

# Utah Geological Survey Lithologic Log

Well ID: Crater Springs CS-4

Well Location: 18.0 miles NW of Delta, Utah

UTM: x 347844 m, y 4381037 m NAD 83 39.56563 N 112.77135 W (WGS 84)

N South 567 ft, E West 30 ft from N 1/4 Corner, Sec 32, T 14S S R 8W E W, SLBM USM

Start Date 4/4/2011 Completion Date 4/13/2011 Driller USGS, Jack Hennagan

Drilling Method: Mud/Rotary from 0 to 805 ft Total Depth 805 ft  
 \_\_\_\_\_ from \_\_\_\_\_ to \_\_\_\_\_ Static Water Level Est. 45 ft  
 \_\_\_\_\_ from \_\_\_\_\_ to \_\_\_\_\_ Water Level Date 4/4/2011  
 Measured From GL

Borehole Diameter 7 7/8-in from 0 to 400 ft Casing 7-in steel sq cover from +2 to 3 ft  
6 3/4-in from 400 to 805 ft Type & Diameter 2-in sch-80 PVC  
(Sealed) from +1.5 to 801 ft  
 \_\_\_\_\_ from \_\_\_\_\_ to \_\_\_\_\_ \_\_\_\_\_ from \_\_\_\_\_ to \_\_\_\_\_

Screen Type & Diameter N/A from \_\_\_\_\_ to \_\_\_\_\_ Ground Elevation: Approx. 4592 ft  
N/A from \_\_\_\_\_ to \_\_\_\_\_ Logged By: M.L. Gwynn, UGS

Geophysical Log  Yes  No Other Logs: High-precision Temperature

DEPTH	LITHOLOGY	WELL DIAGRAM	DRILLING INFO	LITHOLOGY DESCRIPTION
5	XXXXXXXX-	XX	XX	0-10': Tan-med brn poorly sorted fine-coarse sand w/ minor silt. Round-well rounded qtz w/ some angular-subrounded coarse-very coarse limestone and basalt clasts. 5-10% 2-10 mm pebbles.
	XXXXXXXX-	XX	8" XX	
10	XXXXXXXX-	XX	XX	10-20': Med-tan poorly sorted fine-coarse sand w/ minor silt. Subangular-rounded qtz w/ 2% subangular-subrounded 2-8mm basalt clasts and 25% tan hydrated clay.
	XXXXXXXX-	XX	7.875-in	
15	XXXXXXXX-	XX	well cover	20-30': 90% tan hydrated clay. 10% moderately sorted medium-coarse sand of subangular-subrounded qtz (predominant) and basalt.
	XXXXXXXX-	XX	cemented	
20	XXXXXXXX-	XX	in with	30-40': AA, except coarse clasts are subrounded-rounded and more (15-20%) are basalt.
	XXXXXXXX-	XX	well pad.	
25	XXXXXXXX-	XX	Annulus	40-50': 60% tan hydrated clay. 20% moderately sorted medium-coarse sand of subangular-subrounded qtz w/ some basalt. 20% dk gy basalt cuttings.
	XXXXXXXX-	XX	filled	
30	XXXXXXXX-	XX	with	ESTIMATED static H2O level - 45'
	XXXXXXXX-	XX	Bentonite	
35	XXXXXXXX-	XX	grout (30%	
	XXXXXXXX-	XX	solids) to	
40	XXXXXXXX-	XX	TD.	
	XXXXXXXX-	XX	7.875-in	
45	XXXXXXXX-	XX	hole to	
	XXXXXXXX-	XX	400 ft.	
50	XXXXXXXX-	XX	Hard	
	XXXXXXXX-	XX	drilling in	
55	XXXXXXXX-	XX	basalt	
	XXXXXXXX-	XX	ESTIMATED	
60	XXXXXXXX-	XX	static H2O	
	XXXXXXXX-	XX	level - 45'	
65	XXXXXXXX-	XX		
	XXXXXXXX-	XX		
70	XXXXXXXX-	XX		
	XXXXXXXX-	XX		
75	XXXXXXXX-	XX		
	XXXXXXXX-	XX		
80	XXXXXXXX-	XX		
	XXXXXXXX-	XX		
85	XXXXXXXX-	XX		
	XXXXXXXX-	XX		
90	XXXXXXXX-	XX		
	XXXXXXXX-	XX		
95	XXXXXXXX-	XX		
	XXXXXXXX-	XX		
100	XXXXXXXX-	XX		
	XXXXXXXX-	XX		

DEPTH	LITHOLOGY	WELL DIAGRAM	DRILLING INFO	LITHOLOGY DESCRIPTION
55	++++:~::~	8"		50-60': 50% dk gy basalt cuttings. 50% coarse-very coarse sand of subrounded qtz and some basalt. Few subangular-subrounded 3-10mm clasts.
60	++++:~::~	B O R E		60-70': 60% gr gn hydrated clay. 30% tan hydrated clay. 10% dk gy basalt cuttings.
65	-----+	H O L E		
70	++++:~::~	W I T H		70-80': 85% poorly sorted coarse-very coarse sand w/ some silt and clay. Subangular-subrounded qtz and basalt clasts. Few subangular 3-10mm qtz pebbles. 15% dk gy basalt cuttings.
75	++++:~::~	2"		80-90': 60% dk gy basalt cuttings. 30% moderately sorted coarse-very coarse sand of subrounded qtz and more angular basalt with some tan silt and clay.
80	++++:~::~	S C H		
85	++++:~::~	8 O		90-100': 80% tan hydrated clay. 20% dk gy basalt cuttings.
90	-----++	P V C		
95	-----++			100-110': 90% tan hydrated clay. 10% dk gy basalt cuttings (no indication of drilling in basalt--probably picked up from 80-90 foot interval).
100	-----++			
105	-----++			
110	-----++			110-120': Tan hydrated clay w/ some silt.
115	-----++			
120	-----++			120-130': AA
125	-----++			
130	-----++			130-140': AA
135	-----++			
140	-----++			140-150': AA
145	-----++			

DEPTH	LITHOLOGY	WELL DIAGRAM	DRILLING INFO	LITHOLOGY DESCRIPTION
155		8"		150-160': 60% tan hydrated clay. 40% gn gy hydrated clay.
160		B O R E		160-170': Tan hydrated clay w/ some silt.
165		H O L E		
170		W I T H		170-180': AA
175		2"	Clay boot on drill string from about 175 ft until discovered at 320 ft. Fewer cuttings in this interval. May affect sample depths, especially from 285-320 ft. Changed bit, added additive to prevent sticking.	
180		S C H		180-190': Tan hydrated clay w/ minor gn gy hydrated clay.
185		8 0		190-200': AA, w/ minor silt/very fine sand.
190		P V C		200-210': AA, w/more gy and gn gy hydrated clay.
195				
200				
205				
210				210-220': Tan hydrated clay minor silt/very fine sand.
215				
220				220-230': AA
225				
230				230-240': AA
235				
240				240-250': AA
245				

DEPTH	LITHOLOGY	WELL DIAGRAM	DRILLING INFO	LITHOLOGY DESCRIPTION
	-----: \/\	\	\	250-260': AA, w/ more silt/very fine sand.
255	-----: \/\	8"	\	
	-----: \/\	B	\	
	-----: \/\	O	\	
260	-----: \/\	R	\	260-270': Tan hydrated clay w/ minor very fine sand.
	-----: \/\	E	\	
	-----: \/\	H	\	
265	-----: \/\	O	\	
	-----: \/\	L	\	
	-----: \/\	E	\	
270	-----: \/\		\	270-280': AA, w/ more very fine sand.
	-----: \/\	W	\	
	-----: \/\	I	\	
275	-----: \/\	T	\	
	-----: \/\	H	\	
280	-----: \/\	2"	\	280-290': Tan hydrated clay w/ minor silt/very fine sand. Depth suspect due to clay boot on drill string preventing upflow of fresh cuttings.
	-----: \/\	S	\	
	-----: \/\	C	\	
	-----: \/\	H	\	
285	-----: \/\		\	
	-----: \/\	8	\	
	-----: \/\	0	\	
290	-----: \/\		\	290-300': AA
	-----: \/\	P	\	
	-----: \/\	V	\	
295	-----: \/\	C	\	
	-----: \/\		\	
300	-----: \/\		\	300-310': Tan hydrated clay w/ minor silt to coarse sand. Depth suspect due to clay boot on drill string preventing upflow of fresh cuttings.
	-----: \/\		\	
305	-----: \/\		\	
	-----: \/\		\	
310	-----: \/\		\	310-320': AA
	-----: \/\		\	
315	-----: \/\		\	
	-----: \/\		\	
320	-----: \/\		\	320-330': AA, depth probably reliable.
	-----: \/\		\	
325	-----: \/\		\	
	-----: \/\		\	
330	-----: \/\		\	330-340': Tan and some gn gy hydrated clay w/ minor silt/very fine sand.
	-----: \/\		\	
335	-----: \/\		\	
	-----: \/\		\	
340	-----: \/\		\	340-350': AA
	-----: \/\		\	
345	-----: \/\		\	
	-----: \/\		\	
	-----: \/\		\	

DEPTH	LITHOLOGY	WELL DIAGRAM	DRILLING INFO	LITHOLOGY DESCRIPTION
		∨ ∨		350-360': AA
		∨ ∨ 8" ∨ ∨		
355		∨ ∨		
		∨ ∨ B ∨ ∨		
		∨ ∨ O ∨ ∨		
360		∨ ∨ R ∨ ∨		360-370': AA, w/ more silt/very fine sand.
		∨ ∨ E ∨ ∨		
		∨ ∨		
365		∨ ∨ H ∨ ∨		
		∨ ∨ O ∨ ∨		
		∨ ∨ L ∨ ∨		
370		∨ ∨ E ∨ ∨		370-380': AA
		∨ ∨		
		∨ ∨ W ∨ ∨		
375		∨ ∨ I ∨ ∨		
		∨ ∨ T ∨ ∨		
		∨ ∨ H ∨ ∨		
380		∨ ∨ 2" ∨ ∨		380-390': Tan hydrated clay w/ minor silt.
		∨ ∨		
		∨ ∨ S ∨ ∨		
		∨ ∨ C ∨ ∨		
		∨ ∨ H ∨ ∨		
390		∨ ∨ 8 ∨ ∨		390-400': Tan hydrated clay w/ minor silt/very fine sand.
		∨ ∨ 0 ∨ ∨		
395		∨ ∨		
		∨ ∨		
		∨ ∨		
400		∨ ∨ 6" ∨ ∨	Begin 6.75-in hole to TD.	400-410': AA
		∨ ∨		
405		∨ ∨ B ∨ ∨		
		∨ ∨ O ∨ ∨		
		∨ ∨ R ∨ ∨		
410		∨ ∨ E ∨ ∨		410-420': AA
		∨ ∨		
		∨ ∨ H ∨ ∨		
415		∨ ∨ O ∨ ∨		
		∨ ∨ L ∨ ∨		
		∨ ∨ E ∨ ∨		
420		∨ ∨		420-430': Tan hydrated clay w/ 1-3 mm thick semi-lithified tan brn and gn gy siltstone.
		∨ ∨ W ∨ ∨		
		∨ ∨ I ∨ ∨		
425		∨ ∨ T ∨ ∨		
		∨ ∨ H ∨ ∨		
		∨ ∨		
430		∨ ∨ 2" ∨ ∨		430-440': 60% gn gy hydrated clay. 40% tan hydrated clay.
		∨ ∨		
		∨ ∨ S ∨ ∨		
435		∨ ∨ C ∨ ∨		
		∨ ∨ H ∨ ∨		
		∨ ∨		
440		∨ ∨ 8 ∨ ∨		440-450': Tan hydrated clay w/ moderate amounts of silt/very fine sand.
		∨ ∨ 0 ∨ ∨		
		∨ ∨		
445		∨ ∨ P ∨ ∨		
		∨ ∨		
		∨ ∨ V ∨ ∨		
		∨ ∨		
		∨ ∨ C ∨ ∨		

DEPTH	LITHOLOGY	WELL DIAGRAM	DRILLING INFO	LITHOLOGY DESCRIPTION
455		6"		450-460': Tan hydrated clay.
460		B O R E		460-470': AA
465		H O L E		470-480': AA, w/ minor gn gy hydrated clay.
470		W I T H		480-490': Tan hydrated clay.
475		2"		
480		S C H		490-500': AA
485		8 O P V C		500-510': Tan hydrated clay w/ minor 1-2 mm thick semi-lithified gn gy siltstone/claystone.
490				
495				
500				
505				
510				510-520': AA
515				
520				520-530': Tan hydrated clay w/ minor gn gy hydrated clay.
525				
530				530-540': Tan hydrated clay w/ minor 1-2 mm thick semi-lithified gn gy claystone.
535				
540				540-550': 70% tan hydrated clay. 30% 0.5-1.5 mm thick semi-lithified gn gy siltstone/claystone.
545				

DEPTH	LITHOLOGY	WELL DIAGRAM	DRILLING INFO	LITHOLOGY DESCRIPTION
		\\	\\	550-560': AA
555		6"	\\	
		B	\\	
560		O	\\	560-570': AA
		R	\\	
		E	\\	
565			\\	
		H	\\	
		O	\\	
570		L	\\	570-580': AA
		E	\\	
			\\	
575		W	\\	
		I	\\	
		T	\\	
580		H	\\	580-590': 80% tan/20% gn gy 0.5-1.5 mm thick semi-lithified siltstone/claystone.
		2"	\\	
585			\\	
		S	\\	
		C	\\	
590		H	\\	590-600': AA, w/ minor tan hydrated clay.
			\\	
		8	\\	
595		O	\\	
			\\	
		P	\\	
600		V	\\	600-610': AA, w/ more tan/gn gy hydrated clay.
		C	\\	
605			\\	
			\\	
610			\\	610-620': 85% tan/5% gn gy 0.5-1.5 mm semi-lithified siltstone/claystone. 10% tan hydrated clay.
			\\	
615			\\	
			\\	
620			\\	620-630': AA, except siltstone/claystone 0.5-3.0 mm thick.
			\\	
625			\\	
			\\	
630			\\	630-640': 80% tan/20% gn gy hydrated clay.
			\\	
635			\\	
			\\	
640			\\	640-650': 60% tan/40% gn gy 0.5-1.5 mm thick semi-lithified siltstone/claystone and some tan hydrated clay.
			\\	
645			\\	
			\\	
			\\	

DEPTH	LITHOLOGY	WELL DIAGRAM	DRILLING INFO	LITHOLOGY DESCRIPTION
655		\\	\\	650-660': Tan hydrated clay w/ some 0.5-2.0 mm thick tan/ gn gy semi-lithified siltstone/ claystone.
660		6"	\\	
665		B O R E	\\	660-670': 80 % tan/20% gn gy silt/very fine sand w/ some 0.5-1.5 mm thick tan/gn gy semi-lithified siltstone/claystone.
670		H O L E	\\	670-680': AA
675		W I T H	\\	
680		2"	\\	680-690': AA, except mostly tan.
685		S C H	\\	
690		8 O	\\	690-700': AA
695		P V C	\\	
700			\\	700-710': AA
705			\\	
710			\\	710-720': AA
715			\\	
720			\\	720-730': AA
725			\\	
730			\\	730-740': AA
735			\\	
740			\\	740-750': Gn gy hydrated clay w/ some silt and 0.5-1-5 mm thick tan siltstone/claystone.
745			\\	



DEPTH	LITHOLOGY	WELL DIAGRAM	DRILLING INFO	LITHOLOGY DESCRIPTION
755		6"		750-760': AA
760		B O R E		
765		H O L E	Bit plugged 762 ft. Refreshed mud and switched pump.	760-770': Gn-gy /tan/tan brn 1.0-5.0 mm thick siltstone/claystone w/ minor hydrated clay.
770		W I T H		770-780': Tan hydrated clay w/ 0.5-1.5 mm thick gn gy semi-lithified siltstone/ claystone.
780		2"		780-790': AA
785		S C H		
790		8 0		790-800': AA, except more hydrated clay.
795		P V C		
800			Drilled 5 ft rat hole for E-logs.	800' Total depth of samples.
805				TD: 805 ft
810				Note: 2" PVC sealed at bottom; annulus filled with Bentonite grout (30 percent solids) from surface to TD.
815				
820				
825				
830				
835				
840				
845				