

Appendix 15. Location, physical characteristics, borehole-geophysical logs and interpreted structures for well Sto 1.

Sto 1 is located at Kids-A-Lot daycare off Red Acre Rd in Stow, MA. The daycare commissioned the drilling of a bedrock rock well in the spring of 2007 due to the decreasing productivity of the existing bedrock well on site. The well ID is sto1.052207 and it is at an elevation of approximately 74 meters above sea level. The well logged from May 22, 2007 through May 22 through May 24, 2007. The well yielded 80 gallons per minute and was fitted with a pump several days after it was logged. The well site is at the top of a small hill behind the daycare playground.

Overburden is approximately 6 meters thick. The surficial material is a nonsorted, unstratified glacial till with some clay, silt and boulders. The bedrock is an unnamed amphibolite-gneiss unit. It is primarily a fine to medium-grained hornblende-actinolite-biotite-quartz-plagioclase orthogneiss with strongly defined lineation. The unit lies between the schist of the Nashoba Formation Schist and a large mapped fault in the Nashoba Terrane.

The well is 92 meters deep. Casing length is 10.4 meters. A total of 62 fractures were identified and measured. Of the total fractures, 27 are FPF, 13 are tectonic, and 22 are subhorizontal unloading joints. The water level was 2.2 meters below the ground surface at the outset of logging. The well was pumped at 0.5 gallons per gallon for 2 hours and 48 minutes and showed a drawdown of 1.19 meters. Heat pulse flow meter tests identified 6 flowing fractures. The fractures were located at 11.7, 14.6, 16.5, 20.5, 24.7 and 81.8 meters depth. One of the flowing fractures was a subhorizontal unloading joint and the remaining 5 were FPF.

Appendix 15, continued. Midpoint depth, strike and dip of features identified in optical televiewer log, fracture type and heat pulse flowmeter data from Sto 1 (azimuth and dip reported using right hand rule convention; t = tectonic fractures, s = sheeting joints, p = foliation parallel fractures). Data shown under the pumping test have been normalized.

Site ID: sto1.052207
 Location: "Kids O Lot" Daycare Stow, MA
 Elevation (m): 74
 Reported Yield (gpm): 80
 Rocktype: Amphibolite

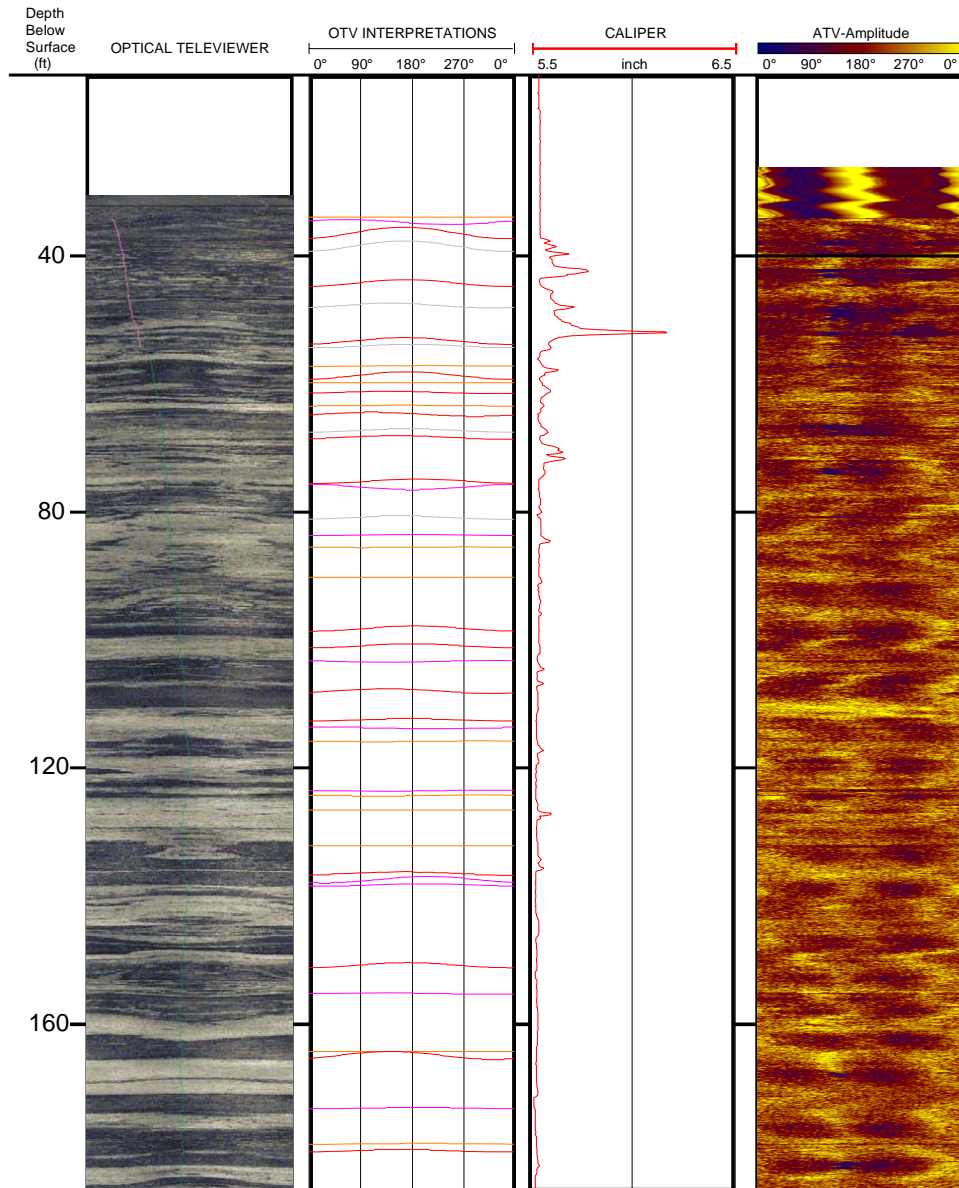
Depth to water: 7.28 ft 2.22 m
 Depth of casing: 34 ft 10.36 m
 Depth of well: 301 ft 91.74 m
 Land surface to MP: 1.97 ft 0.60 m

Fractures						Ambient			Pump at 0.5 gpm		
number	depth (m)	depth (ft)	Azimuth	Dip	Type	Flow (y/n)	gpm	notes	Flow (y/n)	gpm	notes
1	10.4	34.0	232	5	s	n	0		n	0.50	
2	10.6	34.7	153	66	t	n	0		n	0.50	
3	11.1	36.3	256	80	p	n	0		n	0.50	
4	11.7	38.5	257	79	p	y	-0.16	flow in	y	0.50	flow in
5	13.5	44.2	259	74	p	n	-0.16		n	0.18	
6	14.6	47.8	231	66	p	y	-0.27	flow in	y	0.18	flow in
7	16.2	53.3	256	72	p	n	-0.27		n	0.00	
8	16.5	54.1	270	61	p	y	-0.4	flow in	y	-0.04	flow in
9	17.4	57.2	303	18	s	n	-0.4		n	-0.05	
10	17.9	58.7	261	74	p	n	-0.4		n	-0.05	
11	18.2	59.8	270	0	s	n	-0.4		n	-0.05	
12	18.7	61.3	227	48	p	n	-0.4		n	-0.05	
13	19.3	63.4	253	18	s	n	-0.4		n	-0.05	
14	19.7	64.8	199	63	p	n	-0.4		n	-0.05	
15	20.5	67.2	264	59	p	y	-0.52	flow in	y	-0.23	flow in
16	20.9	68.4	241	57	p	n	-0.52		n	-0.23	
17	22.9	75.2	280	64	p	n	-0.52		n	-0.23	
18	23.2	76.1	90	68	t	n	-0.52		n	-0.23	
19	24.7	80.9	249	59	p	n	-0.52		y	-0.97	flow in
20	25.5	83.6	275	25	s	n	-0.52		n	-0.97	
21	26.1	85.5	3	16	s	n	-0.52		n	-0.97	
22	27.5	90.2	270	0	s	n	-0.52		n	-0.97	
23	29.9	98.2	275	68	p	n	-0.52		n	-0.97	
24	30.8	100.9	271	62	p	n	-0.52		n	-0.97	
25	31.5	103.4	46	40	t	n	-0.52		n	-0.97	
26	32.9	108.0	225	66	p	n	-0.52		n	-0.97	
27	34.3	112.5	264	47	p	n	-0.52		n	-0.97	
28	34.7	113.8	126	27	t	n	-0.52		n	-0.97	
29	35.3	115.8	27	18	s	n	-0.52		n	-0.97	
30	37.7	123.6	35	26	t	n	-0.52		n	-0.97	
31	37.9	124.3	31	22	s	n	-0.52		n	-0.97	
32	38.6	126.6	54	7	s	n	-0.52		n	-0.97	
33	40.3	132.2	270	0	s	n	-0.52		n	-0.97	
34	41.6	136.5	254	55	p	n	-0.52		n	-0.97	
35	41.9	137.5	296	72	t	n	-0.52		n	-0.97	
36	42.2	138.3	290	53	t	n	-0.52		n	-0.97	
37	46.0	150.8	261	68	p	n	-0.52		n	-0.97	
38	47.3	155.3	213	27	t	n	-0.52		n	-0.97	
39	50.1	164.3	163	3	s	n	-0.52		n	-0.97	
40	50.3	164.9	231	75	p	n	-0.52		n	-0.97	
41	52.8	173.1	280	26	t	n	-0.52		n	-0.97	
42	54.5	178.7	291	20	s	n	-0.52		n	-0.97	
43	54.8	179.8	252	50	p	n	-0.52		n	-0.97	
44	59.4	194.8	205	76	p	n	-0.52		n	-0.97	
45	67.8	222.3	182	33	t	n	-0.52		n	-0.97	
46	68.7	225.2	209	78	p	n	-0.52		n	-0.97	
47	71.0	232.8	280	11	s	n	-0.52		n	-0.97	
48	71.5	234.7	165	15	s	n	-0.52		y	-0.97	
49	72.6	238.1	178	71	t	n	-0.52		n	-0.97	
50	76.5	251.0	275	61	p	n	-0.52		n	-0.97	

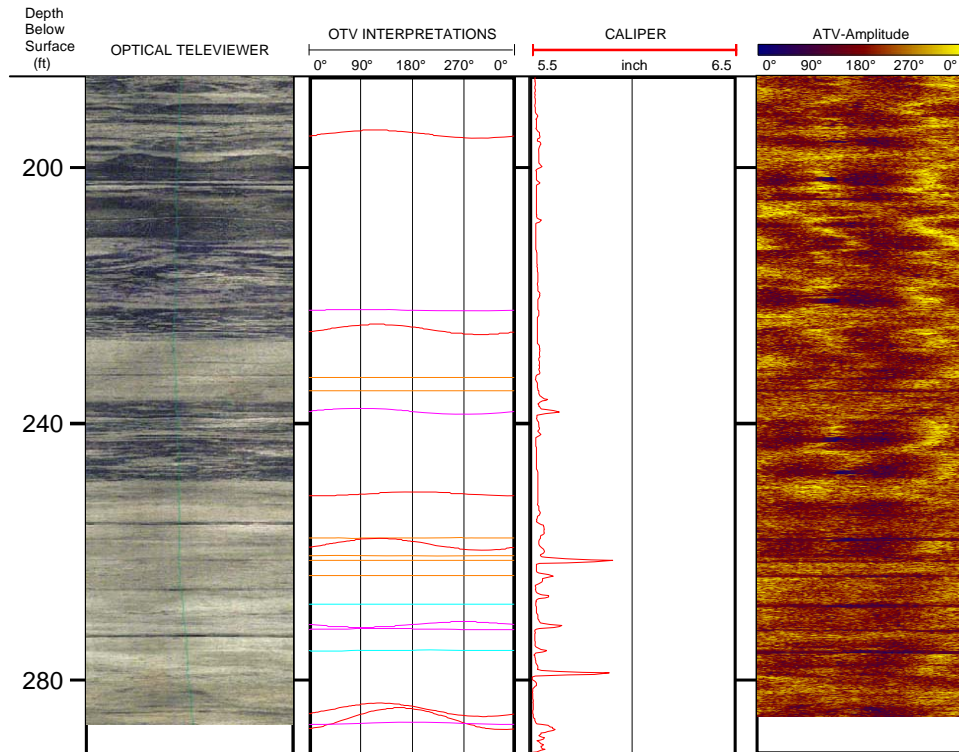
Appendix 15, continued. Midpoint depth, strike and dip of features identified in optical televiewer log, fracture type and heat pulse flowmeter data from Sto 1 (azimuth and dip reported using right hand rule convention; t = tectonic fractures, s = sheeting joints, p = foliation parallel fractures). Data shown under the pumping test have been normalized.

51	78.8	257.8	348	18	s	n	-0.52		n	-0.97
52	78.9	258.7	212	80	p	n	-0.52		n	-0.97
53	79.4	260.5	138	18	s	n	-0.52		n	-0.97
54	79.7	261.4	341	10	s	n	-0.52		n	-0.97
55	80.4	263.7	290	7	s	n	-0.52		n	-0.97
56	81.8	268.2	321	15	s	y	-0.62	flow in	y	-1.08 flow in
57	82.7	271.4	0	70	t	n	-0.62		n	-1.08
58	82.9	272.1	218	25	s	n	-0.62		n	-1.08
59	83.9	275.4	303	18	s	y	-0.62	flow out	n	-1.08
60	86.8	284.7	213	81	p	n	0		n	-1.08
61	87.2	286.1	247	84	p	n	0		n	-1.08
62	87.4	286.8	270	50	t	n	0		n	-1.08

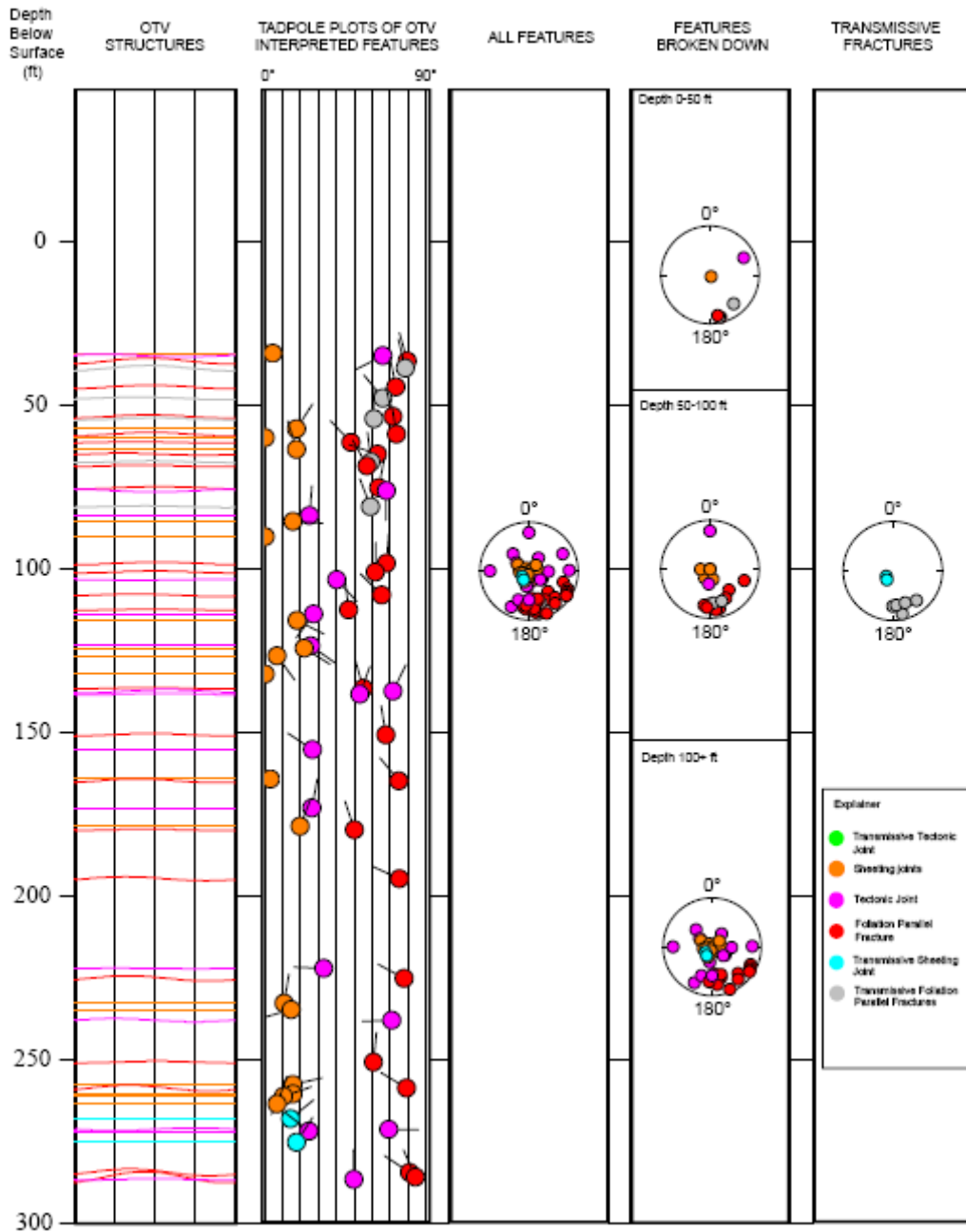
Appendix 15, continued. Interpreted features for Sto 1. Optical televiewer interpretations indicated by color: orange – subhorizontal sheeting joint; magenta – tectonic joint; red – foliation parallel fracture (FPF); cyan – transmissive subhorizontal sheeting joint; green – transmissive tectonic joint; grey – transmissive foliation parallel fracture (FPF). OTV – optical televiewer; ATV – acoustic televiewer.



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Appendix 15, continued. Tadpole plots and stereoplots of interpreted optical televiwer (OTV) structures for Sto 1. In the tadpole plot depth is plotted along the y-axis and magnitude of the dip plotted on the x-axis. The tail of the tadpole points in the direction of the dip, relative to true north, which is toward the top of the page. The stereonets represent poles to planar features plotted on a lower-hemisphere equal-area stereonet. Stereonets use right hand rule convention. Colors on the OTV structures plot correspond to those in the tadpole explanation.



Appendix 15, continued. Composite log for Sto 1 of natural gamma, fluid resistivity, fluid temperature and heat pulse flowmeter data under ambient and stressed (pumping) conditions. For the heat pulse flowmeter data collected under pumping conditions, the well was pumped at 0.5 gallons per minute and data have been normalized.

