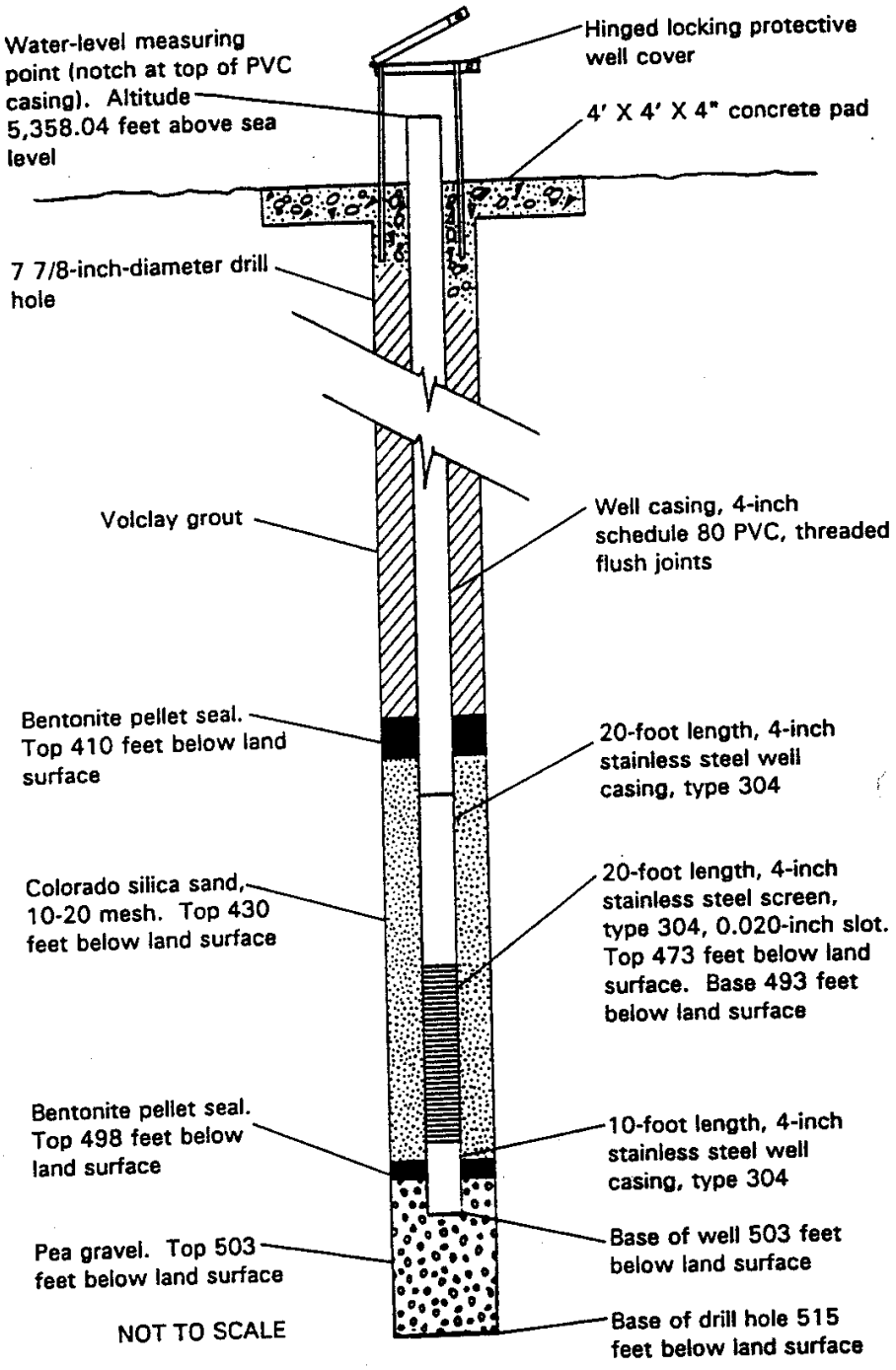
KAFB-0501 to KAFB-0525



Well-completion diagram for monitoring well KAFB0501 drilled and completed by U.S. Geological Survey, Coal Branch, Denver, Colo. Started on 11-09-89. Completed on 11-18-89. Well drilled using mud-rotary method and Wyoming sodium bentonite drilling fluid.

AR2520

RFI, Technical Report, Stage 2, Volume 2
Appendix C, (USAF, 1993)

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger hole 1
Borehole number: KAFB0501 Location: 1468359N 406793E Surface Elevation: 5356
Drilling Company: USGS Drilling crew: Roger Nicols, Dave Rehder, & Tony Shanahan
Date started drilling: 09-07-89 Date completed drilling: 09-18-89 Total Depth: 152ft
Drilling method: Hollow Stem Auger Drilling Fluid: _____
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth(ft)	Lithology and Remarks
09-07-89	1441	0-4	sand, vfg, very pale orange 10YR8/2 w/ <1% pebbles all <5 mm, cutting sample.
	1428	4-6	same as 0-4, very calcareous, unconsolidated, sampled @ 5 ft.
	1451	9-11	9.0-10.1 same as above with approx. 10% vcg sand, 10.1-10.9 no vcg sand, moist, grayish orange 10 YR 6/6,10.9-11.1 approx. 10% vcg sand, somewhat more lithified, breaks with knife edge.
	1500	14-16	14.0-15.4 sand vfg-fg, light brown 5YR5/6 grades into very pebbly ss at base w/pebbles <3 mm 15.4-16.0 sand vfg-fg, light brown 5YR5/6, clay present.
	1530	19-21	(1.3 recovered) sand, fg, light brown 5YR5/6; lower 0.3 ft argillaceous sand, sampled @ 20 ft.
	1600	24-26	(1.7 ft recovered) argillaceous, silty sand with pebbles <1 cm, poorly sorted.
09-08-89	0746	29-31	0.8 ft recovered) argillaceous sand, vfg, moderate brown 5YR4/4, w/ <1% pebbles <1 cm, moist.
	0809	34-36	(1.3 ft recovered) sand, fg-vcg w/pebbles <2 cm, moderate brn 5YR4/4, moist.
	0830	39-41	same as 34-36 w/ 1s cobble approx. 4"; lower 0.3' silty sand vfg-fg, moist.
09-09-89	0820	44-46	(1. ft recovered) very silty sand, vfg, moderate brown 5YR4/4, upper 0.4 ft contains pebbles of caliche, <1 cm, <5% of section, moist.

AR 2520

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2 Sheet 2 of 3
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger hole 1
Borehole number: KAFB0501 Location: 1468359N 406793E Surface Elevation: 5356
Drilling Company: USGS Drilling crew: Roger Nicols, Dave Rehder, & Tony Shanahan
Date started drilling: 09-07-89 Date completed drilling: 09-18-89 Total Depth: 152ft
Drilling method: Hollow Stem Auger Drilling Fluid:
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth(ft)	Lithology and Remarks
	0834	49-51	(2.0 ft recovered) silty sandy clay, vfg-vcg, vcg 5% of section, moderate brown 5YR4/4; approx. 2%-5% of section caliche pebbles distributed irregularly through core, pinkish gray 5YR8/1, very strong reaction HCl; moist, sampled @ 50 ft.
	0900	54-56	(1.8 ft recovered) upper 1.15 ft very silty sand, vfg, moderate brown 5YR4/4, lower 0.65 ft conglomeratic sand, angular pebbles, <2 cm, sand fg & up, slightly cemented w/ caliche.
	0933	59-61	(1.45 ft recovered) upper 0.1 ft argillaceous sand vfg-cg, moderate brown 5YR4/4, next 1.1 ft gravel at top w/ pebbles <1 cm, grading downward into ss vfg-fg, lower 0.35 ft mg-vcg ss, mixed lithologies qtz, mafics, mica flakes; wet.
	1004	64-66	(2.0 ft recovered) upper 0.8 ft corglomeratic sand fg-vcg w/pebbles <2 in, angular, mixed litho qtz, fldspr, mafics, ls; lower 1.2 ft sandy silty clay grading downward to a silty clay, vfg, light brown, 5YR5/6; moist.
09-11-89	1215	71-73	1.8 ft recovered) silty sand, vfg, moderate brown 5YR4/4, approx. 2% vcg sand distributed through section, slightly moist, lower 0.5 ft silty sand to sandy silt.
	1230	73-74	(1.0 ft recovered) same as above, sandy silt to silty sand, lower 0.2 ft contains approx. 20% vcg sand.
	1304	74-74.4	sity sand, fg-vcg, moderate brown 5YR4/4.
	1336	74.7-76	(1.7 ft recovered) slightly silty sand, vfg-fg, light brown 5YR5/6, slightly moist.

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2 Sheet 3 of 3
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger hole 1
Borehole number: KAFB0501 Location: 1468359N 406793E Surface Elevation: 5356
Drilling Company: USGS Drilling crew: Roger Nicols, Dave Rehder, & Tony Shanahan
Date started drilling: 09-07-89 Date completed drilling: 09-18-89 Total Depth: 152ft
Drilling method: Hollow Stem Auger Drilling Fluid:
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth(ft)	Lithology and Remarks
	1432	79-81	(1.7 ft recovered) upper 1.0 ft argillaceous silty sand to sandy silt, vfg-fg, moderate brown 5YR4/4, isolated pebbles <8 mm; lower 0.7 ft slighty silty sand, vfg, variegated mod olive brown 5YR4/4 to light brown 5YR5/6.
	1521	84-86	(2.3 ft recovered) sandy silt to silty sand, vfg, light brown 5YR5/6, slightly moist.
	1600	89-91	same as 84-86 ft.
	1630	94-96	(2.0 ft recovered) upper 0.2 ft sandy, argillaceous silt, vfg, moderate brown 5YR4/4, lower 1.8 ft sand, vfg, quartzitic, rounded, drk yellowish orange 10YR6/6, slightly moist.
		99-101	(1.8 ft recovered) upper 0.5 ft sand vfg-fg, moderate brown 5YR4/4, lower 1.3 ft conglomeratic ss, fg-pebbles 4.5 in moderate brown, mixed lithologies, qtz, ls, mafics, slightly moist, sampled @ 100 ft.
09-12-89	1146		101 Switched from auger drilling to mud rotary @ 101ft. All cutting samples below 101 ft.
	1158	101-112	sand, mg-vcg, mixed lithologies, qtz, Kspar ls, biotite, angular.
	1632	114-136	sand & gravel.
09-13-89	1215	136-152	silty sand, vfg, grayish orange 10YR7/4.
09-18-89	1630		Abandoned drill hole, unable to drill w/B-61 rig.

Borehole Log

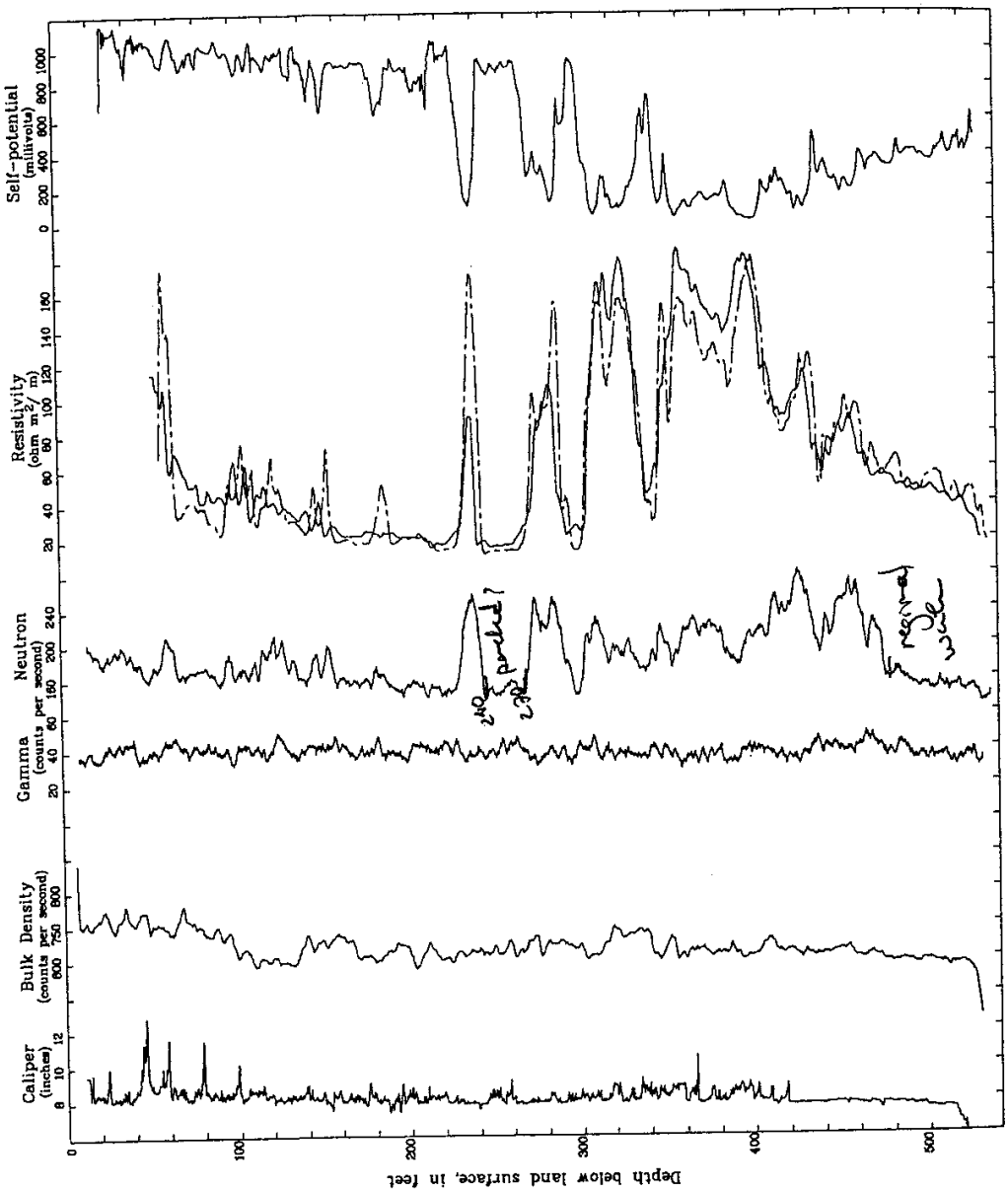
Project name: Kirtland Air Force Base IRP, Phase II Stage 2
Project number: 463536000 Site: Site 5-Sewage Lagoon Well 1
Borehole number: KAFB0501* Location: 1468358.60N, 406793.25E Surface Elevation: 5356.13
Drilling Company: USGS Drilling crew: Jeff Eman, John Palmer, Dave Rehder
Date started drilling: 11-09-89 Date completed drilling: 11-10-89 Total Depth: 535ft
Drilling method: Mud Rotary Drilling Fluid: Bentonite
Borehole diameter: 7-7/8"
Drilling equipment: Gardner-Denver 17W
Logged by: Ralph Wilcox Sample type: cutting
Geophysical Logging Company: USGS Logger: Jim Hudson
Geophysical Tools Run: LSN Resistivity, SP, Natural Gamma, Density, Neutron, & Caliper

Date	Time	Depth(ft)	Lithology and Remarks
11-09-89			Cuttings will be logged from 150 ft depth to T.D. Lithology from surface to 150 ft was logged in KAFB0501 auger hole which was mud rotary drilled from 100-150 ft before abandoned.
		155-175	sand vfg-vcg, light brown 5YR6/4.
		175-185	sand vfg-vcg w/ caliche nodules
		185-195	sand vfg-vcg
		195-205	sand vfg-vcg & pebbles <1in
		205-215	sand vfg-vcg & silt
		215-245	sand fg & silt
		245-265	sand, vcg
		265-275	sand, vcg & silt
		275-285	sm pebbles <4 mm & silt
		285-295	no samples recoverd probably fg sand & silt
		295-335	sand vcg
		335-355	sand vfg
		355-365	sm pebbles <0.6 cm
		365-375	sm pebbles <0.6 cm w/ caliche
		375-395	sm pebbles <0.6 cm angular
11-10-89		395-405	Pebbles, <1 cm, angular
		405-415	as above to 408, sand mg-cg 408-415
		415-535	sand vfg-fg & silt

T.D. 535 ft

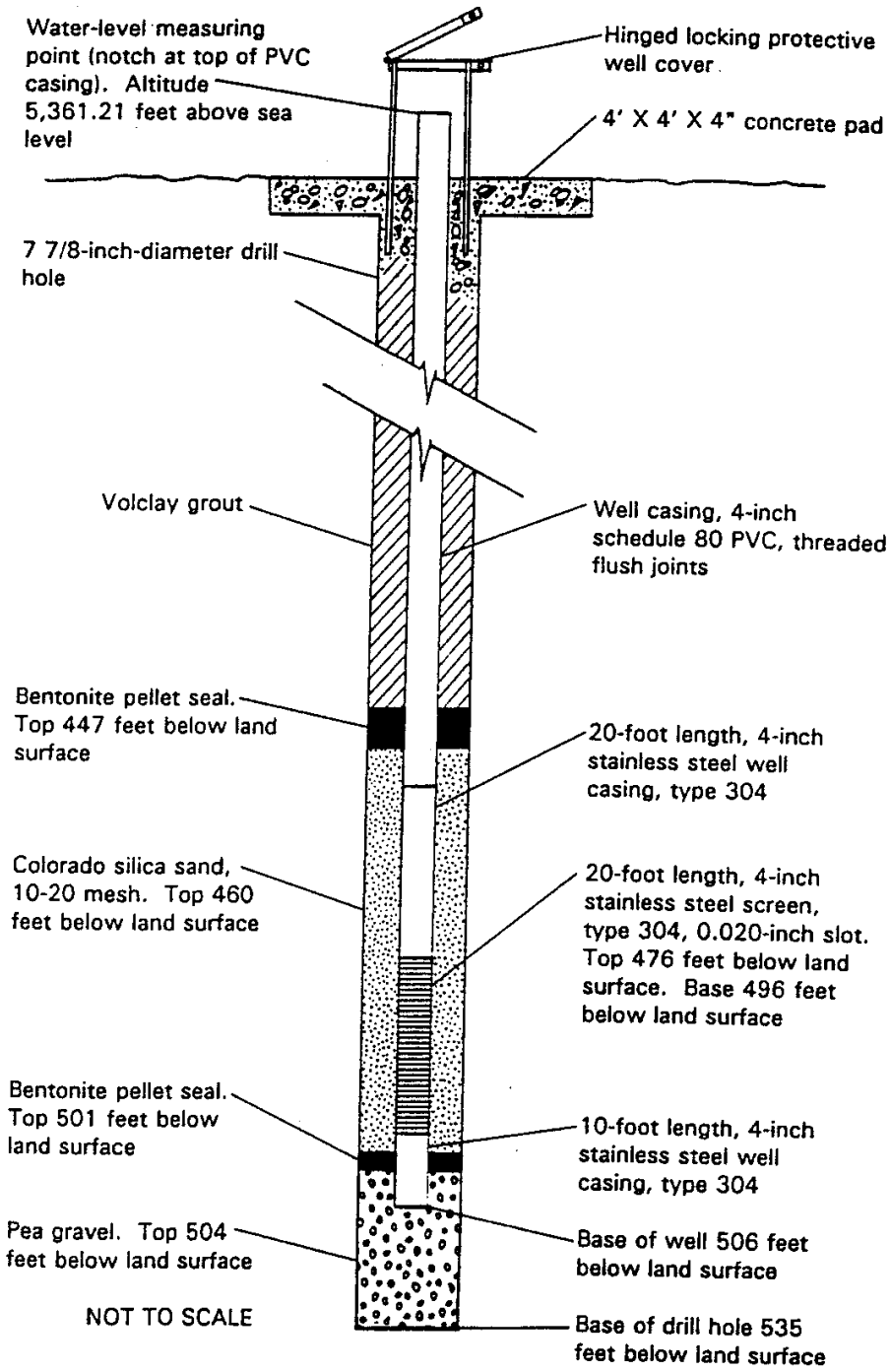
*Well KAFB0501 was not completed in this borehole. A second borehole was drilled to a depth of 515 feet approximately eight feet west of this borehole and was completed as well KAFB0501. The location coordinates and surface elevation listed are for the completed well.

RFI Stage 2, Appendix D (USAF, 1993)



Geophysical Well Logs (KAFB0501)

AR 2520



Well-completion diagram for monitoring well KAFB0502 drilled and completed by U.S. Geological Survey, Coal Branch, Denver, Colo. Started on 11-30-89. Completed on 12-06-89. Well drilled using mud-rotary method and Wyoming sodium bentonite drilling fluid.

AR 2520

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2 Sheet 1 of 3
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger hole 2
Borehole number: KAFB0502 Location: 1469677N 406717E Surface Elevation: 5361ft
Drilling Company: USGS Drilling crew: Roger Nicols, Dave Rehder, Tony Shanahan
Date started drilling: 09-19-89 Date completed drilling: 09-22-89 Total Depth: 99ft
Drilling method: Hollow Stem Auger Drilling Fluid: _____
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth(ft)	Lithology and Remarks
09-19-89	0850	0-4.5	0-2 sand, fg, pale yellowish brown 10YR6/2; 2-4.5 ft gravel, 2" pebbles, cutting sample.
	0930	4.5-6.5	sand w/pebbles vfg-fg, pebbles <2% of interval <1.5cm, some induration by caliche, grayish orange 10YR7/4, caliche cream colored, strong reaction to HCl (2.0 ft recovered), sampled @ 5 ft.
	0940	9-11	sand, vfg-fg, w/pebbles <5%, <1.5 cm, light brown5YR6/4.
	1003	14-16	(1.9 ft recovered) sand, vfg-fg w/caliche pebbles <1.5in; lower 0.9 ft slightly indurated w/caliche cement.
	1205	19-21	(2 ft recovered) upper 1.1 ft sand w/pebbles vfg-vcg, pebbles mixed lithologies mafics, orthoclase, & is approx. 20% of interval; next 0.4 ft similar but less pebbles, slightly indurated w/caliche, slightly moist; lowermost 0.5 ft same as upper
	1222	24-26	(2.0 ft recovered) upper 1.3 ft sandy gravel, fg-pebbles, <1 in, mixed lithos., moderate brown 5YR4/4; lower 0.7ft silty sand, vfg, light brown 5YR5/6, traces of caliche, slightly moist.
	1320	30-30.5	(0.0 recovered)
		30.5-36	gravel w/cobbles, subrounded to rounded, as much as 3 in comming up along outside of augers, no coring attemped.
		36-38.2	(0.5 ft recovered) sand, vfg, light brown, 5YR5/6, approx. 2% pebbles angular.
		38.2-41	sand & gravel, cobbles, <3 in subang-subrounded.

AR 2520

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger hole 2
Borehole number: KAFB0502 Location: 1469677N 406717E Surface Elevation: 5361ft
Drilling Company: USGS Drilling crew: Roger Nicols, Dave Rehder, Tony Shanahan
Date started drilling: 09-19-89 Date completed drilling: 09-22-89 Total Depth: 99ft
Drilling method: Hollow Stem Auger Drilling Fluid: _____
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth(ft)	Lithology and Remarks
	1530	46-47	(1.0 ft recovered) sand, vfg, llight brown 5YR6/4; material in core barrel shoe is more indurated sand, vfg, light brown, caliche cemented w/ a single pebble, <1 in, sampled @ 46.5 ft.
		47-49	Very slow augering, hard material.
	1615	49-49.3	sand, vfg-fg, light brown 5YR6/4, caliche cemented pebbles of ss.
09-20-89	0822	54-56	(0.6 ft recovered) sand, vfg-vcg, w/ pebbles, <0.5 cm, light brown 5YR5/6.
09-21-89	0730	60-61	(1.0 ft recovered) silty sand, vfg, light brown 5YR6/4;(core was drilled yesterday and pulled from drill holethis a.m.), sampled @ 61 ft for VOC's.
	0828	64-66	(2.0+ recovered) very silty sand to sandy silt, vfg, approx. 1% sm pebbles <4 mm, slightly moist, lower 0.4 ft more indurated, moderate reddish brown 10R4/6, sampled @ 66 ft for VOC's.
	1140	69-71	(1.3 ft recovered) upped 0.15 ft sandy silt, vfg, moderate brown, 5YR4/4; middle 0.3 ft sand mg-vcg w/ pebbles <1 cm; lower 0.85 ft very silty sand to sandy silt, vfg, w/ <1% pebbles <1 cm, moderate brown 5YR6/4, traces of caliche near base of core.
	1300	74-75.5	silty sand, vfg-fg, w/ approx. 1% pebbles, lower 0.9 ft well indurated.
09-22-89	1006	79-81	(2.0 ft recovered) upper 0.25 ft silty sand vfg w/ <1% vcg sand, light brown 5YR6/4; core becomes increasingly silty and indurated downward, base of core is sandy silt light brown 5YR5/6, caliche patches in lower 0.5 ft, root casts visible in core x-section.

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2 Sheet 3 of 3
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger hole 2
Borehole number: KAFB0502 Location: 1469677N 406717E Surface Elevation: 5361ft
Drilling Company: USGS Drilling crew: Roger Nicols, Dave Rehder, Tony Shanahan
Date started drilling: 09-19-89 Date completed drilling: 09-22-89 Total Depth: 99ft
Drilling method: Hollow Stem Auger Drilling Fluid: _____
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth(ft)	Lithology and Remarks
	1103	84-85.3	(1.3 ft recovered) sandy silt to silty sand vfg, light brown 5YR6/4, caliche present, root casts present, dry.
	1143	89-91	(2.0 ft recovered) sand, vfg-fg, light brown 5YR6/4 tograyish orange 10YR7/4, subangular to subrounded pebbles approx. 2%, upper 0.2 ft contains several silty laminae 2 mm thick, mod olive brown 5YR4/4; dry.
	1235	94-96	silty sand vfg-fg, w/ caliche nodules present throughout<3% of total core, vcg sand & small pebbles <1cm distributed through core <1%, light brown 5YR6/4.
	1400	98.5-99	(0.5 ft recovered) sand, vfg-fg, light brown 5YR6/4, <1% vcg sand, sampled @ 99 ft.

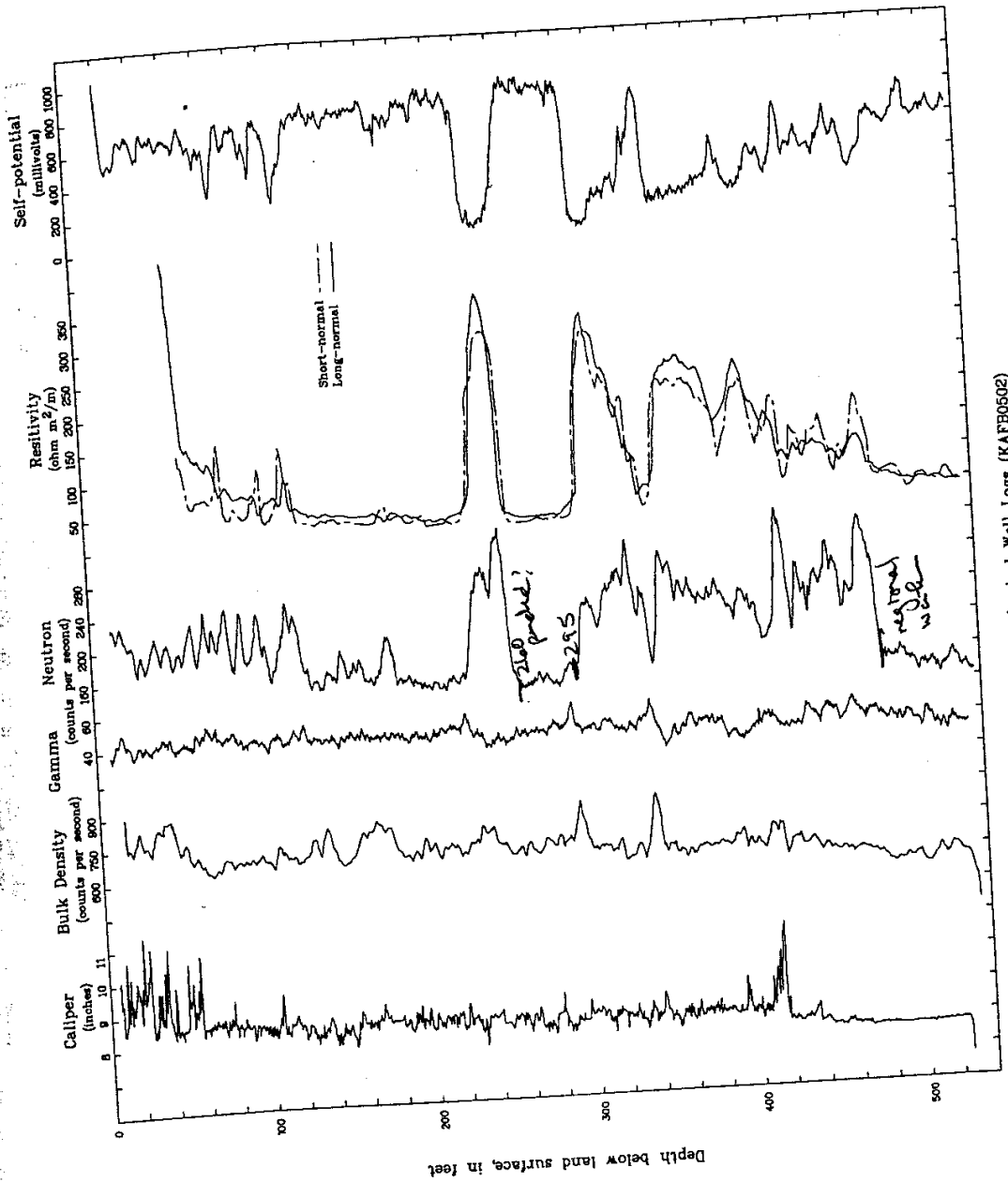
Borehole Log

Sheet 1 of 1

Project name: Kirtland Air Force Base IRP, Phase II Stage 2
Project number: 463536000 Site: Site 5 (Sewage Lagoons) Well 2
Borehole number: KAFB0502 Location: 1469676.84N, 406717.74E Surface Elevation: 5360.65
Drilling Company: USGS Drilling crew: Jeff Eman, Dave Rehder
Date started drilling: 11-30-89 Date completed drilling: 12-03-89 Total Depth: 535ft
Drilling method: Mud Rotary Drilling Fluid: Bentonite
Borehole diameter: 7-7/8"
Drilling equipment: Gardner-Denver 17W
Logged by: Ralph Wilcox Sample type: cutting
Geophysical Logging Company: USGS Logger: Jim Hudson
Geophysical Tools Run: LSN Resistivity, SP, Natural Gamma, Density, Neutron, & Caliper

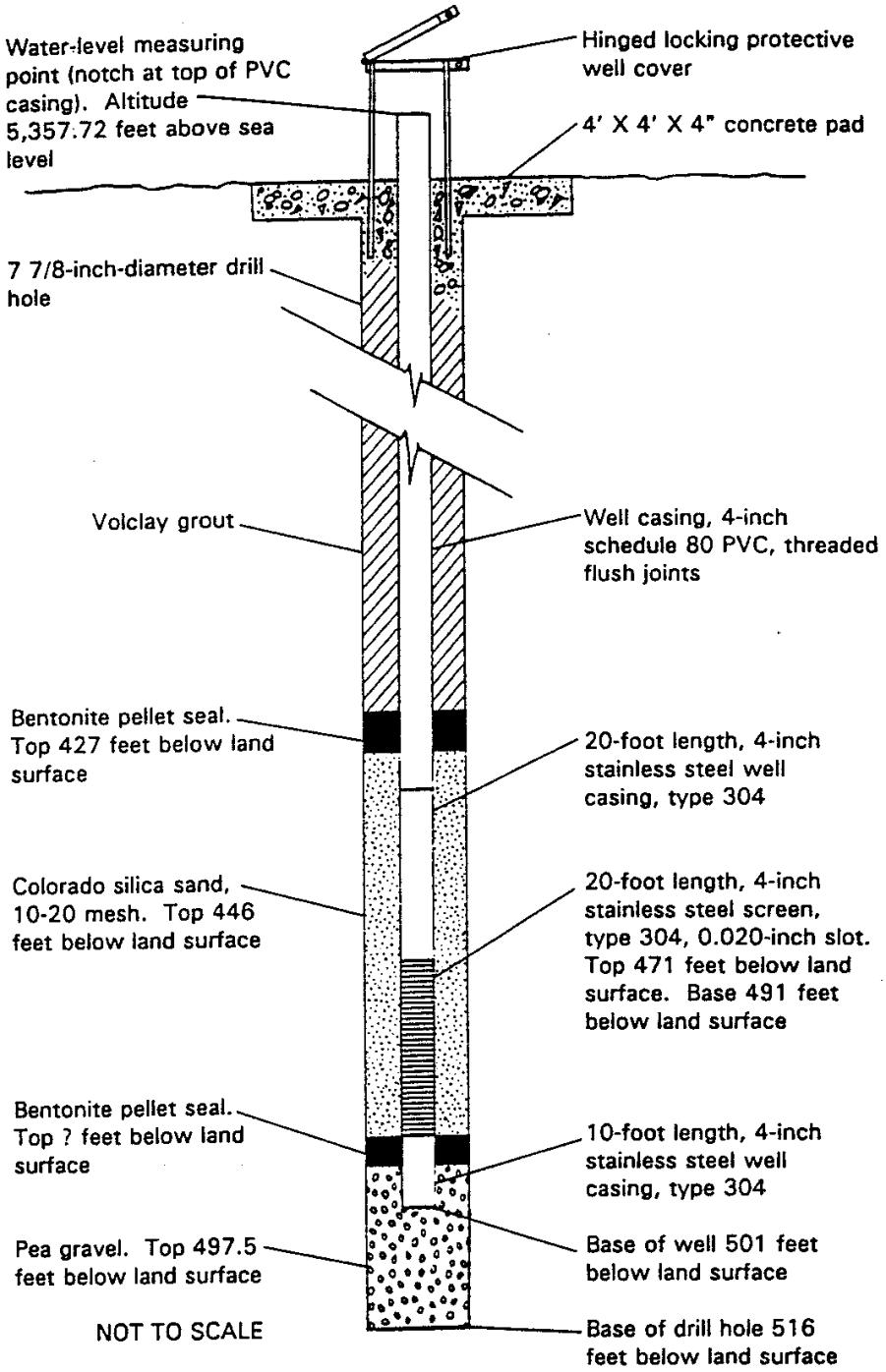
Date	Time	Depth(ft)	Lithology and Remarks
11-30-89			Cuttings will be logged from 100 ft depth. Lithology above 100 ft described in auger hole.
12-01-89		100-105	silt w/ sm pebbles <1 cm, light brown, 5YR6/4.
		105-108	silt w/ larger pebbles.
		108-115	silt w/ sm pebbles.
		115-120	silt, more indurated.
		120-135	sand, cg, light brown.
		135-185	silt & sand, vfg-fg.
		185-199	gravel w/ cobbles & sand & silt.
		199-235	silt w/ sand cg & pebbles.
		235-255	sand & silt, vfg-fg.
		255-275	sand & silt, vfg-fg w/ mafic sand grains.
		275-295	sand & silt, vfg-fg.
12-02-89	1000	295-303	sand & silt, vfg-fg.
		303-312	sand & gravel, fg-broken fvags <1 cm.
		312-315	sand fg.
		315-339	sand, fg w/ numerous gravel interbeds <1 ft thick, qtz & mafics.
		339-344	gravel.
		344-355	sand, fg-mg.
	1100	355-375	sand, fg-vcg w/ gravel stringers <1 ft thick generally, frags <1 cm.
		375-392	sand, fg-mg, w/ few gravel stringers.
		392-394	gravel, hard, probably cobbles to boulders.
	1130	394-395	sand, fg.
		395-410	gravel & sand, hard gravels probably pebbles.
	1237	410-415	gravel, hard probably pebbles, qtz, mafics, & K spar.
		415-417	pebbles, <1.5 cm.
12-03-89	1050	417-420	gravel, hard.
	1120	420-435	sand, vfg-fg.
	1311	435-455	sand, vfg-mg, w/ occasional gravel stringers <1 ft.
	1410	455-535	sand, vfg-mg.

T.D. 535 ft



Geophysical Well Logs (KAFB0502)

AR2520



Well-completion diagram for monitoring well KAFB0503 drilled and completed by U.S. Geological Survey, Coal Branch, Denver, Colo. Started on 12-07-89. Completed on 12-10-89. Well drilled using mud-rotary method and Wyoming sodium bentonite drilling fluid.

AR 2520

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger Hole 3
Borehole number: KAFB0503 Location: 1469680N 406159E Surface Elevation: 5357ft
Drilling Company: USGS Drilling crew: Dave Rehder & Tony Shanahan
Date started drilling: 09-23-89 Date completed drilling: 09-27-89 Total Depth: 101ft
Drilling method: Hollow Stem Auger Drilling Fluid:_____
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth(ft)	Lithology and Remarks
09-23-89	0805	0-4	sand, vfg-fg, light brown 5YR6/4, cutting sample.
		4-6	(1.5 ft recovered) sand & gravel, fg-cobbles <3 in, light brown 5YR6/4, dry, sampled @ 5 ft.
	0832	9-11	(1.25 ft recovered) same as 4-6, very slight moistness.
	0846	14-16	(1.5 ft recovered) same as 4-6; except lower 0.3 ft, sand vfg-fg w/vcg sand & sm pebbles approx. 5%, root casts w/ traces of carbonaceous material, light brown 5YR6/4, very slight moistness.
	0900	19-21	sand, vfg-fg, w/vcg sand & sm pebbles <1 in approx. 1%; lower 1 ft w/ caliche nodules & more indurated (still easily broken up between thumb & fore finger), light brown 5YR6/4, very slight moistness, sampled @ 20 ft.
	0920	24-26	(2.0 ft recovered) upper 0.5 ft gravel, mg sand & sm pebbles <1 cm; lower 1.5ft very silty sand-sandy silt, vfg, w/ vcg sand <1%, numerous caliche nodules <1 cm approx. 10%, light brown 5YR6/4, very slight moistness.
	0936	29-31	(2.0 ft recovered) upper 0.4 ft silty sand, vfg, w/ vcg sand & sm pebbles <2%; core grades downward to a very silty sand vfg, traces of caliche, root cast containing traces of carbonaceous material, mod reddish orange, 10R6/6, slightly moist.
	0955	34-36	(2.0 ft recovered) sand, vfg, grayish orange 10YR7/4, very slight moistness.
	1014	39-41	(2.0 ft recovered) sand, vfg, grayish orange 10YR7/4, poorly consolidated, very slight moistness.

AR2520

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2 Sheet 2 of 3
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger Hole 3
Borehole number: KAFB0503 Location: 1469680N 406159E Surface Elevation: 5357ft
Drilling Company: USGS Drilling crew: Dave Rehder & Tony Shanahan
Date started drilling: 09-23-89 Date completed drilling: 09-27-89 Total Depth: 101ft
Drilling method: Hollow Stem Auger Drilling Fluid:
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth(ft)	Lithology and Remarks
	1050	44-45.3	(1.3 ft recovered) upper 0.4 ft sand, vfg-fg, w/vcg sand <1%, light brown 5YR6/4; lower 0.9 ft same as above but more indurated w/ caliche nodules approx. 5%, very slight moistness
	1122	49-51	(2.0 ft recovered) silty sand, vfg, w/ vcg sand & sm pebbles <2%, light brown, 5YR5/6, root cast w/ traves of carbonaceous material, very slight moistness, sampled @ 50 ft.
	1306	54-55.5	(1.25 ft recovered) silty sand, vfg, w/ vcg sand approx. 1%, grayish orange 10YR7/4, root casts w/ carbonaceous material traces, very slight moistness.
09-25-89	0820	59-61	(1.2 ft recovered) upper 0.4 ft sand & gravel mg - pebbles <2 in; lower 0.8 ft sand, vfg-fg, w/ vcg sand <1%, mod reddish brown 10R4/6, slightly moist.
	0844	84-66	(2.0 ft recovered) upper 1.4 ft sand, vfg-fg, grayish orange 10YR7/4 w/ vcg sand approx. 5%; lower 0.6 ft silty sand - sandy silt, vfg w/ vcg sand approx. 5% light brown 5YR6/4, upper 1.4 ft unconsolidated, lower 0.6 slightly consolidated, dry.
	0904	69-71	(2.0 ft recovered) upper 1.3 ft slightly silty sand, vfg, w/ vcg approx 5% light brown 5YR6/4, root casts w/ traces of carbonaceous material; lower 0.7 ft clay sand, vfg, w/ vcg-sm pebbles <1 cm approx. 20%, light brown 5YR6/4 very slight moistness
	1013	74-75.9	(1.9 ft recovered) upper 0.9 ft sand vfg-fg w/ vcg-pebbles <1in approx. 10%, grayish orange 10YR7/4; lower 1.0 ft as above w/ silt (silty sand) and coarse fraction < 2%, dry.

Borehole Log

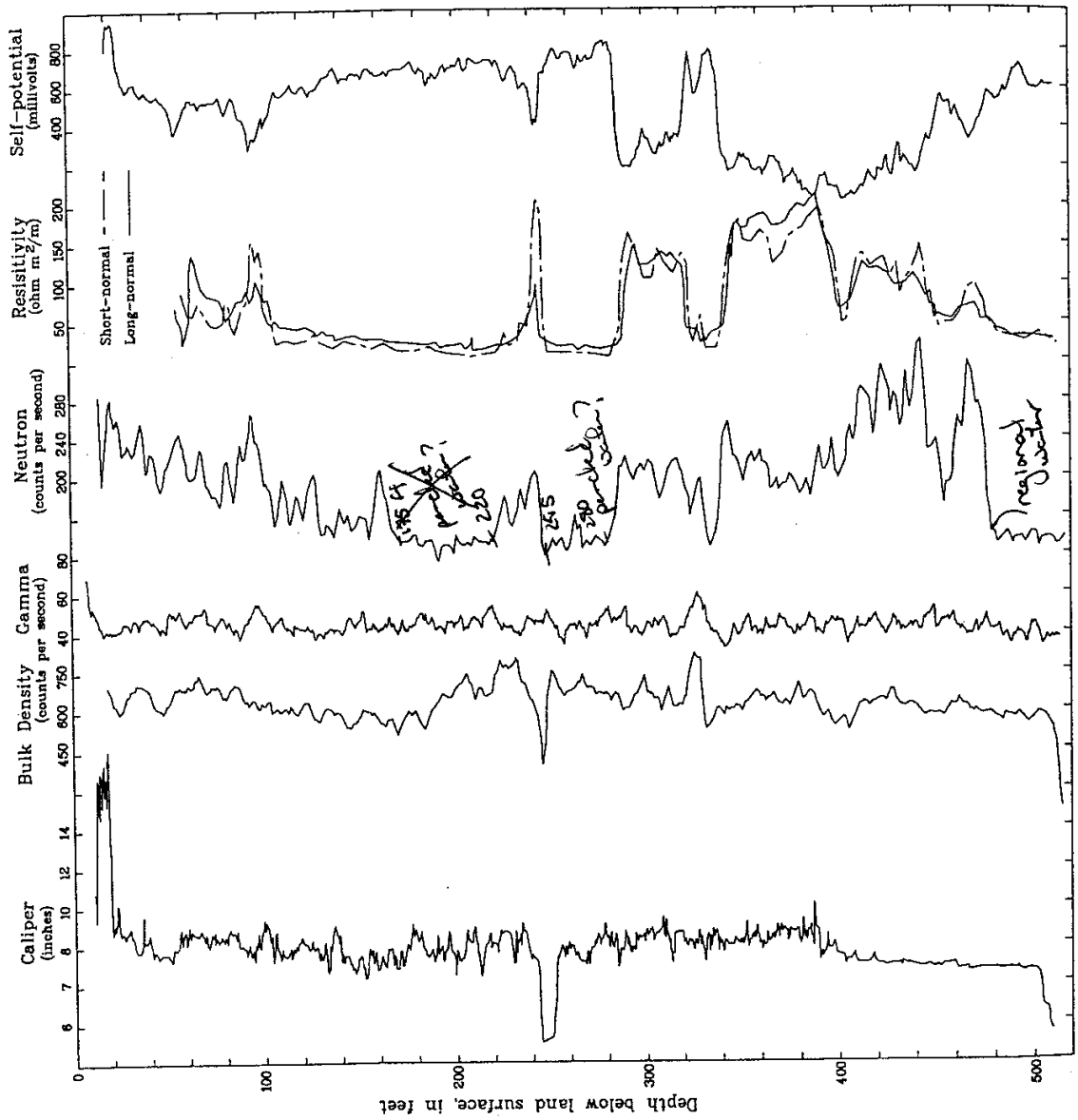
Project name: Kirtland Air Force Base IRP, Phase II Stage 2
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger Hole 3
Borehole number: KAFB0503 Location: 1469680N 406159E Surface Elevation: 5357ft
Drilling Company: USGS Drilling crew: Dave Rehder & Tony Shanahan
Date started drilling: 09-23-89 Date completed drilling: 09-27-89 Total Depth: 101ft
Drilling method: Hollow Stem Auger Drilling Fluid: _____
Borehole diameter: 8"
Drilling equipment: Mobile B-61 Sample type: core
Logged by: Ralph Wilcox

Date	Time	Depth(ft)	Lithology and Remarks
09-26-89	0744	79-80	(1.0 ft recovered) upper 0.5 ft sand, mg-vcg; lower 0.5 ft sandy silt, vfg, mod brown 5YR4/4 core wet probably from water put down outside of augers yesterday.
	1018	84-86	(2.0 ft recovered) upper 1.1 ft silty sand-sandy silt, vfg, w/ vcg sand <1%; lower 0.9 ft sand, vfg-fg, w/ vcg sand approx 1%, light brown 5YR5/6, very slight moistness.
	1104	89-91	(2.0 ft recovered) sand, vfg-fg, w/ vcg-sm pebbles <1cm, approx. 5%, grayish orange 10YR7/4, unconsolidated, very slight moistness, caliche nodules <3 in.
09-27-89	0737	94-96	(2.0 ft recovered) sand, fg, w/ vcg, sand-pebbles <2" approx. 10%, caliche nodules in lower 0.2 ft, light brown 5YR6/4, slightly moist, core drilled on 9-26 and pulled on 9-27.
	0855	99-101	(2.25 ft recovered) sand, vfg-fg, lower 0.4 ft gravelly approx. 25% vcg sand-sm pebbles <1in, unconsolidated slightly moist, light brown 5YR6/4, sampled @ 100 ft.

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2 Sheet 1 of 1
Project number: 463536000 Site: Site 5 (Sewage Lagoons) Well 3
Borehole number: KAFB0503 Location: 1469679.97N, 406159.74E Surface Elevation: 5356.89
Drilling Company: USGS Drilling crew: Jeff Eman, Art Clark, Dave Rehder
Date started drilling: 12-07-89 Date completed drilling: 12-08-89 Total Depth: 516ft
Drilling method: Mud Rotary Drilling Fluid: Bentonite
Borehole diameter: 7-7/8"
Drilling equipment: Gardner-Denver 17W
Logged by: Ralph Wilcox Sample type: cutting
Geophysical Logging Company: USGS Logger: Jim Hudson
Geophysical Tools Run: LSN Resistivity, SP, Natural Gamma, Density, Neutron, & Caliper

Date	Time	Depth(ft)	Lithology and Remarks
			Cuttings will be logged from 100 ft depth.
			Lithology above 100 ft was logged in auger hole.
12-07-89		100-115	sand, vcg, lower 5 ft near 2 mm, light brown 5YR6/4.
		115-120	sand fg-vcg w/ pebbles <0.5 cm.
		120-135	sand, vfg-fg & silt.
		135-175	silt and sand vfg w/ thin gravel stringers.
	1230	175-185	sand & silt, vfg.
		185-195	sand, vfg, slower drilling.
		195-235	silty sand to sandy silt vfg.
	1347	235-292	sand, fg.
		292-295	gravel.
		295-315	sand, fg, w/ gravel, loosing circulation @ 300 ft.
		315-370	gravel, cg sand-sm pebbles <0.5 cm qtz, kspar, mafics.
	1624	370-375	pebbles <1 cm, sm pebbles <0.5 cm qtz, kspar, mafics.
12-08-89	1145	375-395	gravel pebbles & frags <1 cm.
		395-516	sand, fg.
	1700		T.D. 516 ft.

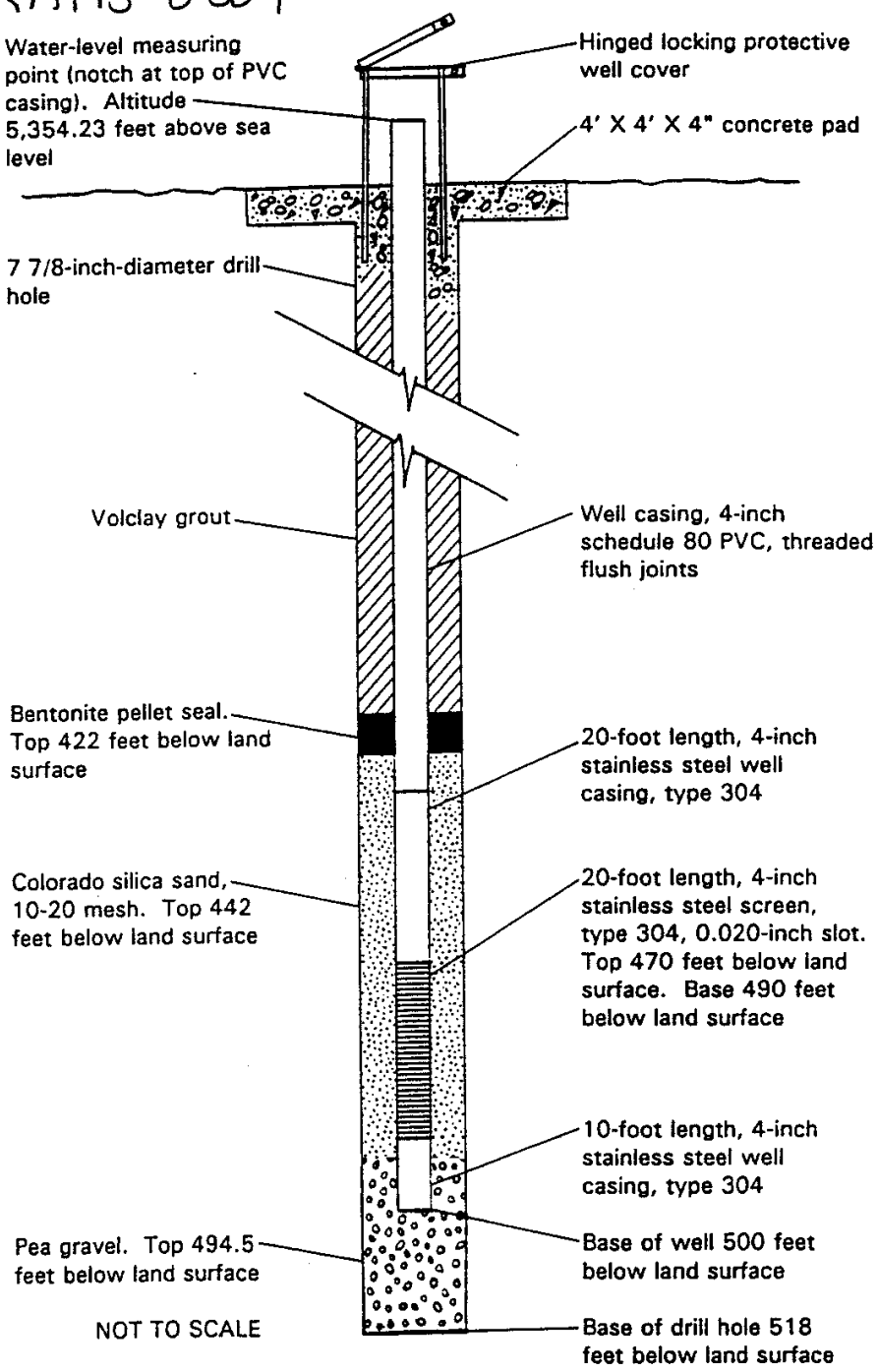


Geophysical Well Logs (KAFB0503)

D-250

AR2520

KAFB-0504



Well-completion diagram for monitoring well KAFB0504 drilled and completed by U.S. Geological Survey, Coal Branch, Denver, Colo. Started on 12-12-89. Completed on 01-21-90. Well drilled using mud-rotary method and Wyoming sodium bentonite drilling fluid.

AR2520

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2 Sheet 1 of 3
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger Hole 4
Borehole number: KAFB0504 Location: 1468485N, 406080E Surface Elevation: 5354ft
Drilling Company: USGS Drilling crew: Dave Rehder, Tony Shanahan, & Joe Wallace
Date started drilling: 09-27-89 Date completed drilling: 10-11-89 Total Depth: 101ft
Drilling method: Hollow Stem Auger Drilling Fluid: _____
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth (ft)	Lithology and Remarks
09-27-89	1252	0-4	sand, vfg-fg, grayish orange 10YR7/4, cutting sample.
	1310	4-6	(2.0 ft recovered) sand, vfg-fg, caliche presentalmost throughout, pinkish gray 5YR8/1, somewhatindurated breaks easily between thumb & forefinger,dry, vcg sand <1%, sampled @ 5 ft.
	1320	9-11	(2.0 ft recovered) sand & silty sand, vfg-fg, w/ vcg sand & sm. pebbles <1 cm, <2% except in lower 0.4 ft of core approx. 10%, root costs numerous w/ carbonaceous material (rare), caliche nodules, light brown 5YR6/4, dry.
	1347	14-16	(0.9 ft recovered) sandy gravel, fg sand approx. 50%, vcg sand to pebbles <3 in approx. 50%, dry, unconsolidated.
	1402	19-21	(1.0 recovered) sand, fg, w/ vcg sand <5%, light brown 5YR5/6, dry, unconsolidated, sampled @ 20 ft.
	1420	24-26	(1.80 ft recovered) upper 1.05 ft sandy gravel, fg & vcg sand & pebbles <1 in; lower 0.75 ft sand, vfg-fg, light brown 5YR5/6.
09-28-89	0756	29-31	(2.0 ft recovered) 29.0-29.7 sand, vfg-fg, w/ vcg sand & sm pebbles <1 cm, <1%, root casts numerous, few w/ traces of carbonaceous material, light brown 5YR6/4; 29.7-29.85 sandy gravel fg-sm pebbles <1 cm; 29.85-31 same as 29.0-29.7 w/
	1340	34-36	(2.0 ft recovered) silty sand, vfg, w/ vcg sand-sm pebbles, <1 cm, <1%, root casts numerous, carbonaceous material in some, light brown 5YR5/6, very slight moistness.
	1404	39-41	(1.3 ft recovered) sand, vfg-fg, light brown 5YR6/4, slightly moist, unconsolidated.

AR 2520

Borehole Log
Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger Hole 4
Borehole number: KAFB0504 Location: 1468485N, 406080E Surface Elevation: 5354ft
Drilling Company: USGS Drilling crew: Dave Rehder, Tony Shanahan, & Joe Wallace
Date started drilling: 09-27-89 Date completed drilling: 10-11-89 Total Depth: 101ft
Drilling method: Hollow Stem Auger Drilling Fluid: _____
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth (ft)	Lithology and Remarks
09-29-89		44-46	(2.0 ft recovered) silty sand, vfg, light brown 5YR5/6, slightly moist.
	1025	49-51	(2.0 ft recovered) sand, vfg-fg, w/ caliche nodules,w/ vcg sand <1%, light brown 5YR6/4, very slightmoistness, sampled @ 50 ft.
	1103	54-56	(2.0 ft recovered) silty sand-sandy silt, vfg,moderate yellowish brown 10YR5/4, 2 rhyolite pebbles1-2 in. in center of core, slightly moist.
	1126	59-61	(1.4 ft recovered) upper 1.0 ft sand, fg, w/ vcg sand, moderate yellowish brown, 10YR5/4; middle 0.3 ft gravel, mg sand approx. 30% & sm pebble 2-8 mm 70%; lower 0.1 ft silty sand, vfg, grayish orange 10YR7/4, very slight moistness.
	1156	64-66	(1.8 ft recovered) upper 0.7 ft, silty gravelly sand-sandy gravelly silt, vfg, w/ vcg sand-sm pebbles <1 cm, approx. 5%, light brown 5YR5/6; some induration but breaks up readily between thumb & forefinger; grades downward into gravelly sand vfg; lower 1.1 ft, gravel same as in upper 0.7 ft. caliche cemented throughout, very pale orange 10YR8/2.
	1445	69-71	(2.0 ft recovered) sand, vfg-fg, w/ vcg sand <2%, light brown 5YR6/4, dry.
10-11-89	1000	74-76	(2.0 ft recovered) upper 0.95 ft sand vfg-fg, light brown 5YR6/4; middle 0.9 ft as above slightly silty w/ root casts, some w/ traces of carbonaceous material; lower 0.15 ft same as middle but w/ approx. 2% vcg sand, dry.
	1033	79-81	(2.0 ft recovered) upper 0.4 ft, sand, fg w/ vcg sand <1% light brown 5YR6/4; middle 1.3 ft as above but silty w/ approx. 5% vcg sand; lower 0.3 ft sand vfg-fg, unconsolidated, dry.

Borehole Log

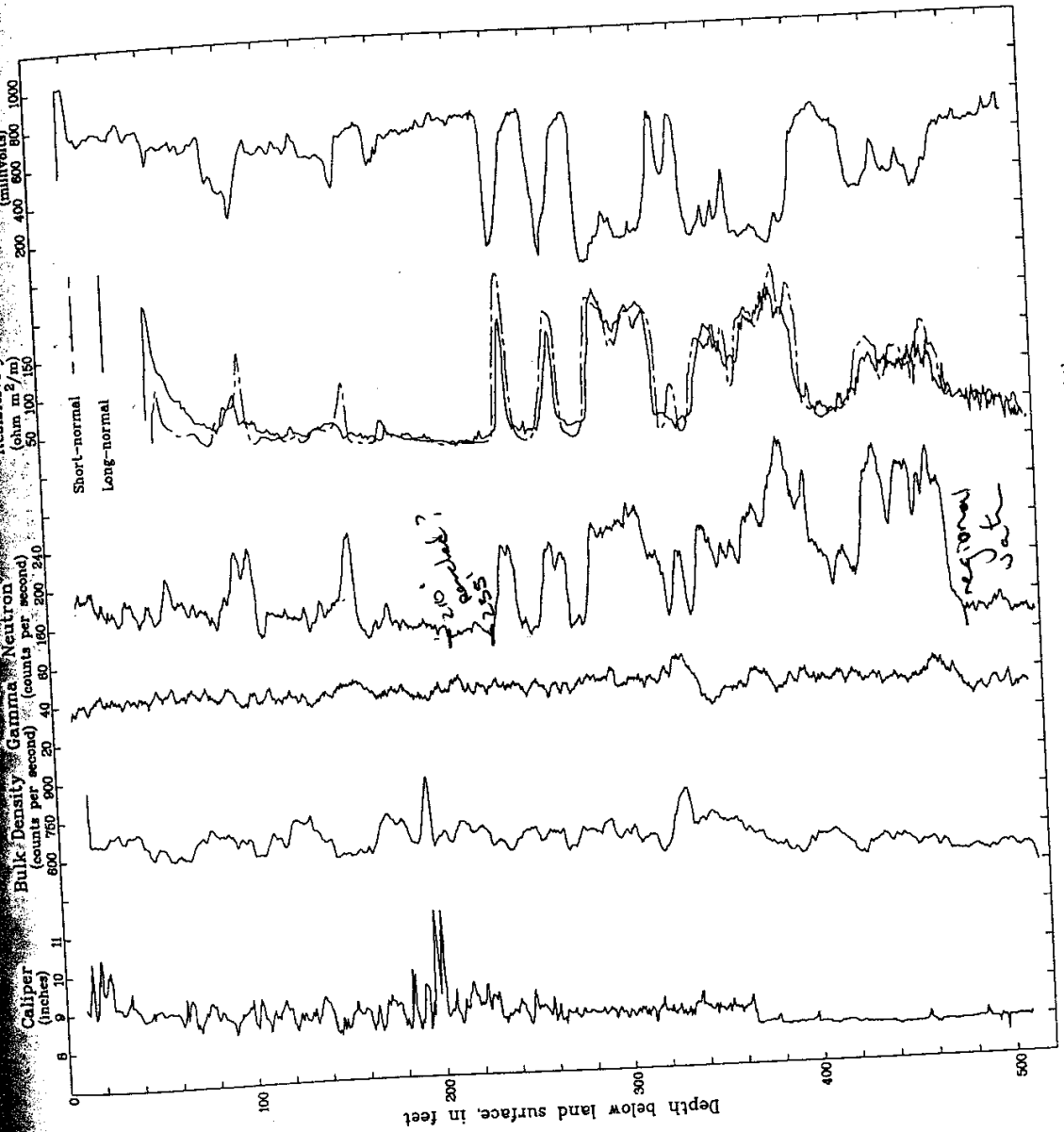
Project name: Kirtland Air Force Base IRP, Phase II Stage 2 Sheet 3 of 3
Project number: 463536000 Site: Site 5 (Sewage Lagoons), Auger Hole 4
Borehole number: KAFB0504 Location: 1468485N, 406080E Surface Elevation: 5354ft
Drilling Company: USGS Drilling crew: Dave Rehder, Tony Shanahan, & Joe Wallace
Date started drilling: 09-27-89 Date completed drilling: 10-11-89 Total Depth: 101ft
Drilling method: Hollow Stem Auger Drilling Fluid: _____
Borehole diameter: 8"
Drilling equipment: Mobile B-61
Logged by: Ralph Wilcox Sample type: core

Date	Time	Depth (ft)	Lithology and Remarks
	1125	84-84.5	(0.5 ft recovered) silty sand, vfg-fg, moderage brown 5YR4/4, wet (moisture from water which was added to bore hole to allow drilling).
	1151	84.5-86	(1.5 ft recovered) silty sand, vfg-fg, light brown5YR5/6, w <1% pebbles, <2 cm, & root casts some w/carbonaceous material, core damp (moisture from wateradded to bore hole, i.e. barrel wet on outside).
	1215	89-91	(0.7 ft recovered) sand & gravel, fg-sm pebbles, <1cm, moderate brown 5YR4/4, moist (still moist fromwater added @ 84 ft depth).
	1241	94-96	(2.0 ft recovered) sand, fg, upper 1.2 ft w/ vcg sand approx. 5%, light brown, 5YR6/4, slightly moist.
	1319	99-99.4	(0.4 ft recovered) sand & gravel fg-pebbles <2.5 cm, uncolidated, slightly moist.
	1404	99.4-101	(1.5 ft recovered) same as 99-99.4, sampled @ 100 ft.

Borehole Log

Project name: Kirtland Air Force Base IRP, Phase II Stage 2 Sheet 1 of 1
Project number: 463536000 Site: Site 5 (Sewage Lagoons) Well 4
Borehole number: KAFB0504 Location: 1468485.45N, 406080.66E Surface Elevation: 5353.50
Drilling Company: USGS Drilling crew: Jeff Eman, Ark Clark, Dave Rehder
Date started drilling: 12-12-89 Date completed drilling: 01-17-90 Total Depth: 518ft
Drilling method: Mud Rotary Drilling Fluid: Bentonite
Borehole diameter: 7-7/8"
Drilling equipment: Gardner-Denver 17W
Logged by: Ralph Wilcox Sample type: cutting
Geophysical Logging Company: USGS Logger: Jim Hudson
Geophysical Tools Run: LSN Resistivity, SP, Natural Gamma, Density, Neutron, & Caliper

Date	Time	Depth(ft)	Lithology and Remarks
12-12-89			Lithology is logged from 100 ft down. Lithology above 100 ft was logged in the auger hole.
		100-102	sandy silt to silty sand, vfg.
		102-115	sand, cg w/ sm pebbles <0.5 cm.
		115-135	sandy silt to silty sand vfg w/ vcg sand.
		135-155	sand, vfg
		155-195	sand cg-vcg, w/ pebbles <0.5 cm.
12-30-89		195-240	sandy silt to silty sand, vfg.
		240-250	sandy silt to silty sand,w/ stray gravels <1 ftthick.
		250-255	sand & gravel, fg-vcg, pebbles <0.5 cm; mafics, qtz& kspar.
		255-315	sand mg-cg.
		315-335	gravel, vcg sand to pebbles <1 cm; circulating @ 335 ft brought up clay balls, pale olive 10Y6/2.
		335-345	sand & gravel mg-sm pebbles <1 cm.
		345-362	sand & gravel cg-sm pebbles <1 cm (coarse gravel probably cobbles @ 362 ft.
01-16-90	1300	362-391	sand & gravel, mg-sm pebbles <0.5 cm (mafics, qtz, & Kspar).
	1404	391-395	gravel w/ pebbles <1 cm.
		395-410	sand & gravel, mg-sm pebbles <0.5 cm.
01-17-90	0905	410-472	sand, vfg, probably silty, drilling slowly.
	0950	472-475	sand, vfg, drilling faster = less silty.
		475-477	gravel.
		477-518	sand, vfg-fg, silty in spots.
	1140		T.D. 518 ft.



Geophysical Well Logs (KAFB0504)

AR 2520

KAFB-0505

AIR FORCE ID KAFB-0505
LOCATION ID WP26-SB-L6
DATE INSTALLED 7/22/99
WELL OWNER Kirtland AFB
WELL TYPE Monitor well
DRILLING COMPANY Water Development
FORM OF COMPLETION Slotted

MEASURING POINT EVALUATION 5360.14
HYDROGEOLOGIC COMPLETION ZONE Santa Fe Group
SOLE SOURCE AQUIFER CODE
INSIDE DIAMETER OF BOREHOLE 11-7/8" to 290'; 9-5/8" to 524'
TOTAL DEPTH OF BOREHOLE 524'
SCREEN NUMBER 0.020"
FIELD GEOLOGIST Clarence Pigman

BEGIN DEPTH	END DEPTH	
2.0'	479.2'	GROUT INTERVAL GROUT TYPE Cement with 3% bentonite
479.2'	491.5'	BENTONITE SEAL SEAL TYPE 3/8" pellets
491.5'	521.3'	FILTER PACK FILTER PACK TYPE 10/20 silica sand
495.4'	520.5'	SCREEN INTERVAL MATERIAL SCH 80 PVC SLOT SIZE 0.020" DIAMETER 5" % OPEN Standard
520.5'	521.3'	SILT TRAP (FOOT) MATERIAL SCH 80 PVC

TOTAL WELL DEPTH 521.3'

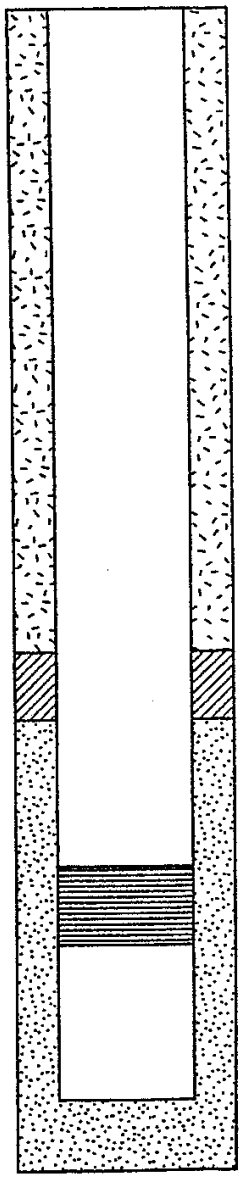
ANNULAR VOLUME:

$V = \pi H (R_1^2 - R_2^2)$

WHERE:

V = Annular Volume (ft^3)
π = 3.142
H = Length of Interval (ft)
R_1 = Borehole Radius (ft)
R_2 = Well Casing Radius (ft)

CALCULATIONS:



(NOT TO SCALE)

COMMENTS: Slough present from 521.3' to 524' bgs.

MONITORING WELL COMPLETION FORM

AR176

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PROJECT NO. 13701128.02162601 12/2/99

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Air Force ID: Kirtland AFB

Date Drilled: 6/29/99 Date Completed: 7/29/99

Logged By: Clarence Pigman

ESTAB Company: Daniel B. Stephens & Assoc.

Soil Boring ID: WP26-SB-L6

LTC: BH MW

Northing: 1,469,786.69 Easting: 406,436.61

Coordinate System Type: NAD 27
Method: Survey
Units: Feet

Location Proximity:
Kirtland AFB Sewage Lagoon WP-26

Ground Surface Elevation (ft): 5358.14

Measuring Point (MP) Elevation (ft): 5360.14

MP is Top of Casing Datum: msl

Drilling Contractor: Water Development

Drilling Method: Air Rotary

Borehole Diameter (in.): 11 7/8 Depth (ft BGS): 0-290
9 5/8 290-524

Depth to Water Below GS (ft): 497.06 Date Measured: 7/11/99

(USAF, 2000)

AR 176

Kirtland AFB Sewage Lagoons
Soil Boring Log: WP26-SB-L6
Monitor Well Log: KAFB0505

Daniel B. Stephens & Associates, Inc.
8-27-99 JN 8039

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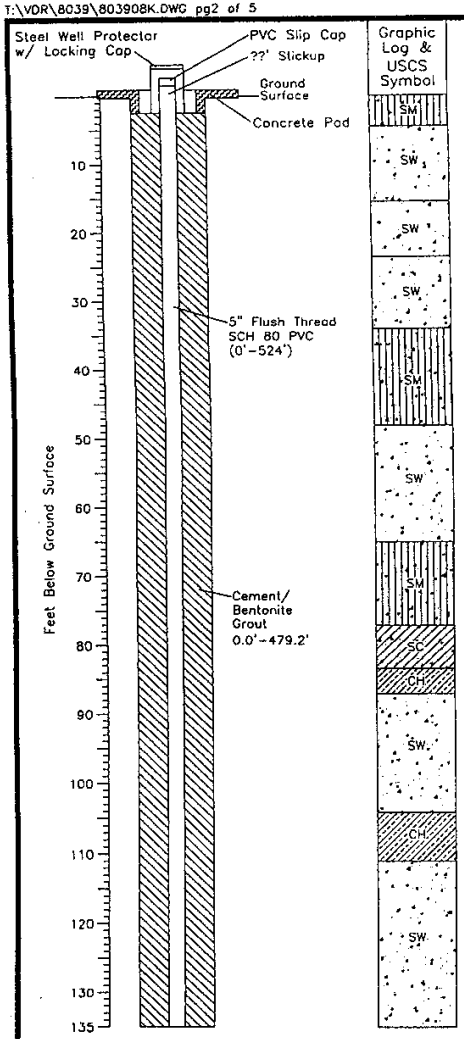

Graphic Log & USCS Symbol	Lith. Code (ERPIMS)	PID Reading (ppm)	Sampling Device	Blow Counts (per 0.5')	Sample Interval (feet bgs)	Sample Recovery (%)	Comments and Lithology
SM	SDSL	16.3	Cuttings	NA	2-3	NA	2 - Silty sand; light brown (7.5YR 6/4); silt to medium-grained sand; mostly very fine-grained sand; poorly sorted; subrounded grains; moderate plasticity; loose; few coarse grains; dry
SW	SDFN	7.8	Cuttings	NA	10-11	NA	10 - Sand with silt; light brown (7.5YR 6/4); silt to coarse grained sand; mostly fine-grained sand; poorly sorted; subrounded grains; slight plasticity; medium dense; dry; a lot of caliche and caliche nodules
SW	SD	25.0	Split Spoon	45/18	19.6-21.1	100	19.6 - Sand; brown (7.5YR 5/4); very fine to coarse grained sand with pebbles; poorly sorted; well graded; angular to subrounded; medium dense; dry; a lot of caliche nodules; biotite mica common
SW	SDFN	1.6	Cuttings	NA	30-31	NA	30 - Sand with silt (7.5YR 6/4); light brown; silt to coarse grained sand; mostly very fine to fine-grained sand; poorly sorted; slight plasticity; angular to subrounded grains; loose; dry; biotite mica common; gravel clasts granitic and limestone
SM	SDSL	1.9	Cuttings	NA	41-42	NA	41 - Silty sand; light brown (7.5YR 6/4); silt to 3/4" gravel; mostly very fine-grained sand; poorly sorted; subrounded grains; slight plasticity; loose; dry; biotite mica common
SW	SDFN	1.3	Cuttings	NA	50-51	NA	50 - Sand with silt; light brown (7.5YR 6/4); silt to pebbles; mostly fine-grained sand; poorly sorted; angular to subangular grains; moderate plasticity; loose; dry; limestone pebbles common
SW	SDFN	39.4	Split Spoon	8/24/8-3"	58.5-59.7	100	58.5 - Sand with silt; light brown (7.5YR 6/4); silt to pebbles; mostly fine-grained sand; poorly sorted; angular to subangular grains; slight plasticity; loose; dry; caliche nodules; pebbles are greenstone and limestone
SM	SDSL	1.1	Cuttings	NA	70-71	NA	70 - Silty sand; light brown (7.5YR 6/4); silt to medium-grained sand; mostly very fine-grained sand; poorly sorted; subrounded grains; loose; dry
SC	SDCL	1.1	Cuttings	NA	80-81	NA	80 - Clayey sand; brown (7.5YR 5/4); clay to medium-grained sand; mostly fine-grained sand; poorly sorted; subangular grains; moderate to high plasticity; medium dense; moist; at 84', encounter clay
CH	CLAY						
SW	SDFN	1.4	Cuttings	NA	90-91	NA	90 - Sand; reddish yellow (7.5YR 6/6); very fine-grained to coarse-grained sand; mostly fine-grained sand; poorly sorted; angular to rounded grains; loose; moist; have clay balls that probably represent thin interbeds of clay
SW	SDFN	1.2	Cuttings	NA	100-101	NA	100 - Sand; strong brown (7.5YR 5/6); very fine to coarse-grained sand; mostly fine-grained; poorly sorted; subangular to subrounded grains; loose; damp; fines are clay; at 104' encounter clays
CH	CLAY						
SW	SDFN	0.7	Cuttings	NA	120-121	NA	120 - Sand; strong brown (7.5YR 5/6); very fine to coarse grained; mostly fine-grained sand; poorly sorted; subangular to subrounded grains; loose; damp
	SDFN	1.3	Cuttings	NA	130-131	NA	130 - Sand; strong brown (7.5YR 5/6); very fine-grained sand to pebbles; mostly fine-grained sand; poorly sorted; angular to rounded clasts; loose; dry; pebbles mostly quartz; a lot of biotite mica; fines are mostly clay

Hydrogeologist: C. Pigman
Driller: Water Development
Date completed: 7-29-99

Drilling method: Air rotary
Bit diameter:
11 7/8 in. O.D. from 0'-290'
9 5/8 in. O.D. from 290'-534'

Note: PID readings may be unrepresentative due to use of air rotary drilling method and injected water.

Kirtland AFB Sewage Lagoons

Soil Boring Log: WP26-SB-L6
Monitor Well Log: KAFB0505

Daniel B. Stephens & Associates, Inc.
8-27-99
JN 8039

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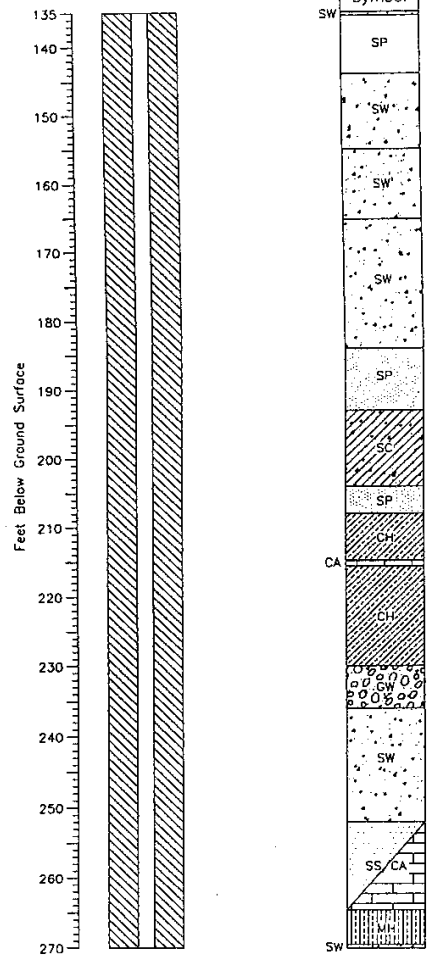


Graphic Log & USCS Symbol	Lith. Code (ERPIMS)	PID Reading (ppm)	Sampling Device	Blow Counts (per 0.5')	Sample Interval (feet bgs)	Sample Recovery (%)	Comments and Lithology
SW							
SP	SDFN	0.7	Cuttings	NA	140–141	NA	140 – Sand with clay; reddish yellow (7.5YR 6/6); clay to fine-grained sand with few pebbles; mostly fine-grained sand; well sorted; subrounded grains; slight to moderate plasticity; medium dense; damp to moist; fines mostly clay
SW	SD	0.1	Cuttings	NA	150–151	NA	150 – Sand; light brown (7.5YR 6/4); very fine-grained to coarse grained; poorly sorted; well graded; angular to subrounded grains; loose; dry; a lot of quartz, plag, and biotite (granitic detritous); fines mostly clay; at 155' have sand with gravel
SW	SD	0.0	Cuttings	NA	160–161	NA	160 – Sand; light brown (7.5YR 6/4); clay to 3/4" diameter gravel; poorly sorted; well graded; angular to rounded clasts; loose; damp to moist; granitic detritous, quartz, plag, k-spar, biotite; at 160' predominantly sand
SW	SDFN	1.5	Cuttings	NA	170–171	NA	170 – Sand with clay and gravel; reddish yellow (7.5YR 6/6); clay to 1/2" diameter gravel; mostly very fine to fine-grained sand; poorly sorted; angular to rounded clasts; slight plasticity; medium dense; moist; balls of clayey sand probably represent interbeds of clay or clayey sand
	SDFN	2.4	Cuttings	NA	180–181	NA	180 – Sand with clay; pale brown (10YR 6/3); clay to coarse-grained sand; mostly fine-grained sand; poorly sorted; angular to rounded grains; plasticity and moisture content undetermined and P.I.D. reading questionable due to water injection, caliche nodules or layer at 184'
SP	SDFN	1.1	Cuttings	NA	190–191	NA	190 – Sand with clay
	SDFN	1.2	Split Spoon	5/3/3	192–193.5	100	192 – Sand with clay; brown (7.5YR 5/4); clay to fine-grained sand; mostly fine-grained sand; well sorted; subrounded to rounded grains; slight plasticity (fines silty clay); loose; wet; mica common, caliche layers and nodules from 184' to 193'
SC	SDCL	2.1	Split Spoon	7/9/9	197–198.5	100	197 – Clayey sand; brown (7.5YR 5/4); clay to fine-grained sand; mostly fine-grained sand; well sorted; subangular to subrounded grains; loose; wet to saturated (alternating layers)
	SDCL	1.3	Cuttings	NA	200–201	NA	200 – Clayey sand; same as above; moisture content and plasticity undetermined and P.I.D. in question, been injecting water
SP	SDFN	5.0	Split Spoon	3/7/9	207–208.5	100	207 – Sand with silt; brown (7.5YR 5/4); silt to fine-grained sand; mostly fine-grained sand; well sorted; subangular to subrounded grains; loose; wet to saturated; micaceous (biotite common); at 208' encounter fat clay with caliche nodules
CH	CLAY	5.0	Cuttings	NA	210–211	NA	210 – Clay with sand; brown (7.5YR 5/4); clay to very fine grained sand; high plasticity; moisture content undetermined injecting water; at 215' have caliche layer or nodules
CA	SSCA						
CH	CLAY	2.0	Cuttings	NA	220–221	NA	220 – Clay with sand; same as above
GW	GVLP	2.0	Cuttings	NA	230–231	NA	230 – Gravel and sand; fine-grained sand to 1/2" diameter gravel; clasts of black volcanics and quartzite; some caliche but probably from uphole; moisture content undetermined, injecting water
SW	SD	0.0	Cuttings	NA	240–241	NA	240 – Sand; grayish brown (10YR 5/2); fine to coarse grained sand; poorly sorted; subangular to subrounded grains; loose; moisture content undetermined; black mafic lithic fragments, quartz, k-spar, sanidine (one grain); plag grains common; tagged water at 240.18' bgs on 7/6/99 through drill stem after sat undisturbed for 3 days
	SDGR	0.0	Cuttings	NA	250–251	NA	250 – Sand; same as above except with gravel to 3/4" in diameter; mostly coarse grained sand; at 252' encounter clayey sand and caliche; borehole making water
SS/CA	SSCA	0.2	Split Spoon	4/7/10	257–258.5	100	257 – Calcareous clayey sand (caliche); light brown (7.5YR 6/4); clay to medium-grained sand; mostly fine-grained sand; poorly sorted; subrounded grains; high plasticity; loose to dense depending on amount of cementation; moist to wet; stringers of calcium carbonate; black laminae possible organics
MH	STCL	1.0	Split Spoon	5/7/10	267–268.5	100	270 – Sandy silt; very pale brown (10YR 7/4); clay to fine-grained sand; mostly silt (clayey silt); high plasticity; loose; wet to saturated; saturated portion of sample possible slurry from injected water; at approximately 269–270' have a lot of black lithic grains in cuttings and slurry thin, may be in sand; at 280' encounter caliche
SW	SW??						

Hydrogeologist: C. Pigman
Driller: Water Development
Date completed: 7–29–99

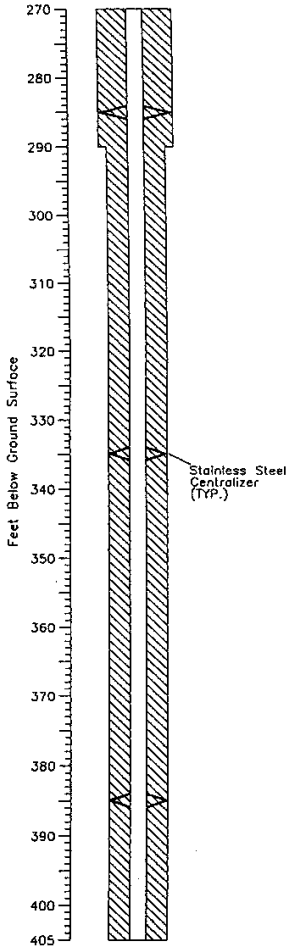
Drilling method:
Bit diameter:
11 7/8 in. O.D. from 0'–290'
9 5/8 in. O.D. from 290'–534'

Note: PID readings may be unrepresentative due to use of air rotary drilling method and injected water.

Kirtland AFB Sewage Lagoons

Soil Boring Log: WP26-SB-L6
Monitor Well Log: KAFB0505

Daniel B. Stephens & Associates, Inc.
8-27-99
JN 8039



Graphic Log & USCS Symbol	Lith. Code (ERPIMS)	PID Reading (ppm)	Sampling Device	Blow Counts (per 0.5')	Sample Interval (feet bgs)	Sample Recovery (%)	Comments and Lithology
SW							
CA SM	SSCA/ SDSL	2.0	Cuttings	NA	280–281	NA	280 – Calcareous sandstone (caliche) with possible clayey silty sand interbedded; pinkish gray (7/5YR 7/2) and brown (7.5YR 5/4); silt to fine-grained sand; mostly fine-grained sand; poorly sorted; subrounded grains in calcareous or calcareous silty matrix; loose to moderately dense; few clay layers interbedded; moisture content nondeterminant injecting water; at approximately 287' encounter silty sand and borehole making water
SW	SSCA/ SDSL SD	1.5	Split Spoon	9/13/16	290–291.5	85	290 – Calcareous sandstone and silty sand; very pale brown (10YR 7/3); silt to medium-grained sand; mostly fine grained sand; subangular grains; low plasticity; calcareous sandstone is fissile and moist; silty sand wet to saturated; at 291.5' have sand; very fine to coarse grained; poorly sorted; well graded; subangular grains; moist to wet; at 290' borehole making approximately 5 gpm of water; lag water at 284.6' bgs on 7/7/99
GW	GVLG	0.0	Cuttings	NA	301–302	NA	301 – Gravel with sand; brown (10YR 4/3); medium-grained sand to 1 1/2" diameter gravel; mostly coarse sand and gravel; poorly sorted; angular to rounded clasts; loose; moisture content undetermined injecting water to get circulation back; grains of quartz, k-spar, and black lithic fragments (volcanic dacite)
GW	GVLG	2.0	Cuttings	NA	311–314	NA	311 – Gravel with sand; same as above; at 314' encounter sand
SW	SDMD	1.5	Cuttings	NA	322–323	NA	322 – Sand; brown (10YR 5/3); fine to coarse grained; mostly medium grained; poorly sorted; subangular to rounded grains; loose; wet; mostly quartz; k-spar and black lithic grains common; minor sanadine
	SDMD	1.0	Cuttings	NA	330–331	NA	330 – Sand; same as above
	SDMD	1.5	Cuttings	NA	340–341	NA	340 – Sand; same as above; little drier; just moist; at 345' encounter sand with silt
SW	SD	1.8	Cuttings	NA	350–351	NA	350 – Sand with silt; dark yellowish brown (10YR 4/4); silt to coarse-grained sand; poorly sorted; well graded; moderately dense; damp to moist; at 354 encounter clayey sand with gravel
SC	SPCL	NA	Cuttings	NA	355–356	NA	355 – Clayey sand with gravel; brown (7.5YR 4/3); clay to 2" diameter gravel; mostly medium to coarse grained sand; poorly sorted; well graded; subangular to rounded clasts; moderate plasticity; moist to wet; loose to moderately dense; at 359' sand with silt again
	SD	1.0	Cuttings	NA	360–362	NA	360 – Sand; yellowish brown (10YR 5/4); very fine-grained to coarse-grained sand; few pebbles; poorly sorted; well graded; angular to rounded grains; loose; moist; grains of mostly quartz with k-spar and black lithic grains common
SW	SD	2.0	Cuttings	NA	370–371	NA	370 – Sand; same as above
	SD	1.7	Cuttings	NA	380–381	NA	380 – Sand; same as above; fewer pebbles; more quartz grains; less k-spar and lithic grains
	SD	1.5	Cuttings	NA	390–391	NA	390 – Sand; light yellowish brown (10YR 6/4); very fine to coarse grained; mostly fine to medium grains; poorly sorted; angular to subrounded grains; loose; damp; at 392' have sand with gravel
SW GW	SDGR	1.8	Cuttings	NA	400–401	NA	400 – Sand and gravel; light yellowish brown (10YR 6/4); fine-grained sand to 3/8" diameter gravel; poorly sorted; well graded; angular to rounded grains; loose; damp; gravel content and size varying from near 50% gravel and clasts up to 2" in diameter; most sand grains quartz with k-spar common; gravel clasts mostly black to gray volcanics

Hydrogeologist: C. Pigman
Driller: Water Development
Date completed: 7–29–99

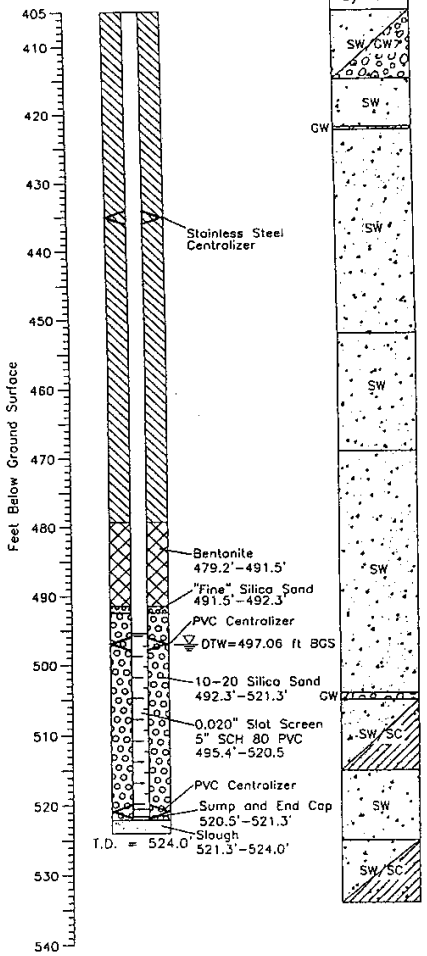
Drilling method:
Bit diameter:
11 7/8 in. O.D. from 0'–290'
9 5/8 in. O.D. from 290'–534'

Note: PID readings may be unrepresentative due to use of air rotary drilling method and injected water.

Kirtland AFB Sewage Lagoons

Soil Boring Log: WP26-SB-L6
Monitor Well Log: KAFB0505

Daniel B. Stephens & Associates, Inc.
8–27–99
JN 8039



Lith. Code (ERPIMS)	PID Reading (ppm)	Sampling Device	Blow Counts (per 0.5')	Sample Interval (feet bgs)	Sample Recovery (%)	Comments and Lithology
SDGR	0.2	Cuttings	NA	410-411	NA	410 – Sand and gravel; same as above; at 412' have moist sand with gravel; at 415' mostly sand with little gravel and just damp
SDMD GVL	2.0	Cuttings	NA	420-421	NA	420 – Sand; pale brown (10YR 6/3); fine to coarse grained; mostly medium to coarse grained; poorly sorted; subangular to rounded grains; loose; damp to moist; grains mostly quartz, k-spar and black lithic grains common; gravel layer at 422'-423'
SDMD	1.9	Cuttings	NA	430-431	NA	430 – Sand; same as above; occasional gravel clasts; mostly 3/8" diameter pebbles
SDMD	2.0	Cuttings	NA	440-441	NA	440 – Sand; same as above
SDMD	1.0	Cuttings	NA	450-451	NA	450 – Sand; pale brown (10YR 6/3); very fine to coarse grained; mostly medium grained; poorly sorted; angular to rounded grains; loose; dry; mostly quartz grains with k-spar common; few black lithic grains; at 452' have pebbles in sand
SD	1.8	Cuttings	NA	460-461	NA	460 – Sand with gravel; brown (10YR 5/3); fine-grained sand to 1/2" diameter gravel; mostly medium to coarse grained sand; poorly sorted; well graded; angular to rounded clasts; loose; moist to wet
SD SD	1.8 1.8	Split Spoon Cuttings	8/13/18 NA	469.2-470.8 470-471	100 NA	469.2 – Sand; pale brown (10YR 6/3); very fine to coarse grained; poorly sorted; angular to rounded grains; loose; moist; gravel in top sleeve of sample 469.2 through 469.5 bgs 470 – Sand with gravel; light brownish gray (10YR 6/2); fine-grained sand to pebble gravel 1/4" in diameter; mostly medium to coarse grained sand; poorly sorted; angular to rounded clasts; loose; dry
SDMD	2.0	Cuttings	NA	480-481	NA	480 – Sand; yellowish brown (10YR 5/4); fine-grained sand to 1" diameter-gravel; mostly medium grained sand; poorly sorted; angular to rounded clasts; loose; moisture content undetermined (injecting water)
SD	2.0	Cuttings	NA	492-493	NA	492 – Sand; same as above; little more clay matrix and little more gravel
SD GVL	2.0	Cuttings	NA	500-501	NA	500 – Sand and gravel; yellowish brown (10YR 5/4); fine-grained sand to 3/4" gravel; poorly sorted; well graded; subangular to rounded clasts; loose; moisture content undetermined; injecting water; at 504' to 505' encounter gravel layer with clasts to 2" in diameter, at 505' driller thinks may be in clayey sand
SDCL	2.0	Cuttings	NA	510-511	NA	510 – Sand with clay or clayey sand; yellowish brown (10YR 5/6); clay to coarse-grained sand; poorly sorted; well graded; subangular to rounded grains; loose; saturated; difficult to estimate amount of fines and plasticity (injecting water) at approximately 515' encounter sand
SDGR	1.8	Cuttings	NA	520-521	NA	520 – Sand with gravel; yellowish brown (10YR 5/4); fine sand to 3/8" diameter gravel; poorly sorted; well graded; angular to rounded clasts; loose; saturated; at approximately 525' encounter clayey sand or sand with clay
SD	1.8	Cuttings	NA	530-531	NA	530 – Sand with clay or clayey sand; clay to coarse grained sand; mostly fine to medium grained sand; poorly sorted; subangular to rounded grains; loose; saturated; difficult to estimate amount of fines and plasticity (injecting water)

Hydrogeologist: C. Pigmon
Driller: Water Development
Date completed: 7-29-99

Drilling method:
Bit diameter:
11 7/8 in. O.D. from 0'-290'
9 5/8 in. O.D. from 290'-534'

Note: PID readings may be unrepresentative due to use of air rotary drilling method and injected water.

Kirtland AFB Sewage Lagoons

Soil Boring Log: WP26-SB-L6
Monitor Well Log: KAFB0505

Daniel B. Stephens & Associates, Inc.
8-27-99
JN 8039

AR 176

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
NATURAL GAMMA RAY NEUTRON INDUCTION IND. RESISTANCE	LOG MEASURED FROM: GL ELEVATION:	VIDEO

COMPANY: KIRTLAND AIR FORCE BASE
PROJECT/FIELD: SEWAGE LAGOONS
WELL: KAFB0505
LOCATION: SEC: T: R:
NORTH= EAST=
COUNTY: BERNALILLO STATE: NEW MEXICO

ELEVATION KB:
DF:
GL:

	RUN NO. 1		RUN NO. 1
DATE	8/10/99	FLUID LEVEL	499 FT
DEPTH DRILLER	525 FT	FLUID NATURE	FORMATION FLUID
DEPTH LOGGER	522 FT	FLUID VISCOSITY	
BOTTOM LOGGED	521 FT	FL. RESISTIVITY	
TOP LOGGED INT.	SURFACE	FL. RES. @ B.H.T.	
CASING LEVEL	ALL	CIRCULATION TEMP.	
CASING SIZE	5" SCH. 80	BOT HOLE TEMP.	
CASING SIZE	PVC	TOOL #	COMBO/GEONICS
BIT SIZE		LOGGED BY:	SHERRY MILLER
BIT SIZE		WITNESSED BY:	JIM CALVERT

REMARKS:

THANK YOU

COMPANY: KIRTLAND AIR FORCE BASE
WELL: KAFB0505

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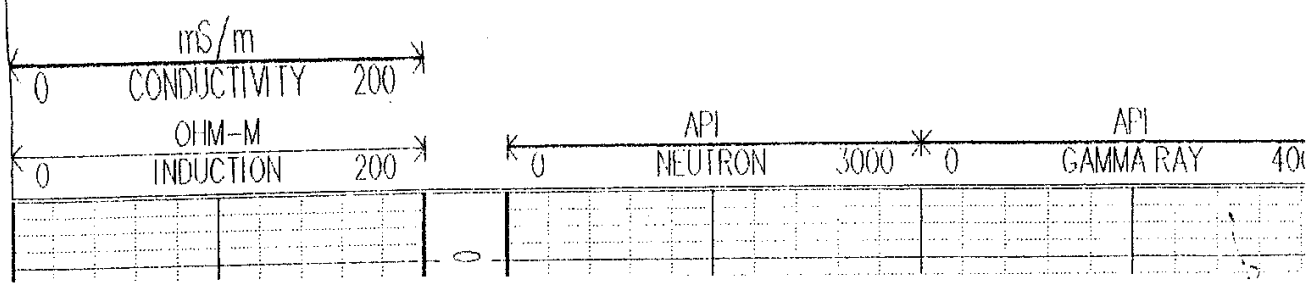

REMARKS:

THANK YOU

BASE

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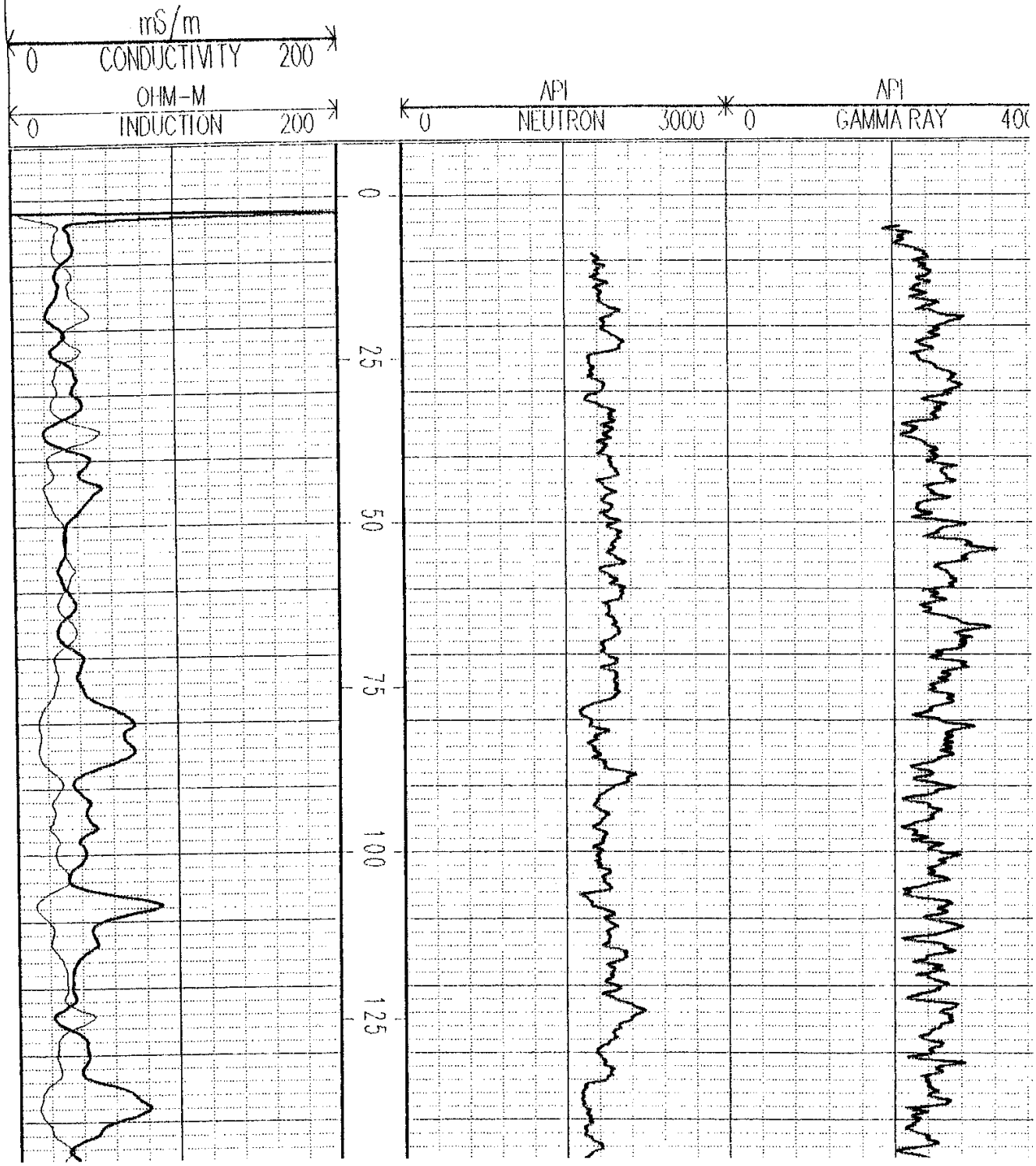

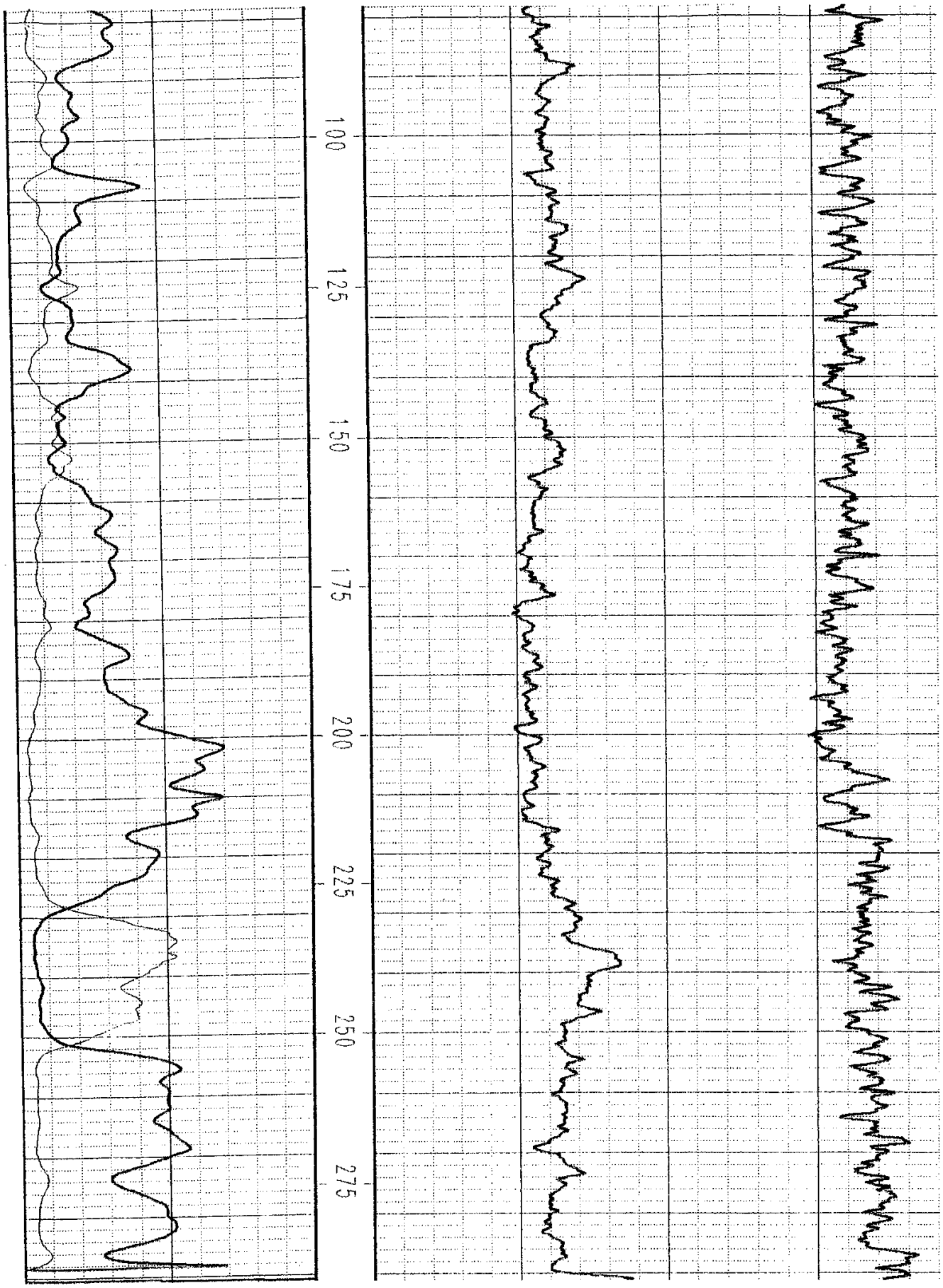
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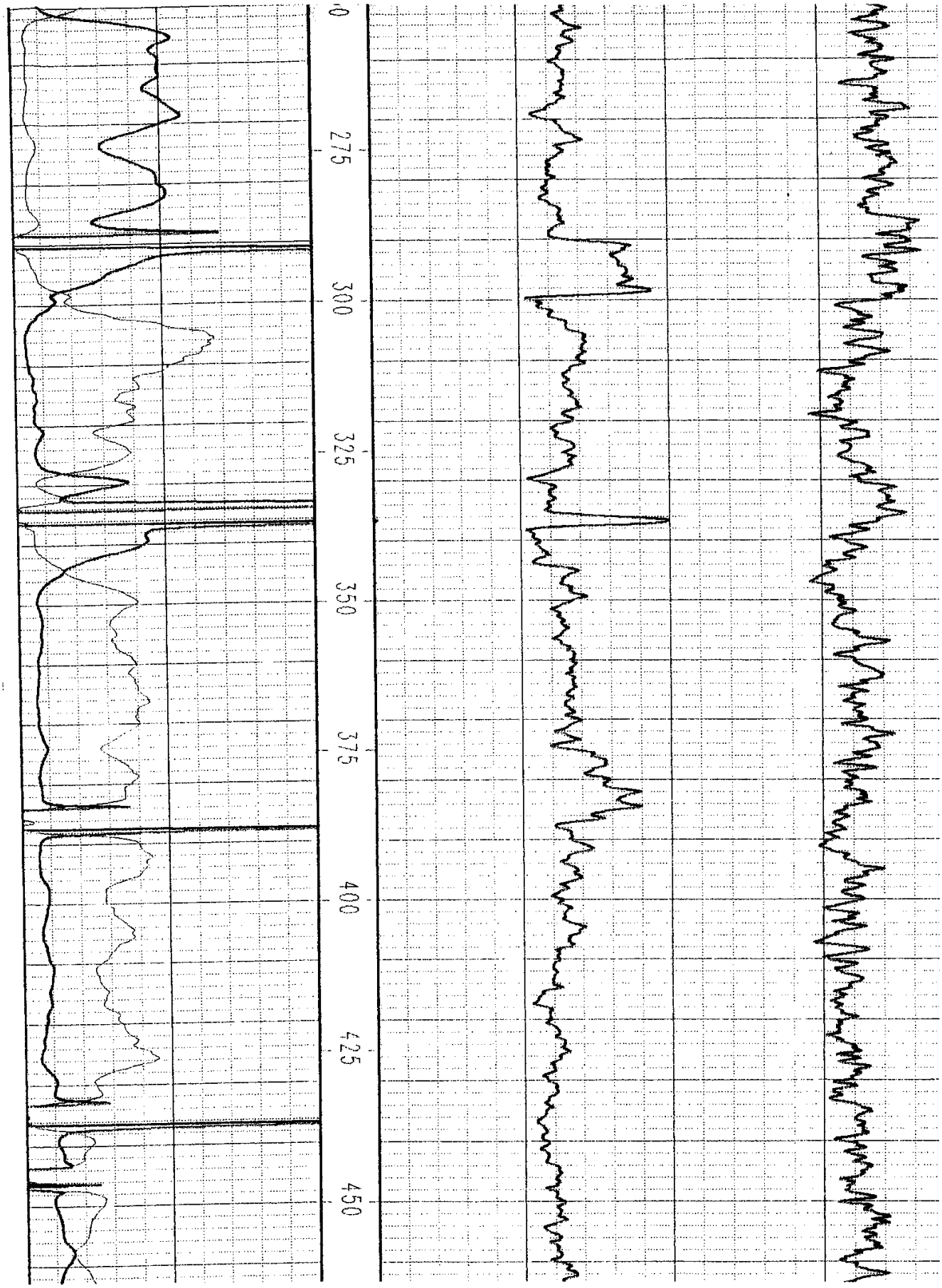
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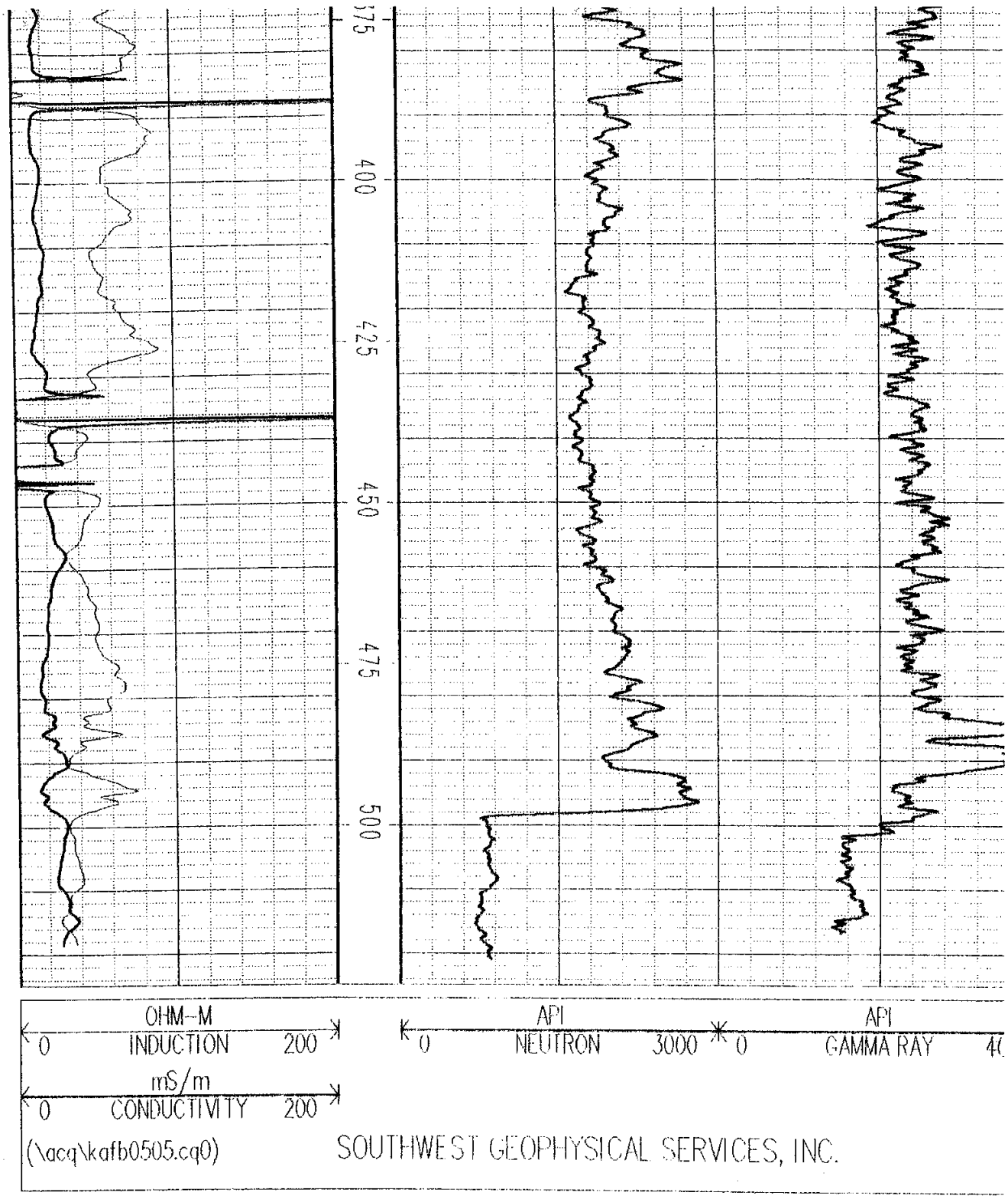
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OHM-M
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0 CONDUCTIVITY 200
API
0 NEUTRON 3000
API
0 GAMMA RAY 40
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SOUTHWEST GEOPHYSICAL SERVICES, INC.

KAFB-0506

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AIR FORCE ID: KAFB-0506
LOCATION ID: WP26-SB-L5
DATE INSTALLED: 11/17/98
WELL OWNER: Kirtland AFB
WELL TYPE: Monitor well
DRILLING COMPANY: Beylik
FORM OF COMPLETION: Slotted

MEASURING POINT EVALUATION: 5360.80
HYDROGEOLOGIC COMPLETION ZONE: Santa Fe Group
SOLE SOURCE AQUIFER CODE:
INSIDE DIAMETER OF BOREHOLE: 9-5/8"
TOTAL DEPTH OF BOREHOLE: 268.7'
SCREEN NUMBER: 0.010"
FIELD GEOLOGIST: Clarence Pigman

BEGIN DEPTH	END DEPTH	
~2.0'	183.7'	**GROUT INTERVAL** / **GROUT TYPE** Cement with 3% bentonite
183.7'	194.1'	**BENTONITE SEAL** / **SEAL TYPE** 3/8" pellets
194.1'	221.6'	**FILTER PACK** / **FILTER PACK TYPE** 16/30 silica sand
200.10'	220.03'	**SCREEN INTERVAL** / **MATERIAL** SCH 80 PVC / **SLOT SIZE** 0.010" / **DIAMETER** 5" / **% OPEN** Standard
220.03'	220.78'	**SILT TRAP (FOOT)** / **MATERIAL** SCH 80 PVC

TOTAL WELL DEPTH 220.78'

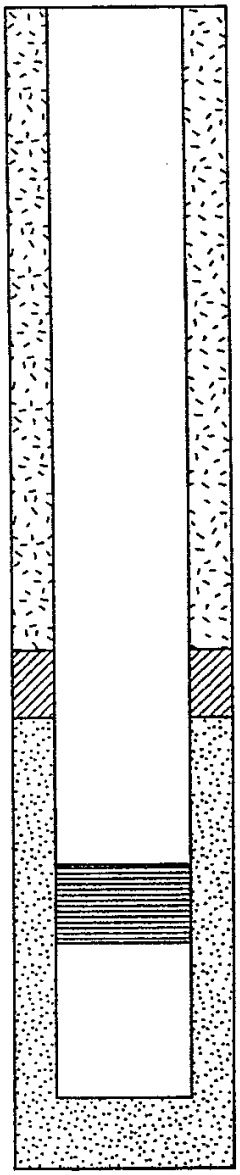
ANNULAR VOLUME:

$V = \pi H (R_1^2 - R_2^2)$

WHERE:

V = Annular Volume (ft^3)
π = 3.142
H = Length of Interval (ft)
R_1 = Borehole Radius (ft)
R_2 = Well Casing Radius (ft)

CALCULATIONS:



(NOT TO SCALE)

COMMENTS: Borehole over-drilled to collect soil sample from 268.7'-270.7' bgs. Borehole backfilled with bentonite chips to 221.6' bgs.

PROJECT NO.: 1370128.02162601 7/28/99

MONITORING WELL COMPLETION FORM

AR 176

Air Force ID: Kirtland AFB

Date Drilled: 11/9/98 Date Completed: 11/17/98

Logged By: Clarence Pigman

ESTAB Company: Daniel B. Stephens & Assoc.

Soil Boring ID: WP26-SB-L5

LTC: BH MW

Northing: 1468667.94 Easting: 406914.23

Coordinate System Type: NAD 27
Method: Survey
Units: Feet

Location Proximity:
Kirtland AFB Sewage Lagoon WP-26

Ground Surface Elevation (ft): 5358.27

Measuring Point (MP) Elevation (ft): 5360.80

MP is Top of Casing Datum: msl

Drilling Contractor: Beylik

Drilling Method: Air Rotary

Borehole Diameter (in.): 9 5/8 Depth (ft BGS): 0-268.7

Depth to Water Below TOC (ft): 202.49 Date Measured: 11-24-98

AR 1376

Daniel B. Stephens & Associates, Inc.
-29-99 JN 8039

Kirtland AFB Sewage Lagoons
Soil Boring Log: WP26-SB-L5
Monitor Well Log: KAFB0506

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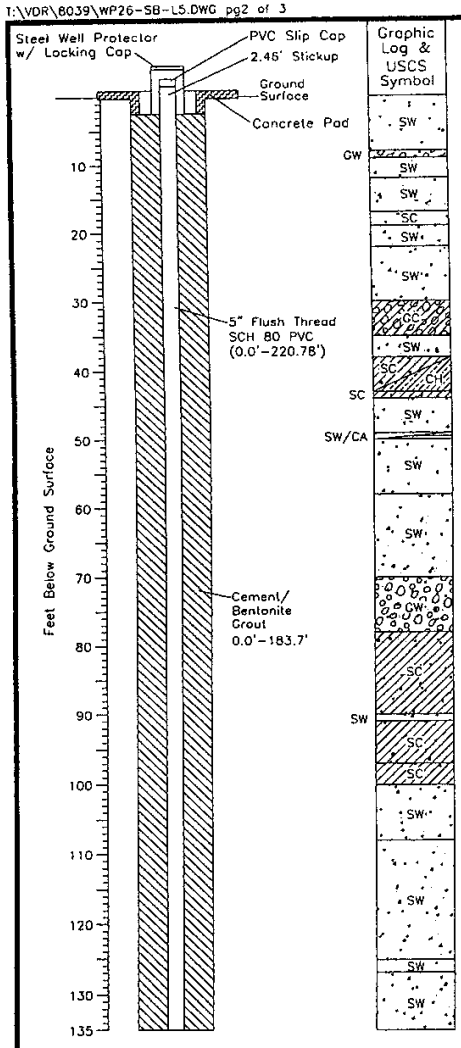

Graphic Log & USCS Symbol	Lith. Code (ERPIMS)	PID Reading (ppm)	Sampling Device	Blow Counts (per 0.5')	Sample Interval (feet bgs)	Sample Recovery (%)	Comments and Lithology
SW	SDGR						0 - Sand with gravel
GW	GVL						8 - Gravel with sand; mostly limestone clasts
SW	SDGR	0.1	Cuttings	NA	10-11	NA	10 - Sand with gravel; light brown (7.5YR 6/4); very fine-grained sand to 1/2" diameter gravel; poorly sorted; angular to rounded clasts; medium dense; moist; silty calcareous; at 12' encounter sand; at 17' encounter clayey sand; at 19' encounter sand
SW	SD						
SC	SDCL						
SW	SDFN	0.0	Cuttings	NA	20-21	NA	20 - Sand; strong brown (7.5YR 4/6); very fine- to medium-grained; mostly fine-grained; poorly sorted; subangular grains; loose; moist; at 22' encounter sand with gravel
SW	SDGR						
GC	GVCL	0.0	Cuttings	NA	30-31	NA	30 - Clayey gravel with sand; brown (7.5YR 4/4); clay to 3/4" gravel; mostly coarse sand and pebbly gravel; poorly sorted; angular to subrounded clasts; slight to moderate plasticity; loose to medium dense; moist to wet; at 38' have sand and clay interbedded
SW	SD						
SC CH	SDCL	0.0	Cuttings	NA	40-41	NA	40 - Clayey sand and clay interbedded; yellowish red (5YR 4/6); clay to coarse-grained sand; mostly fine- to medium-grained sand; poorly sorted; subangular to subrounded grains; moderate plasticity to high plasticity (clay); loose; moist; at 43' clay sand with gravel; at 44' sand; at 49' calcareous sand layer
SC	SDCL						
SW	SD						
SW/CA	SSCA						
SW	SDCR	0.0	Cuttings	NA	50-51	NA	50 - Sand with gravel; brown (7.5YR 5/4); clay to pebble-size gravel; mostly coarse sand and pebbles; poorly sorted; angular to subrounded clasts; loose; moist; at 58' encounter sand
SW	SDFN	0.9	Cuttings	NA	60-61	NA	60 - Sand; brown (7.5YR 4/4); very fine- to medium-grained; mostly fine-grained; poorly sorted; subangular grains; loose; moist; biotite mica common
GW	GVL	0.7	Cuttings	NA	70-71	NA	70 - Gravel with sand and clay; brown (7.5YR 4/4); clay to 2" diameter gravel; mostly gravel; poorly sorted; subangular to subrounded clasts; dense; moist; most gravel limestone; at 78' encounter clayey sand; at 90' sand
SC	SDCL	0.7	Cuttings	NA	80-81	NA	80 - Clayey sand with gravel; brown (7.5YR 4/4); clay to 3/8" diameter gravel; mostly fine- to coarse-grained sand; poorly sorted; very well graded; angular to subrounded clasts; mostly subangular; slight plasticity; loose; moist to wet
SW	SDFN	0.7	Cuttings	NA	90-91	NA	90 - Sand; brown (7.5YR 5/4); very fine- to fine-grained; minor coarse-grained sand; poorly sorted; subangular grains; loose; moist; biotite common; lithic fragments of schist common; at 91' clayey sand; at 97' clayey sand with coarse-grained sand and pebbles
SC	SDCL						
SC	SDCL						
SW	SDFN	0.3	Cuttings	NA	100-101	NA	100 - Sand with clay; brown (7.5YR 5/4); clay to coarse-grained sand; few pebbles; mostly fine-grained sand; poorly sorted; subangular to subrounded clasts; loose; moist; biotite common; at 108' encounter sand with a lot of coarse-grained sand and gravel
SW	SDGR	0.5	Cuttings	NA	110-111	NA	110 - Sand with gravel; brown (7.5YR 5/4); very fine-grained sand to pebble-size gravel (3/8" diameter); mostly coarse-grained sand; poorly sorted; angular to subrounded clasts; loose; moist; a lot of feldspar; 60% quartz, 30% feldspar, 10% lithic; a lot of schist fragments; mica common
SW	SDFN	0.6	Cuttings	NA	120-121	NA	120 - Sand; brown (7.5YR 5/4); very fine- to coarse-grained; mostly fine-grained; poorly graded; subrounded grains; loose; moist; at 125' have coarse-grained sand with pebbles; at 127' back in sand, same as above
SW	SDCR						
SW	SDFN	2.3	Cuttings	NA	130-131	NA	130 - Sand; strong brown (7.5YR 5/6); very fine- to fine-grained; minor coarse-grained sand; poorly sorted; subrounded grains; loose; moist; minor mica; at approximately 135' clay content in sand increases slightly

Hydrogeologist: C. Pigman
Driller: Beylik
Date completed: 11-17-98

Drilling method: Air rotary
Bit diameter: 9 5/8 in. O.D.

Note: PID readings may be unrepresentative due to use of air rotary drilling method.

Kirtland AFB Sewage Lagoons

Soil Boring Log: WP26-SB-L5
Monitor Well Log: KAFB0506

Daniel B. Stephens & Associates, Inc.
5-19-99
JN 8039

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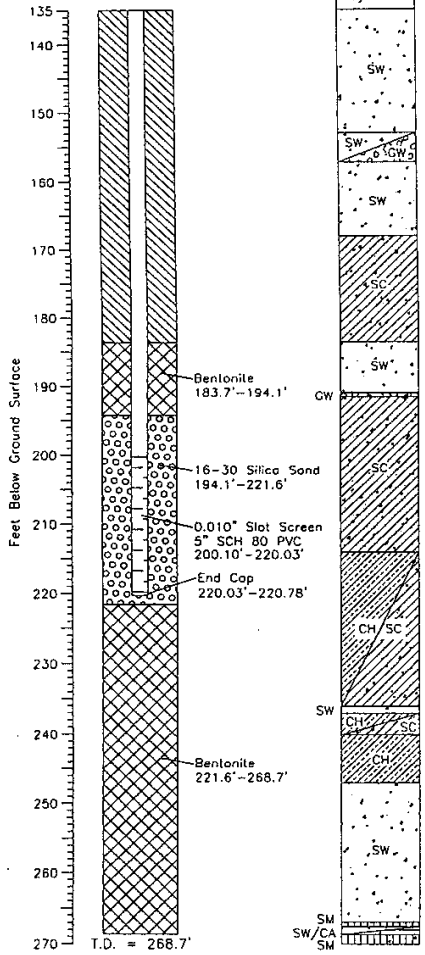


Lith. Code (ERPIMS)	PID Reading (ppm)	Sampling Device	Blow Counts (per 0.5')	Sample Interval (feet bgs)	Sample Recovery (%)	Comments and Lithology
SDFN	3.2	Cuttings	NA	140	NA	140 – Sand; brown (7.5YR 5/4); very fine- to fine-grained; minor medium- to coarse-grained sand; poorly sorted; subrounded grains; loose; moist
SDFN	3.5	Cuttings	NA	150–151	NA	150 – Sand; strong brown (7.5YR 4/6); very fine- to fine-grained sand; medium- to coarse-grained sand common; poorly sorted; subrounded grains; loose; moist; at 153' coarse sand with pebbles and very few fines; at 157' less coarser clasts and more fines; at 158.5' clay content increases and only minor coarse clasts
SDCR						
SDFN	8.1	Cuttings	NA	160–161	NA	160 – Sand; strong brown (7.5YR 4/6); very fine- to fine-grained; minor coarse grains; poorly sorted; subrounded grains; loose; moist; at 162' sand very moist with very little fines; at 168' contains significant fines, again clayey sand
SDCL	5.0	Cuttings	NA	170–171	NA	170 – Clayey sand; brown (7.5YR 5/4); clay to fine-grained sand; mostly fine-grained sand; poorly sorted; subrounded grains; loose; moist to wet; slight plasticity; at 173' have few caliche nodules and clay content increases
SDCL	3.3	Cuttings	NA	180–181	NA	180 – Clayey sand; brown (7.5YR 5/4); clay to very fine-grained sand; poorly sorted; subrounded grains; high plasticity; loose to medium dense; wet; at 183.5' encounter coarse-grained sand
SDCR GVL	3.5	Cuttings	NA	190	NA	190 – Sand; yellowish brown (10YR 5/4); fine-grained sand to 3/8" diameter gravel; mostly coarse-grained sand; poorly sorted; angular to subrounded grains; loose; wet; a lot of feldspar and lithic fragments of schist and limestone; at 191' encounter clayey and with thin gravel layer on top of clayey sand; gravel was limestone clasts to 2" in diameter
SDCL	4.4	Cuttings	NA	200–201	NA	200 – Clayey sand; brown (7.5YR 5/4); clay to fine-grained sand; mostly fine-grained sand; poorly sorted; subangular to subrounded grains; high plasticity; dense; wet; biotite mica common; a lot of coarse-grained caliche nodules present which consist of fine-grained sand in calcareous matrix
SDCL	3.8	Cuttings	NA	210–211	NA	210 – Clayey sand; brown (7.5YR 5/4); clay to fine-grained sand; mostly very fine to fine-grained sand; poorly sorted; subrounded grains; moderate plasticity; medium dense; saturated; micaceous; few medium-size grains of sand; at 215.5 sandy clay that is only moist to wet with light gray spots of caliche; at 216' borehole making a lot of water
SDCL	1.6	Split Spoon	25/50/79/85	213.9–215.9	120	
SDCL	4.8	Split Spoon	15/45/20@3"	220–221.3	100	220 – Clay and clayey sand interbedded; brown (7.5YR 5/4); clay has high plasticity and contains caliche nodules up to 2" in diameter; clayey sand is clay to fine-grained sand; poorly sorted; subrounded grains; moderate plasticity; medium dense and wet to saturated and water producing
SDCR						236 – Possible coarse sand layer or coarse sand and pebbles in clay and clayey sand
CLAY	3.1	Cuttings	NA	240–241	NA	240 – Clay; few possible clayey sand layers; brown (7.5YR 5/4); high plasticity; caliche nodules common; dense; wet to saturated; stratigraphic contacts difficult to see because drive casing plugging up and cuttings return sporadic; at 247' encounter sand
SDMD	3.6	Cuttings	NA	250–251	NA	250 – Sand; pale brown (10YR 6/3); very fine-grained sand to pebbles; mostly medium-grained sand; poorly sorted; angular to subangular grains; loose; moist
SDMD	3.7	Cuttings	NA	260–261	NA	260 – Sand; pale brown (10YR 6/3); fine- to coarse-grained sand; mostly medium-grained; poorly sorted; angular to subrounded grains; loose; dry to moist (damp); 75% quartz, 10% feld, 15% lithic; mostly black volcanic lithic fragments; at 267' encounter moist silty sand; at 267.5–268.5 calcareous silty sand (caliche)
SDSL SCA SDSL	3.3	Split Spoon	22/49/78/ 44@3"	268.7–271	115	268.7 – Silty sand; brown (10YR 5/3); silt to very fine-grained sand; poorly sorted; subrounded grains; slight plasticity; dense; wet to saturated; few white spots of caliche

Hydrogeologist: C. Pigman
Driller: Beylik
Date completed: 11–17–98

Drilling method: Air rotary
Bit diameter: 9 5/8 in. O.D.

Note: PID readings may be unrepresentative due to use of air rotary drilling method.

Kirtland AFB Sewage Lagoons

Soil Boring Log: WP26-SB-L5
Monitor Well Log: KAFB0506

Daniel B. Stephens & Associates, Inc.

19–99 JN 8039

AR 176

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
NATURAL GAMMA RAY NEUTRON INDUCTION IND. RESISTANCE	LOG MEASURED FROM: G. L. ELEVATION:	

COMPANY: KIRTLAND AIR FORCE BASE
PROJECT/FIELD: SEWAGE LAGOONS
WELL: KAFB0506
LOCATION: SEC: T: R:
NORTH= EAST=
COUNTY: BERNALILLO STATE: NEW MEXICO

ELEVATION KB:
DF:
GL:

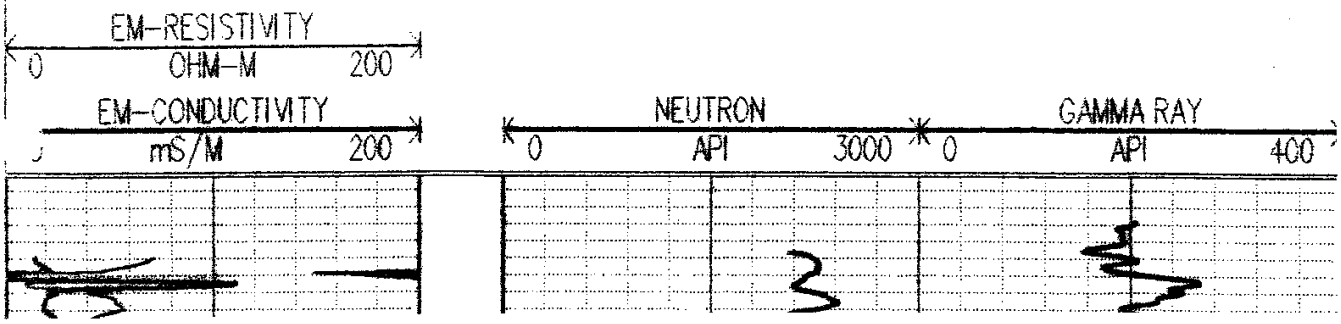
	RUN NO. 1		RUN NO. 1
DATE	12/3/98	FLUID LEVEL	200 FT
DEPTH DRILLER	221 FT	FLUID NATURE	FORMATION FLUID
DEPTH LOGGER	221 FT	FLUID VISCOSITY	
BOTTOM LOGGED	220 FT	FL. RESISTIVITY	
TOP LOGGED INT.	SURFACE	FL. RES. @ B.H.T.	
CASING LEVEL	ALL	CIRCULATION TEMP.	
CASING SIZE	5 IN PVC	BOT HOLE TEMP.	
CASING SIZE	SCH. 80	TOOL #	COMBO/GEONICS
BIT SIZE	10 IN	LOGGED BY:	SHERRY MILLER
BIT SIZE		WITNESSED BY:	RICHARD MEIXNER

REMARKS:
DRILLED BY BEYLIK.
WITNESSED BY DANIEL B. STEPHENS
FOR MONTGOMERY WATSON.

THANK YOU

COMPANY: KIRTLAND AIR FORCE BASE
WELL: KAFB0506

(KAFB0506.CR0) SOUTHWEST GEOPHYSICAL SERVICES, INC.



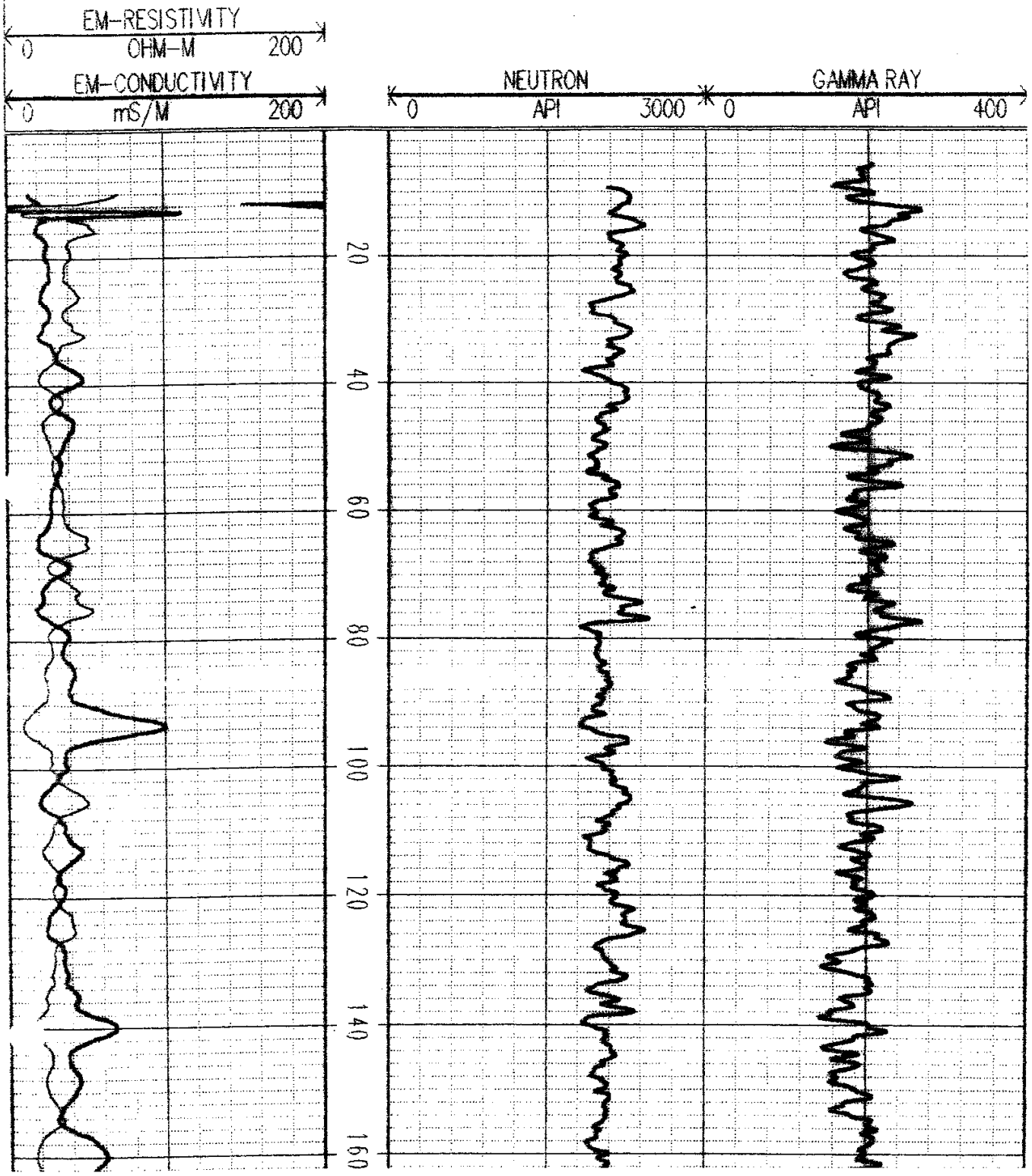
DRILLED BY SETON.
WITNESSED BY DANIEL B. STEPHENS
FOR MONTGOMERY WATSON.

THANK YOU

ASE

(KAFB0506.CR0)

SOUTHWEST GEOPHYSICAL SERVICES, INC.



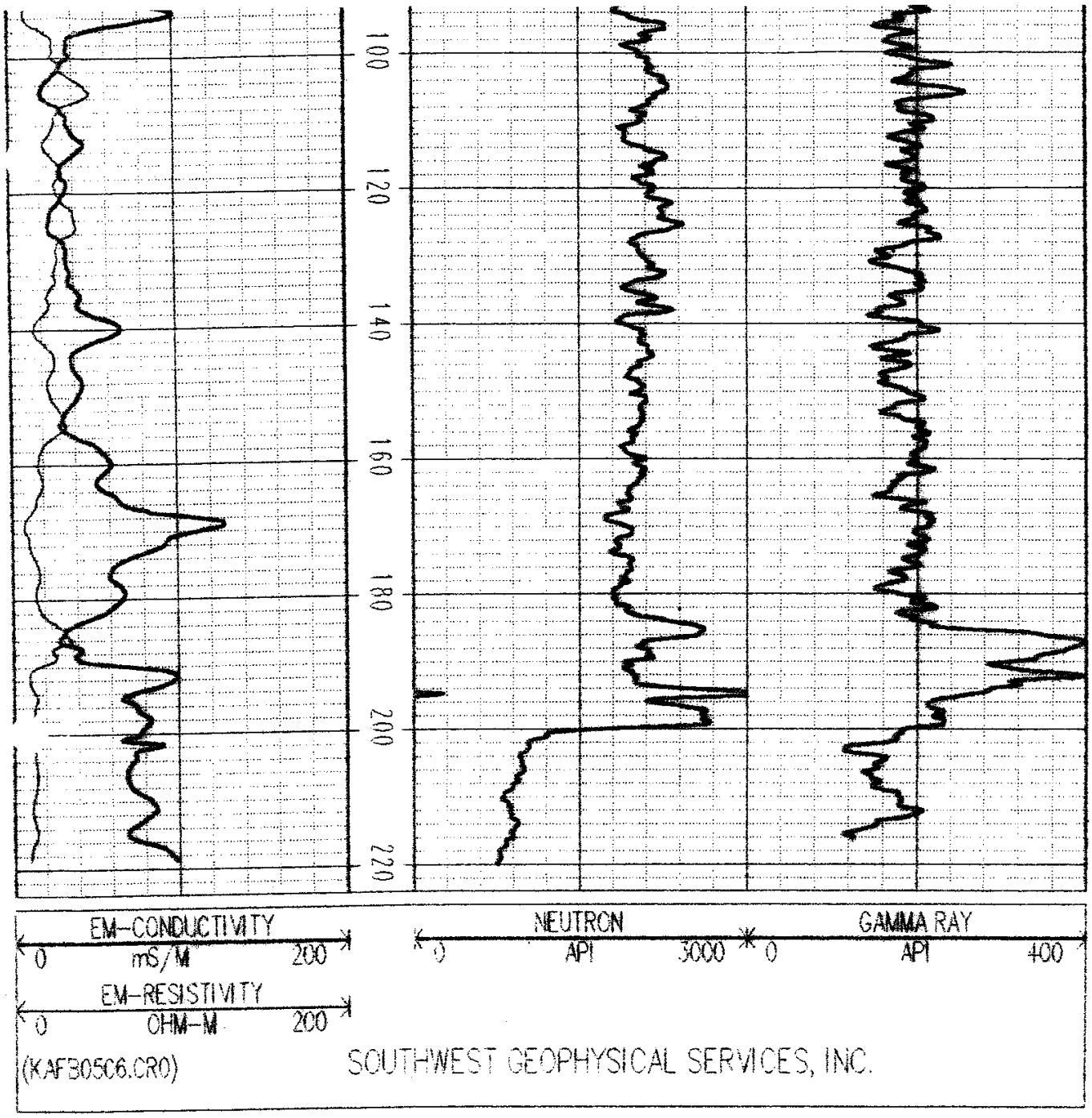
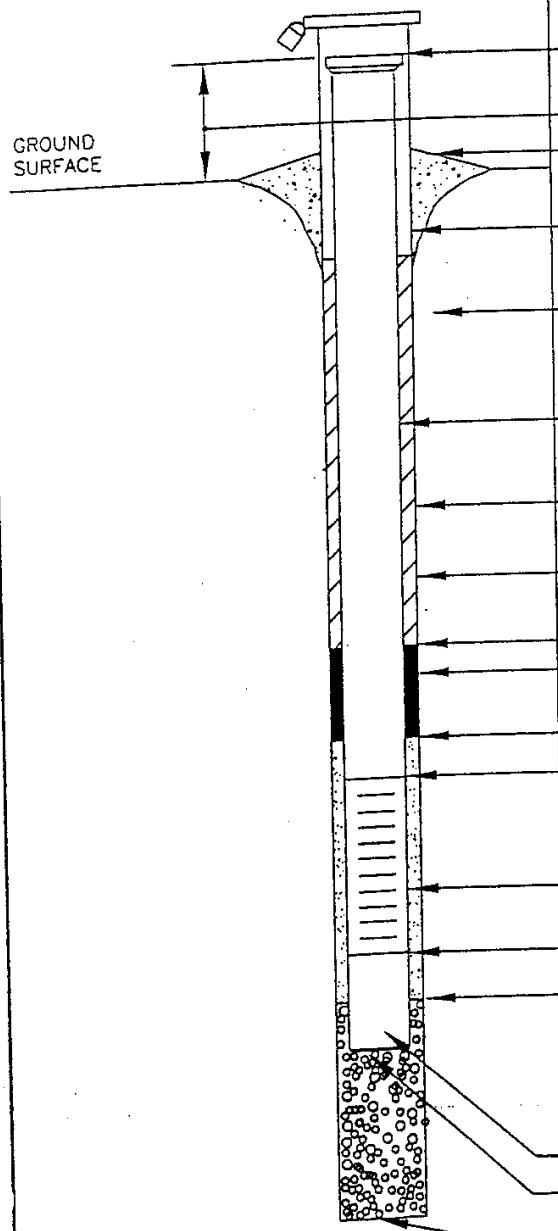

100
120
140
160
180
200
220
EM-CONDUCTIVITY
0 mS/M 200
EM-RESISTIVITY
0 OHM-M 200
NEUTRON
0 API 3000
GAMMA RAY
0 API 400
(KAFB05C6.CR0)
SOUTHWEST GEOPHYSICAL SERVICES, INC.

FIGURE
OVERBURDEN
MONITORING WELL SHEET

WELL NO. KAFB - 0507

PROJECT: ST-105
PROJECT NO.: 5155.0030.0017 A2002
ELEVATION: 5353.15' above S.L.
FIELD GEOLOGIST: Jim Harden, FWENC
BORING NO.: KAFB-0507
DATE: 2/11/01 - 2/21/01

DRILLER: Kevin Jones
DRILLING METHOD: AIR ROTARY/CASING HAMMER
DEVELOPMENT METHOD: SUBMERSIBLE PUMP/SURGE



ELEVATION OF TOP OF RISER PIPE: 5356.15

STICK-UP RISER PIPE: 3.0 feet

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 10-INCH
TYPE OF SURFACE CASING: CARBON STEEL

BOREHOLE DIAMETER: 9 5/8-INCH

RISER PIPE I.D.: 3 1/2-INCH
TYPE OF RISER PIPE: 4-INCH SCHEDULE 80 PVC

BOREHOLE DIAMETER: 9 5/8-INCH

TYPE OF BACKFILL: BENTONITE GROUT to 5303.15/50'
CEMENT/BENTONITE GROUT TO SURFACE

ELEVATION/DEPTH TOP OF SEAL: 4913.15/440'

TYPE OF SEAL: BENTONITE CHIPS

DEPTH TOP OF SAND PACK: 470'

ELEVATION/DEPTH TOP OF SCREEN: 4870.85/482.3'

TYPE OF SCREEN: 4-INCH SCHEDULE 80 PVC

SLOT SIZE X LENGTH: 0.010-INCH x 25 FT.

TYPE OF SAND PACK: 10/20 and 20/40 Silica Sand

ELEVATION/DEPTH BOTTOM OF SCREEN: 4845.85/507.3

ELEVATION/DEPTH BOTTOM OF SAND PACK: 4840.85/512.3'

TYPE OF BACKFILL BELOW OBSERVATION WELL: native formation caved in when bit was removed making the borehole TD=512.3'

TYPE OF SUMP: 4-INCH SCHEDULE 80 PVC

LENGTH OF SUMP 5 FT.

ELEVATION/DEPTH OF HOLE: 4833.15/520'

NOT TO SCALE

AR 235

J:\PROJECTS\KIRTLAND\LTM\FY00WELLS\MW constrdiag.DWG

HTRW DRILLING LOG

DISTRICT Omaha		HOLE NUMBER KAFB-0507
1.COMPANY NAME Foster Wheeler Environmental	2.DRILL SUBCONTRACTOR Water Develpement Corporation	SHEET 1 OF SHEETS 53
3.PROJECT 5155.0030.0017 A2002	4.LOCATION ST-105	
5.NAME OF DRILLER Kevin Jones	6.MANUFACTURER'S DESIGNATION OF DRILL Dresser Air Rotary Casing Hammer Drill Rig	
7.SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8.HOLE LOCATION South west of WP-26, Sewage Lagoons	
9 5/8" steel drive casing	9.SURFACE ELEVATION	
9" 5/8" drill bit	10.DATE STARTED 2/11/01	11.DATE COMPLETED 2/21/01
12.OVERBURDEN THICKNESS	15.DEPTH GROUNDWATER ENCOUNTERED Geophysical logs show groundwater at 491' bgs.	
13.DEPTH DRILLED INTO ROCK N/A	16.DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED Unable to obtain a reading- neutron logging indicated water at 491 bgs 20 hrs after reaching TD	
14.TOTAL DEPTH OF HOLE 520 feet	17.OTHER WATER LEVEL MEASUREMENTS (SPECIFY) Aprox. 96 hrs after drilling water was measured at a depth of 502 ' bgs	

18.GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19.TOTAL NUMBER OF CORE BOXES
N/A			N/A

20.SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21.TOLAL CORE RECOVERY %
No samples were collected during drilling	N/A	N/A	N/A			

22.DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23.SIGNATURE OF INSPECTOR
		KAFB-0507		

LOCATION SKETCH/COMMENTS

SCALE

AR235

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 2 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		SILT with very fine to fine grains, tan, dry, slightly cohesive (ML/SM)	0 ppm				
	1						
	2						
	3						
	4						
	5	Same as above	0 ppm				
	6						
	7						
	8						
	9	Same as Above but with more sand and gravel, brown	0 ppm				Headspace reading on cuttings

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 3 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	11						
	12						
	13						
	14						
	15	Same as above	0 ppm				Headspace on cuttings
	16						
	17						
	18						
	19	very fine SAND, fine to medium gravel (SM)	0 ppm				PID reading on casing

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: KAFB-0507

PROJECT: 5155.0030.0017 A2002

INSPECTOR: Jim Harden

SHEET 4 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	21						
	22						
	23						
	24						
	25	Same as above	0 ppm				Headspace on cuttings
	26						
	27						
	28						
	29	Gravelly silty SAND (SM/GM)	0 ppm				PID reading on casing

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: KAFB-0507

PROJECT: 5155.0030.0017 A2002

INSPECTOR: Jim Harden

SHEET 5 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Brown to light brown dry GRAVEL and fine SAND, angular to subangular to subrounded (GM/SM)					
	31						
	32						
	33						
	34						
	35	Very silty SAND, very fine to coarse light brown minor gravel; sand mostly very fine to fine (SM)					
	36						
	37						
	38						
	39	Same as above	0 ppm				PID reading on casing

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: KAFB-0507

PROJECT: 5155.0030.0017 A2002

INSPECTOR: Jim Harden

SHEET 6 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	41						
	42						
	43						
	44						
	45	Same as above with more fine to medium gravel (SM/GM)					
	46						
	47						
	48						
	49						
		Same as above	0 ppm				Headspace reading on cuttings

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 7 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	51						
	52						
	53						
	54	Very silty, very gravelly SAND, fine to coarse gravel; basalt granite, quartz lenses (GM)					
	55						
	56						
	57						
	58	Very silty fine SAND becomes light brown to sandy silt, medium gravel; clay seams (SM/ML)					
	59		0 ppm				PID at casing

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 8 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	61	Fine GRAVEL with some medium sand (GP)					
	62						
	63						
	64	Silty SAND, medium gravel to very sandy silt (SM)					
	65						
	66						
	67						
	68		0 ppm				headspace at cuttings
	69	GRAVEL, fine; sandy and silty (GM)					

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: KAFB-0507

PROJECT: 5155.0030.0017 A2002

INSPECTOR: Jim Harden

SHEET 9 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	71	Same as above					
	72						
	73						
	74	slightly clayey medium brown SILT, medium gravel, dry to damp with clay seams (slightly plastic and silty) (ML)					
	75						
	76						
	77	Same as above with more gravel and sand					
	78						
	79		0 ppm				PID reading at casing

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 10 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					Drilling at 80ft/hr
	81						
	82	sandy fine GRAVEL, slightly silty, tan to light brown; sand medium to coarse and angular to subrounded (GP)					
	83						
	84						
	85						
	86	Clayey SILT with very fine sand, reddish brown (ML)					
	87						
	88						
	89	GRAVEL, fine to medium, sandy (GW/GP)					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: KAFB-0507

PROJECT: 5155.0030.0017 A2002

INSPECTOR: Jim Harden

SHEET 11 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	91						
	92						
	93						
	94						
	95	Gravelly, sandy, clayey SILT, brown to light reddish brown with very gravelly seams increasing with depth (ML/GC)					
	96						
	97						
	98	predominantly GRAVEL, sandy and silty; tan to light brown, angular to subrounded (GM)					
	99		0 ppm				PID from casing

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 12 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	101						
	102						
	103	SILT, clayey with very fine sand, brownish red to reddish brown clay seams (SC)					
	104						
	105						
	106						
	107						
	108						
	109						
		same as above but becomes more gravelly	0 ppm				headspace at cuttings

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 13 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	111	Sandy silty GRAVEL to gravelly silty SAND, dry (GM)					
	112						
	113						
	114	gravelly to sandy SILT, reddish brown, damp to dry; reddish brown to tan occasional gravelly seam becoming very silty with fine to medium grained sand (ML/GM)					
	115						
	116						
	117						
	118						
	119	Same as Above	0 ppm				PID at cuttings

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 14 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	121						
	122	SILT, clayey and slightly sandy, reddish brown; medium gravel becoming very clayey with depth (ML)					
	123						
	124						
	125						
	126						
	127						
	128	CLAY, very silty, medium sand, plastic, reddish brown to brownish red to red (CL)					
	129						

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: KAFB-0507

PROJECT: 5155.0030.0017 A2002

INSPECTOR: Jim Harden

SHEET 15 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	131						Cyclone clogged
	132						
	133	becomes very silty, Clayey SILT (CL/ML)					
	134						
	135	GRAVEL, sandy and silty with clayey seams (GM)					
	136						
	137	gravelly sandy SILT to very silty sandy GRAVEL with gravelly clay seams (GM/GC)					
	138						
	139		2.7 ppm				hit of 2.7 ppm is probably due to exhast (cuttings = 0 ppm)

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 16 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		less silt and clay, more sand					
	141						
	142	Sandy GRAVEL to gravelly SAND, some silt (GP)					
	143						
	144						
	145	sandy SILT to clayey silt and silt, reddish brown to tan, damp to dry (ML)					
	146						
	147						
	148	grades into tan SILT (ML)					
	149						
		becomes gravelly					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 17 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	151						
	152						
	153						
	154	no gravel but sandy					
	155						
	156	minor gravel					
	157	Clayey sandy SILT, reddish brown with reddish clay seams, damp (ML)					
	158						
	159						
		minor gravel					

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

(Proponent: CECW-EG)

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 18 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	161	clayey SILT/ silty CLAY; minor, fine to coarse sand, fine gravel; reddish brown (ML/CL)					
	162						
	163						
	164						
	165	increasing sand content, mica flakes; becomes light brown and more silty					
	166						
	167	SILT with clayey silt, minor sand and gravel, reddish brown (ML)					
	168						
	169						

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

SHEET 19 OF 53

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		same as above but becoming more sandy (very fine to fine sandy silt/ silty sand)					
	171						
	172						
	173						
	174						
	175	Clayey SILT, some sand, very little gravel, reddish brown to light brown, damp (ML)					
	176						
	177						
	178						
	179	Same as Above	0 ppm				PID reading at casing

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

(Proponent: CECW-EG)

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 20 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		very silty, very fine SAND, slightly clayey (SM)					
	181						
	182						
	183						
	184						
	185	clayey SAND (SC)					
	186	CLAY to sandy clay, damp to slightly moist; minor gravel, silty, slightly plastic, reddish brown to brown (CL/SC)					
	187						
	188						
	189	increasing in gravel, mica flakes					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 21 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		moist					
	191						
	192	more clay. much less sand and no gravel					
	193						
	194	sandy, very silty					
	195						
	196	very sandy (silty CLAY / very clayey SAND)					
	197						
	198						
	199	mostly silty CLAY, minor sand, brown to tan; mica					drilling rate slower (40 to 50 ft/hr)

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 22 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	201						
	202						
	203						
	204	sandy with gravel (CL/SC)					
	205						
	206						
	207	no gravel					
	208						
	209	less sand					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 23 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	211						
	212						
	213						
		clayey SAND/ sandy CLAY (CL/SC)					
	214						
	215	very fine to fine SAND, damp, silty with minor clay (SW/SM)					
	216						
	217						
	218						
	219						

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

(Proponent: CECW-EG)

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 24 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above but well sorted (SP)					
	221						
	222						
	223						
	224						
	225	Same as above					
	226						
	227						
	228	Same as above but very silty (SM)					
	229						

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 25 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		less silt, becoming coarser; fine to coarse SAND with minor fine gravel, light brown (SW)					cyclone and line clogged with cuttings
	231						
	232						
	233						
	234						
	235	same as above with more fines and less coarse grains					
	236						
	237						
	238						after cleaning the cyclone and line, checked for water- none indicated
	239	Same as above but coarser with more fine gravel	0 ppm				PID at casing and cuttings

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 26 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		fine to medium SAND, occasional clay clasts, minor gravel (SW/SP)					
	242						
	243						
	244						
	245	gravelly SAND, fine to coarse (SP/GP)					
	246	Very clayey SILT; whitish layer; mostly redish brown (ML)					
	247						
	248						
	249	Same as above but slightly sandy, damp to moist					

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 27 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		same as above					
	251						
	252						
	253						
	254						
	255	same as above					
	256						
	257						
	258						
			0 ppm				PID at casing and cuttings
	259						

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

(Proponent: CECW-EG)

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 28 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	261						
	262						
	263						
	264						
	265	same as above but less clay and more very fine sand					
	266						
	267						
	268						
	269	Same as Above					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 29 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		same as above					
	271						
	272						
	273						
	274						
	275	same as above					
	276						
	277						
	278	clayey SILT/ silty CLAY to sandy CLAY, minor clayey sand, brown, damp (ML/CL)					
	279		0 ppm				PID at casing and cuttings

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 30 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	281						
	282						
	283						
	284	same as above with an increase in sand					
	285						
	286	clayey, very silty, very fine SAND, brown to light brown (SM/SC)					
	287						
	288						
	289	grayish clayey sandy SILT to silty, very fine SAND (ML/ SM)					

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 31 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		slightly gravelly, silty, fine to coarse SAND, tan, dry to damp (SW/SM)					
	291						
	292						
	293						
	294	less silt					
	295						
	296						
	297	less coarse sand, more fine to medium					
	298		0 ppm				PID at cuttings and casing
	299	fine to coarse SAND (SW)					

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 32 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		SAND, grayish to light brown, angular to subangular (SW)					
	301						
	302						
	303						
	304	mostly medium to coarse SAND (SP)					
	305						
	306						
	307						
	308						
	309	minor gravel					

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 33 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	311						
	312						
	313						
	314	Same as above but becomes finer; fine to coarse (SW)					
	315						
	316						
	317						
	318						
	319						

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

(Proponent: CECW-EG)

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 34 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	321	Sand, fine to medium, slightly silty, angular to subrounded; some lithic grains; slightly micaceous; minor fine gravel (SP)					
	322						
	323						
	324						
	325	abundant dark mafic grains, finer, a little more silt					
	326						
	327						
	328						
	329						
		Fine silty SAND (SM)					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 35 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		some medium to coarse grains, otherwise, same as above (no gravel)					
	331						
	332						
	333						
	334						
	335	fine to coarse SAND, more fine gravel (SW)					
	336						
	337						
	338	increasing in gravel					
	339						

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 36 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	341	Sandy silty GRAVEL, angular to subrounded; fine to medium (up to 1"); some minor clay balls, dry (GM)					
	342						
	343						
	344						
	345	GRAVEL, medium, some fine, dry (GP)					
	346	Clayey GRAVEL, to gravelly CLAY, light brown to brown (mostly clay) (GC/CL)					
	347						
	348						
	349	sandy and silty, damp					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 37 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	351	silty fine SAND to coarse sand with fine gravel, tan to brown, dry to damp (SW/SM)					
	352						
	353						
	354						
	355	mostly fine sand to very fine sand, slightly silty					
	356	becomes coarse and slightly gravelly					
	357						
	358	back to fine to very fine SAND, becomes very light (whitish)	0 ppm				PID at casing and cuttings
	359						

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

(Proponent: CECW-EG)

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 38 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		SAND, fine to coarse (SW)					0730, 2/12/01- start drilling
	361						
	362						
	363						
	364						
	365						
	366						
	367						
	368						
	369	Same as above with occasional fine gravel					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 39 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	371	Mostly fine to medium SAND, damp, minor silt (SP)					
	372						
	373						
	374						
	375						
	376						
	377						
	378	Same as above with gravel up to 1-2 cm.					
	379						

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 40 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	381						
	382						
	383						
	384						
	385						
	386						
	387						
	388						
	389	Same as Above					

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 41 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	391						
	392						
	393						
	394						
	395	Gravel content increasing					
	396						
	397	gravelly SAND to sandy GRAVEL; angular to subrounded, gravel up to 3 cm; sand mostly fine to medium, some coarse (GP)					
	398		0 ppm				PID at casing and cuttings
	399						

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

(Proponent: CECW-EG)

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 42 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		fine to coarse SAND with fine gravel; angular to subrounded, dry to damp (SW)					
	401						
	402						
	403						
	404	fine to medium SAND, minor gravel; angular to subrounded, damp (SP)					
	405						
	406						
	407						
	408						
	409	fine to medium SAND, abundant pea (0.5-1cm) gravel; angular to subrounded, damp (SP)					

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 43 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above but sand coarsening, gravel angular to rounded, dry					
	411						
	412						
	413	Becoming medium to coarse SAND, less gravel (SP)					
	414						
	415						
	416	pea gravel increasing					
	417						
	418						
	419						

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 44 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above but decreasing in gravel; sand coarse to very coarse					
	421						
	422						
	423						
	424						
	425	very coarse SAND with fine GRAVEL (<0.5 cm), angular to subrounded, light gray to brown, dry (SP/GP)					
	426						
	427						
		Same as above but very gravelly (up to 2 cm), slightly silty					
	428						
	429						
		less silty					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: KAFB-0507

PROJECT: 5155.0030.0017 A2002

INSPECTOR: Jim Harden

SHEET 45 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
							drilling at approx. 50 ft/hr
	431	Same as above with little or no silt					
	432						
	433						
	434						
	435	GRAVEL up to 1 cm, SAND medium to coarse; pebbles of quartzite, volcanics, and granite					
	436						
	437						
	438	SAND, fine to very coarse, damp (SP)					
	439						

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 46 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	441						
		fine to medium SAND with some coarse to very coarse sand and fine gravel; light brown to grayish tan, damp, angular to subrounded (SP)					
	442						
	443						
	444						
		coarse to very coarse SAND; little fine gravel (SW)					
	445						
	446						
	447						
	448						
	449						
		Same as Above					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: KAFB-0507

PROJECT: 5155.0030.0017 A2002

INSPECTOR: Jim Harden

SHEET 47 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		abundant fine GRAVEL. dry (SP/GP)					
	451						
	452						
	453	fine to medium SAND, damp					
	454	Sandy GRAVEL; fine gravel, medium to coarse sand					
	455						
	456	very gravelly; medium to very coarse sand					
	457	micaceous					
	458						
	459		0 ppm				PID reading at casing and cuttings

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 48 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	461	gravelly fine to medium SAND, light brown to tan; pebbles (5 cm or less), damp, slightly silty, mostly basaltic gravel (GP/SP)					
	462						
	463						
	464	same as above but becoming fine to medium SAND and much less gravel, damp to slightly moist (SP)					
	465						
	466						
	467						
	468						
	469	pea gravel					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 49 OF 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	471						
	472						
	473						
	474						
	475	Same as above with less gravel					
	476						
	477						
	478						
	479						
		Same as above with more fine sand					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 50 OF SHEETS 53

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	481						
	482	Same as above with abundant gravel 0.5 to 2 cm.					
	483	SAND, fine to coarse (SW)					
	484						
	485	same as above with occasional 'pumaceous' gravel up to 1 cm.					
	486	much less gravel, mostly fine to medium SAND, minor gravel, micaeous, moderately well sorted, some coarse grains, tan, damp to moist (SP)					
	487						
	488						
	489	clay balls present					

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 51 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	491	probably clay seams with fine to medium sand					
	492	fine SAND with very coarse grains of sand and fine gravel, damp to moist (SP/GP)					
	493						
	494						
	495	same as above but moist to wet					
	496						
	497	same as above but wet					
	498		0 ppm				PID reading at casing and cuttings
	499						

PROJECT 5155.0030.0017 A2002

HOLE NO. KAFB-0507

(Proponent: CECW-EG)

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002 | INSPECTOR Jim Harden | SHEET 52 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		visible water on pebbles					
	501						
	502						
	503						
	504						
	505	gravelly SAND/ sandy GRAVEL; gravel up to 5 cm., sand fine to very coarse (GP)					
	506						
	507						
	508						
	509						

PROJECT 5155.0030.0017 A2002 | HOLE NO. KAFB-0507

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER KAFB-0507

PROJECT 5155.0030.0017 A2002

INSPECTOR Jim Harden

SHEET 53 OF 53 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same as above					
	511						
	512						
	513						
	514						
	515	silty to clayey gravelly SAND					soupy returns to surface
	516						injecting water to lift cuttings
	517		0 ppm				PID reading at cuttings
	518						
	519	Gravelly SAND					

PROJECT 5155.0030.0017 A2002 HOLE NO. KAFB-0507

CH2MHILL

PROJECT NUMBER	WELL NUMBER	
162708.02.NA.FI	KAFB-0508	SHEET 1 OF 1

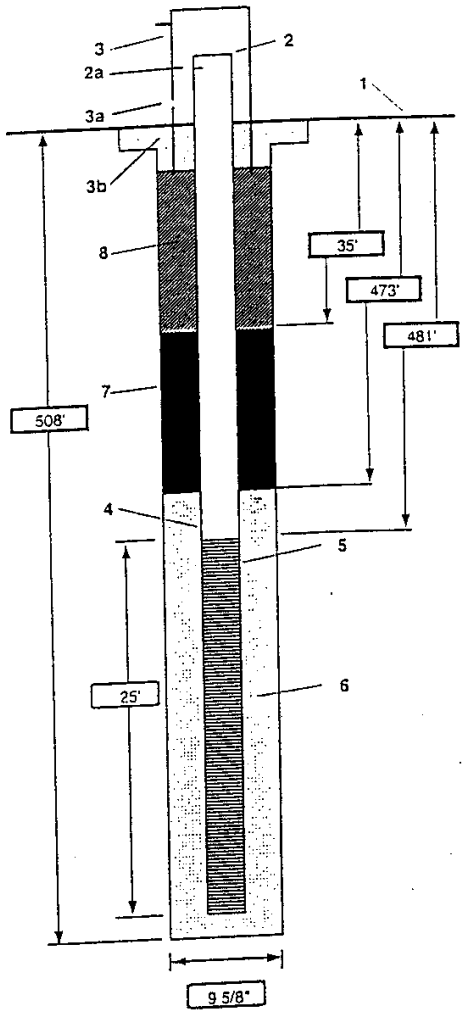
WELL COMPLETION DIAGRAM

PROJECT : KAFB Nitrate Abatement — LOCATION : 100' S of supply well KAFB-7, T9N R3E 1.2.2.4

DRILLING CONTRACTOR : Water Development Corp. / Kevin Jones

DRILLING METHOD AND EQUIPMENT USED : Dresser T70W ARCH - Tricone

WATER LEVEL : 483' bgl — START : 4/25/01 — END: 05/05/2001 — LOGGER : B LeFevre/ABQ



1- Ground elevation at well	5349' (approx)
2- Top of casing elevation	5352' (approx)
a) vent hole?	NA
3- Wellhead protection cover type	Steel 8" dia. aprox. 3' high, locking cap
a) weep hole?	NA
b) concrete pad dimensions	3' x 3' + 4 concrete filled bumper posts
4- Dia./type of well casing	4" Sched 80 threaded PVC
5- Type/slot size of screen	4" Sched 80 threaded PVC 0.010" slot
6- Type screen filter	#2-12 PMC Monterey
7- Type of seal	Quick Grout bentonite slurry
8- Surface Seal	
a) Grout mix used	Portland cement
b) Method of placement	Drive casing pour
c) Vol. of well casing grout	
Development method	Bail, surge and pump
Development time	1/2 day bailing, 1/2 hr pumping
Estimated purge volume	150 Gal. bailed, 300 Gal. Pumped

Comments 12" sump below screen.

Illustration not to scale.

AR 235

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0508	SHEET 1 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 150 ft. South of Well #7.
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 482.8 START : 4/25/01 END: 05/02/2001 LOGGER : BL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis	Time
0	2-2.5	0.5	SS NO2/NO3/TKN/TOC	---	Silty Clay (CL) dk. Brown, moist	0.0 PPM VOC	1530
	5	1.5	SS NO2/NO3/TKN/TOC	50/18	Gravelly Silt (ML) Lt. Orange-tan, dry. Gravel to 3 cm, mostly coarse sand in silt Caliche (Cemented silt) @ 6.5 ft. bgs.	0.0 PPM VOC	1550
10	15-16	1	SS NO2/NO3/TKN/TOC	22/18	Silt (ML) Lt. Brown, dry, with coarse sand and clay	0.0 PPM VOC	1610
20						Soil starts to become damp.	
	25-26.5	1.5	SS NO2/NO3/TKN/TOC		Sandy Silt (SM) Lt. Brown, dry, with trace gravel to 2 cm	0.0 PPM VOC	1640
	26-34		Cuttings		Sandy Clay (CL) dk. Brown, moist		
30	34		Cuttings		Sandy Silt (SM) dk. Brown, moist		
	35		Cuttings		Lean Clay (CL) dk. Brown, moist, soft		1740
40	45		Cuttings	26/18	Sandy Clay (SC) Lt. Brown, damp, very stiff, w/ coarse grained sand	2.1 PPM VOC	1800
	45-50		Cuttings		Gravelly, Sandy, Silty Clay (CL) dk. Red-brown, moist		
50	50-52		Cuttings		Gravelly, Sandy, Silty Clay (CL) dk. Red-brown, dry		
	52		Cuttings		Silt (ML) dk. Red-brown, moist.		

AR235

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CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0508 SHEET 2 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 150 ft. South of Well #7.
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 482.8 START : 4/25/01 END: 05/02/2001 LOGGER : BL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT) / SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
60		Cuttings		Sandy Silt (SM) dk. Red-brown, moist, with medium grained sand	
	62	Cuttings		Clayey Gravel (GC) Coarse gravel with dk. Red-brown clay	
	62-73	Cuttings		Silty, Sandy, Clay (CL) dk. Red-brown	
70					
	73-78	Cuttings		Silt (ML) Lt. Brown-orange, trace fine gravels	
	78	Cuttings		Silty Clay (CL) with trace fine gravels	
80	80	Cuttings		Sandy Silt (SM) Red-brown, with coarse grained sand	
	87-90	Cuttings		Silty Sand (SW) dk. Brown silt with coarse grained granitic sand	
90	90-91	Cuttings		Gravelly Clay (CL) moist	
	91-98	Cuttings		Silt (ML) dk. Red-brown, moist	
	98-99	Cuttings		Lean Clay (CL)	
100	100-100.75	0.75 SS NO2/NO3/TKN/TOC	35/18	Sandy Silt (SM) Lt. Brown, fine grained sand	New Day, 4/26 0.9 PPM VOC 830
110	110-115	Cuttings		Gravelly Silt (ML-GM) dk. Red-brown, wet.	
	115-120	Cuttings		Lean Clay (CL) dk. Red-brown	

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0508	SHEET 3 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 150 ft. South of Well #7.
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 482.8 START : 4/25/01 END: 05/02/2001 LOGGER : BL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
120	115-122		Cuttings		Lean Clay (CL) dk. Red-brown	
	122-135		Cuttings		Silt (ML) Lt. Brown-Orange, moist, with very fine grained and coarse grained Silty Sand (SP)	
130						
	135-136		Cuttings		Lean Clay (CL) dark Red-Brown, moist	
	136-140		Cuttings		Sandy Silt (SM) Lt. Brown-Orange, moist, w/ coarse grained sand	
140	140	1	SS NO2/NO3/TKN/TOC	40/18	Silty, Sandy Clay (CL) Lt. Brown, moist, very stiff, 2-inch cemented zone at top	0.0 PPM VOC 920
	144-146		Cuttings		Silt (ML) Lt. Orange-Brown, dry	
	146-151		Cuttings		Lean Clay (CL) Dk. Brown, moist	
150	151-152		Cuttings		Sandy Silt (SM) w/ coarse-grained sand	
	156-160		Cuttings		Silt (ML) Lt. Orange-Brown, Moist	
160			Cuttings		Sandy Clay (SC)	
	168		Cuttings		Moist. Wet cuttings are collecting on snorkle and cyclone	
170	170-178		Cuttings		Silt (ML) Orange to Lt. Brown, wet.	

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0508	SHEET 4 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 150 ft. South of Well #7.
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 482.8 START : 4/25/01 END: 05/02/2001 LOGGER : BL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
180	178-180				Silty, Lean Clay (CL) Dark-Brown, Wet, Cemented	
	180-187		Cuttings		Silts (ML), Sandy Silts (SM), Sandy Clays (CL) Orange-Brown, Wet.	
	187		Cuttings		Well Graded Sand (SW) Buff colored, wet	1100
190	190		SS NO2/NO3/TKN/TOC	28/18	Well Graded Sand (SM) Buff colored, up to fine gravel, wet.	1125
	195		Cuttings		S. A. A.	
	200		Cuttings		Lean Clay (CL) Dark Red-Brown, wet, soft.	
200	200-201.5	1.5	SS NO2/NO3/TKN/TOC	26/18	Silt (ML) Lt. Brown-Orange, Wet.	1220
	208		Cuttings		Poorly Graded Sand (SP) Buff colored, moist to wet, fine grained	
210	210-211.5	1.5	SS NO2/NO3/TKN/TOC	29/18	Poorly Graded Sand (SP) Buff colored, very moist, fine grained	0.0 PPM VOC
	215		Cuttings		Silt (ML) wet	
	218		Cuttings		Gravelly Sand (SW) Buff color, wet.	
220	220		SS NO2/NO3/TKN/TOC	21/18	Gravelly Sand (SW) wet.	1500
230	230-231.5	1.5	SS NO2/NO3/TKN/TOC	40/18	Well Graded Sand (SW) Buff color, Moist	1.3 PPM VOC 0655
	230-240		Cuttings		S.A.A.	

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0514	SHEET 5 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 150 ft. South of Well #7.
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 482.6 START : 4/25/01 END: 05/02/2001 LOGGER : BL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis	Time
240	240-241.5	1.5	SS NO2/NO3/TKN/TOC	34/18	Silty Sand (SM) Buff-colored, moist, lensed with Clayey Silty Sand(SM)	0.0 PPM VOC	0925
	240-250		Cuttings		S.A.A.		
250	250-251.5	1.5	SS NO2/NO3/TKN/TOC	47/18	Poorly Graded Sand (SP) Buff Colored, moist to wet, bottom 3" wet,coarse grained.	0.1 PPM VOC	0948
	250-258		Cuttings		S.A.A.		
	258-259		Cuttings		Gravel and sand mixture (GW) wet, with chips of lean Clay (CL)		
260	260	1	SS NO2/NO3/TKN/TOC	50/18	Poorly Graded Sand (SP) moist to dry	1.6 PPM VOC	1110
	261-270		Cuttings		Gravelly Sand (SW) moist		
270	270-271.5	1.5	SS NO2/NO3/TKN/TOC	47/18	Poorly Graded Sand (SP) Buff colored, dry, fine grained	1.0 PPM VOC	1335
	273		Cuttings		Gravelly Sand (SP) damp. Silt (SM) dry		
	276		Cuttings		Clayey Sand (SC) moist		
	276-280				Poorly Graded Sand (SP) dry		
280	280-281.5	1.5	SS NO2/NO3/TKN/TOC	50/18	Gravelly Sand (SW) for top 9". Wet from 8" to 9". Lean Clay (CL) from 9" to 12". Gravelly Sand (SW) moist, from 12" to 18"	5.8 PPM VOC	1630
290	290-291.5	1.5	SS NO2/NO3/TKN/TOC	47/18	Poorly Graded Sand (SP) Buff color, dry, loose minor clay (CL)		1735
	290-295				S.A.A.		
	295-300		Cuttings		Well Graded Sand (SW) Buff color, moist. With Sandy Clay (CL) Red- Brown, dry. Gravelly Sand (SW) Buff color, moist with gravel up to 5 cm		

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0508	SHEET 6 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 150 ft. South of Well #7.
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 482.8 START : 4/25/01 END: 05/02/2001 LOGGER : BL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
300	300-301.5	1.5	SS NO2/NO3/TKN/TOC		1" Packed Pumice Layer	
	301-308		Cuttings		Sand (SP) wet, fine	
	308-309		Cuttings		Lean Clay (CL) dk. Red-Brown, wet, stiff	
	309-310		Cuttings		Poorly Graded Sand (SP) Wet again, fine.	
310	318-320		Cuttings		Well Graded Sand (SW) Buff color, very moist, fine to coarse sand with fine gravel	0745
320	322		Cuttings		Well Graded Gravel (GW) with Clay (CL) dk. Brown, moist	
	324		Cuttings		Well Graded Sand (SW) moist, with minor clay layers	
330	330		Cuttings		Well Graded Gravel (GW) minor clay layers, moist	
	332-338		Cuttings		Poorly Graded Sand (SP) Buff to Lt. orange	
	338-348		Cuttings		Well Graded Gravel (GW) up to 5 cm., with poorly graded sand (SP) very moist, fine	
340	348-356		Cuttings		Well Graded Sand (SW) very moist.	

SSL_Nitrate_KAFB_0508.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0508	SHEET 7 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 150 ft. South of Well #7.
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 482.8 START : 4/25/01 END: 05/02/2001 LOGGER : BL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis	Time
350	356		Cuttings		Well Graded Gravel (GW) Large gravel in fine (SP) matrix, moist		
360	360-361.5	1.5	SS NO2/NO3/TKN/TOC	38/18	Well Graded Gravel (GW) Lt. Brown matrix of fine sand and silt, granitic and metamorphic gravels up to 40 mm, damp.	1.7 PPM VOC	0900
	361-375		Cuttings		S.A.A.		
370	375-378		Cuttings		Poorly Graded Sand (SP) Buff colored, damp, fine grained.		
	378-380		Cuttings		Well Graded Gravel (GW)		
380	380-385		Cuttings		Well Graded Sand (SW) Fine to coarse, damp		0935
	385-387		Cuttings		Well Graded Gravel (GW) moist to wet, matrix is fine to coarse grained sand.		
390	387-399		Cuttings		Well Graded Sand (SW) dry.		
	399-400		Cuttings		Poorly Graded Gravel (GP) dk. Color, moist, fine.		

SBL_Nitrate_KAFB_0508.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0508	SHEET 8 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 150 ft. South of Well #7.
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 482.8 START : 4/25/01 END: 05/02/2001 LOGGER : BL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
400	400-401.5	1.5	SS NO2/NO3/TKN/TOC	52/18	Well Graded Gravel (GW) Buff silty sand matrix, damp, gravel up to 2cm.	8.4 PPM VOC
	400-410		Cuttings		S.A.A	
410	410		Cuttings		Well Graded Gravel (GW) wet.	
	411		Cuttings		Well Graded Gravel (GW) only moist.	
	412-420		Cuttings		Well Graded Gravel (GW) wet.	
420	420		Cuttings		Silty Sand (SM) Lt. Tan, dry	
	425		Cuttings		Poorly Graded Sand (SP) wet, fine, to Well Graded Sand (SW) with fine gravel.	
430	430-440		Cuttings		Gravelly Sand (SW) wet. (water added.)	Cuttings clogged above drill bit. Loss of circulation. Water added. 1200
						Restart Drilling. 1300
440	445		Cuttings		S.A.A. with silt	

SBL_Nitrate_KAFB_0508.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0508 SHEET 9 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 150 ft. South of Well #7.
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 482.8 START : 4/25/01 END: 05/02/2001 LOGGER : BL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT) / SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
450	450	Cuttings		Well Graded Gravel (GW) in sand matrix (SP) moist from added water	
	453	Cuttings		Silty Sand (SM) dry	
460	460-461.5	1.5 SS NO2/NO3/TKN/TOC		Poorly Graded Sand (SP) Buff color, damp to moist, fine grained.	4.8 PPM VOC 1450
	461-468	Cuttings		S.A.A.	
	468-469	Cuttings		Well Graded Sand (SW) Buff color, wet.	
	469-470	Cuttings		Poorly Graded Sand (SP) with dark brown, medium stiff clay (CL)	
470	470-480	Cuttings		Poorly Graded Sand (SP) wet, fine.	
480	480-482	Cuttings		Poorly Graded Sand (SP) Buff color, damp.	
	482-488	Cuttings		S.A.A. Moist	
	488	Cuttings		Well Graded Sand (SW) wet, with gravel to 1/2", and silt, buff color, moist.	
490	498	Cuttings		Well Graded Gravel (GW) wet, up to 4 cm, with Well Graded Sand (SW) matrix wet.	

SBL_Nitrate_KAFB_0508.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0508	SHEET 10 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 150 ft. South of Well #7.
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 482.8 START : 4/25/01 END: 05/02/2001 LOGGER : BL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
500	502-510	Cuttings			Poorly Graded Gravel (GP) from 5mm to 2 cm . No sand.	
510	510-518	Cuttings			Poorly Graded Gravel (GP) from 1/2" to 3/4", very wet.	Producing Water
	513	Cuttings				
	518	Cuttings			Well Graded Gravel (GW) S.A.A. gravels, with fine-grained, Buff colored Sands	
520	520-521	1.5	SS	20/18	Sand Heave Poorly Graded Sand (SP) Buff color. Water added No analytical sample was taken, because of the added water. TD = 513' bgs DTW = 482.8' bgs at 1800	Sand Heave @ 1630 A lot of water has been added

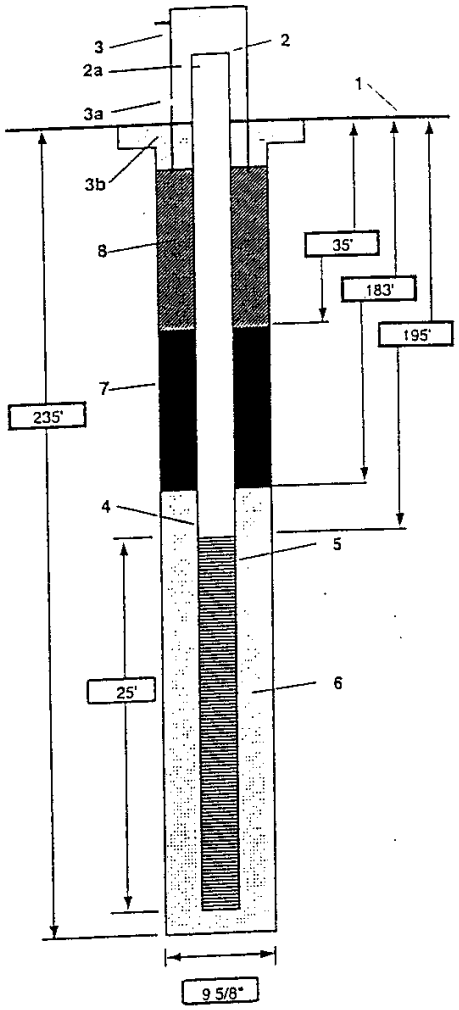
SBL_Nitrate_KAFB_0508.xls

CH2MHILL

PROJECT NUMBER	WELL NUMBER	
162708.02.NA.FI	KAFB-0509	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : KAFB Nitrate Abatement
LOCATION : 100' S of supply well KAFB-7, T9N R3E 1.2.2.4
DRILLING CONTRACTOR : Water Development Corp. / Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70W ARCH - Tricone
WATER LEVEL : Dry
START : 5/5/01 END: 05/10/2001 LOGGER : B LeFevre/ABQ



1- Ground elevation at well	5349' (approx)
2- Top of casing elevation	5352' (approx)
a) vent hole?	NA
3- Wellhead protection cover type	Steel 8" dia. aprox. 3' high, locking cap
a) weep hole?	NA
b) concrete pad dimensions	3' x 3' + 4 concrete filled bumper posts
4- Dia./type of well casing	4" Sched 80 threaded PVC
5- Type/slot size of screen	4" Sched 80 threaded PVC 0.010" slot 25' long
6- Type screen filter	10-20 Colorado silica
7- Type of seal	Quick Grout bentonite slurry
8- Surface Seal	
a) Grout mix used	Portland cement
b) Method of placement	Drive casing pour
c) Vol. of well casing grout	
Development method	Bail
Development time	1/2 hr
Estimated purge volume	2 gal (Dry)

Comments 12" sump below screen.

Illustration not to scale.

AR235

235

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0509	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement
LOCATION : 100' S of well KAFB-7, T9N R3E 1.2.2.4
ELEVATION : 5349' (approx)
DRILLING CONTRACTOR : Water Development Corp. / Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : Dresser T70W ARCH - Tricone
WATER LEVELS : NA
START : 5/5/01
END: 05/10/01
LOGGER B LeFevre/ABQ

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT) / SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
0	0-5	Cuttings		Gravelly Clay (CL) dk. Brown, moist	
	5-8	Cuttings		Sandy Silt (ML) red-brown, dry	
	8-15	Cuttings		Sandy Silt (ML) orange, moist, with gravel	
10	15-20	Cuttings		Silty Gravel (GM) dk. Red-brown, moist	
20	20-24	Cuttings		Sandy silt (SM) dkred-brown, moist	
	24	Cuttings		Gravelly Silt (ML) dk. Red-brown, moist	
	25-27	Cuttings		Lean Clay (CL) dk. Red-brown, moist	
	27-29	Cuttings		Silty Clay (CL) dk. Brown, wet, stiff	
	29-34	Cuttings		Sandy Silt (SM) dark Red-brown, moist, with gravels	
30	34-39	Cuttings		Lean Clay (CL) dk. Red-brown, moist, stiff	10:00 AM
	39-42	Cuttings		Lean Clay (CL) creamy-brown color, wet, soft	
40	42-47	Cuttings		Sandy Silt (ML) dk red-brown , moist	
	47-50	Cuttings		Silt (ML) dk red-brown moist	
50	50-54	Cuttings		Lean Clay (CL) dk. Red-brown, moist, soft	
	54-58	Cuttings		Sandy Silt (SM) moist, with angular coarse-grained sand	
	58-60	Cuttings		Well Graded Sand (SW) dk. Red-brown, angular, coarse grained	

AR235

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CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0509 SHEET 2 OF 4

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement
LOCATION : 100' S of well KAFB-7, T9N R3E 1,2,2,4
ELEVATION : 5349' (approx)
DRILLING CONTRACTOR : Water Development Corp. / Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : ARCH - Tricone
WATER LEVELS : NA
START : 05/05/01
END: 05/10/01
LOGGER : B Lefavre/ASO

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT) / SAMPLE # / TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
60	60-64	Cuttings		Gravelly Sand (SW) dry, limestone and granitic	
	64-65	Cuttings		Sandy Silt (SM) dk. Red-brown, moist	
	65-70	Cuttings		Silt (ML) dk. Red-brown, moist	
70	70-71	Cuttings		Lean Clay (CL) dk. Red-brown, moist, stiff	
	71-76	Cuttings		Silt (ML) dk. Red-brown, moist	1035
	76-80	Cuttings		Lean Clay (CL) dk. Red-brown, moist to wet	
80	80-89	Cuttings		S.A.A. ?	Clogged Snorkel
	89-92	Cuttings		Sandy Silt and Clay (SM/SC) dk. Red-brown, moist	
90	91	Cuttings		S.A.A. with gravel	
	92-100	Cuttings		Silt (ML) dk. Red-brown, moist	
100	100-102	Cuttings		Gravelly Silt (ML) Red-brown, moist	
	102-109	Cuttings		Silt (ML) dk Red-brown, moist	
	109-110	Cuttings		Lean Clay (CL) dk. Red-brown, moist	
110	110-112	Cuttings		Silt (ML) dk Red-brown, moist	
	112-115	Cuttings		Lean Clay (CL) dk. Red-brown, moist	
	115-120	Cuttings		Silty Clay (CL) Layerd	

SBL_Nitrate_KAFB_0509.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0509 SHEET 3 OF 4

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 100' S of well KAFB-7, T9N R3E 1,2,2,4
ELEVATION : 5349' (approx) DRILLING CONTRACTOR : Water Development Corp. / Kevin Jones
DRILLING METHOD AND EQUIPMENT USED : ARCH - Tricone
WATER LEVELS : NA START : 05/05/01 END: 05/10/01 LOGGER : B LeFevre/ABQ

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
120	120-130	Cuttings			Silty Clay (CL) Layerd	
130	130-131	Cuttings			Well Graded Sand (SW)	
	131-136	Cuttings			Silt (ML) with Lean Clay (CL) layers	
	136-140	Cuttings			Silt (ML) dk. Red-brown,	
140	140-143	Cuttings			Lean Clay (CL) dk. Red-brown, wet	
	143-150	Cuttings			Sandy Silt (SM) dk. Red-brown silt with angular, coarse-grained sand	
150	150-160	Cuttings			Lean Clay (CL) wet Silt with Clays (ML, CL)	
160						
170						

SBL_Nitrate_KAFB_0509.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0509 SHEET 4 OF 4

SOIL BORING LOG

PROJECT: KAFB Nitrate Abatement LOCATION: 100' S of well KAFB-7, T9N R3E 1,2,2,4
ELEVATION: 5349' (approx) DRILLING CONTRACTOR: Water Development Corp. / Kevin Jones
DRILLING METHOD AND EQUIPMENT USED: ARCH - Tricone
WATER LEVELS: NA START: 05/05/01 END: 05/10/01 LOGGER: B LeFevre/ABQ

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
180	180-195	Cuttings			Gravelly Clay (CL) dk. Red-brown, wet, with fine gravels	
190	195-200	Cuttings			Well Graded Sand (SW) wet	
200	200-205	Cuttings			Sandy Clay (SC) Lt. Brown, wet	
	205-208	Cuttings			Poorly Graded Sand (SP) Buff color, wet, fine grained	
	208-220	Cuttings			Well Graded Sand (SW) Buff color, wet	
210						
220	220-225	Cuttings			Gravelly Sand (SW) Buff colored, wet	
	225				Total Depth of Borehole	Adding water to clear hole.
230						

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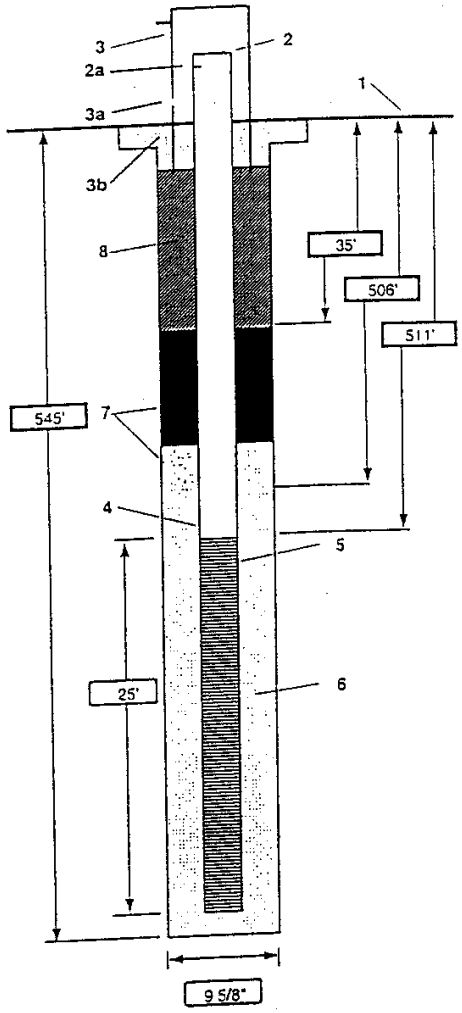
CH2MHILL

PROJECT NUMBER	WELL NUMBER		
162708.02.NA.FI	KAFB-0510	SHEET 1	OF 1

WELL COMPLETION DIAGRAM

PROJECT : KAFB Nitrate Abatement
LOCATION : Between sewage lagoon and KAFB-16, T10N R4E 31.3.1.1.3
DRILLING CONTRACTOR : Water Development Corp. / Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : SpeedStar 30K ARCH -Tricone
WATER LEVEL : 513'
START : 5/7/01 END: 05/17/2001 LOGGER : B LeFevre/ABQ



1- Ground elevation at well	5365' (est. USGS topo)
2- Top of casing elevation	5368' (est)
a) vent hole?	NA
3- Wellhead protection cover type	Steel 8" dia. aprox. 3' high. locking cap
a) weep hole?	NA
b) concrete pad dimensions	3' x 3' + 4 concrete filled bumper posts
4- Dia./type of well casing	4" Sched 80 threaded PVC
5- Type/slot size of screen	4" Sched 80 threaded PVC 0.010" slot
6- Type screen filter	10-20 Colorado silica
7- Type of seal	Quick Grout bent. slurry 35' to 460' 3/8" Bentionite Chips 460' to 506'
8- Surface Seal	
a) Grout mix used	Portland cement
b) Method of placement	Drive casing pour
Development method	Bail, surge and pump
Development time	1/2 day bailing, 1/2 hr pumping
Estimated purge volume	150 Gal. bailed, 300 Gal. Pumped

Comments 12" sump below screen.

Illustration not to scale.

AR 235

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0510	SHEET 1 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : East of runway
ELEVATION : 5365' msl (est. USGS Topo) DRILLING CONTRACTOR WDC/Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/1 8" split spoon
WATER LEVELS : 512' bgs START : 5/7/01 END: 05/08/2001 LOGGER : CES

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT) / SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
0					
2	2'	Cuttings		Silty sand (SM) light brown, moist, with gravel	0800
10	10'	Cuttings		Silty sand (SM), brown, some moisture, with gravel	
	16'	Cuttings		Gravelly sand (SW), brown, some moisture, mafic, quartz gravels, some silt	
20	20'	Cuttings		Silty sand (SM) light brown, few gravels, w/some clay	
	22'	Cuttings		S.A.A.	
	25'	Cuttings		Silty clay (CL) light brown, some moisture, few gravels, with some sand	
30	30'	Cuttings		Silty sand (SM) light brown, little moisture, very fine grained, few gravels	
	34'	Cuttings		S.A.A.	
	37'	Cuttings		Silty sand (SM) reddian brown, some moisture, fine grained, few gravels	
	38'	Cuttings		S.A.A.	
40	42'	Cuttings		S.A.A	
	45'	Cuttings		Clayey gravel (GC), little moisture, mafic gravel >2 cm, not rounded	
	48'	Cuttings		Silty sand (SM), light brown, little moisture, some gravel<1cm, with some clay	
50	52'	Cuttings		Silty clay (CL) reddish brown, little moisture	
	55'	Cuttings		S.A.A	
	57'	Cuttings		S.A.A.	
	58'	Cuttings		Silty clay (CL), reddish brown to light brown	

AR 235

SBL_Nitrate_KAFB_0510.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0510 SHEET 2 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : East of runway
ELEVATION : 5365' msl (est. USGS Topo) DRILLING CONTRACTOR WDC/Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/16" split spoon
WATER LEVELS : 512' bgs START : 5/7/01 END: 05/08/2001 LOGGER : CES

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT) / SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
60	60'	Cuttings		Silty sand (SM) reddish brown, some moisture, pumice gravels	
	62'	Cuttings		S.A.A	
	64'	Cuttings		Silty clay (CL), reddish brown, some moisture, few small gravels <1cm	
	65'	Cuttings		Silty sand (SM) many pumice gravels	
	67'	Cuttings		Gravelly sand (GM) mafic and quartz, with some silt	
	69'	Cuttings		Gravelly sand (GM) gravels< .25 cm	
70	70'	Cuttings		Silty Gravel(GM) some moisture, 1-2 cm gravel, with some sand	
	72'	Cuttings		S.A.A.	
	74'	Cuttings		Silty sand (SM) with few gravels, some moisture	
	76'	Cuttings		Silty sand (SM) with some clay and gravel, some moisture	
	78'	Cuttings		Silty sand (SM), reddish brown sand with green gravel, some moisture	930
80	80'	Cuttings		Silt and sand (SM) reddish brown, dry, very fine grained	
	83'	Cuttings		S.A.A. with small <1 cm gravel	
	85'	Cuttings		S.A.A	
	87'	Cuttings		Gravel, sand silt mixture (GM) reddish brown, some moisture, <1cm gravel, some	
	89'	Cuttings		S.A.A. with <.25 cm gravel	
90					
	92'	Cuttings		S.A.A	
	94'	Cuttings		Gravelly sand (SW), buff, some moisture, <.25 cm gravel	
	96'	Cuttings		Silty Gravel(GM) reddish brown , some moisture, with some sand	
	98'	Cuttings		Silty sand (SM), reddish brown, some moisture	
100	100'	Cuttings		Gravel-sand-silt mixture(GM) reddish brown, moist, > 1 cm gravel	
	102'	Cuttings		S.A.A	
	105'	Cuttings		S.A.A	
	106'	Cuttings		Gravel, sand, silt mixture (GM) , reddish brown, moist, > 1 cm gravel , with some clay	
	108'	Cuttings		S.A.A	
110	110'	Cuttings		Gravelly sand, silt mixture (GM), reddish brown, some moisture <.5 cm gravel	
	112'	Cuttings		S.A.A	
	115'	Cuttings		S.A.A	
	118'	Cuttings		Silty sand (SM) reddish brown, fine grain	

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0510	SHEET 3 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : East of runway
ELEVATION : 5385' msl (est. USGS Topo) DRILLING CONTRACTOR WDC/Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon
WATER LEVELS : 512' bgs START : 5/7/01 END: 05/08/2001 LOGGER : CES

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT) / SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
120	121'	Cuttings		Silty sand (SM) with clay, reddish brown, some moisture	
	123'	Cuttings		Silty gravelly sand (SM) reddish brown and buff, some moisture	
	125'	Cuttings		Silty sand (SM) w/ clay, reddish brown, some moisture	
	127'	Cuttings		Lean Clay (CL) brown, some moisture	
	129'	Cuttings		Silt w/ some clay (ML), brown, fluffy, some moisture	
130	132'	Cuttings		Sand and silt (ML), fluffy, moist	
	134'	Cuttings		Clay and silt (CL), some moisture , plastic, very soft	
	136'	Cuttings		S.A.A.	
	138'	Cuttings		Clay and silt and gravel (CL), some moisture, plastic, very soft clay and gravels<1cm	
140	140'	Cuttings		Silty fine Sand (ML), buff color, very little moisture, very fine grained	
	142'	Cuttings		Silty fine Sand(ML), buff color, moist, very fine grained	1100
	144'	Cuttings		Silty fine Sand (ML), buff color, some moisture, very fine grained	
	146'	Cuttings		Clayey sand (SC) and few gravels, reddish brown, some moisture, with some clay	
	148'	Cuttings		S.A.A.	
150	150'	Cuttings		S.A.A.	
	152'	Cuttings		S.A.A.	
	154'	Cuttings		Silty sand (SM) reddish brown, moist	
	156'	Cuttings		S.A.A	
	158'	Cuttings		Silty sand (SM) moist	
160	160'	Cuttings		Silty sand (SM) with clay, slightly moist, few small gravels	
	162'	Cuttings		Sand-silt mixture (SM) with some clay, medium brown, wet	
	164'	Cuttings		S.A.A	
	165'	Cuttings		Silty Gravel (GM) wet	
	166'	Cuttings		Inorganic Silt (ML) wet	
	168'	Cuttings		Silty sand (SM) medium brown, wet	
	169'	Cuttings		Silty Gravel (GM) wet	
170	170'	Cuttings		Gravel-sand-silt mixture (SM) wet	
	172'	Cuttings		S.A.A	
	174'	Cuttings		S.A.A	
	176'	Cuttings		Clayey Gravel (GC) wet, with some silt and sand	
	177'	Cuttings		Lean Clay (CL) wet, plastic, very pliable	

SBL_Nitrate_KAFB_0510.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0510 SHEET 4 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : East of runway
ELEVATION : 5365' msl (est. USGS Topo) DRILLING CONTRACTOR WDC/Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon
WATER LEVELS : 512' bgs START : 5/7/01 END: 05/08/2001 LOGGER : CES

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT) / SAMPLE # / TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
180	180'	Cuttings		S.A.A.	
	184'	Cuttings		Sandy silt (SM) and few small <.5cm gravel, wet	
	186'	Cuttings		Sandy silt (SM), buff, dry	
	188'	Cuttings		S.A.A.	
	189'	Cuttings		Silty Clay (CL), some moisture	
190	192'	Cuttings		Lean Clay (CL) very moist, pliable	
	195'	Cuttings		Silty Sand(SM), very moist, a few gravels <50 mm, with some clay	
	198'	Cuttings		S.A.A	
200	200'	Cuttings		Silty clay (CL), moist, pliable, very soft	
	202'	Cuttings		S.A.A	
	205'	Cuttings		Silty clay and sand (CL and SM) moist, few gravels <.5 cm	
	206'	Cuttings			
	208'	Cuttings		Silty sand (SM) very moist, some gravel	
210	210'	Cuttings		Silty sand (SM) very moist, lots of gravel <1 cm	
	212'	Cuttings		Well-graded Sand (SW) buff, moist, few gravel <.5 cm, medium grained	
	215'	Cuttings		Well-graded Sand (SW), moist, medium grained, with few gravels	
	218'	Cuttings			
220	220'	Cuttings		S.A.A.	
	222'	Cuttings		Silty sand (SM) buff, moist, medium grained	
	225'	Cuttings		S.A.A.	
	226'	Cuttings		S.A.A.	
	229'	Cuttings		Silty sand (SM) buff, dry, fine grained	
230	230'	Cuttings		S.A.A	
	232	Cuttings		S.A.A.	
	234	Cuttings		S.A.A.	
	235	Cuttings		S.A.A.	
	236	Cuttings		Silty sand (SM) buff, moist, fine grained	

SBL_Nitrate_KAFB_0510.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0510 SHEET 5 OF 10

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : East of runway
ELEVATION : 5365' msl (est. USGS Topo) DRILLING CONTRACTOR WDC/Marvin Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon
WATER LEVELS : 512' bgs START : 5/7/01 END: 05/08/2001 LOGGER : CES

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT) / SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
240	240'	Cuttings		Silty sand (SM), buff, dry, medium grained	
	243'	Cuttings		Silty sand(SM) buff, dry, medium grained, with some gravel	
	245'	Cuttings		Inorganic Silt (ML) buff, dry	
250	250'	Cuttings		Silty sand (SM) with some gravels, buff, moist	1520
	253'	Cuttings		Silty sand (SM) buff, moist, fine grained	
	255'	Cuttings		S.A.A.	
	257'	Cuttings		Gravelly sand (SW), buff, moist, coarse sand, gravels <.25 cm	
260	260'	Cuttings		Sand (SW) light buff, moist, felsic, coarse	
	262'	Cuttings		S.A.A	
	265'	Cuttings		Well-graded Sand (SW) buff, moist, coarse	
	266'	Cuttings		Sand and silt (SM) buff, dry, coarse	
	268'	Cuttings		Well-graded Sand (SW), buff, little moisture, fine grained	
270	271'	Cuttings		Gravel-Sand-Clay mixture (GC) gravel has green mineral, very moist	
	274'	Cuttings		S.A.A	
	276'	Cuttings		Poorly graded sand (SP), buff color, fine grained, very moist, TC coarse grained sand	
280	280'	Cuttings		Well-graded Sand (SW), fine to coarse grained, moist w/ fine gravel	
	285'	Cuttings		Poorly graded sand (SP), buff, fine, dry	lost circulation 285.5'-287
290	290'	Cuttings		Sand and silt (SM), buff, moist, some fine gravel	
	292'	Cuttings		Silty sand (SM) buff, coarse grained, dry	
	297'	Cuttings		Well graded sand (SW) buff, dry, medium grained sand with gravel <1cm	

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CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0510 SHEET 6 OF 10
	SOIL BORING LOG	

PROJECT : KAFB Nitrate Abatement LOCATION : East of runway
ELEVATION : 5365' msl (est. USGS Topo) DRILLING CONTRACTOR WDC/Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon
WATER LEVELS : 512' bgs START : 5/7/01 END: 05/08/2001 LOGGER : CES

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
300	300'	Cuttings			Well-graded Sand (SW) buff, dry, medium grained sand with gravel <1cm	
	302	Cuttings			Well-graded Sand (SW) dry, felsic, gravel <1cm	
	304'	Cuttings			S.A.A.	1700
	307'	Cuttings			Well-graded Sand (SW) buff, some moisture, felsic	
308						
310	310'	Cuttings			Clayey Sand (SC) some moisture, felsic, chunky clay	
	312'	Cuttings			Well-graded Sand (SW) dry, fine grained	
	315'	Cuttings			Well-graded Sand(SW), buff, fine grained, fine grained with <.5 cm gravels	1730
	319'	Cuttings			Clayey Sand (SC) buff, fine grained, fine grained with <.5 cm gravels, clay chunks	
320	320'	Cuttings			Well-graded Sand (SW) buff, slightly moist, coarse grained	new day,0815
	322'	Cuttings			Well-graded Sand (SW) buff, slightly moist, fine grained	
	324'	Cuttings			Well-graded Sand(SW) brown, slightly moist, fine grained	
	326'	Cuttings			S.A.A.	
	328'	Cuttings			Clayey silt (ML) brown, some moisture	
330	330'	Cuttings			Silty sand (SM) buff, some moisture, fine grained	
	332'	Cuttings			S.A.A	
	335'	Cuttings			Silty sand (SM) buff, some moisture, fine grained, felsic	
	337'	Cuttings			S.A.A.	
	338'	Cuttings			Silty sand (SM) yellowish brown, very moist, with some gravel <.5 cm	
340	340'	Cuttings			S.A.A.	
	342'	Cuttings			S.A.A.	
	344'	Cuttings			S.A.A.	
	347'	Cuttings			S.A.A	
	349'	Cuttings			Silty sand (SM), yellowish brown, dry, with some gravel <.5 cm	

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CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0510 SHEET 7 OF 10
	SOIL BORING LOG	

PROJECT : KAFB Nitrate Abatement LOCATION : East of runway
ELEVATION : 5365' msl (est. USGS Topo) DRILLING CONTRACTOR WDC/Marlan Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon
WATER LEVELS : 512' bgs START : 5/7/01 END: 05/08/2001 LOGGER : CES

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT) / SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
350	351'	Cuttings		S.A.A	
	353'	Cuttings		Well-graded Sand (SW) yellow/brown, some moisture, fine grained, some small gravels	
	355'	Cuttings		S.A.A	
	357'	Cuttings		Well-graded Sand (SW) buff, dry, medium grained	
360	360'	Cuttings		Well-graded Sand (SW) buff, slightly moist, coarse grained	
	362'	Cuttings		Well-graded Sand (SW) yellow/brown, slightly moist, medium and coarse grained	
	364'	Cuttings		S.A.A.	
	366'	Cuttings		Well-graded Sand (SW) buff, dry, with some gravels <.5 cm	
	368'	Cuttings		S.A.A	
370	371	Cuttings		S.A.A.	
	374'	Cuttings		S.A.A	
	376'	Cuttings		S.A.A	
	379'	Cuttings		Gravelly Sand (SW) buff, dry, coarse grained	
380	381'	Cuttings		Well-graded Sand (SW) buff, dry, medium grained	
	383'	Cuttings		Well-graded Sand (SW), buff, dry, fine grained	
	385'	Cuttings		Well-graded Sand (SW), buff, dry, coarse grained	
	388'	Cuttings		S.A.A.	
390	390'	Cuttings		Well-graded Sand (SW), buff, some moisture, coarse grained, some gravel <.5 cm	
	392'	Cuttings		S.A.A.	
	394'	Cuttings		Well-graded Sand (SW)buff, dry, coarse grained	
	396'	Cuttings		Well-graded Sand (SW) buff, dry, coarse grained, some mafic gravels <.5 cm	

SBL_Nitrate_KAFB_0510.xls

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0510 SHEET 8 OF 10
	SOIL BORING LOG	

PROJECT : KAFB Nitrate Abatement LOCATION : East of runway
ELEVATION : 5365' msl (est. USGS Topo) DRILLING CONTRACTOR: WDC/Marion Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon
WATER LEVELS : 512' bgs START : 5/7/01 END: 05/09/2001 LOGGER : CES

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
400					S.A.A	
	403'		Cuttings		Silty Gravel (GM), dry, gravel <1cm	
	404'		Cuttings		Sand, buff, dry, coarse grained, felsic	
	406'		Cuttings		Gravelly sand (SW), dry, coarse grained sand, gravels 1-2 cm	
	408'		Cuttings		Silty sand (SM), slightly moist, fine grained	
410	410'		Cuttings		Silty Sand(SM), buff, dry	
	412'		Cuttings		S.A.A.	
	415'		Cuttings		Gravelly Sand (SW) buff, dry, gravel 1-2 cm	
	417'		Cuttings		S.A.A.	
420	420'		Cuttings		S.A.A	
	423'		Cuttings		Well-Graded Sand (SW) buff, dry, coarse grained	
	425'		Cuttings		Gravelly Sand (SW) buff, dry, coarse grained, gravel <.5 cm	
	427'		Cuttings		S.A.A	
430	430'		Cuttings		Gravel and silt (GM) brown silt, some moisture, 1-2 cm gravel	
	432'		Cuttings		Inorganic Silt (ML) light colored, dry	
	435'		Cuttings		S.A.A	
	438'		Cuttings		Sand-gravel-silt mixture (GM), buff sand, brown silt, moist, coarse sand, gravel >1 cm	
440	440'		Cuttings		Well-graded Sand (SW) buff, dry, very fine grained grained	
	442'		Cuttings		Well-graded Sand(SW) buff, dry, coarse grained	
	444'		Cuttings		Silty Gravel (GM), dry, <1 cm gravel	
	447'		Cuttings		Well-graded Sand (SW) buff, some moisture, medium grained	

SBL_Nitrate_KAFB_0510.xls

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0510 SHEET 9 OF 10
	SOIL BORING LOG	

PROJECT : KAFB Nitrate Abatement LOCATION : East of runway
ELEVATION : 5365' msl (est. USGS Topo) DRILLING CONTRACTOR: WOC/Marian Philips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (Incone) w/18" split spoon
WATER LEVELS : 512' bgs START : 5/7/01 END: 05/08/2001 LOGGER : CES

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
450	450'	Cuttings			Silty Sand (SM) buff color, dry, some trace gravels <.5 cm, broken, felsic sand	
	452'	Cuttings			S.A.A	
	455'	Cuttings			Silty Sand (SM) buff, dry, medium grained	
	456'	Cuttings			Silty Gravel (GM) buff, dry, 1-2 cm gravel	
	458'	Cuttings			S.A.A	
460	460'	Cuttings			Silty Sand (SM) buff, dry, coarse grained	
	463'	Cuttings			Silty Sand (SM) buff, dry, fine grained	
	464'	Cuttings			S.A.A.	
	465'	Cuttings			Silty Sand (SM) buff, slightly moist, fine grained	
	467'	Cuttings			Silty Sand(SM) buff, dry, medium grained, <.25 cm gravels	
	469'	Cuttings			Well-graded Sand (SW) buff, slightly moist, fine grained	
470	470'	Cuttings			Well-graded Sand (SW) buff, dry, fine grained	
	472'	Cuttings			Well-graded Sand (SW) buff, dry, fine grained	
	473'	Cuttings			Well-graded Sand (SW) buff, dry, fine grained with trace gravel <.5 cm	
	475'	Cuttings			Well-graded Sand (SW) buff, dry, fine grained with trace gravel <.5 cm	1520
	476'	Cuttings			Well-graded Sand (SW) buff, slightly moist, fine grained	
	478'	Cuttings			S.A.A.	
	479'	Cuttings			Well-graded Sand (SW) buff, slightly moist, fine grained w/ a few wet clay chunks	
480	481'	Cuttings			S.A.A.	
	485'	Cuttings			Well-graded Sand (SW) buff, moist, fine grained w/ a few wet clay chunks	
	487'	Cuttings			S.A.A.	
490	490'	Cuttings			Well-graded Sand (SW) buff, moist, fine grained w/ a few wet clay chunks	
	491'	Cuttings			Clayey Sand (CL) moist, very plastic	
	492'	Cuttings			Silty fine sand (ML) buff, very moist, fine grained	
	494'	Cuttings			S.A.A	
	496'	Cuttings			S.A.A.	
	498'	Cuttings			Silty fine sand (ML) buff, dry, fine grained	

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CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0510 SHEET 10 OF 10
	SOIL BORING LOG	

PROJECT : KAFB Nitrate Abatement LOCATION : East of runway
ELEVATION : 5365' msl (est. USGS Topo) DRILLING CONTRACTOR WDC/Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon
WATER LEVELS : 512' bgs START : 5/7/01 END: 05/08/2001 LOGGER : CES

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
500	500'	Cuttings			Silty sand (SM) buff, dry, fine grained	
	501'	Cuttings			S.A.A	
	502'	Cuttings			Silty sand (SM) buff, moist, fine grained	
	504'	Cuttings			Silty sand (SM) buff, dry, fine grained	
	507'	Cuttings			Silty sand (SM) buff, moist, fine grained	
	508'	Cuttings			Silty sand (SM) buff, very moist, fine grained	
510	510'	Cuttings			Silty sand (SM) buff, dry, fine grained	
	512'	Cuttings			Silty sand (SM) buff, wet, fine grained	
	514'	Cuttings			Silty sand (SM) buff, dry, fine grained	
	515'	Cuttings			S.A.A.	
	516'	Cuttings			Silty sand (SM) buff, wet, fine grained	
520	522'	Cuttings			Silty sand (SM) with some gravel, wet, fine grained	
	524'	Cuttings			Gravel, Sand, Silt mixture (GM) medium grained, wet, with some clay	
	526'	Cuttings				
	528'	Cuttings				
530	530'	Cuttings			Gravelly sand (SW) wet, <1 cm gravel	
	532'	Cuttings			S.A.A.	
	534'	Cuttings			S.A.A.	
	535'	Cuttings			Gravelly sand (SW) medium grained, wet, 2-3 cm gravel	
	536'	Cuttings			Sand-silt mixture (SM) brown, wet	
540						TD of boreholes540' bgs @ 1200 on 5/8/01

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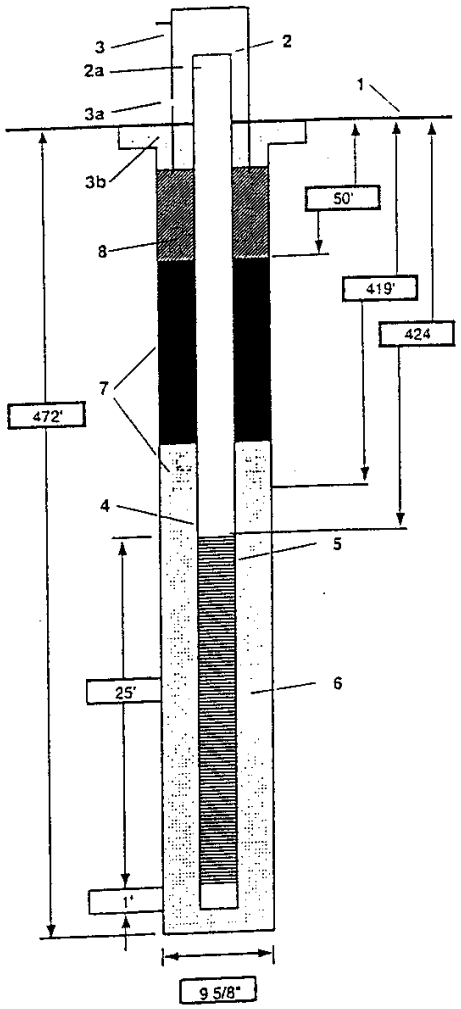
CH2MHILL

PROJECT NUMBER	WELL NUMBER	
162708.02.NA.FI	KAFB-0512	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : KAFB Nitrate Abatement
LOCATION : Intersection of Munition Haul Rd. and Target Rd., T9N R3E 1.2.4.4
DRILLING CONTRACTOR : Water Development Corp. / Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : SpeedStar 30K ARCH - Tricone
WATER LEVEL : 433' bgl
START : 4/19/01 END: 04/25/2001 LOGGER : C Salazar/ABQ



1- Ground elevation at well	5300' (est. USGS topo)
2- Top of casing elevation	5303' (est. USGS topo)
a) vent hole?	NA
3- Wellhead protection cover type	Steel 8" dia. aprox. 3' high, locking cap
a) weep hole?	NA
b) concrete pad dimensions	3' x 3' + 4 concrete filled bumper posts
4- Dia./type of well casing	4" Sched 80 threaded PVC
5- Type/slot size of screen	4" Sched 80 threaded PVC 0.010" slot
6- Type screen filter	8x12 Colorado Silica 41 x 100# sacks
7- Type of seal	Bentonite slurry, 50' to 392' bgs Bentonite chips, 392" to 419' bgs
8- Surface Seal	
a) Grout mix used	Portland cement
b) Method of placement	Drive casing pour
c) Vol. of well casing grout	
Development method	Bail, surge and pump
Development time	1/2 day bailing, 1 hr pumping
Estimated purge volume	50 Gal. bailed, 108 Gal. Pumped

Comments 12" sump below screen.

Illustration not to scale.

AR 235

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0512	SHEET 1 OF 9

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : Int. of Munitions Haul and Target Rds.
ELEVATION : DRILLING CONTRACTOF WDC/Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (bicone) w/18" split spoon
WATER LEVELS : 433' bgs START : 4/19/01 END: 04/25/2001 LOGGER : BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis	Time
0							
2	2-3.5	1.5	SS	---	Sandy and Clayey Silt (ML) Red-brown, moist	0 ppm VOC	0945
		NO2/NO3/TKN/TOC					
9	9-10.5	1.5	SS	---	Silt (ML) Orange-brown, dry, trace of fine gravel	0 ppm VOC	1145
10		NO2/NO3/TKN/TOC					
	10' - 15'	Cuttings			Gravelly Silt (ML) Orange-brown, damp		
15	15-16.5	1.5	SS	26-30-35	Sandy Silt (ML) orange-brown, dry	0 ppm VOC	1205
		NO2/NO3/TKN/TOC					
20							
25	25-26.5	1.5	SS	5-27-50	Sandy Silt (SM) Orange-brown, dry hard plates/waters	0 ppm VOC	1305
		NO2/NO3/TKN/TOC					
					Silty sand (SM) Light tan, wet fine-grained sand		
30							
	35'	Cuttings			S. A. A.		
40	40' - 50'	Cuttings			Poorly Graded Gravel (GP) Coarse (<1") granitic, dry, no fines		1330
49	49-50.5	1.5	SS	13-30-50	Sandy Silt (SM) Orange, dry	0 ppm VOC	1345
		NO2/NO3/TKN/TOC					
50	50' - 65'	Cuttings			Gravelly Silt (ML)		

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AR 235

CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0512 SHEET 2 OF 9

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : Int. of Munitions Haul and Target Rds.
ELEVATION : DRILLING CONTRACTOR WDC/Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon
WATER LEVELS : 433' bgs START : 4/19/01 END: 04/25/2001 LOGGER : BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
60	50' - 65'	Cuttings			Gravelly Silt (ML)	
	65'	Cuttings			Caliche (CA) and Hard Sandy Clays (CL)	
	67'	Cuttings			Gravelly Silt (ML) orange-brown, dry	
70	72' - 74'	Cuttings			S. A. A.	
80	81' - 85'	Cuttings			S. A. A.	
90	98'	Cuttings			S. A. A.	
100						
108	108-109.5	1.5	SS	5-46-50	Silty Clay (CL) light brown, hard (very stiff), some cemented, moist	0 ppm VOC 1540
		NO2/NO3/TKN/TOC				
110						

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0512	SHEET 3 OF 9

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : Int. of Munitions Haul and Target Rds.
ELEVATION : DRILLING CONTRACTOR WDC/Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon
WATER LEVELS : 433' bgs START : 4/19/01 END: 04/25/2001 LOGGER : BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
120	120' - 125'				Clayey Silt (CL) moist	1605
130						
140						
148	148-149.5	1.5	SS	8-10-100	Silty and Lean Clay (CL) Brown & greenish-grey, stiff, moist	0 ppm VOC 1725
		NO2/NO3/TKN/TOC				
150	150-151.5	1.5	SS	4-24-70	1" Well-graded sand (SW) wet, over Lean clay (CL) light grey, moist, stiff	no odor 1500
		Cuttings			Silty Sands (SP) w/pumice, moist	
160	160-161.5	1.5	SS	7-40-50/3	Poorly graded sand (SP) light tan, dry fine-grained w/1.5-cm pumice (black & orange)	no odor 1545
170	170-171.5	1.5	SS	24-40-50/3	Gravel-sand-silt mixture (GM) moist, well-packed	no odor 1615

Stl_Nitrate_KAFB_0512v2.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0512	SHEET 4 OF 9

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : Int. of Munitions Haul and Target Rds.
ELEVATION : DRILLING CONTRACTOR WDC/Marian Phillips
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon
WATER LEVELS : 433' bgs START : 4/19/01 END: 04/25/2001 LOGGER : BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
180	180-181.5	1.5	SS	15-30-50/4	Poorly graded sand (SP) light tan w/rusty layers, firmly packed, fine-grained	no odor 1650
190	190-191	1.0	SS	32-70	Poorly graded sand (SP) light tan, loose, dry, fine- to medium-grained (#20) sand	no odor 1722
200	200-201.5	1.5	SS	15-100/4	Well graded sand (SW) moist, loose	no odor 1756 End of day 3/6/01 Begin day 3/7/01
108	108-109.5	1.5	SS	8-10-100	NO2/NO3/TKN/TOC	
210	210-211	1	SS	13-30-40	Silty & gravelly sand (SW) tan, gravel to 3-cm, dry w/pumice	2.7 ppm VOC/PID 0830
220	220-221.5	1.5	SS	70-100	Poorly graded sand (SP) light tan, dry, loose, fine-grained	0.0 ppm VOC/PID 0915
108	108-109.5	1.5	SS	8-10-100	NO2/NO3/TKN/TOC	
230	230-231.5	1.5	SS	21-38-40/3	Well-graded sand (SW) light tan, w/silt & fine gravels, dry	78 ppm VOC/PID 1645 faint odor

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0512	SHEET 5 OF 9

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : Int. of Munitions Haul and Target Rds.

ELEVATION : DRILLING CONTRACTOR WDC/Marian Phillips

DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon

WATER LEVELS : 433' bgs START : 4/19/01 END: 04/25/2001 LOGGER : BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis	Time
240	240-241	1.0	SS	10-30-50	6" Well graded sand (SW) 6" Silty clay (CL) brown moist, stiff	12 ppm VOC/PID	1005
108	108-109.1	1.5	SS NO2/NO3/TKN/TOC	8-10-100			
250	250-251	1.0	SS GRO/DRO	23-38-50	Well graded sand (SW) tan-orange, dry, upto coarse-grained pumice, w/1/2" lean clay (CL) layer dry, brittle, hard.	14.2 ppm VOC/PID	1045
260	260-261	1.0	SS GRO/DRO	8-15-50/2	Poorly graded sand (SP) light tan, fine-grained w/trace of fine gravel	10.2 ppm VOC/PID	1155
270	270-271.5	1.50	SS GRO/DRO	10-75-50/2	Well-graded sand (SW) light tan, very fine- to coarse-grained sand w/ trace of gravel	1.7 ppm VOC/PID	1250
280	280-281	1.0	SS GRO/DRO	10-50-50/3	S. A. A.	0.8 ppm VOC/PID	1340
290	290-290.2	0.25	SS	175/10	Well graded gravels (GW) fine to 5-cm granitic, metamorphic, and basaltic	0.0 ppm VOC/PID	1525

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CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0512 SHEET 6 OF 9

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : Int. of Munitions Haul and Target Rds.

ELEVATION : DRILLING CONTRACTOR WDC/Marian Phillips

DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon

WATER LEVELS : 433' bgs START : 4/19/01 END: 04/25/2001 LOGGER : BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
300	300-300.5	0.5	SS GRO/DRO	40-100/5	Silty & sandy gravel (GM) Light tan, upto 5-cm gravels	2.1 ppm VOC/PID 1640
308	308-309.5	1.5	SS NO2/NO3/TKN/TOC	8-10-100		
310	310-311.5	1.5	SS GRO/DRO/VOC	40-150/7	Poorly graded sand (SP) light tan, moist, fine-grained, well-packed	1.4 ppm VOC/PID 1735 End of day 3-6-01 Begin day 3-7-01
320	320-321.5	1.5	SS GRO/DRO	10-100/6	Sandy & silty gravel (GM) light tan to yellow-orange, dry, loose, some cemented zones, metamorphic & volcanic gravels	0.0 ppm VOC/PID 0925
330	330-331.5	1.5	SS GRO/DRO/VOC	8-10-100	Poorly graded sand (SP) light tan, fine-grained, loose, moist	1.1 ppm VOC/PID 1015
340						

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0512	SHEET 7 OF 9

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : Int. of Munitions Haul and Target Rds.

ELEVATION : DRILLING CONTRACTOF WDC/Marian Phillips

DRILLING METHOD AND EQUIPMENT USED : Falling Star 30K ARCH (tricone) w/18" split spoon

WATER LEVELS : 433' bgs START : 4/19/01 END: 04/25/2001 LOGGER : BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis	Time
350	350-350.5	0.5	SS GRO/DRO	40-100/5	Silty & sandy gravel (GM) Light tan, upto 5-cm gravels	2.1 ppm VOC/PID	1640
308	308-309.5	1.5	SS NO2/NO3/TKN/TOC	8-10-100			
360	360-361.5	1.5	SS GRO/DRO/VOC	40-150/7	Poorly graded sand (SP) light tan, moist, fine-grained, well-packed	1.4 ppm VOC/PID	1735
						End of day 3-6-01 Begin day 3-7-01	
370	370-371.5	1.5	SS GRO/DRO	10-100/8	Sandy & silty gravel (GM) light tan to yellow-orange, dry, loose, some cemented zones, metamorphic & volcanic gravels	0.0 ppm VOC/PID	0925
380	380-381.5	1.5	SS GRO/DRO/VOC	8-10-100	Poorly graded sand (SP) light tan, fine-grained, loose, moist	1.1 ppm VOC/PID	1015
390							

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CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0512 SHEET 8 OF 9

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : Int. of Munitions Haul and Target Rds.

ELEVATION : DRILLING CONTRACTOR WDC/Marian Phillips

DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon

WATER LEVELS : 433' bgs START : 4/19/01 END: 04/25/2001 LOGGER : BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
400	400-400.5	0.5	SS GRO/DRO	40-100/5	Silty & sandy gravel (GM) Light tan, upto 5-cm gravels	2.1 ppm VOC/PID 1640
408	408-409.5	1.5	SS NO2/NO3/TKN/TOC	8-10-100		
410	410-411.5	1.5	SS GRO/DRO/VOC	40-150/7	Poorly graded sand (SP) light tan, moist, fine-grained, well-packed	1.4 ppm VOC/PID 1735 End of day 3-6-01 Begin day 3-7-01
420	420-421.5	1.5	SS GRO/DRO	10-100/8	Sandy & silty gravel (GM) light tan to yellow-orange, dry, loose, some cemented zones, metamorphic & volcanic gravels	0.0 ppm VOC/PID 0925
430	430-431.5	1.5	SS GRO/DRO/VOC	8-10-100	Poorly graded sand (SP) light tan, fine-grained, loose, moist	1.1 ppm VOC/PID 1015
440						

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CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0512 SHEET 9 OF 9

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : Int. of Munitions Haul and Target Rds.

ELEVATION : DRILLING CONTRACTOR WDC/Marian Phillips

DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH (tricone) w/18" split spoon

WATER LEVELS : 433' bgs START : 4/19/01 END: 04/25/2001 LOGGER : BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
450	450-450.5	0.5	SS GRO/DRO	40-100/5	Silty & sandy gravel (GM) Light tan, upto 5-cm gravels	2.1 ppm VOC/PID 1640
308	308-309.5	1.5	SS NO2/NO3/TKN/TOC	8-10-100		
460	460-461.5	1.5	SS GRO/DRO/VOC	40-150/7	Poorly graded sand (SP) light tan, moist, fine-grained, well-packed	1.4 ppm VOC/PID 1735 End of day 3-6-01 Begin day 3-7-01
470	470-471.5	1.5	SS GRO/DRO	10-100/8	Sandy & silty gravel (GM) light tan to yellow-orange, dry, loose, some cemented zones, metamorphic & volcanic gravels	0.0 ppm VOC/PID 0925
480	480-481.5	1.5	SS GRO/DRO/VOC	8-10-100	Poorly graded sand (SP) light tan, fine-grained, loose, moist TD of Borehole 480' bgs	1.1 ppm VOC/PID 1015
490						

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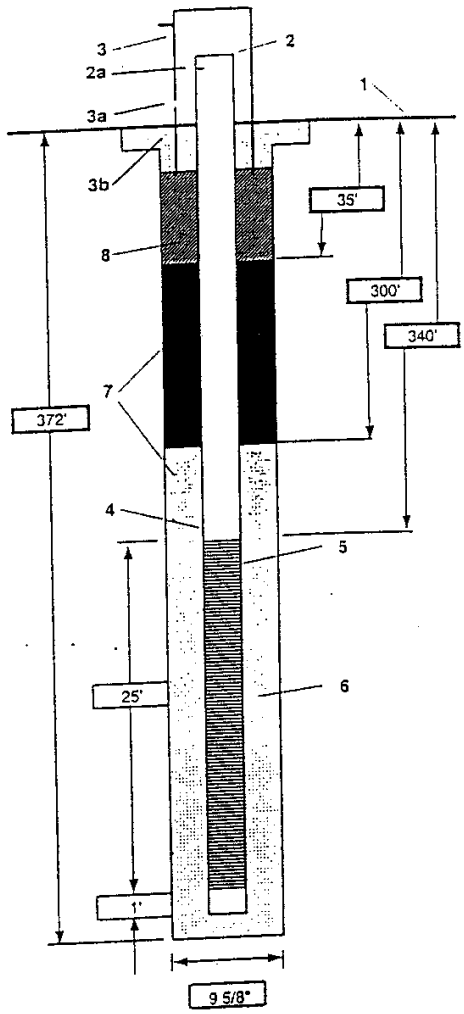
PROJECT NUMBER	WELL NUMBER	
162708.02.NA.FI	KAFB-0514	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : KAFB Nitrate Abatement
LOCATION : Tijeras Arroyo, S of Igloo Munitions Storage Area, T9N R3E 1.4.3.4
DRILLING CONTRACTOR : Water Development Corp. / Mark Green
DRILLING METHOD AND EQUIPMENT USED : Dresser T70W ARCH Tricone
WATER LEVEL : 343' bgl
START : 5/9/01 END: 05/18/2001 LOGGER : B LeFevre/ABQ



1- Ground elevation at well	5208' (approx)
2- Top of casing elevation	5211' (approx)
a) vent hole?	NA
3- Wellhead protection cover type	Steel 8" dia. aprox. 3' high, locking cap
a) weep hole?	NA
b) concrete pad dimensions	3' x 3' + 4 concrete filled bumper posts
4- Dia./type of well casing	4" Sched 80 threaded PVC
5- Type/slot size of screen	4" Sched 80 threaded PVC 0.010" slot
6- Type screen filter	#2-12 Monterey Beach Sand 25 x 100# sacks
7- Type of seal	Bentonite slurry, 35' to 300' bgs Bentonite chips, 300' to 330' bgs
8- Surface Seal	
a) Grout mix used	Portland cement
b) Method of placement	Drive casing pour
c) Vol. of well casing grout	
Development method	Bail, surge and pump
Development time	1/2 day bailing, 1 hr pumping
Estimated purge volume	50 Gal. bailed, 186 Gal. Pumped

Comments 12" sump below screen.

Illustration not to scale.

AR 235

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0514	SHEET 1 OF 6

SOIL BORING LOG

PROJECT: Nitrate Abatement - KAFB
LOCATION: Tijeras Arroyo SW of Bldg. 760
ELEVATION: 5208' @ Surface
DRILLING CONTRACTOR: WDC/ Mark Green
DRILLING METHOD AND EQUIPMENT USED: ARCH (Tricone) 18" SS Sampler
WATER LEVELS: NA
START: 5/9/01
END:
LOGGER: BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
0	2-2.5	0.5	SS NO2/NO3/TKN/TOC		Organic Silt (OL) dk brown, dry	
	5-5.5	0.5	SS NO2/NO3/TKN/TOC		SAA	
10	10-10.5	0.5	SS NO2/NO3/TKN/TOC		Silt (ML), orange-brown, dry	
15	15-15.5	0.5	SS NO2/NO3/TKN/TOC	10/18	SAA	
20	20-20.5	0.5	SS NO2/NO3/TKN/TOC	15/18	Silt (ML) Lt. Brown, moist	
	25-25.5	0.5	SS NO2/NO3/TKN/TOC	18/18	Silt (ML) Lt. Brown w/ vertically oriented Organic Clay (OL) Dk. Brown, moist	
	25-30	Cuttings			Silty Clay (CL) Lt. Brown, moist	
30	30-35	Cuttings			Silt (ML) Lt. Brown, moist	
	35-40	Cuttings			Gravelly Silty Sand (SW), fine grained sand- Lt. Brown, moist	
40			SS NO2/NO3/TKN/TOC	17/18		
50	54-55	Cuttings			Caliche Zone (CA)	
	55-60	Cuttings			Poorly Graded Sand (SP) Buff color, very moist	

AR235

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0514	SHEET 2 OF 6

SOIL BORING LOG

PROJECT : Nitrate Abatement - KAFB
LOCATION : Tijeras Arroyo SW of Bldg. 760
ELEVATION : 5208' @ Surface
DRILLING CONTRACTOR : WDC/ Mark Green
DRILLING METHOD AND EQUIPMENT USED : ARCH (Tricone) 18" SS Sampler
WATER LEVELS : NA
START : 05/08/01
END:
LOGGER BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
60	60-65	Cuttings			Gravelly Sand (SW) Buff colored, very moist	
	65-68	Cuttings			Poorly Graded Sand (SP). Buff color, fine grained , very moist	
	68-80	Cuttings			Well Graded Sand (SW) Buff color, fine to coarse-grained sand, very moist.	
70						
80	80-81.5	1.5	SS NO2/NO3/TKN/TOC	20/18	Top 16 inches: Poorly Graded Sand (SP) Buff colored, moist. Lower 2 inches: Lean Clay (CL) red-brown, soft, moist	
	80-85	Cuttings			Well Graded Sand (SW) Buff colored, moist fine grain sand to 2-cm gravel. Yellowish concretions at 82 ft.	
	85-90	Cuttings			Lean Clay zone (CL) gray color, moist, soft	
90	90-91	Cuttings			Silty Sand (ML/SP) very fine grained sand, buff colored, moist	
	91-96	Cuttings			Poorly Graded Sand (SP) buff colored moist	
	96-97	Cuttings			Sandy Gravel (GW) buff colored well rounded, mixed lithology, fine grained sand	
	97-120	Cuttings			Gravelly Sand (SW) buff color, up to 2 cm gravels, moist	
100						
110						

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0514	SHEET 3 OF 6

SOIL BORING LOG

PROJECT: Nitrate Abatement - KAFB LOCATION: Tijeras Arroyo SW of Bldg. 760
ELEVATION: 5206' @ Surface DRILLING CONTRACTOR: WDC/ Mark Green
DRILLING METHOD AND EQUIPMENT USED: ARCH (Tricone) 18" SS Sampler
WATER LEVELS: NA START: 05/09/01 END: LOGGER BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
120	120-128	Cuttings			Poorly Graded Sand (SP) fine, buff color, moist	
	128-138	Cuttings			Gravelly Sand (SW) Buff color, moist, 2 cm granuals, well rounded, with fine grained	
130	138	Cuttings			Poorly Graded Sand (SP) buff color, moist, fine-grained	
140	140-140.5	0.5	SS	30/18	Gravelly Sand (SW) buff color, fine grained to coarse grained sand, gravels to 2 cm, well rounded, mixed lithology, wet. NO2/NO3/TKN/TOC	
	142	Cuttings			Zone of Calcareous Clay (CA/CL) gray, with fine sands	
150	152	Cuttings			Poorly Graded Sand (SP) buff color, moist	
	155-159	Cuttings			Lean Clay (CL) gray-brown, soft, moist	
	159-163	Cuttings			Silt (ML) tan-orange, dry	
160	163	Cuttings			Lean Clay (CL) dark gray, soft, moist	
	163-170	Cuttings			Poorly Graded Sand (SP) buff color, fine grained, moist	
170	170-171	Cuttings			Well Graded Sand (SW) fine to coarse grained buff colored sand interbeded with Lean Clay (CL) soft, Lt. Brown	
	171-180	Cuttings			Poorly Graded Sand with gravel (SP) grey, wet & Well graded sand (SW) l.g.-3-cm gravels w/Lean clay (CL) grey & red-brown, moist	

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CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0514	SHEET 4 OF 6

SOIL BORING LOG

PROJECT : Nitrate Abatement - KAFB LOCATION : Tijeras Arroyo SW of Bldg. 750
ELEVATION : 5208' @ Surface DRILLING CONTRACTOR : WDC/ Mark Green
DRILLING METHOD AND EQUIPMENT USED : ARCH (Tricone) 18" SS Sampler
WATER LEVELS : NA START : 05/09/01 END: LOGGER BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
180	180-185	Cuttings			Well graded Sand (SW) buff color, very moist	
	185-195	Cuttings			Poorly Graded Sand (SP) Buff color, moist, fine	
190	195-198	Cuttings			Well Graded Sand (SW) Buff color, moist, up to 1/2 cm. Gravels	
	198-200	Cuttings			Poorly Graded Gravels (GP) fine, sub rounded gravel, mixed lithology, moist w/ (SW) as above	
200	200-201	1.0	SS	35/18		
		NO2/NO3/TKN/TOC			Gravelly Sand (SW) Buff color, fine grained sand with gravel to 2 cm, very moist to wet	
	201-220	Cuttings			S.A.A.	
210						
220	220-222	Cuttings			Poorly Graded Gravel (GP) Coarse, 3-5 cm granuals, moist	
	222-238	Cuttings			Well Graded Sand (SW) Buff color, fine grained sand and fine gravel, dry to moist.	
230	238-240	Cuttings			Well graded sand (SW) Buff, fine-coarse grained sand & fine gravel, dry to moist.	

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CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0514 SHEET 5 OF 6

SOIL BORING LOG

PROJECT: Nitrate Abatement - KAFB LOCATION: Tijeras Arroyo SW of Bldg. 780
ELEVATION: 5208' @ Surface DRILLING CONTRACTOR: WDC/ Mark Green
DRILLING METHOD AND EQUIPMENT USED: ARCH (Tricone) 18" SS Sampler
WATER LEVELS: NA START: 05/09/01 END: LOGGER: BJL

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
240	240-246	Cuttings			Well Graded Sand (SW) fine to coarse grained, buff colored, dry.	
	245	Cuttings			S.A.A.	
	246-247				Well Graded Sand (SW) buff colored, fine to coarse gravel, moist.	
	247-248	Cuttings			S.A.A. dry	
	248-252				S.A.A. Moist.	
250	250				S.A.A., moist	
	252-253	Cuttings			Sandy Clay (CL) orange-brown sand w/green-gray, soft, moist Lean Clay (CL)	
	253-258	Cuttings			Gravelly Sand (SW) Moist	
	258-259	Cuttings			Sandy Clay (CL) orange-brown, soft, moist	
	259-260	Cuttings			Gravelly sand (SW) green-grey, dry	
260	260-261	1.0	SS	35/18	Gravelly Sand (SW) Buff colored, moist, and Gravelly Clay (CL) dk. Red-brown,soft, moist	
		NO2/NO3/TKN/TOC				
	260-262	Cuttings			Sandy Gravel (GW) Lt. Brown, moist, well rounded gravel to 3 cm.	
	262-270	Cuttings			Well Graded Sand (SW) moist,fine to coarse grained.	
270	270-275	Cuttings			Sandy Gravel (GW) moist	
	275-278	Cuttings			Well Graded Sand (SW) dry, fine to medium grained, with silt.	
	278-282	Cuttings			Sandy Gravel (GW) moist	
280	282-288	Cuttings			Well Graded Sand (SW) moist, fine to medium	
	288-295	Cuttings			Sandy Gravel (GW)	
290	295-297	Cuttings			Lean Clay (CL) Lt. Gray, soft, moist	Add water.
	297-300	Cuttings			Gravelly Sand (SW) moist.	

SBL_Nitrate_KAFB_0514.xls

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0514 SHEET 6 OF 6
	SOIL BORING LOG	

PROJECT : Nitrate Abatement - KAFB LOCATION : Tijeras Arroyo SW of Bldg. 780
ELEVATION : 5208' @ Surface DRILLING CONTRACTOR : WDC/ Mark Green
DRILLING METHOD AND EQUIPMENT USED : ARCH (Tricone) 18" SS Sampler
WATER LEVELS : NA START : 05/09/01 END: LOGGER B.L

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
300	300-301.5	1.5	SS NO2/NO3/TKN/TOC	35/18	Gravelly Sand (SW) Buff color, moist, well packed, well rounded gravels to 2 cm.	1045
	301-317	Cuttings			S.A. A.	Add water.
310						No added water to 320 feet.
	317-322	Cuttings			Sandy, Gravelly Clay (CL) moist to wet, Lt. Gray clay with Buff colored sands	
320						1035
	322-329	Cuttings			Poorly Graded Sand (SP) fine, buff colored, moist, with minor Lean Clay (CL) layers, Lt. brown	
	329-335	Cuttings			Well Graded Sand (SW) buff color,moist, fine to coarse grained	
330	335-342	Cuttings			Sandy Clay (CL) red-brown colored, with fine to coarse grained sand.	
340	342-360	Cuttings			Gravelly Sand (SW) Buff color, fine to coarse grained, with well rounded gravel, wet	GW table at 343' bgs
370					TD of Borehole 370 ' bgs	

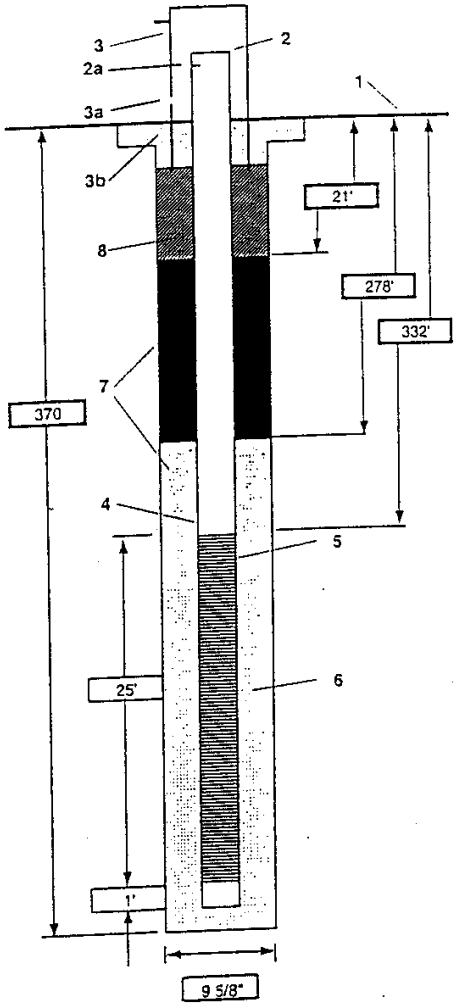
SBL_Nitrate_KAFB_0514.xls

CH2MHILL

PROJECT NUMBER	WELL NUMBER	
162708.02.NA.FI	KAFB-0516	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : KAFB Nitrate Abatement
LOCATION : Tijeras Arroyo, S of Igloo Munitions Storage Area, T9N R3E Sec.12
DRILLING CONTRACTOR : Water Development Corp.
DRILLING METHOD AND EQUIPMENT USED : Failing Star 30K ARCH, mill bit
WATER LEVEL : Approx. 333' bgs
START : 1/17/02 END: 1/30/2002 LOGGER : C. Salazar/ABQ



1- Ground elevation at well	TBD
2- Top of casing elevation	
a) vent hole?	NA
3- Wellhead protection cover type	Steel 8" dia, aprox. 3' high, locking cap
a) weep hole?	NA
b) concrete pad dimensions	3' x 3' + 4 concrete filled bumper posts
4- Dia./type of well casing	4" Sched 80 threaded PVC
5- Type/slot size of screen	4" Sched 80 threaded PVC 0.010" slot
6- Type screen filter	
7- Type of seal	Bentonite slurry, 21 to 278' bgs Bentonite chips, 278' to 322' bgs
8- Surface Seal	
a) Grout mix used	Portland cement
b) Method of placement	Drive casing pour
c) Vol. of well casing grout	
Development method	Bail, surge and pump
Development time	## day bailing, ## hr pumping
Estimated purge volume	## Gal. bailed, ## Gal. Pumped

Comments 12" sump below screen.

Illustration not to scale.

AR 235

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0516	SHEET 1 OF 5

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 800 ft. W. of Munitions Haul Rd.,100 ft. S. of Tijeras Arroyo
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Mike Thompson/John Chaves
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 337.2' START : 1/17/02 END: 01/23/2002 LOGGER : C. Salazar

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	SAMPLE #/TYPE	RECOVE (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
0						0 ppm VOC
	2	hand auger	3		Silty Sand, SM, moderate brown 5YR 4/4, dry, loose, fine grained	0 ppm VOC
	5	SS	2		Silty Sand, SM, moderate brown 5YR 4/4, dry, loose, fine grained with <3% 2 mm quartz gravel	
10	10	SS	1.5	25	Silty Sand, SM, moderate brown 5YR 4/4, dry, medium density, fine grained with some calcium deposits	
20	25	SS	2	42	Silt, ML, dry, dense, fine grained, few air holes in cross section	0 ppm VOC
30	32	cuttings			same as 25 ft to 27 ft	
	38	cuttings			Clayey Silt, ML, moderate brown, fine grained, dry <5% dense clay	
40						
50	50	SS	2		Clayey Silt, ML, moderate brown 5YR 4/4, fine grained, dry, dense, ~ 20% dry dense clay	0 ppm VOC

SBL_Nitrate_KAFB_0516.prj

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0516	SHEET 2 OF 6

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement
LOCATION : 800 ft. W. of Munitions Haul Rd.,100 ft. S. of Tijeras Arroyo
ELEVATION :
DRILLING CONTRACTOR : WDC Exploration, Mike Thompson/John Chaves
DRILLING METHOD AND EQUIPMENT USED : Dresser 770 w/ ARCH - Tricone
WATER LEVELS : 337.2'
START : 1/17/02
END: 01/23/2002
LOGGER : C. Salazar

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	SAMPLE #/TYPE	RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
60	60	cuttings			Silt, ML, light brown 5YR 6/3, dry, fine grained	
	65	cuttings			Silty Gravel, GM, dry, gravel <2 mm, orthoclase, quartz, basalt	
	67	cuttings			same as 60'	
70	70	cuttings			same as 60'	
80	80	cuttings			Silty Sand, light brown 5 YR 5/6, dry, fine grained, loose, <1% 1 cm angular/ subangular basalt gravel, 2 mm subang. quartz	
	85	cuttings			same as 80'	
90	95	cuttings			Gravelly Silty Sand, light brown, dry, fine, loose, <5% 1-3 cm basalt angular gravel	
100	100	SS	1.5	56	Silty Sand with Gravel, light brown 5 YR 5/6, dry, very dense, fine sand and silt, < 3% 30-40 mm subangular and subrounded gravel, orthoclase, quartz, basalt limestone gravel in conglomerate	0 ppm VOC
	105	cuttings			Silty Gravel, GM, dry, angular, .5 to 1 cm	
110						

SBL_Nitrate_KAFB_0516.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0516 SHEET 3 OF 6

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 800 ft. W. of Munitions Haul Rd.,100 ft. S. of Tijeras Arroyo
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Mike Thompson/John Chaves
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 337.2' START : 1/17/02 END: 01/23/2002 LOGGER : C. Salazar

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	SAMPLE #/TYPE	RECOVE (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm Headspace Analysis Time
120	120	cuttings			Gravelly Sand, SP, dry, gravel <5mm, fine and medium grained sand, subrounded and rounded	
130	130	cuttings			Gravelly Sand, SP, dry,, gravel <5 mm, medium grained sand, subrounded and rounded	
	135	cuttings			Same as 130'	
140	140	cuttings			Same as 130'	
	146	cuttings			Silty Sand, SM, light brown, dry, medium to coarse grained, <3% gravel <20 mm	0 ppm VOC
150	150	SS	1.5	56	Sand,SP, light brown 5YR 5/6, dry, medium to coarse grained, very dense sand, few gravels <2cm and<3% tuff clasts and iron concretions	New day 1/18/02
	156	cuttings			same as 150'	
160	165	cuttings			Silty Sand, SM, light brown, dry, medium to coarse grained, few quartz angular gravels <.5 cm	
170	174	cuttings			Silty Sand, SM, light brown, dry, fine to medium grained	

SBL_Nitrate_KAFB_0516.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0516 SHEET 4 OF 6

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 800 ft. W. of Munitions Haul Rd.,100 ft. S. of Tijeras Arroyo
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Mike Thompson/John Chaves
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 357.2' START : 1/17/02 END: 01/23/2002 LOGGER : C. Salazar

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	SAMPLE #/TYPE	RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
180	180	cuttings			Sand, SP, light brown, dry, fine to coarse grained, small gravels <.2 cm angular	
	182	cuttings			Sandy gravel, GP, light brown sand, dry, 2 cm angular and subangular basalt gravel	
	184	cuttings			same as 180'	
190	192				same as 180'	
200	200	SS	0.8	26	pale yellowish brown 10YR 6/2, dry, medium dense sand, fine to coarse grained, few gravels 1-3 cm	.2 ppm VOC, 12 PM
	200.8	SS	0.7		(200.8 ft to 201.5)= Clean gravel, GW, medium bluish gray 5B5/1, dry, subrounded clasts, basalt, quartz	
	208	cuttings			Gravelly sand, SP, light brown sand, medium grained, subangular <1 cm gravel	
210	218	cuttings			same as 208'	
220	223	cuttings			Gravelly sand, SP, light brown sand, medium to coarse grained, subangular <2 cm gravel	
230	238	cuttings			same as 223'	

SBL_Nitrate_KAFB_0516.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER
162708.02.NA.FI	KAFB-0516 SHEET 5 OF 6

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 800 ft. W. of Munitions Haul Rd., 100 ft. S. of Tijeras Arroyo
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Mike Thompson/John Chaves
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 337.2' START : 1/17/02 END: 01/23/2002 LOGGER : C. Salazar

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	SAMPLE #/TYPE	RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
240	241	cuttings			Clean Sand, SP, light brown, dry, loose, subangular sand, medium to coarse grained	
250	250	SS		49	Gravelly Sand, SP, light brown 5 YR 6/4, dry, dense sand, 3% subrounded gravel, 1-3 cm large, orthoclase, quartz, basalt minerals, <2% clay peds	
260	260	cuttings			same as 250'	
	268	cuttings			Clean gravel, GP, light gray, dry, subangular, <2 cm	
270	278	cuttings			same as 250'	
280	280	cuttings			same as 270'	New Day 1/19/02
	282	cuttings			Clean Sand, SP, light brown, dry, subangular, fine to medium grained	
290	290	cuttings			same as 282'	
	296	cuttings			same as 282'	

SBL_Nitrate_KAFB_0516.xls

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0516	SHEET 6 OF 6

SOIL BORING LOG

PROJECT : KAFB Nitrate Abatement LOCATION : 800 ft. W. of Munitions Haul Rd.,100 ft. S. of Tijeras Arroyo
ELEVATION : DRILLING CONTRACTOR : WDC Exploration, Mike Thompson/John Chaves
DRILLING METHOD AND EQUIPMENT USED : Dresser T70 w/ ARCH - Tricone
WATER LEVELS : 337.2' START : 1/17/02 END: 01/23/2002 LOGGER : C. Salazar

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	SAMPLE #/TYPE	RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Headspace Analysis Time
300	300	SS	1.5	17	Gravelly Sand, GW, moderate yellowish brown 10YR 5/4, dry, moderately dense, fine to coarse grained, 2 mm to 10 mm gravel (25%), rounded and subrounded gravel	
	306	cuttings			same as 300'	
310	310'	cuttings			Clean Sand, SP, moderate yellowish brown 10 YR 5/4, dry, fine to coarse grained	
	316	cuttings			same as 310'	
320	326	cuttings			Sand, SP, moderate yellowish brown, 10YR 5/4, dry, fine to medium grained, some clay chunks	
330	336	cuttings			Clean Sand, SP, moderate yellowish brown, 10 YR 5/4, dry, fine to medium grained	
340	342	cuttings			Clean Sand, SP, moderate yellowish brown, 10YR 5/4, wet, fine to medium grained	New Day 1/20/02
	348	cuttings			Clayey Sand, SC, moderate yellowish brown, wet, fine to coarse grained, some clay chunks	
350	355	SS		2-2-3	Silty Sand, SM, moderate yellowish brown, wet, loose, fine to medium grained	New Day 1/23/02
	358	cuttings			Sandy Gravel, GW, 0.3 to 2 cm gravel	.1 ppm VOC This sample is probably slough after sitting 2 days.

SBL_Nitrate_KAFB_0516.xls

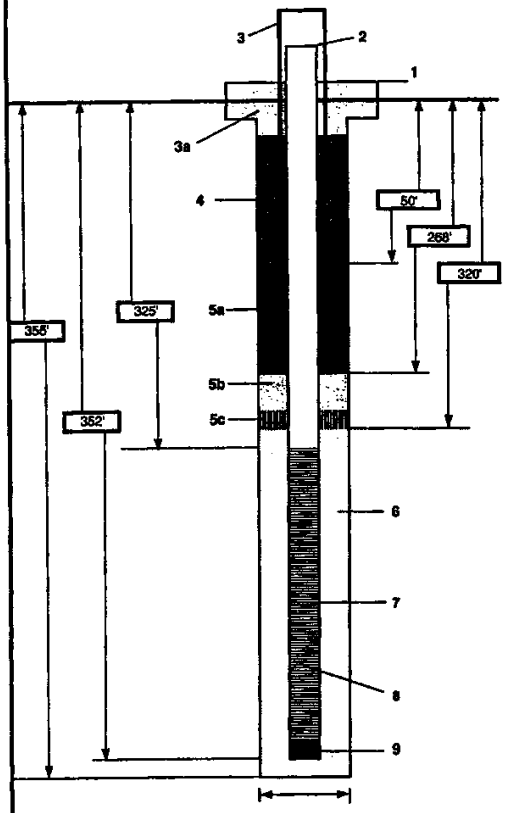
451

MWH
MONTGOMERY WATSON HARZA

PROJECT NUMBER	WELL NUMBER	
3970007	KAFB-0517	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT NAME:	KAFB Nitrate Abatement	WELL COMPLETION DATE:	11/8/2002
DRILLING CONTRACTOR:	Water Development Corp./Mark Green	EASTING (X):	402125.42
DRILLING METHOD/EQUIP:	Air rotary casing hammer/Speedstar 30K	NORTHING (Y):	1464671.94
DRILLING START DATE:	11/5/2002	BOREHOLE DEPTH:	355' bgs
LOGGER :	Christopher Timm	CASING DEPTH:	352' bgs



Well diameter
0 - 280 feet: 11 3/4 "
280' - Total depth: 9 5/8"

Diagram is not to scale

1- Slab elevation at well	5192.06'
2- Top of PVC casing elevation	5194.43'
3- Wellhead protection cover type	Steel pipe
a) Concrete pad dimensions	4' x 4'
4- Surface Seal	
a) Grout mix used	Cement/bentonite 94#/3% wt.
b) Method of placement	Tremie pipe
5- Type of seal	a. Bentonite slurry 50 - 268' bgs
	b. Bentonite chips 268 - 318' bgs
	c. Sugar sand 318 - 328' bgs
6- Type screen filter	20/20 silica sand (320 - 355' bgs)
7- Diameter/type of well casing	4-inch Sch. 80 PVC
	2.5' above ground surface, 325' bgs
8- Type/slot size of screen	25-ft. Sched 80 PVC 0.010 slot
9- Sump	2 feet
Development method	swabbing, bailing, pumping w/ 5 gpm pump
Development time	2.9 hours
Estimated purge volume	490 gal

Comments

AR 451

BORING

Air Force ID: **Kirtland AFB**
Date Drilled: 11/5 Date Completed: 11/8
Logged By: C. Timm
ESTAB Company: MWH
Location Proximity Tijeras Arroyo
Drilling Contractor: WDC
Drilling Method: Air rotary

Soil Boring ID: KAFB - 0517
LTC:
Northing: Easting:
Coordinate System Type:
Method:
Units:
Ground Surface Elevation (ft.):
Measuring Point (MP) Elevation (ft.):
MP is Top of PVC Casing Datum:

Borehole: Diameter (in.) 11 3/4 - 9 5/8 Depth (ft. BGS) 355
Depth to Water Below TOC (ft.): Date Measured:

DEPTH (FEET)	GRAIN % GRAVEL	% SAND	% FINES	MAX. PID READING (ppm)	BLOWS (6 IN.)	SAMPLE TYPE*	SAMPLE RECOVERY	USCS/ASTM CLASSIFICATION	LITH. CODE (ERPIMS)	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
0				N/A	2, 4, 6	SS	50%	ML	SDSL	2' - 3.5' 2, 4, 6 (7.5 YR 5/3) brown v. fine sandy silt w/ minor clays, dry 3, 5, 5 100% recovery, some roots	
5		5	90		2, 7, 3	SS	100 70%	ML	SDSL	7.5 YR 5/3 brown v. fine sandy silt, dry, slightly cohesive 2, 7, 3 silty clay	
10		10	90			SS		ML	SDSL	sandy, silty clay (cohesive) slightly moist 7.5 YR 4/3 brown silty clay	
15		20	80			GR		ML	SDSL	v. fine sand w/ silt (sandy silt) 7.5 YR 6/4 lt. brown - v. well sorted dry	
20		20	80		3, 7, 7	SS	100	ML	SDSL	same as above ss sample at 25 - 26.5' (+ dup) (10:55)	1050 Adding 20-40
25		20	80			GR		ML	SDSL	same as above dry	
30	5	20	75			GR		ML	SDSL	same as above w / gravels and coarse sand dry	
35		20	80			GR		ML	SDSL	same as above - no gravels	
40		40	60			GR		ML	SDSL	fine sand - silt (sandy silt) 7.5 YR 5/4 brown, well sorted - dry	1120 Adding 40-60
45		30	70			GR		ML	SDSL	same as above w/ increased fines	
50											

PROJECT NO. 3970007.56010602

* SS California Split Spoon Sampler (2.5" I.D.)
S Standard penetration test sampler
c Cuttings
▼ Elevation of ground water

PAGE 1 OF 5

AR451

Project: Kirtland AFB
Location ID.: KAFB-0517

DEPTH (FEET)	GRAIN % GRAVEL	% SAND	% FINES	MAX. PID READING (ppm)	BLOWS (6 IN.)	SAMPLE TYPE*	SAMPLE RECOVERY	USCS/ASTM CLASSIFICAT.	LITH. CODE (RPIMS)	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
		90	10		3, 5, 7	SS	60%	SW	SDFN	fine - v. fine sand (minor gravel <1%) 7.5 YR 5/4 brown - dry, well sorted silty sand - - S.S at 11:40	
		80	20			GR		SW	SDFN	same as above w/ upward grading fines no gravels - dry	1200 add 60-80
60		100				GR		SP	SD	fine - med. sand poorly sorted, sub-angular minor gravel (<1%) 7.5 YR 4/3 (brown) lightly moist	
		100				GR		SP	SD	same as above	
70	5	95				GR		SP/GP	SDGR	gravelly sand - poorly sorted sub rounded 7.5 YR 6/2 pinkish gray - dry	
	5	95				GR		SP/GP	SDGR	same as above	
80	5	95				GR		SP	SD	fine to med sand w/gravel poorly sorted 7.5 YR 4/3 brown (low moisture)	1225 add new string 80-40
		100				GR		SP	SD	coarse - med sand w/minor gravel (<1%) poorly sorted 7.5 YR 5/3 (brn) slightly moist	
90		100				GR		SP	SD	same as above 95-100% gravel (1/4"-2"), slightly moist	
	20	80				GR		SP/GP	SDGR	same as above with upward grading gravels	
100	80	20			6, 7, 12	SS		SP/GP	GVL	Unconsolidated poorly sorted gravels subangular, lt. gray 7.5 YR 6/1	1415 add 20' drill/ drive rod 100-120
	80	20				GR		SP/GP	GVL	same as above w/ moisture (v. slight)	
110	5	95				GR		SP	SD	fine to med. gravelly sand 7.5 YR 6/3 (lt. brn.) poorly sorted, slight moisture	
	1	95	4			GR		SP	SD	med to coarse sand, poorly sorted subrounded, pinkish gray 7.5 YR 6/2 minor fines, gravel, slightly moist	
120	5	95				GR		SP/GP	SDGR	gravelly sand, poorly sorted coarse sand w/gravel (1/4-1/2") slight moisture. pinkish gray 7.5 YR 6/2	1430 addition 20' drill stem/ drive case
	5	95				GR		SP/GP	SDGR		
130	5	95				GR		SP/GP	SDCR	Increase of moisture content, larger gravel fraction 1/2"-1" - otherwise same as above	added 120-140
		100				GR		SP	SDCR	coarse - v. coarse sub rounded sand - poorly sorted, pinkish gray to lt. brn 7.5 YR 6/2 & 6/3, v. low moisture	
140		100				GR		SP	SDGR	same as above	1530 add 20' (140-160)
		100				GR		SP	SDGR	same as above	
150											

PROJECT NO. 3970007.56010602

PAGE 2 OF 5

MONITORING WELL/SOIL

Project: Kirtland AFB
Location ID.: KAFB-0517

DEPTH (FEET)	GRAIN % GRAVEL	% SAND	% FINES	MAX. PID READING (ppm)	BLOWS (6 IN.)	SAMPLE TYPE*	SAMPLE RECOVERY	USCS/ASTM CLASSIFICAT.	LITH. CODE (IRPIMS)	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
150	30	50	20	N/A	4, 8, 13	SS	100		SDGR	4, 8, 13 sandy gravel w/ clay lense at ~150.5-151 v. poorly sorted. gravel well rounded sands sub rounded, brn. 7.5 YR 5/4	
		100				GR		SP	SD	medium sand, sub-rounded, poorly sorted, slightly moist brn 7.5 YR 5/4	
160		90	10			GR		SC	SDCL	fine sand - well sorted, sub rounded w/clay - clays ball up lt. brn 7.5 YR 6/4	15:45 add 20' casing/ rod (160-180)
		90	10			GR		SW	SD	fine to medium sand well sorted, sub-rounded 7.5 YR 5/4 (brn), slightly moist	
170		90	10			GR		SW	SD	same as above	
		90	10			GR		SW	SD	same as above	
180		95	5			GR		SP	SD	med - fine sand w/ minor (<1%) gravel poorly sorted, sub angular brn 7.5 YR 5/3	1605 20' 11/7 casing/ rod added
		95	5			GR		SP	SD	same as above	
190		95	5			GR		SP	SD	same as above w/ slightly more moisture	
	5	95				GR		SW	SDFN	v. fine sand (well sorted) w/ minor gravel (rounded) lt. brn 7.5 YR 6/4	
200	20	60	20			SS	40	SW	SD	9, 11, 14 fine sand (well sorted) w/ gravel/cobbles lt brn, 7.5 YR 6/3	1705 add casing/ rod 200-220
		100				GR		SW	SDFN	well sorted fine sand, light brown 7.5 YR 6/4, slight moisture content	
210		100				GR		SW	SDFN	see above	
	30	60	10			GR		SP/GP	SDGR	gravelly sand w/ minor fines, brown 7.5 YR 5/3 gravel - sub rounded, slight moisture	
220	30	60	10			GR		SP/GP	SDGR	see above	0721 add 222 - 240 20' casing/ rod
		70	30			GR		SW	SD	fine - medium sand, lt. brown 7.5 YR 6/4	
230		70	30			GR		SW	SD	see above	
	40	60				GR		SP/GP	SDGR	gravelly sand w/ increasing moisture content brn 7.5 YR 4/2, gravels sub rounded	
240		100				GR		SP	SD	fine to med well sorted sand (99%), minor gravel (<1%) brn 7.5 YR 5/3, slightly moist	0830 add 20' casing/ rod (240-260)
	60	30	10		7, 11, 14	SS	40%	SP/GP	SDGR	coarse sandy gravel, less moist than above, lt. brown 7.5 YR 5/2, S.S. 249-250.5	
250											

PROJECT NO. 39700007.56010602

MONITORING WELL/SOIL

Project: Kirtland AFB
Location ID.: KAFB-0517

DEPTH (FEET)	GRAIN % GRAVEL	GRAIN % SAND	GRAIN % FINES	MAX. PID READING (ppm)	BLOWS (6 IN.)	SAMPLE TYPE*	SAMPLE RECOVERY	USCS/ASTM CLASSIFICAT.	LITH. CODE (IRPIMS)	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
250		90	10			G		SP	SD	med - coarse sand (brn 7.5 YR 5/2)) low moisture, well rounded, well graded	
	5	85	10			G		SP	SDGR	med - coarse sand w/ minor gravel (<5%) brn 7.5 YR 5/3, well rounded	
260	5	90	5			G		SW/GW	SD	v. fine sand w/ gravel	0850 20' casing/ rod 260-280
		95	5			G		SP	SDFN	fine sand w/ minor fine sand gravel (<1%) brn. 7.5 YR 5/4, slightly moist, well sorted, poorly graded	
270	5	90	5			G		SW/GP	SD	med - fine sand w/ well rounded gravel brn 7.5 YR 5/4, slightly moist. sands well sorted/graded	
		95	5			G		SP	SD	med. sand w/ minor fines, - slightly moist. brn 7.5 YR 5/3	
280		100				G		SW	SDFN	v. fine sand - well sorted, well rounded brn. 7.5 YR 5/3, slightly moist	0815 11/07/02 280-300
	2	98				G		SW	SDFN	same as above w/ minor gravel	(9 5/8)
290	10	90				G		SP	SDGR	med - coarse grained sand w/ gravel moist, sand is sub rounded, poorly sorted 7.5 YR 5/3	
	5	95				G		SP	SDGR	same as above	
300		100			7, 10, 15	SS	95	SP	SD	med grained sand, color, texture same as above - no gravel cobbles moist	0910 add 20' casing/ rod (300-320)
		90	10			G		SP	SD	med - fine grained sand, color same as above increasing moisture and fines	
310		40	60			G		SP/CL	CLSD	v. moist clays, fine silty sand, clays ball up 7.5 YR 6/4 - lt. brn.	
		60	40			G		SP/CL	SDCL	same as above with less clay	
320		100			8, 9, 11	SS	60	SW/CL	SDCL	same as above - 320-320.5 med to fine sand - 320.5 - 321.5 well sorted 7.5 YR 6/3 lt. brn - not as moist	perched aquifer 1040
	5	95				G		SP	SD	moist - wet med grained sands 7.5 YR 4/3 brown, poorly sorted	20' added well sorted
330		100				G		SP	SD	wet sand med grained, well sorted 7.5 YR 4/3 brown, sub rounded	
		100				G		SP/GP	SDCR	same as above - wet, coarse sand	
340		100				G		SP/GP	SDCR	wet med coarse grained otherwise same as above	
	90	10				G		SP/GP	SDGR	v. coarse grained sand w/ gravel c sandy gravel - very wet sub rounded	11:10 add 20' 9 5/8 /
350											

PROJECT NO. 3970007.56010602

MONITORING WELL/SOIL

Project: Kirtland AFB
Location ID.: KAFB-0517

DEPTH (FEET)	GRAIN % GRAVEL	GRAIN % SAND	GRAIN % FINES	MAX. PID READING (ppm)	BLOWS (6 IN.)	SAMPLE TYPE*	SAMPLE RECOVERY	USCS/ASTM CLASSIFICAT.	LITH. CODE (IRPIMS)	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
	90	10				GR		SPCP	SDGR	same as above (see 345-350')	
355											

PROJECT NO. 3970007.56010602

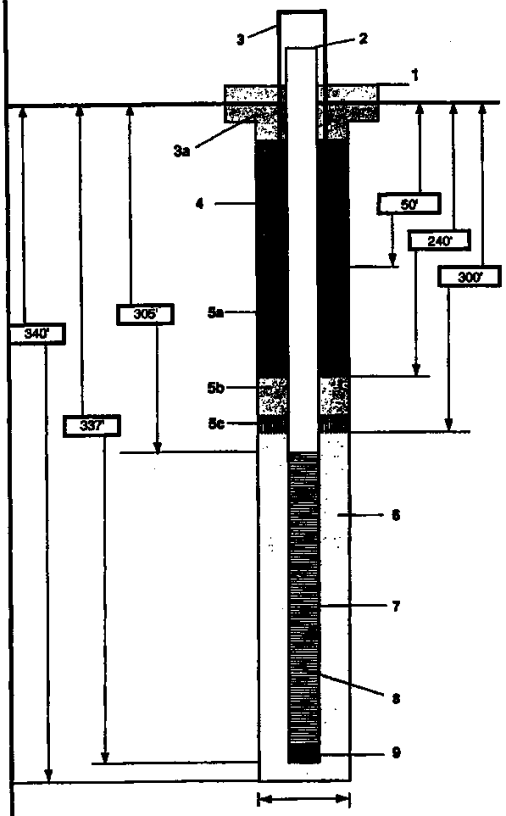
PAGE 5 OF 5

MONITORING WELL/SOIL

MWH MONTGOMERY WATSON HARZA	PROJECT NUMBER 3970007	WELL NUMBER KAFB-0518	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT NAME:	KAFB Nitrate Abatement	WELL COMPLETION DATE:	12/22/2002
DRILLING CONTRACTOR:	Water Development Corp./Mark Green	EASTING (X):	399491.50
DRILLING METHOD/EQUIP:	Air rotary casing hammer/Speedstar 30K	NORTHING (Y):	1464932.85
DRILLING START DATE:	12/19/2002	BOREHOLE DEPTH:	340' bgs
LOGGER :	Christopher Timm	CASING DEPTH:	337' bgs



Well diameter
0 - 180 feet: 11 3/4 "
180' - Total depth: 9 5/8"

Diagram is not to scale

1- Slab elevation at well	5172.87'
2- Top of PVC casing elevation	5175.09'
3- Wellhead protection cover type	Steel pipe
a) Concrete pad dimensions	4' x 4'
4- Surface Seal	
a) Grout mix used	Cement/ bentonite grout
b) Method of placement	Tremie pipe
5- Type of seal	a. Bentonite slurry 50 - 240' bgs b. Bentonite chips 240 - 298' bgs c. Sugar sand 298 - 300' bgs
6- Type screen filter	10/20 silica sand (300 - 340' bgs)
7- Diameter/type of well casing	4-inch Sch. 80 PVC
8- Type/slot size of screen	30-ft. Sched. 80 PVC 0.010 slot
9- Sump	2 feet
Development method	swabbing, bailing, pumping w/ 5 gpm pump
Development time	4.3 hours
Estimated purge volume	1400 gal

Comments 2' 8" stick up

AR451

BORING

Air Force ID: **Kirtland AFB**
Date Drilled: _____ Date Completed: _____
Logged By: C. Timm
ESTAB Company: MWH
Location Proximity _____
Drilling Contractor: WDC
Drilling Method: Air rotary

Soil Boring ID: KAFB-0518
LTC: _____
Northing: _____ Easting: _____
Coordinate System Type: _____
Method: _____
Units: _____
Ground Surface Elevation (ft.): _____
Measuring Point (MP) Elevation (ft.): _____
MP is Top of PVC Casing Datum: _____

Borehole: Diameter (in.) 11 3/4 - 9 5/8 Depth (ft. BGS) 340

Depth to Water Below TOC (ft.): _____ Date Measured: _____

DEPTH (FEET)	GRAIN % GRAVEL	% SAND	% FINES	MAX. PID READING (ppm)	BLOWS (6 IN.)	SAMPLE TYPE*	SAMPLE RECOVERY	USCS/ASTM CLASSIFICATION	LITH. CODE (ERPIMS)	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
0		30	70		2, 2, 2	SS	60	SM	SDSL	Fine silty sand - dry 7.5 YR 5/4	
5		20	80		1, 2, 2	SS	100	SM	SDSL	same as above (finer grained)	
10	50	20	30		3, 4, 5	SS	100	GP	GVL	Sandy gravels - subangular poorly sorted - dry gray 7.5 YR 6/1	
15	10	40	50			C		SW	SDGR	gravelly sand - poorly sorted pinkish gray 7.5 YR 6/2	
20	10	40	50		5, 5, 5	SS	100	SW	SDGR	same as above	
25	25	25	50			C		SW	SDGR	same as above, increasing gravels	
30	50	50				C		GP	GVSD	gravels w/ sand - no fines subangular gravels - well graded lt bm. 7.5 YR 6/3	
35	100					C		GW	GVL	gravels (coarse - subangular) no fines - well sorted lt pinkish gray 7.5 YR 6/2	
40		80	20			C		SW	SDSL	Fine silty sand - dry well sorted bm. 7.5 YR 5/4	
45		80	20			C		SW	SDSL	same as above	
50											

PROJECT NO. 3970007.56010602

* SS California Split Spoon Sampler (2.5" I.D.)
S Standard penetration test sampler
c Cuttings
▼ Elevation of ground water

AR 451

Project: Kirtland AFB
Location ID.: KAFB-0518

DEPTH (FEET)	GRAIN % GRAVEL	GRAIN % SAND	GRAIN % FINES	MAX. PID READING (ppm)	BLOWS (6 IN.)	SAMPLE TYPE[1]	SAMPLE RECOVERY	USCS/ASTM CLASSIFICAT.	LITH. CODE (IRPIMS)	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
50	5	95			8, 8, 10	SS	50	SP	SDGR	Sand w/ gravels (angular) - limestone poorly sorted lt. brn 7.5 YR 5/4	
55		100				C		SP	SD	v. coarse poorly sorted sand dry brn 7.5 YR 5/3	
60		100				C		SP	SD	fine sand well sorted dry brown 7.5 YR 5/4	
65		100				C		SP	SD	same as above	
70		100				C		SP	SD	same as above	
75		100				C		SP	SD	same as above	
80		100				C		SP	SD	same as above	
85		100				C		SP	SD	same as above	
90		100				C		SP	SD	same as above	
95	5	95			8, 12, 17	SS	40	SP	SDGR	same as above w/ subangular gravels limestone - 7.5 YR 5/3 (lighter than above)	
100	80	20				C		GP	GVL	sandy gravels (limestone) angular to subangular 7.5 YR 7/1 light gray	
105	100					C		GP	GVL	well sorted angular - subangular gravels - mixed origin	
110		100				C		SP	SD	med to fine grained sands - dry lt. brn 7.5 YR 6/4	
115		100				C		SP	SD	same as above slightly coarser	
120		100				C		SP	SD	same as above, slightly coarser	
125		100				C		SP	SD	same as above mostly finer	
130		100				C		SP	SD	same as above (110-115)	
135		100				C		SP	SD	same as above - minor <1% gravel	
140		100				C		SP	SD	same as above (110-115)	
145		10	90			C		SL	SDCL	clayey sand - some pilling sands are coarser grained brn. 7.5 YR 4/2	
150											

PROJECT NO. 3970007.56010602

PAGE 2 OF 4

MONITORING WELL/SOIL

Project: Kirtland AFB
Location ID.: KAFB-0518

DEPTH (FEET)	GRAIN % GRAVEL	GRAIN % SAND	GRAIN % FINES	MAX. PID READING (ppm)	BLOWS (6 IN.)	SAMPLE TYPE*	SAMPLE RECOVERY	USCS/ASTM CLASSIFICAT.	LITH. CODE (IRPIMS)	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
150		100			7, 12, 15	SS	100	SW	SD	152-154' BGS ST015-513-0518-152154 coarse subangular well sorted sand slightly moist 7.5 YR 4/2 brown	
155		60	40			C		SW	SDSL	brown sandy silty 7.5 YR 5/3 sand is med coarse grained well sorted slightly moist	
160		100				C		SW	SD	same as above, less fines very well sorted med grained sand	
165		100				C		SW	SD	same as above - coarser grained	
170		100				C		SW	SD	same as above	
175		100				C		SW	SD	same as above	
180		100				C		SW	SD	same as above	
185	5	95				C		SW	SD	same as above w/ gravels (subrounded)	
190		100				C		SW	SD	very well sorted med grained sand 7.5 YR 5/3	
195		100				C		SW	SD	same as above minor gravel (<1%)	
200		100			3, 4, 5	C	60	SW	SD	same as above	
205		100				C		SW	SD	same as above	
210		100				C		SW	SD	same as above (minor gravel <1%)	
215		100				C		SW	SD	same as above	
220		100				C		SW	SD	same as above	
225		100				C		SW	SD	same as above	
230		100				C		SW	SD	same as above	
235		100				C		SW	SD	same as above (minor gravel)	
240		100				C		SW	SD	same as above	
245		100			7, 9, 11	SS	100	SW	SD	same as above	
250											

PROJECT NO. 3970007.56010602

PAGE 3 OF 4

MONITORING WELL/SOIL

Project: Kirtland AFB
Location ID.: KAFB-0518

DEPTH (FEET)	GRAIN % GRAVEL	GRAIN % SAND	GRAIN % FINES	MAX. PID READING (ppm)	BLOWS (6 IN.)	SAMPLE TYPE*	SAMPLE RECOVERY	USCS/ASTM CLASSIFICAT.	LITH. CODE (IRPIMS)	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
250		100				C		SW	SD	same as above	
255		100				C		SW	SD	same as above (minor gravel <1%)	
260		100				C		SW	SD	same as above	
265		100				C		SW	SD	same as above	
270		100				C		SW	SD		
275		100				C		SW	SD		
280		100				C		SW	SD	same as above (minor subrounded gravel <1%)	
285		100				C		SW	SD	same as above	
290		90	10			C		SW	SDSL	silty sand very minor clay (minor pilling) brown 7.5 YR 5/3 slightly moist	
295	5	95				C		SW	SDGR	med to coarse sand w/ gravel (subrounded) 7.5 YR 5/3 brown slightly moist poorly sorted.	
300	10	90			12, 15, 31		50	SW	SDGR	same as above w/ larger gravel	
305		100				C		SW	SD	moist - wet coarse grained well sorted sand brown 7.5 YR 5/3	
310	5	95				C		SW	SDGR	same as above w/ gravels wet	
315	50	50				C		GW	GVL	very coarse sands and gravels wet brown 7.5 YR 5/3 well sorted - subrounded	
320		100				C		SW	SD	med grained well sorted sand w/ minor (<1%) gravel - rounded) brown 7.5 YR 5/2	
325	50	50				C		GW	GVL	very coarse sands and gravels - wet well sorted subrounded brown 7.5 YR 5/3	
330	5	95				C		SW	SDGR	coarse grained well sorted sands w/ subrounded gravel - wet 7.5 YR 5/2	
335	5	95				C		SW	SDCR	same as above	
340											
345											
350											

PROJECT NO. 39700007.56010602

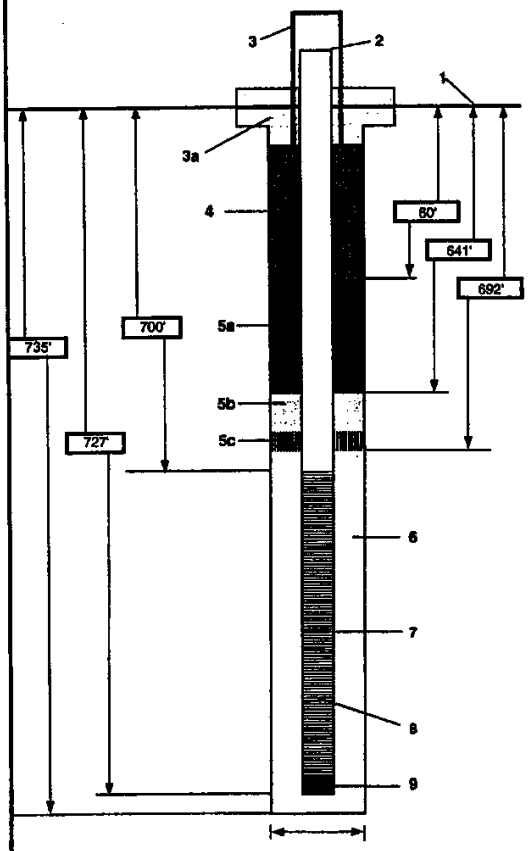
PAGE 4 OF 4

MONITORING WELL/SOIL

MWH	PROJECT NUMBER	WELL NUMBER	
	3970007.56010602	KAFB-0519	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT NAME:	KAFB Nitrate Abatement	WELL COMPLETION DATE:	5/13/2003
DRILLING CONTRACTOR:	Water Development Corp./ Mark Green	EASTING (X):	
DRILLING METHOD/EQUIP:	Mud Rotary/Speedstar 30K	NORTHING (Y):	
DRILLING START DATE:	5/5/2003	BOREHOLE DEPTH:	735 ft bgs
LOGGER:	Christopher Timm	CASING DEPTH:	727 ft bgs



Well diameter
0 - 20 feet: 11 3/4 "
20' - Total depth: 9 5/8"

Diagram is not to scale

1- Ground elevation at well _____

2- Top of casing elevation _____

3- Wellhead protection cover type: 10" steel stove pipe

a) Concrete pad dimensions: 4' x 4'

4- Surface Seal
a) Grout mix used: Bentonite/Cement
b) Method of placement: Tremie pipe

5- Type of seal
a. Bentonite slurry 60-641' bgs
b. Bentonite chips 641-693' bgs
c. Sugar Sand 693-695' bgs

6- Type screen filter: 60/20 silica sand

7- Diameter/type of well casing: 5-Inch Sch. 80 PVC

8- Type/slot size of screen: 25'ft. Sched 80 PVC 0.010 slot

9- Sump: 2 feet

Development method: surging, bailing, pumping

Development time: 4 hours

Estimated purge volume: 700 gallons

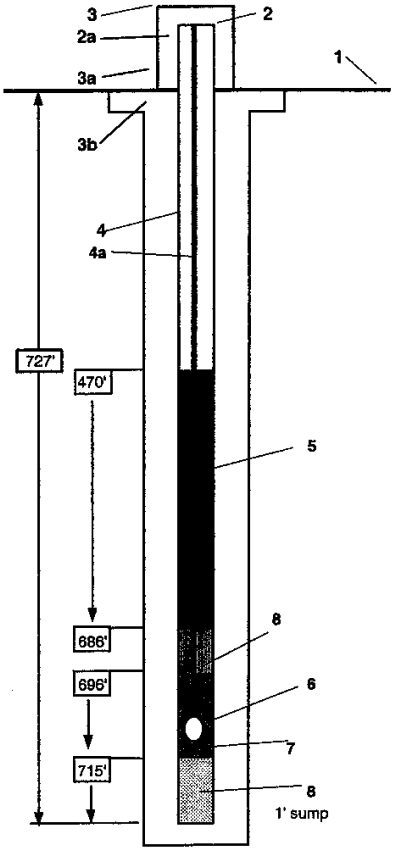
Comments: DTW = 510.75' on 5/13/03

AR451

MWH	PROJECT NUMBER	WELL NUMBER	
	3970009	KAFB-0519	SHEET 1 OF 1

PUMP INSTALLATION DIAGRAM

PROJECT NAME:	KAFB DO6 Drilling	WELL COMPLETION DATE:	8/20/2004
DRILLING CONTRACTOR:	WDC/Barcad	EASTING (X):	404,552.14
DRILLING METHOD/EQUIP:	NA	NORTHING (Y):	1,472,770.88
INSTALLATION START DATE:	8/16/2004	BOREHOLE DEPTH:	735'
LOGGER :	S. Metzger	CASING DEPTH:	727'



1- Concrete slab elevation	5,359.54 feet above mean sea level
2- Top of casing elevation	5,361.85 feet above mean sea level
a) vent hole?	no
3- Wellhead protection cover type	above ground 8" steel monument
a) weep hole?	no
b) concrete pad dimensions	4' x 4' with 4 concrete filled bollards
4- Dia./type of well casing	5" schedule 80 PVC
4a- Dia./type of piping	1" schedule 80 PVC
5- Seal	Bentonite Chips (36 bags) (686' - 470')
6- Barcad Location	712.5' - 710.0'
7- Screen	#60 Colorado Silica Sand (2 bags) (715'-696')
8- Fill material	10/20 Colorado Silica Sand (4.5 bags) (727' - 715') 10/20 Colorado Silica Sand (2.5 bags) (696' - 686')

Not to scale

Field Boring Log

Facility/Project Name	AFCEE DO 56 Nitrate Abatement	**Boring No.**	KAFB-0519
Location	Kirtland AFB, NM	**Project No.**	3970007.56010602

Drilling Co	WDC	Northing:	Easting:
Driller's Name	Mark Green		
Drill Rig		Ground Surface Elevation (ft):	
Drill Method	Mud Rotary	Measuring Point elevation (ft): (top of PVC casing)	
Logged By	Christopher Timm	Borehole Diameter:	10 5/8"
Water Level Below TOC (ft):	510.75 Date Measured: 5/13/03	Borehole Depth:	735' bgs

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
0		5	95	NA	C	NA	ML	SDSL	very fine sandy silt/well sorted sand 7.5 YR 5/4, brown
5		5	95	NA	C	NA	ML	SDSL	same as above
10		10	90	NA	C	NA	ML	SDSL	coarse, poorly sorted, subrounded sandy silt 7.5 YR 6/4, light brown
15		10	90	NA	C	NA	ML	SILT	very fine, well sorted sandy silt 7.5 YR 6/4, light brown
20		40	60	NA	C	NA	ML	SDSL	very fine, subangular sandy silt 7.5 YR 6/4, light brown
25		40	60	NA	C	NA	ML	SDSL	same as above except sand is coarser, well sorted
30		40	60	NA	C	NA	ML	SDSL	same as above
35		60	40	NA	C	NA	SM	SDSL	silty medium to coarse sand (quartz, biotite, plagioclase) 7.5 YR 6/4, light brown sand is well sorted, subangular
40		80	20	NA	C	NA	SM	SDSL	silty coarse sand (quartz, biotite, plagioclase) subangular 7.5 YR 6/4, light brown
45		80	20	NA	C	NA	SM	SDSL	same as above, with coarser sands
50		100		NA	C	NA	SW	SDCR	well sorted, subangular coarse sand 7.5 YR 6/3, light brown

AR 451

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
55		50	50	NA	C	NA	SM	SDSL	silty coarse sand, poorly sorted, subrounded 7.5 YR 6/3, light brown
60		50	50	NA	C	NA	SM	SDSL	same as above
65		50	50	NA	C	NA	SM	SDSL	same as above
70		50	50	NA	C	NA	SM	SDSL	same as above
75		50	50	NA	C	NA	SM	SDSL	same as above
80		50	50	NA	C	NA	SM	SDSL	same as above
85		90	10	NA	C	NA	SM	SDSL	silty medium to coarse sand, well sorted, subangular 7.5 YR 6/3, light brown
90		100		NA	C	NA	SW	SDCR	well sorted, subangular coarse sand (quartz, plagioclase, biotite, minor volcanics) 7.5 YR 6/3
95		100		NA	C	NA	SW	SDCR	same as above
100		100		NA	C	NA	SW	SDCR	same as above
105		100		NA	C	NA	SW	SDCR	same as above
110		100		NA	C	NA	SW	SDCR	same as above
115		100		NA	C	NA	SW	SDCR	same as above

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
120		95	5	NA	C	NA	SM	SDSL	silty, well sorted, very coarse angular sand (quartz, biotite, plagioclase, minor volcanics, some limestone fragments) 7.5 YR 5/3, brown
125		95	5	NA	C	NA	SM	SDSL	same as above
130		95	5	NA	C	NA	SM	SDSL	same as above
135		40	60	NA	C	NA	ML	SLSD	coarse, well sorted, subangular sandy silt 7.5 YR 6/4, light brown
140		40	60	NA	C	NA	ML	SLSD	same as above
145	10	50	40	NA	C	NA	GM	SDGR	subangular, poorly sorted, silty, sandy gravel 7.5 YR 6/4, light brown
150		70	30	NA	C	NA	SM	SDSL	very coarse, poorly sorted, subangular silty sand 7.5 YR 6/4, light brown
155	10		90	NA	C	NA	GM	GVST	subangular, silty gravel (quartz, quartzite, biotite, plagioclase, minor pumice and volcanics) 7.5 YR 5/4, brown
160	10		90	NA	C	NA	GM	GVST	same as above
165		5	95	NA	C	NA	ML	SLSD	very coarse, subangular, well sorted sandy silt 7.5 YR 5/4, brown
170		30	70	NA	C	NA	SM	SLSD	very coarse, subangular, well sorted sandy silt 7.5 YR 5/4, brown
175		60	40	NA	C	NA	SM	SDSL	very coarse, angular, well sorted sand 7.5 YR 6/4, light brown
180		60	40	NA	C	NA	SM	SDSL	same as above

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
185		80	20	NA	C	NA	SM	SDSL	poorly sorted, subangular coarse grained sand with silt 7.5 YR 6/5, light brown
190		80	20	NA	C	NA	SM	SDSL	same as above
195		70	30	NA	C	NA	SM	SDSL	same as above with increased fines
200	5	80	15	NA	C	NA	SP	SDSL	very poorly sorted, subrounded gravelly sand with silt 7.5 YR 6/3, light brown
205		90	10	NA	C	NA	SW	SDCR-SDSL	well sorted, coarse, subangular sand and silt (minor clay - balls up slightly) 7.5 YR 5/4, brown
210		90	10	NA	C	NA	SW	SDCR-SDSL	same as above
215		95	5	NA	C	NA	SP	SDMD-SDFN	medium to fine grained, poorly sorted, subangular sand 7.5 YR 6/4, light brown
220		98	2	NA	C	NA	SP	SDGR	very coarse, poorly sorted, subangular sand with gravel (some minor fines) 7.5 YR 6/3, light brown
225		95	5	NA	C	NA	SP	SDMD	medium grained, poorly sorted, subangular sand with some fines 7.5 YR 6/4, light brown
230		95	5	NA	C	NA	SP	SDMD	same as above
235		100		NA	C	NA	SW	SDCR	well sorted, coarse, subangular sand 7.5 YR 5/3, brown
240	5	95		NA	C	NA	SP	SDVC	very coarse, poorly sorted, subangular sand with gravel (< 5%) 7.5 YR 5/3, brown
245	5	95		NA	C	NA	SP	SCDV	same as above

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
250		100		NA	C	NA	SP	SDVC	very coarse grained, poorly sorted, subangular sand 7.5 YR 6/3, light brown
255		100		NA	C	NA	SP	SDCR	coarse grained, poorly sorted, subangular sand 7.5 YR 6/2, pinkish gray
260		100		NA	C	NA	SW	SDCR	well sorted, coarse grained, subangular sand minor fines (< 1%) 7.5 YR 6/3, light brown
265		100		NA	C	NA	SW	SDCR	same as above
270		100		NA	C	NA	SW	SDCR	same as above
275		100		NA	C	NA	SW	SDCR	same as above
280		100		NA	C	NA	SP	SDVC	very coarse grained, poorly sorted, subangular to angular sand 7.5 YR 7/1, light gray
285		100		NA	C	NA	SP	SDVC	same as above
290		100		NA	C	NA	SP	SDVC	same as above
295		100		NA	C	NA	SP	SDVC	same as above
300		100		NA	C	NA	SP	SDCR	coarse grained, poorly sorted, subangular sand 7.5 YR 7/2, pinkish gray
305		100		NA	C	NA	SP	SDMD	medium grained, poorly sorted subangular sand 7.5 YR 6/2, pinkish gray
310		100		NA	C	NA	SP	SDMD	same as above

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
315		100		NA	C	NA	SP	SDMD	same as above
320		80	20	NA	C	NA	SP	SDVC	very coarse grained, poorly sorted, subrounded sand 7.5 YR 7/2, pinkish gray
325		80	20	NA	C	NA	SP	SDVC	same as above
330		100		NA	C	NA	SP	SDCR	poorly sorted, coarse grained, subangular to subrounded sand (quartz, plagioclase) 7.5 YR 6/3, light brown
335		100		NA	C	NA	SP	SDCR	same as above
340		100		NA	C	NA	SP	SDCR	same as above
345		100		NA	C	NA	SP	SDCR	same as above
350		100		NA	C	NA	SP	SDVC	poorly sorted, very coarse grained, subangular sand (quartz, plagioclase, limestone, biotite) 7.5 YR 6/3, light brown
355		100		NA	C	NA	SP	SDVC	same as above
360		100		NA	C	NA	SP	SDVC	same as above
365		100		NA	C	NA	SP	SDVC	same as above
370		100		NA	C	NA	SP	SDVC	same as above
375		100		NA	C	NA	SP	SDVC	same as above

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
380		100		NA	C	NA	SP	SPVC	same as above
385		100		NA	C	NA	SW	SDMD	medium grained, well sorted sand 7.5 YR 7/2, pinkish gray
390		100		NA	C	NA	SW	SDMD	same as above
395		100		NA	C	NA	SW	SDMD	same as above
400		100		NA	C	NA	SW	SDMD-SDCR	medium to coarse grained, subangular, well sorted sand (quartz, plagioclase, limestone) 7.5 YR 6/2, pinkish gray
405		100		NA	C	NA	SW	SDMD-SDCR	same as above
410		100		NA	C	NA	SW	SDMD-SDCR	same as above
415		100		NA	C	NA	SW	SDMD-SDCR	same as above
420		100		NA	C	NA	SW	SDMD-SDCR	same as above
425		100		NA	C	NA	SW	SDVC	very coarse grained, well sorted, subangular sand 7.5 YR 6/2, pinkish gray
430		100		NA	C	NA	SW	SDVC	same as above
435		100		NA	C	NA	SW	SDMD-SDCR	medium to coarse grained, subangular, well sorted sand 7.5 YR 6/2, pinkish gray
440		100		NA	C	NA	SW	SDMD-SDCR	same as above

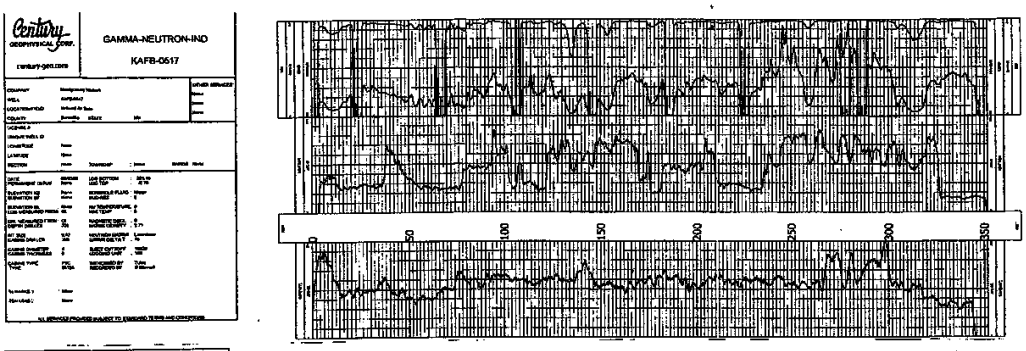
Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
445		100		NA	C	NA	SW	SDCR-SDVC	coarse to very coarse grained, very well sorted, subangular sand (quartz, plagioclase, quartzite, feldspars, biotite)
450		100		NA	C	NA	SW	SDCR-SDVC	same as above
455		100		NA	C	NA	SW	SDCR-SDVC	same as above
460		100		NA	C	NA	SW	SDCR-SDVC	same as above
465		100		NA	C	NA	SW	SDCR-SDVC	same as above
470		100		NA	C	NA	SW	SDCR-SDVC	same as above
475		100		NA	C	NA	SW	SDCR-SDVC	same as above
480		100		NA	C	NA	SW	SDCR-SDVC	same as above
485		100		NA	C	NA	SW	SDCR-SDVC	same as above
490		100		NA	C	NA	SW	SDCR-SDVC	same as above
495		100		NA	C	NA	SW	SDCR-SDVC	same as above
500		100		NA	C	NA	SW	SDCR-SDVC	same as above
505		100		NA	C	NA	SW	SDCR-SDVC	same as above

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
510		100		NA	C	NA	SP	SDCR	coarse grained, poorly sorted, subangular sand (quartz, plagioclase, limestone) 7.5 YR 7/2, pinkish gray
515		100		NA	C	NA	SP	SDCR	same as above
520									no cuttings returned
525									no cuttings returned
530									no cuttings returned
535									no cuttings returned
540									no cuttings returned
545		95	5	NA	C	NA	SW	SDCR	well sorted, coarse grained, subangular sand (quartz, plagioclase, limestone, biotite, minor volcanics) 7.5 YR 6/3, light brown
550		95	5	NA	C	NA	SW	SDCR	same as above
555		95	5	NA	C	NA	SW	SDCR	same as above
560		95	5	NA	C	NA	SW	SDCR	same as above
565									no cuttings returned
570									no cuttings returned

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
575									no cuttings returned
580		100		NA	C	NA	SW	SDMD	medium grained, well sorted, subangular sand (quartz, plagioclase, quartzite) 7.5 YR 6/2, pinkish gray
585		100		NA	C	NA	SP	SDCR	coarse grained, poorly sorted sand 7.5 YR 6/2, pinkish gray
590		100		NA	C	NA	SP	SDCR	same as above
595		90	10	NA	C	NA	SP	SDVC	very coarse grained, poorly sorted, subangular to angular sand (quartz, plagioclase) 7.5 YR 6/2, pinkish gray
600		100		NA	C	NA	SP	SDMD-SDCR	poorly sorted, medium to coarse grained, subangular to angular sand 7.5 YR 6/2, pinkish gray
605		100		NA	C	NA	SW	SDMD	medium grained, well sorted, subangular sand 7.5 YR 6/2, pinkish gray
610		100		NA	C	NA	SW	SDMD	same as above
615		100		NA	C	NA	SW	SDMD	same as above
620		100		NA	C	NA	SW	SDMD	same as above
625		100		NA	C	NA	SW	SDMD	same as above
630									no cuttings returned
635		95	5	NA	C	NA	SP	SDVC-SDMD	poorly sorted, very coarse to medium grained, subangular to subrounded sand 7.5 YR 6/2, pinkish gray

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
640		100		NA	C	NA	SP	SDCR-SDMD	coarse to medium coarse grained, poorly sorted, subangular sand 7.5 YR 6/2, gray-pink
645		95	5	NA	C	NA	SW	SDMD-SDFN	medium to fine grained, well sorted, subangular sand 7.5 YR 6/2, pinkish gray
650		95	5	NA	C	NA	SW	SDMD-SDFN	same as above
655		90	10	NA	C	NA	SP	SDFN	fine grained, poorly sorted, subangular sand 7.5 YR 6/2 pinkish gray
660		100		NA	C	NA	SP	SDVC	very coarse, poorly sorted, subangular sand 7.5 YR 6/2, pinkish gray
665		100		NA	C	NA	SW	SDMD	medium grained, well sorted, subangular sand 7.5 YR 6/2, pinkish gray
670		100		NA	C	NA	SW	SDMD	same as above
675		95	5	NA	C	NA	SW	SDMD	medium grained, well sorted, subangular sand 7.5 YR 6/2, pinkish gray
680		95	5	NA	C	NA	SW	SDMD	same as above
685		98	2	NA	C	NA	SW	SDMD	same as above (slightly coarser)
690		100		NA	C	NA	SW	SDCR	coarse grained, well sorted, subangular sand 7.5 YR 6/2, pinkish gray
695		100		NA	C	NA	SW	SDCR	same as above
700		100		NA	C	NA	SW	SDCR	same as above

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
705		95	5	NA	C	NA	SW	SDVC	very coarse, subangular, well sorted sand (quartz, plagioclase, minor volcanics) 7.5 YR 6/2, pinkish gray
710		95	5	NA	C	NA	SP	SDVC	very coarse, subangular, poorly sorted sand 7.5 YR 6/2, pinkish gray
715		95	5	NA	C	NA	SW	SDCR	coarse, subangular, well sorted sand (quartz, plagioclase) 7.5 YR 6/2, pinkish gray
720		95	5	NA	C	NA	SW	SDCR	same as above
725		95	5	NA	C	NA	SW	SDCR	same as above
730		95	5	NA	C	NA	SW	SDCR-SDMD	coarse to medium coarse, subangular, well sorted sand (quartz, plagioclase, biotite, chlorite) 7.5 YR 6/2, pinkish gray
735		95	5	NA	C	NA	SW	SDCR-SDMD	same as above Total Depth at 737'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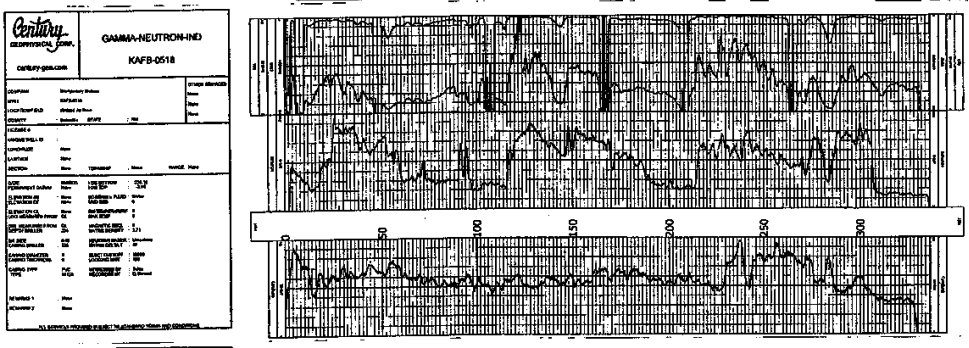
GEOPHYSICAL CORP.
GAMMA-NEUTRON-IND
KAFB-0517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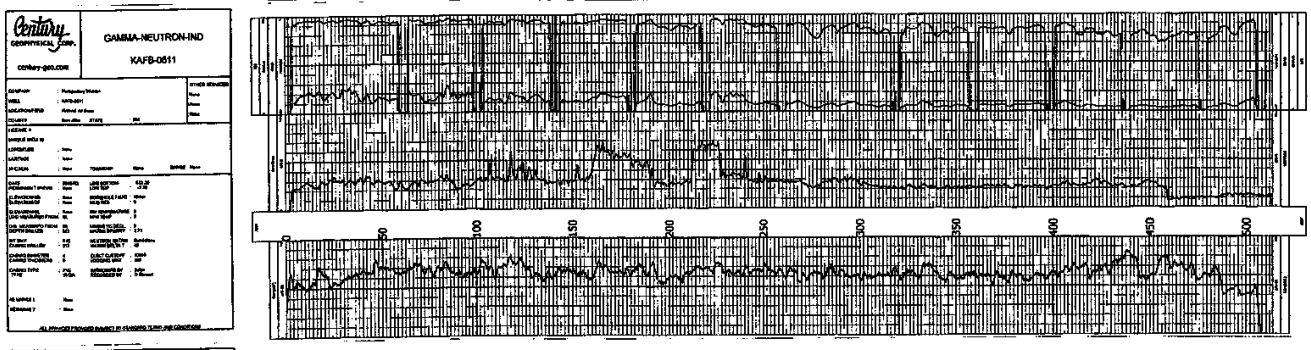
GAMMA-NEUTRON-IND
KAFB-0518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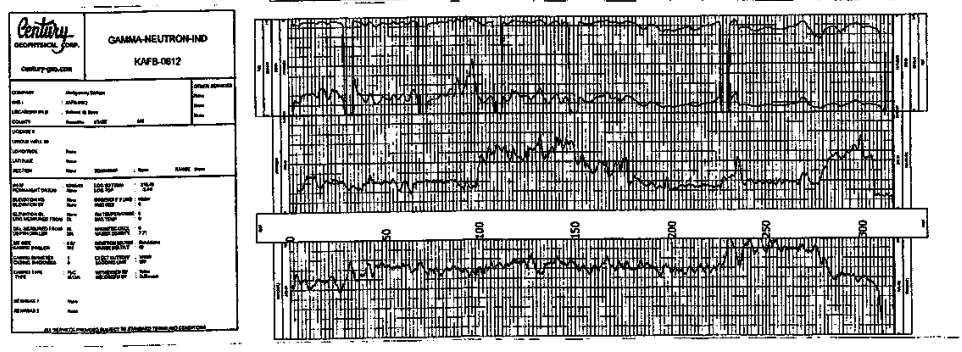
KAFB-0511


Century
GEOPHYSICAL CORP.
GAMMA-NEUTRON-IND
KAFB-0512

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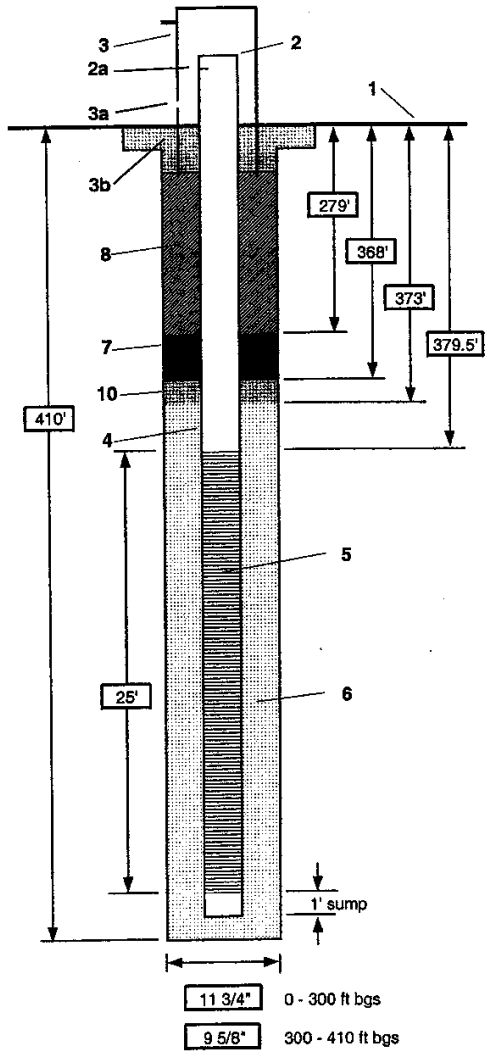
CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	WELL NUMBER KAFB-0520	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : Phase 2, Stage 1 Nitrate Abatement Wells — LOCATION : KAFB - Bldg. 26030
DRILLING CONTRACTOR : WDC Exploration & Wells — EASTING (X): 401,824.16
DRILLING METHOD AND EQUIPMENT USED : ARCH, Speedstar 15K — NORTHING (Y): 1,468,390.00
WATER LEVELS 384.5 ft bgs — START : 6/7/2004 — END : 6/15/2004 — LOGGER : J. Gamlin



1- Concrete slab elevation	5243.51 feet above mean sea level
2- Top of casing elevation	5245.23 feet above mean sea level
a) vent hole?	no
3- Wellhead protection cover type	above ground 8" steel monument
a) weep hole?	no
b) concrete pad dimensions	4' x 4' with 4 concrete filled bollards
4- Dia./type of well casing	4" schedule 80 PVC
5- Type/slot size of screen	0.010" schedule 80 PVC
6- Type screen filter	10/20 Colorado Silica Sand
a) Quantity used	40 bags
7- Type of seal	bentonite chips
a) Quantity used	50 bags
8- Grout	
a) Grout mix used	bentonite volclay grout
b) Method of placement	tremmie pipe
c) Vol. of well casing grout	30 bags (5 tubs)
Development method	bail, swab, bail, pump
Development time	approximately 7 hours
Estimated purge volume	185 gallons

Comments (10) transition sand: 20/40 Colorado Silica Sand from 368 - 373, 4 bags; top of grout is 58 ft bgs; bentonite chips from 58 - 48 ft bgs; portland cement from 1 - 48 ft bgs; 1 foot sump below well screen

Not to scale

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0520	SHEET 1 OF 7

SOIL BORING LOG

PROJECT : Phase 2, Stage 1 Nitrate Abatement Wells — LOCATION : KAFB - Bldg. 26030

ELEVATION : approximately 5,199 ft amsl — DRILLING CONTRACTOR : WDC Exploration & Wells

DRILLING METHOD AND EQUIPMENT USED : ARCH, Speedstar 15K

WATER LEVEL : 384.50 ft bgs — START : 06/07/2004 — END : 06/09/2004 — LOGGER : J. Gamlin

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
2	X	1.5	002004 SS	7-10-13	SILT WITH SAND (ML), brown (7.5 YR 4/3), dry, low plasticity, 15% sand	PID = 0.0 ppm
5	X	1.5	005007 SS	8-12-14	same as above	PID = 0.0 ppm
10	X	1.5	010012 SS	16-24-30	same as above	PID = 0.0 ppm
20						PID = 0.0 ppm
25	X	1.5	025027 SS	5-10-14	WELL GRADED GRAVEL WITH SILT (GW-GM), brown (7.5 YR 5/3), dry, non plastic, 15% silt	PID = 0.0 ppm
30					same as above	PID = 0.0 ppm
40					same as above	PID = 0.0 ppm
50	X	1.5	050052 SS	6-10-12	POORLY GRADED SAND (SP), brown (7.5 YR 5/2), dry, non plastic, medium grained sand	PID = 0.0 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0520	SHEET 2 OF 7

SOIL BORING LOG

PROJECT : Phase 2, Stage 1 Nitrate Abatement Wells — LOCATION : KAFB - Bldg. 26030

ELEVATION : approximately 5,199 ft amsl — DRILLING CONTRACTOR : WDC Exploration & Wells

DRILLING METHOD AND EQUIPMENT USED : ARCH, Speedstar 15K

WATER LEVEL : 384.50 ft bgs — START : 06/07/2004 — END : 06/09/2004 — LOGGER : J. Gamlin

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
60					SILT WITH SAND (ML), brown (7.5 YR 5/3), dry, low plasticity, 15% sand	PID = 0.0 ppm
70					WELL GRADED SAND (SW), brown (7.5 YR 5/2), dry, non plastic	PID = 0.0 ppm
80					WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 5/2), dry, non plastic, 15% coarse gravel to cobbles	PID = 0.0 ppm
90					same as above	PID = 0.0 ppm
100		1.5	100102 SS	4-4-6	same as above	PID = 0.0 ppm
110					WELL GRADED SAND (SW), brown (7.5 YR 5/2), dry, non plastic	PID = 0.0 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0520	SHEET 3 OF 7

SOIL BORING LOG

PROJECT : Phase 2, Stage 1 Nitrate Abatement Wells — LOCATION : KAFB - Bldg. 26030

ELEVATION : approximately 5,199 ft amsl — DRILLING CONTRACTOR : WDC Exploration & Wells

DRILLING METHOD AND EQUIPMENT USED : ARCH, Speedstar 15K

WATER LEVEL : 384.50 ft bgs — START : 06/07/2004 — END : 06/09/2004 — LOGGER : J. Gamlin

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
120					WELL GRADED SAND (SW), brown (7.5 YR 5/2), dry, non plastic	PID = 0.0 ppm
130					same as above	PID = 0.0 ppm
140					same as above	PID = 0.0 ppm
150		1.5	150152 SS	4-6-7	WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 5/2), dry, non plastic, 15% gravel	PID = 0.0 ppm
160					WELL GRADED SAND (SW), brown (7.5 YR 5/2), dry, non plastic	PID = 0.0 ppm
170					CLAYEY SAND (SC), brown (7.5 YR 5/3), dry, low plasticity, 10% gravel	PID = 0.0 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0520	SHEET 4 OF 7

SOIL BORING LOG

PROJECT : Phase 2, Stage 1 Nitrate Abatement Wells — LOCATION : KAFB - Bldg. 26030

ELEVATION : approximately 5,199 ft amsl — DRILLING CONTRACTOR : WDC Exploration & Wells

DRILLING METHOD AND EQUIPMENT USED : ARCH, Speedstar 15K

WATER LEVEL : 384.50 ft bgs — START : 06/07/2004 — END : 06/09/2004 — LOGGER : J. Gamlin

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
180					WELL GRADED SAND (SW), brown (7.5 YR 5/2), dry, non plastic	PID = 0.0 ppm
190					same as above, 5% gravel	PID = 0.0 ppm
200		1.5	200202 SS	5-5-5	same as above	PID = 0.0 ppm
210					same as above, moist	PID = 0.0 ppm
220					same as above, dry	PID = 0.0 ppm
230					same as above, moist	PID = 0.0 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0520	SHEET 5 OF 7

SOIL BORING LOG

PROJECT : Phase 2, Stage 1 Nitrate Abatement Wells — LOCATION : KAFB - Bldg. 26030

ELEVATION : approximately 5,199 ft amsl — DRILLING CONTRACTOR : WDC Exploration & Wells

DRILLING METHOD AND EQUIPMENT USED : ARCH, Speedstar 15K

WATER LEVEL : 384.50 ft bgs — START : 06/07/2004 — END : 06/09/2004 — LOGGER : J. Gamlin

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
240					WELL GRADED SAND (SW), brown (7.5 YR 4/2), moist, non plastic, 5% clay, 5% gravel	6/8/2004 PID = 0.0 ppm
250		1.5	250252 SS	5-7-7	same as above	PID = 0.0 ppm
260					same as above, no clay	PID = 0.0 ppm
270					WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 5/3), moist, non plastic, 30% coarse gravel to cobbles	PID = 0.0 ppm
280					WELL GRADED SAND (SW), brown (7.5 YR 5/3), moist, non plastic	PID = 0.0 ppm
290					same as above	PID = 0.0 ppm
						Perched water at 297.80 ft bgs

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0520	SHEET 6 OF 7

SOIL BORING LOG

PROJECT : Phase 2, Stage 1 Nitrate Abatement Wells — LOCATION : KAFB - Bldg. 26030

ELEVATION : approximately 5,199 ft amsl — DRILLING CONTRACTOR : WDC Exploration & Wells

DRILLING METHOD AND EQUIPMENT USED : ARCH, Speedstar 15K

WATER LEVEL : 384.50 ft bgs — START : 06/07/2004 — END : 06/09/2004 — LOGGER : J. Gamlin

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
300	X	1.5	300302 SS	4-7-8	WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 5/3), wet, non plastic, 15% gravel	PID = 0.0 ppm
310					same as above	PID = 0.0 ppm
320					same as above	PID = 0.0 ppm Perched water cased off, water level drops to bottom of borehole
330					same as above	PID = 0.0 ppm
340					WELL GRADED GRAVEL WITH SAND (GW), brown (7.5 YR 4/3), moist, non plastic, 15% sand	6/9/2004 PID = 0.0 ppm
350	X	1.5	350352 SS	3-3-4	POORLY GRADED SAND (SP), brown (7.5 YR 5/2), moist, non plastic, medium grained sand, 5% gravel	PID = 0.0 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0520	SHEET 7 OF 7

SOIL BORING LOG

PROJECT : Phase 2, Stage 1 Nitrate Abatement Wells — LOCATION : KAFB - Bldg. 26030

ELEVATION : approximately 5,199 ft amsl — DRILLING CONTRACTOR : WDC Exploration & Wells

DRILLING METHOD AND EQUIPMENT USED : ARCH, Speedstar 15K

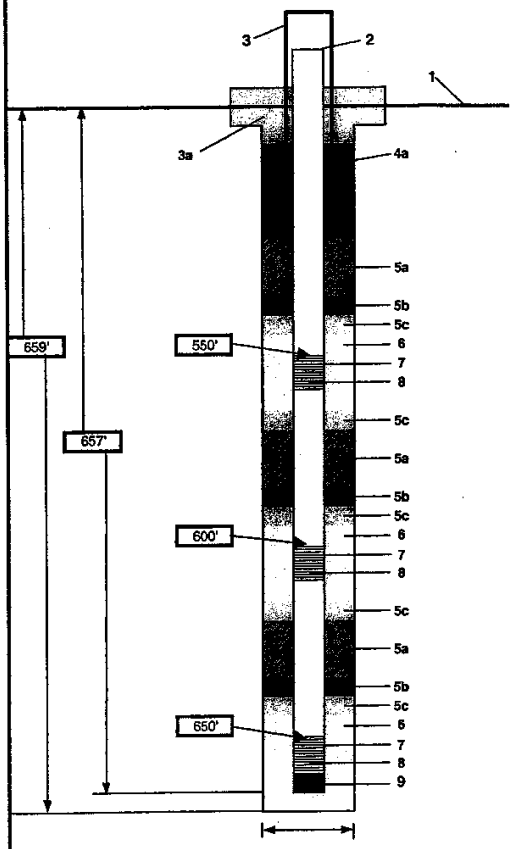
WATER LEVEL : 384.50 ft bgs — START : 06/07/2004 — END : 06/09/2004 — LOGGER : J. Gamlin

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
360					WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 5/4), moist, non plastic, 15% gravel	PID = 0.0 ppm
370					same as above	PID = 0.0 ppm
380					POORLY GRADED SAND (SP), brown (7.5 YR 5/2), moist, non plastic, medium grained sand, 5% gravel	PID = 9,999 ppm no staining or odor
						Water table
390					WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 4/2), wet, non plastic, 15% gravel	PID = 9,999 ppm no staining or odor
400	X	1.5	400402 SS	3-4-4	same as above	PID = 9,999 ppm no staining or odor
410					same as above	TD = 410 ft bgs

MWH	PROJECT NUMBER	WELL NUMBER	
	3970009	KAFB-0521	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT NAME:	KAFB DO6 Drilling	WELL COMPLETION DATE:	5/7/2004
DRILLING CONTRACTOR:	WDC	EASTING (X):	404,559.87
DRILLING METHOD/EQUIP:	Mud Rotary	NORTHING (Y):	1,470,478.92
DRILLING START DATE:	4/28/2004	BOREHOLE DEPTH:	570'
LOGGER :	C. Timm	CASING DEPTH:	562'



Borehole diameter
0 - 659 feet: 10 5/8 "

Diagram is not to scale

1- Concrete slab elevation: 5,346.98 feet above mean sea level

2- Top of casing elevation: 5,349.78 feet above mean sea level

3- Wellhead protection cover type: 3' above ground surface and 3' bgs wit 4 concrete filled bollards

a) Concrete pad dimensions: 3' x 3'

4- Surface Seal
- Grout mix used: a. Cement/bentonite 94#/3% wt.
- Method of placement: b. Tremmie

5- Type of seal:
- a. Bentonite slurry (50 - 500' bgs)
- b. Bentonite chips (500 - 546', 559 - 596', 609 - 646' bgs)
- c. Sugar sand (546 - 548', 557 - 559', 596 - 598', 607 - 609', and 646 - 648' bgs)

6- Type screen filter: 10/20 silica sand (548 - 557', 598 - 607', 648 - 659' bgs)

7- Diameter/type of wall casing: 5-inch schedule 80 PVC
3' above ground surface to 550' bgs

8- Type/slot size of screen: 3 screens of 5-feet schedule 80 PVC, 0.010 slot (550 - 555', 600 - 605', 650 - 655' bgs)

9- Sump: 2 feet (655 - 657' bgs)

Development method: bail, surge, swab and pump

Development time: 5/11/04 - 5/13/04

Volume purged: 660 gallons

Comments: Groundwater FLUTe installed as sampling system

MWH	PROJECT NUMBER	WELL NUMBER	
	3970009	KAFB-0521	SHEET 1 OF 1

FLUTe INSTALLATION DIAGRAM

PROJECT NAME:	KAFB DO6 Drilling	FLUTe INSTALLATION DATE:	9/15/04, adjusted 9/17/04
DRILLING CONTRACTOR:	FLUTe, Inc.	EASTING (X):	404,559.87
DRILLING METHOD/EQUIP:	NA	NORTHING (Y):	1,470,478.92
DRILLING START DATE:	NA	BOREHOLE DEPTH:	570'
LOGGER :	C. Timm	CASING DEPTH:	562'

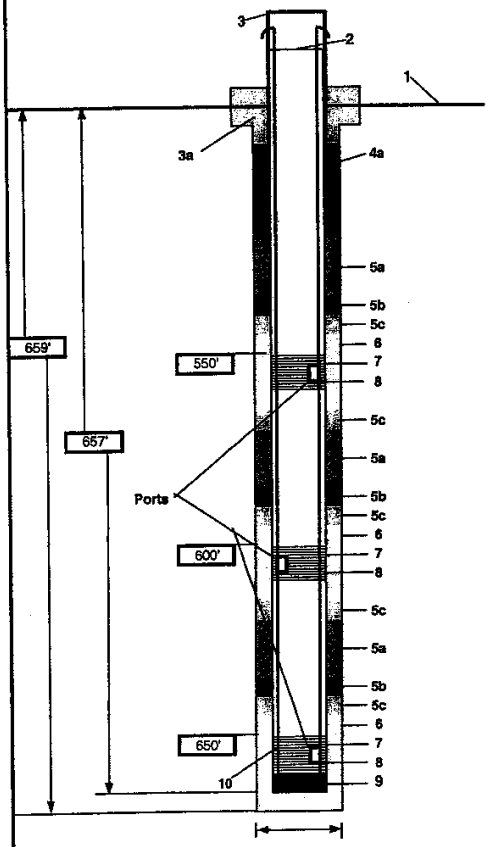


Diagram is not to scale

1- Concrete slab elevation		5,346.98 feet above mean sea level
2- Top of casing elevation		5,349.78 feet above mean sea level
3- Wellhead protection cover type		3' above ground surface and 3' bgs
a) Concrete pad dimensions		3' x 3'
4- Surface Seal		
Grout mix used	a.	Cement/bentonite 94#/3% wt.
Method of placement	b.	Tremmie
5- Type of seal	a.	Bentonite slurry (50 - 500' bgs)
	b.	Bentonite chips (500 - 546', 559 - 596', 609 - 646' bgs)
	c.	Sugar sand (546 - 548', 557 - 559', 596 - 598', 607 - 609', and 646 - 648' bgs)
6- Type screen filter		10/20 silica sand (548 - 557', 598 - 607', 648 - 659' bgs)
7- Diameter/type of well casing		5-inch schedule 80 PVC 3' above ground surface to 550' bgs
8- Type/slot size of screen		3 screens of 5-feet schedule 80 PVC, 0.010 slot (550 - 555', 600 - 605', 650 - 655' bgs)
9- Sump		2 feet (655 - 657' bgs)
10- FLUTe System		Sample ports installed within each screened interval.

Comments

MWH

Field Boring Log

Facility/Project Name	Kirtland Air Force Base - DO6 Drilling	**Boring No.**	KAFB-0521
Location	Across Southgate Road from KAFB-7	**Project No.**	3970009

Drilling Co	WDC Exploration & Wells	Northing: 1,470,478.92	Easting: 404,559.87
Driller's Name	Quentin Stevens		
Drill Rig	STAR 50K	Ground Surface Elevation (ft):	5,346.98
Drill Method	Mud Rotary	Measuring Point elevation (ft): (top of PVC casing)	5,349.78
Logged By	Chris Timm	Borehole Diameter:	11 3/4" and 9 5/8"
Water Level Below TOC (ft):	496.1 Date Measured: 5/11/2004	Borehole Depth:	659' below ground surface

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
0	5	60	35		Cuttings		ML	SLSD	Fine silty sand with minor subangular gravel, <1/2 in., light brown, 7.5 yr 6/3
5	5	60	35		Cuttings		ML	SLSD	Fine silty sand with minor subangular gravel, <1/2 in., light brown, 7.5 yr 6/3
10	20	30	50		Cuttings		ML	SLSD	Fine silty sand with poorly sorted subangular gravel, <1/2 in.
15	20	30	50		Cuttings		ML	SLSD	Fine silty sand with poorly sorted subangular gravel, <1/2 in.
20	20	30	50		Cuttings		ML	SLSD	Fine silty sand with poorly sorted subangular gravel, <1/2 in.
25	20	30	50		Cuttings		ML	SLSD	Fine silty sand with poorly sorted subangular gravel, <1/2 in.
30	0	60	40		Cuttings		ML	SLSD	Coarse silty sand, well sorted, brown, 7.5 yr 5/4
35	0	60	40		Cuttings		ML	SLSD	Coarse silty sand, well sorted, brown, 7.5 yr 5/4
40	0	30	70		Cuttings		ML	SLSD	Fine silty sand, brown, 7.5 yr 4/4
45	0	30	70		Cuttings		ML	SLSD	Fine silty sand, brown, 7.5 yr 4/4
50	0	30	70		Cuttings		ML	SLSD	Fine silty sand, brown, 7.5 yr 4/4

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
55	0	30	70		Cuttings		ML	SLSD	Fine silty sand, brown, 7.5 yr 4/4
60	5	20	75		Cuttings		ML	SLSD	Fine silty sand with minor subangular gravel, <1/2 in., brown, 7.5 yr 4/4
65	5	20	75		Cuttings		ML	SLSD	Fine silty sand with minor subangular gravel, <1/2 in., brown, 7.5 yr 4/4
70	10	40	50		Cuttings		ML	SLSD	Coarse silty sand with subangular gravel, <1/2 in., brown, 7.5 yr 4/4
75	10	40	50		Cuttings		ML	SLSD	Coarse silty sand with subangular gravel, <1/2 in., brown, 7.5 yr 4/4
80	5	20	75		Cuttings		ML	SLSD	Fine silty sand with minor subangular gravel, <1/2 in., brown, 7.5 yr 5/4
85	5	20	75		Cuttings		ML	SLSD	Fine silty sand with minor subangular gravel, <1/2 in., brown, 7.5 yr 5/4
90	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor coarse sand, <5 %, brown, 7.5 yr 5/3
95	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor coarse sand, <5 %, brown, 7.5 yr 5/3
100	0	50	50		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3
105	0	50	50		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3
110	0	20	80		Cuttings		ML	SLSD	Mostly fine silty sand with minor coarse sand, <1%, brown, 7.5 yr 4/4
115	0	20	80		Cuttings		ML	SLSD	Mostly fine silty sand with minor coarse sand, <1%, brown, 7.5 yr 4/4

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
120	0	10	90		Cuttings		ML	SLSD	Very fine silty sand with clay (lightly holds shape), brown, 7.5 yr 4/4
125	0	10	90		Cuttings		ML	SLSD	Very fine silty sand with clay (lightly holds shape), brown, 7.5 yr 4/4
130	0	20	80		Cuttings		ML	SLSD	Coarse silty sand, light brown, 7.5 yr 6/3
135	0	20	80		Cuttings		ML	SLSD	Coarse silty sand, light brown, 7.5 yr 6/3
140	0	10	90		Cuttings		CL	SDSL	Silty sandy clay, highly plastic, holds shape when balled up, brown, 7.5 yr 5/4
145	0	10	90		Cuttings		CL	SDSL	Silty sandy clay, highly plastic, holds shape when balled up, brown, 7.5 yr 5/4
150	0	10	90		Cuttings		CL	SDSL	Silty sandy clay, highly plastic, holds shape when balled up, brown, 7.5 yr 5/4
155	0	10	90		Cuttings		CL	SDSL	Silty sandy clay, highly plastic, holds shape when balled up, brown, 7.5 yr 5/4
160	0	10	90		Cuttings		CL	SDSL	Silty sandy clay, highly plastic, holds shape when balled up, brown, 7.5 yr 5/4
165	0	10	90		Cuttings		CL	SDSL	Silty sandy clay, highly plastic, holds shape when balled up, brown, 7.5 yr 5/4
170	0	20	80		Cuttings		ML	SLSD	Very fine silty sand with minor clay (low plasticity), brown, 7.5 yr 4/4
175	0	20	80		Cuttings		ML	SLSD	Very fine silty sand with minor clay (low plasticity), brown, 7.5 yr 4/4
180	0	30	70		Cuttings		ML	SLSD	Fine silty sand (coarser than above) with minor clay, brown, 7.5 yr 5/3

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
185	0	30	70		Cuttings		ML	SDCL	Fine silty sand (coarser than above) with minor clay, brown, 7.5 yr 5/3
190	0	10	90		Cuttings		CL	SDSL	Fine sandy silty clay (low plasticity), brown, 7.5 yr 5/4
195	0	10	90		Cuttings		CL	SDSL	Fine sandy silty clay (low plasticity), brown, 7.5 yr 5/4
200	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay, brown, 7.5 yr 5/3
205	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay, brown, 7.5 yr 5/3
210	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay, brown, 7.5 yr 5/3
215	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/4
220	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/4
225	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/4
230	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/4
235	0	20	80		Cuttings		CL	SDSL	Silty sandy clay (high plasticity), brown, 7.5 yr 5/3
240	0	60	40		Cuttings		ML	SLSD	Very coarse silty sand, brown, 7.5 yr 5/3
245	0	60	40		Cuttings		ML	SLSD	Very coarse silty sand, brown, 7.5 yr 5/3

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
250	0	20	80		Cuttings		ML	SLSD	Fine silty sand, brown, 7.5 yr 5/3
255	0	20	80		Cuttings		ML	SLSD	Fine silty sand, brown, 7.5 yr 5/3
260	0	20	80		Cuttings		ML	SLSD	Fine silty sand, brown, 7.5 yr 5/3
265	0	20	80		Cuttings		ML	SLSD	Fine silty sand, brown, 7.5 yr 5/3
270	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3
275	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3
280	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3
285	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3
290	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3
295	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3
300	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 4/3
305	0	20	80		Cuttings		ML	SLSD	Fine silty sand with clay (greater plasticity than above), brown, 7.5 yr 5/3
310	0	20	80		Cuttings		ML	SLSD	Fine silty sand with clay (greater plasticity than above), brown, 7.5 yr 5/3

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
315	0	20	80		Cuttings		ML	SLSD	Fine silty sand with clay (greater plasticity than above), brown, 7.5 yr 5/3
320	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 5/3
325	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 5/3
330	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 5/3
335	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 5/3
340	0	10	90		Cuttings		CL	SDSL	Very fine silty sandy clay, brown, 7.5 yr 5/3
345	0	10	90		Cuttings		CL	SDSL	Very fine silty sandy clay, brown, 7.5 yr 5/3
350	0	10	90		Cuttings		CL	SDSL	Very fine silty sandy clay, brown, 7.5 yr 5/3
355	0	10	90		Cuttings		CL	SDSL	Very fine silty sandy clay, brown, 7.5 yr 5/3
360	0	40	60		Cuttings		ML	SLSD	Coarse silty sand with minor clay, brown, 7.5 yr 5/3
365	0	40	60		Cuttings		ML	SLSD	Coarse silty sand with minor clay, brown, 7.5 yr 5/3
370	0	40	60		Cuttings		ML	SLSD	Coarse silty sand with minor clay, brown, 7.5 yr 5/3
375	0	20	80		Cuttings		CL	SDSL	Coarse sandy clay, brown, 7.5 yr 5/2

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
380	0	20	80		Cuttings		ML	SLSD	Coarse sitly sand (cobbles - rig chatter), brown, 7.5 yr 5/3
385	0	20	80		Cuttings		ML	SLSD	Coarse sitly sand (cobbles - rig chatter), brown, 7.5 yr 5/3
390	0	20	80		Cuttings		ML	SLSD	Coarse sitly sand (cobbles - rig chatter), brown, 7.5 yr 5/3
395	0	20	80		Cuttings		ML	SLSD	Coarse sitly sand (cobbles - rig chatter), brown, 7.5 yr 5/3
400	0	10	90		Cuttings		ML	SLSD	Fine silty sand (slightly coarse), brown, 7.5 yr 5/3
405	0	10	90		Cuttings		ML	SLSD	Fine silty sand (slightly coarse), brown, 7.5 yr 5/3
410	0	10	90		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 5/3
415	0	10	90		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 5/3
420	0	20	80		Cuttings		ML	SLSD	Silty sandy slightly coarse, pinkish gray, 7.5 yr 6/2
425	0	20	80		Cuttings		ML	SLSD	Silty sandy slightly coarse, pinkish gray, 7.5 yr 6/2
430	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3
435	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3
440	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/3

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
445	0	60	40		Cuttings		ML	SLSD	Very coarse silty sand, brown, 7.5 yr 5/4
450	0	60	40		Cuttings		ML	SLSD	Very coarse silty sand, brown, 7.5 yr 5/4
455	0	60	40		Cuttings		ML	SLSD	Very coarse silty sand, brown, 7.5 yr 5/4
460	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 5/2
465	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 5/2
470	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 5/2
475	0	30	70		Cuttings		ML	SLSD	Fine silty sand with minor clay (slightly plastic), brown, 7.5 yr 5/2
480	0	40	60		Cuttings		ML	SLSD	Coarse sands with silt and clay, brown, 7.5 yr 5/2
485	0	40	60		Cuttings		ML	SLSD	Coarse sands with silt and clay, brown, 7.5 yr 5/2
490	0	40	60		Cuttings		ML	SLSD	Coarse sands with silt and clay, brown, 7.5 yr 5/2
495	0	40	60		Cuttings		ML	SLSD	Coarse sands with silt and clay, brown, 7.5 yr 5/2
500	0	40	60		Cuttings		ML	SLSD	Coarse sands with silt and clay, brown, 7.5 yr 5/2
505	0	40	60		Cuttings		ML	SLSD	Coarse sands with silt and clay, brown, 7.5 yr 5/2

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
510	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/2
515	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/2
520	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/2
525	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/2
530	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/2
535	0	40	60		Cuttings		ML	SLSD	Coarse silty sand, brown, 7.5 yr 5/2
540	0	20	80		Cuttings		ML	SLSD	Coarse sand with silt, brown, 7.5 yr 5/2
545	0	20	80		Cuttings		ML	SLSD	Coarse sand with silt, brown, 7.5 yr 5/2
550	0	20	80		Cuttings		ML	SLSD	Coarse sand with silt, brown, 7.5 yr 5/2
555	0	20	80		Cuttings		ML	SLSD	Coarse sand with silt, brown, 7.5 yr 5/2
560	0	40	60		Cuttings		ML	SLSD	Coarse sand with silt, brown, 7.5 yr 5/2
565	0	20	80		Cuttings		ML	SLSD	Coarse silty clayey sand (slightly plastic), brown, 7.5 yr 5/4
570	0	40	60		Cuttings		ML	SLSD	Coarse silty sand (less clay than above), 7.5 yr 5/3

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
575	0	40	60		Cuttings		ML	SLSD	Coarse silty sand (less clay than above), 7.5 yr 5/3
580	0	20	80		Cuttings		ML	SLSD	Silty, clayey, coarse sand, brown, 7.5 yr 5/3
585	0	20	80		Cuttings		ML	SLSD	Silty, clayey, coarse sand, brown, 7.5 yr 5/3
590	0	20	80		Cuttings		ML	SLSD	Silty, clayey, coarse sand, brown, 7.5 yr 5/3
595	0	20	80		Cuttings		ML	SLSD	Silty, clayey, coarse sand, brown, 7.5 yr 5/3
600	0	30	70		Cuttings		ML	SLSD	Coarse silty sand with minor clay, brown, 7.5 yr 5/2
605	0	30	70		Cuttings		ML	SLSD	Coarse silty sand with minor clay, brown, 7.5 yr 5/2
610	0	20	80		Cuttings		ML	SLSD	Coarse silty sand, minor clay, <5%, brown, 7.5 yr 5/2
615	0	20	80		Cuttings		ML	SLSD	Coarse silty sand, minor clay, <5%, brown, 7.5 yr 5/2
620	0	20	80		Cuttings		ML	SLSD	Coarse silty sand, minor clay, <5%, brown, 7.5 yr 5/2
625	0	20	80		Cuttings		ML	SLSD	Coarse silty sand, minor clay, <5%, brown, 7.5 yr 5/2
630	0	30	70		Cuttings		ML	SLSD	Coarse silty sand, no clay, brown, 7.5 yr 5/2
635	0	30	70		Cuttings		ML	SLSD	Coarse silty sand, no clay, brown, 7.5 yr 5/2

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
640	0	40	60		Cuttings		ML	SLSD	Very coarse silty sand, brown, 7.5 yr 5/2
645	0	40	60		Cuttings		ML	SLSD	Very coarse silty sand, brown, 7.5 yr 5/2
650	0	40	60		Cuttings		ML	SLSD	Very coarse silty sand, brown, 7.5 yr 5/2
655	0	40	60		Cuttings		ML	SLSD	Very coarse silty sand, brown, 7.5 yr 5/2
660									TD at 660 ft.

MWH	PROJECT NUMBER	WELL NUMBER	
	3970009	KAFB-0522	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT NAME:	KAFB DO6 Drilling	WELL COMPLETION DATE:	6/23/2004
DRILLING CONTRACTOR:	WDC	EASTING (X):	404,704.70
DRILLING METHOD/EQUIP:	Air Rotary/Star 30K	NORTHING (Y):	1,468,090.59
DRILLING START DATE:	6/18/2004	BOREHOLE DEPTH:	440' bgs
LOGGER :	Amy Ewing/Steffanie Metzger	CASING DEPTH:	432.5' bgs

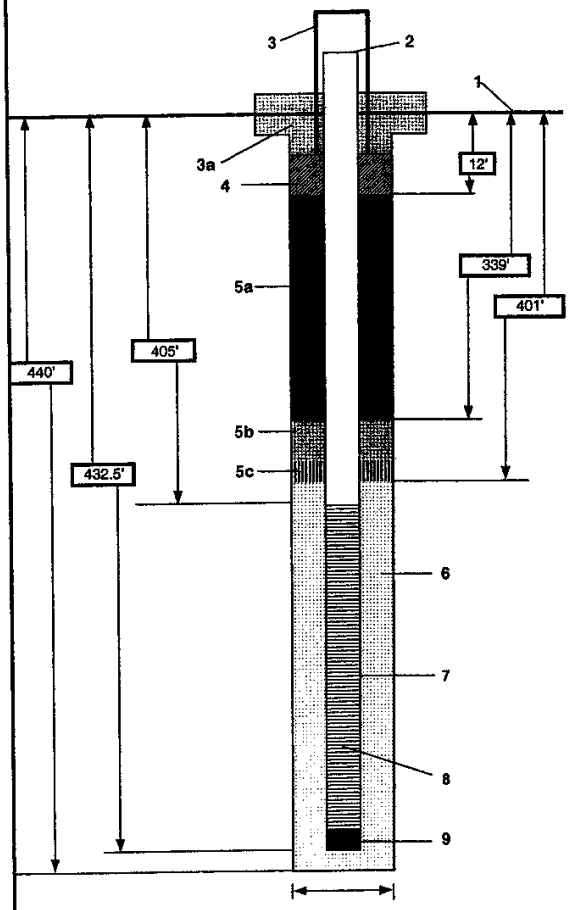


Diagram is not to scale

1- Concrete slab elevation	5,262.95 feet above mean sea level
2- Top of casing elevation	5,264.81 feet above mean sea level
3- Wellhead protection cover type	3' above ground surface and 3' bgs
a) Concrete pad dimensions	3' x 3' with 4 concrete filled bollards
4- Surface Seal	
a) Grout mix used	Cement/bentonite 94#/3% weight
b) Method of placement	Tremmie
5- Type of seal	a. Bentonite slurry (12 - 339' bgs)
	b. Bentonite chips (339 - 399' bgs)
	c. Sugar sand (399 - 401' bgs)
6- Type screen filter	10/20 silica sand (401 - 440' bgs)
7- Diameter/type of well casing	4-inch schedule 80 PVC
	3' above ground surface to 432.5' bgs
8- Type/slot size of screen	25' schedule 80 PVC 0.010 slot
	(405 - 430' bgs)
9- Sump	2.5' schedule 80 PVC (430 - 432.5' bgs)
Development method	bail, swab and pump
Development time	7/27/2004
Volume purged	120 gallons

MWH

Field Boring Log

Facility/Project Name	Kirtland Air Force Base - DO6 Drilling	**Boring No.**	KAFB-0522
Location	East of Munitions Haul Road	**Project No.**	3970009

Drilling Co	WDC Exploration & Wells	Northing: 1,468,090.59	Easting: 404,704.70
Driller's Name	Mark Green		
Drill Rig	Star 30 K	Ground Surface Elevation (ft):	5,262.95
Drill Method	Air Rotary/Casing Hammer	Measuring Point elevation (ft): (top of PVC casing)	5,264.81
Logged By	Amy Ewing/Steffanie Metzger	Borehole Diameter:	9 5/8"; 11 3/4"
Water Level Below TOC (ft):	408.4 Date Measured: 7/22/2004	Borehole Depth:	440' below ground surface

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
0	10	25	65		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.3 in, light brown. 7.5 yr 6/3
5	10	20	70		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.2 in, light brown. 7.5 yr 6/3
10	15	20	65		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 1.4 in, light brown. 7.5 yr 6/4
15	15	20	65		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.8 in, light brown. 7.5 yr 6/4
20	15	20	65		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.6 in, light brown. 7.5 yr 6/3
25	20	20	60		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 1.1 in, buff. 7.5 yr 7/3
30	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.6 in, medium brown. 7.5 yr 6/3
35	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.3 in, medium brown. 7.5 yr 5/3
40	70	10	20		Cuttings		GP	GVST	Poorly graded, subangular gravel <0.1 - 1 in. with sandy silt, buff. 7.5 yr 8/2
45	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.8 in, medium brown. 7.5 yr 6/4
50	40	10	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 1.2 in, medium brown. 7.5 yr 6/3

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 Inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
55	20	20	60		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 3.0 in, reddish brown. 7.5 yr 5/6
60	15	20	65		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.3 in, medium brown. 7.5 yr 6/4
65	20	20	60		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 2.5 in, medium brown. 7.5 yr 6/4
70	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <1.0 in, medium brown. 7.5 yr 5/4
75	20	20	60		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.6 in, medium brown. 7.5 yr 5/4
80	10	20	70		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.5 in, medium brown. 7.5 yr 5/4
85	10	20	70		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.3 in, medium brown. 7.5 yr 4/4
90	20	20	60		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 0.6 in, medium brown. 7.5 yr 5/4
95	20	20	60		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel < 1.1 in, medium brown. 7.5 yr 4/4
100	5	20	75		Cuttings		ML	SLSD	Very fine, sandy silt, rich brown. 7.5 yr 4/4
105	5	20	75		Cuttings		ML	SLSD	Very fine, sandy silt, rich brown. 7.5 yr 4/4
110	62	10	30		Cuttings		GM	GVST	Poorly graded, subangular gravel <0.1 - 0.7 in. with sandy silt, rich brown. 7.5 yr 4.3
115	50	15	35		Cuttings		GM	GVST	Poorly graded, subangular gravel <0.1 - 1 in. with sandy silt, rich brown. 7.5 yr 4/4

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
120	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <1.0 in., medium brown. 7.5 yr 5/3
125	5	20	75		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.5 in., medium brown. 7.5 yr 5/3
130	70	10	20		Cuttings		GM	GVST	Poorly graded, subangular gravel <0.1-1.8 in., with sandy silt, buff. 7.5 yr 6/2
135	5	35	60		Cuttings		ML	SLSD	Very fine, sandy silt, gray. 7.5 yr 6/2
140	5	35	60		Cuttings		ML	SLSD	Very fine, sandy silt, gray. 7.5 yr 6/2
145	5	35	60		Cuttings		ML	SLSD	Very fine, sandy silt, gray. 7.5 yr 6/2
150	5	35	60		Cuttings		ML	SLSD	Very fine, sandy silt, gray. 7.5 yr 6/2
155	5	35	60		Cuttings		ML	SLSD	Very fine, sandy silt, gray. 7.5 yr 6/2
160	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <1.0 in., gray. 7.5 yr 5/3
165	15	35	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.3 in., gray. 7.5 yr 6/2
170	50	20	30		Cuttings		GM	GVST	Poorly graded, subangular gravel <0.1-0.5 in., with sandy silt, gray. 7.5 yr 6/2
175	20	20	60		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.4 in., gray. 7.5 yr 6/1
180	15	30	55		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <1.0 in., gray. 7.5 yr 6/2

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
185	15	30	55		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.3 in., gray 7.5 yr 6/2
190	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.2 in., gray 7.5 yr 6/2
195	40	15	45		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.7 in., gray 7.5 yr 6/2
200	50	20	30		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-1.0 in., with sandy silt, gray. 7.5 yr 6/2
205	10	30	60		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.3 in., gray 7.5 yr 6/2
210	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.3 in., gray 7.5 yr 6/2
215	60	20	20		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-1.2 in., with sandy silt, gray. 7.5 yr 6/2
220	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.3 in., gray 7.5 yr 6/2
225	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.7 in., gray-brown. 7.5 yr 6/2
230	15	20	65		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.6 in., light brown 7.5 yr 6/3
235	15	20	65		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <1.1 in., light brown 7.5 yr 6/3
240	15	30	55		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.3 in., light brown. 7.5 yr 6/3
245	20	30	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.6 in., light brown 7.5 yr 6/3

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
250	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.2 in., light brown 7.5 yr 6/2
255	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.2 in., light brown 7.5 yr 6/2
260	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.5 in., light brown 7.5 yr 6/2
265	20	20	60		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.2 in., light brown 7.5 yr 6/2
270	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.2 in., light brown 7.5 yr 6/2
275	80	10	10		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-1.1 in., with sandy silt, gray. 7.5 yr 6/2
280	80	10	10		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.6 in., with sandy silt, gray. 7.5 yr 6/2
285	80	10	10		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.6 in., with sandy silt, gray. 7.5 yr 6/2
290	80	10	10		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.6 in., with sandy silt, gray. 7.5 yr 6/2
295	80	10	10		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.6 in., with sandy silt, gray. 7.5 yr 6/2
300	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.5 in., gray. 7.5 yr 6/2
305	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.5 in., gray. 7.5 yr 6/2
310	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.8 in., gray. 7.5 yr 6/2

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
315	5	25	70		Cuttings		ML	SLSD	Very fine, sandy silt, buff. 7.5 yr 6/2
320	5	40	55		Cuttings		ML	SLSD	Very fine, sandy silt, gray brown. 7.5 yr 6/2
325	5	40	55		Cuttings		ML	SLSD	Very fine, sandy silt, gray brown. 7.5 yr 6/2
330	70	10	20		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.8 in., with sandy silt, gray brown. 7.5 yr 6/2
335	70	10	20		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.4 in., with sandy silt, gray brown. 7.5 yr 6/2
340	70	10	20		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.4 in., with sandy silt, gray brown. 7.5 yr 6/2
345	65	15	20		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.9 in., with sandy silt, gray brown. 7.5 yr 6/2
350	85	5	10		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-1.4 in., with sandy silt, gray brown. 7.5 yr 6/2
355	60	20	20		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-1.0 in., with sandy silt, gray brown. 7.5 yr 6/2
360	60	15	25		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.5 in., with sandy silt, gray brown. 7.5 yr 6/2
365	60	15	25		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.5 in., with sandy silt, gray brown. 7.5 yr 6/2
370	60	15	25		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.5 in., with sandy silt, gray brown. 7.5 yr 6/2
375	60	15	25		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.5 in., with sandy silt, gray brown. 7.5 yr 6/2

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
380	50	20	30		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.5 in., with sandy silt, gray brown. 7.5 yr 6/2
385	50	20	30		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.5 in., with sandy silt, gray brown. 7.5 yr 6/2
390	50	20	30		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.5 in., with sandy silt, gray brown. 7.5 yr 6/2
395	30	30	40		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.4 in., gray brown 7.5 yr 6/2
400	10	30	60		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <1.5 in., gray brown 7.5 yr 6/2
405	5	20	75		Cuttings		ML	SLSD	Very fine, sandy silt with minor subangular gravel <1.0 in., medium brown 7.5 yr 5/3
410	10	15	75		Cuttings		ML	SLSD	Very fine, sandy silt with minor subangular gravel <1.0 in., rich brown 7.5 yr 4/3
415	5	30	65		Cuttings		ML	SLSD	Very fine, sandy silt with minor subangular gravel <0.4 in., medium brown 7.5 yr 6/3
420	30	20	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.5 in., gray brown 7.5 yr 6/2
425	5	40	55		Cuttings		ML	SLSD	Very fine, sandy silt, damp, rich brown 7.5 yr 5/3
430	10	40	50		Cuttings		ML	SLSD	Very fine, sandy silt with subangular gravel <0.2 in., gray brown 7.5 yr 6/2
435	60	20	20		Cuttings		GP	GVST	Poorly sorted, subangular gravel <0.1-0.6 in., with sandy silt, gray brown. 7.5 yr 6/2
440	10	40	50		Cuttings		ML	SLSD	Very fine, sandy silt, wet, dark brown. 7.5 yr 4/2

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	WELL NUMBER KAFB-0523	SHEET 1 OF 1

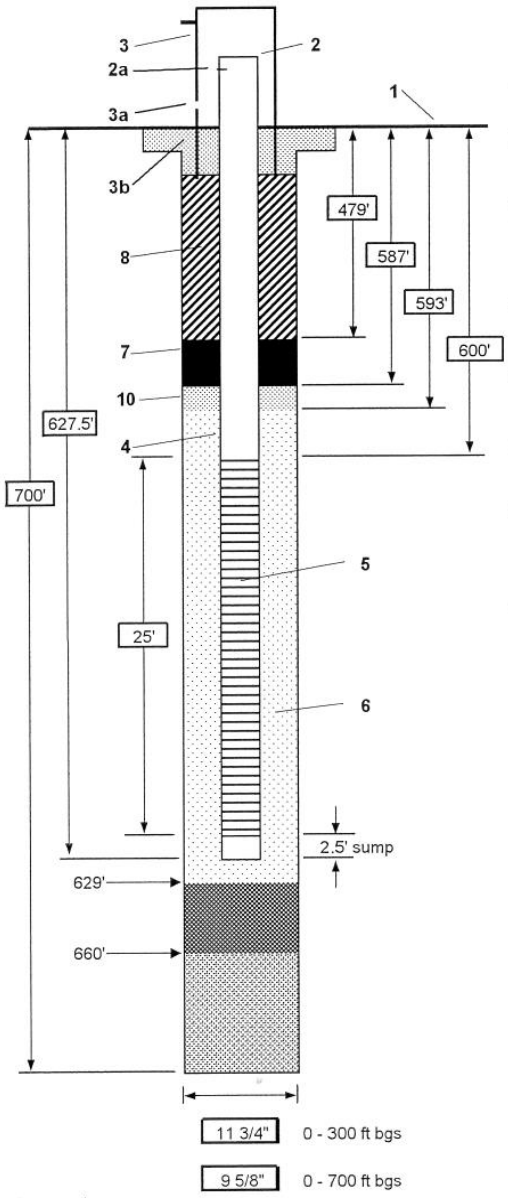
WELL COMPLETION DIAGRAM

PROJECT: ST-105 | LOCATION: NW of former sewage lagoons | DRILLER: M. Green

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer, Speedstar 15K | DRILLING CONTRACTOR: WDC Exploration & Wells

TOP OF CASING ELEVATION: 5349.95 ft NAVD 88 datum | WATER LEVELS: 492.47 ft bgs | START: 05/30/2006 END: 06/02/2006

COORDINATES: 1543889.9691 ft E, 1470575.1300 ft N, New Mexico State Plane, Central Zone, NAD 83 datum | LOGGER: M. Brislen



1- Ground elevation at well	5347.84' NAVD88
2- Top of casing elevation	5349.95' NAVD88
a) vent hole?	no
3- Wellhead protection cover type	above ground 8" dia. steel pipe w/locking lid
a) weep hole?	no
b) concrete pad dimensions	4' x 4' with 4 concrete filled bollards
4- Dia./type of well casing	4" schedule 80 PVC
5- Type/slot size of screen	0.010" schedule 80 PVC
6- Type screen filter	10/20 Colorado Silica Sand
a) Quantity used	1.5 super sacks - approx. 45 cu-ft
7- Type of seal	hydrated bentonite chips
a) Quantity used	2 super sacks & 25 buckets - approx. 155 cu-ft
8- Grout	
a) Grout mix used	volclay bentonite grout
b) Method of placement	tremie pipe
c) Vol. of well casing grout	400 gallons
Development method	bail, swab, bail, pump
Development time	1.5 days
Estimated purge volume	550 gallons

Comments (10) transition sand: 20/40 Colorado Silica Sand from 587 - 593 ft bgs; top of slurry is 60 ft bgs; hydrated bentonite chips from 60 - 50 ft bgs; portland cement from 1 - 50 ft bgs; 2.5 foot sump below well screen. Top of bentonite chips is approximately 10 feet above the water table. Time release bentonite chips from approximately 629 to 660 ft bgs. Borehole caved in from 660 to 700 ft bgs

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 1 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
0					SILT WITH SAND (ML), reddish brown (5 YR 5/4), dry, low plasticity, well graded sand	PID = 0.0 ppm
10					SILT WITH SAND (ML), reddish brown (5 YR 4/4), moist, low plasticity, well graded sand	PID = 0.0 ppm
20					same as above	PID = 0.1 ppm
30					SILT WITH SAND (ML), reddish brown (5 YR 4/4), moist, low plasticity, well graded sand, 5% clay	PID = 0.1 ppm
40					WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), light reddish brown (5 YR 6/3), moist, low plasticity	PID = 0.1 ppm
50					SILT WITH SAND (ML), reddish brown (5 YR 4/4), moist, low plasticity, 5% clay	PID = 0.1 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 2 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
60					WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), reddish brown (5 YR 4/4), moist, low plasticity	PID = 0.2 ppm
70					SILTY SAND WITH GRAVEL (SM), reddish brown (5 YR 5/4), moist, low plasticity, some clay nodules	PID = 0.3 ppm
80					SANDY SILT WITH GRAVEL (ML), reddish brown (5 YR 5/3), dry, low plasticity	PID = 0.3 ppm
90					SILT WITH SAND (ML), reddish brown (5 YR 5/3), moist, low plasticity, <5% gravel	PID = 0.2 ppm
100					SANDY SILT WITH GRAVEL (ML), reddish brown (5 YR 5/3), dry, low plasticity	PID = 0.1 ppm
110					SILT (ML), reddish brown (5 YR 5/3), moist, medium plasticity, clay nodules	PID = 0.2 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 3 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
120					SANDY SILT (ML), reddish brown (5 YR 5/3), dry, low plasticity	PID = 0.1 ppm
130					same as above	PID = 0.3 ppm
140					SILT (ML), reddish brown (5 YR 5/4), moist, medium plasticity, 10% lean clay	PID = 0.3 ppm
150					SANDY SILT (ML), reddish brown (5 YR 5/4), moist, medium plasticity, 10% lean clay	PID = 0.3 ppm
160					SANDY SILT (ML), reddish brown (5 YR 5/3), dry, low plasticity	PID = 0.2 ppm
170					LEAN CLAY (CL), reddish brown (5 YR 5/4), moist, medium plasticity	PID = 0.1 ppm clogged cyclone hose

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 4 OF 12
	SOIL BORING LOG		

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
180					SILT WITH SAND (ML-SW), reddish-brown (5 YR 5/4), moist, low plasticity, 5% gravel	PID = 0.2 ppm
190					WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), reddish brown (5 YR 4/3), moist, medium plasticity	PID = 0.1 ppm
200					WELL GRADED SAND (SW), light brown (7.5 YR 6/3), moist, non-plastic	PID = 0.2 ppm
210					WELL GRADED SAND WITH GRAVEL (SW), light brown (7.5 YR 6/3), moist, non-plastic	PID = 0.2 ppm
220					same as above	PID = 0.2 ppm
230					same as above	PID = 0.3 ppm

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
162708.02.NA.FI	KAFB-0523	SHEET 5 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
240					WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), brown (7.5 YR 5/4), moist, low plasticity	PID = 0.4 ppm
250					WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), brown (7.5 YR 5/4), moist, medium plasticity	PID = 0.1 ppm
260					WELL GRADED SAND WITH GRAVEL (SW), light brown (7.5 YR 6/3), moist, non-plastic	PID = 0.4 ppm
270					same as above	PID = 0.1 ppm
280					same as above	PID = 0.1 ppm
290					WELL GRADED SAND WITH GRAVEL (SW), light brown (7.5 YR 6/3), moist, non-plastic, gravel covered in clay	PID = 0.2 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 6 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
300					WELL GRADED SAND (SW), light brown (7.5 YR 6/3), moist, non-plastic	start of 5/16/2006 PID = 0.0 ppm
310					same as above	PID = 0.0 ppm
320					WELL GRADED SAND WITH GRAVEL (SW), light brown (7.5 YR 6/3), dry, non-plastic	PID = 0.0 ppm
330					WELL GRADED SAND WITH GRAVEL (SW), light brown (7.5 YR 6/3), dry, non-plastic, 5% gravel	PID = 0.0 ppm
340					WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 5/4), dry, non-plastic	PID = 0.1 ppm
350					same as above	PID = 0.1 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 7 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
360					WELL GRADED SAND (SW), light brown (7.5 YR 6/3), moist, non-plastic	PID = 0.0 ppm
370					WELL GRADED SAND WITH GRAVEL (SW), light brown (7.5 YR 6/3), moist, non-plastic	PID = 0.0 ppm
380					same as above	PID = 0.0 ppm
390					same as above	PID = 0.0 ppm
400	X	1.5 full		7-19-21	WELL GRADED SAND (SW), light brown (7.5 YR 6/3), moist, non-plastic	start of split spoon sampling PID = 0.0 ppm
410	X	1.5 full		9-15-17	WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 5/4), dry, non-plastic	PID = 0.1 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 8 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
420	X	1.5 full		8-12-12	WELL GRADED GRAVEL WITH SAND (GW), brown (7.5 YR 5/3), dry, non-plastic	PID = 0.9 ppm
430	X	1.5 full		3-7-7	WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 5/3), dry, non-plastic	PID = 0.7 ppm
440	X	1.5 full		7-7-9	WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 5/3), dry, low plasticity, clay nodules	PID = 0.3 ppm
450	X	1.5 full		21-38-50	LEAN CLAY (CL), light brown (7.5 YR 6/3), dry, medium plasticity	PID = 0.2 ppm
460					WELL GRADED SAND (SW), brown (7.5 YR 4/4), moist, non-plastic	start of 05/17/2006 PID = 0.0 ppm
470	X	1.5 full			WELL GRADED SAND WITH SILT (SW-SM), brown (7.5 YR 5/3), moist, low plasticity	PID = 0.6 ppm

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 9 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
480					WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM), brown (7.5 YR 5/4), moist, low plasticity	PID = 0.4 ppm
490					WELL GRADED GRAVEL WITH SAND (GW), brown (7.5 YR 4/4), moist, non-plastic	PID = 0.5 ppm
500	X	1.5 full		7-7-8	WELL GRADED SAND (SW), brown (7.5 YR 5/2), wet, non-plastic	start of 5/18/2006 PID = 0.3 ppm * water sample attempt- bailer came up muddy at tip with no water
510					WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), brown (7.5 YR 5/2), wet, low plasticity	PID = 0.5 ppm water sample: ST105-GW-0523-510 collected at 09:15 on 5/18/2006 analysis: Nitrate EPA 300.0
520	X	1.5 full		3-3-5	WELL GRADED SAND (SW), brown (7.5 YR 5/2), wet, non-plastic, 20 ft sand heave	PID = 0.3 ppm water sample: ST105-GW-0523-520 collected at 10:35 on 5/18/2006 analysis: Nitrate EPA 300.0
530					WELL GRADED SAND WITH SILT (SW-SM), brown (7.5 YR 5/4), wet, low plasticity	PID = 0.2 ppm * sticky, silty sand at 525', brief gravel layer more sticky, siltly sand then 530' material

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 10 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
540	X	0.5 partial		no count too wet, driller cannot feel the penetration	WELL GRADED SAND (SW), brown (7.5 YR 5/2), wet- more water in split spoon than sand, non-plastic, 30 ft sand heave *sampler sent twice-little sand recovery, mostly water both times	PID = 2.2 ppm water samples: ST105-GW-0523-540 & ST105-GW-0523-540DUP collected at 14:20 on 5/18/2006 analysis: Nitrate EPA 300.0
550					WELL GRADED GRAVEL WITH SAND (GW), brown (7.5 YR 5/4), wet, non-plastic	PID = 0.7 ppm
560	X	0.5 partial		no count too wet, driller cannot feel the penetration	WELL GRADED SAND (SW), brown (7.5 YR 5/2), wet- more water in split spoon than sand, non-plastic, 40 ft sand heave *sampler sent twice-little sand recovery, mostly water both times	PID = 0.5 ppm water sample: ST105-GW-0523-560 collected at 16:45 on 5/18/2006 analysis: Nitrate EPA 300.0 (see note below)
570					WELL GRADED GRAVELWITH SAND (GW), dark brown (7.5 YR 3/2), wet, non-plastic	start of 5/19/2006 PID= 0.4 ppm
580	X	1 partial		no count too wet, driller cannot feel the penetration	WELL GRADED SAND WITH SILT (SW-SM), brown (7.5 YR 5/4), wet, low plasticity, 25 ft sand heave	PID = 0.2 ppm water sample: ST105-GW-0523-580 collected at 09:45 on 5/19/2006 analysis: Nitrate EPA 300.0 *driller indicates hole is producing 120' worth of cuttings & water for every 20' drilled
590					WELL GRADED SAND WITH SILT (SW-SM), brown (7.5 YR 5/4), wet, low plasticity	PID = 0.3 ppm *NOTE: bailer sample ST105-GW-0523-560 has high sand content. Groundwater produced from split spoon sample was collected as sample ST105-GW-0523-560A, as an alternate to the bailer. To be analyzed only if the bailer sample has too much sand for analysis

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 11 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
600	X	1 partial		no count too wet, driller cannot feel the penetration	WELL GRADED SAND WITH SILT (SW-SM), brown (7.5 YR 4/3), wet, low plasticity, 20 ft sand heave	water sample: ST105-GW-0523-600 collected at 09:45 on 5/19/2006 analysis: Nitrate EPA 300.0 Cable break, recover split spoon on 5/23/06 PID = 0.5 ppm
610					WELL GRADED SAND WITH SILT (SW-SM), dark brown (7.5 YR 4/2), wet, low plasticity	start of 5/24/2006 PID = 0.6 ppm *at 612'- same as 590', finer grained, less water than 590'
620	X	1.5 full		20 total	WELL GRADED SAND WITH SILT (SW-SM), brown (7.5 YR 4/3), wet, low plasticity, 50 ft sand heave	PID = 0.8 ppm water sample: ST105-GW-0523-620 collected at 09:55 on 5/24/2006 analysis: Nitrate EPA 300.0
630					WELL GRADED SAND (SW), brown (7.5 YR 4/3), wet, non-plastic	PID = 0.9 ppm *sand with gravel at ~635'
640	X	1 partial		no count too wet, driller cannot feel the penetration	WELL GRADED SAND (SW), brown (7.5 YR 4/3), wet, non-plastic	PID = 1.7 ppm water sample: ST105-GW-0523-640 collected at 13:00 on 5/24/2006 analysis: Nitrate EPA 300.0
650					WELL GRADED SAND WITH SILT (SW-SM), brown (7.5 YR 4/3), wet, low plasticity	PID = 0.2 ppm *round pieces of clay in cuttings at ~655'

CH2MHILL	PROJECT NUMBER 162708.02.NA.FI	BORING NUMBER KAFB-0523	SHEET 12 OF 12

SOIL BORING LOG

PROJECT: ST-105 LOCATION: NW of former sewage lagoons

ELEVATION: 5347.84' NAVD88 COORDINATES: 1544419.8286 ft E, 1471079.8281 ft N, New Mexico State Plane, Central Zone, NAD 83 datum

DRILLING METHOD AND EQUIPMENT USED: Air Rotary Casing Hammer DRILLING CONTRACTOR: WDC Exploration & Wells

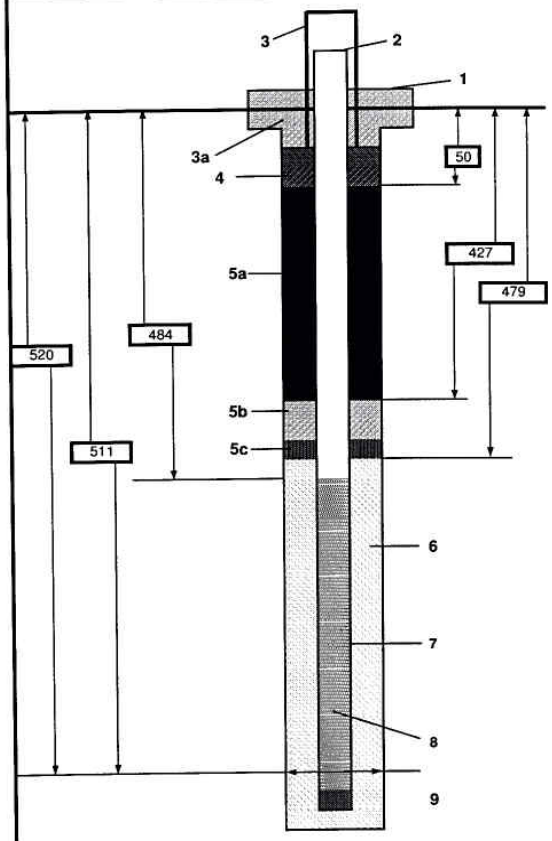
WATER LEVEL: 492 ft bgs START: 05/15/2006 END: 5/25/2006 LOGGER: M. Brislen

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
660	X	1 partial		no count too wet, driller cannot feel the penetration	WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 5/4), wet, non-plastic	PID = 0.7 ppm water sample: ST105-GW-0523-660 collected at 16:50 on 5/24/2006 analysis: Nitrate EPA 300.0
670					WELL GRADED SAND (SW), brown (7.5 YR 5/4), wet, non-plastic	start of 5/25/2006 PID = 0.3 ppm
680	X	1 partial		no count too wet, driller cannot feel the penetration	WELL GRADED SAND (SW), brown (7.5 YR 4/3), wet, non-plastic	PID = 0.8 ppm water sample: ST105-GW-0523-680 collected at 10:20 on 5/25/2006 analysis: Nitrate EPA 300.0
690					WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 4/3), wet, non-plastic	PID = 1.0 ppm
700	X	1 partial		no count too wet, driller cannot feel the penetration	SILT WITH SAND (ML), brown (7.5 YR 4/3), wet, low plasticity	PID = 0.7 ppm water sample: ST105-GW-0523-700 collected at 14:25 on 5/25/2006 analysis: Nitrate EPA 300.0

PROJECT NUMBER	WELL NUMBER	
396060075	KAFB-0524	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT NAME: DO75 CMI Nitrate	WELL COMPLETION DATE: 10/31/2006
DRILLING CONTRACTOR: WDC Inc.	EASTING (X):401917.81
DRILLING METHOD/EQUIP: Air Rotary, STAR 50K CH	NORTHING (Y):1470541.56
DRILLING START DATE: 10/19/06	BOREHOLE DEPTH: 520'
LOGGER : C.Timm	CASING DEPTH: 511'



Borehole diameter
11 3/4" 0 - 300
9 5/8" 300 - 520

Diagram is not to scale

1- Concrete slab elevation	5340.74
2- Top of casing elevation	5342.94
3- Wellhead protection cover type	Steel Stove Pipe
a) Concrete pad dimensions	3'x3'
4- Surface Seal	
a) Grout mix used	Cement/Bentonite Slurry (0 - 50ft)
b) Method of placement	Tremie
5- Type of seal	a. Bentonite Slurry (50 - 427ft)
	b. Bentonite Chips (427 - 477ft)
	c. Sugar Sand (477 - 479ft)
6- Type screen filter	10/20 Silica Sand (479 - 520ft)
7- Diameter/type of well casing	4' Schedule 80 PVC (0 - 484ft)
8- Type/slot size of screen	0.10 Slot Sch. 80 PVC (484 - 509ft)
9- Sump	2' Sump (509 - 511ft)
Development method	air lift/swab/bail/pump
Development time	~ 4 hours
Purged volume	305 gallons

AR 3184

3184

amec

Field Boring Log

Facility/Project Name	Kirtland Air Force Base - DO75 CMI Drilling	Boring No.	KAFB-0524
Location	Approx., 0.7 miles W of Hardin/Southgate S of Southgate	Project No.	376060075

Drilling Co	WDC Exploration & Wells	Northing: 1,470,541.56	Easting: 401,917.81
Driller's Name	Quentin Stevens		
Drill Rig	Star 50K	Ground Surface Elevation (ft):	5,340.74
Drill Method	Air Rotary	Measuring Point elevation (ft): (top of PVC casing)	5,342.94
Logged By	Chris Timm	Borehole Diameter:	9 5/8"; 11 3/4"
Water Level Below TOC (ft):	487.5 Date Measured: 11/30/06	Borehole Depth:	520' below ground surface

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
0	0	25	75	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5YR 5/4 Brown Hand Auger Sample ST105-SS-0524-000002-01 collected from 0 - 2' bgs
5	0	30	70	NA	Cuttings		ML	SLSD	Very fine sandy silt with very minor gravel, 7.5YR 7/4 Pink Hand Auger Sample ST105-SB-0524-005007-01 collected from 5 - 7' bgs
10	0	20	80	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5YR 7/3 Pink Sample ST105-SB-0524-010012-01 collected from 10 - 12' bgs
15	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5YR 6/4 Light Brown
20	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5YR 6/4 Light Brown
25	0	75	25	NA	Cuttings		SW	SLSD	Very fine silty sand well sorted 7.5YR 6/4 Light Brown Sample ST105-SB-0524-025027-01 collected from 25 - 27' bgs
30	0	40	60	NA	Cuttings		ML	SLSD	Very fine sandy silt 7.5YR 5/3 Brown
35	0	70	30	NA	Cuttings		SP/SC	SDSL	Medium grained silty sand (poorly sorted) 7.5YR 5/3 Brown
40	0	20	80	NA	Cuttings		ML	SLSD	Very fine grained sandy silt 7.5YR 6/3 Light Brown
45	0	20	80	NA	Cuttings		ML	SLSD	Very fine grained sandy silt 7.5YR 6/3 Light Brown
50	0	20	80	NA	Cuttings		ML	SLSD	Very fine sandy silty 7.5 YR 5/4 Light Brown Sample ST105-SB-0524-050052-01 collected from 50 - 52' bgs

AR 3184

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Field Boring Log

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
55	0	20	80	NA	Cuttings		ML	SLSD	Very fine sandy silty 7.5 YR 5/4 Light Brown
60	0	10	90	NA	Cuttings		ML	SLSD	Medium to fine sandy silt (poorly sorted), 7.5 YR 6/3 Light Brown
65	0	10	90	NA	Cuttings		SP	SLSD	Medium to fine silty sand (poorly sorted), 7.5 YR 6/3 Light Brown
70	0	60	40	NA	Cuttings		SP	SLSD	Coarse silty sand (porly sorted), 7.5 YR 6/3 Light Brown
75	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5 YR 6/4 Light Brown
80	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5 YR 6/4 Light Brown
85	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5 YR 6/4 Light Brown
90	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt (well sorted), 7.5 YR 7/4 Pink
95	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt (well sorted), 7.5 YR 5/3 Brown
100	0	90	10	NA	Cuttings		SW	SDSL	Fine silty sand - well sorted, 7.5YR 6/2 Pinkish Gray Sample ST105-SB-0524-100102-01 collected from 100 - 102' bgs
105	0	90	10	NA	Cuttings		SP/SC	SDFN	Fine silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
110	0	90	10	NA	Cuttings		SP/SC	SDSL	Fine silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
115	0	90	10	NA	Cuttings		SP/SC	SDSL	Fine grained silty sand - well sorted, 7.5 YR 6/4 Light Brown

amec

Field Boring Log

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
120	0	80	20	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5YR 5/3 Light Brown
125	0	80	20	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5YR 5/4 Light Brown
130	0	90	10	NA	Cuttings		SW	SDFN	Very fine silty sand - well sorted, 7.5 YR 6/3 Light Brown
135	0	90	10	NA	Cuttings		SW	SDFN	Very fine silty sand - well sorted, 7.5 YR 6/3 Light Brown
140	0	70	30	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
145	0	70	30	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
150	0	70	30	NA	Cuttings		SW	SDFN	Very fine silty sand, 7.5 YR 6/2 Pinkish Gray Sample ST105-SB-0524-150152-01 collected from 150 - 152' bgs
155	0	80	20	NA	Cuttings		SW	SDFN	Fine grained silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
160	0	80	20	NA	Cuttings		SW	SDFN	Fine grained silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
165	0	70	30	NA	Cuttings		SP	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 6/2 Pinkish Gray
170	5	90	10	NA	Cuttings		SW	SDFN	Fine grained silty sand with very minor gravel (subangular) - well sorted, 7.5YR 6/3 Light Brown
175	0	90	10	NA	Cuttings		SW	SDFN	Very fine grained silty sand - well sorted, 7.5YR 6/3 Light Brown
180	0	90	10	NA	Cuttings		SW	SDFN	Very fine grained silty sand - well sorted, 7.5YR 6/3 Light Brown

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
185	0	90	10	NA	Cuttings		SW	SDFN	Fine grained silty sand - well sorted, 7.5YR 6/3 Light Brown
190	0	80	20	NA	Cuttings		SW	SDSL	Medium to fine grained silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
195	0	80	20	NA	Cuttings		SW	SDSL	Medium to fine grained silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
200	0	90	10	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5YR 6/2 Pinkish Gray Sample ST105-SB-0524-200202-01 collected from 200 - 202' bgs
205	0	90	10	NA	Cuttings		SP	SDFN	Medium to fine silty sand - poorly sorted, 7.5YR 5/2 Brown
210	0	90	10	NA	Cuttings		SP	SDFN	Medium to fine silty sand - poorly sorted, 7.5YR 5/2 Brown
215	0	90	10	NA	Cuttings		SP	SDFN	Medium to fine silty sand - poorly sorted, 7.5YR 5/2 Brown
220	0	90	10	NA	Cuttings		SP	SDFN	Medium to fine silty sand - poorly sorted, 7.5YR 5/2 Brown
225	0	90	10	NA	Cuttings		SP	SDFN	Medium to fine silty sand - poorly sorted, 7.5YR 5/2 Brown
230	0	70	30	NA	Cuttings		SW	SDSL	Medium to coarse grained silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
235	0	80	20	NA	Cuttings		SW	SDFN	Medium to fine grained silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
240	0	80	20	NA	Cuttings		SW	SDFN	Medium to fine grained silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
245	0	80	20	NA	Cuttings		SW	SDFN	Medium to fine grained silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
250	5	70	25	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand with minor gravel - poorly sorted, 7.5YR 6/1 Gray Sample ST105-SB-0524-250252-01 collected from 250 - 252' bgs
255	0	70	30	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 6/2 Pinkish Gray
260	0	70	30	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 6/2 Pinkish Gray
265	0	60	40	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
270	0	40	60	NA	Cuttings		ML	SLSD	Very Fine sandy silt - well sorted, 7.5YR 6/2 Pinkish Gray
275	0	40	60	NA	Cuttings		ML	SLSD	Very Fine sandy silt - well sorted, 7.5YR 6/3 Light Brown
280	0	60	40	NA	Cuttings		SW	SDSL	Fine silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
285	0	60	40	NA	Cuttings		SW	SDSL	Fine silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
290	0	30	70	NA	Cuttings		ML	SLSD	Very fine grained sandy silt, well sorted, 7.5YR 5/3 Brown
295	0	80	20	NA	Cuttings		SW	SDSL	Medium grained silty sand - well sorted, 7.5 YR 5/2 Brown
300	0	80	20	NA	Cuttings		SW	SDSL	Medium to coarse grained silty sand - well sorted, 7.5 YR 5/2 Brown Sample ST105-SB-0524-300302-01 collected from 300 - 302' bgs
305	5	75	20	NA	Cuttings		SP/SC	SDSL	Medium to coarse grained silty sand with gravel (less than above) - poorly sorted, subrounded, 7.5 YR 5/2 Brown
310	0	80	20	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 5/2 Brown

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
315	0	80	20	NA	Cuttings		SW	SDSL	Fine grained silty sand - well sorted, 7.5YR 5/2 Brown
320	40	30	30	NA	Cuttings		SW/GP	SDGR	Silty sandy gravel - poorly sorted, subrounded, 7.5YR 6/2 Pinkish Gray
325	40	30	30	NA	Cuttings		SW/GP	SDGR	Silty sandy gravel - poorly sorted, subrounded, 7.5YR 6/2 Pinkish Gray
330	0	80	20	NA	Cuttings		SW	SDFN	Medium grained silty sand - well sorted, 7.5 YR 5/2 Brown
335	0	30	70	NA	Cuttings		SW	SDSL	Very fine silty sand, well sorted, 7.5YR 7/3 Pink
340	0	60	40	NA	Cuttings		SW	SDSL	Medium grained silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
345	0	70	30	NA	Cuttings		SW	SDSL	Medium grained silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
350	0	70	30	NA	Cuttings		SW	SDSL	Medium grained silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray Sample ST105-SB-0524-350352-01 collected from 350 -352' bgs
355	15	60	25	NA	Cuttings		SP/GP	SDGR	Medium to coarse grained silty sand with gravel, poorly sorted, subrounded, 7.5YR 6/3 Light Brown
360	0	90	10	NA	Cuttings		SP	SDSL	Medium to coarse grained silty sand, poorly sorted, 7.5YR 6/3 Light Brown
365	40	30	30	NA	Cuttings		SW/GP	SDGR	Silty sandy gravel - poorly sorted, subrounded, 7.5YR 6/3 Light Brown
370	0	90	10	NA	Cuttings		SW	SDSL	Medium to fine grained silty sand - well sorted - moist, 7.5 YR 6/2 Pinkish Gray
375	40	30	30	NA	Cuttings		SW/GP	SDGR	Silty sandy gravel - poorly sorted, subrounded, 7.5YR 6/3 Light Brown

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
380	0	90	10	NA	Cuttings		SW	SDSL	Medium grained silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
385	0	90	10	NA	Cuttings		SW	SDSL	Medium grained silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
390	0	90	10	NA	Cuttings		SW	SDSL	Medium grained silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
395	0	70	30	NA	Cuttings		SW	SDCL	Medium to fine silty sand - poorly sorted, 7.5YR 6/2 Pinkish Gray
400	0	70	30	NA	Cuttings		SW	SDCL	Medium to fine silty sand - poorly sorted, 7.5YR 6/2 Pinkish Gray Sample ST105-SB-0524-400402-01 collectde from 400 - 402' bgs
405	0	90	10	NA	Cuttings		SW	SDSL	Medium to fine grained silty sand - well sorted, 7.5YR 6/3 Light Brown
410	0	90	10	NA	Cuttings		SW	SDSL	Medium to fine grained silty sand - well sorted, 7.5YR 6/3 Light Brown
415	0	90	10	NA	Cuttings		SW	SDSL	Medium to fine grained silty sand - well sorted, 7.5YR 6/3 Light Brown
420	0	80	20	NA	Cuttings		SW	SDSL	Fine grained silty sand - well sorted, 7.5YR 6/3 Light Brown
425	0	80	20	NA	Cuttings		SW	SDSL	Fine grained silty sand - well sorted, 7.5YR 6/3 Light Brown
430	0	80	20	NA	Cuttings		SW	SDSL	Fine grained silty sand - well sorted, 7.5YR 6/3 Light Brown
435	0	80	20	NA	Cuttings		SW	SDSL	Fine grained silty sand - well sorted, 7.5YR 6/3 Light Brown
440	10	70	20	NA	Cuttings		SP	SPGR	Medium to fine grained silty sand with gravel - poorly sorted, subangular, 7.5YR 6/2 Pinkish Gray

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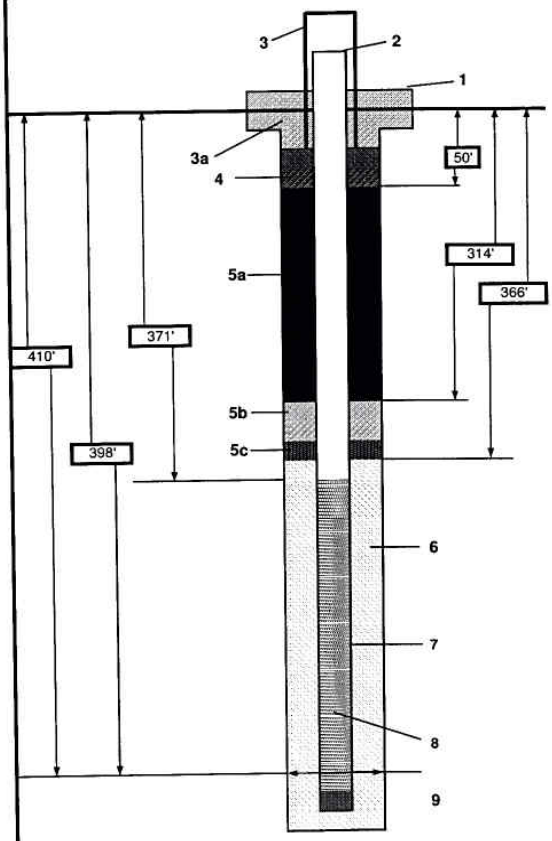
Field Boring Log

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
445	40	30	30	NA	Cuttings		SP/GP	SPGR	Silty sandy gravel - poorly sorted, subrounded, 7.5YR 6/2 Pinkish Gray
450	0	80	20		Cuttings		SW	SDSL	Fine grained silty sand - well sorted. 7.5YR 6/2 Pinkish Gray Sample ST-105-SB-0524-450452-01/99/MS/MSD collected from 450 -452' bgs
455	0	80	20		Cuttings		SW	SDSL	Very fine grained silty sand - well sorted, 7.5YR 5/3 Brown
460	0	80	20		Cuttings		SW	SDSL	Very fine grained silty sand - well sorted, 7.5YR 5/3 Brown
465	0	90	10		Cuttings		SW	SDSL	Fine grained silty sand - well sorted. 7.5YR 6/2 Pinkish Gray
470	0	90	10		Cuttings		SW	SDSL	Medium to fine grained silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
475	5	85	10		Cuttings		SP	SDSL	Medium to fine grained silty sand with minor gravel - poorly sorted, 7.5YR 6/2 Pinkish Gray
480	0	80	20		Cuttings		SW	SDSL	Medium grained silty sand - well sorted, 7.5YR 5/2 Brown
485	5	75	20		Cuttings		SP	SDSL	Medium grained silty sand with minor gravel - poorly sorted - moist, 7.5YR 5/2 Brown
490	0	90	10		Cuttings		SW	SDSL	Medium grained silty sand - well sorted - moist, 7.5YR 4/2 Brown
495	0	90	10		Cuttings		SW		Medium to coarse grained silty sand - well sorted - wet, 7.5YR 4/2 Brown
500	0	90	10		Cuttings		SW	SDSL	Medium to coarse grained silty sand - well sorted - wet, 7.5YR 4/2 Brown Sample ST-105-SB-0524-500502-01 collected from 500 -502' bgs
505					Cuttings				Borehole TD at 510 - no cuttings returned.

PROJECT NUMBER	WELL NUMBER	
396060075	KAFB-0525	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT NAME: DO75 CMI Nitrate	WELL COMPLETION DATE: 11/19/2006
DRILLING CONTRACTOR: WDC Inc.	EASTING (X):405444.28
DRILLING METHOD/EQUIP: Air Rotary, STAR 50K CH	NORTHING (Y):1465868.32
DRILLING START DATE: 11/01/06	BOREHOLE DEPTH: 410'
LOGGER: C.Timm	CASING DEPTH: 398'



Borehole diameter
11 3/4" 0 - 300
9 5/8" 300 - 410

Diagram is not to scale

1- Concrete slab elevation		5225.26
2- Top of casing elevation		5227.08
3- Wellhead protection cover type		Steel Stove Pipe
a) Concrete pad dimensions		3'x3'
4- Surface Seal		
a) Grout mix used		Cement/Bentonite Slurry (0 - 50ft)
b) Method of placement		Tremie
5- Type of seal	a.	Bentonite Slurry (50 - 314ft)
	b.	Bentonite Chips (314 - 364ft)
	c.	Sugar Sand (364 - 366ft)
6- Type screen filter		10/20 Silica Sand (366 - 410)
7- Diameter/type of well casing		4" Schedule 80 PVC (0 - 371ft)
8- Type/slot size of screen		0.10 Slot Sch. 80 PVC (371 - 396ft)
9- Sump		2' Sump (396 - 398ft)
Development method		air lift/swab/bail/pump
Development time		~3.5 hours
Purged volume		350 gallons

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Field Boring Log

Facility/Project Name	Kirtland Air Force Base - DO75 CMI Drilling	Boring No.	KAFB-0525
Location	NE of Haul Road and Tijeras Arroyoy (S of LF-07)	Project No.	376060075

Drilling Co	WDC Exploration & Wells	Northing: 1,465,868.32	Easting: 405,444.28
Driller's Name	Quentin Stevens		
Drill Rig	Star 50K	Ground Surface Elevation (ft):	5,227.08
Drill Method	Air Rotary	Measuring Point elevation (ft): (top of PVC casing)	5,225.26
Logged By	Chris Timm	Borehole Diameter:	9 5/8"; 11 3/4"
Water Level Below TOC (ft):	366.7 Date Measured: 11/30/06	Borehole Depth:	410' below ground surface

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
0	0	25	75	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5YR 5/3 Brown Hand Auger Sample ST105-SS-0525-000002-01 collected from 0 - 2' bgs
5	0	30	70	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5YR 5/3 Brown Hand Auger Sample ST105-SB-0525-005007-01 collected from 5 - 7' bgs
10	0	20	80	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5YR 5/2 Brown Sample ST105-SB-0525-010012-01 collected from 10 - 12' bgs
15	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt, 7.5YR 5/3 Brown
20	5	25	70	NA	Cuttings		ML	SLSD	Very fine sandy silt with minor subangular gravel 7.5YR 5/3 Brown
25	5	25	70	NA	Cuttings		ML	SLSD	Very fine sandy silt with minor (more than above) subangular gravel 7.5YR 5/3 Brown Sample ST105-SB-0525-025027-01/99/MS/MSD collected from 25 - 27' bgs
30	10	40	50	NA	Cuttings		ML	SLSD	Very fine sandy silt with minor (more than above) subangular gravel 7.5YR 5/3 Brown
35	0	70	30	NA	Cuttings		SP/SC	SDSL	Medium grained silty sand (poorly sorted) 7.5YR 5/3 Brown
40	0	20	80	NA	Cuttings		ML	SLSD	Medium to fine grained sandy silt (poorly sorted) 7.5YR 6/3 Light Brown
45	0	20	80	NA	Cuttings		ML	SLSD	Medium to fine grained sandy silt (poorly sorted) 7.5YR 6/3 Light Brown
50	0	20	80	NA	Cuttings		ML	SLSD	Very fine sandy silty with very minor (,1%) gravel 7.5 YR 6/3 Light Brown Sample ST105-SB-0525-050052-01 collected from 50 - 52' bgs

AR 3184

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
55	0	70	30	NA	Cuttings		ML	SLSD	Very fine sandy silt (well sorted), 7.5 YR 6/4 Light Brown
60	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt (well sorted), 7.5 YR 7/4 Pink
65	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt (well sorted), 7.5 YR 6/4 Light Brown
70	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt (well sorted), 7.5 YR 6/4 Light Brown
75	0	10	90	NA	Cuttings		ML	SLSD	Fine sandy silt, 7.5 YR 5/4 Brown
80	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt with minor clay , poorly sorted, 7.5 YR 5/3 Brown
85	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt with no clay , poorly sorted, 7.5 YR 5/4 Brown
90	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt (well sorted), 7.5 YR 5/3 Brown
95	0	10	90	NA	Cuttings		ML	SLSD	Very fine sandy silt (well sorted), 7.5 YR 5/3 Brown
100	5	75	20	NA	Cuttings		SP/SC	SDSL	Medium to coarse grained silty sand with minor gravel (poorly sorted), 7.5 YR 5/3 Brown Sample ST105-SB-0525-100102-01 collected from 100 - 102' bgs
105	0	10	90	NA	Cuttings		SP/SC	SDFN	Fine silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
110	0	10	90	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
115	0	10	90	NA	Cuttings		SP/SC	SDSL	Medium to coarse grained silty sand - well sorted, 7.5 YR 5/2

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
120	0	80	20	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
125	0	80	20	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5YR 6/2 Pinkish Gray
130	0	10	90	NA	Cuttings		ML	SDFN	Very fine sandy silt - well sorted, 7.5 YR 6/3 Light Brown
135	0	30	70	NA	Cuttings		ML	SDFN	Fine sandy silt - well sorted, 7.5 YR 6/3 Light Brown
140	0	30	70	NA	Cuttings		ML	SDFN	Fine sandy silt - well sorted, 7.5 YR 6/3 Light Brown
145	0	30	70	NA	Cuttings		ML	SDFN	Fine sandy silt - well sorted, 7.5 YR 6/3 Light Brown
150	0	30	70	NA	Cuttings		ML	SDFN	Very fine sandy silt with minor clay, 7.5 YR 5/4 Brown Sample ST105-SB-0525-150152-01 collected from 150 - 152' bgs
155	0	60	40	NA	Cuttings		SW	SDSL	Medium to fine grained silty sand - well sorted, 7.5YR 5/2 Brown
160	0	70	30	NA	Cuttings		SP	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 6/2 Pinkish Gray
165	0	70	30	NA	Cuttings		SP	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 6/2 Pinkish Gray
170	5	70	25	NA	Cuttings		SP	SDSL	Medium to coarse grained silty sand with minor gravel (subangular) - poorly sorted, 7.5YR 6/2 Pinkish Gray
175	10	70	20	NA	Cuttings		SP	SDCR	Coarse silty sand with minor gravel - poorly sorted - subangular, 7.5YR 5/2 Brown
180	5	70	25	NA	Cuttings		SP	SDCR	Medium to coarse grained silty sand with minor gravel (subangular) - poorly sorted, 7.5YR 6/2 Pinkish Gray

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
185	0	70	30	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 6/2 Pinkish Gray
190	10	80	10	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand with gravel - poorly sorted - subangular, 7.5YR 6/2 Pinkish Gray
195	0	80	20	NA	Cuttings		SW	SDFN	Very fine silt sand - well sorted, 7.5YR 6/2 Pinkish Gray
200	0	90	10	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5YR 6/1 Gray Sample ST105-SB-0525-200202-01 collected from 200 - 202' bgs
205	0	90	10	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5YR 5/2 Brown
210	0	90	10	NA	Cuttings		SW	SDFN	Very fine silt sand - well sorted, 7.5YR 6/2 Pinkish Gray
215	0	80	20	NA	Cuttings		SW	SDSL	Medium to fine grained silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
220	0	70	30	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5YR 5/2 Brown
225	0	80	20	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
230	0	70	30	NA	Cuttings		SW	SDFN	Very fine silty sand - well sorted, 7.5 YR 6/3 Light Brown
235	0	80	20	NA	Cuttings		SW	SDFN	Medium to fine grained silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
240	0	60	40	NA	Cuttings		SW	SDFN	Very fine silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
245	0	70	30	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 6/1 Gray

Depth (feet)	Grain Size % Gravel	% Sand	% Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
250	5	70	25	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand with minor gravel - poorly sorted, 7.5YR 6/1 Gray Sample ST105-SB-0525-250252-01 collected from 250 - 252' bgs
255	0	70	30	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 5/3 Brown
260	10	60	30	NA	Cuttings		SP/SC	SDCR	Coarse silty sand with gravel - poorly sorted, subrounded, 7.5YR 6/2 Pinkish Gray
265	10	50	40	NA	Cuttings		SP/SC	SDSL	Fine to medium coarse (less coarse than above) silty sand with gravel - poorly sorted, subrounded, 7.5 YR 6/2 Pinkish Gray
270	10	70	30	NA	Cuttings		SP/SC	SDCR	Coarse silty sand with gravel - poorly sorted, subrounded, 7.5YR 5/2 Brown
275	0	80	20	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5 YR 5/2 Brown
280	10	50	40	NA	Cuttings		SP/SC	SDSL	Medium to coarse silty sand with gravel - poorly sorted, subrounded, 7.5 YR 5/2 Brown
285	0	90	10	NA	Cuttings		SW	SDFN	Fine grained silty sand - well sorted, 7.5 YR 5/2 Brown
290	0	90	10	NA	Cuttings		SW	SDSL	Medium grained silty sand - well sorted, 7.5 YR 6/2 Pinkish Brown
295	5	75	20	NA	Cuttings		SP/SC	SDSL	Medium grained silty sand with gravel - poorly sorted, subrounded, 7.5 YR 5/2 Brown
300	20	60	20	NA	Cuttings		SP/SC	SDCR	Medium to coarse grained silty sand with gravel - poorly sorted, subrounded, 7.5 YR 5/2 Brown Sample ST105-SB-0525-300302-01/99 collected from 300 - 302' bgs
305	5	75	20	NA	Cuttings		SP/SC	SDSL	Medium to coarse grained silty sand with gravel (less than above) - poorly sorted, subrounded, 7.5 YR 5/2 Brown
310	0	80	20	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 5/2 Brown

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Field Boring Log

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
315	0	80	20	NA	Cuttings		SP/SC	SDSL	Medium to fine grained silty sand - poorly sorted, 7.5YR 5/2 Brown
320	5	75	20	NA	Cuttings		SP/SC	SDSL	Medium to coarse grained silty sand with minor gravel - poorly sorted, subrounded, 7.5 YR 6/2 Pinkish Gray
325	0	80	20	NA	Cuttings		SW	SDFN	Very fine silty sand - well sorted - no gravel, 7.5 YR 6/2 Pinkish Gray
330	0	80	20	NA	Cuttings		SW	SDFN	Fine silty sand - well sorted, 7.5 YR 6/2 Pinkish Gray
335	20	60	20	NA	Cuttings		SP/SC	SDSL	Medium grained silty sand with gravel - poorly sorted, subrounded, 7.5 YR 6/2 Pinkish Gray
340	20	60	20	NA	Cuttings		SP/SC	SDSL	Medium grained silty sand with gravel - poorly sorted, subrounded, 7.5 YR 6/2 Pinkish Gray
345	20	60	20	NA	Cuttings		SP/SC	SDSL	Medium grained silty sand with gravel - poorly sorted, subrounded, 7.5 YR 6/2 Pinkish Gray
350	10	80	10	NA	Cuttings		SP/SC	SDSL	Medium grained silty sand with minor gravel - poorly sorted, subrounded, 7.5 YR 6/2 Pinkish Gray Sample ST105-SB-0525-350352-01 collected from 350 - 352' bgs
355	0	90	10	NA	Cuttings		SW	SDSL	Fine grained silty sand - well sorted, 7.5 YR 6/3 Light Brown
360	0	90	10	NA	Cuttings		SW	SDSL	Fine grained silty sand - well sorted - slightly moist - 7.5 YR 6/3 Light Brown
365	0	90	10	NA	Cuttings		SW	SDSL	Fine grained silty sand - well sorted - moist, 7.5 YR 5/3 Brown
370	0	90	10	NA	Cuttings		SW	SDSL	Fine grained silty sand - well sorted - moist, 7.5 YR 5/3 Brown
375	0	80	20	NA	Cuttings		SW	SDSL	Fine silty sand - well sorted - moist, 7.5 YR 6/3 Light Brown

amec

Field Boring Log

Depth (feet)	Grain Size % Gravel	Grain Size % Sand	Grain Size % Fines	Blows (6 inches)	Sample Type	Sample Recovery	USCS/ASTM Classification	Lith. Code (ERPIMS)	Lithologic Description
380	10	60	30	NA	Cuttings		SP/SC	SDCR	Very coarse silty sand with minor gravel - poorly sorted, subrounded - wet, 7.5YR 5/2 Brown
385	0	70	30	NA	Cuttings		SP/SC	SDCR	Coarse silty sand - poorly sorted, subrounded - wet, 7.5YR 5/2 Brown
390	0	70	30	NA	Cuttings		SP/ML	SDCL	Fine silty sand with minor clay - poorly sorted - wet, 7.5YR 5/2 Brown
395	0	70	30	NA	Cuttings		SP/ML	SDCL	Fine silty sand with minor clay - poorly sorted - wet, 7.5YR 5/2 Brown
400	0	40	60	NA	Cuttings		SP/ML	SDCL	Very fine sandy silt with clay - porrly sorted - wet, 7.5YR 5/3 Light
405					Cuttings				No Returns
410					Cuttings				No Returns - Borehole TD at 410' BGS
415					Cuttings				
420					Cuttings				
425					Cuttings				
430					Cuttings				
435					Cuttings				
440					Cuttings				