LOG OF BORING B-1

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1543.2 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			100 (95)	***-white to light gray GYPSUM layer, low hardness, vitreous from 276.6 to 282.4 ft***								
				-hard from 281.5 to 281.9 ft	1260.8							
				Dark bluish-gray SHALE, fresh, low to moderately hard, non-calcareous, w/gypsum and limestone seams and layers. (Jagger Bend/Valera)	282.4	7					141	176(U)
285			100 (77)									
290			100 (70)									
295			100 (87)		1247.2 296.0							
				-white to light gray GYPSUM layer, low hardness, vitreous from 296.0 to 298.0 ft	1245.2 298.0							
				Gray LIMESTONE, slightly weathered, hard, slightly fractured, w/shale seams and layers. (Jagger Bend/Valera)								
300			100 (100)	*-w/numerous micro-vugs from 300.5 to 314.0 ft*								
				-w/multiple healed vertical fractures from 304.4 to 310.0 ft		5					138	149(U)
305			100 (100)									
310			100 (97)	*-gypsum seam (1/4") at 310.2 ft*								
				-w/numerous open vugs (1/8") from 311.6 to 312.4 ft								
315			100 (100)									
				-gypsum seam (1/4") at 318.0 ft								

COMPLETION DEPTH: 350.0 ft DEPTH TO WATER: See Note

DRILL DATE: 06/07/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING B-1

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1543.2 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			100 (68)	Gray LIMESTONE, slightly weathered, hard, slightly fractured, w/shale seams and layers. (Jagger Bend/Valera)								
				-dark gray shale layer from 320.5 to 321.6 ft								
325			100 (52)	*-dark gray shale layer from 326.0 to 331.1 ft*								
330			100 (57)									
335			100 (88)	*-tan and light gray from 335.1 to 336.7 ft*								
				-dark gray shale layer from 336.9 to 338.6 ft		7					138	33(U)
340			100 (95)	*-w/numerous dark gray shale seams from 340.0 to 345.0 ft*								
345			100 (48)	*-dark gray shale layer from 345.8 to 348.4 ft*								
				-grayish-brown below 348.4 ft								
350					1193.2 350.0							
				NOTES: *1) Boring was advanced dry to the 5.5-ft depth and groundwater was not encountered above that depth prior to coring.* *2) GPS coordinates were obtained with handheld GPS Device: N: 33°01'34.50" W: 99°24'08.66".*								
355												

COMPLETION DEPTH: 350.0 ft DEPTH TO WATER: See Note

DRILL DATE: 06/07/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING B-2

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1300 ft± Job No. 04.10013715

DEPTH, FT	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
		11	Dark reddish-brown lean CLAY with sand. CL (Alluvium)	1299.0	14	29	16	100	71		
			Reddish-brown silty SAND, loose. SM (Alluvium)	1.0							
		7									
		7			4	NP	NP	100	44		
5											
		10		1293.0							
			Reddish-brown sandy silty CLAY. CL-ML (Alluvium)	7.0							
		8			9	24	5	100	65		
10											
		32		1286.5							
			Greenish-gray fat CLAY, non-calcareous, carbonaceous, w/light gray silt partings and ferrous staining. CH (Jagger Bend/Valera)	13.5							
15											
		29			22	51	30	99	88		
20											
				1276.0							
			Greenish-gray and tan SHALE, weathered, low hardness, non-calcareous, slightly fissile, w/limestone layers. (Jagger Bend/Valera)	24.0	22					104	2.3(U)
25		73 (23)									
			-tan limestone w/weathered vertical fracture from 29.0 to 30.0 ft	1270.0							
30		92 (72)	Dark bluish-gray SHALE, fresh, low hardness, non-calcareous, w/gypsum and limestone seams and layers. (Jagger Bend/Valera)	30.0							
			-fossiliferous, ferrous-stained, porous limestone from 32.8 to 33.3 ft		5					146	188(U)
			-w/vugs (up to 1/8") from 34.4 to 36.4 ft								
35		92 (25)									
				1262.2							
			-gypsum layer from 37.8 to 38.3 ft	37.8							
			Light bluish-gray SHALE	1261.7							
			(--see next page--)	38.3							

COMPLETION DEPTH: 62.5 ft DEPTH TO WATER: See Note

DRILL DATE: 05/19/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING B-2

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1300 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			95 (63)	Light bluish gray SHALE, fresh, low to moderately hard, non-calcareous, w/gypsum and limestone seams and layers. (Jagger Bend/Valera)								
				-gypsum layer from 41.6 to 42.0 ft								
				-light bluish-gray dolomitic limestone w/multiple vertical fractures and vugs (up to 1/8") from 42.0 to 43.8 ft								
				-w/numerous gypsum seams (up to 1/2") from 42.6 to 44.4 ft		8					138	116(U)
45			82 (8)	*-w/pink gypsum nodules (up to 1/2") from 44.0 to 44.4 ft*								
					1252.2 47.8							
				-white to light gray GYPSUM layer, low hardness, vitreous from 47.8 to 53.4 ft								
50			100 (63)									
						9					131	104(U)
					1246.6 53.4							
				Gray LIMESTONE, slightly weathered, hard, fractured, w/numerous micro-vugs and gypsum seams. (Jagger Bend/Valera)								
55			98 (98)	*-gypsum seam (1/8") at 55.0 ft*								
				-w/multiple healed vertical fractures from 55.2 to 57.7 ft								
				-gypsum seam (1/8") at 56.6 ft								
				-gypsum seam (1/2") at 56.8 ft								
60			87 (87)									
				-pressurized gas at 62.5 ft	1237.5 62.5							
				NOTES:								
				1) Boring was advanced dry to the 24.0-ft depth and groundwater was not encountered above that depth prior to coring.								
				2) Boring terminated at 62.5 ft due to pressurized gas blowout of drilling fluid and intermittent but continuous gas release.								
				3) GPS coordinates were obtained with handheld GPS Device: N: 33°01'21.34" W: 99°24'20.90".								
65												
70												
75												

COMPLETION DEPTH: 62.5 ft DEPTH TO WATER: See Note

DRILL DATE: 05/19/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING B-3

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1470 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			18	Brown and tan sandy lean CLAY, w/limestone fragments. CL (Residual Soil)								
			50/4"		1467.7 2.3							
			100 (63)	Tan and light gray LIMESTONE, moderately weathered, hard, fractured, w/abundant fossil fragments and shale seams and layers. (Bead Mountain)								
				-w/multiple healed vertical fractures from 3.0 to 5.0 ft								
5			93 (30)	*-greenish-gray from 5.7 to 6.2 ft*		2					158	254(U)
				-bluish-gray, tan and pink from 8.6 to 11.6 ft								
10			100 (42)	*-vertical fracture from 11.6 to 12.4 ft*								
15			95 (53)	*-bluish-gray, tan and pink, ferrous-stained from 15.7 to 17.6 ft*		19					105	8.0(U)
20			100 (58)	*-w/numerous shale seams from 18.8 to 19.4 ft [25% drilling fluid loss at 19.5 ft]*								
				-open vug (1.0") at 22.9 ft *-w/open vugs (up to 1/16") from 23.2 to 23.7 ft*								
25			93 (62)	*-tan and bluish-gray from 25.4 to 26.7 ft*								
30			100 (68)	Gray LIMESTONE, slightly weathered, hard, fractured, w/numerous dark gray horizontal discontinuities and shale seams and layers. (Bead Mountain)	1440.0 30.0							
35			98 (90)									

COMPLETION DEPTH: 300.0 ft DEPTH TO WATER: See Note

DRILL DATE: 05/21/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING B-3

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1470 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			100 (73)	Gray LIMESTONE, slightly weathered, hard, fractured, w/numerous dark gray horizontal discontinuities and shale seams and layers. (Bead Mountain)								
				-dark gray shale seam from 43.1 to 43.2 ft								
				-dark gray shale seam from 43.4 to 43.5 ft								
45			100 (77)			2					161	326(U)
50			100 (77)									
				-w/very close horizontal discontinuities from 52.9 to 53.4 ft								
				-tan to brownish-gray from 53.4 to 55.4 ft								
55			97 (93)									
				-bluish-gray shale seam from 57.8 to 58.0 ft								
				-crystalline-coated vug (1.0") at 58.9 ft								
60			97 (82)	*-crystalline-coated vug (0.5") at 59.6 ft*								
				-dark gray shale seam from 60.0 to 60.2 ft								
				-dark gray shale seam (1/4") at 62.2 ft								
				-bioturbated (siltstone infilled) from 63.5 to 68.0 ft								
65			93 (57)			8					138	35(U)
70			100 (93)									
75			100 (100)	*-dark gray shale seam (1/2") at 74.7 ft*								
				-dark gray shale seam from 78.0 to 78.1 ft								
				DOLOMITIC LIMESTONE (--see next page--)	1391.2 78.8							

COMPLETION DEPTH: 300.0 ft DEPTH TO WATER: See Note

DRILL DATE: 05/21/08

U = Unconfined
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LOG OF BORING B-3

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1470 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			98 (42)	Grayish-brown DOLOMITIC LIMESTONE, slightly weathered, hard, slightly fractured, w/numerous micro-vugs and shale seams and layers. (Bead Mountain) *-w/open vugs (up to 1/4") from 80.8 to 81.0 ft* *-w/open vugs (up to 1/4") from 82.1 to 82.5 ft* *-w/multiple healed vertical fractures from 83.6 to 84.0 ft*								
85			92 (58)			8					134	64(U)
				-bluish-gray from 86.6 to 87.2 ft								
				-w/open vugs (up to 1/4") from 88.9 to 89.1 ft	1380.9 89.1							
90			98 (48)	Dark bluish-gray SHALE, fresh, low hardness, non-calcareous, w/limestone seams and layers. (Jagger Bend/Valera)								
95			92 (72)									
				-red, brown and bluish-gray from 97.3 to 98.7 ft								
100			100 (97)									
				-grayish brown, w/micro-vugs from 101.7 to 103.0 ft								
				-w/very close limestone laminations from 104.0 to 106.6 ft								
105			97 (90)			7					142	53(U)
				-grayish-brown dolomitic limestone, w/vugs (up to 1/4") from 108.0 to 108.2 ft								
110			93 (58)	*-light gray fossiliferous limestone from 108.8 to 109.3 ft* *-grayish-brown from 109.3 to 112.4 ft*								
115			100 (93)									
				-red, brown and bluish gray from 116.8 to 121.2 ft								

COMPLETION DEPTH: 300.0 ft DEPTH TO WATER: See Note

DRILL DATE: 05/21/08

U = Unconfined
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T = Torvane

LOG OF BORING B-3

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1470 ft± Job No. 04.10013715

DEPTH, FT	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
		97 (52)	Dark bluish-gray SHALE, fresh, low hardness, non-calcareous, w/limestone seams and layers. (Jagger Bend/Valera)								
125		93 (57)			7					141	94(U)
			Grayish brown to gray DOLOMITIC LIMESTONE, slightly weathered, hard, slightly fractured, w/gypsum and shale seams and layers. (Jagger Bend/Valera)	1343.1 126.9							
			-w/pink gypsum nodules (up to 1/4") at 127.1 ft								
130		98 (55)	*-w/pink gypsum nodules (up to 1/2") from 130.5 to 131.0 ft*								
			-w/pink gypsum nodules (up to 1-1/2") from 132.1 to 132.5 ft								
			-w/multiple healed vertical fractures from 132.4 to 132.6 ft								
135		100 (72)	*-w/numerous gypsum seams (up to 2.0") from 134.5 to 136.0 ft*								
140		100 (73)									
			-w/numerous gypsum seams (up to 1.0") from 142.6 to 143.5 ft								
			-pink, white to light gray GYPSUM layer, low hardness, vitreous from 144.0 to 145.5 ft	1326.0 144.0							
145		100 (87)									
			-gypsum seam from 147.0 to 147.1 ft								
			-w/gypsum nodules (up to 1/2") from 149.0 to 149.6 ft								
150		92 (78)		1318.6 151.4							
			-white to light gray GYPSUM layer, low hardness, vitreous, w/thin shale interbeds from 151.4 to 157.1 ft		7					135	133(U)
155		97 (72)									
			-healed vertical fracture from 157.1 to 157.8 ft	1312.9 157.1							
			Dark bluish-gray SHALE (--see next page--)	1311.2 158.8							

COMPLETION DEPTH: 300.0 ft DEPTH TO WATER: See Note

DRILL DATE: 05/21/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING B-3

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1470 ft± Job No. 04.10013715

DEPTH, FT	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
		100 (27)	Dark bluish-gray SHALE, fresh, low to moderately hard, non-calcareous, w/gypsum and limestone seams and layers. (Jagger Bend/Valera)								
			-w/dolomitic limestone seams from 160.0 to 161.6 ft								
			-red, brown and bluish-gray from 164.0 to 166.7 ft								
165		97 (78)									
			-red, brown and bluish-gray from 168.0 to 170.0 ft								
					6					145	95(U)
170		100 (83)									
			-w/very close limestone laminations from 173.2 to 173.6 ft								
175		100 (85)									
			-red, brown and greenish-gray from 177.7 to 179.1 ft *-gypsum seam (1/16") at 178.2 ft*								
180		97 (80)	*-gypsum seam (1/16") at 179.6 ft*								
			-gypsum seam (1/4") at 182.5 ft								
185		100 (75)	*-gypsum-coated slickensided joint (35°) at 185.8 ft*								
			-pink, white to light gray GYPSUM layer, low hardness, vitreous from 189.2 to 190.1 ft	1280.8 189.2							
190		90 (75)									
			-gypsum seam (1/2") at 192.6 ft *-fossiliferous from 193.4 to 193.6 ft* *-limestone seam (3/4") at 194.2 ft*								
					6					145	33(U)
195		100 (73)	*-limestone seam from 194.7 to 194.9 ft* *-w/numerous limestone seams from 196.1 to 197.3 ft* *-gypsum seam from 197.6 to 197.7 ft*								

COMPLETION DEPTH: 300.0 ft DEPTH TO WATER: See Note

DRILL DATE: 05/21/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING B-3

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1470 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			100 (93)	Dark bluish-gray SHALE, fresh, low to moderately hard, non-calcareous, w/gypsum and limestone seams and layers. (Jagger Bend/Valera) *-gypsum seam (1/2") at 201.1 ft* *-gypsum seam (1/2") at 201.5 ft*	1267.3 202.7							
205			100 (87)	***-white to light gray GYPSUM layer, low hardness, vitreous from 202.7 to 208.5 ft*** *-hard from 206.1 to 208.3 ft*	1261.5 208.5							
210			100 (88)	*-gypsum seam from 209.0 to 209.1 ft* *-grayish-brown, w/scattered open vugs (up to 1/4") from 209.1 to 212.0 ft* *-gypsum seam from 211.2 to 211.4 ft* *-gypsum seam (1/4") at 212.8 ft* *-gypsum seam (1/4") at 212.9 ft*								
215			100 (80)	*-grayish-brown, w/scattered open vugs (up to 1/4") from 216.0 to 219.6 ft* *-healed vertical fracture from 217.6 to 217.9 ft* *-pink gypsum nodule (1-1/2") at 219.0 ft*								
220			100 (57)	*-dark gray from 220.0 to 222.1 ft*	1246.9 223.1							
225			100 (93)	***-white to light gray GYPSUM layer, low hardness, vitreous from 223.1 to 228.7 ft***	1241.3 228.7							
230			100 (100)	Gray LIMESTONE, slightly weathered, hard, w/numerous micro-vugs and shale seams and layers. (Jagger Bend/Valera)		5					146	203(U)
235			100 (93)	*-gypsum seam from 235.5 to 235.6 ft* *-no vugs below 237.6 ft* *-gypsum seam (1/4") at 237.7 ft* *-gypsum seam (1/4") at 237.9 ft*								

COMPLETION DEPTH: 300.0 ft DEPTH TO WATER: See Note

DRILL DATE: 05/21/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING B-3

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1470 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			98 (98)	Gray LIMESTONE, slightly weathered, hard, w/numerous micro-vugs and shale seams and layers. (Jagger Bend/Valera) *-gypsum seam from 240.8 to 241.0 ft* *-w/numerous shale seams from 242.0 to 244.0 ft*								
245			100 (100)	*-w/numerous shale seams from 245.4 to 245.7 ft* *-w/numerous shale seams from 246.0 to 246.5 ft* *-w/numerous shale seams from 248.0 to 251.5 ft*								
250			100 (70)			2					158	129(U)
				Dark gray to bluish-gray SHALE, fresh, low to moderately hard, non-calcareous, w/limestone seams and layers. (Jagger Bend/Valera)	1216.6 253.4							
255			97 (60)									
260			98 (85)									
265			100 (82)	*-slickensided joint (45°) at 264.1 ft*								
270			100 (95)									
275			100 (95)									
				Gray LIMESTONE, slightly weathered, hard, fractured. (Jagger Bend/Valera)	1194.0 276.0							

COMPLETION DEPTH: 300.0 ft DEPTH TO WATER: See Note

DRILL DATE: 05/21/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING B-3

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1470 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			100 (100)	Gray LIMESTONE, slightly weathered, hard, fractured. (Jagger Bend/Valera)								
285			100 (100)									
290			100 (97)	*-w/multiple healed vertical fractures from 292.5 to 294.2 ft*								
295			100 (93)	*-tan and light gray from 295.0 to 296.3 ft*								
300				*-tan, w/numerous horizontal discontinuities from 299.6 to 300.0 ft*	1170.0 300.0							
305												
310												
315												

NOTES:
1) Boring was advanced dry to the 3.0-ft depth and groundwater was not encountered above that depth prior to coring.
2) GPS coordinates were obtained with handheld GPS Device: N: 33°01'7.1" W: 99°24'33.3".

COMPLETION DEPTH: 300.0 ft DEPTH TO WATER: See Note

DRILL DATE: 05/21/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING S-1

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1479 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			12	Brown and tan fat CLAY, w/trace limestone fragments and sand. CH (Residual Soil)		15	54	32	98	92		
					1477.0							
				Tan and light gray LIMESTONE, moderately weathered, hard, fractured, w/abundant fossil fragments and shale seams and layers. (Bead Mountain)	2.0							
			88 (58)	*-bluish-gray, tan and pink shale from 4.0 to 5.8 ft*								
5			100 (38)	*-tan shale from 6.4 to 7.4 ft*								
						1					159	210(U)
10			100 (40)	*-tan shale from 10.3 to 10.7 ft*								
				-tan shale from 11.0 to 11.3 ft								
				-tan and bluish-gray from 13.1 to 14.0 ft		17					115	8.5(U)
15			100 (32)									
				-tan and bluish-gray shale from 16.8 to 19.2 ft								
20			100 (42)	*-w/open vugs (up to 1/2") from 20.0 to 20.9 ft*								
						3					146	139(U)
				-tan shale from 22.9 to 24.5 ft								
25			100 (67)									
				-tan and bluish-gray shale from 27.2 to 30.0 ft								
						19					113	13(U)
30			100 (75)									
				-healed vertical fracture from 31.3 to 32.0 ft								
					1445.4	1					163	190(U)
				Gray LIMESTONE, slightly weathered, hard, fractured, w/numerous dark gray horizontal discontinuities and shale seams and layers. (Bead Mountain)	33.6							
35			100 (45)	*-dark gray shale layer from 35.9 to 40.0 ft*								

COMPLETION DEPTH: 50.0 ft DEPTH TO WATER: See Note

DRILL DATE: 06/04/08

U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

LOG OF BORING S-1

Cedar Ridge Reservoir
Throckmorton County, Texas

TYPE: Sample/Wet Rotary LOCATION: See Plate 2

SURF. EL. 1479 ft± Job No. 04.10013715

DEPTH, FT	SYMBOL	SAMPLES	BLOWS PER FOOT OR REC/(RQD),%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX(PI),%	PASSING NO. 4 SIEVE,%	PASSING NO. 200 SIEVE,%	UNIT DRY WEIGHT, PCF	COMPRESSIVE STRENGTH, TSF
			100 (48)	Gray LIMESTONE, slightly weathered, hard, fractured, w/numerous dark gray horizontal discontinuities and shale seams and layers. (Bead Mountain)								
				-tan from 40.7 to 43.5 ft		3					154	201(U)
45			98 (82)	*-dark gray shale layer from 44.5 to 45.6 ft* *-tan from 46.0 to 47.0 ft* *-healed vertical fracture from 46.3 to 46.9 ft* *-tan from 47.5 to 48.2 ft*								
50					1429.0 50.0							
				NOTES: *1) Boring was advanced dry to the 3.0-ft depth and groundwater was not encountered above that depth prior to coring.* *2) GPS coordinates were obtained with handheld GPS Device: N: 33°00'47.70" W: 99°24'31.38".*								
55												
60												
65												
70												
75												

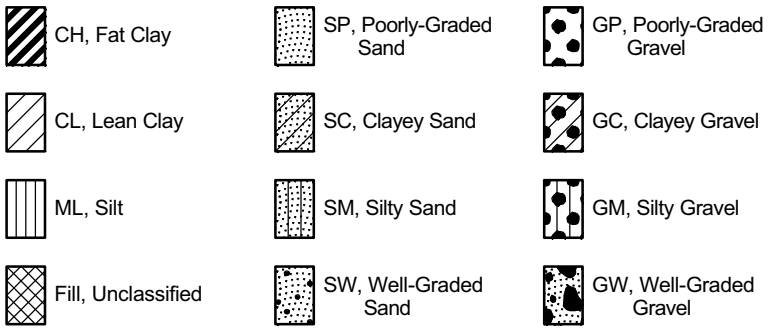
COMPLETION DEPTH: 50.0 ft DEPTH TO WATER: See Note

DRILL DATE: 06/04/08

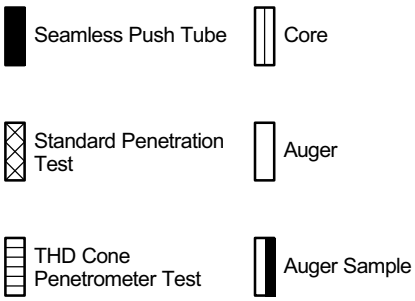
U = Unconfined
Q = Unconsolidated Undrained Triaxial
P = Pocket Penetrometer
T = Torvane

TERMS & SYMBOLS USED ON BORING LOGS FOR SOIL

SOIL TYPES

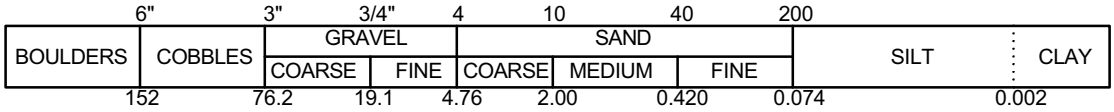


SAMPLER TYPES



SOIL GRAIN SIZE

U.S.STANDARD SIEVE



SOIL GRAIN SIZE IN MILLIMETERS

STRENGTH OF COHESIVE SOILS[1]

CONSISTENCY	COMPRESSIVE STRENGTH Tons Per Sq. Ft.
Very Soft	Less Than 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very Stiff	2.00 to 4.00
Hard	Greater Than 4.00

DENSITY OF GRANULAR SOILS[1]

NUMBER OF BLOWS PER FT., N	RELATIVE DENSITY
0-4	Very Loose
4-10	Loose
10-30	Medium
30-50	Dense
Over 50	Very Dense

1) Peck, Hanson, and Thornburn, (1974), Foundation Engineering.

ASTM D 2488 · TABLE 7 · Criteria for Describing Structure

Description	Criteria
Stratified	Alternating layers of varying material or color with layers at least 6 mm thick; note thickness
Laminated	Alternating layers of varying material or color with the layers less than 6mm thick; note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness
Homogeneous	Same color and appearance throughout

ASTM D 2488 · TABLE 3 · Criteria for Describing Moisture Condition

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

ASTM D 2488 Note 15 Criteria for Describing Percentages of Gravel, Sand and Fines

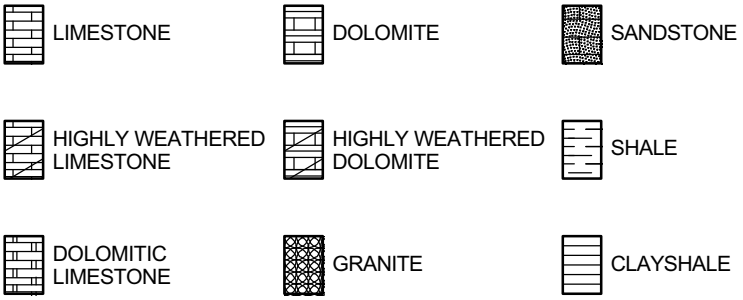
Description	Criteria
Trace	Particles are present but estimated to be less than 5 %
Few	5 to 10 %
Little	15 to 25 %
Some	30 to 45 %
Mostly	50 to 100 %

Criteria for Describing Inclusions

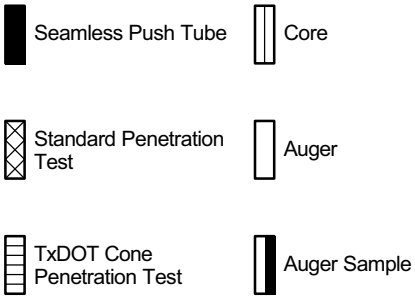
Description	Criteria
Parting	Inclusion <1/8" thick extending through sample
Seam	Inclusion 1/8" to 3" thick extending through sample
Layer	Inclusion >3" thick extending through sample

TERMS & SYMBOLS USED ON BORING LOGS FOR ROCK

ROCK TYPES



SAMPLER TYPES



HARDNESS

Friable	- Crumbles under hand pressure
Low Hardness	- Can be carved with a knife
Moderately Hard	- Can be scratched easily with a knife
Hard	- Can be scratched with a knife with difficulty

SOLUTION & VOID CONDITIONS

Void	Interstice; a general term for pore space or other opening in rock.
Cavities	Small solutional concavities.
Vuggy	Containing small cavities, usually lined with a mineral of different composition from that of the surrounding rock.
Vesicular	Containing numerous small, unlined cavities, formed by expansion of gas bubbles or steam during solidification of the rock.
Porous	Containing pore, interstices, or other openings which may or may not interconnect.
Cavernous	Containing cavities or caverns, sometimes quite large. Most frequent in limestones and dolomites.

WEATHERING GRADES OF ROCKMASS (1)

TERM	DESCRIPTION
Slightly	Discoloration indicates weathering of rock material and discontinuity surfaces.
Moderately	Less than half of the rock material is decomposed or disintegrated to a soil
Highly	More than half of the rock material is decomposed or disintegrated to a soil.
Completely	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact.
Residual Soil	All rock material is converted to soil. The mass structure and material fabric are destroyed.

BEDDING THICKNESS (2)

Very Thick	>4'
Thick	2' - 4'
Thin	2" - 2'
Very Thin	1/2" - 2"
Laminated	0.08" - 1/2"
Thinly-Laminated	<0.08"

JOINT DESCRIPTION

SPACING	INCLINATION	SURFACES
Very Close <2"	Horizontal 0 - 5	Slickensided - Polished, grooved
Close 2" - 12"	Shallow 5 - 35	Smooth - Planar
Medium Close 12" - 3'	Moderate 35 - 65	Irregular - Undulating or granular
Wide >3'	Steeply 65 - 85	Rough - Jagged or pitted
	Vertical 85 - 90	

REFERENCES:

1) British Standard (1981) Code of Practice for Site Investigation , BS 5930

2) The Bridge Div., Tx. Highway Dept. Foundation Exploration & Design Manual 2nd Edition, revised June, 1974.

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Report No. 04.1001-3715
February 3, 2009

Fugro Consultants, Inc.
8613 Cross Park Drive
Austin, Texas 78754

Attention: Mr. Lewis B. Yates, P.E.
Special Projects Manager

GEOLOGICAL RECONNAISSANCE REPORT
CEDAR RIDGE RESERVOIR
THROCKMORTON COUNTY, TEXAS

The City of Abilene is investigating the feasibility of permitting and constructing a water supply reservoir along the Clear Fork of the Brazos River called Cedar Ridge Reservoir. The proposed reservoir is located in Throckmorton, Haskell and Shackelford counties northwest of the town of Albany. Fugro Consultants is conducting a Phase 1 Geotechnical Investigation in the area of the proposed dam and spillway site. This geological reconnaissance is being conducted as a part of the Phase 1 Geotechnical Investigation. The geological reconnaissance was limited to the immediate area upstream and downstream of the proposed dam site.

The purpose of the geological reconnaissance was to assess geologic information obtained from commercially available publications and to conduct an on-site walkthrough in the area of the proposed dam site to assess stratigraphic, structural and topographic conditions. A photographic record of the geological reconnaissance is presented in Plates 1a to 1m. The locations of the photos are referenced on Plate 1a.

AREA GEOLOGY

Physiography

The proposed Cedar Ridge Reservoir is located on the Limestone Belt physiographic province in north central Texas. The Limestone Belt was formed on late Paleozoic-aged carbonates with a resultant valley and ridge topography due to erosion. As presented on Figure 1, the topography in the area of the proposed dam ranges between EL 1300 at the Clear Fork of the

Brazos River to EL 1557 at the top of Cedar Ridge to the northeast of the left abutment. The average slope of the Cedar Ridge valley sidewall is approximately 8 degrees. Elevations presented in this report are approximate and were determined by inference from the 7-½ minute topographic map or from GPS hand-held instrument.

The alignment of the Clear Fork channel meanders sinuously in an overall south-north flow direction following zones of weakness over a regionally occurring geologic structure called the Bend Arch (discussed in more detail the Structural Geology section below). A semi-circular landform called Round Valley is located approximately 2,000 feet southwest of the right abutment of the proposed dam. Round Valley is likely an oxbow cutoff that was eroded by the ancestral river channel, as presented on the photo in Plate 1k. Near the center of Round Valley is a small mound-shaped topographic feature with a resistant limestone cap at EL 1400. Round Valley will be underwater after filling the reservoir.

There are sections of the Clear Fork channel with straight alignments trending northeast or northwest that form right-angle bends. The straight channel segment alignments are controlled by regional joint and fracture patterns and possibly by localized, surficial fault traces. One noticeable straight channel segment with right angle bends occurs approximately 6,000 feet upstream of the proposed dam.

Stratigraphy

There are four geologic formations identified in the area of the proposed dam site, including from youngest to oldest:

- Alluvium and terrace deposits (Quaternary)
- Grape Creek Formation (Permian)
- Bead Mountain Formation (Permian)
- Jagger Bend and Valera Formations (undivided) (Permian)

The formation contacts are presented on the Geologic Map, Figure 2. The following is a general description of the stratigraphy in the area based upon information provided on the regional geologic map.

Quaternary-aged alluvial and terrace deposits were formed by the ancestral Clear Fork River within the Cedar Ridge Valley. The alluvial and terrace deposits are described as discontinuous beds of sand, gravel, silt and clay.

The Grape Creek Formation forms the caprock along the surrounding ridges at an elevation generally above EL 1500. The Grape Creek Formation is described as alternating beds of limestone and shale with a thickness ranging between 100 to 120 feet. The limestone is tan to gray, fine to coarse-grained, and fossiliferous, with individual beds ranging between 2 to 10 feet in thickness. The shale is tan to gray to greenish-gray and argillaceous.

The underlying Bead Mountain Formation generally occurs in the area of the dam site between EL 1380 to EL 1500. The Bead Mountain Formation is described as limestone and shale sequences with shale occurring mostly in the upper part of the formation with individual beds ranging between 3 to 50 feet thick. The shale is tan, gray to maroon. Individual limestone beds range in thickness between 5 to 15 feet, gray, tan, pale-green and fine to coarse-grained, and fossiliferous. Regionally, the Bead Mountain Formation ranges in thickness between 150 to 200 feet, however, only 116 feet was encountered in boring B-1, which penetrated the full section of the formation.

The underlying Jagger Bend and Valera Formations (undivided) occurs near the base of Cedar Ridge Valley, generally below EL 1380. The Jagger Bend-Valera formation is described as limestone, shale, and mudstone. The limestone is thin-bedded, tan to gray, fine to coarse-grained, and argillaceous. Shale occurs in beds 10 to 50 feet thick, gray, tan, grayish-green with interbedded reddish-brown mudstones. The Jagger Bend-Valera formation ranges in thickness between 170 feet to 220 feet, although only the upper 30 feet are exposed in the Cedar Ridge Valley.

There was no description on the regional geologic maps (Abilene and Wichita Falls-Lawton sheets) regarding the occurrence of gypsum or evaporate beds in the area of the proposed dam. Gypsum was, however, encountered in borings B-1, B-2 and B-3 and was found in an outcrop along the gravel road about one-quarter mile west of the proposed dam site at EL 1320 (see Plates 1f and 1g). Gypsum at the site occurs in the middle section of the Jagger Bend-Valera formation. Gypsum is described on the regional geologic map (Wichita Falls-Lawton Sheet) as occurring in the Waggoner Ranch Formation in an area about 45 miles north of the

dam site. The Waggoner Ranch Formation is situated stratigraphically between the Bead Mountain and Jagger Bend-Valera formations.

Tectonics and Seismicity

The area of the proposed Cedar Ridge Reservoir is situated on the Bend Arch, a broad, north-south trending flexure covering a large area southward to the Llano Uplift in central Texas. Bend Arch was forming during the late Paleozoic period during the time of deposition of the formations that outcrop in the area of the proposed dam site. Bend Arch is regionally surrounded by the Fort Worth Basin to the east, Knox-Baylor Basin to the north and Garza Arch to the west. Permian and Pennsylvanian-aged sedimentary rocks are exposed along Bend Arch.

Texas is located in a region of low seismicity with a statewide maximum recorded horizontal ground motion of 6 percent of gravity in an area in southwest Texas. Cedar Ridge Reservoir is located in a seismic zone with an average horizontal ground motion of 2.5 percent of gravity. The largest recorded earthquake with an epicenter in Texas was near Valentine about 400 miles southwest of the proposed reservoir. The Valentine earthquake occurred in 1931 with a Richter magnitude of 6.0 resulting from tectonic movement along a fault.

Earthquakes have also been documented in Texas as a result of injection or withdrawal of fluids associated with oil and gas production. The largest induced earthquake occurred in a Midland Basin oil field near Snyder in 1974. The earthquake measured 4.8 on the Richter scale.

Structural Geology

The proposed dam alignment is located near or possibly along the axis of the northeast-trending Woodson Arch. The strike of Woodson Arch is approximately 22 miles in length trending across southwestern Throckmorton County and superimposed on the much longer and regionally occurring Bend Arch. The formations strike northeast in a direction parallel to Woodson Arch and dip to the northwest along the northwest flank of the arch. Northwest-southeast trending normal faults downthrown to the south occur along both flanks of Woodson Arch. The closest mapped faults to the proposed dam site are located approximately 3-½ miles to the northeast. There were no faults observed in the immediate area of the proposed dam site, however, the

occurrence of straight channel alignment and right angle bends along the river may be indicative of surficial fault traces.

Oil and Gas Production

Oil and gas drilling and production records are maintained by the Texas Railroad Commission. There are online records of six producing wells and six dry holes located within approximately 2,000 feet of the proposed dam. The six producing wells are in the M-K field and operated by C. E. Jacobs. The depth of the wells ranges between 1,203 feet to 1,769 feet with production from the Lower Cook reservoir. These wells have produced 47,745 barrels of oil and 21 million cubic feet (MCF) casing head gas from January 1993 to March 2008. The location of the six wells in addition to one other well is presented in Plate 2.

SITE GEOLOGY

The geologic site reconnaissance was conducted between May 19 to May 21, 2208 by J. Mark Wilkerson, P.G. and Kevin Mandeville, project geologist. A photographic record of the geological reconnaissance is presented in Plates 1a to 1m and includes photos and reference points (Plate 1a). In general, the stratigraphy and formation contacts depicted on the geologic map were in general agreement with what was identified in the outcrops during the site reconnaissance. The discussion of the site geology is based upon the findings of the site reconnaissance and boring logs. Based upon the regional geologic map and evaluation of stratigraphy from the outcrops, formation contacts were projected into the boring logs. The boring logs are presented in the Phase 1 Geotechnical Investigation report. A generalized subsurface profile along the proposed dam alignment is presented in Plate 3.

The alluvium consists of river deposited terrace sands, gravels, cobbles, point bar deposits and wind-blown silt (loess). The low terrace was formed along the river and consists of gravels and cobbles ranging up to 9-inches in diameter and coarse-grained sands. The low terrace is about 4 to 5 feet thick with particle grain sizes generally fining-upwards, as presented on the photo in Plate 1e. Point bars consisting of sand and gravel that were deposited within the river channel are presented in the photos in Plates 1e and 1j. Above the low terrace is a sequence of wind-blown silt deposits that were formed within the valley. The loess consists of reddish-brown silt that supports near-vertical exposures, as presented on the photos in Plates 1b, 1c, and 1l. The

loess was deposited generally below EL 1390. There is a local area of loess that was deposited on the inside of the large river meander above MK Crossing. The loess is comprised of reddish-brown silt with near-vertical exposures that occurs from the top of the gravel terrace near the river to EL 1390. The contact of the silt terrace with the Bead Mountain Formation is very pronounced along a gravel road west of the proposed dam site, as presented on the photo in Plate 1l. Alluvium was encountered in only one of the four borings in B-2 to a depth of 13.5 feet (EL 1286.5) and consisted of reddish-brown silty sand and sandy silty clay.

Grape Creek Formation limestone beds form the caprock along Cedar Ridge near the left abutment at an elevation generally above EL 1500. The outcrop of the Grape Creek Formation near boring B-1 is shown in the photo on Plate 1c. There was 45 feet of Grape Creek strata encountered in boring B-1 consisting of alternating beds of tan and gray limestone, fractured, solution features, and fossiliferous and tan and bluish-gray shale, non-calcareous.

The underlying Bead Mountain Formation limestone beds form the caprock along the north-south ridge to the east of MK Crossing, as presented in the photo on Plate 1d. The Bead Mountain Formation generally occurs in the area of the proposed dam between EL 1380 to EL 1500. The Bead Mountain Formation was encountered in borings B-1, B-3 and S-1 and was described as alternating beds of gray limestone, locally fractured, fossiliferous with localized vugs up to ½ inch in diameter with dark gray to bluish gray shale. The full section of the Bead Mountain Formation was penetrated in boring B-1 and was 116 feet thick. The proposed location of the emergency spillway is located on the Bead Mountain Formation, as presented in the photo on Plate 1m.

The underlying Jagger Bend and Valera Formations (undivided) occurs near the base of Cedar Ridge Valley, generally below EL 1380. The Geologic Map, Figure 2, indicates a narrow band of outcrop of Jagger Bend-Valera formation situated between the alluvium and Bead Mountain Formation. The Jagger Bend-Valera formation was encountered in borings B-1, B-2 and B-3. The formation consisted of alternating beds of limestone, shale and gypsum. The limestone was described as gray and slightly fractured, and locally dolomitic. The shale was described as dark bluish gray, non-calcareous, and low to moderately hard. Multiple gypsum beds occur throughout a gross interval thickness ranging between 85 to 91 feet in the middle part of the formation in borings B-1 and B-3. There is a concentration of gypsum beds within two intervals, referenced on Plate 3 as Gypsum Zone "A" and Gypsum Zone "B". Gypsum Zone "A" appears to be generally encased in shale while Gypsum Zone "B" is overlain by shale and underlain by

limestone. The percentage of net thickness of gypsum in boring B-1 was 18 percent (16.5 feet net gypsum, 91.4 feet gross stratigraphic interval). The percentage of net gypsum thickness in boring B-3 was 24 percent (20.5 feet net gypsum, 84.7 feet gross stratigraphic interval). The gypsum was described on the boring logs as white to light gray, fibrous, vitreous to satin sheen. The satin luster variety is called Satin Spar and the vitreous luster variety is called Selenite. There were no indications of solution activity of gypsum in the core samples. Individual beds of gypsum ranged in thickness between 0.9 to 6.6 feet. The total thickness of the Jagger Bend-Valera formation encountered in boring B-1 was 187 feet.

Gypsum occurs in three mineral forms in the outcrop at EL 1320, including Satin Spar, a pinkish-orange nodular variety and Selenite. The outcrop also contains examples of fractures and joints in individual limestone beds. There is a noticeable but unmeasured northwest dip of strata in the outcrop. Photos of the outcrop containing gypsum, shale and limestone are presented in Plates 1f, 1g, and 1h.

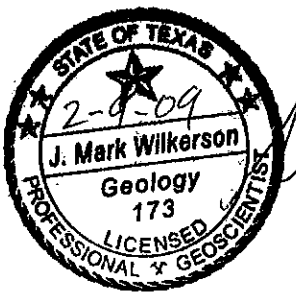
Although gypsum is very soluble in water, there were no dissolution features noted in the core samples. The lowest gypsum bed encountered in boring B-2 occurred between the depths of 47 to 53 feet at EL 1253 compared with the gypsum bed in the outcrop at EL 1320. The 2.5-foot gypsum bed encountered in boring B-2 was likely contained a limited reservoir of natural gas, as evidenced by a small "blowout" encountered during drilling. The occurrence of natural gas was likely due to leaking casing from one of the nearby production wells. Boring B-3 is located near the proposed right abutment approximately 500 feet south of C. E. Jacobs Well No. 7 (API No. 44781465) and boring B-2 is located near the left abutment approximately 700 feet northeast of C. E. Jacobs Well No. 8 (API No. 44720044) and 700 feet northwest of C. E. Jacobs Well No. 2 (API No. 44720161.

ILLUSTRATIONS

We appreciate the opportunity to be of assistance on this project. Please feel free to contact us if you have questions about this information or if we can be of further service.

Very truly yours,

FUGRO CONSULTANTS, INC.
TBPE Firm Registration No. 299



J. Mark Wilkerson, P.G.
Senior Geologist

JMW/kp
Copies submitted: (10)

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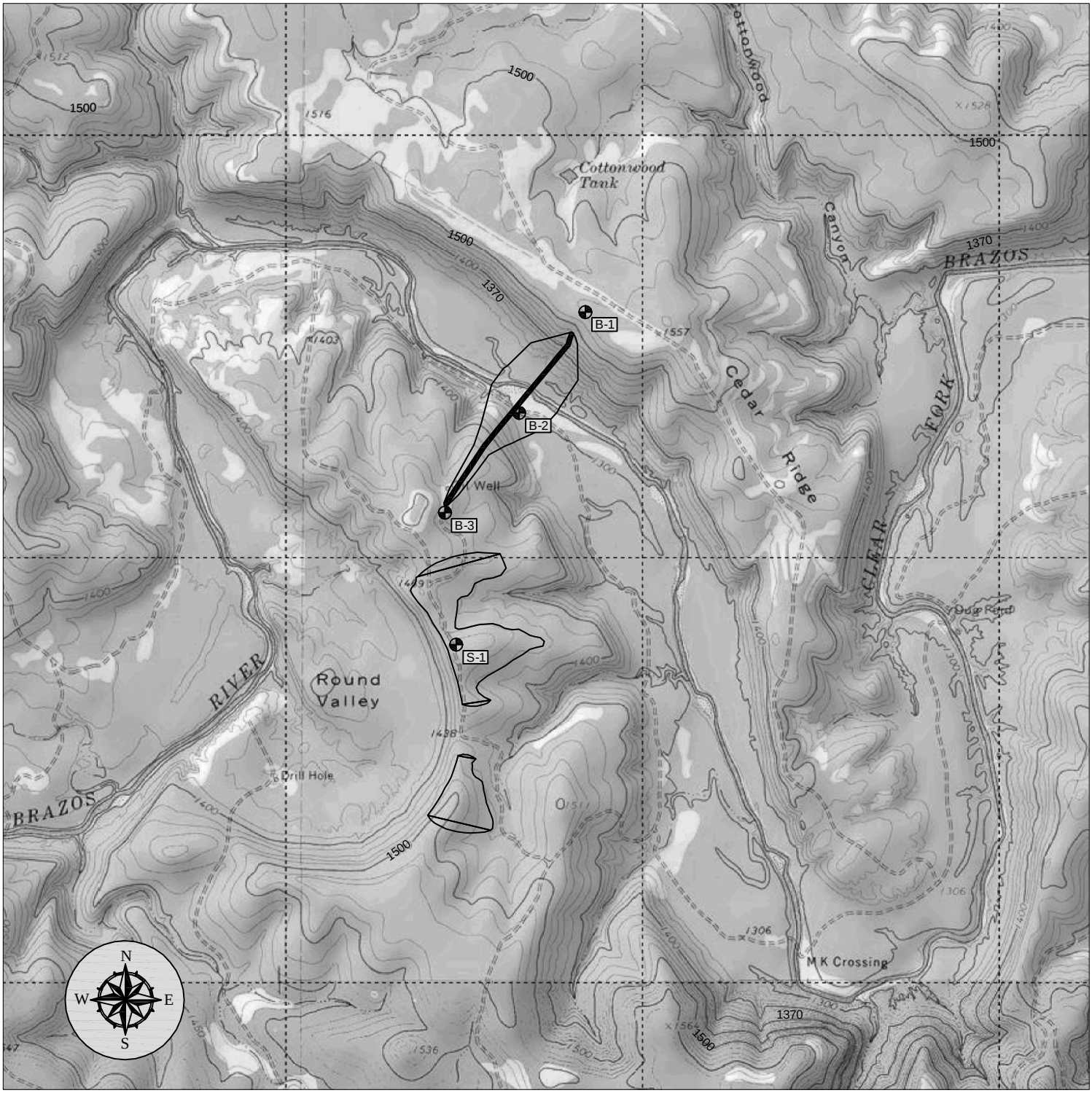
Probabilistic Earthquake Acceleration and Velocity Maps for the United States and Puerto Rico, S. T. Algermissen et al, 1990, U.S.G.S. Miscellaneous Field Studies Map MF-2120

Texas Railroad Commission website, oil and gas production data

ILLUSTRATIONS



Source: USGS Topographic Map Throckmorton County, Texas

2000 1000 0 2000

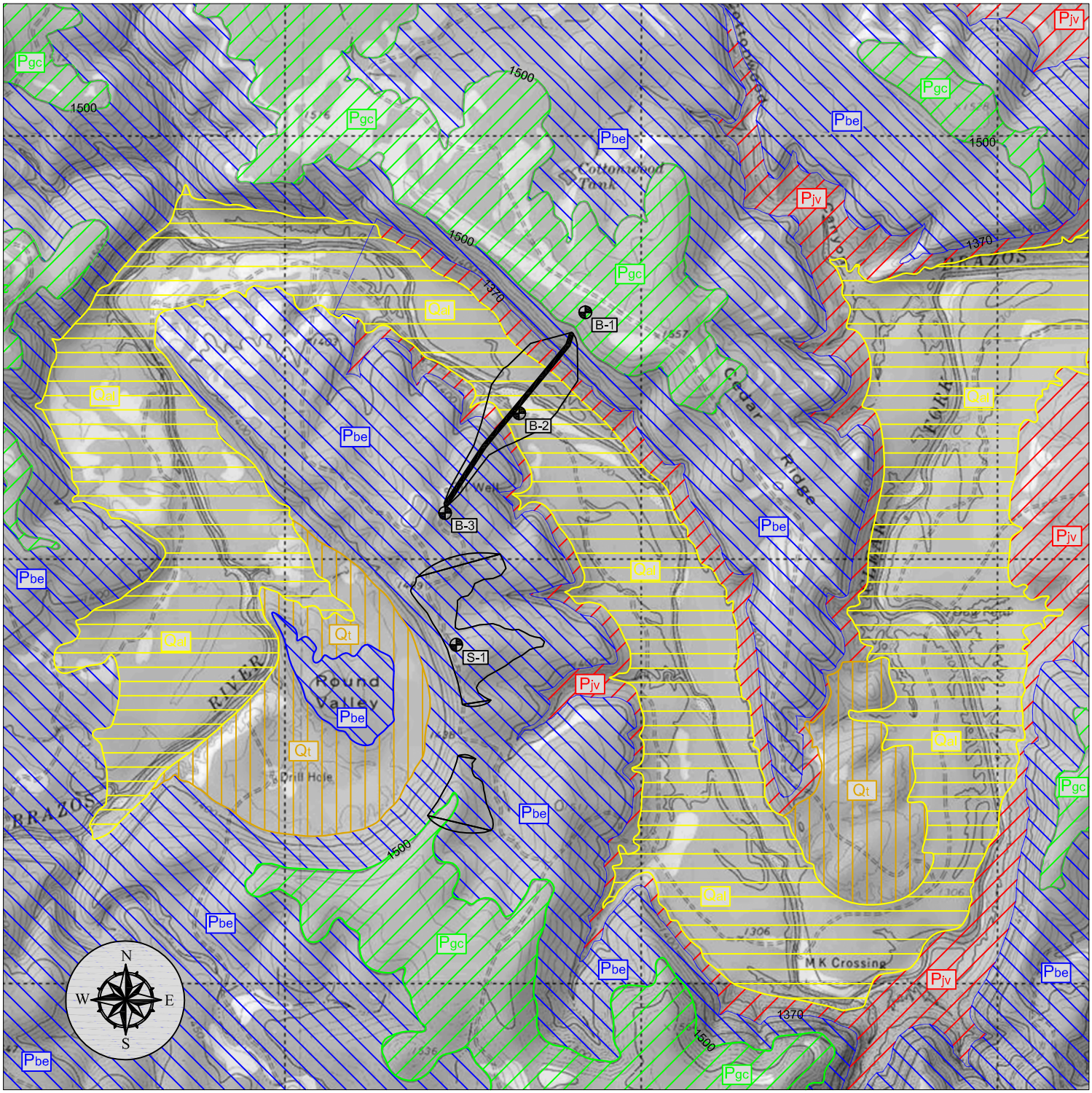
Scale: 1" = 2000'

TOPOGRAPHIC MAP AND PLAN OF BORINGS

Cedar Ridge Reservoir

Throckmorton County, Texas

FIGURE 1



LEGEND

- Qal - Alluvium
- Qt - Fluviatile terrace deposits
- Pgc - Grape Creek Formation
- Pbe - Bead Mountain Formation
- Pjv - Jagger Bend/Valera Formation

2000 1000 0 2000

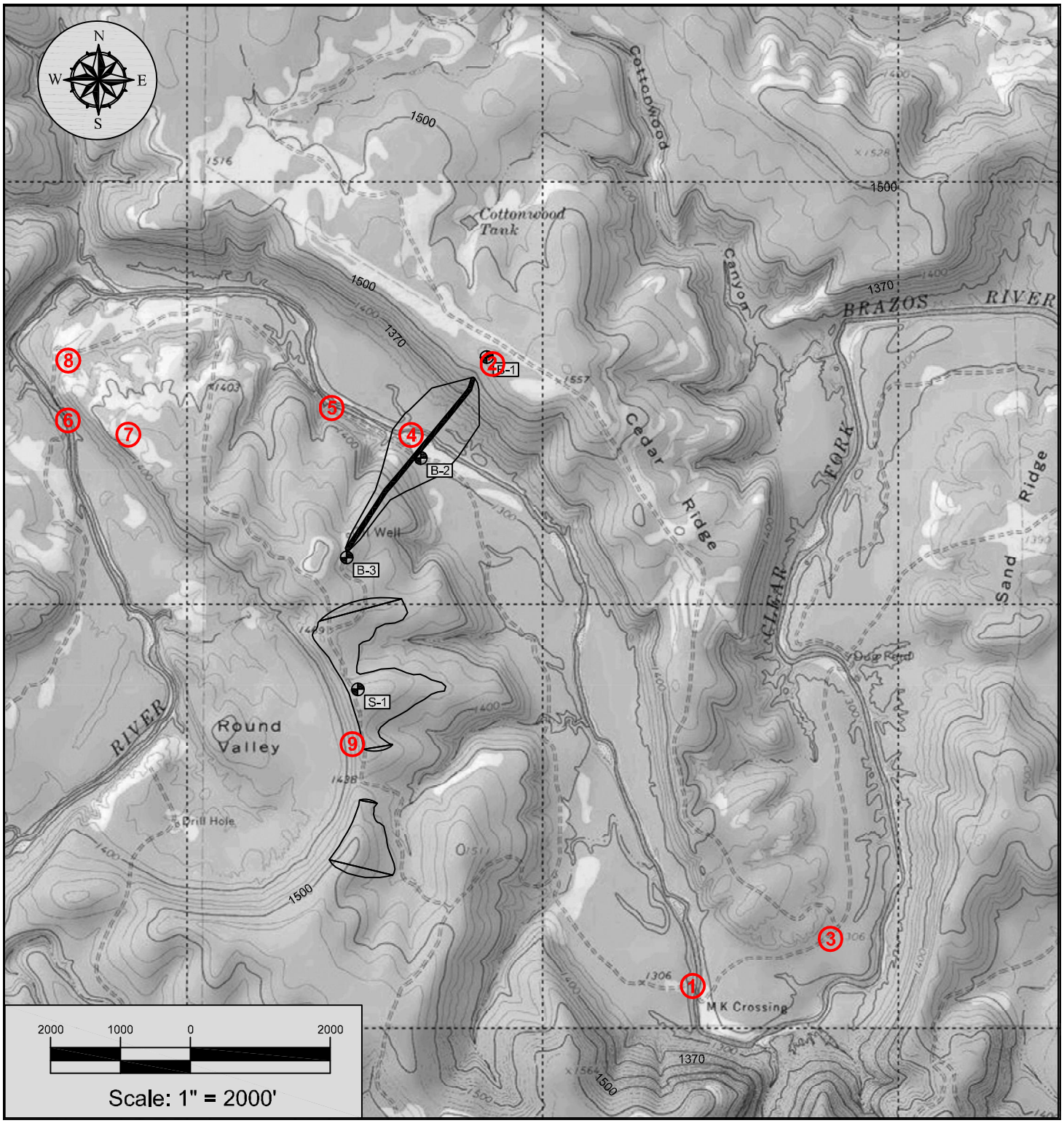
Scale: 1" = 2000'

GEOLOGIC MAP

Cedar Ridge Reservoir

Throckmorton County, Texas

FIGURE 2



Source: USGS Topographic Map Throckmorton County, Texas

SITE RECONNAISSANCE PHOTOS

Photo Reference
Cedar Ridge Reservoir
Throckmorton County, Texas

Loess in road cut on West Bank of Clear Fork Brazos River at MK Crossing

Loess in road cut on West Bank of Clear Fork Brazos River at MK Crossing

SITE RECONNAISSANCE PHOTOS

Reference Point: ①

Cedar Ridge Reservoir

Throckmorton County, Texas

Looking West from area of Left Abutment (B-1) *Note Loess bluff at center of photo

Fossil in limestone at area of Left Abutment (B-1)

SITE RECONNAISSANCE PHOTOS

Reference Point: ②

Cedar Ridge Reservoir

Throckmorton County, Texas

Looking East at Cap Rock on Sand Ridge

Looking East at Cap Rock on Sand Ridge

SITE RECONNAISSANCE PHOTOS

Reference Point: ③

Cedar Ridge Reservoir

Throckmorton County, Texas

Contact between gravel Terrace and Loess near proposed dam alignment (looking Northeast)

Looking Northwest upstream along Clear Fork of Brazos River

SITE RECONNAISSANCE PHOTOS

Reference Point: ④

Cedar Ridge Reservoir

Throckmorton County, Texas

Gypsum bed in outcrop located at approximately 1/4 mile Northwest of proposed dam alignment

Gypsum bed in outcrop located at approximately 1/4 mile Northwest of proposed dam alignment

SITE RECONNAISSANCE PHOTOS

Reference Point: ⑤

Cedar Ridge Reservoir

Throckmorton County, Texas

Closeup of Weathered Gypsum bed in outcrop located at approximately 1/4 mile Northwest of proposed dam alignment

Vertical Fractures (Joints) in Limestone bed in outcrop located at approximately 1/4 mile Northwest of proposed dam alignment

SITE RECONNAISSANCE PHOTOS
Reference Point: ⑤
Cedar Ridge Reservoir
Throckmorton County, Texas

Outcrop of Gypsum bed dipping to the right (Northwest)

Vertical Fractures (Joints) in Limestone bed in outcrop located at approximately 1/4 mile Northwest of proposed dam alignment

SITE RECONNAISSANCE PHOTOS

Reference Point: ⑤

Cedar Ridge Reservoir

Throckmorton County, Texas

Small Crystalline-coated Vug in Limestone outcrop in Jagger Bend/Valera Formation

Bivalve Fossils in outcrop of Limestone bed in Jagger Bend/Valera Formation

SITE RECONNAISSANCE PHOTOS

Reference Point: ⑤

Cedar Ridge Reservoir

Throckmorton County, Texas

River Crossing near Hunting Cabin located upstream of proposed dam alignment (looking South)

Point Bar near Hunting Cabin (looking North)

SITE RECONNAISSANCE PHOTOS

Reference Point: ⑥

Cedar Ridge Reservoir

Throckmorton County, Texas

Hunting Cabin (looking Southwest)

Round Valley (looking South)

SITE RECONNAISSANCE PHOTOS

Reference Point: ⑦

Cedar Ridge Reservoir

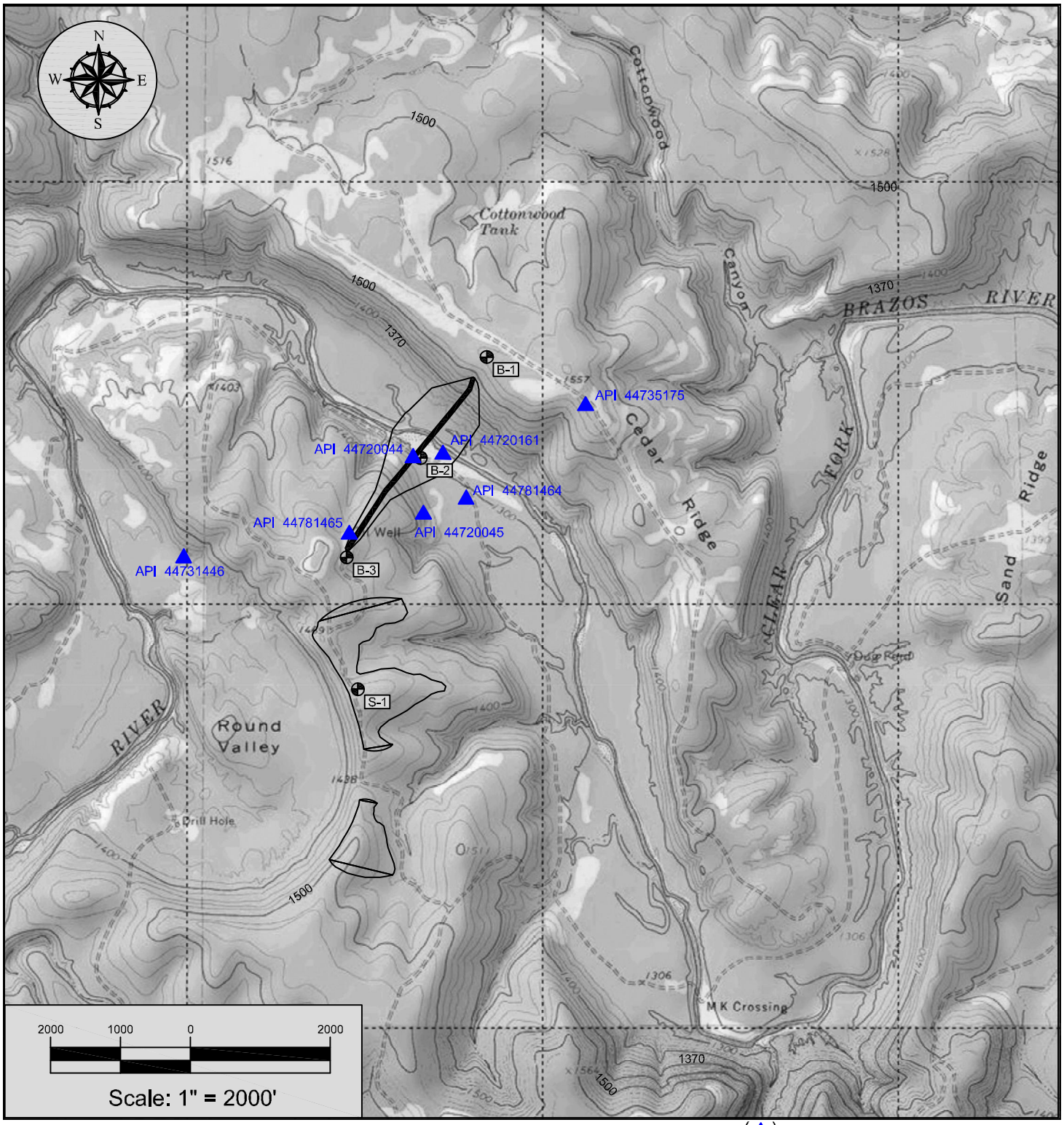
Throckmorton County, Texas

Alluvial (Loess)/Bedrock Contact of the Bead Mountain Formation about 1 mile Northwest of proposed dam alignment

SITE RECONNAISSANCE PHOTOS
Reference Point: ⑧
Cedar Ridge Reservoir
Throckmorton County, Texas

Limestone bed in Bead Mountain Formation at Emergency Spillway (looking East)

SITE RECONNAISSANCE PHOTOS
Reference Point: ⑨
Cedar Ridge Reservoir
Throckmorton County, Texas

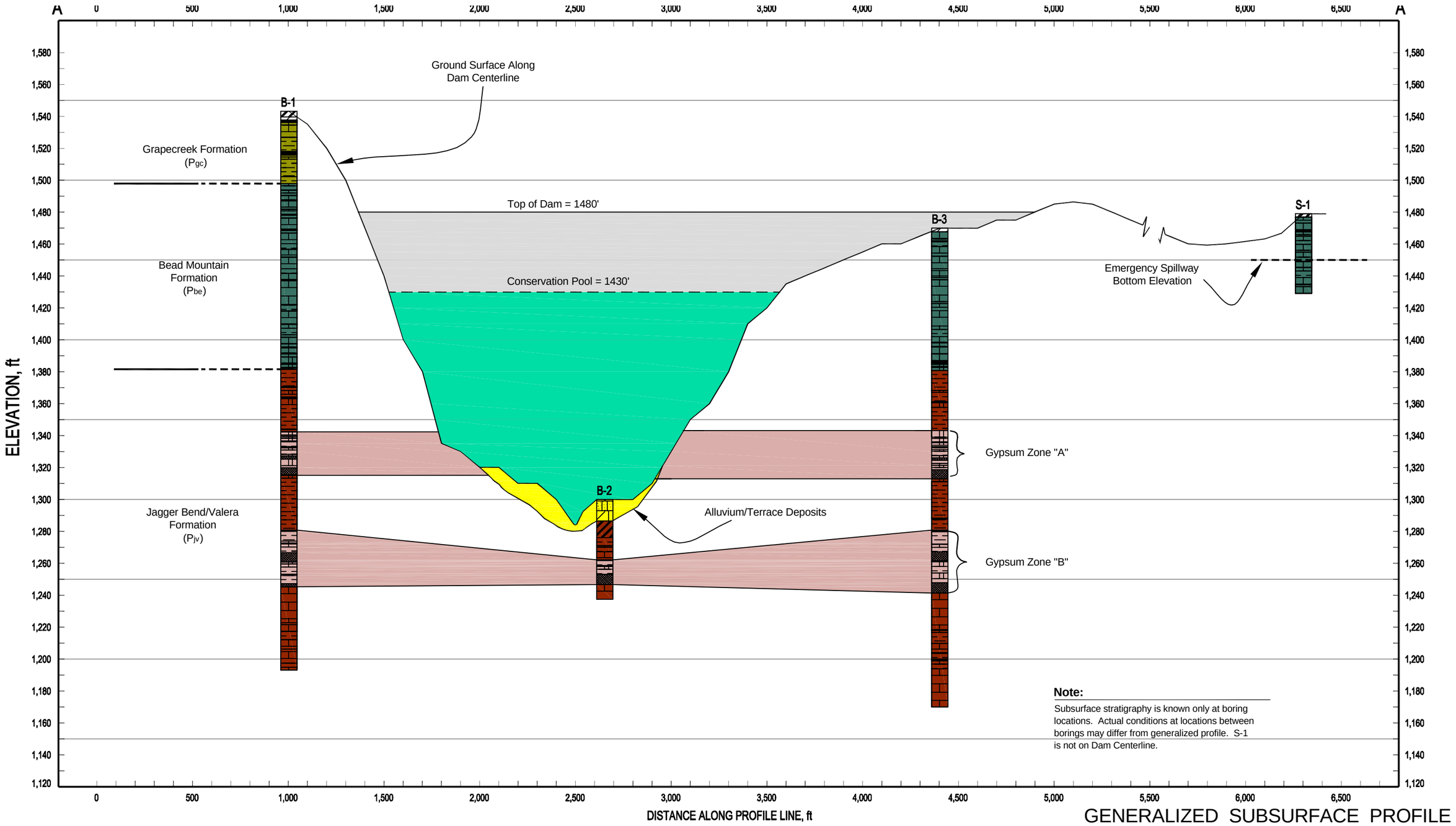


Source: USGS Topographic Map Throckmorton County, Texas. Well location data from Railroad Commission of Texas. (▲)

OIL AND GAS WELL INFORMATION IN VICINITY OF DAM SITE

Cedar Ridge Reservoir

Throckmorton County, Texas



Note:

Subsurface stratigraphy is known only at boring locations. Actual conditions at locations between borings may differ from generalized profile. S-1 is not on Dam Centerline.

GENERALIZED SUBSURFACE PROFILE

Cedar Ridge Reservoir

Throckmorton County, Texas

PLATE 3