very fine to medium sand; 30% clay; nonplastic.	SC		
330					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 95% medium to very coarse sand; 5% gravel to 8mm; angular to subangular.	SP		

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 95% medium to coarse sand; 5% very coarse sand.			
335					Same as above (330 ft); 100% fine to medium sand.			New 20' connection @ 0850. Resumed drilling @ 0857.
340					Same as above (330 ft); 95% fine to coarse sand; 5% silt and clay.	SP		
345					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 90% fine to medium sand; 10% coarse sand.		High Solids Bentonite Grout	
350					Silty SAND with Gravel (SM); brown (7.5YR 4/4); wet; loose; 70% medium to very coarse sand; 15% gravel to 15mm; angular to subangular; 15% silt.	SM		
355					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 90% fine to medium sand; 10% coarse sand.	SP		New 20' connection @ 0928. Resumed drilling @ 0935.
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

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Project Number: 140705

Date Started: 8/22/2011
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Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND with Silt (SW-SM); brown (7.5YR 5/4); dry; loose; 80% sand; 10% gravel to 5mm; angular; 10% silt.	SW-SM		
365					Poorly graded GRAVEL with Sand (GP); brown (7.5YR 5/4); dry; loose; 70% gravel to 30mm; subangular to rounded; 30% coarse to very coarse sand.	GP		
370					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); dry; loose; 85% medium to very coarse sand; 15% gravel to 15mm; subangular to subrounded.	SP		
375					Well graded SAND (SW); brown (7.5YR 4/4); dry; loose; 90% sand; 10% gravel to 5mm; angular to subangular.	SW	High Solids Bentonite Grout	New 20' connection @ 0949. Resumed drilling @ 0957.
380					No cuttings returned.			Air compressor stalled.
385					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 90% fine to coarse sand; 10% very coarse sand.	SP		
390								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; loose; 70% fine to very coarse sand; 25% gravel to 10mm; subangular to subrounded; 5% clay.			
395					Poorly graded SAND (SP); light brown (7.5YR 6/4); dry; loose; 100% fine to medium sand.			New 20' connection @ 1016. Resumed drilling @ 1249.
400					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 100% fine to very coarse sand.			
405					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; loose; 80% fine to medium sand; 20% coarse to very coarse sand.	SP	High Solids Bentonite Grout	
410					Same as above (405 ft).			
415					Same as above (405 ft).			New 20' connection @ 1308. Resumed drilling @ 1315.
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to coarse sand.			
425					Same as above (420 ft).			
430					Same as above (420 ft); 100% fine to medium sand.			
435					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 90% fine to very coarse sand; 10% gravel to 15mm; angular to subangular.	SP	High Solids Bentonite Grout	New 20' connection @ 1329. Resumed drilling @ 1337.
440					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to coarse sand.			
445					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; loose; 80% medium to very coarse sand; 20% gravel to 15mm; subangular to subrounded.			
450								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; loose; 100% fine to medium sand.	SP	High Solids Bentonite Grout	New 20' connection @ 1354. Resumed drilling @ 1401.
455					Same as above (450 ft); light brown (7.5YR 6/4).			
460					Same as above (450 ft); brown (7.5YR 4/4).		Top of Bentonite Seal	
465					Poorly graded SAND with Clay (SP-SC); brown (7.5YR 5/4); moist; loose; 90% very fine to very coarse sand; 10% clay; nonplastic.	SP-SC		
470					Poorly graded SAND with Silt with Gravel (SP-SM); brown (7.5YR 4/4); moist; loose; 75% medium to very coarse sand; 15% gravel to 12mm; subangular to subrounded; 10% silt.	SP-SM	Native Backfill	Hole in hydaulic hose @ 1420. Repaired and resumed drilling @ 1615.
475					Clayey GRAVEL with Sand (GC); wet; loose; 65% gravel to 20mm; subangular to subrounded; 20% medium to very coarse sand; 15% clay; nonplastic. Note: clay is greenish gray (GLEY1 10Y 6/1).	GC		New 20' connection @ 1623. Resumed drilling @ 1630.
480							Bentontite Seal	

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 10/26/11 08:51 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Poorly graded GRAVEL with Sand (GP); brown (7.5YR 4/4); wet; loose; 80% gravel to 12mm; angular to subangular; 20% coarse to very coarse sand.	GP	Bentontite Seal	
485					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); saturated; medium dense; 45% coarse to very coarse sand; 15% medium sand; 40% gravel to 15mm; angular to subangular.	SP		
490					No cuttings returned.		Native Backfill	
495					Clayey SAND with Gravel (SC); brown (7.5YR 4/4); wet; medium dense; 70% fine to coarse sand; 15% gravel to 15mm; subangular to subrounded; 15% clay; nonplastic.	SC		End of 8/25/11. New 20' connection and resumed drilling @ 0908 on 8/26/11.
500					Clayey SAND (SC); brown (7.5YR 4/4); saturated; medium dense; 65% fine to coarse sand; 5% very coarse sand; 30% clay; nonplastic.		Bentontite Seal	Added 100 gallons of water downhole.
505					Silty SAND with Gravel (SM); brown (7.5YR 4/4); saturated; medium dense; 55% well graded sand; 15% gravel to 15mm; subangular to subrounded; 30% silt.	SM	Top of 20/40 Sand Top of 10/20 Sand	
510								

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Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); saturated; medium dense; 60% fine to very coarse sand; 40% gravel to 10mm; subangular to subrounded.		Top of 5" Schedule 80 PVC 0.010" Slot Screen	Added 50 gallons of water downhole.
515					Poorly graded SAND (SP); brown (7.5YR 4/4); saturated; medium dense; 70% fine to medium sand; 20% coarse to very coarse sand; 10% gravel to 15mm; subangular to subrounded.			New connection @ 0940. Resumed drilling @ 0950.
520					Poorly graded SAND (SP); brown (7.5YR 4/4); saturated; medium dense; 85% fine to medium sand; 10% coarse to very coarse sand; 5% gravel to 10mm; subangular to subrounded.	SP		
525					Poorly graded SAND (SP); brown (7.5YR 4/4); saturated; medium dense; 90% fine to coarse sand; 10% very coarse sand.		Bottom of Screen Sump	
530					Poorly graded GRAVEL with Sand (GP); saturated; medium dense; 70% gravel to 15mm; angular to subangular; 30% fine to very coarse sand.	GP	Bottom of Sump	
535					Poorly graded SAND (SP); brown (7.5YR 4/4); saturated; medium dense; 100% fine to coarse sand.	SP	Bottom of Filter Pack	
540								

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Borehole ID: KAFB-106107

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 8/22/2011
Date TD Reached: 8/26/2011
Date Completed: 8/30/2011

Ground Elevation AMSL (ft): 5322.1
Y Coordinate: 1477810.19
X Coordinate: 1543378.74

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: Not Recorded
After Drilling: 469.30

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					No cuttings returned.		Native Backfill	
545					Poorly graded SAND (SP); brown (7.5YR 4/4); saturated; dense; 100% fine to coarse sand.	SP		
550								Total depth = 547 ft. Reached @ 1130 on 8/26/11.
555								Water added during drilling (gallons) = 150
560								Water added after drilling (gallons) = 975
565								Water added during construction (gallons) = 40
570								

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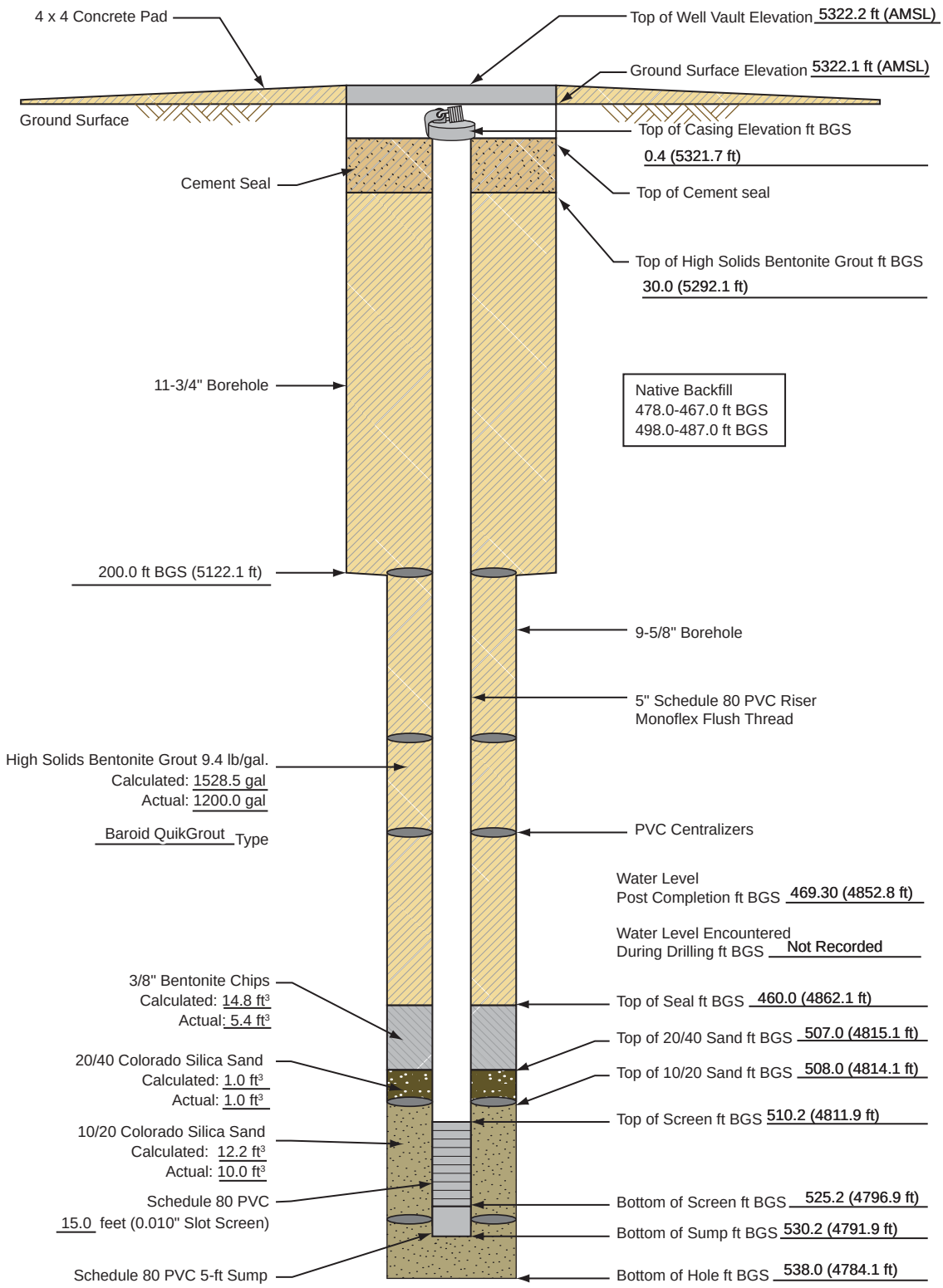
Monitoring Well Completion Diagram KAFB-106107

Installation Start Date/Time: 8/26/2011 @ 16:40
Installation End Date/Time: 8/30/2011 @ 17:30



** Sand had to be blown out and replaced*

(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106107

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: GW-28

Well/Piez. No.: 106107

Personnel: V. Bracht

Date Installed: 8/30/11

Date: 9/20/11

Csg. Diameter (I.D.): 5"

Samplers: V. Bracht

Total Depth (ft. BGL): 530.16

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 9/20/11 - 9/21/11

Depth to Water Before Developing Well (ft. BGL): 470, 469.4 (TOC)

				Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column:	60.16	feet	=	1207.39	gal.	*	1	=	1207.39

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w^2 - r_c^2) * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1207.39 gallons

Depth Purging From: 522 feet

Time Purging Begins: 0945, 9/21/11

Weather: Partly Cloudy

Screened Interval (ft BGL): 510.16 - 525.16

Equipment Nos.: **pH Meter:** YSI 36952 **EC Meter**: YSI 36952 **Turbidity Meter**: LVE 002384

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1125 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
9/20/2011	1020	469.40	10	22.51	6.74	0.403	Out of Range	Begin Bailing; Water is Muddy Brown
9/20/2011	1030	--	50	--	--	--	--	Bailed
9/20/2011	1035	--	--	--	--	--	--	Begin Swabbing
9/20/2011	1050	--	--	--	--	--	--	Stop Swabbing
9/20/2011	1120	--	125	22.48	5.18	0.386	Out of Range	Begin Bailing
9/20/2011	1200	--	225	--	--	--	--	Bailed
9/21/2011	0945	469.26	--	--	--	--	--	Begin Pumping at 4.5 GPM
9/21/2011	0950	469.73	--	18.99	7.41	0.406	39.80	Continue Pumping; Cloudy
9/21/2011	1005	469.78	290	20.30	7.27	0.406	3.15	Continue Pumping; Clear
9/21/2011	1020	469.78	355	20.49	7.35	0.405	1.54	Continue Pumping; Clear

Notes:
* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #
GPM = Gallons Per Minute

Where:
B=3.14
$Ø_s$= porosity of the sand pack
r_c= radius of the well casing and screen in feet
L_c= length of water column inside the casing and screen in feet
r_w= radius of the well bore in feet
L_s= length of saturated portion of the sand pack in feet
7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106107

Project Number: 140705

Samplers: V. Bracht

Date: 9/21/11

Checked By:

Time Start: 1020, 9/20/11

Time Finish: 1335, 9/21/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
9/21/2011	1035	469.80	420	20.89	7.47	0.405	1.22	Continue Pumping; Clear
9/21/2011	1050	469.80	485	21.08	7.48	0.405	1.01	Continue Pumping; Clear
9/21/2011	1105	469.80	550	20.79	7.44	0.406	1.25	Continue Pumping; Clear
9/21/2011	1120	469.79	615	20.59	7.31	0.405	0.90	Continue Pumping; Clear
9/21/2011	1135	469.78	680	20.63	7.33	0.405	0.73	Continue Pumping; Clear
9/21/2011	1150	469.79	745	21.50	7.28	0.406	0.75	Continue Pumping; Clear
9/21/2011	1205	469.79	810	22.64	7.09	0.407	0.95	Continue Pumping; Clear
9/21/2011	1220	469.79	875	20.66	6.98	0.404	0.64	Continue Pumping; Clear
9/21/2011	1235	469.78	940	21.45	6.99	0.405	1.28	Continue Pumping; Clear
9/21/2011	1250	469.78	1005	21.22	7.38	0.404	1.46	Continue Pumping; Clear
9/21/2011	1305	469.78	1060	20.69	7.19	0.404	0.95	Continue Pumping; Clear
9/21/2011	1320	469.78	1125	20.60	6.99	0.404	1.05	Continue Pumping; Clear
9/21/2011	1335	469.76	1190	20.74	7.48	0.405	1.07	Stop Pumping; Clear
9/21/2011	1335	--	1215	--	--	--	--	Total Removed; 25 Gals in Flow-Through

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded; disturbed; dirt road.		Concrete Seal	Hand augered.
5					Sandy SILT (ML); light reddish brown (5YR 5/4); dry; very soft; 50% silt; 40% fine to medium sand; 10% gravel to 4mm; angular to subangular.			Began drilling @ 0915 on 2/15/11.
		SB0001	0.0		Sandy SILT (ML); reddish brown (2.5YR 5/4); dry; firm; 50% silt; 45% fine to medium sand; 5% gravel to 4mm; subangular.		Bentonite Seal	Blow counts (8-9.5'): Not Recorded (cable at an angle).
10						ML		
15					Sandy SILT (ML); red (2.5YR 5/6); dry; soft; low plasticity; 30% silt; 20% clay; 45% very fine to medium sand; 5% gravel to 8mm; subangular.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20		SB0002	0.0		Silty SAND (SM); red (2.5YR 5/6); dry; dense; 60% very fine to fine sand; 40% silt.			Blow counts (18-19.5'): 26/50. Blow counts (19.5-21'): 50/Not Recorded. Blow counts (21-22.5'): Not Recorded.
		SB0002-MS	0.0					
		SB0002-MSD	0.0					
25					Same as above (18 ft).	SM	Bottom of Screen	Added 10' of casing @ 1045.
30		SB0003	0.0		Silty SAND (SM); yellowish red (5YR 5/6); moist; dense; 60% very fine to fine sand; 20% silt; 20% clay; low plasticity.		Bentonite Seal	Blow counts (28-29.5'): 16/45/50.

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Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); yellowish red (5YR 5/6); moist; dense; 60% very fine to fine sand; 20% silt; 20% clay; low plasticity.		Bentonite Seal	Added 10' of casing @ 1110. Resumed drilling @ 1115.
35					Silty SAND (SM); red (2.5YR 4/6); moist; loose; 80% fine to medum sand; 5% gravel to 4mm; 15% silt.	SM		
40		SB0004	0.0		Silty SAND (SM); red (2.5YR 4/6); moist; dense; 80% fine to medium sand; 5% gravel to 4mm; 15% silt; mottled through out; calcite to 3mm; mica flakes.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Blow counts (38-39.5'): 50/Not Recorded. Blow counts (39.5-41'): 50/Not Recorded. Blow counts (41-42.5'): Not Recorded. Added 10' of casing @ 1140.
		SB0004						
		SB0004						
45					Poorly graded SAND with Gravel (SP); yellowish red (5YR 4/6); dry; very loose; 70% fine and coarse to very coarse sand; 30% gravel to 15mm; angular to subrounded; gravel is composed of granite.			
50		SB0005 SB0006	0.0		Poorly graded SAND (SP); yellowish red (5YR 4/6); 95% very fine to fine sand; 5% silt.	SP	Bottom of Screen	Blow counts (48-49.5'): 38/40/43. Added 10' of casing @ 1230.
55					Same as above (48 ft).		Bentonite Seal	
60					Poorly graded SAND with Gravel (SP); yellowish red (5YR 4/6); dry; very loose; 70% very fine to fine sand; 30% gravel to 8mm; angular to subangular; gravel is			

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Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					composed of granite.			Added 20' of casing @ 1245. Resumed drilling @ 1250.
65					Poorly graded SAND (SP); yellowish red (5YR 5/6); dry; loose; 95% very fine to fine sand; 5% silt.			
70					Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; loose; 95% very fine sand; 5% silt.			
75					Same as above (70 ft).	SP	Bentonite Seal	
80					Poorly graded SAND (SP); yellowish red (5YR 5/6); dry; loose; 95% medium to coarse sand; 5% silt; coarse grains are composed of granite.			Added 20' of casing @ 1255. Resumed drilling @ 1305.
85					Poorly graded SAND with Gravel (SP); light gray (5YR 7/1); dry; very loose; 85% medium to coarse sand; 15% gravel to 21mm; angular to subrounded; some sand is cemented.			
90								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 15:11 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); light gray (5YR 7/1); dry; very loose; 100% medium to very coarse sand; some coarse sand is volcanic tuff.			
95					Same as above (90 ft).	SP		
		SB0007	0.0		Poorly graded SAND (SP); light gray (5YR 7/1); dry; medium dense; 100% very fine to medium sand.			Blow counts (98-99.5'): 23/28/38. Blow counts (99.5-101'): 20/26/38.
100		SB0007						
105					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 60% very fine to fine sand; 40% silt.		Bentonite Seal	
110					Same as above (103 ft).	SM		
115					Same as above (103 ft).			
120								

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Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 60% very fine to fine sand; 40% silt.	SM		Added 5' of casing @ 1350 and drove flush with surface. Tripped out drill pipe @ 1405. Resumed drilling @ 0755 on 02/16/2011.
					Poorly graded SAND with Gravel (SP); light gray (5YR 7/1); dry; very loose; 85% medium to coarse sand; 15% gravel to 8mm; angular to subrounded.			
125					Same as above (122 ft).			
130					Same as above (122 ft).		Bentonite Seal	
135					Same as above (122 ft).	SP		
140					Poorly graded SAND with Gravel (SP); light gray (5YR 7/1); dry; very loose; 80% medium to coarse sand; 20% gravel to 30mm; angular to subrounded.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Added 10' of casing @ 0805. Resumed drilling @ 0830.
145					Poorly graded SAND (SP); pinkish gray (5YR 6/2); dry; very loose; 95% fine to medium sand; 5% gravel to 7mm; subangular to subrounded.			
150		SB0008	0.0		Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); dry; very dense; 70% medium to very coarse sand; 30%			Blow counts (148-149.5'): 6/50. Blow counts (149.5-151'): 50/Not

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Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
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Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150		SB0008			gravel to 15mm; angular to subrounded.		Bottom of Screen	Recorded. Added 10' of casing @ 0850. Resumed drilling @ 0855.
155					Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; very loose; 95% fine to medium sand; 5% gravel to 10mm; angular to subrounded.			
160					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/3); dry; loose; 60% medium to coarse sand; 40% gravel to 10mm; subrounded to rounded; gravel is dominantly pumice/tuff.			
165					Same as above (158 ft).	SP	Bentonite Seal	
170					Poorly graded SAND with Gravel (SP); 55% meduim to very coarse sand; 45% gravel to 12mm; subangular to subrounded.			
175					Same as above (170 ft).			
180								

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Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
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Date TD Reached: 2/16/2011
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Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND with Gravel (SP); 55% meduim to very coarse sand; 45% gravel to 12mm; subangular to subrounded.			
					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% medium to coarse sand.			
185					Same as above (182 ft).			
190					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 100% fine to medium sand.			
195					Same as above (189 ft).	SP	Bentonite Seal	
		SB0009	0.5		Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); 55% medium to very coarse sand; 45% gravel to 40mm; subrounded to rounded; coarse gravel is dominantly rounded.			Blow counts (198-199.5'): 38/50. Blow counts (199.5-201'): 40/50. Blow counts (201-202.5'): 38/50.
200		SB0009						
		SB0009						
205					Same as above (198 ft).			
210								

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Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
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Project Number: 140705

Date Started: 2/15/2011
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Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); moist; very loose; 80% medium to very coarse sand; 20% gravel to 22mm; subrounded to rounded.	SP		
215					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; loose; 60% fine to medium sand; 30% silt; 10% clay.	SM		
220					Same as above (213 ft); 35% silt; 5% clay.			
225					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 100% fine to medium sand.	SP	Bentonite Seal	
230					Same as above (223 ft).			
235					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 100% medium to coarse sand.			
240							Top of Filter Pack	

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Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
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Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
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Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); pinkish gray (5YR 6/2); 95% medium to coarse sand; 5% clay.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Added 10' of casing @ 1005. Resumed drilling @ 1010.
245					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 95% medium to very coarse sand; 5% gravel to 5mm; subrounded to rounded.			
		SB0010	4.0		Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; very dense; 100% medium to coarse sand.			Blow counts (248-249.5'): 38/50. Blow counts (249.5-251'): Not Recorded.
250		SB0010					Bottom of Screen	Added 10' of casing @ 1130. Resumed drilling @ 1135.
					Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 5/4); moist; loose; 90% fine to medium sand; 10% silt.	SP-SM		
255					Same as above (252 ft).			
260					Same as above (252 ft); finer.		Bentonite Seal	Added 20' of casing @ 1140. Resumed drilling @ 1145.
265					Well graded SAND with Gravel (SW); pinkish gray (5YR 6/2); dry; loose; 70% sand; 30% gravel to 15mm; angular to rounded.	SW		
270					Silty SAND (SM); reddish brown (5YR 4/4); moist; medium dense; 60% fine sand; 20% silt; 20% clay.	SM		

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Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
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Project Number: 140705

Date Started: 2/15/2011
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Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Silty SAND (SM); reddish brown (5YR 4/4); moist; medium dense; 60% fine sand; 20% silt; 20% clay.	SM		
275					Silty SAND (SM); moist; medium dense; 60% very fine to fine sand; 30% silt; 10% clay.			
					Poorly graded SAND with Silt (SP-SM); reddish brown (2.5YR 5/3); moist; loose; 90% fine to medium sand; 10% silt.	SP-SM		
280					Same as above (275 ft).			Added 20' of casing @ 1155.
285					Same as above (275 ft).		Bentonite Seal	
290					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 90% medium to coarse sand; 10% gravel to 7mm; subangular to rounded.	SP		
295					Same as above (290 ft).			
300		SB0011	0.3		Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); dry; dense; 70% medium to coarse sand; 30% gravel to			Blow counts (298-299.5'): 38/50.

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Borehole ID: KAFB-106108

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Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					25mm; subangular to subrounded.	SP		Added 20' of casing @ 1230. Resumed drilling @ 1235.
305					Poorly graded GRAVEL with Clay and Sand (GP-GC); dry; loose; 60% gravel to 30mm; subangular to subrounded; 30% medium to coarse sand; 5% silt; 5% clay. Same as above (301 ft).	GP-GC		
310					Poorly graded SAND with Gravel (SP); dry; loose; 80% fine to coarse sand; 20% gravel to 8mm; angular to rounded. Same as above (307 ft).	SP		
315					Well graded SAND (SW); dry; very loose; 100% sand.	SW	Bentonite Seal	
320					Poorly graded SAND (SP); light reddish brown (5YR 6/3); dry; very loose; 95% very fine to medium sand; 5% silt.	SP		
325					Poorly graded GRAVEL with Sand (GP); dry; loose; 70% gravel to 12mm; subrounded to rounded; 30% fine to coarse sand; well graded.	GP		
330								

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Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
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Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Silt and Gravel (SW-SM); brown (7.5YR 4/3); dry; loose; 75% sand; 15% gravel to 15mm; subrounded to rounded; 10% silt.	SW-SM	Bentonite Seal	
335					Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; loose; 95% medium to coarse sand; 5% gravel to 12mm; rounded.	SP	Top of Filter Pack	
340					Same as above (335 ft).		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
345					Poorly graded GRAVEL (GP); dry; loose; 95% gravel to 8mm; subangular to subrounded; 5% coarse to very coarse sand.	GP		
350		SB0012	0.2		Well graded SAND with Gravel (SW); light reddish brown (5YR 6/3); 85% sand; 15% gravel to 10mm; angular to rounded.	SW	Bottom of Screen	Blow counts (348-349.5'): 50/Not Recorded. Added 10' of casing @ 1345. Resumed drilling @ 1350.
355					Poorly graded SAND with Gravel (SP); reddish gray (5YR 5/2); dry; loose; 85% medium to very coarse sand; 15% gravel to 18mm; subrounded to rounded.	SP	Bentonite Seal	
360								

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Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
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Date Started: 2/15/2011
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X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); reddish gray (5YR 5/2); dry; loose; 90% medium to very coarse sand; 10% gravel to 20mm; angular to subrounded.	SP		Added 20' of casing @ 1355. Resumed drilling @ 1400.
365					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); dry; very loose; 85% sand; 15% gravel to 10mm; subangular to rounded.	SW		
370					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); moist; loose; 60% sand; 40% gravel to 10mm; subangular to rounded.			
375					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; very loose; 70% medium to coarse sand; 30% gravel to 7mm; subrounded to rounded.	SP	Bentonite Seal	
380					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 100% fine sand.			
385					Well graded SAND (SW); light brown (7.5YR 6/3); dry; loose; 95% sand; 5% gravel to 4mm; subrounded to rounded.	SW		
390								

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X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); light reddish brown (5YR 6/3); dry; loose; 95% fine to medium sand; 5% gravel to 3mm; subrounded.			
395					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 100% fine to coarse sand.			
		SB0013	0.0		Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; dense; 100% medium to coarse sand.			Blow counts (398-399.5'): 6/27/50. Blow counts (399.5-401'): 11/14/50. Added 20' of casing @ 1440.
400		SB0013						
						SP		
405					Same as above (398 ft).		Bentonite Seal	
410					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 97% medium to coarse sand; 3% gravel to 15mm; subrounded to rounded.			
415					Well graded SAND (SW); light reddish brown (5YR 6/4); moist; loose; 95% sand; 5% gravel to 3mm; subangular.	SW		
420								

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Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; loose; 100% fine to coarse sand.	SP		Resumed drilling @ 1500.
425					Silty SAND with Gravel (SM); light reddish brown (5YR 4/4); moist; loose; 50% fine to medium sand; 30% gravel to 30mm; rounded; 20% silt.	SM	Bentonite Seal	
430					Silty SAND (SM); light reddish brown (5YR 4/4); moist; loose; 79% very fine to medium sand; 1% gravel to 40mm; rounded; 20% silt; some obsidian (30-40mm).			
435					Poorly graded SAND (SP); reddish brown (5YR 4/3); moist; loose; 100% very fine to medium sand.	SP	Top of Filter Pack	
440					Same as above (435 ft).		Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Silty SAND (SM); light reddish brown (5YR 4/4); moist; medium dense; 70% fine to medium sand; 30% silt.	SM		
450		SB0014	0.0		Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/3); moist; dense; 75% fine to coarse sand; 20% gravel to	SP		Blow counts (448-449.5'): 16/50. Blow counts (449.5-451'): Not

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X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450		SB0014			15mm; subrounded to rounded; 5% silt.	SP	Bottom of Screen	Recorded.
					Well graded SAND with Gravel (SW); reddish brown (5YR 5/3); moist; medium dense; 85% sand; 15% gravel to 4mm; subangular to rounded. Same as above (452 ft).	SW	Native Backfill	
455								
460								Total depth = 458 ft. Reached @ 1600 on 02/16/11. Water added during drilling (gallons) = 0
465								Water added during construction (gallons) = Not Recorded
470								
475								
480								

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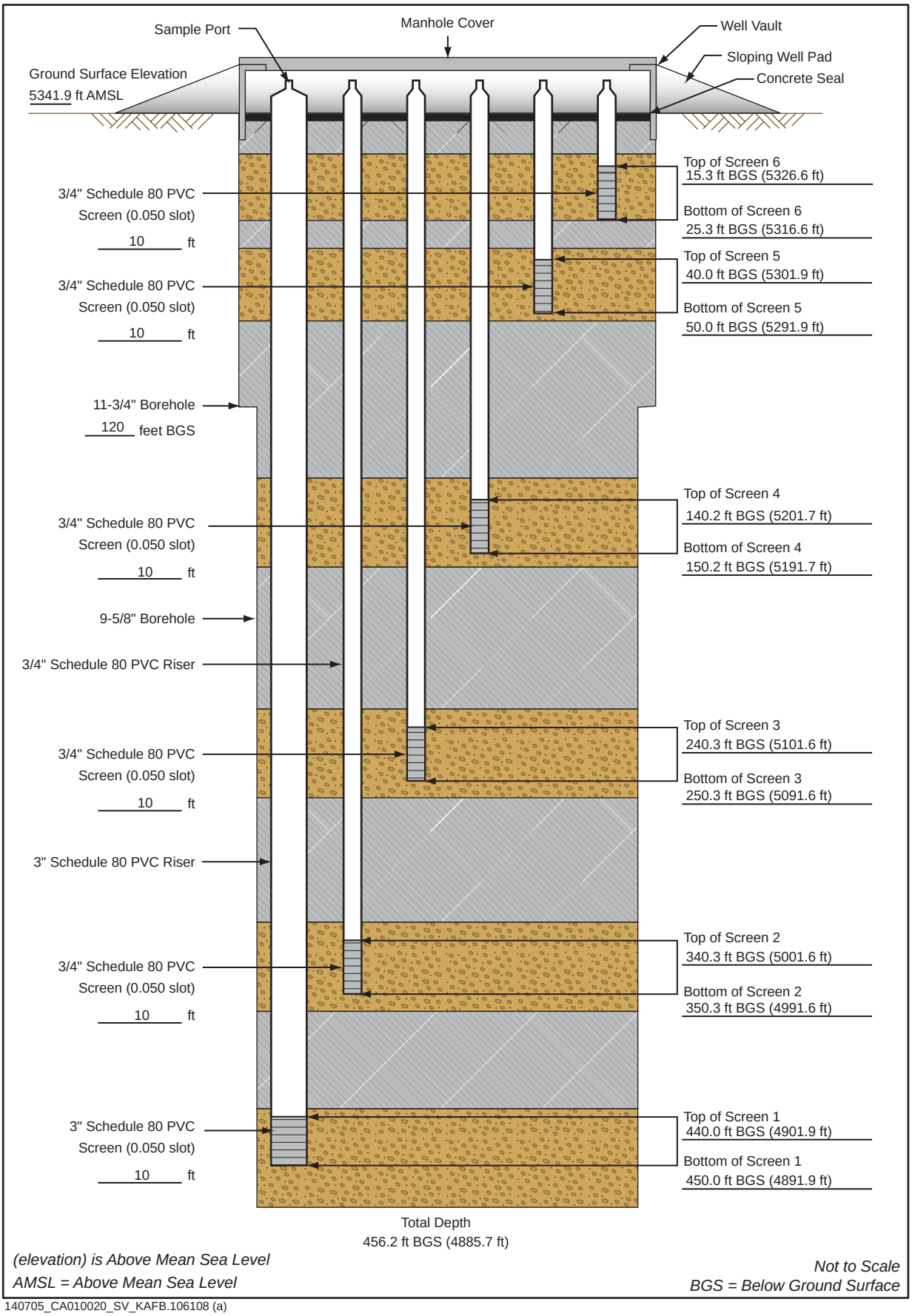
Nested Soil Vapor Well Completion Diagram for KAFB-106108

Installation Start Date/Time: 2/17/2011 @ 10:40
Installation End Date/Time: 2/18/2011 @ 17:15

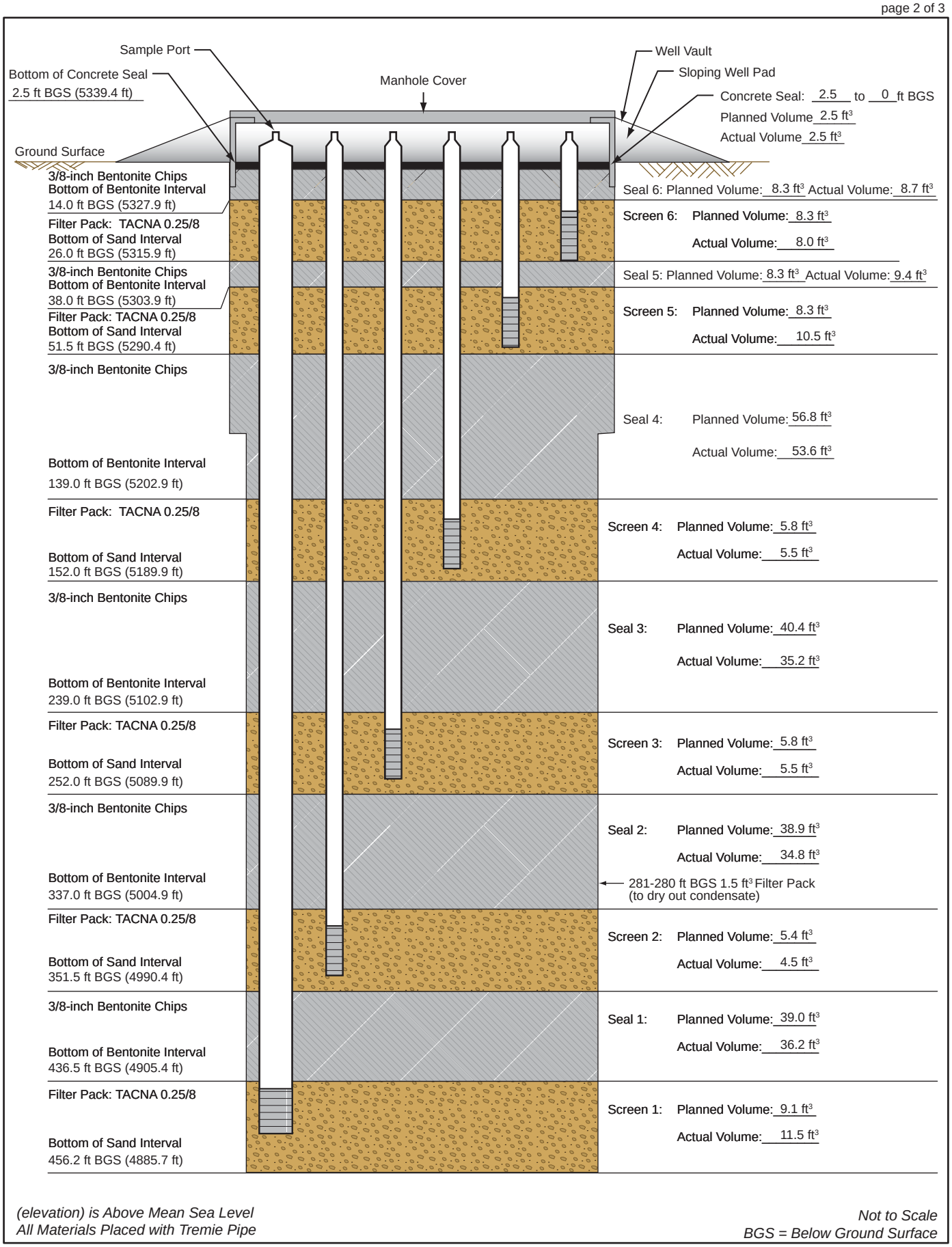


(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

140705_CA010020_SV_KAFB.106108 (a)

Nested Soil Vapor Well Completion Diagram for KAFB-106108



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

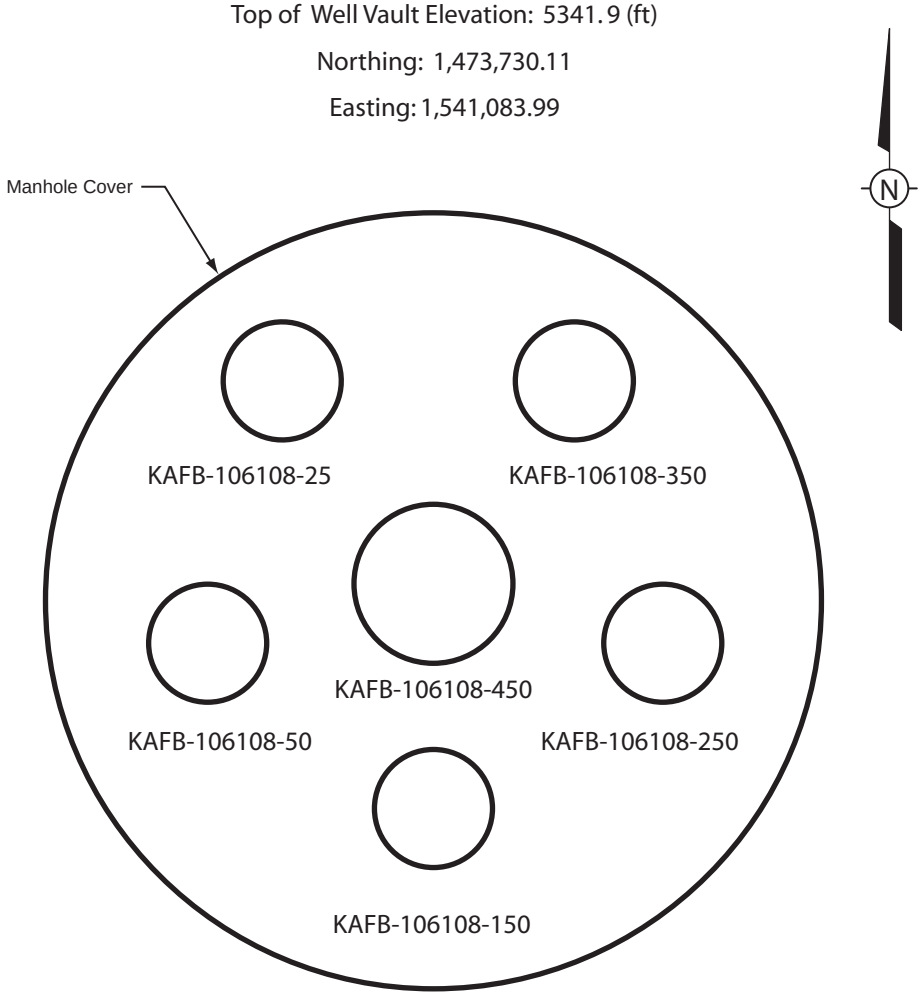
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106108

Top of Well Vault Elevation: 5341.9 (ft)

Northing: 1,473,730.11

Easting: 1,541,083.99



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106108-25	3/4	25.3	15.3 - 25.3	1,473,729.71	1,541,083.87	5341.5
KAFB-106108-50	3/4	50.0	40.0 - 50.0	1,473,729.47	1,541,083.74	5341.5
KAFB-106108-150	3/4	150.2	140.2 - 150.2	1,473,729.28	1,541,083.96	5341.5
KAFB-106108-250	3/4	250.3	240.3 - 250.3	1,473,729.42	1,541,084.21	5341.5
KAFB-106108-350	3/4	350.3	340.3 - 350.3	1,473,729.72	1,541,084.14	5341.5
KAFB-106108-450	3	450.0	440.0 - 450.0	1,473,729.60	1,541,083.99	5341.5

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded; disturbed		Concrete Seal	Hand augered.
5								Began drilling @ 1255 on 1/21/11.
		SB0015	9.4				Bentonite Seal	Blow counts (7-8.5'): 7/38.
10					Silty SAND with Gravel (SM); reddish brown (5YR 5/4); dry; loose; 60% very fine to medium sand; 15% gravel to 7mm; subrounded; 15% silt; low plasticity.			
15					Silty SAND with Gravel (SM); red (5YR 5/6); dry; loose; 55% fine to coarse sand; 15% gravel to 10mm; subrounded; 15% silt; low plasticity.	SM	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20		SB0016	5.3					Blow counts (18.5-20'): 7/12/38.
					Silty SAND with Gravel (SM); red (5YR 5/6); dry; loose; 70% very fine to medium sand; 15% gravel to 7mm; 15% silt; low plasticity.			
25					Clayey SAND (SC); reddish brown (5YR 5/4); moist; loose; 80% fine to medium sand; 20% clay; low to medium plasticity.	SC	Bottom of Screen	
		SB0017	6.8				Bentonite Seal	Blow counts (27-28.5'): Not Recorded.
30								

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND with Gravel (SM); reddish brown (5YR 4/3); moist; loose; 70% fine to medium sand; 15% gravel to 20mm; subangular to subrounded; 15% silt; low plasticity.		Bentonite Seal	
35					Silty SAND with Gravel (SM); yellowish red (5YR 5/6); moist; very loose; 80% fine to medium sand; 15% fine gravel to 4mm; angular to subangular; 15% silt; low plasticity.			Sand line stuck. Stopped @ 37'. Cut and repaired line. Resumed drilling @ 0915 on 01/22/11.
		SB0018	12.9				Top of Filter Pack	Blow counts (37-38.5'): 12/15/30.
40					Same as above (35 ft).	SM	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
45					Silty SAND with Gravel (SM); yellowish red (5YR 5/6); moist; very loose; 60% fine to medium sand; 15% gravel to 6mm; angular to rounded; 15% silt; low plasticity. Note: coarse gravel @ 47-48'.			
		SB0019	2.0					Blow counts (47-48.5'): 12/15/36.
50					Well graded SAND with Silt and Gravel (SW-SM); reddish brown (5YR 4/4); dry; very loose; 75% sand; 15% fine gravel to 8mm; angular to subrounded; 10% silt; nonplastic.	SW-SM	Bottom of Screen	
55					Silty SAND (SM); strong brown (7.5YR 5/6); moist; loose; 75% fine to medium sand; 10% gravel to 7mm; angular to subrounded; 15% silt; nonplastic.	SM	Bentonite Seal	
60								

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); light brown (7.5YR 6/4); moist; very loose; 75% fine to medium sand; 10% gravel; angular to subangular; 15% silt; low plasticity.	SM		
65					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 80% fine to medium sand; 5% gravel to 40mm; subrounded; 15% silt; low plasticity.			
70					Clayey SAND (SC); reddish brown (5YR 4/4); moist; loose; 60% fine to medium sand; 40% clay; low to medium plasticity.	SC		
75					Silty SAND (SM); light reddish brown (5YR 6/4); moist; loose; 60% very fine to fine sand; 5% gravel; 35% silt; low plasticity.	SM	Bentonite Seal	
					Same as above (70 ft).			
80					Silty SAND (SM); yellowish red (5YR 5/6); moist; loose; 70% fine to medium sand; 30% silt; low plasticity.			
85					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 95% medium to coarse sand; 5% fines.	SP		
					Same as above (82 ft).			
90								

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 95% medium to coarse sand; 5% fines.	SP		
95					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 60% fine to medium sand; 10% gravel; 30% silt; low plasticity.	SM		
					Same as above (92 ft); 70% fine to medium sand; 30% silt.			
		SB0020	1.0					Blow counts (97-98.5'): 12/12/31.
100					Silty SAND (SM); brown (7.5YR 5/4); moist; very loose; 60% very fine to fine sand; 40% silt; low plasticity.			Sand line eyelet came off. Stopped drilling. Resumed drilling @ 1130. Cyclone plugged with silt @ 1145. Stopped drilling. Resumed drilling @ 1310. No soil classification due to large chunks of silt coming out of cyclone.
					No cuttings returned.			
105					No cuttings returned.		Bentonite Seal	
110					No cuttings returned.			
115								Visually clean soil from cyclone.
					Lean CLAY with Sand (CL); brown (7.5YR 5/4); moist; loose; medium plasticity; 85% clay; 15% very fine sand.	CL		
120					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 95% fine to medium sand; 5% fines.	SP		

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 95% fine to medium sand; 5% fines.			Resumed drilling @ 0845 on 1/23/11.
					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 85% medium to coarse sand; 15% gravel to 11mm; subangular to subrounded; 5% fines.			
125							Bentonite Seal	
130					Same as above (122 ft).			
					Same as above (122 ft); 15% gravel to 10mm; subangular to subrounded.	SP		
135							Top of Filter Pack	
					Poorly graded SAND wth Gravel (SP); moist; very loose; 80% medium to coarse sand; 20% gravel to 9mm; subangular to subrounded; 5% fines.			
140							Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
145					Same as above (138 ft); 70% sand; 30% gravel.			
		SB0021	0.0		Clayey SAND with Gravel (SC); brown (7.5YR 5/4); moist; medium dense; 60% medium to coarse sand; 15% gravel;	SC		Blow counts (147-148.5'): 12/12/31.
150					subangular to subrounded; 15% clay;	SP		

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					low to medium plasticity. Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 85% medium to coarse sand; 15% gravel; subrounded to rounded; 5% fines.		Bottom of Screen	
155					Same as above (151 ft).			
160					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; very loose; 95% fine to medium sand; 5% fines.	SP		
165					Same as above (160 ft).		Bentonite Seal	
170					Well graded SAND with Gravel (SW); reddish gray (5YR 5/2); dry; very loose; 75% sand; 20% gravel to 20mm; subangular to rounded; 5% fines.			
175					Well graded SAND (SW); reddish gray (5YR 5/2); moist; very loose; 90% sand; 10% fine gravel; angular to subrounded.	SW		
180								

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Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND with Gravel (SW); reddish gray (5YR 5/2); moist; very loose; 70% sand; 30% gravel to 12mm; subangular to subrounded; 5% fines.	SW		
185					Poorly graded SAND (SP); reddish brown (5YR 5/3); 95% medium to coarse sand; 5% gravel to 5mm; 5% fines.	SP		
190					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; very loose; 85% sand; 15% gravel; subrounded to rounded; 5% fines; clasts of volcanic tuff.	SW		
195					Poorly graded SAND with Gravel (SP); brown (10YR 5/3); moist; very loose; 70% medium to coarse sand; 30% gravel to 20mm; subangular to rounded; 5% fines.	SP	Bentonite Seal	
		SB0022	6.1		Poorly graded SAND (SP); light brown (2.5YR 6/4); moist; very loose; 95% medium to coarse sand; 5% fines.			Blow counts (197-198.5'): 5/30/refusal.
200		SB0023	6.1		Silty SAND (SM); brown (7.5YR 5/4); moist; very loose; 85% very fine to medium sand; 15% silt; low to medium plasticity.	SM		Blow counts (198.5-200'): Not Recorded. Blow counts (200-201.5'): Not Recorded.
		SB0023						
205					Clayey SAND (SC); reddish brown (5YR 5/4); moist; loose; 75% very fine to fine sand; 25% clay; low plasticity.	SC		
210					Silty SAND (SM); reddish brown (5YR 5/3); 80% sand; 20% silt.	SM		

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Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Silty SAND (SM); reddish brown (5YR 5/3); 80% sand; 20% silt.	SM		
215					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); moist; very loose; 85% sand; 15% gravel to 6mm; rounded; 5% fines.	SW		
220					Well graded GRAVEL with Sand (GW); pinkish gray (7.5YR 6/2); moist; very loose; 70% gravel to 15mm; subangular to well rounded; 30% medium to coarse sand; 5% fines.	GW	Bentonite Seal	
225					Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; very loose; 90% medium to coarse sand; 10% gravel to 11mm.	SP		
230					Well graded SAND (SW); pinkish gray (5YR 6/2); moist; very loose; 95% sand; 5% gravel.	SW		
235					Same as above (230 ft).			
240					Clayey SAND (SC); light reddish brown (5YR 6/3); moist; loose; 50% very fine to fine sand; 50% clay; medium plasticity.	SC	Top of Filter Pack	

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Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
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Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); pinkish gray (7.5YR 7/2); moist; very loose; 85% fine sand; 15% fines.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
245					Same as above (240 ft); medium to coarse sand.			
					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; very loose; 75% sand; 20% fine gravel to 13mm; subrounded to rounded; 10% fines.	SW		
		SB0024	2.4			SM		Blow counts (247-248.5'): 7/23/42. Description from split spoon sample.
250					Silty SAND (SM); reddish brown (5YR 5/3); moist; firm; 75% very fine to fine sand; 25% silt; low plasticity.		Bottom of Screen	
					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; very loose; 95% fine to medium sand; 5% fines.			
255					Same as above (250 ft).		Bentonite Seal	
260					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 80% medium to coarse sand; 15% fine gravel; angular to rounded.	SP		
265					Same as above (258 ft).		Native Backfill	
270								

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Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 80% medium to coarse sand; 15% fine gravel; angular to rounded.	SP		
275					Poorly graded GRAVEL with Sand (GP); reddish brown (5YR 5/3); moist; very loose; 60% gravel to 10mm; subrounded to rounded; 40% medium to coarse sand.	GP	Native Backfill	
280					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); dry; very loose; 70% sand; 30% gravel to 13mm.	SW	Filter Pack	
285					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 95% fine to coarse sand; 5% gravel.	SP		
290					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); dry; very loose; 70% sand; 30% gravel to 25mm.	SW	Bentonite Seal	
295					Poorly graded SAND (SP); light brown (5YR 6/3); moist; very loose; 90% fine to coarse sand; 10% gravel to 25mm.	SP		
		SB0025	18.0		Poorly graded SAND (SP); brown (5YR 4/4); moist; very loose; 95% medium to coarse sand.			Blow counts (297-298.5'): 17/48/refusal. Blow counts (298.5-300'): Not Recorded.
300		SB0025						

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At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded SAND with Gravel (SP); light brown (5YR 5/3); dry; very loose; 70% medium to coarse sand; 30% gravel to 7mm; subangular to rounded.			
305					Same as above (300 ft).			
310					Poorly graded SAND with Gravel (SP); light brown (5YR 5/3); dry; very loose; 85% medium to coarse sand; 15% gravel to 30mm; subrounded to rounded.			
315					Same as above (308 ft).	SP	Bentonite Seal	
320					Poorly graded SAND (SP); light reddish brown (5YR 6/3); dry; very loose; 95% fine to medium sand; 5% gravel.			
325					Same as above (317 ft).			
330					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 60% medium to coarse sand; 40% gravel to 10mm; subrounded to rounded.			

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/25/11 16:25 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 60% medium to coarse sand; 40% gravel to 10mm; subrounded to rounded. Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); dry; very loose; 60% medium to very coarse sand; 40% gravel to 30mm; subangular to subrounded.	SP	Bentonite Seal; Top of Filter Pack	
335								
340					Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/3); 80% medium to very coarse sand; 20% gravel to 8mm; subrounded to rounded. No cuttings returned.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	No recovery. Blockage in drill system.
345								
350		SB0026 SB0026	0.0		Well graded SAND with Gravel (SW); light reddish brown (5YR 6/3); dry; very loose; 80% sand; 20% gravel to 9mm.	SW	Bottom of Screen	Blow counts (347-348.5'): 7/12/23. Blow counts (348.5-350'): Not Recorded.
355					Well graded GRAVEL with Sand (GW); dry; very loose; 70% gravel to 15mm; angular to subrounded; 30% medium to very coarse sand.	GW	Bentonite Seal	
360					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); dry; very loose; 95% fine to medium sand; 5% fines.	SP		

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Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); dry; very loose; 95% fine to medium sand; 5% fines.			Resumed drilling @ 0820 on 1/24/11.
365					Poorly graded SAND (SP); moist; loose; no gravel.			"Stop Work" called by Shaw and WDC @ 0945.
370					Same as above (365 ft).	SP		
375					Same as above (365 ft).		Bentonite Seal	Samples placed in chip tray but not described. Samples placed in IDW sample bag. "Stop Work" called by Shaw/WDC.
380					Well graded SAND with Gravel (SW); light reddish brown (5YR 6/3); dry; very loose; 85% sand; 15% gravel to 11mm; subangular to subrounded.	SW		Resumed drilling @ 0945 on 02/04/11.
385					Poorly graded GRAVEL with Sand (GP); light reddish brown (5YR 6/3); dry; very loose; 70% gravel to 26mm; angular to subrounded; 30% medium to very coarse sand.	GP		
390								

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Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND with Gravel; brown (7.5YR 5/4); dry; very loose; 85% medium to coarse sand; 15% gravel to 7mm; subangular to subrounded.			
395					Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; very loose; 95% medium sand.			
		SB0027	NR					Could not obtain accurate blow counts from 397-400'. Insufficient volume for headspace measurement.
400		SB0027			Same as above (395 ft).	SP		
405					Same as above (395 ft).		Bentonite Seal	
410					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); dry; very loose; 60% sand; 40% gravel to 20mm; subangular to subrounded.	SW		
415					Same as above (410 ft).			
420					Poorly graded SAND with Silt (SP-SM); light brown (7.5YR 5/4); moist; very loose; 90% very fine to fine sand; 10% silt; nonplastic.	SP-SM		

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Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); reddish brown (5YR 5/4); dry; very loose; 95% sand; 5% fines.	SW		
425					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 95% fine to medium sand.		Bentonite Seal	
430					Same as above (425 ft); very fine to fine sand.			
435					Same as above (425 ft); fine to medium sand; 5% gravel to 11mm; subrounded.	SP	Top of Filter Pack	
440					Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; very loose; 90% fine to medium sand; 10% gravel to 22mm; angular to subrounded.		Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Well graded SAND with Gravel (SW); light gray (7.5YR 7/1); dry; very loose; 60% very fine to coarse sand; 40% gravel to 20mm; angular to subrounded.	SW		
		SB0028	NR					Blow counts (447-448.5'): could not obtain accurate count. Blow counts (448.5-450'): Not
450		SB0028						

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Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); moist; very loose; 85% sand; 15% gravel to 16mm; subangular to subrounded.	SW	Bottom of Screen	Recorded. Insufficient volume for headspace measurement.
455					Silty SAND (SM); reddish brown (5YR 5/3); moist; loose; 70% very fine to fine sand; 30% silt; nonplastic.	SM		
					Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; very loose; 95% very fine to medium sand; 5% fines.	SP		
460								Total depth = 458.2 ft. Reached @ 1630 on 2/4/11.
								Water added during drilling (gallons) = 0
465								Water added during construction (gallons) = Not Recorded
470								
475								
480								

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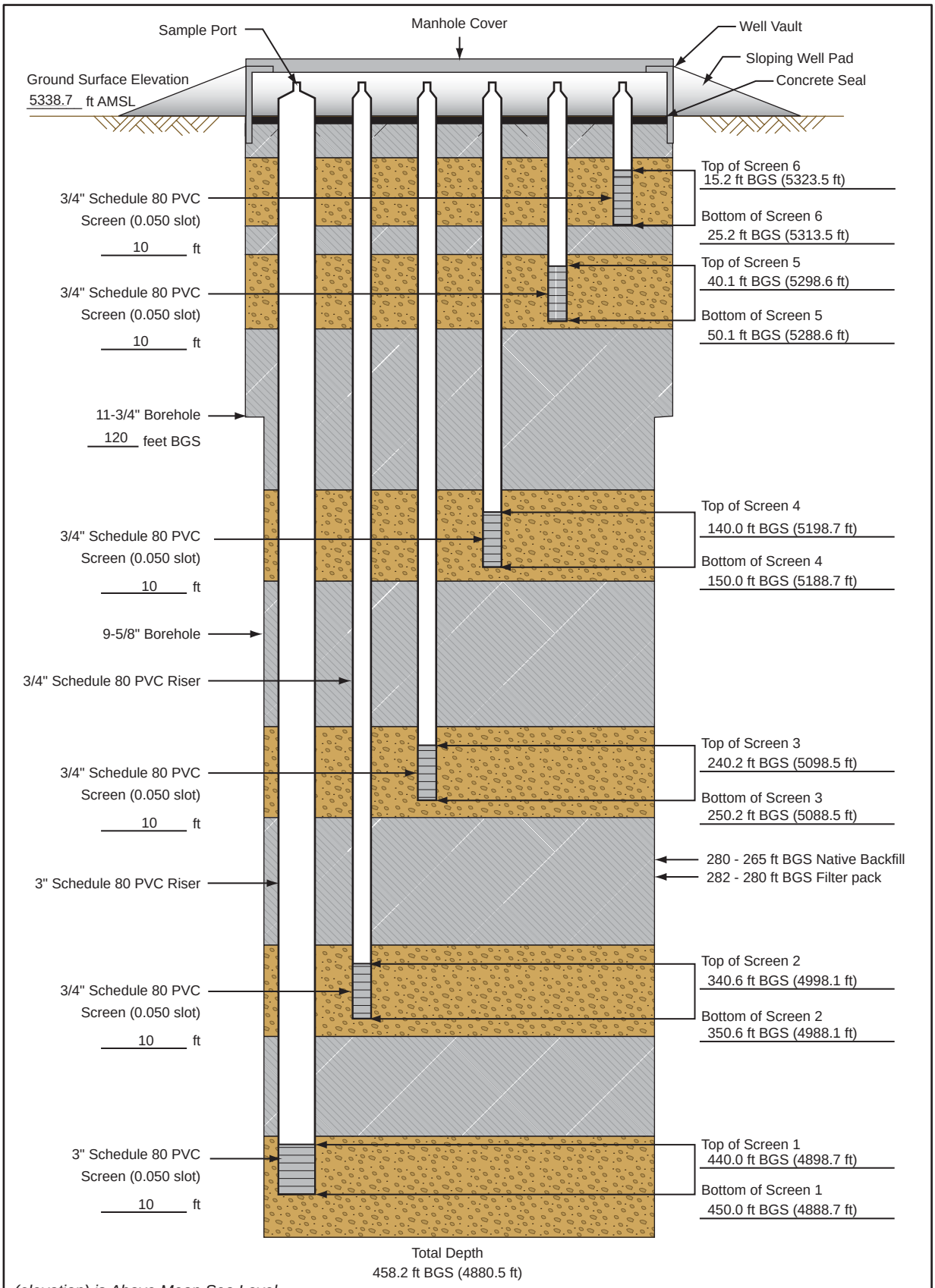
Nested Soil Vapor Well Completion Diagram for KAFB-106109

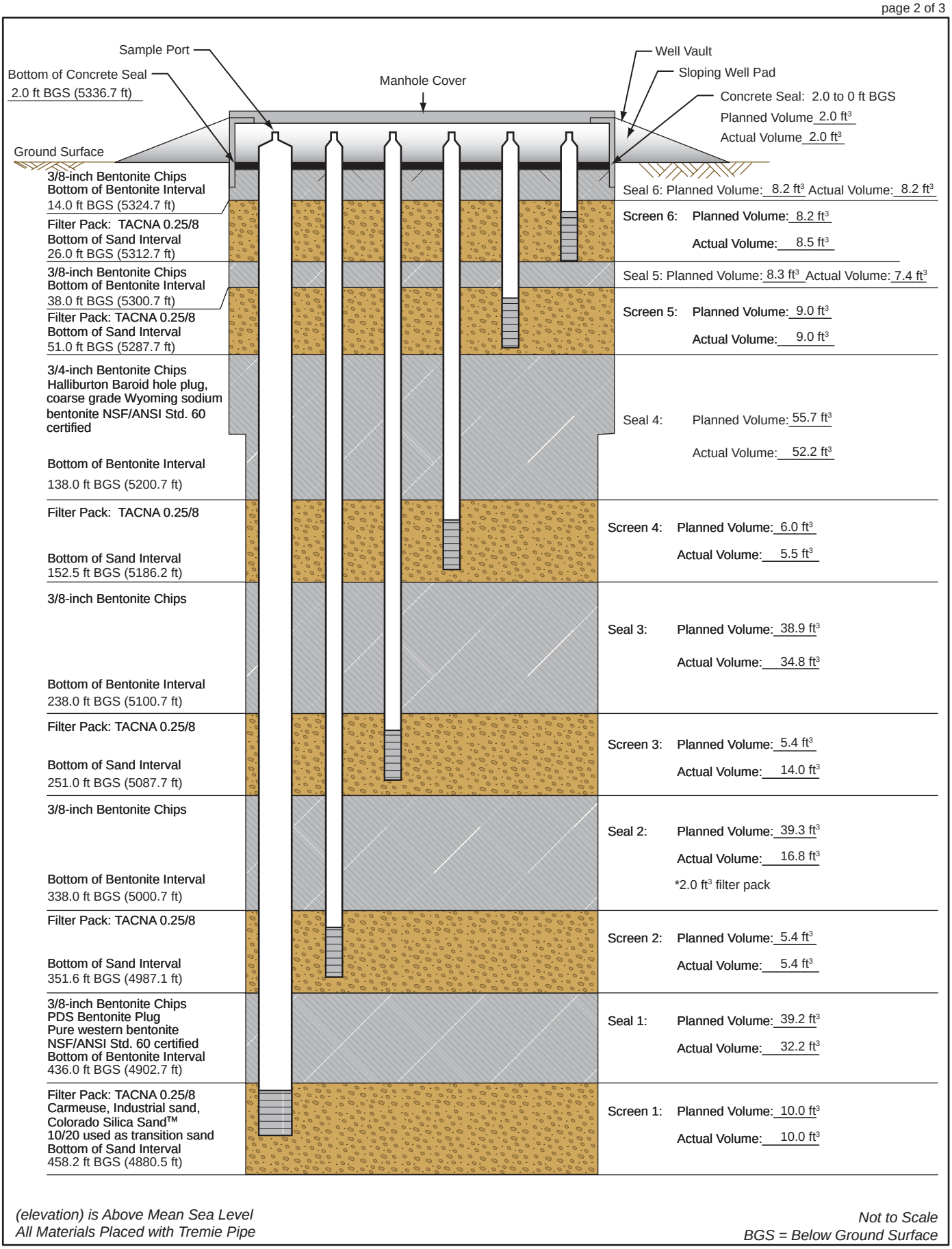
Installation Start Date/Time: 2/7/2011 @ 08:05
Installation End Date/Time: 2/9/2011 @ 15:00



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106109



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

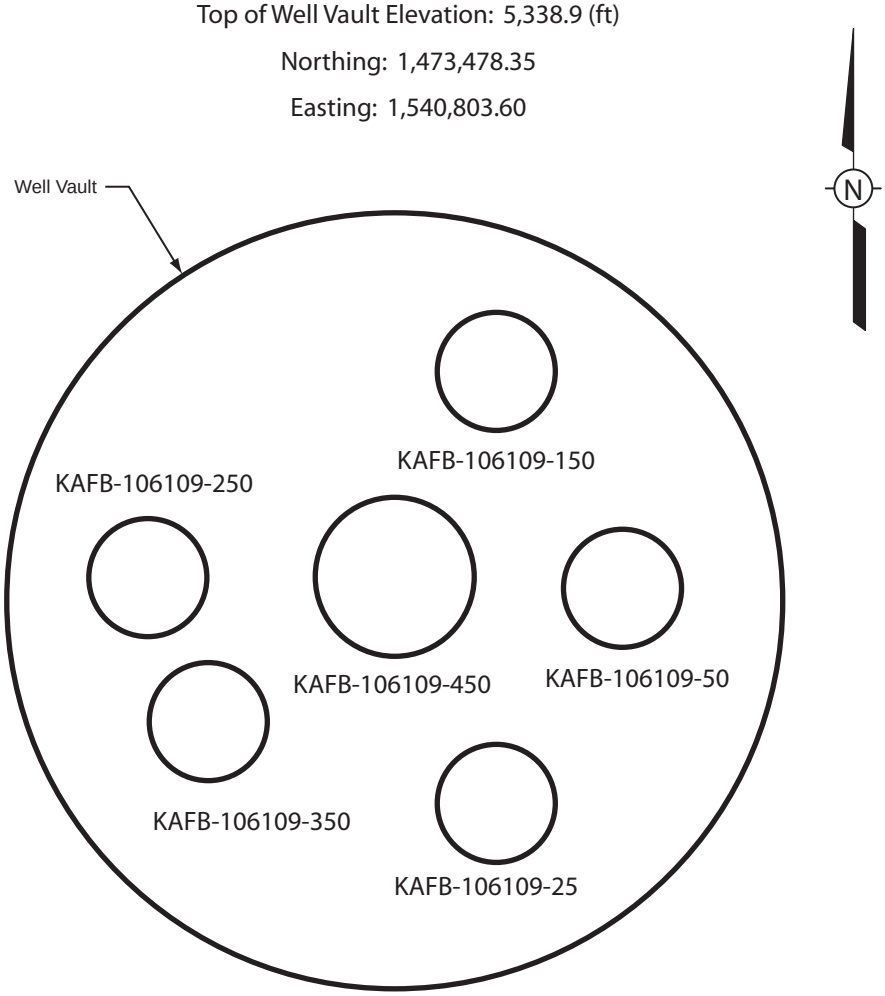
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106109

Top of Well Vault Elevation: 5,338.9 (ft)

Northing: 1,473,478.35

Easting: 1,540,803.60



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106109-25	3/4	25.2	15.2-25.2	1,473,477.62	1,540,803.71	5338.4
KAFB-106109-50	3/4	50.1	40.1-50.1	1,473,477.83	1,540,803.89	5338.3
KAFB-106109-150	3/4	150.0	140.0-150.0	1,473,478.11	1,540,803.71	5338.3
KAFB-106109-250	3/4	250.2	240.2-250.2	1,473,478.02	1,540,803.43	5338.4
KAFB-106109-350	3/4	350.6	340.6-350.6	1,473,477.70	1,540,803.42	5338.4
KAFB-106109-450	3	450.0	440.0-450.0	1,473,477.95	1,540,803.65	5338.4

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded; disturbed.		Concrete Seal	Hand augered.
5					Silty SAND (SM): light reddish brown (5YR 6/4); 60% very fine to fine sand; 40% silt.			Began drilling @ 1435 on 2/19/11.
10		SB0029	0.0		Silty SAND (SM): light reddish brown (5YR 6/4); dry; very dense; 60% very fine to fine sand; 40% silt.		Bentonite Seal	Blow counts (8.0-9.5'): 50/Not Recorded.
15					Silty SAND (SM); reddish brown (2.5YR 5/4); dry; loose; 65% very fine and coarse sand; 5% gravel to 12mm; subrounded to rouded; 30% silt.	SM	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20		SB0030	0.0		Silty SAND (SM); red (2.5YR 5/6); dry; very dense; 70% very fine to medium sand; 30% silt; mottling throughout.			Blow counts (18-19.5'): 50/Not Recorded.
25					Silty SAND (SM); reddish brown (2.5YR 5/3); dry; loose; 55% very fine to fine sand; 45% silt.		Bottom of Screen	
30		SB0031	0.0		Silty SAND (SM); reddish brown (2.5YR 5/3); dry; very dense; 55% very fine to fine sand; 45% silt.		Bentonite Seal	Blow counts (28-29.5'): 50/Not Recorded. Blow counts (29.5-31'): 50/Not

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Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30		SB0031			Silty SAND (SM); reddish brown (2.5YR 5/3); dry; very dense; 55% very fine to fine sand; 45% silt.	SM	Bentonite Seal	Recorded. Blow counts (31-32.5'): 50/Not Recorded. End of 2/19/11. Resumed drilling @ 0810 on 2/20/11.
		SB0032	0.0					
35					Silty SAND (SM); red (2.5YR 5/6); dry; loose; 50% very fine to fine sand; 5% gravel to 8mm; subangular to subrounded; 45% silt.			
40		SB0033	0.0		Silty GRAVEL with Sand (GM): red (2.5YR 5/6); dry; very dense; 40% gravel to 15mm; angular to subrounded; 40% very fine to fine and coarse sand; 20% silt; gravel is coated with caliche.	GM	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Blow counts (38-39.5'): 50/Not Recorded. Blow counts (39.5-41'): 50/Not Recorded. Blow counts (41-42.5'): Not Recorded.
		SB0033						
		SB0033						
45					Silty SAND (SM); red (2.5YR 5/6); dry; loose; 40% very fine to fine sand; 10% very coarse sand; 5% gravel to 8mm; rounded; 45% silt. Same as above (42 ft).	SM		
50		SB0034	0.0		Silty SAND (SM); reddish brown (5YR 5/4); dry; very dense; 55% very fine to fine sand; 45% silt.		Bottom of Screen	Blow counts (48-49.5'): 50/Not Recorded. Blow counts (49.5-51'): 50/Not Recorded. New 10' connection @ 0920. Resumed drilling @ 0925.
		SB0034						
55					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 55% very fine to fine sand; 45% silt.		Bentonite Seal	
60								

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Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); reddish brown (5YR 4/4); dry; loose; 55% very fine to fine sand; 45% silt.			New 10' connection @ 0930. Resumed drilling @ 0950.
65					Silty SAND (SM); reddish brown (5YR 4/4); dry; loose; 52% very fine to fine sand; 3% gravel to 10mm; subrounded to rounded; 45% silt.			New 20' connection @ 0955.
70					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 55% very fine to fine sand; 45% silt.			
75					Same as above (70 ft).	SM	Bentonite Seal	
80					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 70% fine to coarse sand; 30% silt.			Resumed drilling @ 1010.
85					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 60% very fine to fine sand; 40% silt.			
90								

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Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Silty SAND (SM); light reddish brown (5YR 6/3); dry; loose; 60% very fine to fine sand; 10% coarse sand; 30% silt.	SM		
95					Poorly graded SAND with Silt (SP-SM); pinkish gray (5YR 7/2); dry; loose; 85% medium to very coarse sand; 5% gravel to 12mm; angular to subrounded; 10% silt.	SP-SM		
100		SB0035, SB0035-MS	0.9		Poorly graded SAND with Silt (SP-SM); pinkish gray (5YR 7/2); dry; dense; 85% medium to very coarse sand; 5% gravel to 10mm; angular to subrounded; 10% silt; some mottling.			Blow counts (98-99.5'): 38/49/50. Blow counts (99.5-101'): 40/50. New 20' connection @ 1110. Resumed drilling @ 1120.
		SB0035-MSD	0.9					
105					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 55% very fine sand; 45% silt.		Bentonite Seal	
					Same as above (102 ft).			
110					Same as above (102 ft).	SM		
115					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 70% fine to medium sand; 30% silt.			
120								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Clayey SAND (SC); yellowish red (5YR 4/6); moist; loose; 50% very fine to medium sand; 40% clay; 10% silt.	SC		New 20' connection @ 1135. Prepared for 9 5/8" casing. Resumed drilling @ 1545.
125					No cuttings returned.			9 5/8" casing fell through strata too fast.
130					Poory graded SAND with Gravel (SP); light reddish brown (2.5YR 6/3); dry; very loose; 80% very fine to coarse sand; 20% gravel to 30mm; angular to rounded.	SP	Bentonite Seal	
135					No cuttings returned.			9 5/8" casing fell through strata too fast.
140					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 70% fine to medium sand; 30% silt.	SM	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
145					Poorly graded SAND with Silt (SP-SM); pinkish gray (5YR 7/2); moist; very loose; 85% fine to coarse sand; 5% gravel to 20mm; subangular to subrounded; 10% silt.	SP-SM		
150		SB0036	0.0		Silty SAND with Gravel (SM); yellowish red (5YR 4/6); dry; very dense; 65% fine to coarse sand; 15% gravel to 10mm;	SM		Blow counts (148-149.5'): 100/75.

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Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					subangular to subrounded; 20% silt.	SM	Bottom of Screen	New 10' connection @ 1625. Resumed drilling @ 1635.
					Poorly graded SAND (SP); dry; loose; 100% medium to very coarse sand.	SP		
155								
					Poorly graded SAND with Silt (SP-SM); dry; loose; 90% fine to medium sand; 10% silt.	SP-SM		
160					Same as above (156 ft).			New 20' connection @ 1635. Resumed drilling @ 1655.
165					Same as above (156 ft).		Bentonite Seal	
170								
					Well graded SAND with Silt and Gravel (SW-SM); pinkish gray (5YR 6/2); dry; loose; 70% sand; 20% gravel to 7mm; subangular to subrounded; 10% silt.	SW-SM		
175								
					Poorly graded SAND (SP); yellowish red (5YR 5/6); 95% fine to medium sand; 5% silt.	SP		
180								End of 2/20/11.

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 09:23 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND with Silt and Gravel (SW-SM); pinkish gray (7.5YR 6/2); dry; loose; 75% sand; 15% gravel to 15mm; subangular to rounded; 10% silt.	SW-SM		Resumed drilling @ 0800 on 2/21/11.
185					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; very loose; 95% medium to coarse sand; 5% gravel to 10mm; subangular to rounded.	SP		
190					Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/3); moist; very loose; 90% very fine to medium sand; 10% silt; trace 1mm pumice.	SP-SM		
195					Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/3); moist; very loose; 90% very fine to fine sand; 10% silt; trace 2-3mm pumice.		Bentonite Seal	
200		SB0037	0.3		Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/3); moist; dense; 90% very fine to fine sand; 10% silt; trace 2-3mm pumice.			Blow counts (198-199.5'): 35/50. New 20' connection @ 0820. Resumed drilling @ 0840.
205					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; very loose; 90% fine to coarse sand; 10% gravel to 13mm; subangular to rounded.	SP		
210								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 09:23 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Gravel (SP); pinkish gray (5YR 7/2); moist; very loose; 70% medium to coarse sand; 30% gravel to 5mm; subrounded to rounded.	SP		
215					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% medium to fine sand.			
220					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% fine to very coarse sand.		Bentonite Seal	
225					Same as above (220 ft).			
230					Same as above (220 ft); fine to coarse sand.			
235					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/3); moist; very loose; 85% very fine to medium sand; 15% gravel to 33mm; subrounded to rounded.		Top of Filter Pack	
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 09:23 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% fine to coarse sand.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 0905. Resumed drilling @ 0915.
245					Same as above (240 ft).			
		SB0038	0.0		Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; dense; 100% very fine to medium sand; coarse fraction is quatrz and pumice.			Blow counts (248-249.5'): 15/35/50.
250							Bottom of Screen	Stopped drilling @ 1045. Top hammer seal stuck to drill pipe. End of 2/21/11. Resumed drilling @ 0840 on 2/22/11.
						SP		
255					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 95% very fine to medium sand; 5% coarse sand.			
260					Same as above (255 ft).		Bentonite Seal	New 20' connection @ 0850. Resumed drilling @ 0900.
265					Clayey SAND (SC); brown (7.5YR 5/4); moist; loose; 50% fine to medium sand; 30% clay; 20% silt; nonplastic.	SC		
270								

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Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Silty SAND (SM); strong brown (7.5YR 4/6); moist; loose; 80% fine to medium sand; 20% silt.	SM		
275					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/3); moist; loose; 70% fine to coarse sand; 30% gravel to 8mm; subangular to subrounded.	SP		
280					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/3); moist; loose; 85% fine to medium sand; 15% gravel to 4mm; subrounded to rounded.	SP		
285					Poorly graded GRAVEL with Sand (GP); moist; very loose; 70% gravel to 35mm; subangular to subrounded; 30% fine to coarse sand.	GP	Bentonite Seal	
290					Poorly graded SAND with Gravel (SP); pinkish gray (7.5YR 6/2); moist; very loose; 60% medium to coarse sand; 40% gravel to 15mm.	SP		
295					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); moist; very loose; 85% sand; 15% gravel to 7mm; subangular to rounded.	SW		
300		SB0039	0.0		Poorly graded SAND with Gravel (SP); dry; dense; 70% fine to coarse sand; 30% gravel to 40mm; subangular to	SP		Blow counts (298-299.5'): 50/25. Blow counts (299.5-301'): 50/31.

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Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300		SB0039			rounded.	SP		New 20' connection @ 0945.
305					Poorly graded GRAVEL with Sand (GP); reddish brown (5YR 5/4); moist; medium dense; 55% gravel to 35mm; subangular to rounded; 40% medium to coarse sand; 5% silt.	GP		
310					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; medium dense; 60% medium to very coarse sand; 40% gravel to 15mm; subangular to rounded.	SP		
315					Poorly graded GRAVEL with Sand (GP); reddish brown (5YR 5/4); moist; medium dense; 70% gravel to 35mm; subrounded to rounded; 30% medium to coarse sand.	GP	Bentonite Seal	
320					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; loose; 95% medium to coarse sand; 5% gravel to 15mm; subrounded to rounded.	SP		Resumed drilling @ 1015.
325					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); dry; loose; 80% sand; 20% gravel to 10mm; subangular to rounded.	SW		
330								

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Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Silty SAND (SM); brown (7.5YR 5/4); moist; medium dense; 60% medium to coarse sand; 30% silt; 10% clay; nonplastic.	SM	Bentonite Seal	
335					Poorly graded SAND with Silt (SP-SM); reddish yellow (7.5YR 6/6); moist; loose; 90% very fine to medium sand; 10% silt.	SP-SM	Top of Filter Pack	
340					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; loose; 85% fine to coarse sand; 15% gravel to 5mm; angular to subrounded.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
345					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); dry; loose; 60% medium to very coarse sand; 40% gravel to 20mm; subrounded to rounded.			
350		SB0040	0.0		Poorly graded GRAVEL with Sand (GP); dry; medium dense; 85% gravel to 40mm; subrounded to rounded; 15% coarse to very coarse sand.	GP	Bottom of Screen	Blow counts (348-349.5'): 15/30/50. Blow counts (349.5-351'): Not Recorded. New 10' connection @ 1115.
		SB0040						
355					Poorly graded GRAVEL with Sand (GP); dry; loose; 60% gravel to 20mm; angular to rounded; 40% medium to very coarse sand.		Bentonite Seal	
360								

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Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/4); moist; loose; 85% fine to coarse sand; 15% gravel to 12mm; subangular to subrounded.			New 20' connection @ 1140. Resumed drilling @ 1145.
365					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; loose; 95% medium to coarse sand; 5% gravel to 5mm; subangular to rounded.			
370					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/4); moist; loose; 70% fine to very coarse sand; 30% gravel to 20mm; subangular to rounded.			
375					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/3); moist; loose; 55% fine to very coarse sand; 45% gravel to 15mm; subangular to subrounded.	SP	Bentonite Seal	
380					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 90% medium to coarse sand; 10% gravel to 5mm; subrounded to rounded.			New 20' connection @ 1200. Resumed drilling @ 1205.
385					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 95% fine to coarse sand; 5% gravel to 12mm; subrounded to rounded.			
390								

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Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); reddish brown (5YR 3/3); moist; loose; 100% sand.			
395					Same as above (390 ft); increase in coarse fraction.	SW		
		SB0041	0.0		Well graded SAND (SW); reddish brown (5YR 5/3); moist; dense; 100% sand.			Blow counts (398-399.5'): 50/20. Blow counts (399.5-401'): 50/30 New 20' connection @ 1235. Resumed drilling @ 1245.
400		SB0041			Same as above (398 ft).			
405					Poorly graded SAND (SP); reddish gray (5YR 5/2); dry; very loose; 100% very fine to fine sand.	SP	Bentonite Seal	
410					Well graded SAND (SW); reddish brown (5YR 5/3); dry; loose; 100% sand.			
					Same as above (406 ft).			
415					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); moist; medium dense; 80% sand; 20% gravel to 20mm; subangular to rounded.	SW		
420								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 09:23 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 100% fine to medium sand.	SP		New 20' connection @ 1250. Resumed drilling @ 1305.
425					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 85% very fine to fine sand; 15% silt.	SM	Bentonite Seal	
430					Silty SAND (SM); reddish brown (5YR 4/4); moist; medium dense; 55% very fine to fine sand; 30% silt; 15% clay; nonplastic.			
435					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 100% medium sand; trace fine sand. Same as above (432 ft).		Top of Filter Pack	
440					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; medium dense; 100% fine to coarse sand.	SP	Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; medium dense; 100% fine to very coarse sand.			
450		SB0042	0.0		Poorly graded SAND (SP); reddish brown (5YR 4/4); moist; dense; 90% medium to very coarse sand; 10% gravel			Blow counts (448-449.5'): 50/20.

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Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					to 10mm; rounded.		Bottom of Screen	
455					Poorly graded SAND (SP); reddish brown (5YR 4/4); moist; medium dense; 100% fine to coarse sand.	SP		
460								Total Depth = 456.4 ft. Reached @ 1355 on 2/22/11. Water added during drilling (gallons) = 0 Water added during construction (gallons) = Not Recorded
465								
470								
475								
480								

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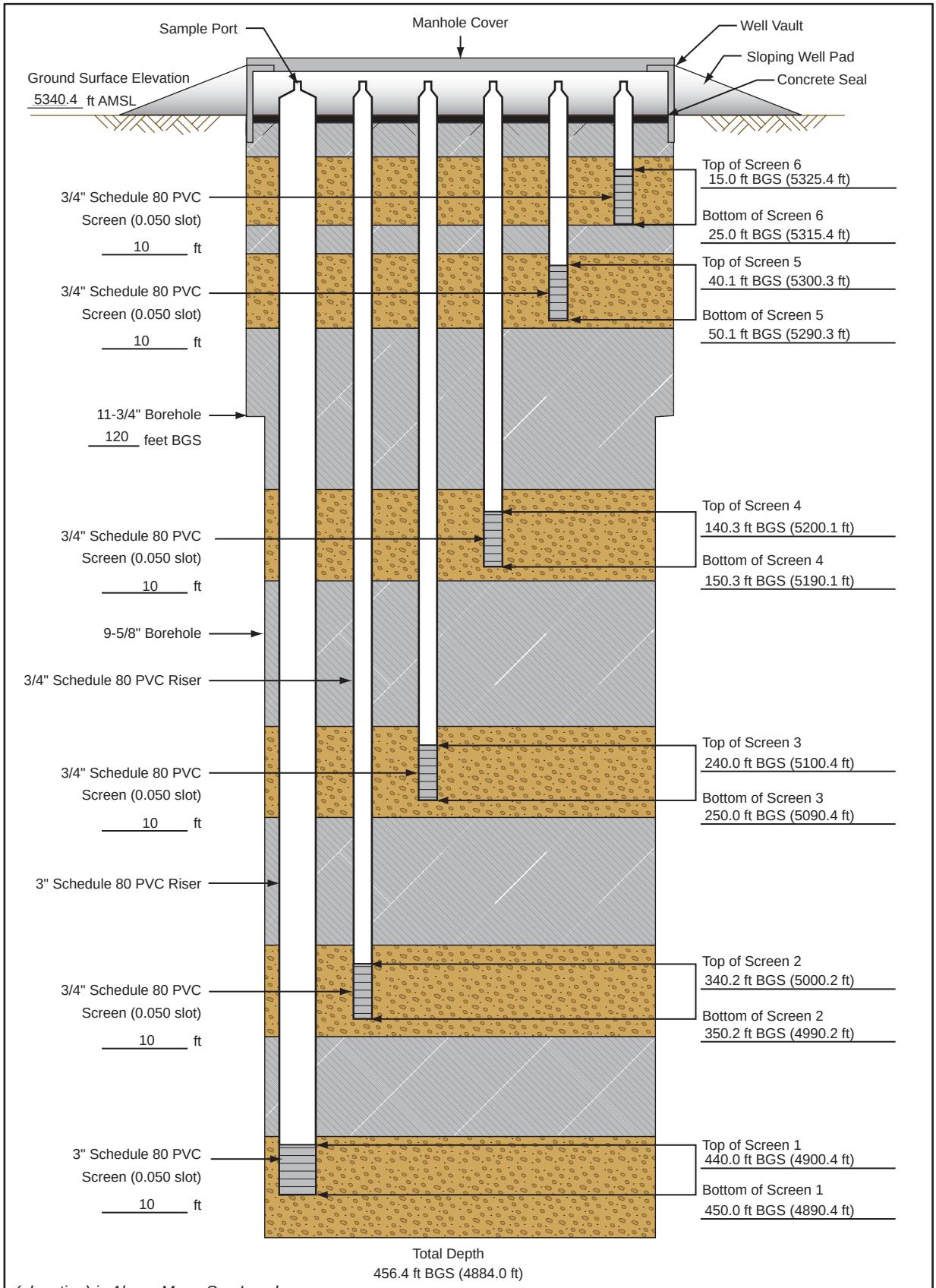
Nested Soil Vapor Well Completion Diagram for KAFB-106110

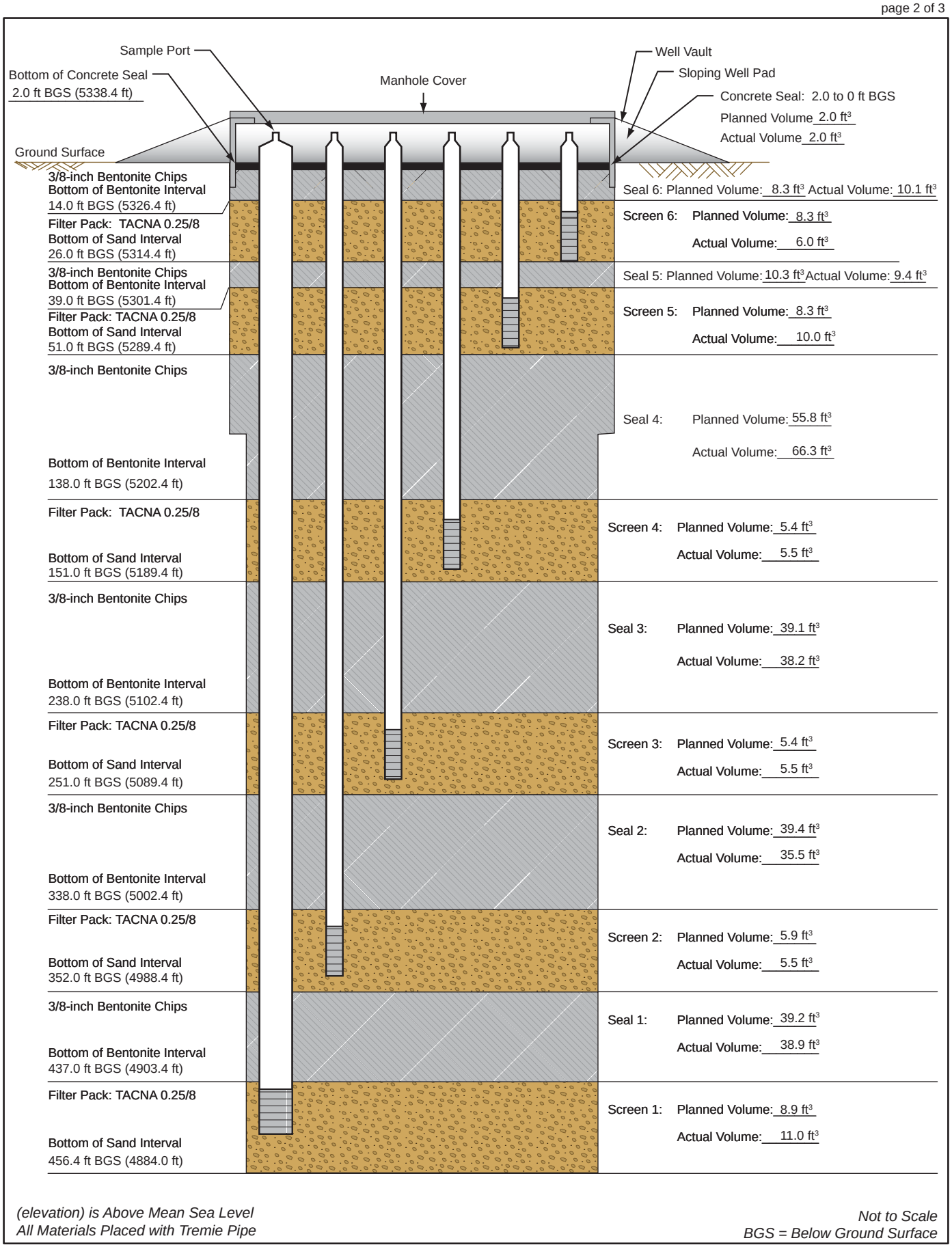
Installation Start Date/Time: 2/23/2011 @ 08:25
Installation End Date/Time: 2/24/2011 @ 14:50



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106110



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

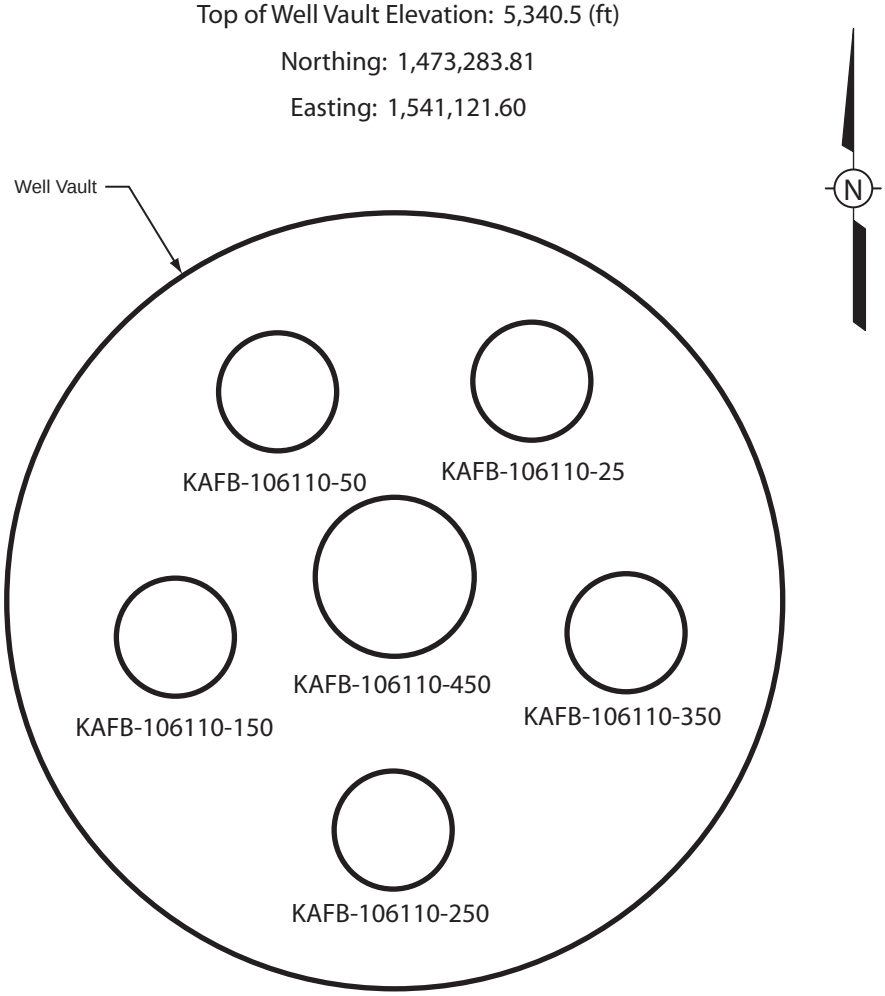
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106110

Top of Well Vault Elevation: 5,340.5 (ft)

Northing: 1,473,283.81

Easting: 1,541,121.60



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106110-25	3/4	25.0	15.0 - 25.0	1,473,283.48	1,541,121.58	5340.1
KAFB-106110-50	3/4	50.1	40.1 - 50.1	1,473,283.26	1,541,121.34	5340.1
KAFB-106110-150	3/4	150.3	140.3 - 150.3	1,473,283.02	1,541,121.49	5340.1
KAFB-106110-250	3/4	250.0	240.0 - 250.0	1,473,283.07	1,541,121.75	5340.1
KAFB-106110-350	3/4	350.2	340.2 - 350.2	1,473,283.35	1,541,121.80	5340.1
KAFB-106110-450	3	450.0	440.0 - 450.0	1,473,283.34	1,541,121.58	5340.1

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded; disturbed.		Concrete Seal	Hand augered.
5					Silty SAND (SM); light reddish brown (2.5YR 6/4); dry; loose; 55% very fine to fine sand; 5% very coarse sand; 10% gravel to 4mm; subrounded; 30% silt.			Began drilling @ 1220 on 3/1/11.
		SB0043	0.0				Bentonite Seal	Blow counts (7-8.5'): 75/Not Recorded. Blow counts (8.5-10'): 100/Not Recorded. Blow counts (10-11.5'): Not Recorded.
10		SB0044	0.0		Silty SAND (SM); reddish brown (2.5YR 4/4); dry; very dense; 55% very fine to fine sand; 5% gravel to 4mm; subrounded to rounded; 40% silt; mottling throughout. Note: small piece of wood (10mm) in split spoon sample.			
		SB0044					Top of Filter Pack	
15					Silty SAND (SM); reddish brown (2.5YR 4/4); dry; medium dense; 50% very fine to fine sand; 5% coarse sand; 45% silt.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
		SB0045	0.0			SM		Blow counts (17-18.5'): 100/Not Recorded. Blow counts (18.5-20'): 100/Not Recorded. Petroleum odor @ 18'.
20		SB0045			Silty SAND (SM); light reddish brown (2.5YR 7/3); dry; very dense; 55% very fine to fine sand; 5% very coarse sand; 40% silt; very mottled throughout.			
25					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; medium dense; 55% very fine to fine sand; 45% silt.		Bottom of Screen	
		SB0046 SB0046-MS	0.0				Bentonite Seal	Blow counts (27-28.5'): 50/35/20. Blow counts (28.5-30'): 50/25/15.
30		SB0046-MSD	0.0					

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 10:30 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; medium dense; 55% very fine to fine sand; 45% silt.			New 10' connection @ 1440. Resumed drilling @ 1448.
35					Silty SAND (SM); reddish brown (2.5YR 5/4); moist; medium dense; 55% very fine to fine sand; trace gravel; 35% silt; 10% clay; nonplastic; some mottling.		Bentonite Seal	
	X	SB0047	0.0					Blow counts (37-38.5'): 20/30/50.
40					Silty SAND (SM); reddish brown (2.5YR 5/4); dry; medium dense; 60% very fine to fine sand; trace gravel to 4mm; rounded; 40% silt; mottling throughout.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 1505. Resumed drilling @ 1515.
45					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; medium dense; 65% very fine to fine and coarse sand; 5% gravel to 3mm; rounded; 30% silt; mica flakes throughout.	SM		
	X	SB0048	0.0					Blow counts (47-48.5'): 20/30/50.
50					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; medium dense; 70% very fine to fine sand; trace gravel; 30% silt.		Bottom of Screen	New 10' connection @ 1530. Resumed drilling @ 1540.
55					Silty SAND with Gravel (SM); reddish brown (2.5YR 4/3); moist; loose; 60% very fine to fine sand; 15% gravel to 15mm; subangular to subrounded; 25% silt.		Bentonite Seal	
60								

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; loose; 60% very fine to fine sand; 40% silt.			New 20' connection @ 1545. Resumed drilling @ 1550.
65					Same as above (60 ft).			
70					Same as above (60 ft).			
75					Silty SAND (SM); reddish brown (2.5YR 5/4); moist; loose; 85% fine sand; 15% silt.	SM	Bentonite Seal	
80					Silty SAND (SM); yellowish red (5YR 5/6); moist; loose; 85% very fine to fine sand; 15% silt.			New 20' connection @ 1605.
85					Silty SAND (SM); yellowish red (5YR 5/6); moist; loose; 80% fine sand; 3% gravel to 20mm; subrounded to rounded; 17% silt.			
90								

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; loose; 97% fine to medium sand; 3% gravel to 15mm; subrounded to rounded.			
95					Poorly graded SAND (SP); pinkish gray (5YR 7/2); dry; loose; 100% very fine to medium sand.			
	X	SB0049	0.9					Blow counts (97-98.5'): 30/50.
100					Poorly graded SAND (SP); pinkish gray (5YR 7/2); dry; dense; 100% very fine to medium sand. Note: split spoon contained 2" section of cemented sand.			Resumed drilling @ 1645.
105					Poorly graded SAND (SP); pinkish gray (5YR 7/2); dry; loose; 100% very fine to medium sand. Note: fragments of cemented very fine sand and silt.	SP	Bentonite Seal	
110					Poorly graded SAND with Gravel (SP); moist; loose; 60% fine and coarse to very coarse sand; 40% gravel to 20mm; angular to subrounded.			
115					Poorly graded SAND (SP); moist; loose; 100% very fine to fine sand.			
120								

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; loose; 60% very fine to fine sand; 40% silt.	SM		End of 3/1/11 @ 1645. Resumed drilling @ 1010 on 3/2/11, advancing with 9-5/8" casing.
125					Silty SAND (SM); reddish brown (5YR 5/3); moist; loose; 55% very fine to fine sand; 35% silt; 10% clay; nonplastic.			
130					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 100% medium to coarse sand.	SP	Bentonite Seal	
135					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% medium to very coarse sand.		Top of Filter Pack	
140					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/4); moist; very loose; 85% fine to coarse sand; 15% gravel to 4mm; subrounded.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 1020.
145					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% fine to coarse sand.			
	X	SB0050	0.0					Blow counts (147-148.5'): 50/30/20. Blow counts (148.5-150'): Not Recorded.
150	X	SB0050			Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); moist; dense; 85% medium to very coarse sand; 15%			

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
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Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					gravel to 10mm; angular to rounded. Note: split spoon contained cemented fragments to 45mm.	SP	Bottom of Screen	
155					Poorly graded GRAVEL with Sand (GP); moist; very loose; 70% gravel to 35mm; subrounded to rounded; 30% medium to very coarse sand.	GP		
160					Poorly graded SAND (SP); pinkish gray (5YR 7/2); moist; very loose; 90% medium to very coarse sand; 10% gravel to 10mm; subrounded to rounded.			
					Same as above (156 ft).			New 20' connection @ 1105.
165					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; very loose; 95% fine to medium sand; 5% gravel to 4mm; subangular to subrounded.	SP	Bentonite Seal	
170					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 90% fine to coarse sand; 10% gravel to 4mm; subrounded.			
175					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 90% fine to medium sand; 10% gravel to 4mm; subrounded.			
180								

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 85% fine to medium sand; 15% gravel to 10mm; subangular to subrounded.	SP		New 20' connection @ 1120. Resumed drilling @ 1125.
185					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 80% medium to very coarse sand; 20% gravel to 10mm; subangular to rounded.			
190					No cuttings returned; casing fell too fast to collect sample.			
195					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 60% medium to very coarse sand; 40% gravel to 7mm; subangular to rounded.	SP	Bentonite Seal	
		SB0051	0.0					Blow counts (197-198.5'): 50/50.
200					Poorly graded GRAVEL with Sand (GP); moist; very dense; 60% gravel to 30mm; subrounded to rounded; 40% medium to coarse sand.	GP		New 20' connection @ 1140. Resumed drilling @ 1220.
205					Clayey SAND (SC); light yellowish brown (2.5YR 6/3); moist; medium dense; 80% fine to medium sand; 15% clay; 5% silt.	SC		
210								

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Gravel (SP); yellowish brown (10YR 5/4); moist; very loose; 85% fine to coarse sand; 15% gravel to 20mm; subrounded to rounded.			
215					Poorly graded SAND with Gravel (SP); light brownish gray (10YR 6/2); moist; very loose; 70% sand; 30% gravel to 15mm; subangular.			
220					Poorly graded SAND with Gravel (SP); light brownish gray (10YR 6/2); moist; very loose; 85% fine to coarse sand; 15% gravel to 4mm; subangular to rounded; gravel is pumice.	SP	Bentonite Seal	New 20' connection @ 1225. Resumed drilling @ 1235.
225					Poorly graded SAND with Gravel (SP); light brownish gray (10YR 6/2); moist; very loose; 85% fine to coarse sand; 15% gravel to 15mm; angular to subrounded; gravel is pumice.			
230					Well graded SAND with Gravel (SW); light gray (7.5YR 7/1); moist; very loose; 60% sand; 40% gravel to 20mm; subangular to subrounded.			
235					Well graded SAND with Gravel (SW); light brownish gray (10YR 6/2); moist; very loose; 60% sand; 40% gravel to 20mm; subangular to rounded.	SW	Top of Filter Pack	
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 10:30 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND with Gravel (SW); light brownish gray (10YR 6/2); dry; very loose; 75% sand; 25% gravel to 15mm; subangular to rounded.	SW	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 1240. Resumed drilling @ 1250.
245					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); dry; very loose; 80% sand; 20% gravel to 7mm; subangular to rounded; pumice present.			
		SB0052	0.7					Blow counts (247-248.5'): 50/Not Recorded. Blow counts (248.5-250'): 60/Not Recorded.
250		SB0052			Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; very dense; 100% very fine to medium sand; trace gravel.	SP	Bottom of Screen	New 10' connection @ 1315.
255					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); moist; very loose; 100% fine to medium sand; coarse pumice fragments.			
260					Silty SAND (SM); reddish brown (5YR 5/4); moist; medium dense; 60% very fine to medium sand; 40% silt.	SM	Bentonite Seal	New 20' connection @ 1335. Resumed drilling @ 1340.
265					Same as above (258 ft).			
270								

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
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Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
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Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Clayey SAND (SC); brown (7.5YR 4/4); moist; medium dense; 60% fine to medium sand; 20% clay; 20% silt; nonplastic.	SC		
275					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; loose; 100% medium to very coarse sand.	SP		
280					Well graded SAND (SW); dry; loose; 95% sand; 5% gravel to 5mm; subangular to rounded.	SW		New 20' connection @ 1350. Resumed drilling @ 1400.
285					Poorly graded GRAVEL with Sand (GP); dry; medium dense; 60% gravel to 15mm; subangular to subrounded; 40% medium to very coarse sand.	GP	Bentonite Seal	
290					Poorly graded GRAVEL with Sand (GP); dry; medium dense; 50% gravel to 15mm; subangular to subrounded; 45% fine to very coarse sand; 5% silt.	GP		
295					Well graded SAND with Gravel (SW); moist; medium dense; 60% sand; 40% gravel to 35mm; subrounded to rounded.	SW		
	X	SB0053	0.0					Blow counts (297-298.5'): 60/Not Recorded. Blow counts (298.5-300'): 67/Not Recorded.
300	X	SB0053			Poorly graded GRAVEL (GP); dry; very dense; 90% gravel to 25mm; angular to rounded; 10% medium to very coarse	GP		

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					sand.			New 20' connection @ 1430. Resumed drilling @ 1435.
305					Poorly graded GRAVEL with Sand (GP); dry; medium dense; 55% gravel to 25mm; subangular to rounded; 45% coarse to very coarse sand.	GP		
310					Well graded SAND with Gravel (SW); light reddish brown (5YR 6/4); moist; medium dense; 60% sand; 40% gravel to 12mm; subrounded to rounded.	SW		
315					Poorly graded GRAVEL with Sand (GP); pale brown (10YR 6/3); moist; medium dense; 70% gravel to 30mm; subrounded to rounded; 30% medium to coarse sand.	GP	Bentonite Seal	
320					Well graded SAND with Gravel (SW); pale brown (10YR 6/3); moist; medium dense; 80% sand; 20% gravel to 10mm; subangular to subrounded.	SW		New 20' connection @ 1445. Resumed drilling @ 1450.
325					Poorly graded SAND (SP); pinkish gray (5YR 6/2); dry; loose; 95% medium to coarse sand; 5% gravel to 4mm; subangular to subrounded.	SP		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 10:30 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

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Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; loose; 80% sand; 20% gravel to 4mm; angular to subrounded.	SW	Bentonite Seal	
335					Well graded SAND with Clay and Gravel (SW-SC); brown (7.5YR 5/3); moist; loose; 70% sand; 20% gravel to 35mm; angular to rounded; 10% clay.	SW-SC	Top of Filter Pack	
340					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 95% fine to medium sand; 5% gravel to 10mm; subangular to rounded.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 1455. Resumed drilling @ 1505.
345					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; medium dense; 60% sand; 40% gravel to 20mm; angular to rounded.	SW		
		SB0054	0.0					Blow counts (347-348.5'): 50/Not Recorded.
350					Poorly graded SAND with Gravel (SP); dry; dense; 85% medium to coarse sand; 15% gravel to 20mm; angular to rounded.	SP	Bottom of Screen	New 10' connection @ 1525.
355					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); moist; loose; 85% sand; 15% gravel to 30mm; angular to rounded.	SW	Bentonite Seal	
360								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 10:30 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND with Gravel (SP); light brown (7.5YR 6/3); moist; loose; 85% fine to very coarse sand; 15% gravel to 25mm; angular to rounded.	SP		New 20' connection @ 1525. Resumed drilling @ 1545.
365					Well graded SAND (SW); pinkish gray (5YR 6/2); dry; loose; 95% sand; 5% gravel to 15mm; subangular to rounded.			
370					Well graded SAND with Gravel (SW); pinkish gray (5YR 6/2); moist; loose; 85% sand; 15% gravel to 50mm; subangular to rounded.			
375					Well graded SAND (SW); pinkish gray (5YR 6/2); moist; loose; 95% sand; 5% gravel to 15mm; subangular to rounded.	SW	Bentonite Seal	
380					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); moist; loose; 70% sand; 30% gravel to 20mm; subangular to rounded.			New 20' connection @ 1550. Resumed drilling @ 1600.
385					Well graded SAND with Gravel (SW); dry; dense; 85% sand; 15% gravel to 10mm; angular to rounded.			
390								

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense; 100% medium sand.	SP		
					Silty SAND (SM); light brown (7.5YR 6/4); dry; dense; 50% very fine to medium sand; 5% gravel to 5mm; subrounded to rounded; 35% silt; 10% clay; nonplastic.	SM		
395					Clayey SAND (SC); light gray (10YR 7/1); moist; dense; 55% very fine to fine sand; 35% clay; 10% silt; low plasticity.	SC		
		SB0055	0.0					Blow counts (397-398.5'): 50/40. Blow counts (398.5-400'): 50/40.
400		SB0056	0.0		Poorly graded SAND (SP); light reddish brown (5YR 6/4); dry; dense; 100% fine to coarse sand.			Resumed drilling @ 1650.
405					Same as above (398 ft).		Bentonite Seal	
410					Same as above (398 ft).	SP		
415					Same as above (398 ft).			
420								

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Silty SAND (SM); brown (7.5YR 5/4); moist; medium dense; 60% very fine to medium sand; 40% silt.			New 20' connection @ 1655.
425					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 60% very fine to medium sand; 40% silt.	SM	Bentonite Seal	
430					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 60% very fine to medium sand; trace gravel to 40mm; 25% silt; 15% clay; nonplastic.			
435					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 95% very fine to medium sand; trace gravel to 30mm; 5% silt.		Top of Filter Pack	
440					Same as above (435 ft).	SP	Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 100% very fine to medium sand.			End of 3/2/11. Resumed drilling @ 0755 on 3/3/11.
		SB0057	0.0					Blow count (447-448.5'): 50/45.
450					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); moist; dense; 100% fine to medium sand.			

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Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); moist; dense; 100% fine to medium sand.	SP	Bottom of Screen	New 10' connection @ 0810. Resumed drilling @ 0815.
455					Same as above (450 ft).		Bottom of Filter Pack	
460					Well graded SAND (SW); brown (7.5YR 4/3); moist; medium dense; 100% sand.	SW	Native Backfill	Total depth = 460 ft. Reached @ 0820 on 3/3/11.
465								Water added during drilling (gallons) = 0
470								Water added during construction (gallons) = 320
475								
480								

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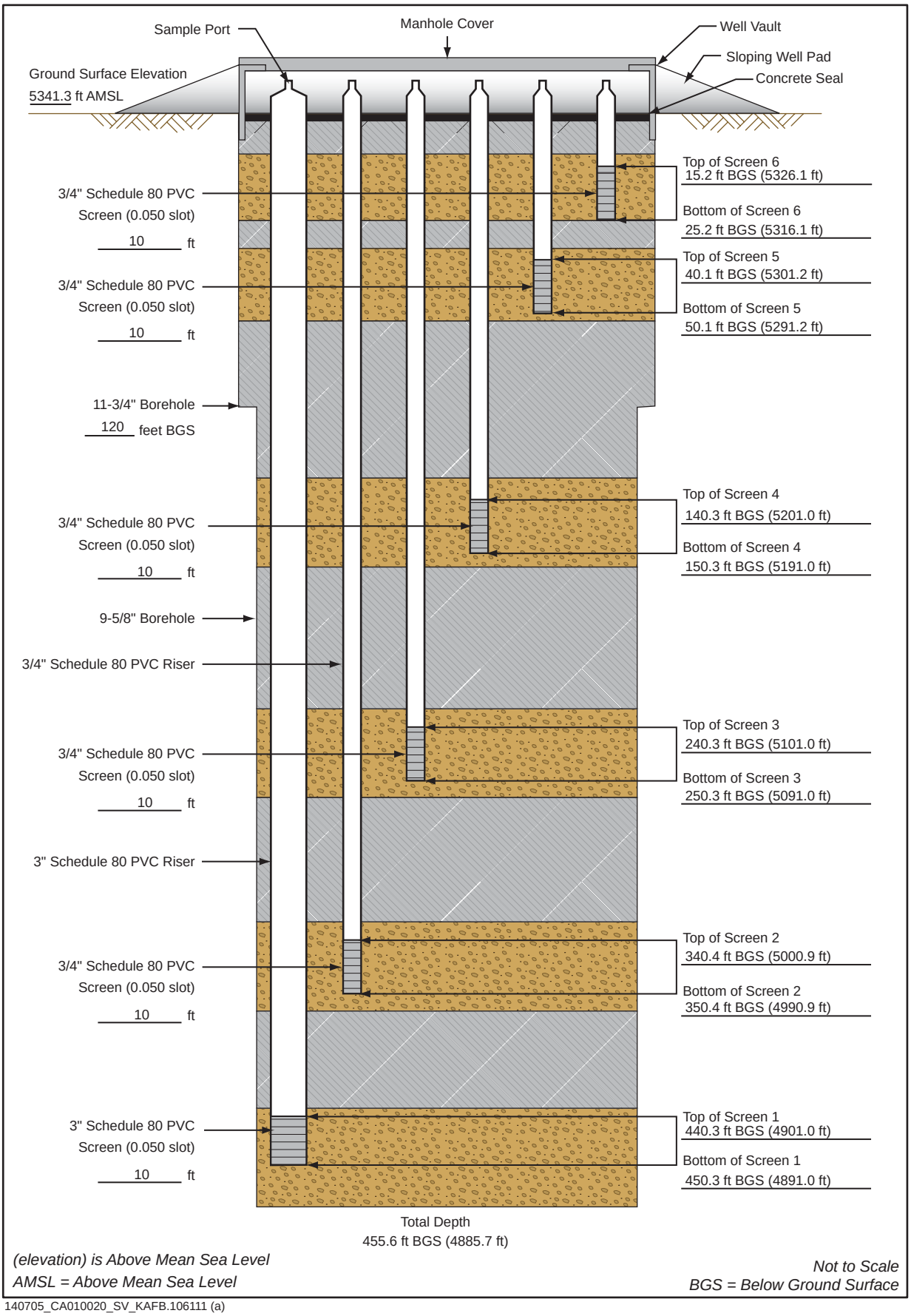
Nested Soil Vapor Well Completion Diagram for KAFB-106111

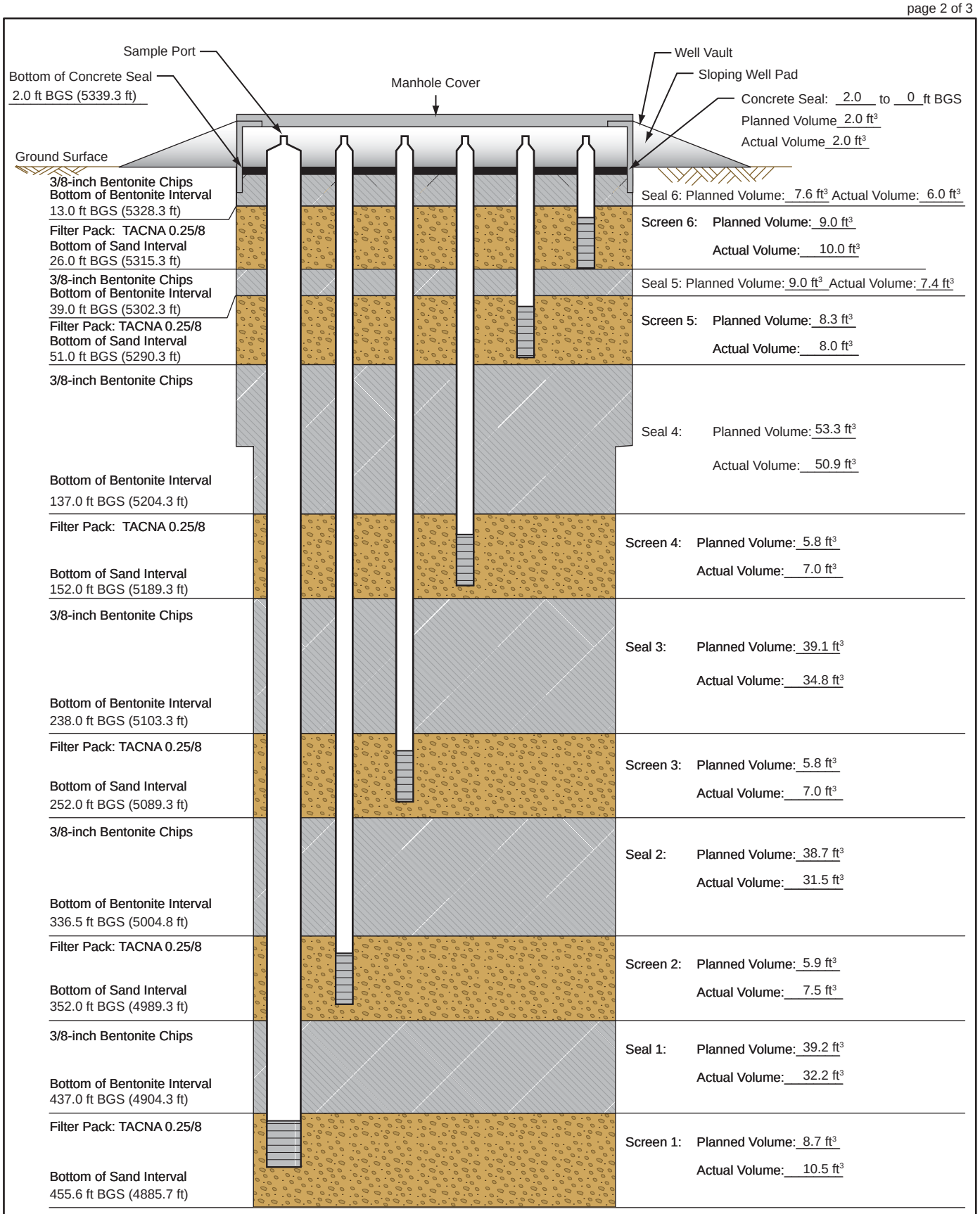
Installation Start Date/Time: 3/3/2011 @ 10:35
Installation End Date/Time: 3/4/2011 @ 16:25



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106111



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

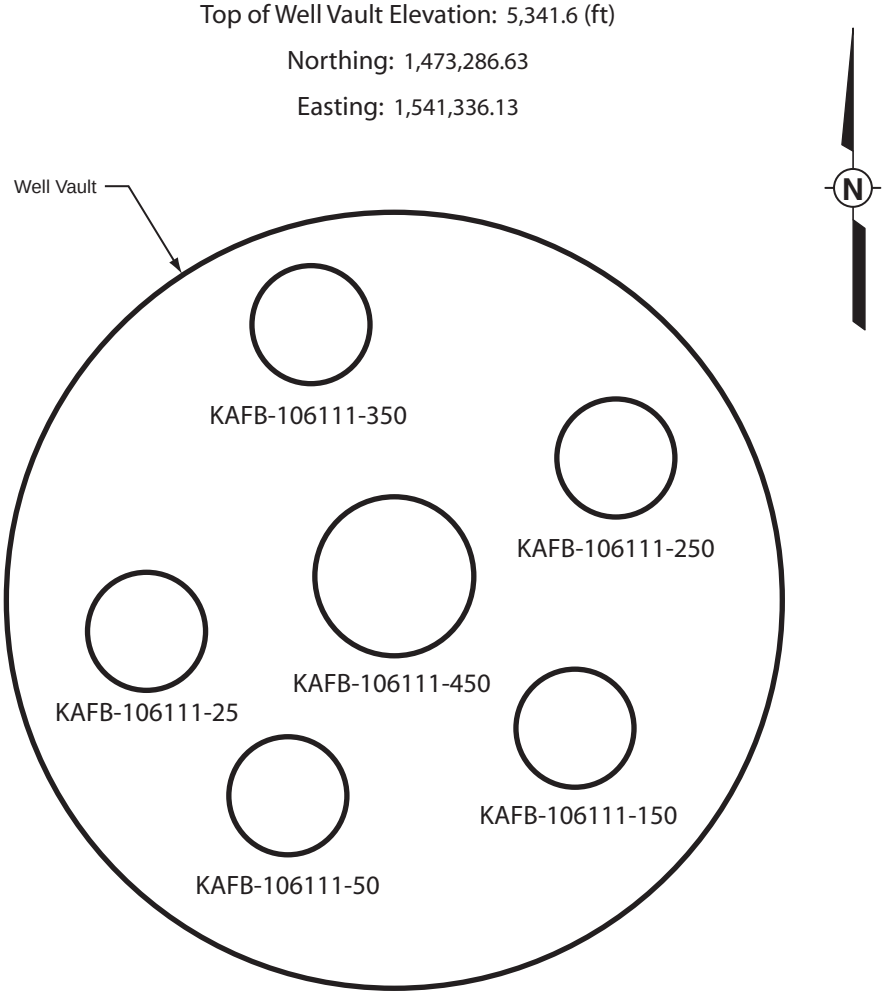
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106111

Top of Well Vault Elevation: 5,341.6 (ft)

Northing: 1,473,286.63

Easting: 1,541,336.13



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106111-25	3/4	25.2	15.2 - 25.2	1,473,286.17	1,541,335.96	5341.0
KAFB-106111-50	3/4	50.1	40.1 - 50.1	1,473,285.95	1,541,336.14	5341.1
KAFB-106111-150	3/4	150.3	140.3 - 150.3	1,473,286.06	1,541,336.40	5341.1
KAFB-106111-250	3/4	250.3	240.3 - 250.3	1,473,286.32	1,541,336.38	5341.1
KAFB-106111-350	3/4	350.4	340.4 - 350.4	1,473,286.40	1,541,336.08	5341.1
KAFB-106111-450	3	450.3	440.3 - 450.3	1,473,286.30	1,541,336.22	5341.0

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); brown (7.5YR 5/4); dry; very loose; low plasticity; 70% silt; 30% very fine to medium sand; trace fine gravel to 8mm.		Concrete Seal	Hand augered.
5					Same as above (0 ft); 60% silt; 40% very fine to coarse sand; trace fine gravel to 4mm.		Bentonite Seal	Began drilling @ 1517 on 2/22/11.
10		SB0058	0.0			ML		Blow counts (8.5-10'): 5/6.
					Same as above (0 ft); reddish brown (5YR 5/4); stiff; trace gravel to 8mm; angular.		Top of Filter Pack	Kelly down @ 1522. Resumed drilling @ 1535.
15					SILT with Sand (ML); reddish brown (2.5YR 4/4); dry; stiff; nonplastic; 85% silt; 15% very fine to medium sand to 1mm.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20		SB0059	0.0		Lean CLAY (CL); brown (7.5YR 5/4); dry; hard; low plasticity; 70% clay; 30% silt.	CL		Blow counts (18.5-20'): 16/30. Kelly down @ 1543. Resumed drilling @ 1553.
25					Sandy SILT (ML); strong brown (7.5YR 5/6); dry; stiff; nonplastic; 60% silt; 35% very fine to very coarse sand; 5% fine gravel to 1cm.	ML	Bottom of Screen Bentonite Seal	
30		SB0060	0.0					Blow counts (28.5-30'): 9/12.

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT with Sand (ML); strong brown (7.5YR 4/6); dry; very stiff; low plasticity; 70% silt; 15% clay; 15% very fine sand to 0.1mm.		Bentonite Seal	Resumed drilling @ 1615.
35					Same as above (30 ft); 85% silt; 15% very fine to coarse sand; trace fine gravel to 6mm.		Top of Filter Pack	
40		SB0061	0.0					Blow counts (38.5-40'): 8/15.
					Sandy SILT (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 60% silt; 40% very fine to very coarse sand; trace fine gravel to 7mm.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1622. Resumed drilling @ 1633.
45					Same as above (40 ft); trace clay nodules.	ML		
50		SB0062	0.0					Blow counts (48.5-50'): 12/22. Blow counts (50-51.5'): 12/23. Kelly down @ 1638. Resumed drilling @ 1655.
		SB0063	0.0		Same as above (40 ft); very stiff.		Bottom of Screen	
55					Same as above (40 ft).		Bentonite Seal	
60								

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 80% silt; 20% very fine to medium sand; trace gravel to 1.5cm.			Driller forgot to remove 10' drill rod, drilled to 70' open hole and then hammered in casing.
65					Same as above (60 ft).			
70					Same as above (60 ft); trace gravel to 2.3cm.			Kelly down @ 1702. New connection, pushed to 70' @ 1713. End of 2/22/11. Resumed drilling @ 0745 on 2/23/11.
75					Same as above (60 ft); 80% silt; 20% very fine to medium sand; trace clay nodules.	ML	Bentonite Seal	
80					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; hard; nonplastic; 85% silt; 15% very fine to coarse sand to 3mm.			Kelly down @ 0752. Resumed drilling @ 0758.
85					Same as above (80 ft); trace fine gravel to 5mm.			
90								

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; hard; nonplastic; 85% silt; 15% very fine to coarse sand to 3mm.	ML		
95					Same as above (90 ft).			
100		SB0064	0.0		Silty SAND (SM); yellowish brown (10YR 5/4); dry; very dense; 70% fine sand to 0.2mm; rounded; 30% silt.	SM	Bentonite Seal	Blow counts (98.5-100'): 30/50. Kelly down @ 0810. Resumed drilling @ 0826.
105					Poorly graded SAND (SP); brown (10YR 5/3); dry; loose; 90% medium sand; 5% coarse sand; trace gravel to 6mm; rounded; 5% silt.	SP		
110					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); dry; loose; 85% very fine to very coarse sand; 5% fine gravel to 1cm; subrounded; 10% silt.	SW-SM		
115					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; nonplastic; 75% silt; 25% very fine to coarse sand to 4mm.	ML	Native Backfill	
120							Bentonite Seal	

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; nonplastic; 85% silt; 15% very fine to fine sand to 0.5mm.	ML		Kelly down @ 0835. Total depth with 11-3/4" casing reached. Resumed drilling @ 1230.
125					Same as above (120 ft).	ML	Bentonite Seal	
130					SILT with Sand (ML); brown (7.5YR 5/4); moist; very stiff; low plasticity; 60% silt; 25% clay; 15% fine to medium sand to 1mm.	ML		
135					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 85% silt; 15% very fine to medium sand to 1mm.	ML		
					Lean CLAY (CL).	CL	Top of Filter Pack	
140					Well graded SAND with Silt (SW-SM); brown (10YR 4/3); dry; very loose; 90% very fine to medium sand to 2mm; subrounded; 10% silt with clay nodules.	SW-SM	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1242. Resumed drilling @ 1247.
145					Well graded SAND (SW); brown (10YR 4/3); dry; loose; 95% very fine to very coarse sand; trace gravel to 6mm; subangular; 5% silt.	SW		
		SB0065	0.0					Blow counts (147-148.5'): 11/15.
150								

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Well graded SAND (SW); brown (10YR 4/3); dry; medium dense; 95% very fine to very coarse sand; trace gravel to 6mm; subangular; 5% silt; medium to coarse sand is predominantly pumice.	SW	Bottom of Screen	Kelly down @ 1250. Resumed drilling @ 1302.
155					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; nonplastic; 80% silt; 20% very fine to medium sand to 2mm.	ML		
160					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); dry; medium dense; 90% very fine to coarse sand to 3mm; subrounded; 10% silt.	SW-SM		Kelly down @ 1306. Resumed drilling @ 1311.
165					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; nonplastic; 85% silt; 15% very fine sand to 0.1mm.	ML	Bentonite Seal	
170					Well graded SAND with Silt (SW-SM); light brown (7.5YR 6/4); dry; loose; 80% very fine to very coarse sand; 10% fine gravel to 1.3cm; well rounded; 10% silt; predominantly pumice.	SW-SM		
175					Same as above (170 ft); 90% very fine to very coarse sand; trace fine gravel; 10% silt.			
180								

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 95% medium sand to 1mm; subrounded; 5% silt.	SP		Kelly down @ 1317. Resumed drilling @ 1324.
185					Well graded SAND (SW); brown (10YR 4/3); dry; very loose; 95% very fine to very coarse sand; trace fine gravel to 1.1cm; rounded; 5% silt.			
190					Same as above (185 ft); finer.			
195					Same as above (185 ft); finer.	SW	Bentonite Seal	
		SB0066	0.0					Blow counts (197-198.5'): 17/12.
200					Same as above (185 ft); medium dense.			Resumed drilling @ 1342.
205					Silty SAND (SM); brown (10YR 4/3); dry; medium dense; 70% fine sand to 0.5mm; rounded; 30% silt.	SM		
210					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 90% very fine to very coarse sand; 5% fine gravel to 1.8cm;	SW		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 11:08 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					rounded; 5% silt.	SW		
215					SILT with Sand (ML); dark yellowish brown (10YR 4/4); moist; very stiff; low plasticity; 60% silt; 25% clay; 15% very fine to fine sand; trace gravel to 3cm; well rounded.	ML		
220					Silty SAND (SM); brown (10YR 5/3); moist; loose; 75% very fine to very coarse sand; 5% fine gravel to 1.5cm; rounded; 20% silt.	SM	Bentonite Seal	Kelly down @ 1349. Resumed drilling @ 1357.
225					Same as above (220 ft); coarser gravel to 3cm.			
230					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; loose; 90% very fine to very coarse sand; 5% fine gravel to 1.5cm; rounded; 5% silt; predominantly lithics.	SW		
235					Same as above (230 ft); grayish brown (10YR 5/2); predominantly pumice.		Top of Filter Pack	
240								

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; very loose; 90% very fine to very coarse sand; 5% fine gravel to 1.5cm; rounded; 5% silt; mix of pumice and lithics.	SW	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1401.
245					Same as above (240 ft); loose; predominantly lithics.			
		SB0067	3.4					Blow counts (247-248.5'): 12/43.
250					Lean CLAY (CL); brown (7.5YR 5/3); dry; hard; low plasticity; 100% clay.	CL	Bottom of Screen	Kelly down @ 1410.
255					SILT (ML); brown (7.5YR 5/3); moist; hard; low plasticity; 60% silt; 40% clay.	ML		
					Same as above (252 ft).			
260					Same as above (252 ft); 90% silt; 10% very fine to medium sand.		Bentonite Seal	Kelly down @ 1429. Resumed drilling @ 1435.
265					Silty SAND (SM); yellowish brown (10YR 5/4); moist; loose; 60% very fine to medium sand to 1mm; rounded; 40% silt.	SM		
270								

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 90% fine to medium sand; 10% coarse sand to 2mm; subrounded; trace fines.			
275					Same as above (270 ft); 90% fine sand; 10% medium sand.	SP		
280					Same as above (270 ft).			Kelly down @ 1440.
285					Silty SAND (SM); brown (7.5YR 4/3); moist; loose; 70% very fine to medium sand to 1mm; rounded; 30% silt.	SM	Bentonite Seal	
290					Well graded SAND (SW); brown (7.5YR 5/2); dry; loose; 95% very fine to very coarse sand; 5% fine gravel to 8mm; subrounded.	SW		
295		SB0068	0.5		Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 85% medium sand to 2mm; 15% very fine to fine sand; rounded.	SP		Blow counts (297-298.5'): 3/Not recorded (for 18").
300								

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); grayish brown (10YR 5/2); dry; loose; 95% very fine to very coarse sand; 5% fine gravel to 9mm; subrounded to rounded.			Resumed drilling @ 1511.
305					Same as above (300 ft).			
310					Same as above (300 ft); gravel to 2.6cm.			
315					Same as above (300 ft); 90% very fine to very coarse sand; 10% fine gravel.	SW	Bentonite Seal	
320					Well graded SAND with Gravel (SW); 70% very fine to very coarse sand; 30% fine gravel.			Kelly down @ 1521. Resumed drilling @ 1528.
325					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; loose; 100% very fine to very coarse sand; trace fine gravel to 7mm; subrounded; trace fines.			
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 11:08 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; loose; 100% very fine to very coarse sand; trace fine gravel to 7mm; subrounded; trace fines; coarser than 325'.		Bentonite Seal	
335					Same as above (330 ft); finer.	SW	Top of Filter Pack	
340					Same as above (330 ft); finer.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1542. Resumed drilling @ 1551.
					Lean CLAY (CL); lense.	CL		
345					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; loose; 100% very fine to coarse sand to 4mm; rounded.	SW		
		SB0069	0.5					Blow counts (347-348.5'): 26/50.
350							Bottom of Screen	
					Well graded SAND with Silt (SW-SM); yellowish brown (10YR 5/4); dry; very dense; 85% very fine to very coarse sand; 5% fine gravel to 1cm; rounded; 10% silt.	SW-SM		Kelly down @ 1605. Crew had trouble making connection. Used a different 10' section. Resumed drilling @ 1637.
355					Well graded SAND (SW); brown (10YR 5/3); dry; very dense; 95% very fine to very coarse sand to 4mm; subrounded; 5% silt.	SW	Bentonite Seal	Rate of penetration very slow.
360								

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); brown (10YR 5/3); dry; very dense; 95% very fine to very coarse sand to 4mm; subrounded; 5% silt; coarser than 355'.	SW		Kelly down @ 1650.
365					Poorly graded SAND (SP); brown (10YR 5/3); dry; very dense; 90% medium sand; 5% coarse sand to 2.5mm; rounded; 5% fines.	SP		Bit packed off @ 1708. Resumed drilling @ 1709. End of day @ 1714 on 2/23/11. Resumed drilling @ 0738 on 2/24/11.
370					Same as above (365 ft); trace fine gravel to 6mm.			
375					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 100% very fine to coarse sand to 3mm; subangular to rounded; trace fines.	SW	Bentonite Seal	
380					Same as above (375 ft); coarser.			Kelly down @ 0746. Resumed drilling @ 0752.
385					Same as above (375 ft).			
390								

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 100% very fine to coarse sand to 3mm; subangular to rounded; trace gravel to 2.5cm; trace fines.			
395					Same as above (390 ft); trace gravel to 1.1cm.			
		SB0070	3.3					Blow counts (397-398.5'): 6/Not Recorded. Blow counts (398.5-400'): 2/35.
400		SB1742	3.3		Same as above (390 ft); no gravel.			Kelly down @ 0813. Replaced flange from cyclone hose to hammer @ 0830. Resumed drilling @ 1004.
405					Same as above (390 ft); no gravel; grading finer.	SW	Bentonite Seal	
410					Same as above (390 ft); no gravel; grading coarser.			
415					Same as above (390 ft); no gravel; grading coarser than 410'.			
420								

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; very dense; 100% very fine to very coarse sand; trace fine gravel to 8mm; subangular to rounded; trace fines.			Kelly down @ 1021. Resumed drilling @ 1027.
425					Same as above (420 ft); grading coarser.		Bentonite Seal	
430					Same as above (420 ft); 95% very fine to very coarse sand; 5% fine gravel to 2cm.	SW		
435					Same as above (420 ft); grading finer; very fine to coarse sand to 3mm; no gravel.			
440					Well graded SAND with Gravel (SW); brown (10YR 5/3); dry; very dense; 80% very fine to very coarse sand; 20% fine gravel to 1.5cm; subrounded.		Top of Filter Pack Top of 3" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1103. Resumed drilling @ 1108.
445					Poorly graded SAND (SP); brown (10YR 4/3); moist; very dense; 95% fine sand; 5% medium sand; trace fine gravel to 1.6cm; rounded.	SP		
		SB0071	25.3					Blow counts (447-478.5'): 33/50.
450							Bottom of Screen	

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Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
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Ground Elevation AMSL (ft): 5347.6
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X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450								
					Silty SAND (SM); brown (7.5YR 4/4); moist; very dense; 80% medium sand to 1mm; rounded; 20% silt.	SM		Kelly down @ 1123. Resumed drilling @ 1139. Drillers noted a strong odor from hole and cuttings.
455								
					Poorly graded SAND (SP); brown (10YR 5/3); dry; very dense; 100% very fine to medium sand to 1mm; subrounded.	SP	Bottom of Filter Pack	
					Well graded SAND (SW); brown (10YR 5/3); dry; very dense; 100% very fine to very coarse sand to 4mm; rounded.	SW	Native Backfill	
460								
								Total depth @ 460 ft. Reached @ 1200 on 2/24/11.
								Water added during drilling (gallons) = 0
465								
								Water added during construction (gallons) = 230
470								Kelly down: TD the joint and ready to make new connection.
475								
480								

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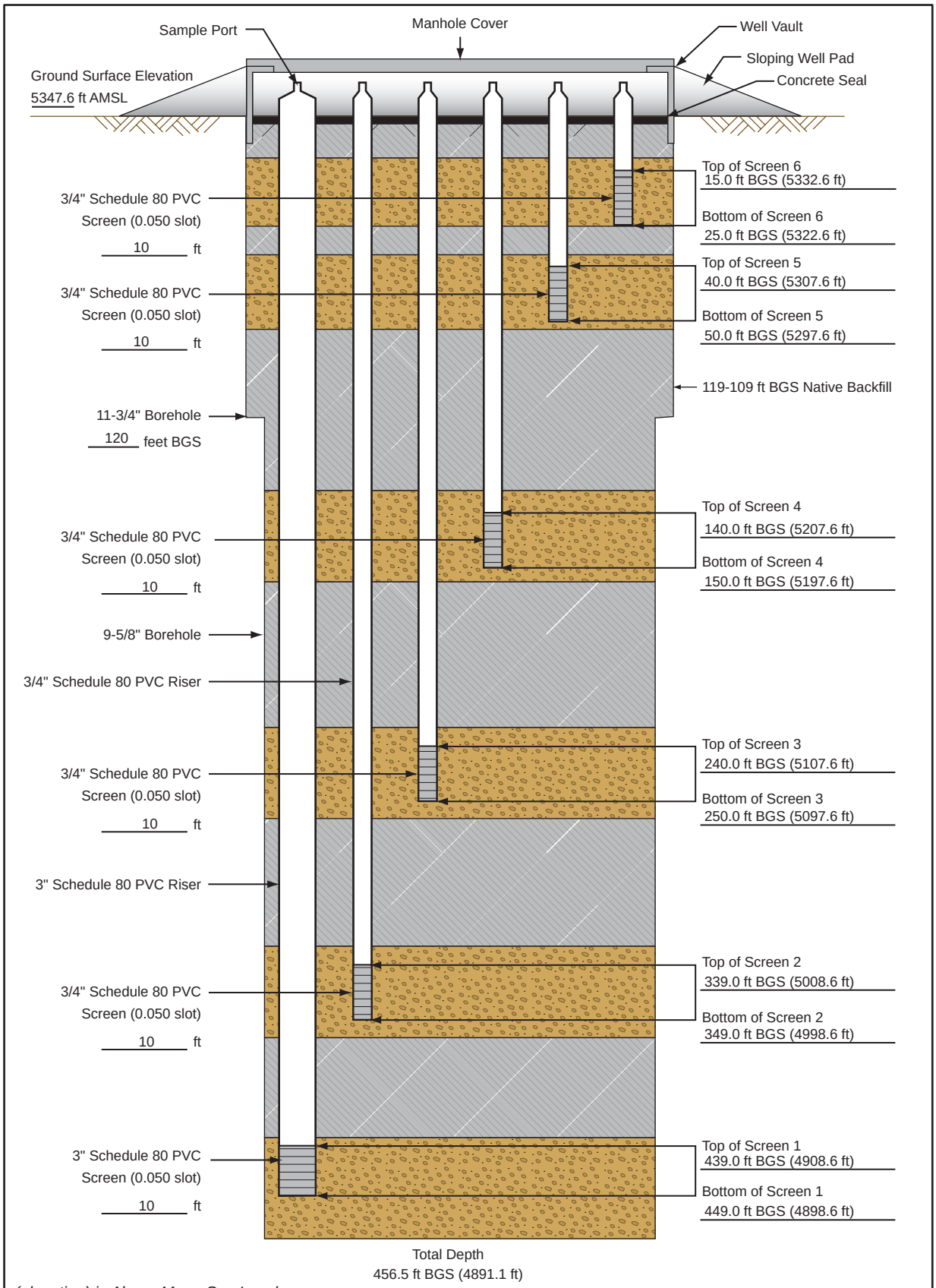
Nested Soil Vapor Well Completion Diagram for KAFB-106112

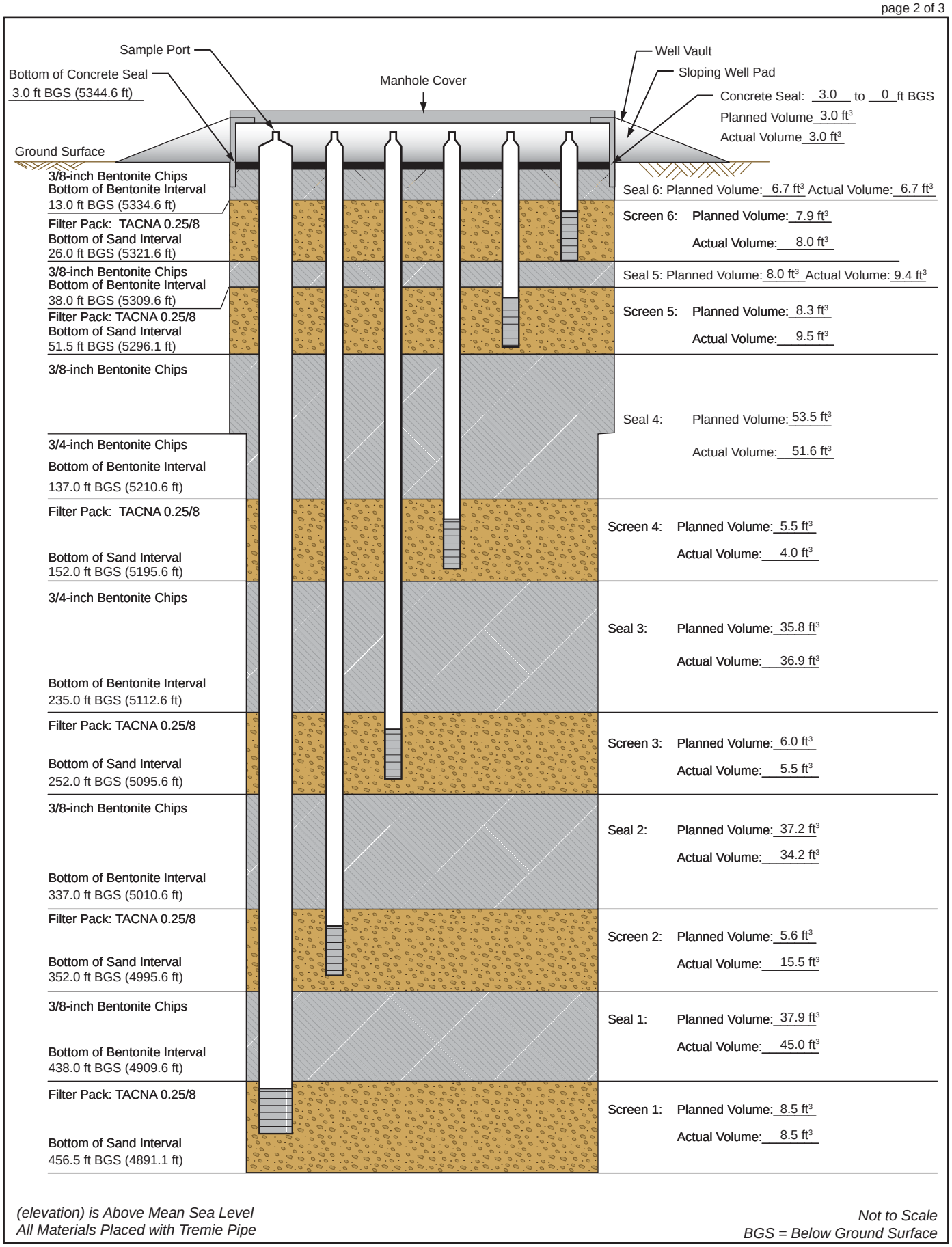
Installation Start Date/Time: 3/1/2011 @ 8:00
Installation End Date/Time: 3/2/2011 @ 16:45



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106112



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

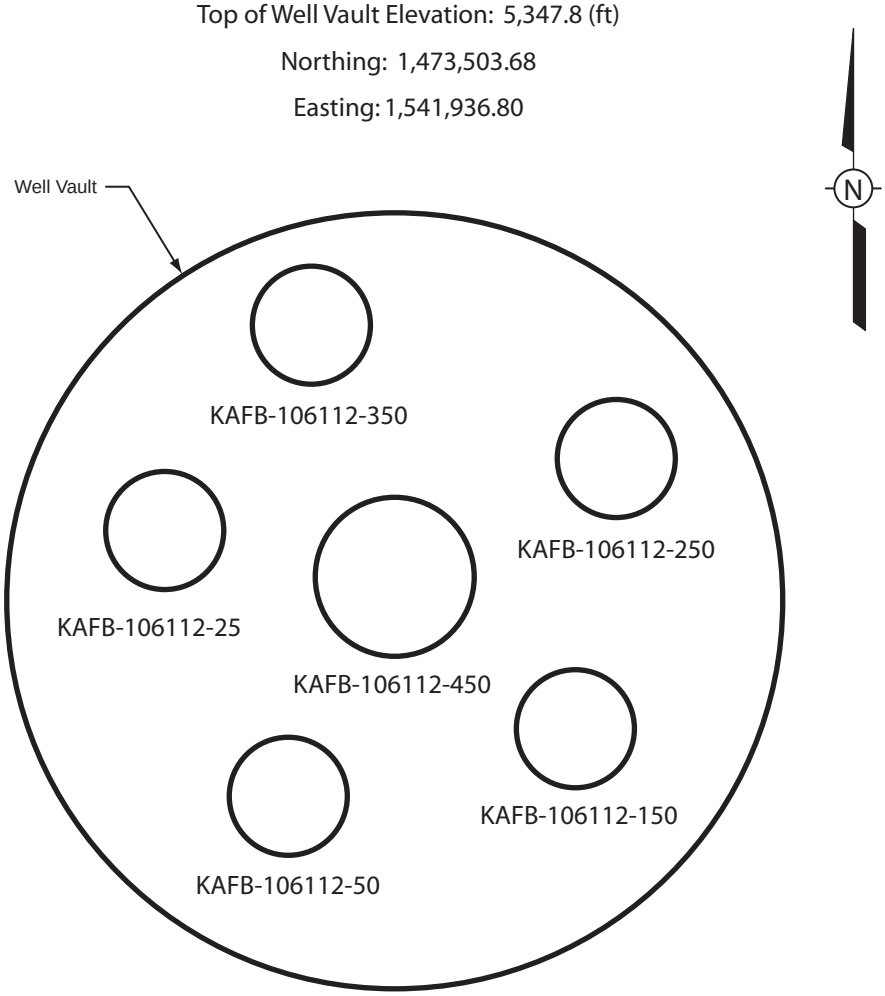
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106112

Top of Well Vault Elevation: 5,347.8 (ft)

Northing: 1,473,503.68

Easting: 1,541,936.80



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106112-25	3/4	25.0	15.0 - 25.0	1,473,503.09	1,541,936.54	5347.2
KAFB-106112-50	3/4	50.0	40.0 - 50.0	1,473,502.85	1,541,936.70	5347.2
KAFB-106112-150	3/4	150.0	140.0 - 150.0	1,473,502.95	1,541,936.98	5347.3
KAFB-106112-250	3/4	250.0	240.0 - 250.0	1,473,503.22	1,541,937.01	5347.3
KAFB-106112-350	3/4	349.0	339.0 - 349.0	1,473,503.34	1,541,936.72	5347.3
KAFB-106112-450	3	449.0	439.0 - 449.0	1,473,503.19	1,541,936.80	5347.3