Appendix 1. Borehole geophysical logs from boreholes on or near Miller Mountain, near Machiasport, Maine

Explanation Information for Appendixes

Abbreviations on log plots:

Acou Caliper, in inch	caliper measured by acoustic televiewer, in inches
ATV	acoustic televiewer traveltime
ATV Amp	acoustic televiewer amplitude
ATV Amp, in mV	acoustic televiewer amplitude, in millivolts
Azi	azimuth
Caliper, in inch	3-arm mechanical caliper, in inches
deg	degrees
dev	deviation
DO	dissolved oxygen
Eh, in mV	electromotive potential, in millivolts
EMI Cond, in mmho/m	electromagnetic induction conductivity, in millimhos per meter
Frax	fracture
FRX	fracture
gal/min	gallon(s) per minute
gpm	gallon(s) per minute
Fl Cond, in μS/cm	fluid conductivity, in microsiemens per centimeter
Gamma, in CPS	natural gamma radiation, in counts per second
HPFM Amb, in gal/min	heat-pulse flowmeter, under ambient conditions, in gallons per minute
HPFM Pump, in gal/min	heat-pulse flowmeter, under pumped conditions, in gallons per minute
LH	lower hemisphere
Lith	lithologic feature
ls	land surface
Max	maximum
Min	minimum
Mtn	Mountain
O2 ppm	dissolved oxygen, in parts per million
OTV	optical televiewer image
pH	pH
R8, in Ohm-m	normal resistivity with electrode spacing of 8 inches, in ohm-meters
R16, in Ohm-m	normal resistivity with electrode spacing of 16 inches, in ohm-meters
R32, in Ohm-m	normal resistivity with electrode spacing of 32 inches, in ohm-meters
R64, in Ohm-m	normal resistivity with electrode spacing of 64 inches, in ohm-meters
SP, in mV	spontaneous potential, in millivolts
SP Cond, in μS/cm	specific conductivity, in microsiemens per centimeter
SPR, in Ohm	single point resistance, in ohms
Std. Dev.	standard deviation
T-Frax	transmissive fracture
tad	tadpole
Temp, in deg F	temperature, in degrees Fahrenheit
TN	true north
toc	top of casing
tt	travel time
Tx	transmissive

Image log interpretation:

Interpretations of structure from the image logs are shown in three forms, including projection, stereo, and tadpole plots. A consistent color code was used for all three plots. In addition, lithologic features are shown in the tadpole and stereoplots with squares, so as to distinguish them from interpreted fractures. Fractures interpreted as transmissive and shown with blue dots, were determined to be transmissive using the heat-pulse flowmeter. Transmissive fractures coded with blue squares were inferred to be transmissive from fluid conductivity, temperature, or other water-quality parameter logs.

- Transmissive fracture
- Large fracture
- Minor fracture
- Partial fracture
- Sealed fracture
- Possible fracture
- Lithologic feature
- Transmissive fracture, inferred from fluid logs

Example of interpretation of borehole imaging data:

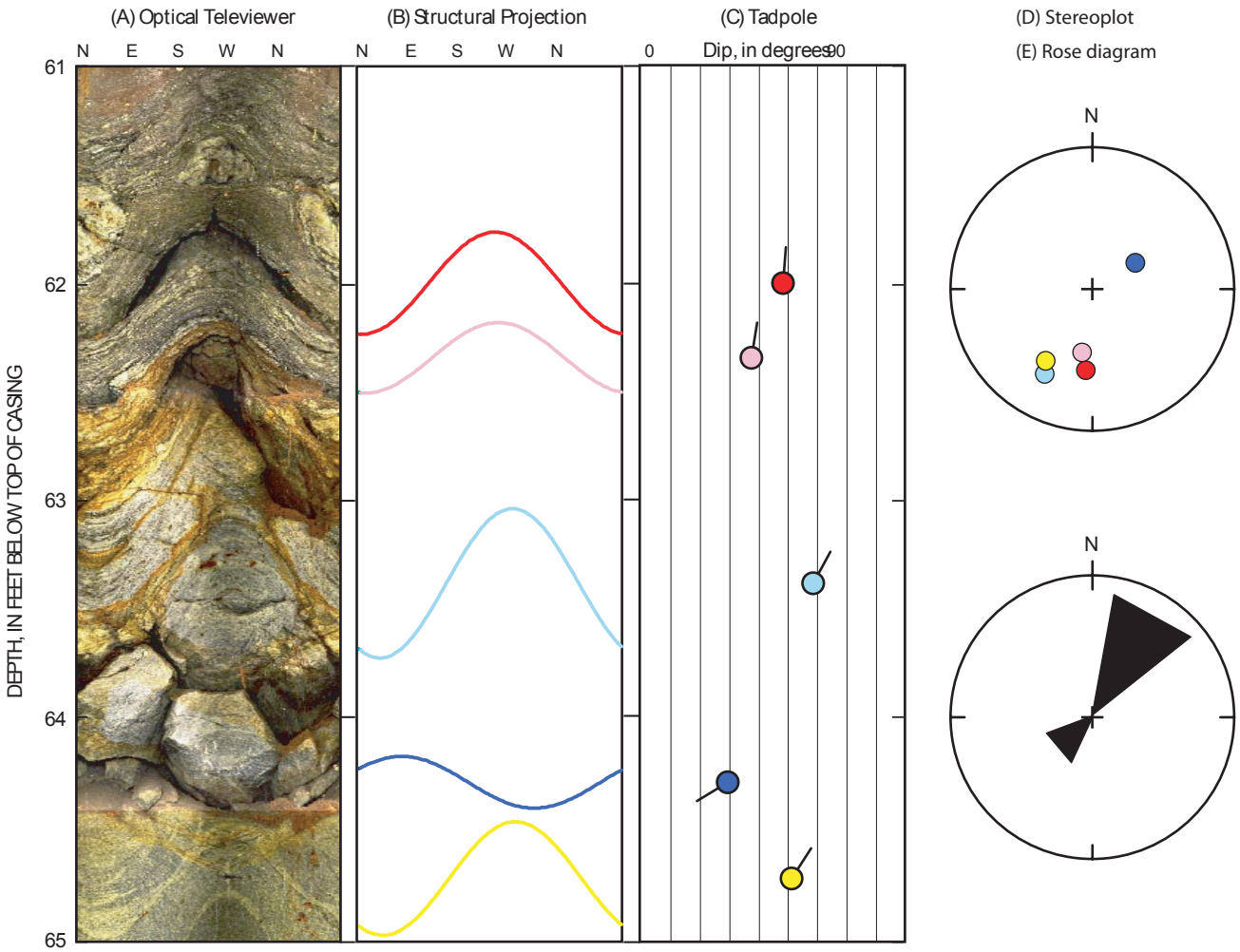


Figure. Example of interpretation of borehole imaging data.
(A) Optical televiewer image and the corresponding interpretation of planar data in (B) structural, (C) tadpole, and (D) stereographic projection plots. The trace of the features on the structural projection (B) directly overlays on the image (A). In the tadpole plot (C), depth is plotted along the y axis, and the magnitude of dip is plotted on the x axis. The tail of the tadpole points in the direction of dip relative to True North, which is at the top of the page. The poles to the planar features are shown in a lower-hemisphere equal-area stereonet (stereoplot) (D), which reduces the plane to a point. (E) Rose diagram, which shows frequency of dip direction.

Appendix 1.

Borehole geophysical logs from boreholes on or near Miller Mountain, near Machiasport, Maine

A. Borehole MW-13

Figure 1A–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole MW-13, near Machiasport, Maine.

Figure 1A–2. Borehole deviation logs for borehole MW-13, near Machiasport, Maine.

Table 1A–1. Interpretation of acoustic televiewer logs for borehole MW-13, near Machiasport, Maine.

Figure 1A–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole MW-13, near Machiasport, Maine.

B. Borehole DW-22

Figure 1B–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-22, near Machiasport, Maine.

Figure 1B–2. Borehole deviation logs for borehole DW-22, near Machiasport, Maine.

Table 1B–1. Interpretation of acoustic televiewer logs for borehole DW-22, near Machiasport, Maine.

Table 1B–2. Interpretation of optical televiewer logs for borehole DW-22, near Machiasport, Maine.

Figure 1B–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-22, near Machiasport, Maine.

Figure 1B–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-22, near Machiasport, Maine.

C. Borehole DW-23

Figure 1C–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-23, near Machiasport, Maine.

Figure 1C–2. Borehole deviation logs for borehole DW-23, near Machiasport, Maine.

Table 1C–1. Interpretation of acoustic televiewer logs for borehole DW-23, near Machiasport, Maine.

Table 1C–2. Interpretation of optical televiewer logs for borehole DW-23, near Machiasport, Maine.

Figure 1C–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-23, near Machiasport, Maine.

Figure 1C–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-23, near Machiasport, Maine.

D. Borehole DW-24

Figure 1D–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-24, near Machiasport, Maine.

Figure 1D–2. Borehole deviation logs for borehole DW-24, near Machiasport, Maine.

Table 1D–1. Interpretation of acoustic televiewer logs for borehole DW-24, near Machiasport, Maine.

Figure 1D–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-24, near Machiasport, Maine.

Figure 1D–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-24, near Machiasport, Maine.

E. Borehole DW-25

Figure 1E–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-25, near Machiasport, Maine.

Figure 1E–2. Borehole deviation logs for borehole DW-25, near Machiasport, Maine.

Table 1E–1. Interpretation of acoustic televiewer logs for borehole DW-25, near Machiasport, Maine.

Figure 1E–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-25, near Machiasport, Maine.

Figure 1E–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-25, near Machiasport, Maine.

F. Borehole DW-31

Figure 1F–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-31, near Machiasport, Maine.

Figure 1F–2. Borehole deviation logs for borehole DW-31, near Machiasport, Maine.

Table 1F–1. Interpretation of acoustic televiewer logs for borehole DW-31, near Machiasport, Maine.

Table 1F–2. Interpretation of optical televiewer logs for borehole DW-31, near Machiasport, Maine.

Figure 1F–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-31, near Machiasport, Maine.

Figure 1F–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-31, near Machiasport, Maine.

G. Borehole DW-32

Figure 1G–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-32, near Machiasport, Maine.

Figure 1G–2. Borehole deviation logs for borehole DW-32, near Machiasport, Maine.

Table 1G–1. Interpretation of acoustic televiewer logs for borehole DW-32, near Machiasport, Maine.

Figure 1G–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-32, near Machiasport, Maine.

Figure 1G–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-32, near Machiasport, Maine.

H. Borehole DW-33

Figure 1H–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-33, near Machiasport, Maine.

Figure 1H–2. Borehole deviation logs for borehole DW-33, near Machiasport, Maine.

Table 1H–1. Interpretation of acoustic televiewer logs for borehole DW-33, near Machiasport, Maine.

Figure 1H–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-33, near Machiasport, Maine.

Figure 1H–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-33, near Machiasport, Maine.

I. Borehole DW-34

Figure 1I–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-34, near Machiasport, Maine.

Figure 1I–2. Borehole deviation logs for borehole DW-34, near Machiasport, Maine. Deviation (tilt) data interpolated from 95 to 295 feet below top of casing.

Table 1I–1. Interpretation of acoustic televiewer logs for borehole DW-34, near Machiasport, Maine.

Figure 1I–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-34, near Machiasport, Maine.

Figure 1I–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-34, near Machiasport, Maine.

J. Borehole DW-39

Figure 1J–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-39, near Machiasport, Maine.

Figure 1J–2. Borehole deviation logs for borehole DW-39, near Machiasport, Maine.

Table 1J–1. Interpretation of acoustic televiewer logs for borehole DW-39, near Machiasport, Maine.

Figure 1J–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-39, near Machiasport, Maine.

Figure 1J–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-39, near Machiasport, Maine.

K. Borehole DW-40

Figure 1K–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-40, near Machiasport, Maine.

Figure 1K–2. Borehole deviation logs for borehole DW-40, near Machiasport, Maine.

Table 1K–1. Interpretation of acoustic televiewer logs for borehole DW-40, near Machiasport, Maine.

Figure 1K–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-40, near Machiasport, Maine.

Figure 1K–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-40, near Machiasport, Maine.

L. Borehole WY-GATR

Figure 1L–1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, dissolved oxygen, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole WY-GATR, near Machiasport, Maine.

Figure 1L–2. Borehole deviation logs for borehole WY-GATR, near Machiasport, Maine.

Table 1L–1. Interpretation of acoustic televiewer logs for borehole WY-GATR, near Machiasport, Maine.

Table 1L–2. Interpretation of optical televiewer logs for borehole WY-GATR, near Machiasport, Maine.

Figure 1L–3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole WY-GATR, near Machiasport, Maine.

Figure 1L–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole WY-GATR, near Machiasport, Maine.

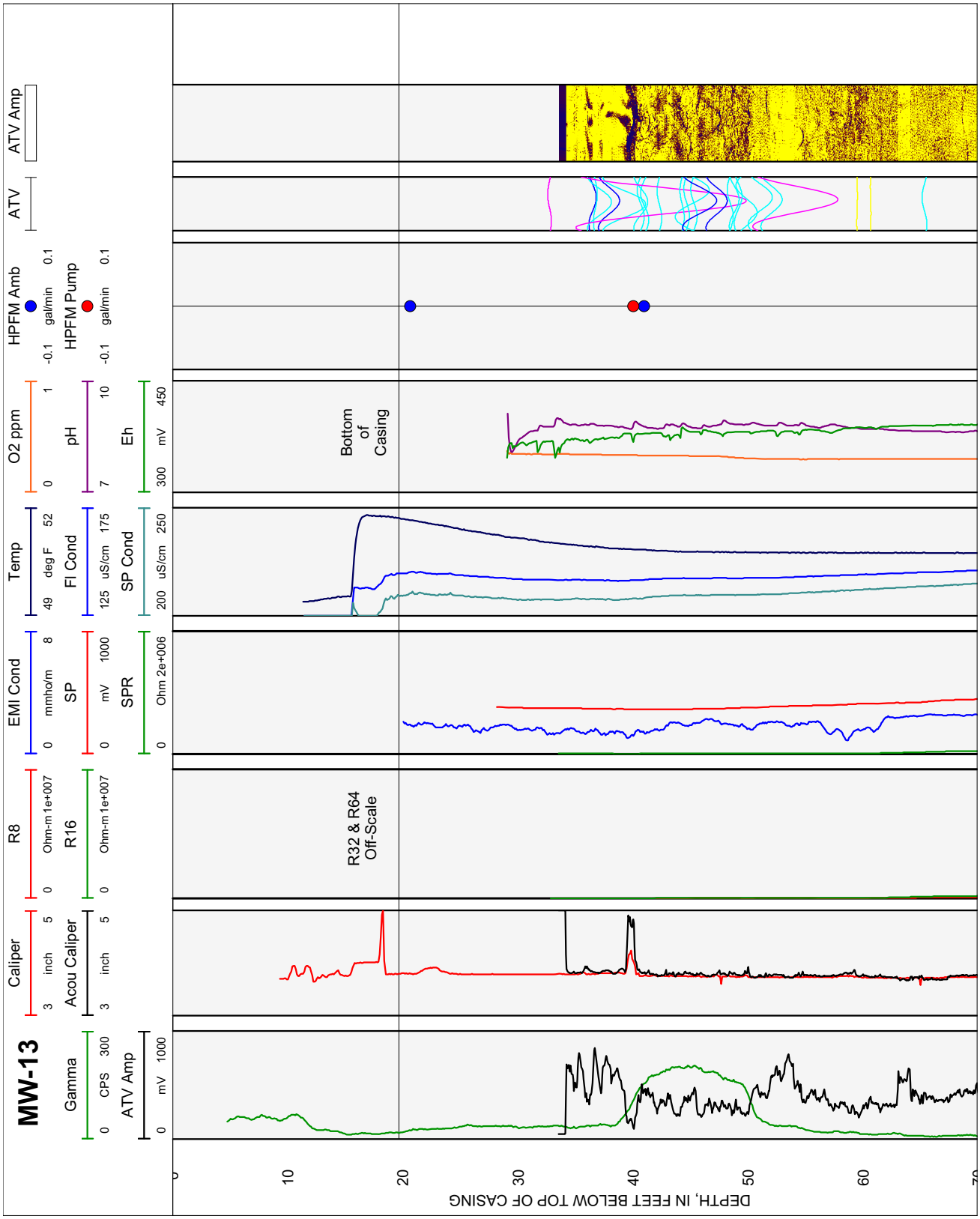


Figure 1A-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole MW-13, near Machiasport, Maine.

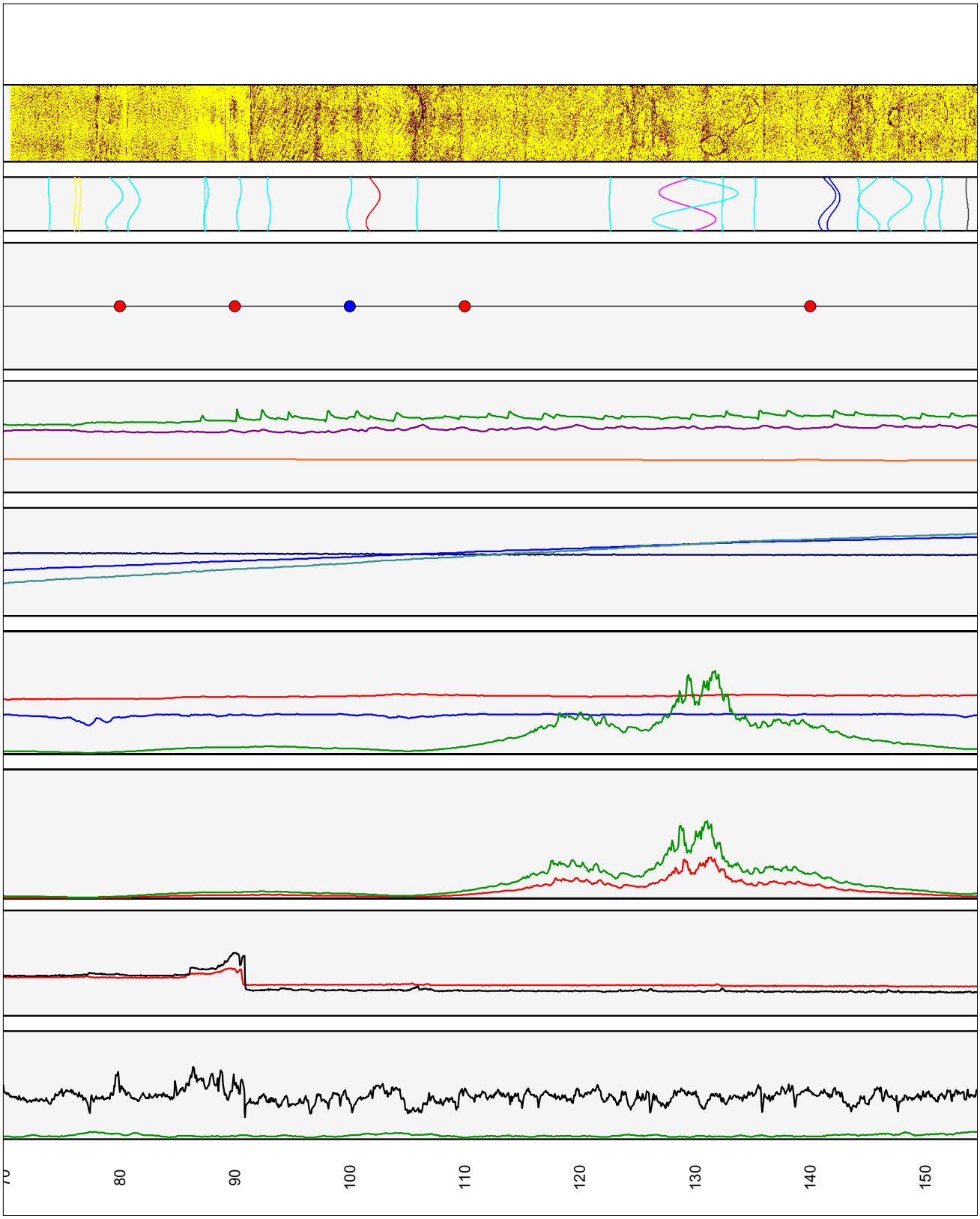


Figure 1A-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole MW-13, near Machiasport, Maine.—Continued

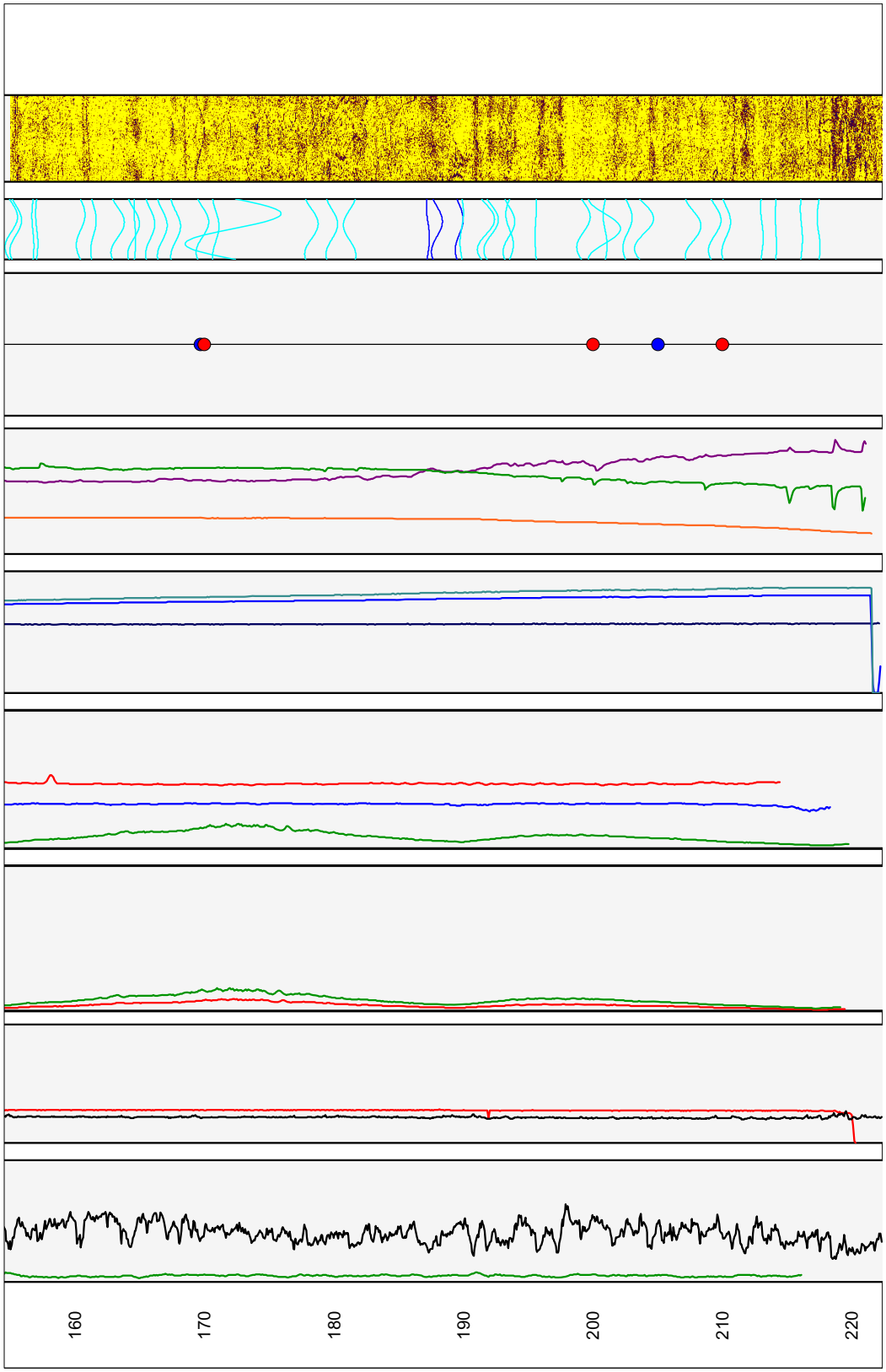


Figure 1A-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole MW-13, near Machiasport, Maine.—Continued

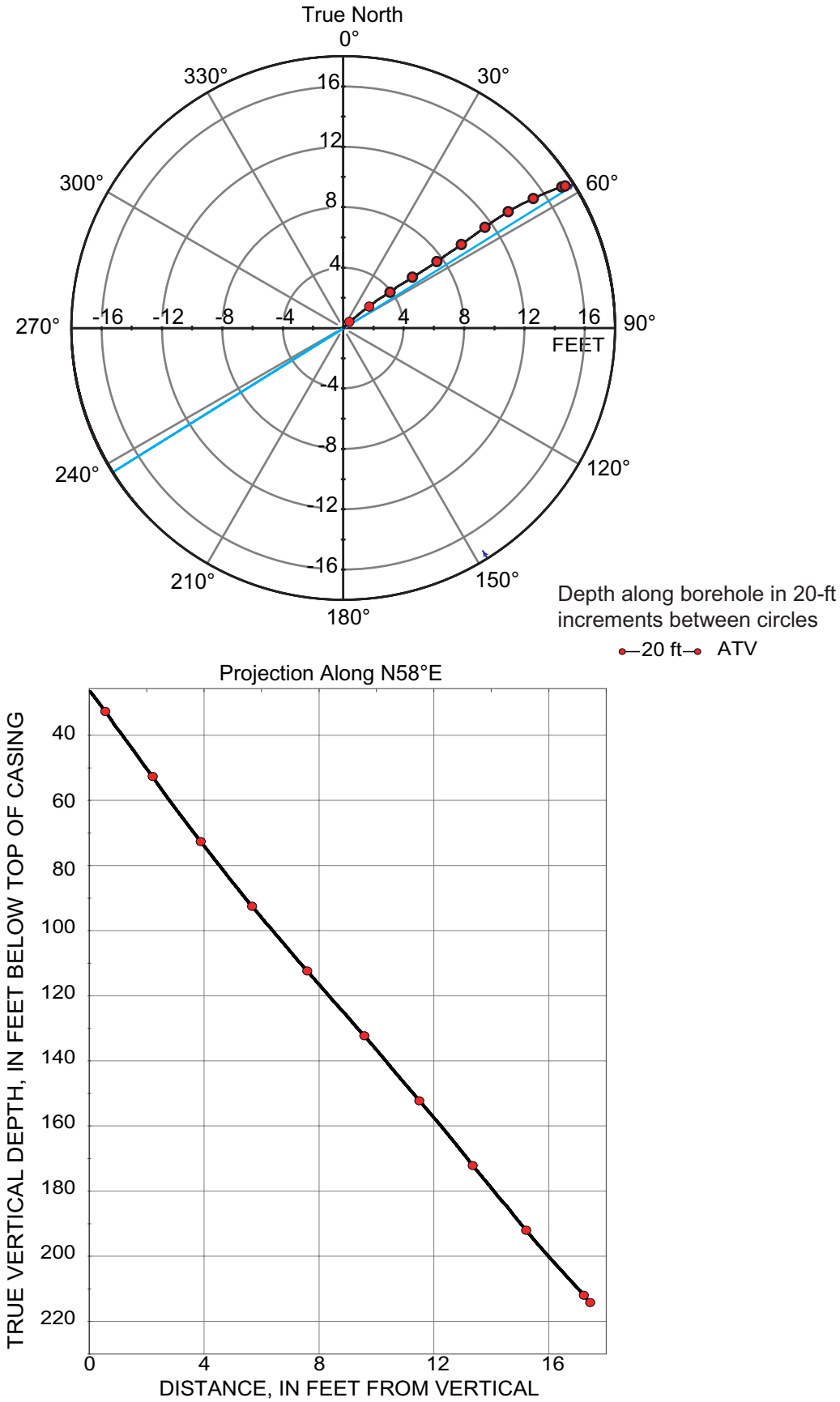


Figure 1A-2. Borehole deviation logs for borehole MW-13, near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer]

Table 1A–1. Interpretation of acoustic televiewer logs for borehole MW-13, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 3.48 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
34.13	10.40	240	150	5	SW	Nearly horizontal	Minor fracture
36.22	11.04	64	334	51	NE	Steep	Partial fracture
39.94	12.17	222	132	68	SW	Steep	Transmissive fracture, inferred from fluid logs
40.18	12.25	242	152	53	SW	Steep	Minor fracture
40.56	12.36	192	102	83	S	Nearly vertical	Minor fracture
41.37	12.61	201	111	82	S	Nearly vertical	Transmissive fracture, inferred from fluid logs
42.72	13.02	178	88	86	S	Nearly vertical	Minor fracture
44.13	13.45	92	2	67	E	Steep	Minor fracture
44.14	13.45	194	104	78	S	Nearly vertical	Minor fracture
44.45	13.55	72	342	70	E	Nearly vertical	Minor fracture
45.75	13.94	86	356	58	E	Steep	Minor fracture
45.92	14.00	200	110	89	S	Nearly vertical	Partial fracture
47.70	14.54	89	359	55	E	Steep	Minor fracture
48.12	14.67	99	9	62	E	Steep	Minor fracture
48.60	14.81	272	182	85	W	Nearly vertical	Minor fracture
48.77	14.86	96	6	65	E	Steep	Minor fracture
49.25	15.01	203	113	85	SW	Nearly vertical	Transmissive fracture, inferred from fluid logs
50.72	15.46	200	110	82	S	Nearly vertical	Transmissive fracture, inferred from fluid logs
51.92	15.82	96	6	64	E	Steep	Minor fracture
52.23	15.92	211	121	73	SW	Nearly vertical	Minor fracture
52.57	16.02	230	140	69	SW	Steep	Minor fracture
53.33	16.25	123	33	82	SE	Nearly vertical	Minor fracture
54.53	16.62	224	134	83	SW	Nearly vertical	Minor fracture
55.49	16.91	209	119	82	SW	Nearly vertical	Minor fracture
57.55	17.54	209	119	88	SW	Nearly vertical	Partial fracture
62.95	19.19	233	143	12	SW	Shallow	Possible fracture
64.12	19.54	115	25	11	SE	Shallow	Possible fracture
68.78	20.96	42	312	59	NE	Steep	Minor fracture
77.34	23.57	116	26	23	SE	Shallow	Minor fracture
79.62	24.27	250	160	31	W	Moderate	Possible fracture
80.00	24.38	241	151	36	SW	Moderate	Possible fracture
83.00	25.30	236	146	80	SW	Nearly vertical	Minor fracture
84.69	25.81	209	119	76	SW	Nearly vertical	Minor fracture
90.88	27.70	261	171	5	W	Nearly horizontal	Minor fracture
90.98	27.73	256	166	59	W	Steep	Minor fracture
93.85	28.60	279	189	57	W	Steep	Minor fracture
96.44	29.39	128	38	51	SE	Steep	Minor fracture
103.44	31.53	293	203	59	NW	Steep	Minor fracture
105.49	32.15	235	145	78	SW	Nearly vertical	Minor fracture
109.33	33.32	288	198	29	W	Shallow	Minor fracture
116.43	35.49	274	184	30	W	Shallow	Minor fracture
126.07	38.42	7	277	16	N	Shallow	Minor fracture
132.82	40.48	77	347	87	E	Nearly vertical	Partial fracture
133.49	40.69	252	162	88	W	Nearly vertical	Minor fracture
135.86	41.41	285	195	22	W	Shallow	Minor fracture
138.68	42.27	289	199	22	W	Shallow	Minor fracture
144.98	44.19	237	147	80	SW	Nearly vertical	Transmissive fracture, inferred from fluid logs
145.52	44.35	221	131	77	SW	Nearly vertical	Transmissive fracture, inferred from fluid logs
147.65	45.00	236	146	38	SW	Moderate	Minor fracture
148.55	45.28	30	300	82	NE	Nearly vertical	Minor fracture

Table 1A–1. Interpretation of acoustic televiewer logs for borehole MW-13, near Machiasport, Maine.—Continued

[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 3.48 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
151.29	46.11	224	134	83	SW	Nearly vertical	Minor fracture
153.69	46.84	249	159	66	W	Steep	Minor fracture
154.80	47.18	292	202	47	W	Moderate	Minor fracture
157.13	47.89	110	20	37	E	Moderate	Lithlogic/foliation
158.53	48.32	253	163	75	W	Nearly vertical	Minor fracture
158.89	48.43	233	143	74	SW	Nearly vertical	Minor fracture
160.24	48.84	79	349	31	E	Moderate	Minor fracture
160.53	48.93	93	3	33	E	Moderate	Minor fracture
163.90	49.95	266	176	69	W	Steep	Minor fracture
164.89	50.26	233	143	59	SW	Steep	Minor fracture
166.75	50.82	221	131	76	SW	Nearly vertical	Minor fracture
168.02	51.21	213	123	74	SW	Nearly vertical	Minor fracture
168.08	51.23	117	27	27	SE	Shallow	Minor fracture
169.28	51.59	211	121	70	SW	Nearly vertical	Minor fracture
170.22	51.88	203	113	71	SW	Nearly vertical	Minor fracture
171.27	52.20	198	108	71	S	Nearly vertical	Minor fracture
173.29	52.82	223	133	75	SW	Nearly vertical	Minor fracture
174.34	53.14	198	108	62	S	Steep	Minor fracture
175.68	53.54	273	183	88	W	Nearly vertical	Minor fracture
181.72	55.39	212	122	76	SW	Nearly vertical	Minor fracture
183.30	55.87	210	120	74	SW	Nearly vertical	Minor fracture
184.70	56.29	25	295	75	NE	Nearly vertical	Minor fracture
190.73	58.13	128	38	41	SE	Moderate	Transmissive fracture, inferred from fluid logs
191.44	58.35	226	136	73	SW	Nearly vertical	Transmissive fracture, inferred from fluid logs
193.14	58.87	237	147	67	SW	Steep	Transmissive fracture, inferred from fluid logs
193.32	58.92	279	189	46	W	Moderate	Minor fracture
195.23	59.50	239	149	79	SW	Nearly vertical	Minor fracture
195.62	59.62	236	146	77	SW	Nearly vertical	Minor fracture
197.00	60.04	226	136	74	SW	Nearly vertical	Minor fracture
197.02	60.05	89	359	66	E	Steep	Minor fracture
199.07	60.67	314	224	22	NW	Shallow	Minor fracture
202.75	61.80	253	163	76	W	Nearly vertical	Minor fracture
204.35	62.28	184	94	84	S	Nearly vertical	Minor fracture
204.41	62.30	84	354	50	E	Steep	Minor fracture
206.16	62.83	248	158	70	W	Steep	Minor fracture
207.43	63.22	244	154	80	SW	Nearly vertical	Minor fracture
211.21	64.37	200	110	78	S	Nearly vertical	Minor fracture
212.89	64.89	234	144	75	SW	Nearly vertical	Minor fracture
213.75	65.15	224	134	69	SW	Steep	Minor fracture
216.52	65.99	129	39	38	SE	Moderate	Minor fracture
217.58	66.32	81	351	18	E	Shallow	Minor fracture
219.57	66.92	121	31	32	SE	Moderate	Minor fracture
220.90	67.33	71	341	42	E	Moderate	Minor fracture

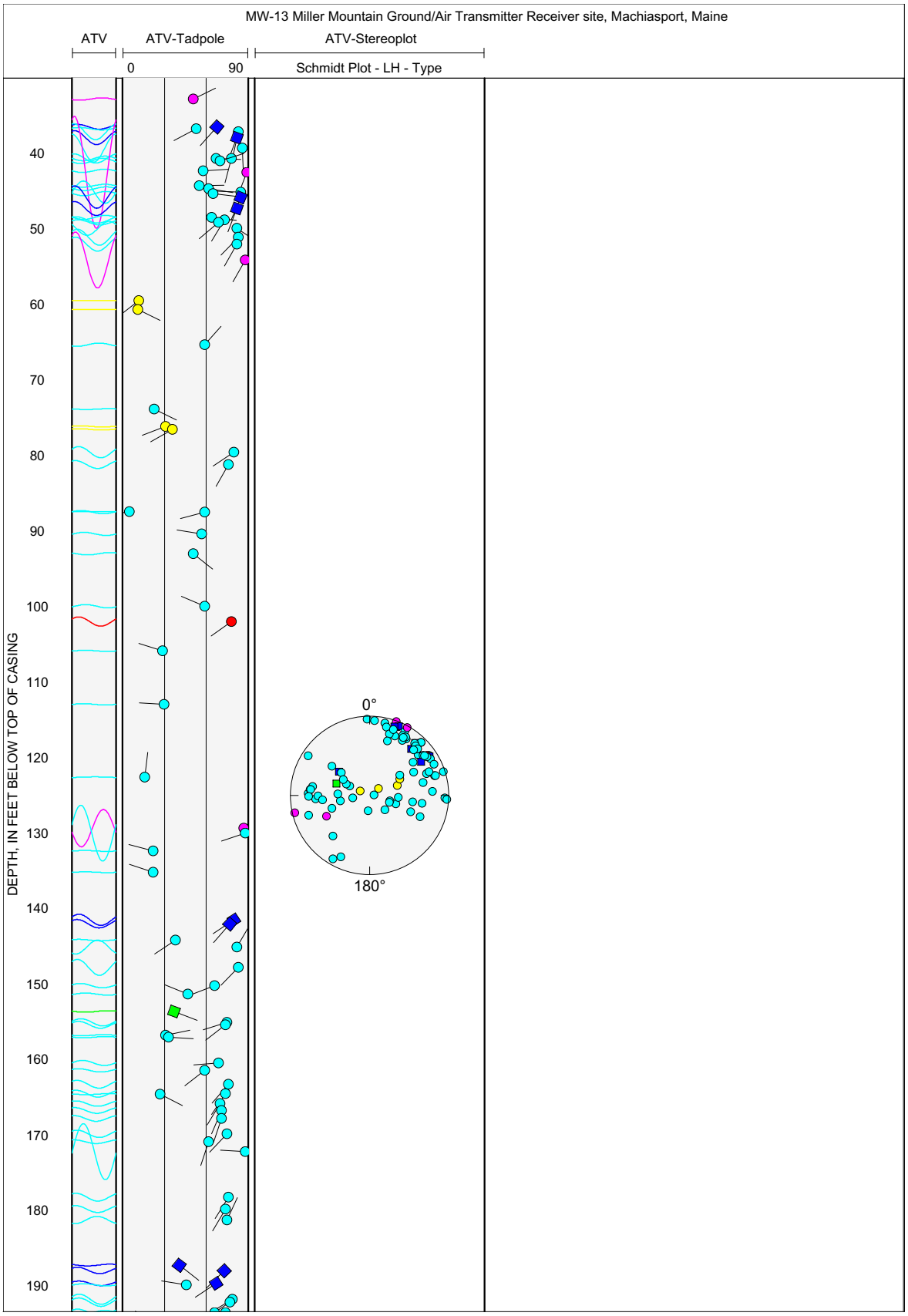


Figure 1A-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole MW-13, near Machiasport, Maine.

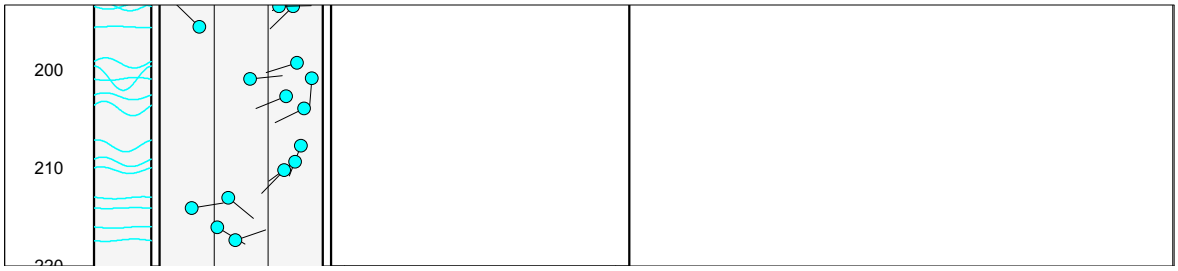


Figure 1A-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole MW-13, near Machiasport, Maine.—Continued

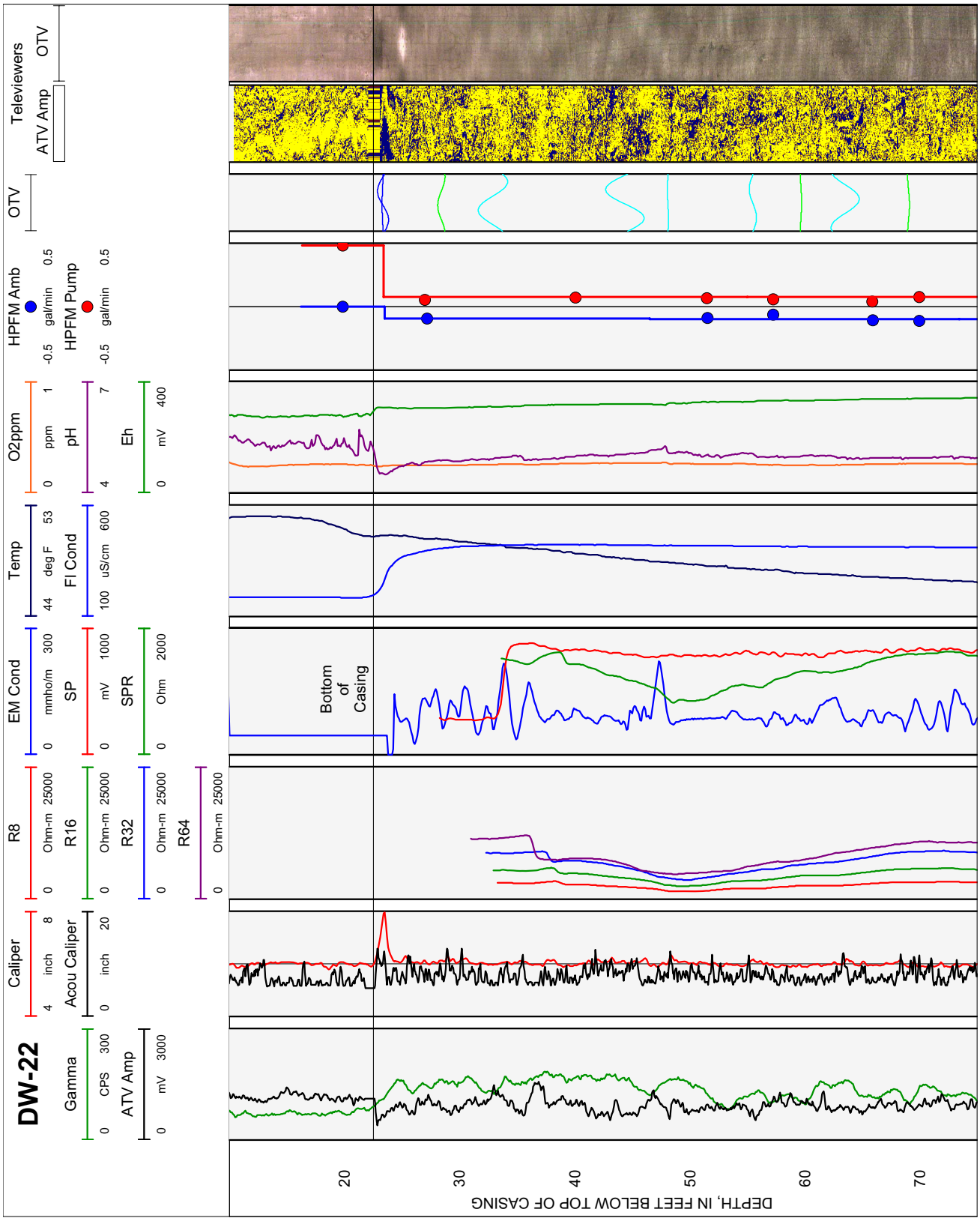


Figure 1B-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-22, near Machiasport, Maine.

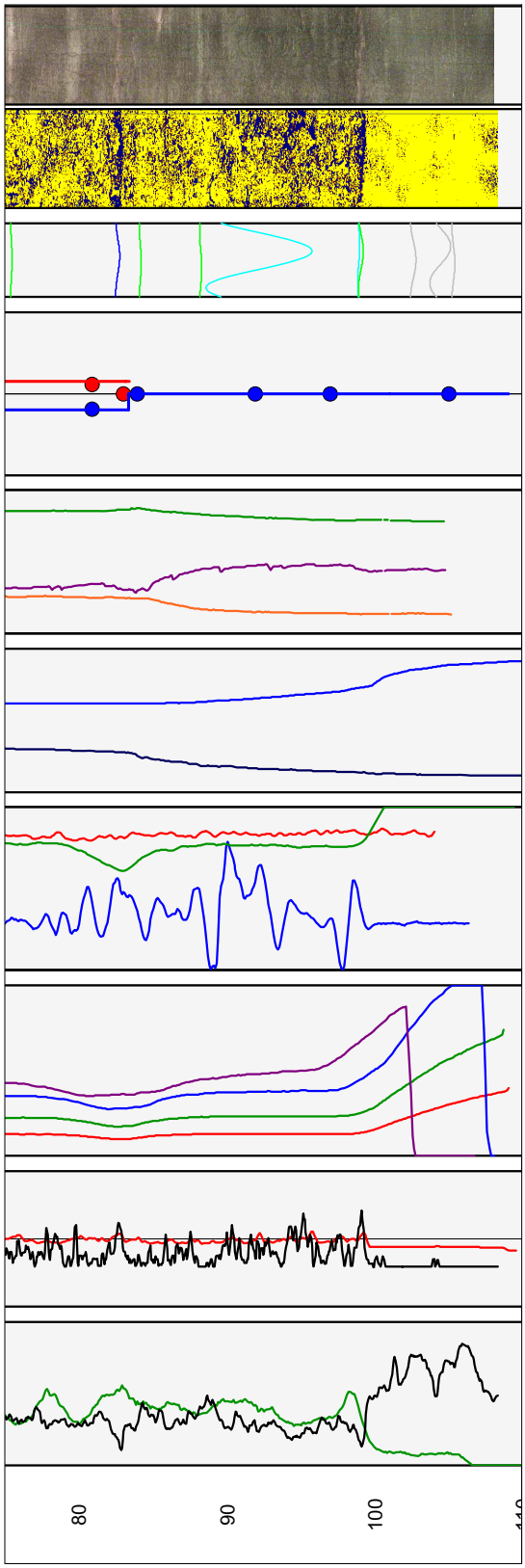


Figure 1B-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-22, near Machiasport, Maine.—Continued

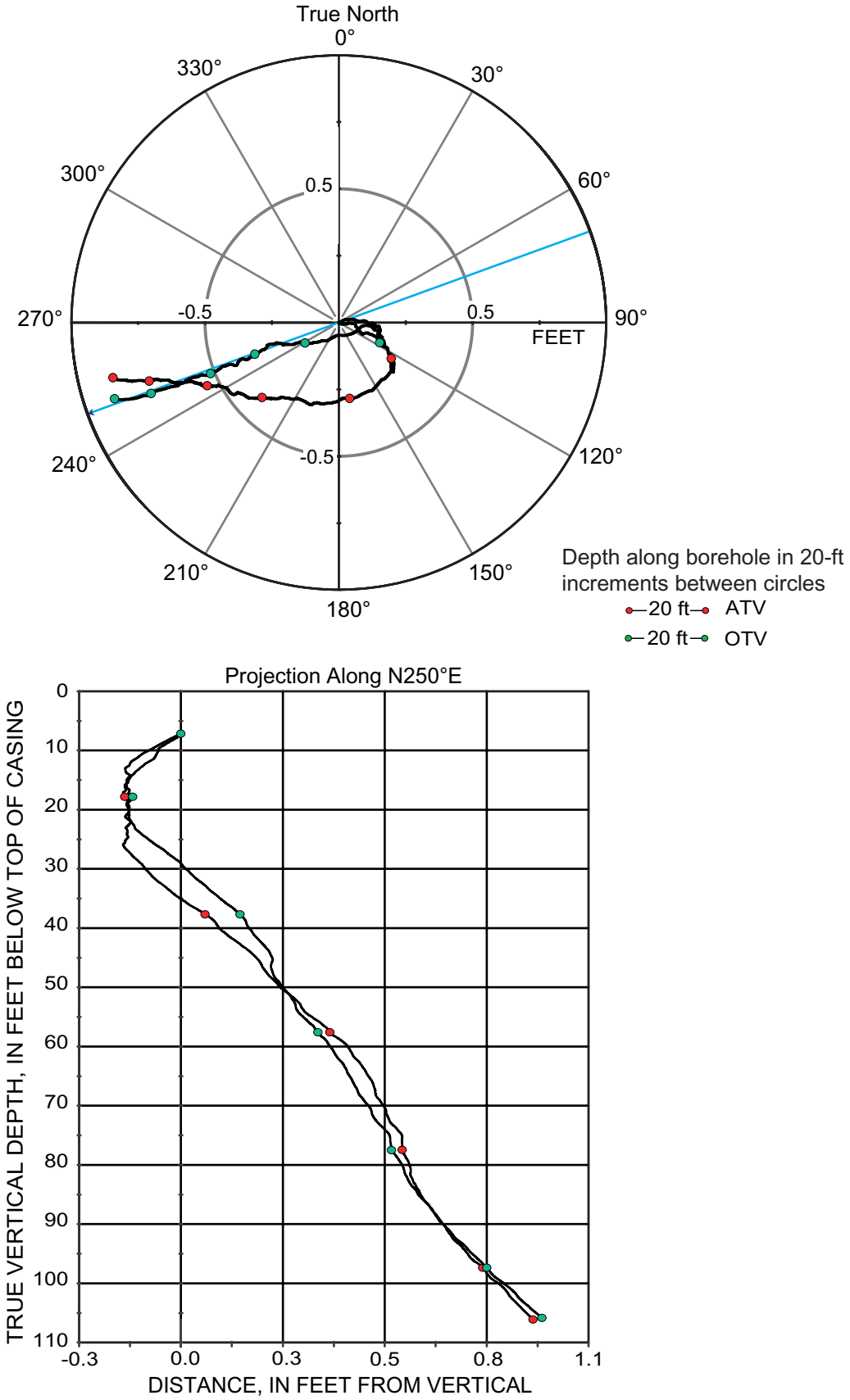


Figure 1B-2. Borehole deviation logs for borehole DW-22, near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer; OTV, optical televiewer]

Table 1B–1. Interpretation of acoustic televiewer logs for borehole DW-22, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 0.34 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
22.71	6.92	0	270	0	N	Horizontal	Bottom of casing
23.08	7.03	63	333	66	NE	Steep	Transmissive fracture
44.66	13.61	94	4	80	E	Nearly vertical	Fracture
48.17	14.68	180	90	21	S	Shallow	Minor fracture
51.92	15.82	230	140	39	SW	Moderate	Minor fracture
56.25	17.14	256	166	68	W	Steep	Minor fracture
82.89	25.26	208	118	27	SW	Shallow	Transmissive fracture
90.52	27.59	242	152	81	SW	Nearly vertical	Minor fracture
95.08	28.98	49	319	78	NE	Nearly vertical	Minor fracture
99.02	30.18	261	171	14	W	Shallow	Fracture
99.26	30.25	264	174	25	W	Shallow	Lithologic feature
104.54	31.86	255	165	72	W	Nearly vertical	Sealed feature

Table 1B–2. Interpretation of optical televiewer logs for borehole DW-22, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 0.34 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
22.46	6.85	5	275	0	N	Horizontal	Bottom of casing
23.31	7.10	349	259	9	N	Nearly horizontal	Transmissive, not well defined fracture
23.32	7.11	72	342	62	E	Steep	Transmissive, not well defined fracture
28.40	8.66	343	253	52	N	Steep	Lithologic feature
32.89	10.02	311	221	79	NW	Nearly vertical	Minor fracture
44.35	13.52	82	352	81	E	Nearly vertical	Minor fracture
48.08	14.65	77	347	11	E	Shallow	Minor fracture
55.49	16.91	86	356	51	E	Steep	Minor fracture
59.64	18.18	180	90	11	S	Shallow	Lithologic feature
63.51	19.36	203	113	78	SW	Nearly vertical	Minor fracture
69.03	21.04	166	76	18	S	Shallow	Lithologic feature
75.39	22.98	184	94	10	S	Shallow	Lithologic feature
82.59	25.17	199	109	27	S	Shallow	Transmissive fracture
84.12	25.64	168	78	14	S	Shallow	Lithologic feature
88.20	26.88	141	51	16	SE	Shallow	Lithologic feature
92.15	28.09	225	135	86	SW	Nearly vertical	Minor fracture
98.88	30.14	251	161	16	W	Shallow	Minor fracture
99.04	30.19	222	132	32	SW	Moderate	Lithologic feature
102.54	31.25	182	92	35	S	Moderate	Sealed feature
104.39	31.82	248	158	70	W	Nearly vertical	Sealed feature
105.29	32.09	164	74	22	S	Shallow	Sealed feature

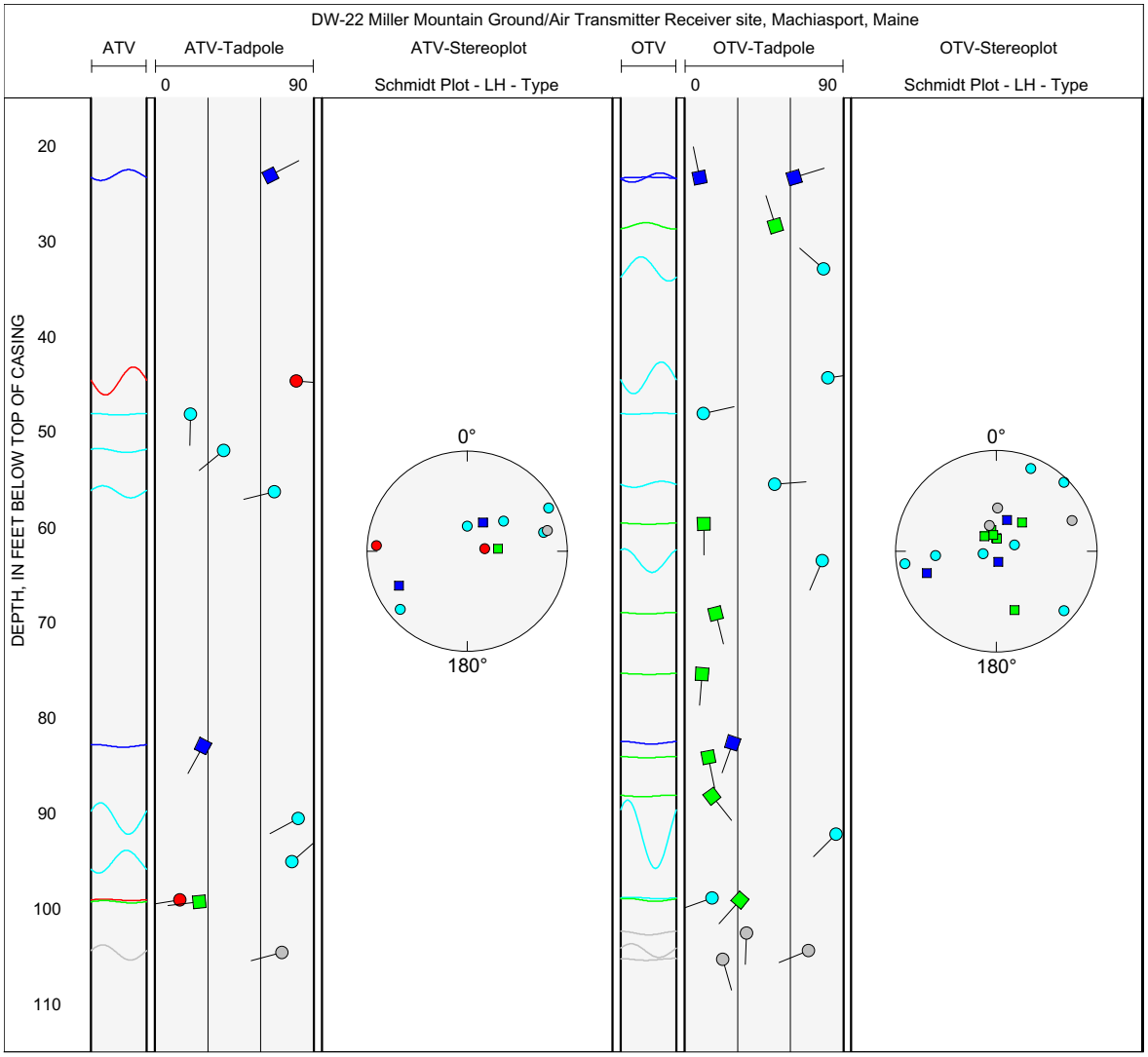


Figure 1B-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-22, near Machiasport, Maine.

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of measuring point	60	feet
Number of fractures	2	
Well diameter	6	inches
Drawdown	5.6	feet
Depth to ambient water level	6.7	feet

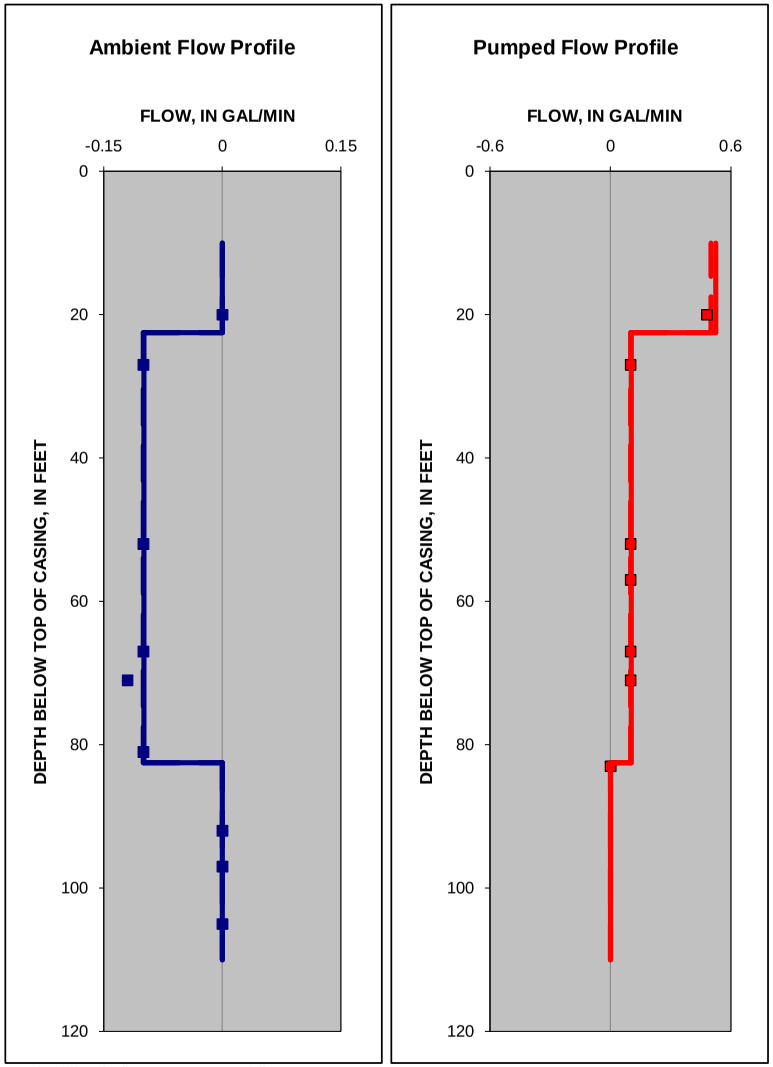
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)
2	22.5	0.00	0.50
1	82.5	-0.10	0.10

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, ambient water level	53.30	feet
Elevation, pumped water level	47.70	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)	Zone trans-missivity (ft^2/d)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
2	22.5	0.000	0.524	11.66	5.08	54.92	63
1	82.5	-0.099	0.104	6.82	9.48	50.52	37

Total borehole transmissivity	18.5	(ft^2/d)
Sum of squares error	0.00060	$(gal/min)^2$
Root mean square error	0.01737	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1B–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-22, near Machiasport, Maine.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]

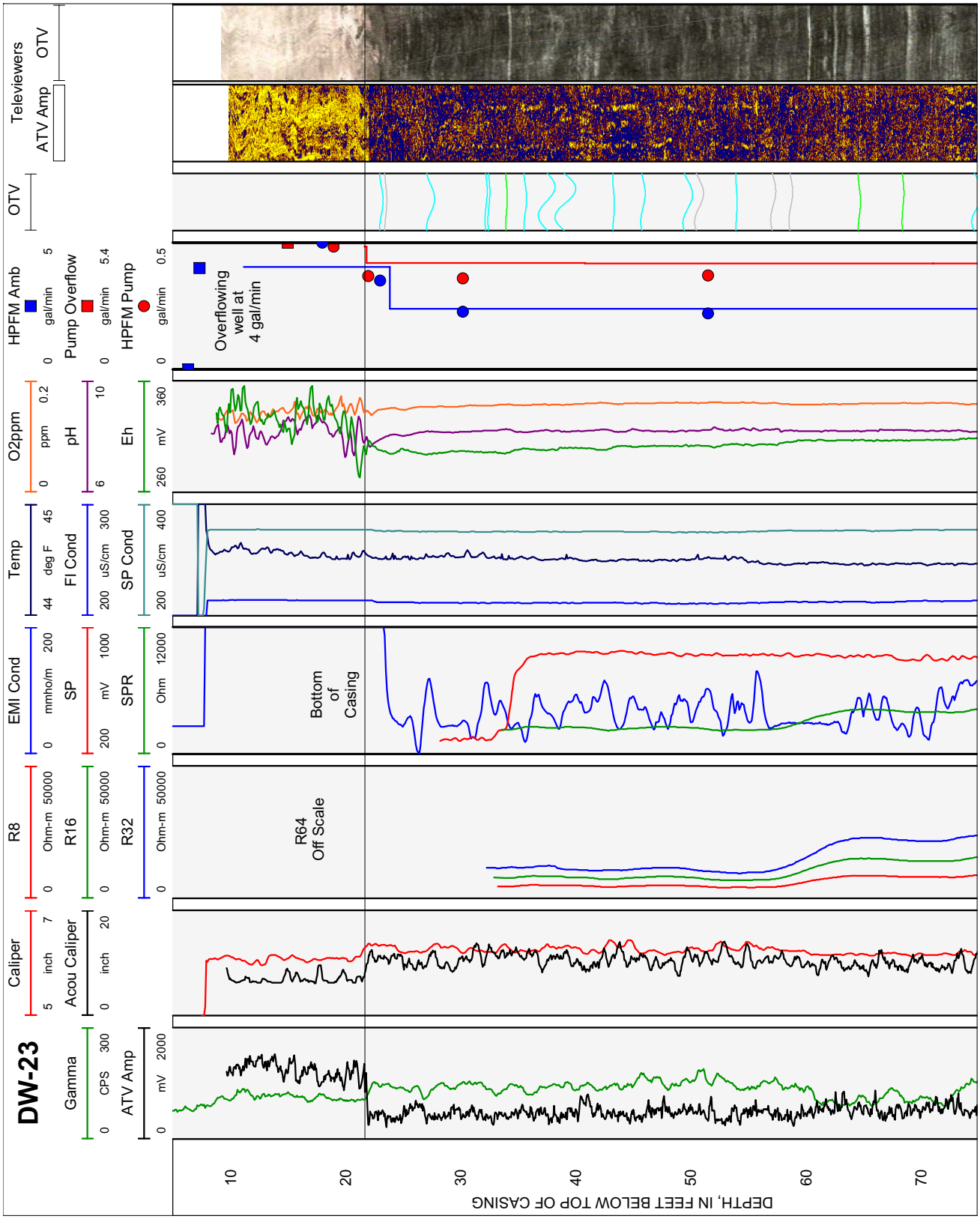


Figure 1C-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-23, near Machiasport, Maine.

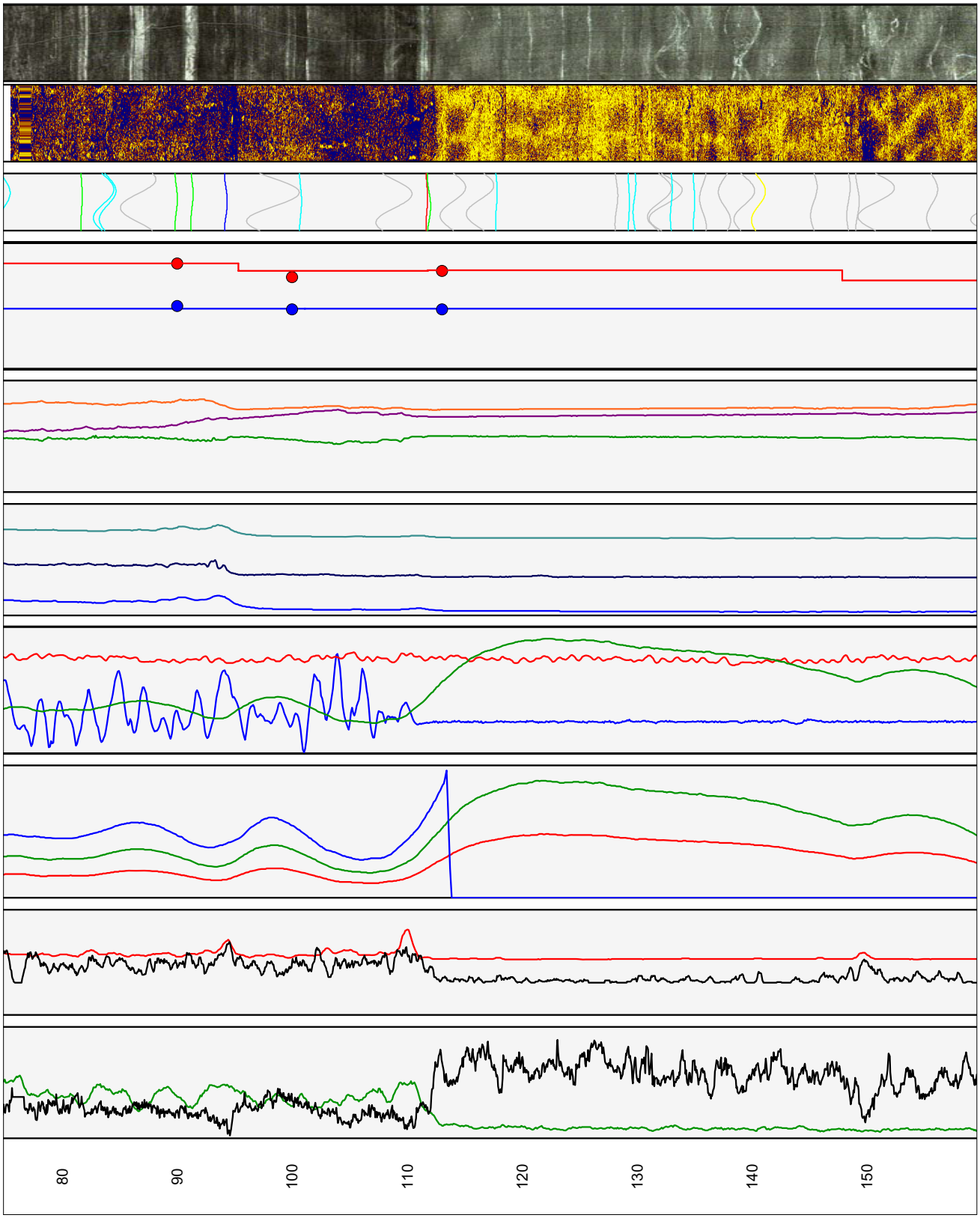


Figure 1C-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-23, near Machiasport, Maine.—Continued

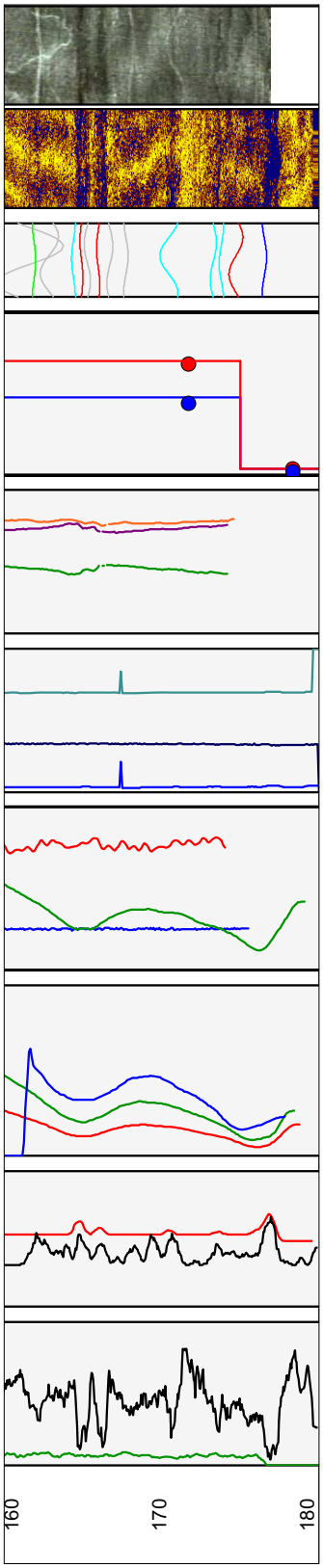


Figure 1C-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-23, near Machiasport, Maine.—Continued

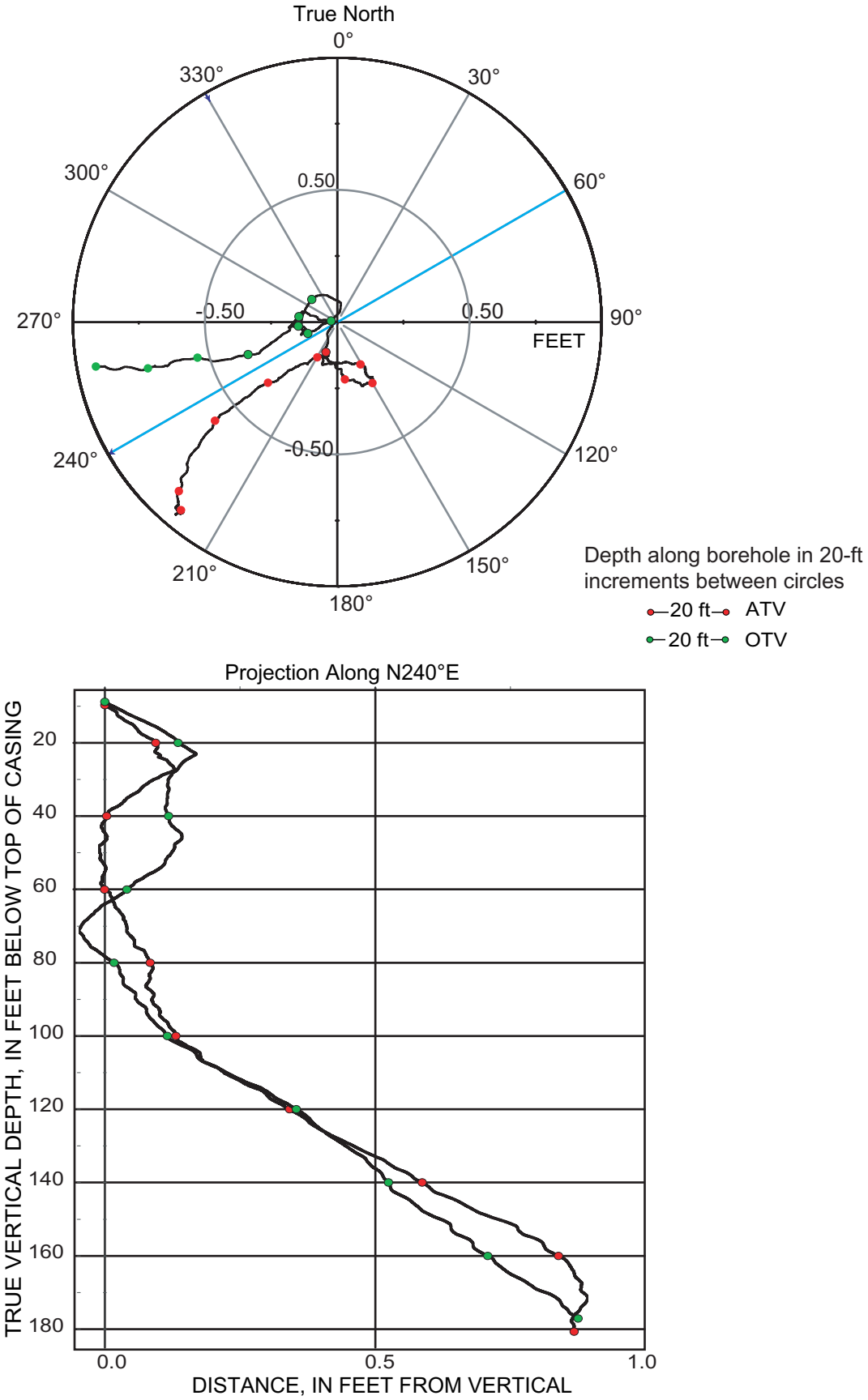


Figure 1C-2. Borehole deviation logs for borehole DW-23 near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer; OTV, optical televiewer]

Table 1C–1. Interpretation of acoustic televiewer logs for borehole DW-23, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 1.95 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
23.09	7.04	184	94	31	S	Moderate	Minor fracture
23.50	7.16	183	93	18	S	Shallow	Fabric
27.37	8.34	195	105	54	S	Steep	Minor fracture
32.22	9.82	241	151	20	SW	Shallow	Minor fracture
32.48	9.90	237	147	19	SW	Shallow	Minor fracture
34.00	10.36	198	108	14	S	Shallow	Possible fracture
35.61	10.85	196	106	24	S	Shallow	Minor fracture
37.50	11.43	269	179	71	W	Nearly vertical	Minor fracture
39.09	11.91	258	168	74	W	Nearly vertical	Minor fracture
43.28	13.19	156	66	14	SE	Shallow	Minor fracture
45.87	13.98	228	138	37	SW	Moderate	Minor fracture
49.73	15.16	221	131	59	SW	Steep	Minor fracture
50.71	15.46	229	139	56	SW	Steep	Fabric
53.98	16.45	167	77	12	S	Shallow	Minor fracture
57.15	17.42	243	153	41	SW	Moderate	Fabric
58.68	17.88	237	147	32	SW	Moderate	Fabric
64.67	19.71	177	87	22	S	Shallow	Possible fracture
68.43	20.86	230	140	17	SW	Shallow	Possible fracture
72.60	22.13	183	140	13	SW	Shallow	Minor fracture
74.91	22.83	231	141	64	SW	Steep	Minor fracture
81.67	24.89	210	120	12	SW	Shallow	Possible fracture
83.58	25.47	254	164	74	W	Nearly vertical	Minor fracture
83.95	25.59	245	155	71	SW	Nearly vertical	Minor fracture
86.60	26.39	317	227	81	NW	Nearly vertical	Fabric
89.91	27.40	192	102	22	S	Shallow	Possible fracture
91.27	27.82	224	134	22	SW	Shallow	Possible fracture
94.22	28.72	175	85	25	S	Shallow	Minor fracture
98.31	29.96	235	145	84	SW	Nearly vertical	Fabric
100.73	30.70	178	88	19	S	Shallow	Minor fracture
108.83	33.17	225	135	81	SW	Nearly vertical	Fabric
111.69	34.04	202	112	13	S	Shallow	Fracture
111.88	34.10	147	57	29	SE	Shallow	Possible fracture
113.94	34.73	268	178	77	W	Nearly vertical	Fabric
116.33	35.46	280	190	78	W	Nearly vertical	Fabric
117.77	35.89	232	142	16	SW	Shallow	Minor fracture
128.20	39.07	214	124	26	SW	Shallow	Fabric
129.27	39.40	172	82	11	S	Shallow	Minor fracture
129.75	39.55	290	200	26	W	Shallow	Minor fracture
131.94	40.21	260	170	76	W	Nearly vertical	Fabric
132.47	40.37	249	159	80	W	Nearly vertical	Fabric
132.93	40.52	257	167	18	W	Shallow	Minor fracture
134.94	41.13	182	92	14	S	Shallow	Minor fracture
135.69	41.36	16	286	49	N	Moderate	Fabric
137.59	41.94	57	327	64	NE	Steep	Fabric
139.31	42.46	246	156	74	SW	Nearly vertical	Fabric
140.55	42.84	240	150	67	SW	Steep	Lithologic feature
145.34	44.30	268	178	48	W	Moderate	Fabric
148.35	45.21	268	178	30	W	Moderate	Fabric
149.14	45.46	178	88	31	S	Moderate	Fabric
150.77	45.95	263	173	81	W	Nearly vertical	Fabric
155.65	47.44	254	164	62	W	Steep	Fabric
161.24	49.14	243	153	84	SW	Nearly vertical	Fabric
161.56	49.24	172	82	23	S	Shallow	Possible fracture
162.58	49.55	289	199	68	W	Steep	Fabric

Table 1C–1. Interpretation of acoustic televiewer logs for borehole DW-23, near Machiasport, Maine.—Continued

[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 1.95 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
164.22	50.05	0	270	27	N	Shallow	Minor fracture
164.72	50.20	87	357	21	E	Shallow	Fracture
165.15	50.34	72	342	40	E	Moderate	Fabric
165.86	50.55	50	320	24	NE	Shallow	Fracture
166.68	50.80	241	151	38	SW	Moderate	Fabric
167.75	51.13	195	105	30	S	Moderate	Fabric
170.64	52.01	15	285	67	N	Steep	Minor fracture
173.66	52.93	259	169	40	W	Moderate	Minor fracture
174.20	53.09	339	249	31	N	Moderate	Minor fracture
175.16	53.39	285	195	62	W	Steep	Fracture
177.12	53.98	189	99	30	S	Moderate	Transmissive fracture

Table 1C–2. Interpretation of optical televiewer logs for borehole DW-23, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 1.95 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
23.09	7.04	184	94	31	S	Moderate	Minor fracture
23.50	7.16	183	93	18	S	Shallow	Fabric or foliation
27.37	8.34	195	105	54	S	Steep	Minor fracture
32.22	9.82	241	151	20	SW	Shallow	Minor fracture
32.48	9.90	237	147	19	SW	Shallow	Minor fracture
34.00	10.36	198	108	14	S	Shallow	Possible fracture
35.61	10.85	196	106	24	S	Shallow	Minor fracture
37.50	11.43	269	179	71	W	Nearly vertical	Minor fracture
39.09	11.91	258	168	74	W	Nearly vertical	Minor fracture
43.28	13.19	156	66	14	SE	Shallow	Minor fracture
45.87	13.98	228	138	37	SW	Moderate	Minor fracture
49.73	15.16	221	131	59	SW	Steep	Minor fracture
50.71	15.46	229	139	56	SW	Steep	Fabric or foliation
53.98	16.45	167	77	12	S	Shallow	Minor fracture
57.15	17.42	243	153	41	SW	Moderate	Fabric or foliation
58.68	17.88	237	147	32	SW	Moderate	Fabric or foliation
64.67	19.71	177	87	22	S	Shallow	Possible fracture
68.43	20.86	230	140	17	SW	Shallow	Possible fracture
74.91	22.83	231	141	64	SW	Steep	Minor fracture
81.67	24.89	210	120	12	SW	Shallow	Possible fracture
83.58	25.47	254	164	74	W	Nearly vertical	Minor fracture
83.95	25.59	245	155	71	SW	Nearly vertical	Minor fracture
86.60	26.39	317	227	81	NW	Nearly vertical	Fabric or foliation
89.91	27.40	192	102	22	S	Shallow	Possible fracture
91.27	27.82	224	134	22	SW	Shallow	Possible fracture
94.22	28.72	175	85	25	S	Shallow	Minor fracture
98.31	29.96	235	145	84	SW	Nearly vertical	Fabric or foliation
100.73	30.70	178	88	19	S	Shallow	Minor fracture
108.83	33.17	225	135	81	SW	Nearly vertical	Fabric or foliation
111.69	34.04	202	112	13	S	Shallow	Fracture
111.88	34.10	147	57	29	SE	Shallow	Possible fracture
113.94	34.73	268	178	77	W	Nearly vertical	Fabric or foliation
116.33	35.46	280	190	78	W	Nearly vertical	Fabric or foliation
117.77	35.89	232	142	16	SW	Shallow	Minor fracture
128.20	39.07	214	124	26	SW	Shallow	Fabric or foliation
129.27	39.40	172	82	11	S	Shallow	Minor fracture
129.75	39.55	290	200	26	W	Shallow	Minor fracture
131.94	40.21	260	170	76	W	Nearly vertical	Fabric or foliation
132.47	40.37	249	159	80	W	Nearly vertical	Fabric or foliation
132.93	40.52	257	167	18	W	Shallow	Minor fracture
134.94	41.13	182	92	14	S	Shallow	Minor fracture
135.69	41.36	16	286	49	N	Moderate	Fabric or foliation
137.59	41.94	57	327	64	NE	Steep	Fabric or foliation
139.31	42.46	246	156	74	SW	Nearly vertical	Fabric or foliation
140.55	42.84	240	150	67	SW	Steep	Lithologic feature
145.34	44.30	268	178	48	W	Moderate	Fabric or foliation
148.35	45.21	268	178	30	W	Moderate	Fabric or foliation
149.14	45.46	178	88	31	S	Moderate	Fabric or foliation
150.77	45.95	263	173	81	W	Nearly vertical	Fabric or foliation
155.65	47.44	254	164	62	W	Steep	Fabric or foliation
161.24	49.14	243	153	84	SW	Nearly vertical	Fabric or foliation
161.56	49.24	172	82	23	S	Shallow	Possible fracture
162.58	49.55	289	199	68	W	Steep	Fabric or foliation

Table 1C–2. Interpretation of optical televiewer logs for borehole DW-23, near Machiasport, Maine.—Continued

[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 1.95 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
164.22	50.05	0	270	27	N	Shallow	Minor fracture
164.72	50.20	87	357	21	E	Shallow	Fracture
165.15	50.34	72	342	40	E	Moderate	Fabric or foliation
165.86	50.55	50	320	24	NE	Shallow	Fracture
166.68	50.80	241	151	38	SW	Moderate	Fabric or foliation
167.75	51.13	195	105	30	S	Moderate	Fabric or foliation
170.64	52.01	15	285	67	N	Steep	Minor fracture
173.66	52.93	259	169	40	W	Moderate	Minor fracture
174.20	53.09	339	249	31	N	Moderate	Minor fracture
175.16	53.39	285	195	62	W	Steep	Fracture
177.12	53.98	189	99	30	S	Moderate	Transmissive fracture

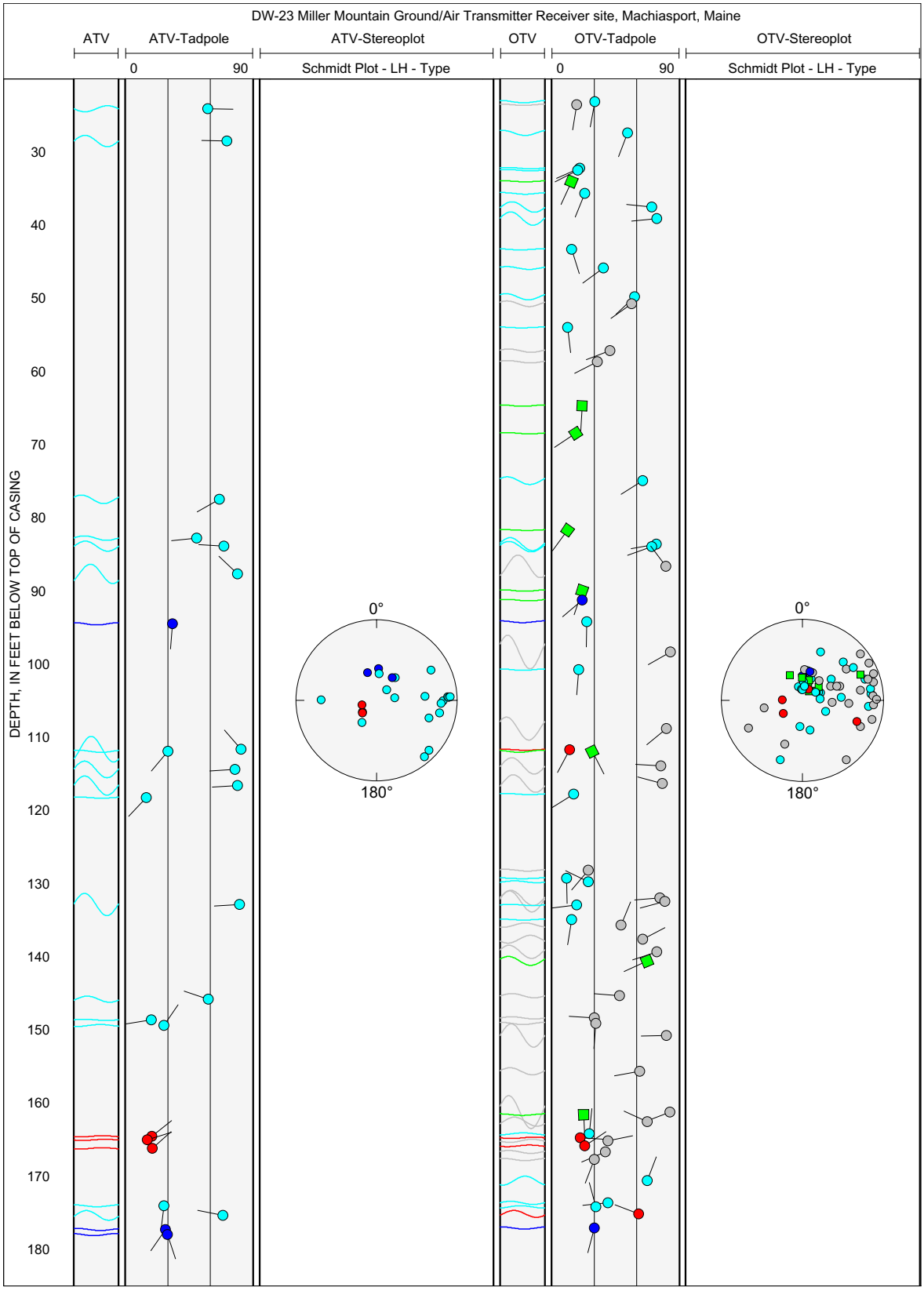


Figure 1C-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-23, near Machiasport, Maine.

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of measuring point	60	feet
Number of fractures	3	
Well diameter	6	inches
Drawdown	1.3	feet
Depth to ambient water level	7.3	feet

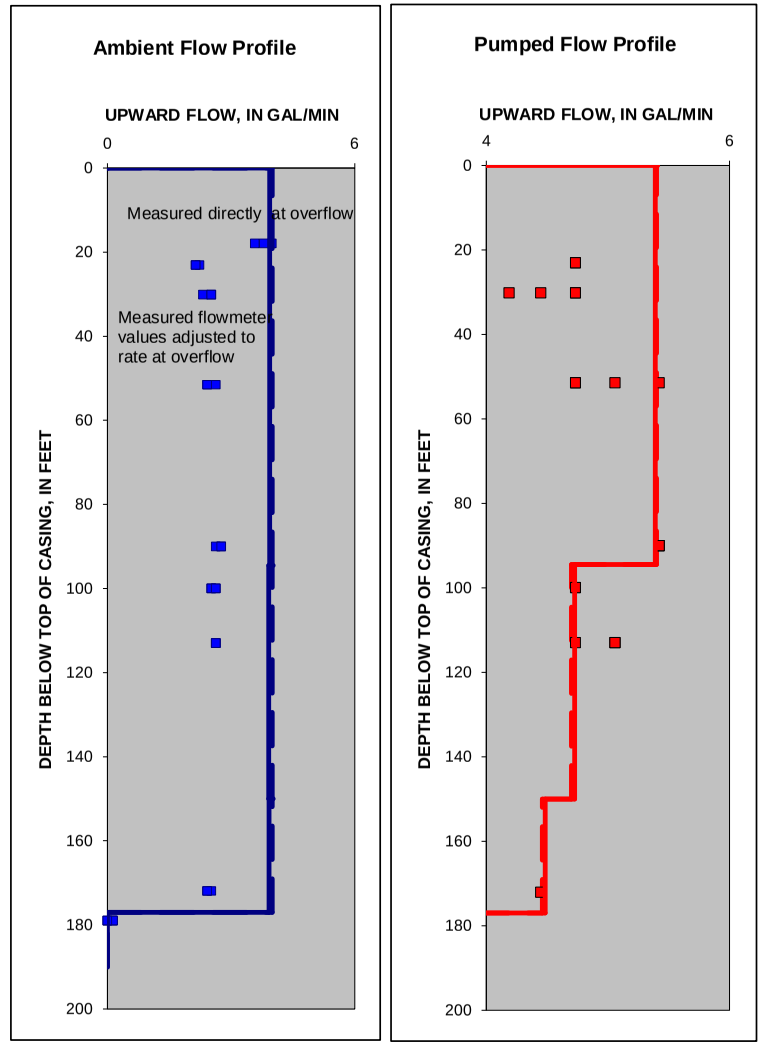
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)
3	94.5	4.00	5.40
2	150	4.00	4.70
1	177.6	4.000	4.460

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, ambient water level	52.70	feet
Elevation, pumped water level	51.40	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)	Zone trans-missivity (ft^2/d)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
3	94.5	3.939	5.388	69.00	6.88	53.12	45
2	150	3.916	4.725	24.00	6.98	53.02	16
1	177.6	3.918	4.484	60.00	-4.52	64.52	39

Total borehole transmissivity	153.0	(ft^2/d)
Sum of squares error	2.74000	$(gal/min)^2$
Root mean square error	0.82800	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1C–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-23, near Machiasport, Maine.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]

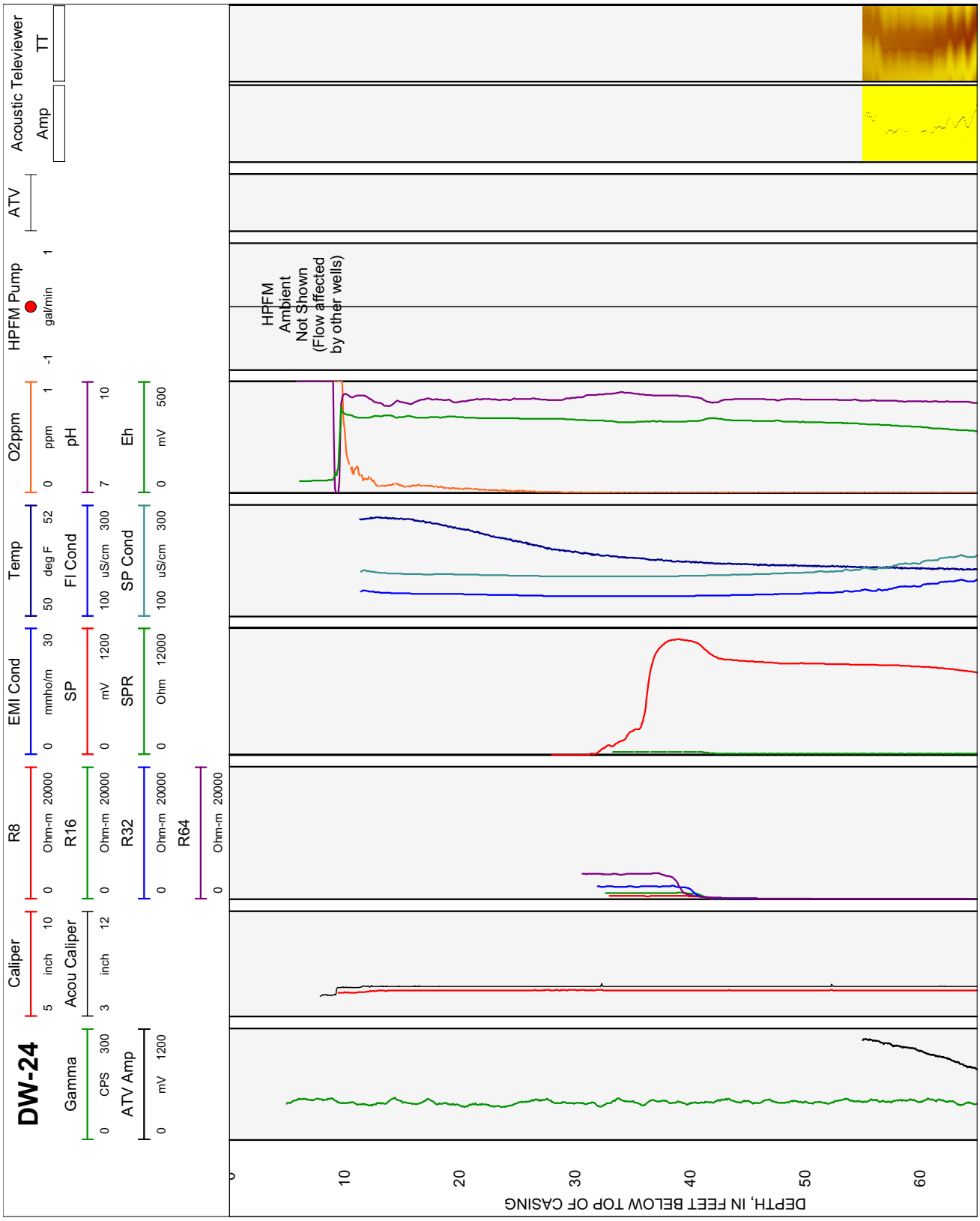


Figure 1D-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-24, near Machiasport, Maine.

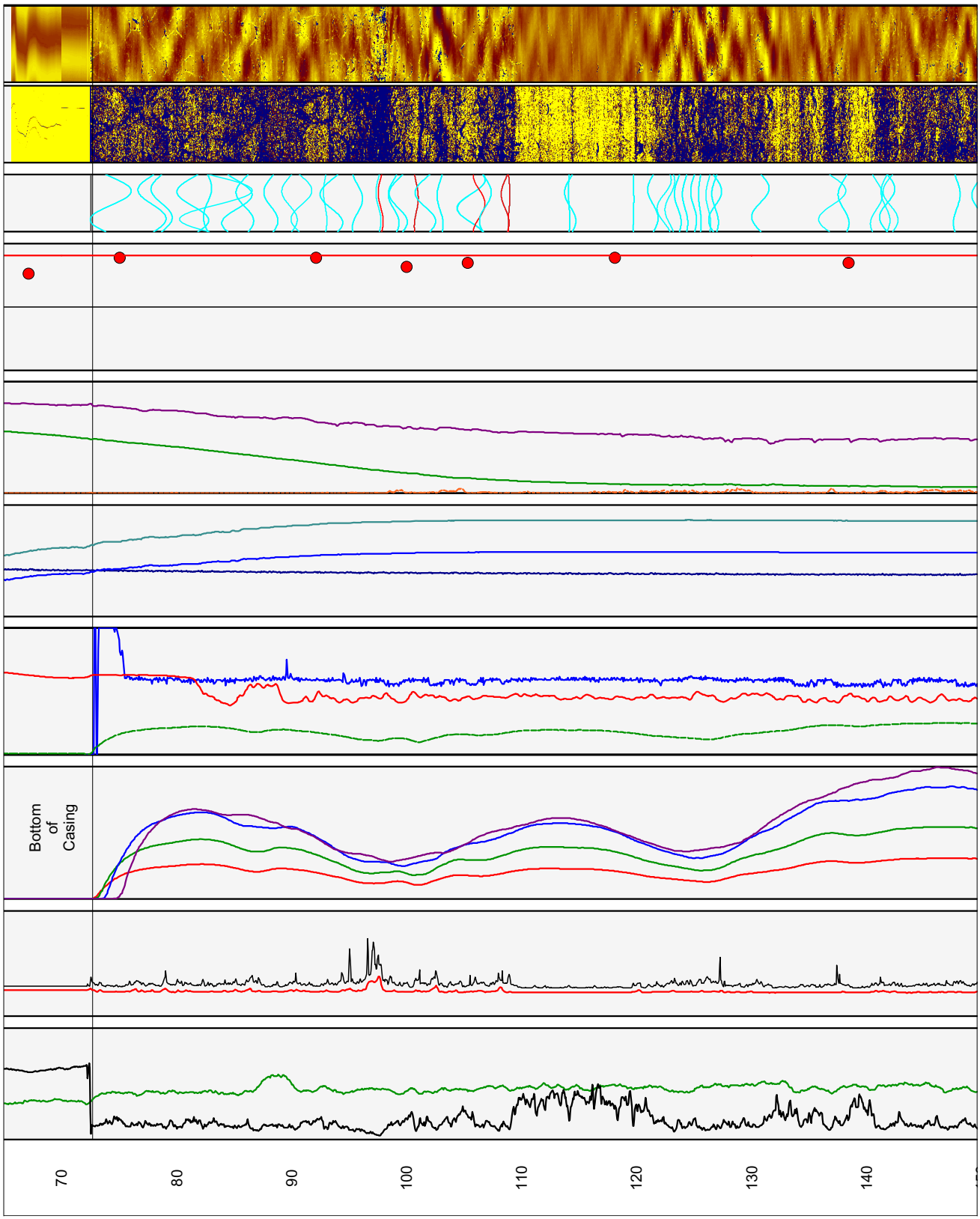


Figure 1D-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-24, near Machiasport, Maine.—Continued

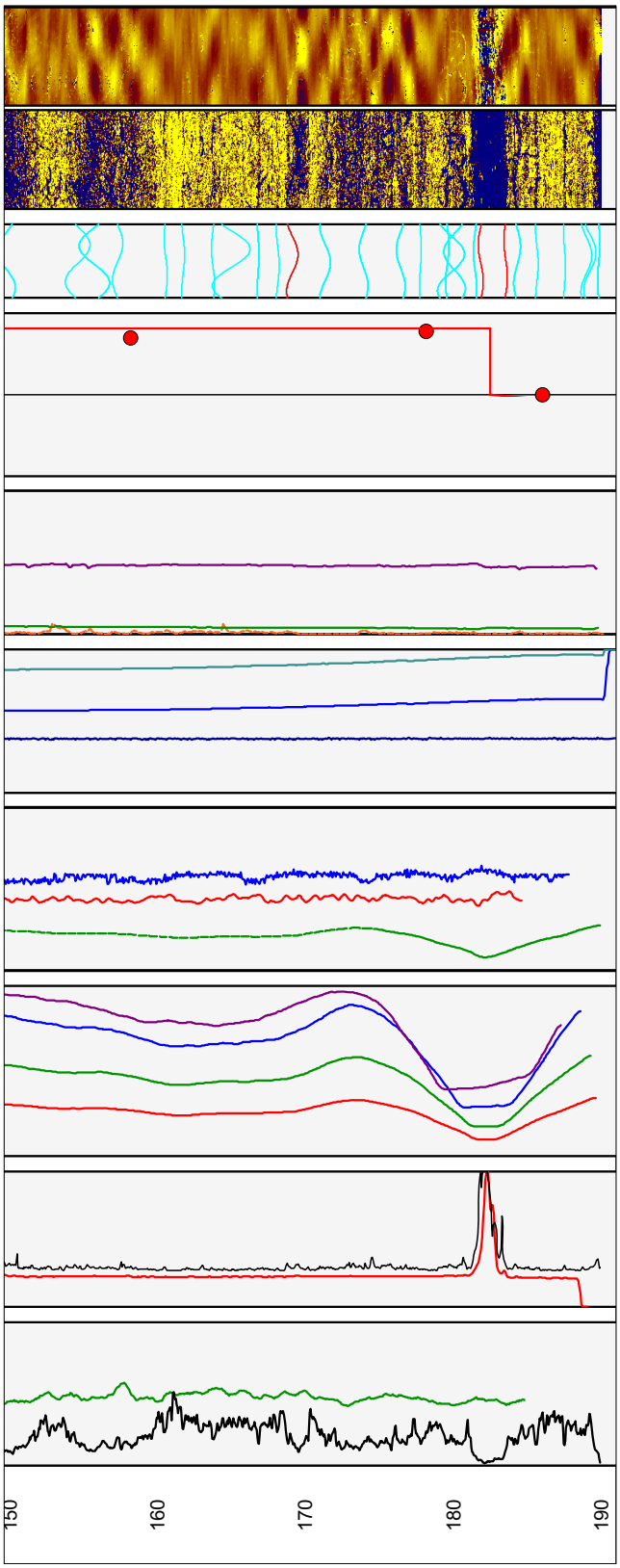


Figure 1D-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-24, near Machiasport, Maine.—Continued

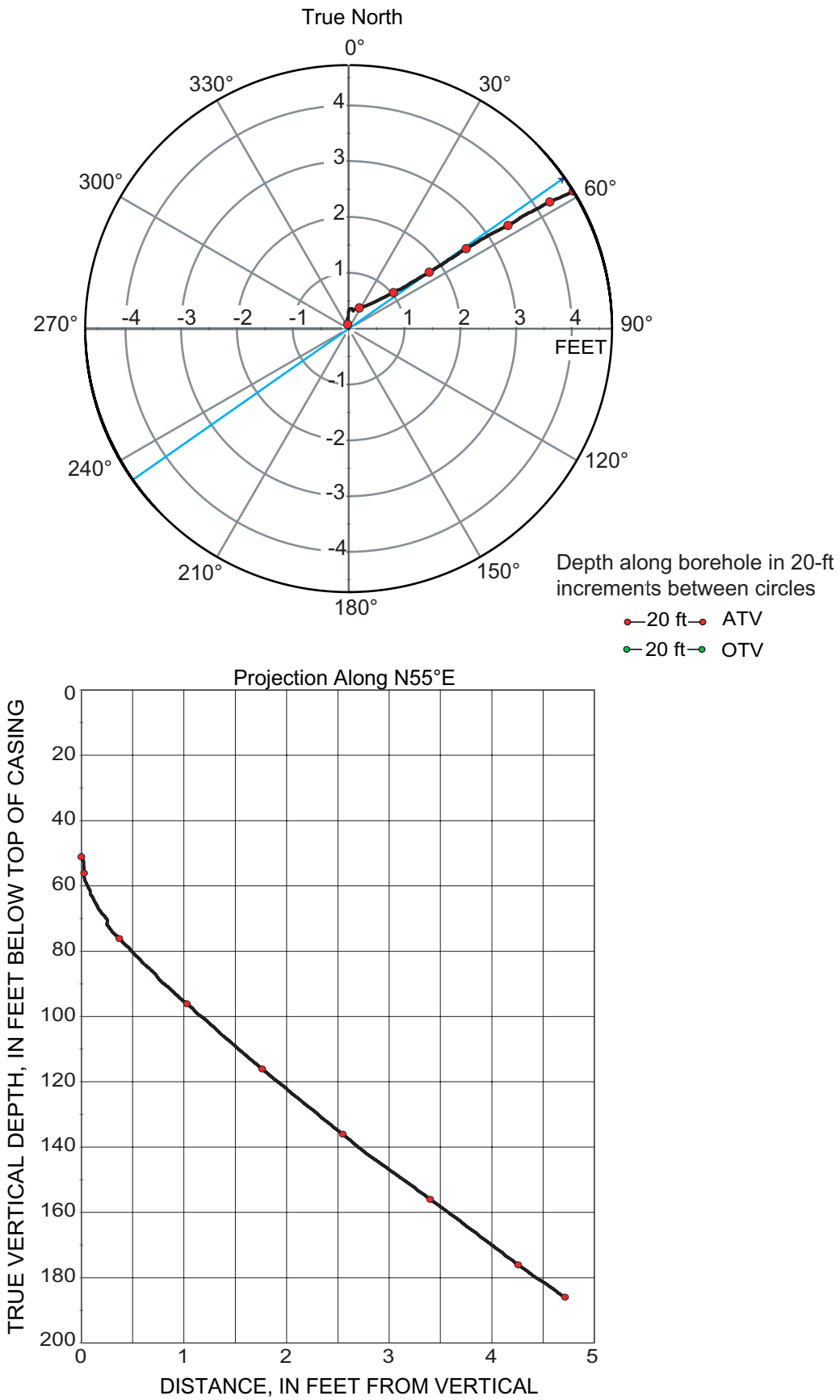


Figure 1D-2. Borehole deviation logs for borehole DW-24, near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer; OTV, optical televiewer]

Table 1D–1. Interpretation of acoustic televiewer logs for borehole DW-24, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 1.52 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
72.53	22.11	0	270	0	N	Horizontal	Foliation
74.28	22.64	256	166	82	W	Nearly vertical	Minor fracture
77.85	23.73	83	353	78	E	Nearly vertical	Minor fracture
78.68	23.98	88	358	75	E	Nearly vertical	Minor fracture
81.38	24.80	71	341	80	E	Nearly vertical	Minor fracture
82.70	25.21	273	183	55	W	Steep	Minor fracture
83.42	25.43	259	169	85	W	Nearly vertical	Minor fracture
85.22	25.97	234	144	79	SW	Nearly vertical	Minor fracture
85.91	26.18	67	337	72	NE	Nearly vertical	Minor fracture
88.17	26.87	69	339	68	E	Steep	Minor fracture
89.80	27.37	74	344	69	E	Steep	Minor fracture
90.83	27.68	259	169	74	W	Nearly vertical	Minor fracture
92.92	28.32	68	338	30	E	Shallow	Minor fracture
93.44	28.48	56	326	76	NE	Nearly vertical	Minor fracture
95.73	29.18	207	117	60	SW	Steep	Minor fracture
97.74	29.79	65	335	40	NE	Moderate	Fracture
98.89	30.14	55	325	61	NE	Steep	Minor fracture
99.26	30.25	61	331	72	NE	Nearly vertical	Minor fracture
100.84	30.73	214	124	34	SW	Moderate	Fracture
101.64	30.98	65	335	74	NE	Nearly vertical	Minor fracture
102.91	31.37	47	317	46	NE	Moderate	Minor fracture
105.61	32.19	329	239	78	NW	Nearly vertical	Minor fracture
106.32	32.40	176	86	63	S	Steep	Fracture
106.86	32.57	247	157	64	SW	Steep	Minor fracture
108.56	33.09	56	326	54	NE	Steep	Fracture
108.88	33.19	232	142	15	SW	Shallow	Fracture
114.12	34.78	74	344	12	E	Shallow	Minor fracture
114.20	34.81	67	337	63	NE	Steep	Minor fracture
119.73	36.49	205	115	6	SW	Nearly horizontal	Minor fracture
121.40	37.00	85	355	61	E	Steep	Minor fracture
122.38	37.30	326	236	68	NW	Steep	Minor fracture
122.88	37.45	318	228	59	NW	Steep	Minor fracture
123.59	37.67	59	329	49	NE	Moderate	Minor fracture
124.20	37.85	55	325	42	NE	Moderate	Minor fracture
124.94	38.08	72	342	46	E	Moderate	Minor fracture
125.49	38.25	57	327	25	NE	Shallow	Minor fracture
126.22	38.47	51	321	40	NE	Moderate	Minor fracture
126.82	38.65	59	329	48	NE	Moderate	Minor fracture
126.83	38.66	254	164	66	W	Steep	Minor fracture
130.74	39.85	273	183	71	W	Nearly vertical	Minor fracture
137.02	41.76	258	168	78	W	Nearly vertical	Minor fracture
138.00	42.06	54	324	62	NE	Steep	Minor fracture
140.82	42.92	230	140	64	SW	Steep	Minor fracture
141.62	43.16	70	340	57	E	Steep	Minor fracture
141.78	43.21	270	180	69	W	Steep	Minor fracture
142.08	43.30	74	344	69	E	Steep	Minor fracture
147.82	45.05	236	146	49	SW	Moderate	Minor fracture
149.75	45.64	50	320	67	NE	Steep	Minor fracture
154.58	47.11	259	169	73	W	Nearly vertical	Minor fracture
155.70	47.46	74	344	76	E	Nearly vertical	Minor fracture
157.29	47.94	267	177	54	W	Steep	Minor fracture
160.53	48.93	109	19	24	E	Shallow	Minor fracture
161.71	49.29	209	119	21	SW	Shallow	Minor fracture
163.72	49.90	62	332	22	NE	Shallow	Minor fracture
164.94	50.27	239	149	79	SW	Nearly vertical	Minor fracture

Table 1D–1. Interpretation of acoustic televiewer logs for borehole DW-24, near Machiasport, Maine.—Continued

[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 1.52 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
166.80	50.84	210	120	12	SW	Shallow	Minor fracture
168.10	51.23	158	68	22	S	Shallow	Minor fracture
169.11	51.54	212	122	56	SW	Steep	Fracture
171.30	52.21	173	83	55	S	Steep	Minor fracture
173.92	53.01	57	327	50	NE	Moderate	Minor fracture
176.45	53.78	55	325	49	NE	Moderate	Minor fracture
177.75	54.18	237	147	14	SW	Shallow	Minor fracture
179.59	54.74	256	166	25	W	Shallow	Minor fracture
179.82	54.81	215	125	74	SW	Nearly vertical	Minor fracture
180.06	54.88	46	316	71	NE	Nearly vertical	Minor fracture
181.46	55.31	48	318	24	NE	Shallow	Minor fracture
183.51	55.93	101	11	26	E	Shallow	Transmissive fracture
184.30	56.17	251	161	42	W	Moderate	Minor fracture
185.64	56.58	164	74	19	S	Shallow	Minor fracture
187.48	57.14	149	59	13	SE	Shallow	Minor fracture
188.99	57.60	208	118	56	SW	Steep	Minor fracture
189.21	57.67	220	130	58	SW	Steep	Minor fracture
189.82	57.85	266	176	15	W	Shallow	Minor fracture

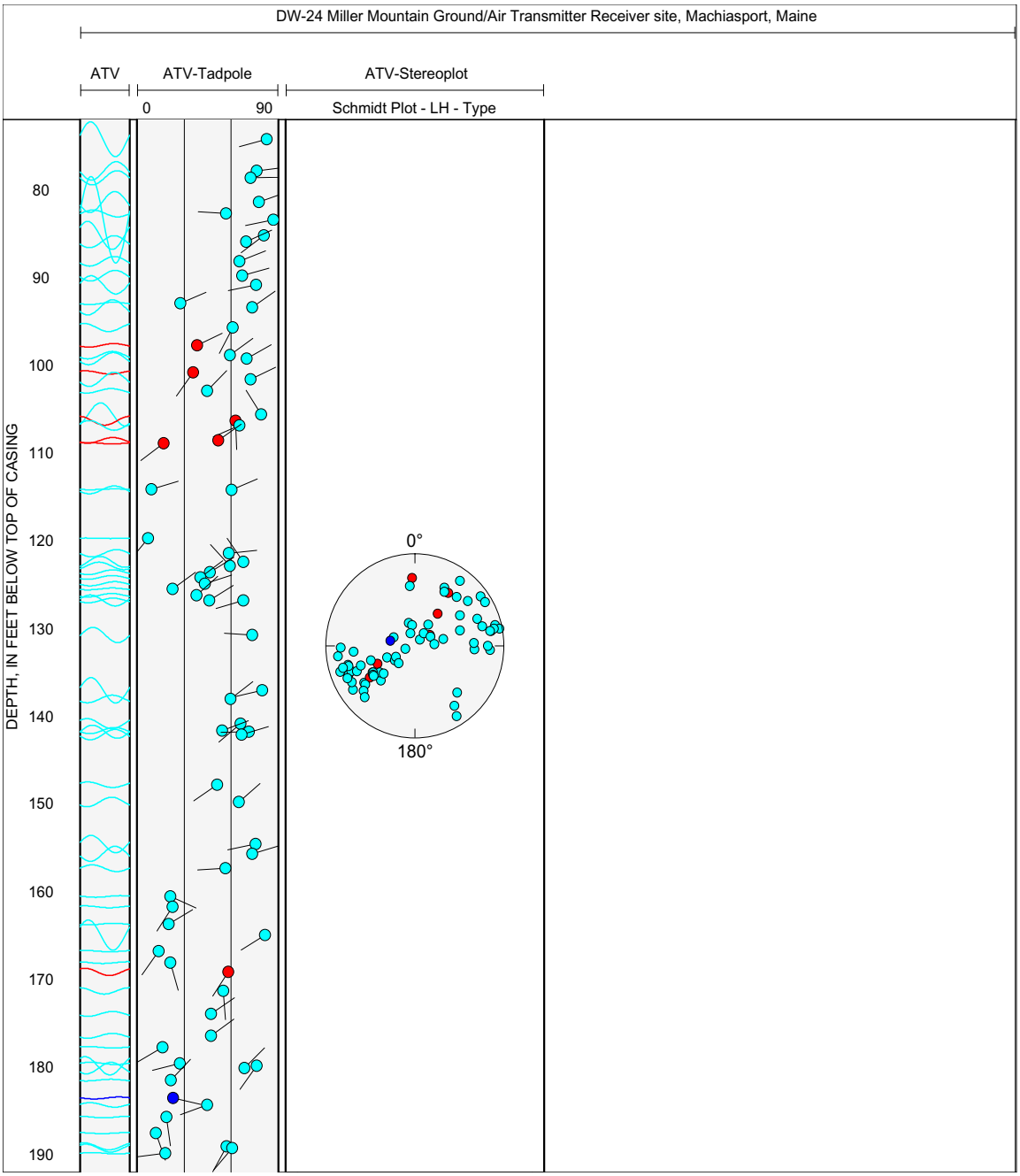


Figure 1D-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-24, near Machiasport, Maine.

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of measuring point	60	feet
Number of fractures	1	
Well diameter	6	inches
Drawdown	0.5	feet
Depth to ambient water level	9.8	feet

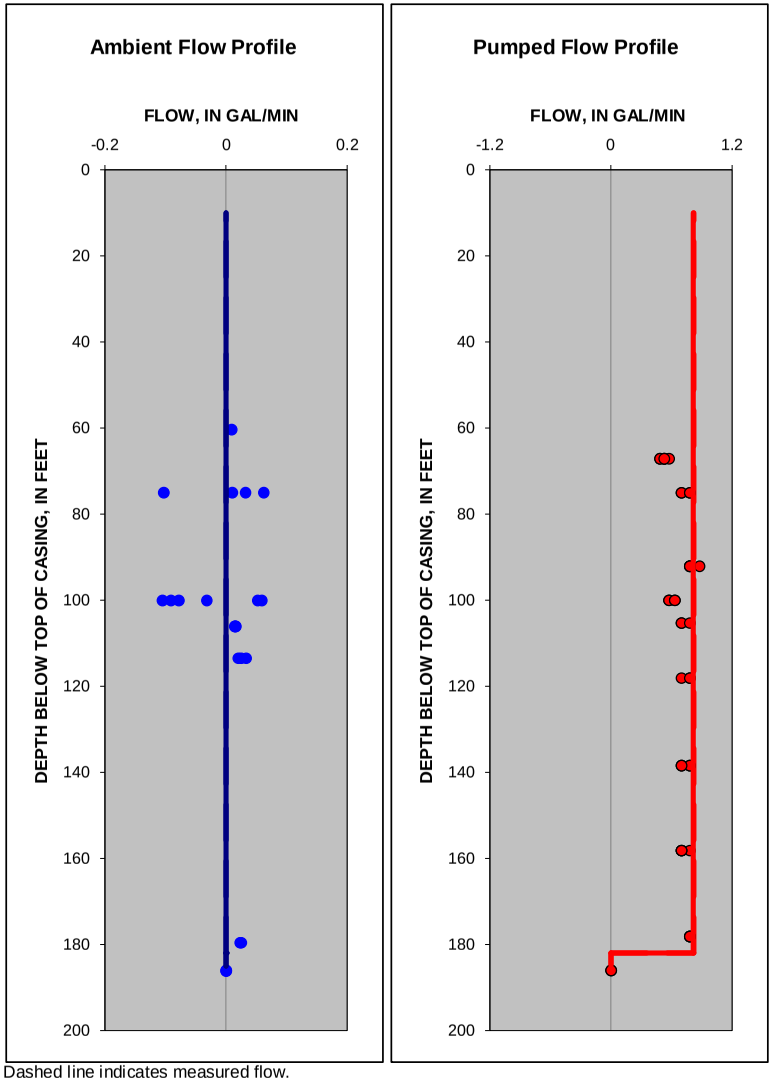
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)
1	182.0	0.00	0.82

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, ambient water level	50.20	feet
Elevation, pumped water level	49.70	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)	Zone trans-missivity (ft^2/d)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
1	182.0	0.0	0.81	306.0	9.80	50.20	100

Total borehole transmissivity	306.0	(ft^2/d)
Sum of squares error	0.000	$(gal/min)^2$
Root mean square error	0.006	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1D–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-24, near Machiasport, Maine.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]

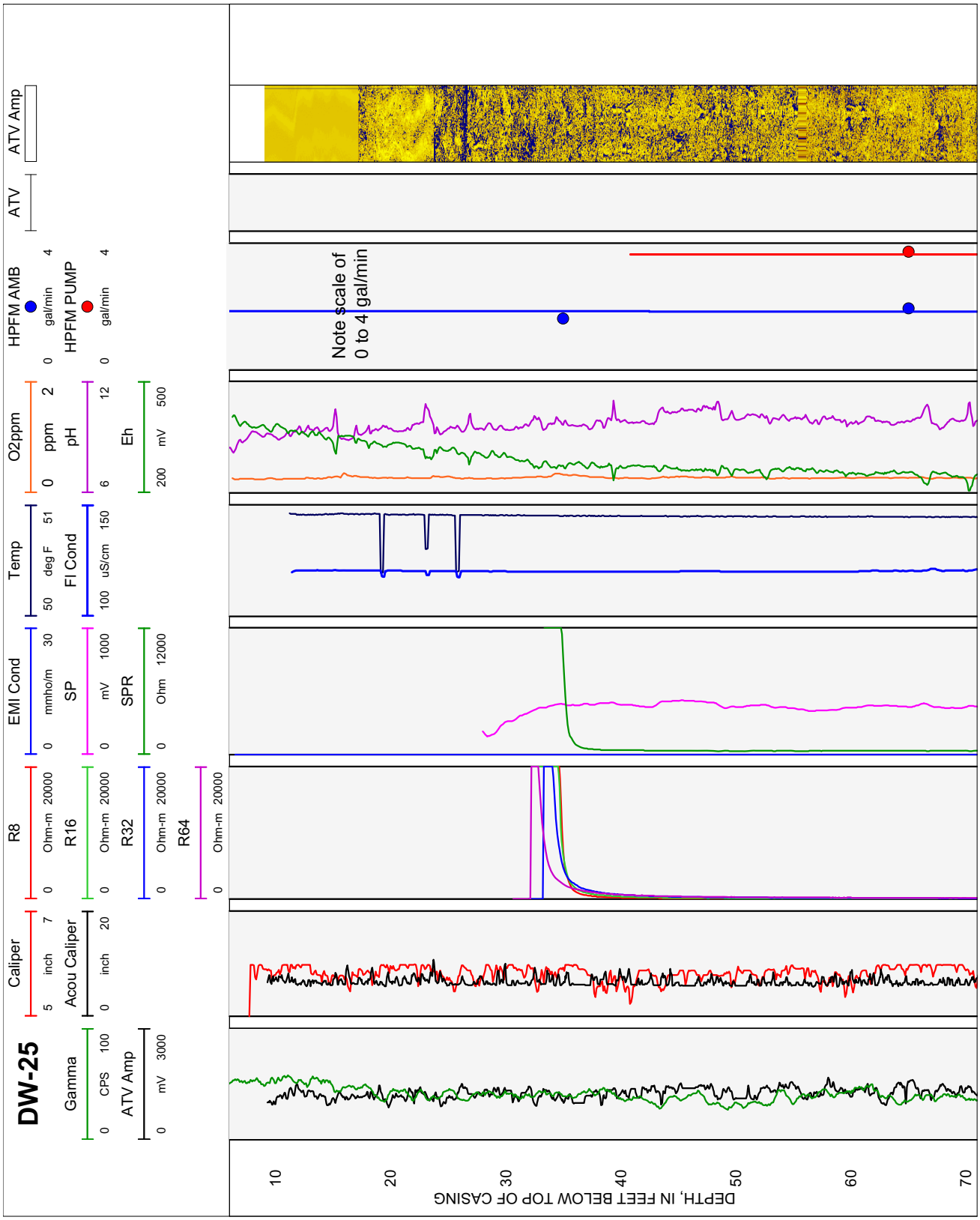


Figure 1E-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-25, near Machiasport, Maine.

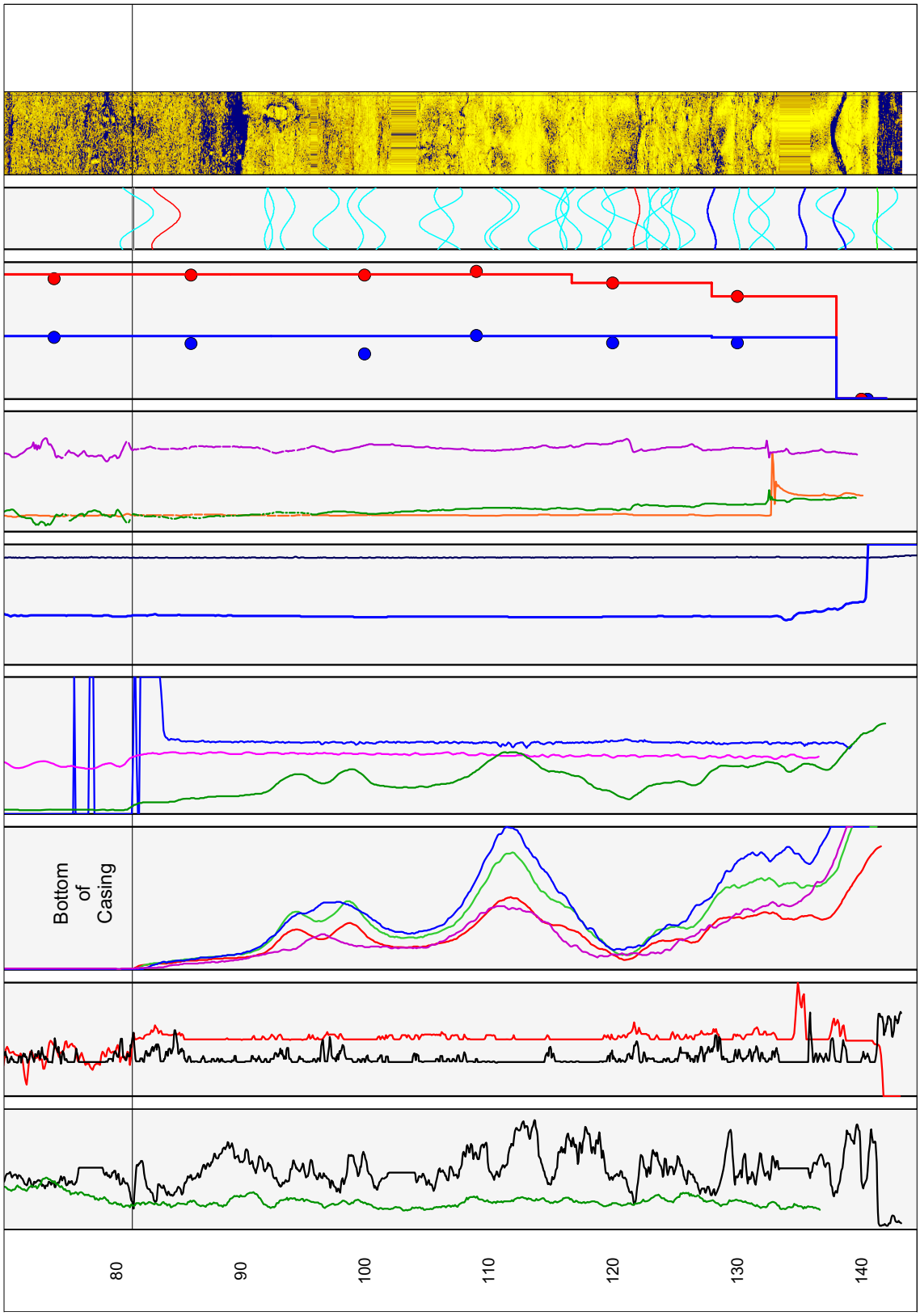


Figure 1E-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-25, near Machiasport, Maine.—Continued

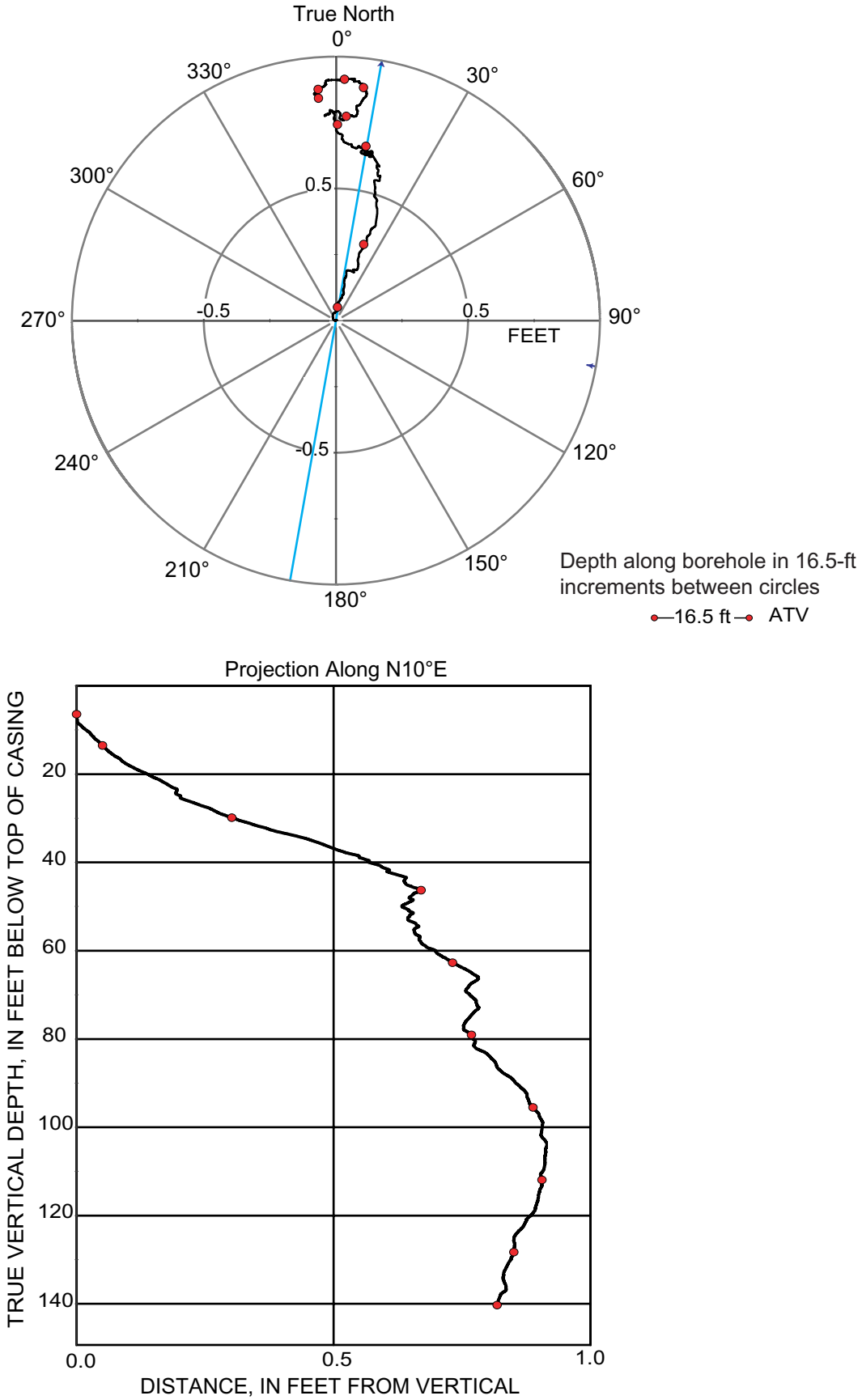


Figure 1E-2. Borehole deviation logs for borehole DW-25, near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer]

Table 1E–1. Interpretation of acoustic televiewer logs for borehole DW-25, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 0.78 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
81.38	24.80	227	137	1	SW	Nearly horizontal	Bottom of casing
81.40	24.81	227	137	2	SW	Nearly horizontal	Other
81.64	24.88	214	124	80	SW	Nearly vertical	Minor fracture
84.01	25.60	201	111	78	S	Nearly vertical	Large fracture
92.28	28.13	90	0	52	E	Steep	Minor fracture
92.33	28.14	238	148	56	SW	Steep	Minor fracture
93.79	28.59	250	160	66	W	Steep	Minor fracture
96.89	29.53	281	191	77	W	Nearly vertical	Minor fracture
99.28	30.26	76	346	68	E	Steep	Minor fracture
100.58	30.66	72	342	77	E	Nearly vertical	Minor fracture
106.15	32.35	330	240	82	NW	Nearly vertical	Minor fracture
106.37	32.42	130	40	72	SE	Nearly vertical	Minor fracture
110.80	33.77	249	159	77	W	Nearly vertical	Minor fracture
111.28	33.92	250	160	78	W	Nearly vertical	Minor fracture
114.79	34.99	241	151	81	SW	Nearly vertical	Minor fracture
115.84	35.31	33	303	61	NE	Steep	Minor fracture
116.07	35.38	266	176	54	W	Steep	Minor fracture
116.65	35.55	65	335	74	NE	Nearly vertical	Minor fracture
118.50	36.12	84	354	79	E	Nearly vertical	Minor fracture
119.63	36.46	212	122	63	SW	Steep	Minor fracture
121.01	36.88	85	355	83	E	Nearly vertical	Minor fracture
121.88	37.15	231	141	44	SW	Moderate	Large fracture
122.83	37.44	249	159	28	W	Shallow	Minor fracture
123.60	37.67	322	232	78	NW	Nearly vertical	Minor fracture
123.77	37.72	88	358	72	E	Nearly vertical	Minor fracture
125.06	38.12	43	313	54	NE	Steep	Minor fracture
125.24	38.17	92	2	80	E	Nearly vertical	Minor fracture
127.95	39.00	43	313	53	NE	Steep	Transmissive fracture
129.98	39.62	11	281	43	N	Moderate	Minor fracture
131.73	40.15	156	66	74	SE	Nearly vertical	Minor fracture
131.97	40.22	351	261	77	N	Nearly vertical	Minor fracture
135.29	41.23	49	319	52	NE	Steep	Transmissive fracture
137.90	42.03	80	350	81	E	Nearly vertical	Minor fracture
138.22	42.13	2	272	63	N	Steep	Transmissive fracture
141.30	43.07	275	185	12	W	Shallow	Lithologic feature
141.91	43.25	310	220	76	NW	Nearly vertical	Minor fracture

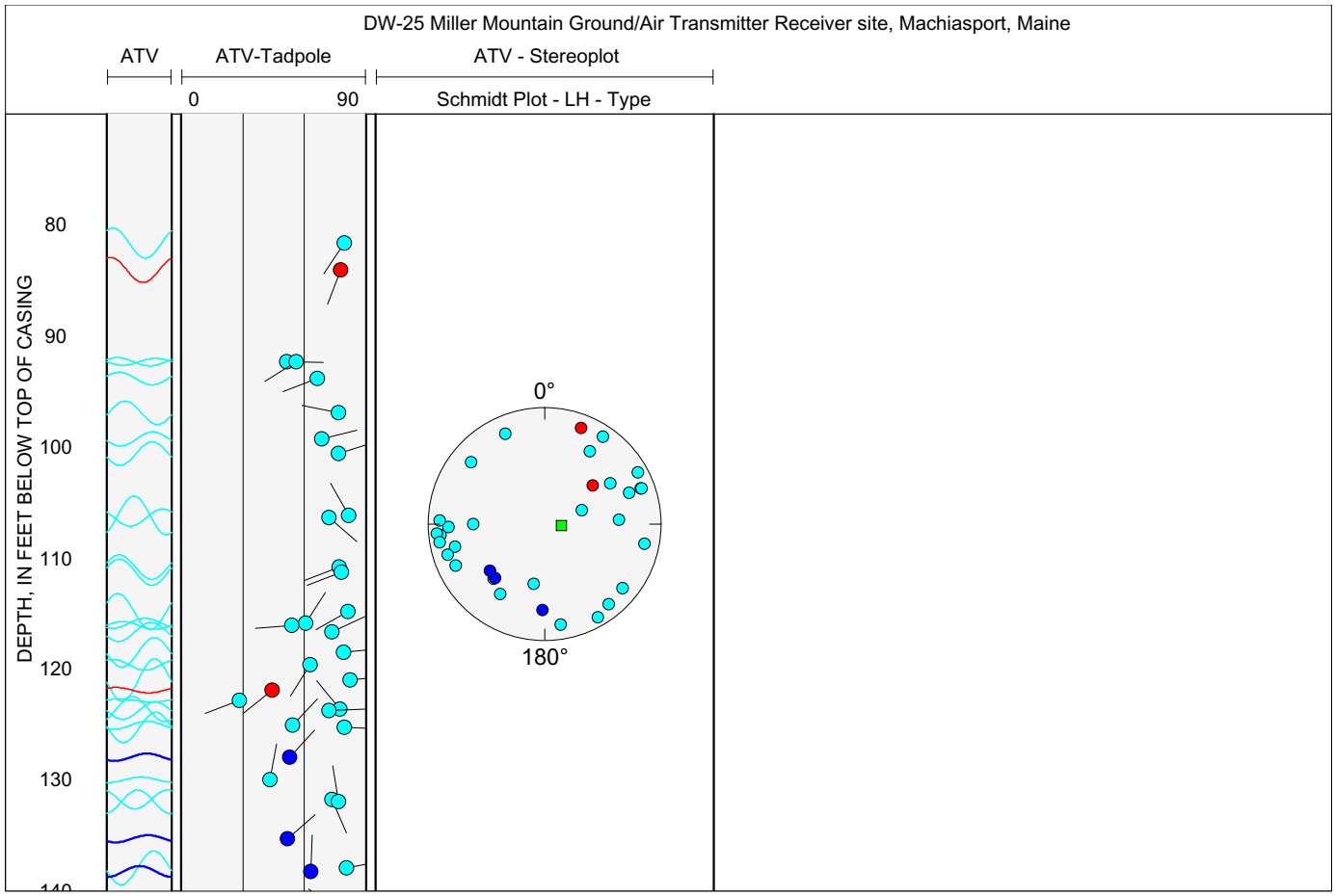


Figure 1E-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-25, near Machiasport, Maine.

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of measuring point	40	feet
Number of fractures	3	
Well diameter	6	inches
Drawdown	2.46	feet
Depth to ambient water level	1.5	feet

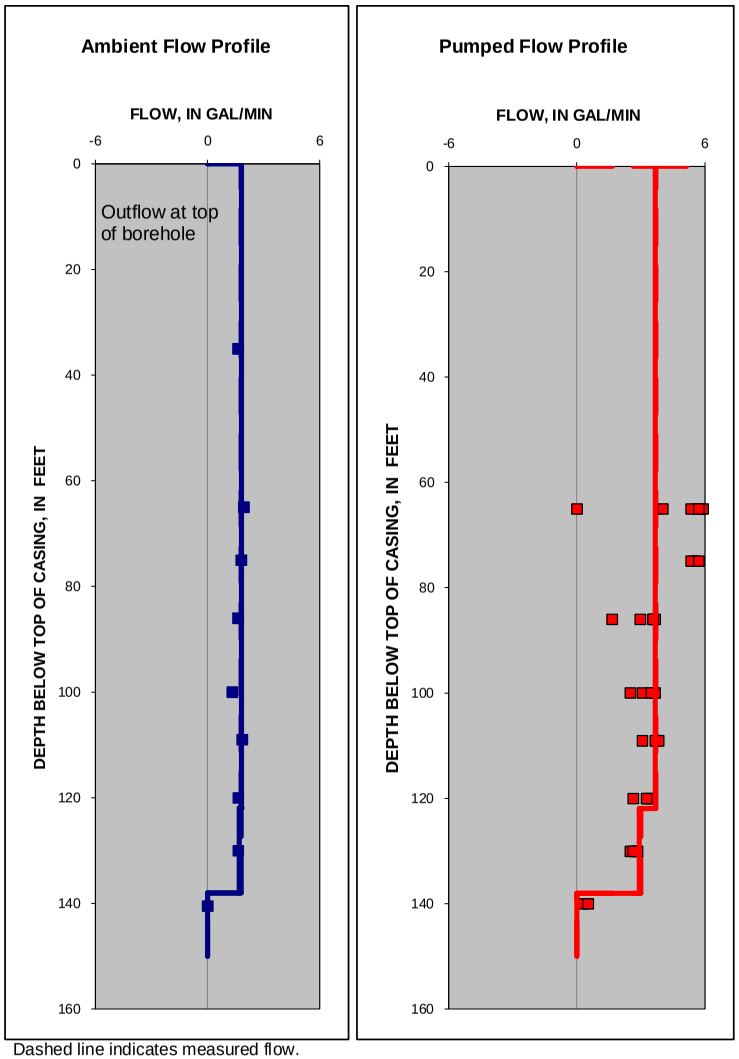
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)
2	128.0	1.80	3.70
1	138.0	1.80	3.00

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, ambient water level	38.50	feet
Elevation, pumped water level	36.04	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)	Zone trans-missivity (ft^2/d)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
2	128.0	1.816	3.671	40.5	0.82	39.18	31
1	138.0	1.686	2.922	89.1	-2.18	42.18	69

Total borehole transmissivity	129.6	(ft^2/d)
Sum of squares error	25.98	$(gal/min)^2$
Root mean square error	2.94	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1E–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-25, near Machiasport, Maine.
Uppermost fracture used to simulate overflow at the top of casing is not shown in model results.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]

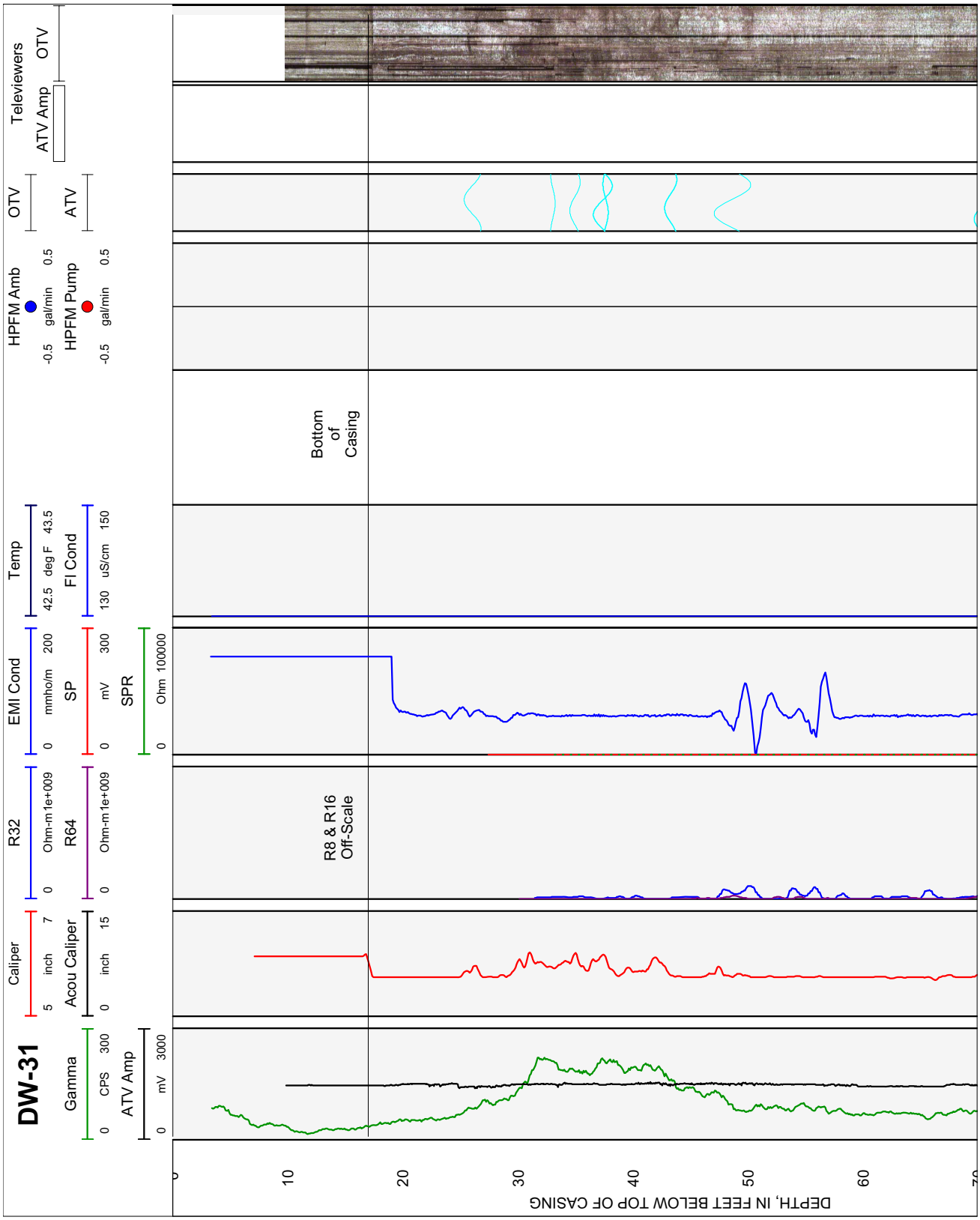


Figure 1F-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-31, near Machiasport, Maine.

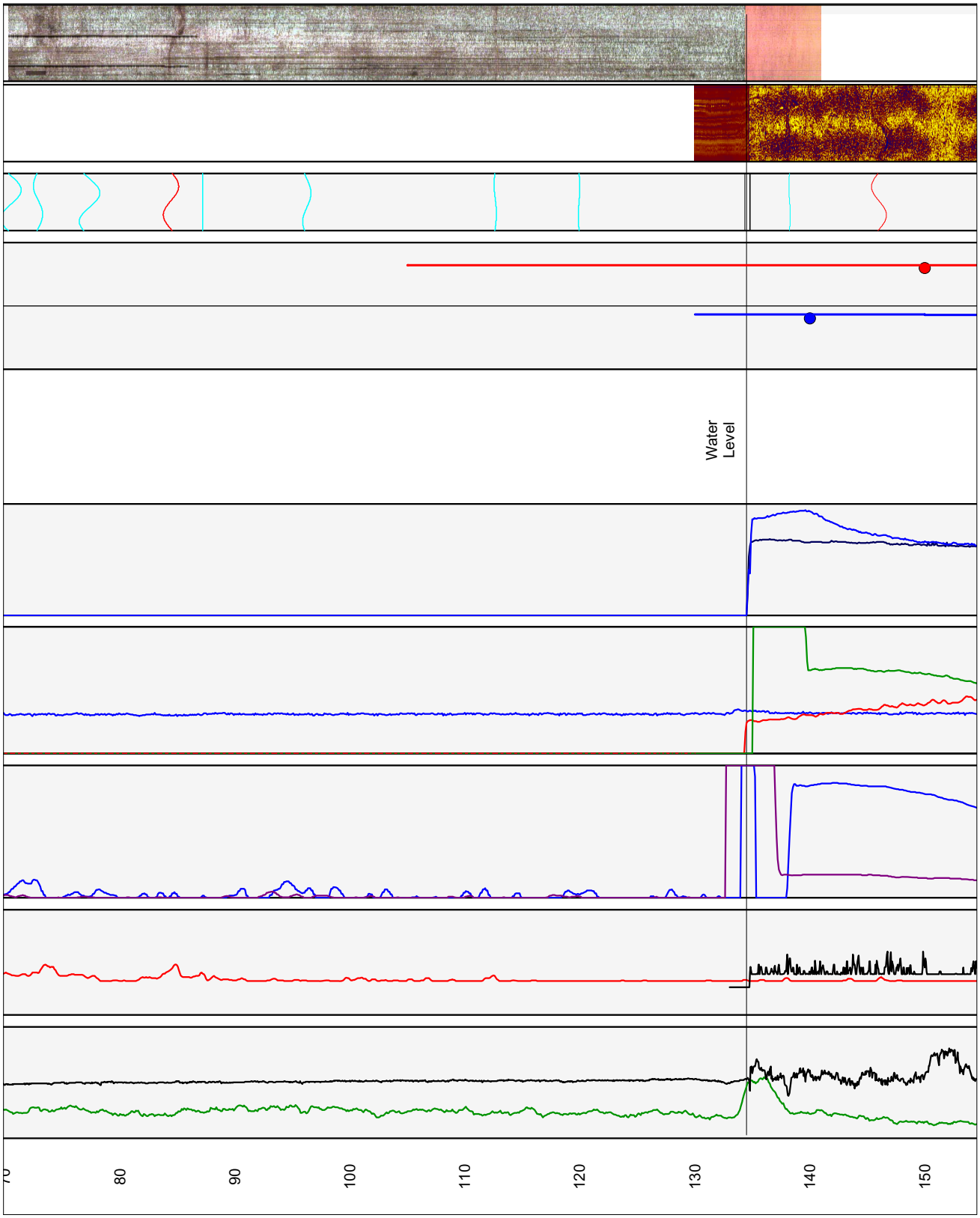


Figure 1F-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-31, near Machiasport, Maine.—Continued

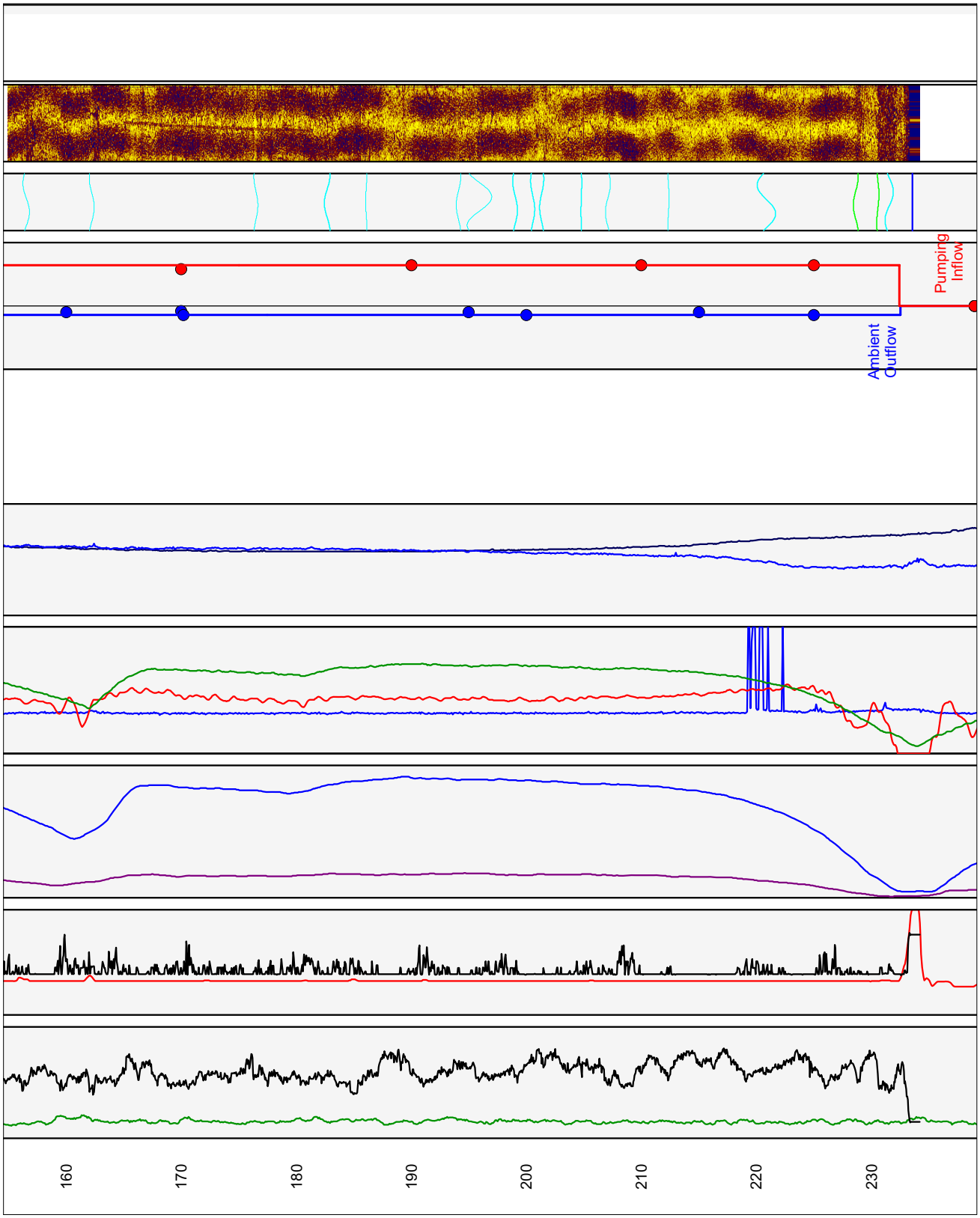


Figure 1F-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-31, near Machiasport, Maine.—Continued

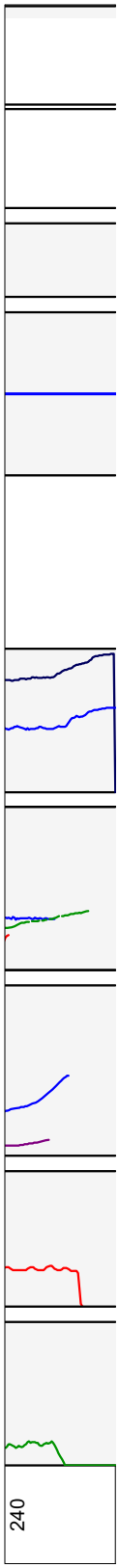


Figure 1F-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-31, near Machiasport, Maine.—Continued

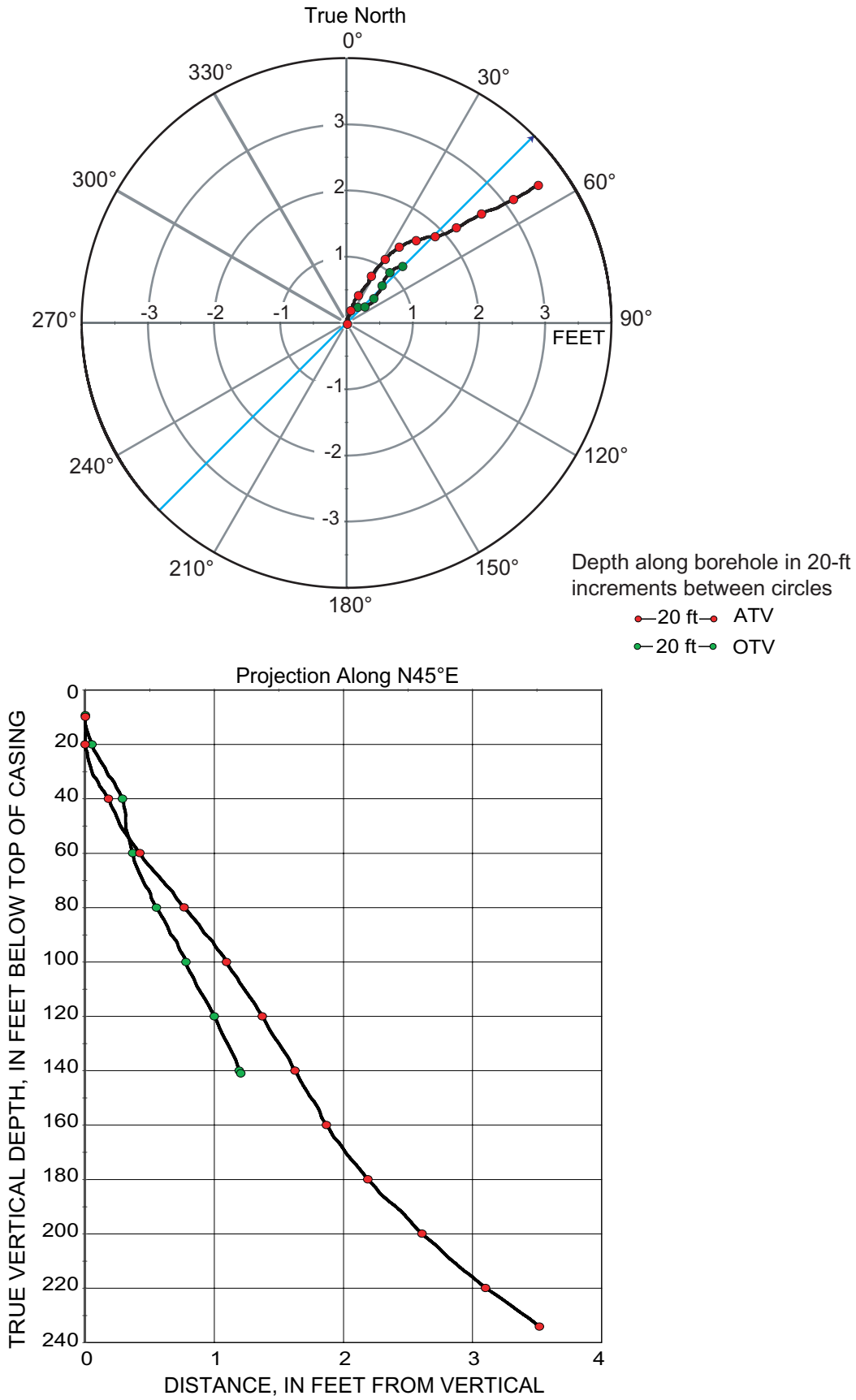


Figure 1F-2. Borehole deviation logs for borehole DW-31, near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer; OTV, optical televiewer]

Table 1F–1. Interpretation of acoustic televiewer logs for borehole DW-31, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 2.2 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike; --, orientation of fracture could not be determined]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
134.79	41.08	265	175	1	W	Nearly horizontal	Water level
138.22	42.13	96	6	22	E	Shallow	Minor fracture
146.02	44.50	97	7	76	E	Nearly vertical	Fracture
156.48	47.69	117	27	60	SE	Steep	Minor fracture
162.19	49.43	148	58	52	SE	Steep	Minor fracture
176.45	53.78	159	69	47	S	Moderate	Minor fracture
182.70	55.68	352	262	57	N	Steep	Minor fracture
186.06	56.71	5	275	19	N	Shallow	Minor fracture
194.09	59.16	341	251	50	N	Steep	Minor fracture
195.91	59.71	213	123	81	SW	Nearly vertical	Minor fracture
199.02	60.66	130	40	52	SE	Steep	Minor fracture
200.53	61.12	134	44	47	SE	Moderate	Minor fracture
201.33	61.36	326	236	47	NW	Moderate	Minor fracture
204.79	62.42	299	209	10	NW	Shallow	Minor fracture
207.10	63.12	296	206	53	NW	Steep	Minor fracture
212.38	64.73	202	112	18	S	Shallow	Minor fracture
220.86	67.31	107	17	79	E	Nearly vertical	Minor fracture
228.64	69.69	341	251	53	N	Steep	Possible fracture
230.54	70.27	228	138	30	SW	Shallow	Possible fracture
231.56	70.58	244	154	66	SW	Steep	Minor fracture
233.56	71.19	--	--	--	--	Horizontal	Transmissive fracture

Table 1F–2. Interpretation of optical televiewer logs for borehole DW-31, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 2.2 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
17.00	5.18	346	256	1	N	Nearly horizontal	Bottom of casing
26.02	7.93	18	288	72	N	Nearly vertical	Minor fracture
33.01	10.06	175	85	38	S	Moderate	Minor fracture
34.96	10.66	309	219	62	NW	Steep	Minor fracture
37.35	11.38	285	195	74	W	Nearly vertical	Minor fracture
37.62	11.47	117	27	43	SE	Moderate	Minor fracture
43.27	13.19	325	235	65	NW	Steep	Minor fracture
48.65	14.83	292	202	81	W	Nearly vertical	Minor fracture
70.53	21.50	256	166	75	W	Nearly vertical	Minor fracture
72.86	22.21	103	13	59	E	Steep	Minor fracture
77.36	23.58	237	147	75	SW	Nearly vertical	Minor fracture
84.46	25.74	279	189	70	W	Nearly vertical	Fracture
87.19	26.57	215	125	0	SW	Nearly horizontal	Minor fracture
96.25	29.34	237	147	56	SW	Steep	Minor fracture
112.63	34.33	108	18	23	E	Shallow	Minor fracture
119.93	36.55	272	182	15	W	Shallow	Minor fracture
134.36	40.95	262	172	1	W	Nearly horizontal	Water level

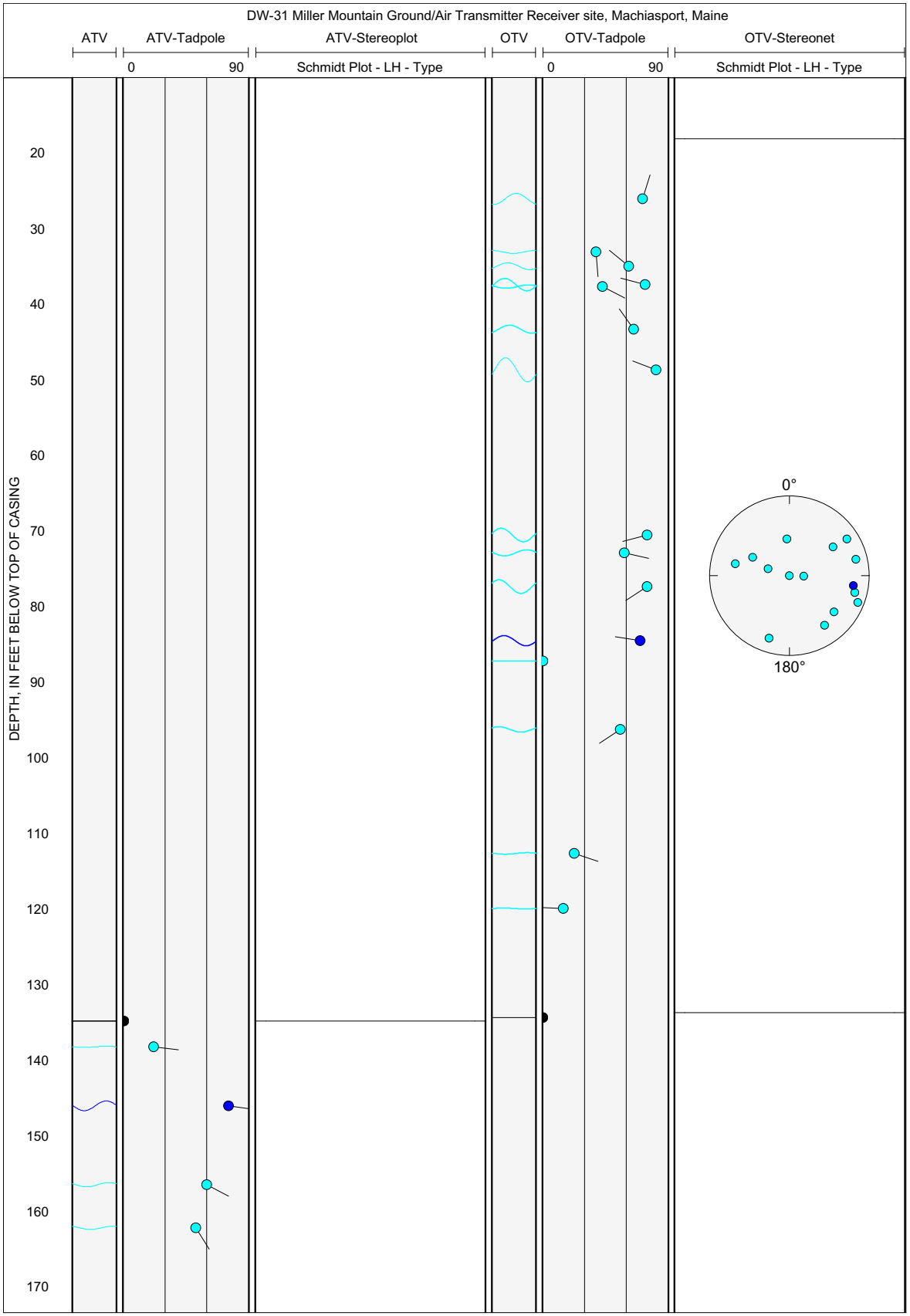


Figure 1F-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-31, near Machiasport, Maine.

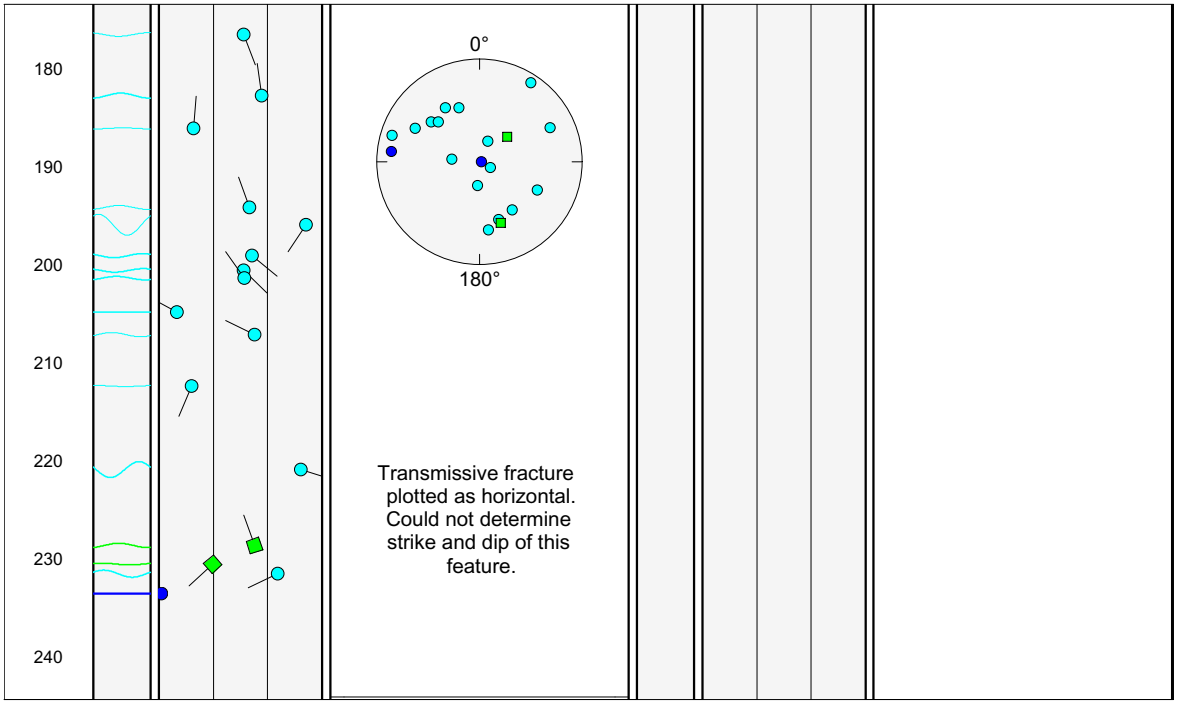


Figure 1F-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-31, near Machiasport, Maine.—Continued

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of measuring point	208	feet
Number of fractures	2	
Well diameter	6	inches
Drawdown	6.18	feet
Depth to ambient water level	134.45	feet

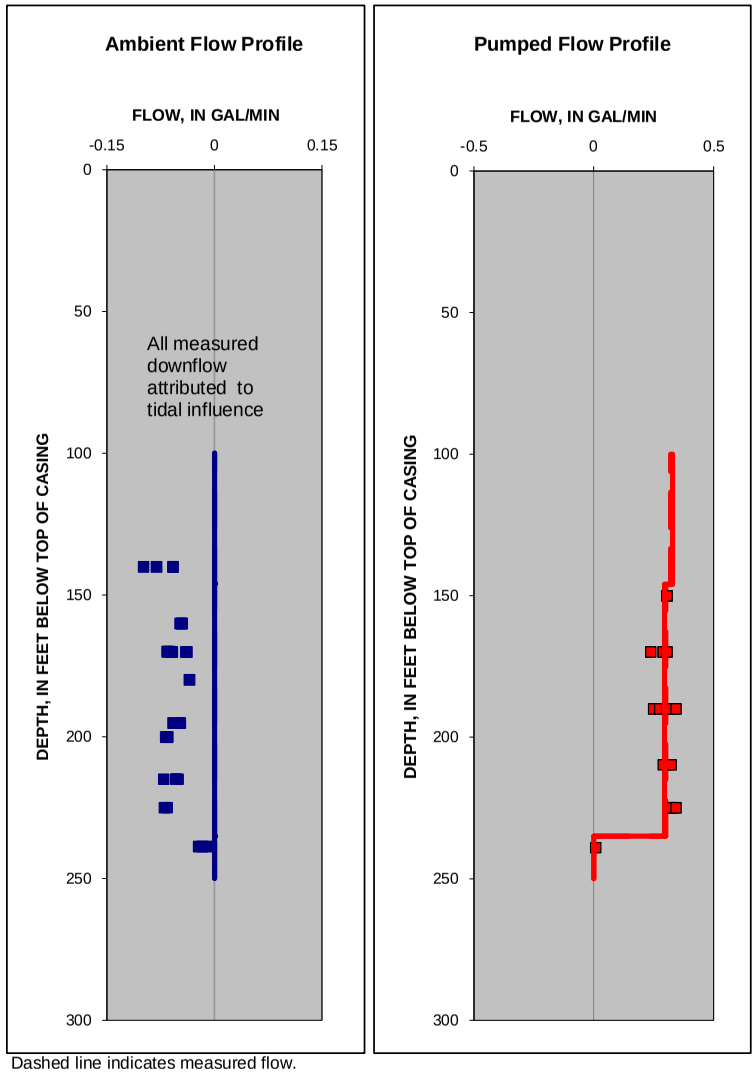
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)
2	146	0.0	0.32
1	235	0	0.30

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, ambient water level	73.55	feet
Elevation, pumped water level	67.37	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)	Zone trans-missivity (ft^2/d)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
2	146	0	0.327	0.80	134.45	73.55	8
1	235	0	0.295	9.40	134.45	73.55	92

Total borehole transmissivity	10.2	(ft^2/d)
Sum of squares error	0.00008	$(gal/min)^2$
Root mean square error	0.00627	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1F–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-31, near Machiasport, Maine.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]

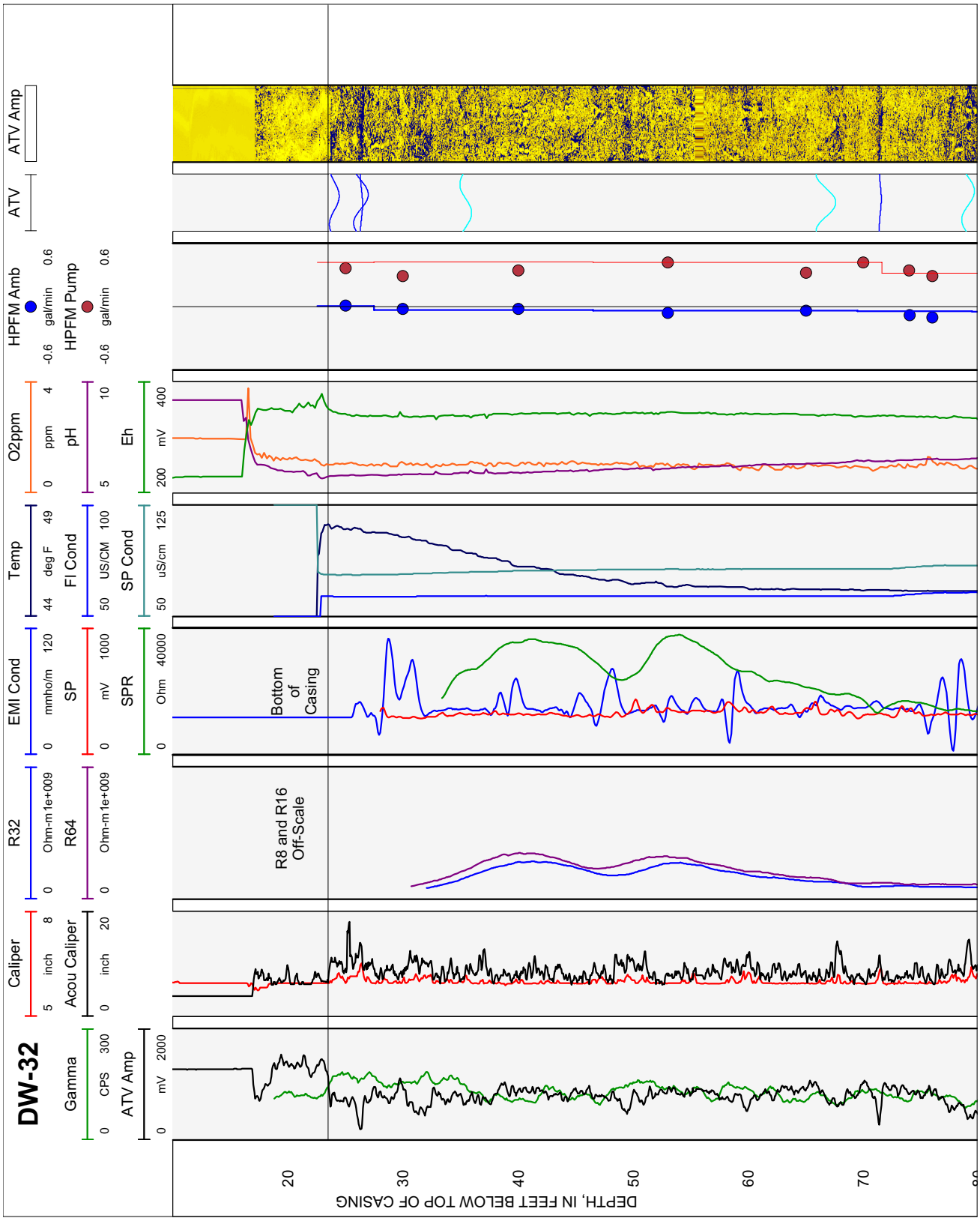


Figure 1G-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-32, near Machiasport, Maine.

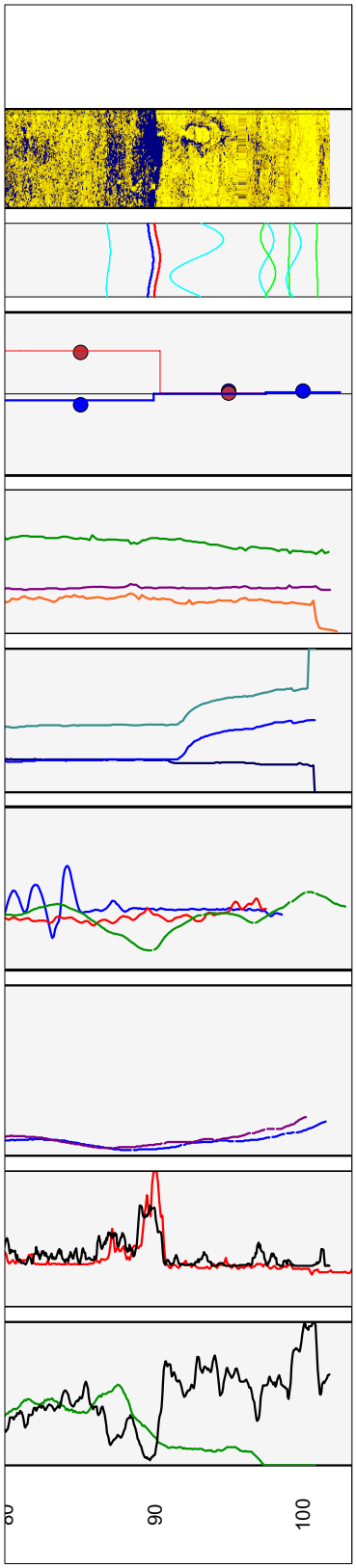


Figure 1G-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-32, near Machiasport, Maine.—Continued

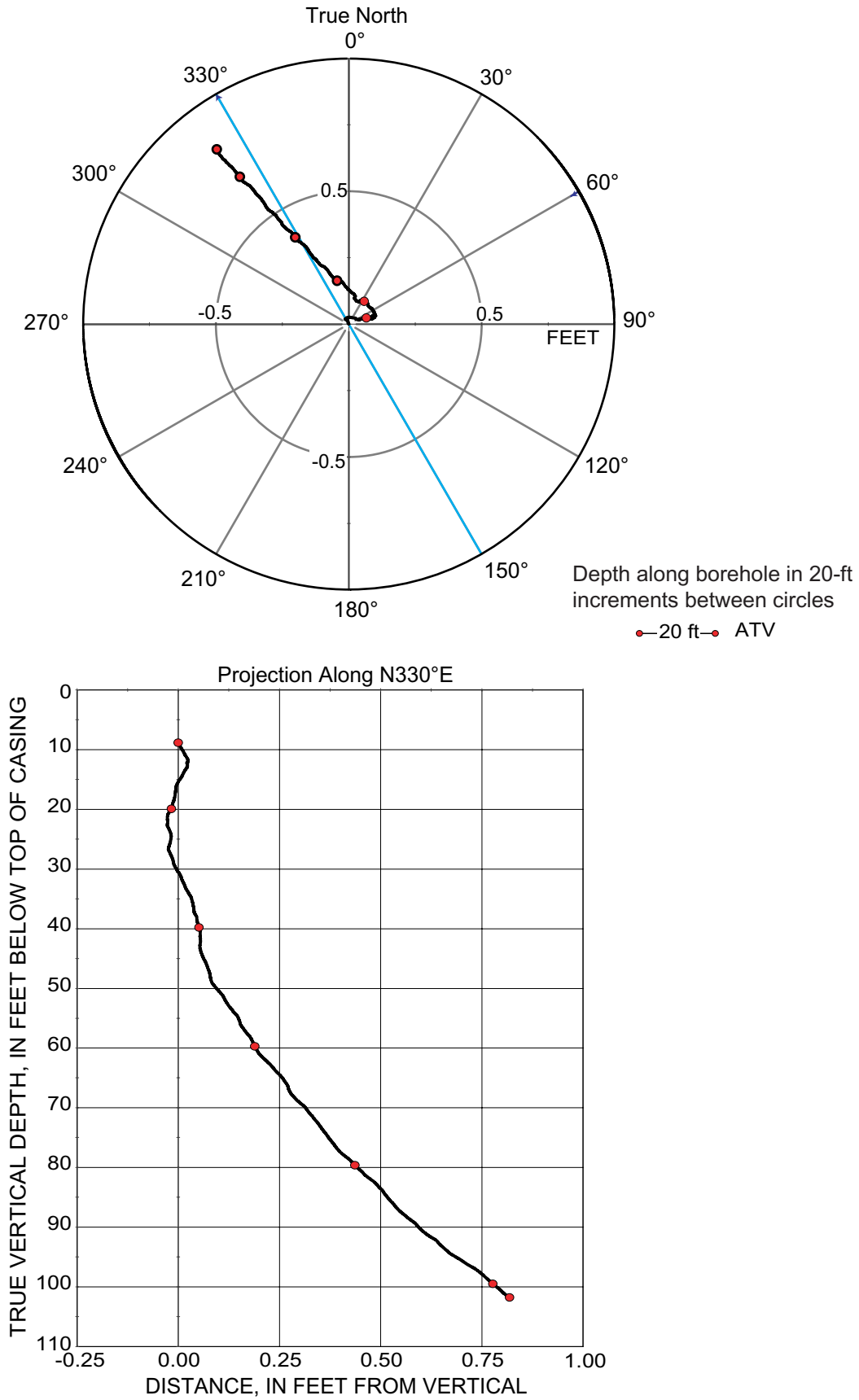


Figure 1G-2. Borehole deviation logs for borehole DW-32, near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer]

Table 1G–1. Interpretation of acoustic televiewer logs for borehole DW-32, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 1.4 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike; --, no measurement]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
17.00	5.18	336	246	0	--	Horizontal	Water level
23.61	7.20	89	359	89	E	Nearly vertical	Bottom of casing
24.04	7.33	232	132	59	SW	Steep	Transmissive fracture
26.33	8.02	231	141	68	SW	Steep	Transmissive fracture
26.38	8.04	171	81	20	S	Shallow	Transmissive fracture
35.46	10.81	128	38	66	SE	Steep	Minor fracture
36.50	11.12	124	34	22	SE	Shallow	Minor fracture
66.75	20.34	197	107	47	S	Moderate	Minor fracture
71.47	21.78	282	192	15	W	Shallow	Transmissive fracture
79.09	24.11	263	173	70	W	Nearly vertical	Minor fracture
86.86	26.47	268	178	26	W	Shallow	Minor fracture
89.73	27.35	256	166	23	W	Shallow	Transmissive fracture
90.16	27.48	190	100	33	S	Moderate	Fracture
92.84	28.30	281	191	88	W	Nearly vertical	Minor fracture
97.53	29.73	271	181	65	W	Steep	Minor fracture
97.63	29.76	260	170	2	W	Nearly horizontal	Lithologic feature
99.10	30.20	339	249	27	N	Shallow	Lithologic feature
99.36	30.28	272	182	70	W	Steep	Minor fracture
100.96	30.77	336	246	38	NW	Moderate	Lithologic feature

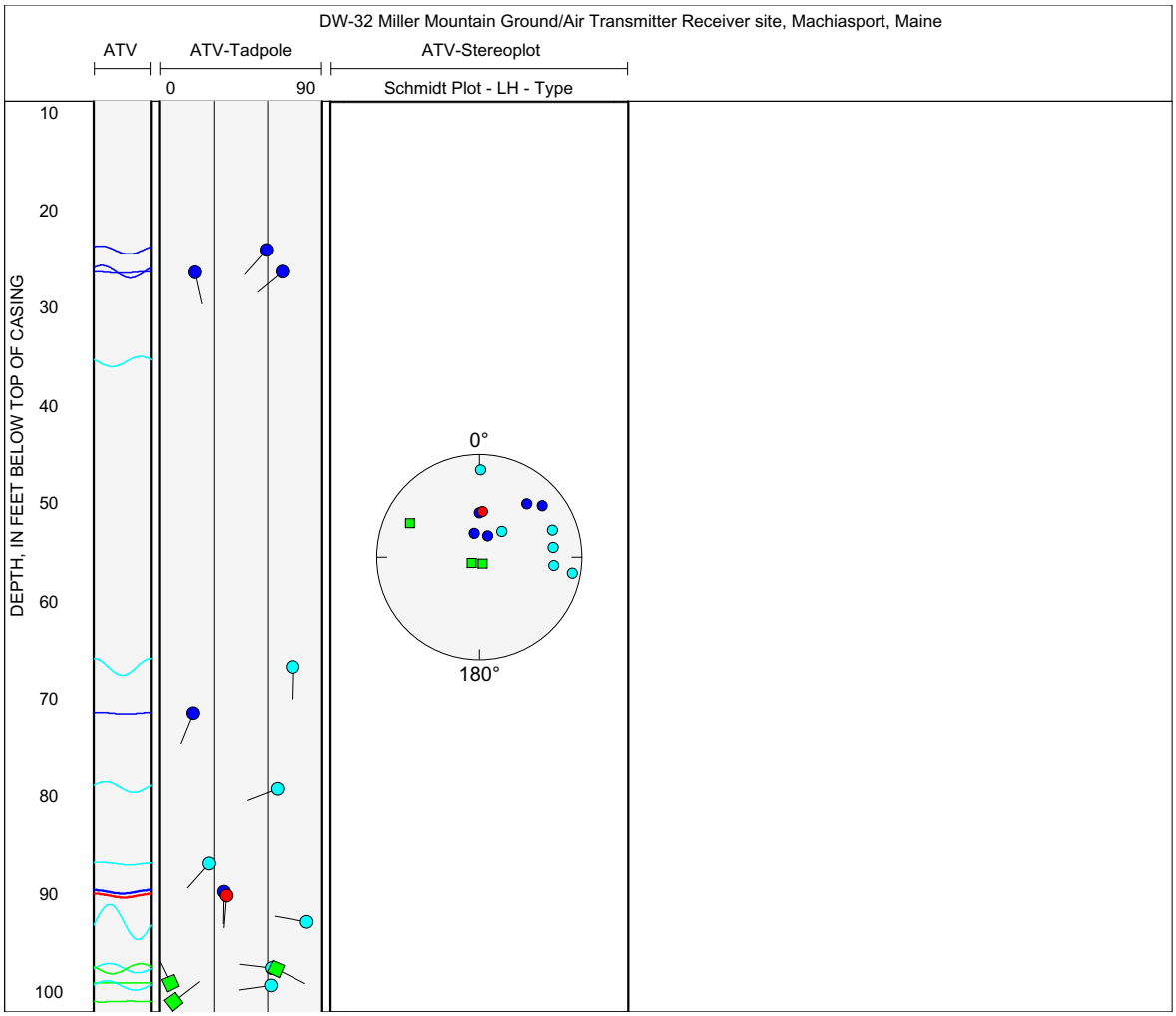


Figure 1G-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-32, near Machiasport, Maine.

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of measuring point	62	feet
Number of fractures	3	
Well diameter	6	inches
Drawdown	0.21	feet
Depth to ambient water level	17.04	feet

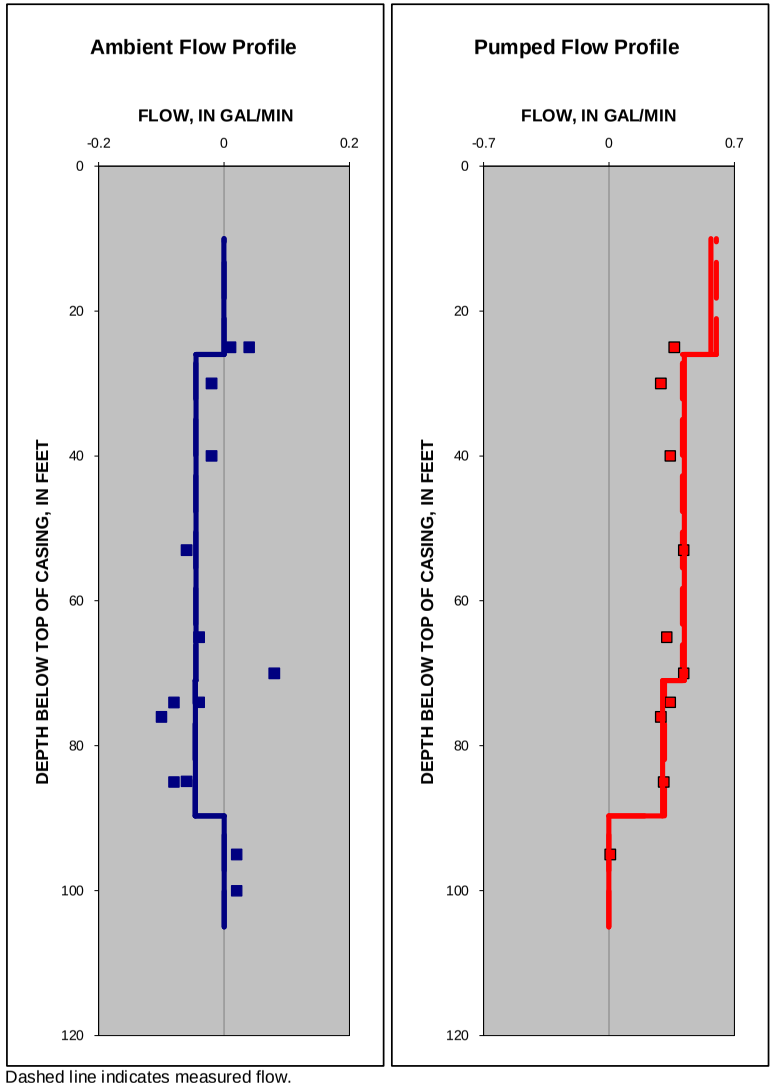
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)
3	26	0.000	0.600
2	71	-0.045	0.410
1	89.7	-0.046	0.310

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, ambient water level	44.96	feet
Elevation, pumped water level	44.75	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)	Zone trans-missivity (ft^2/d)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
3	26.0	0.000	0.570	82.5	16.95	45.05	16
2	71.0	-0.045	0.422	99.0	17.04	44.96	19
1	89.7	-0.046	0.299	330.0	17.07	44.93	65

Total borehole transmissivity	511.5	(ft^2/d)
Sum of squares error	0.00116	$(gal/min)^2$
Root mean square error	0.01967	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1G–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-32, near Machiasport, Maine.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]

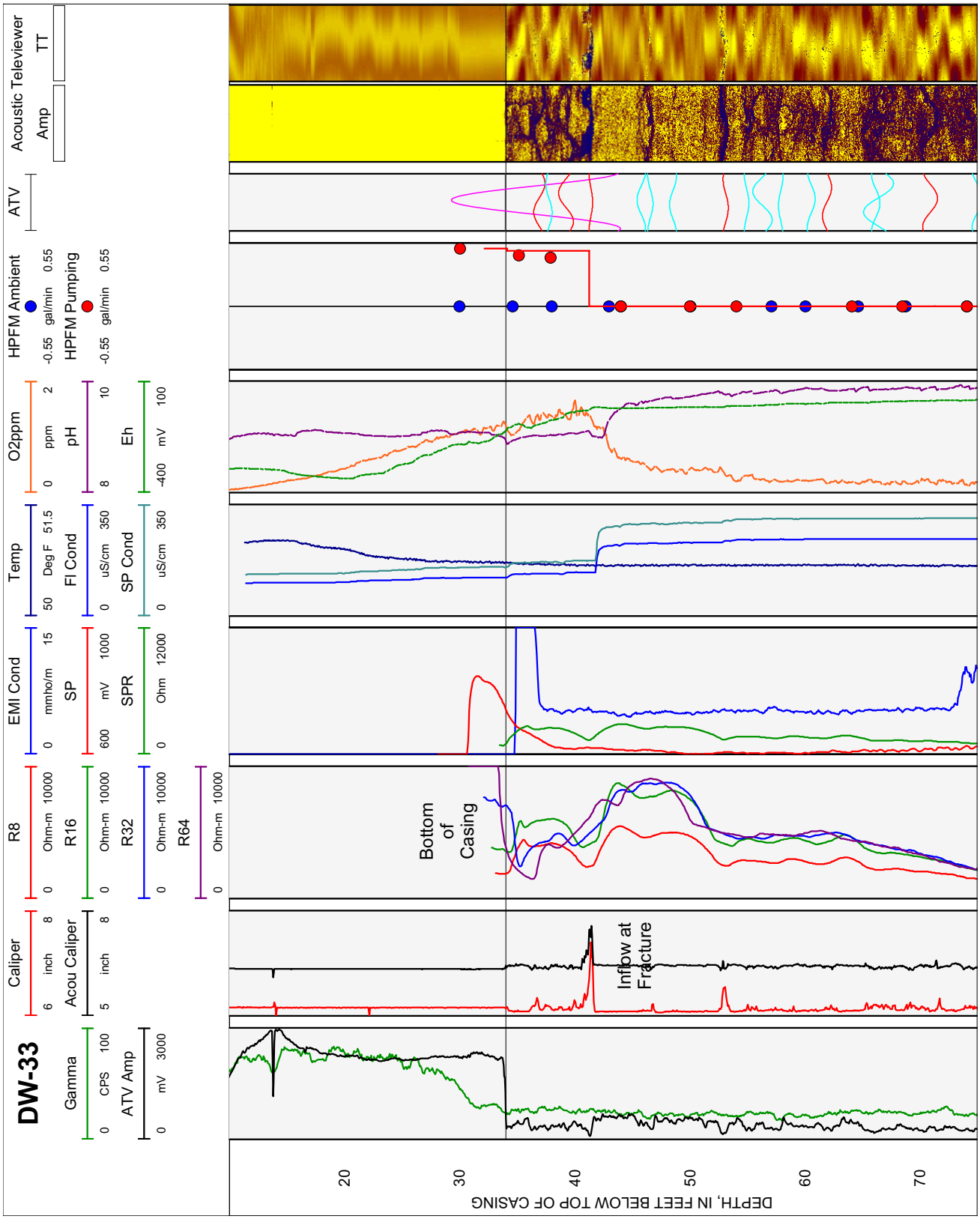


Figure 1H-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-33, near Machiasport, Maine.

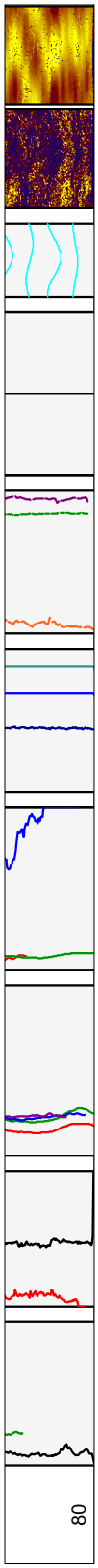


Figure 1H-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-33, near Machiasport, Maine.—Continued

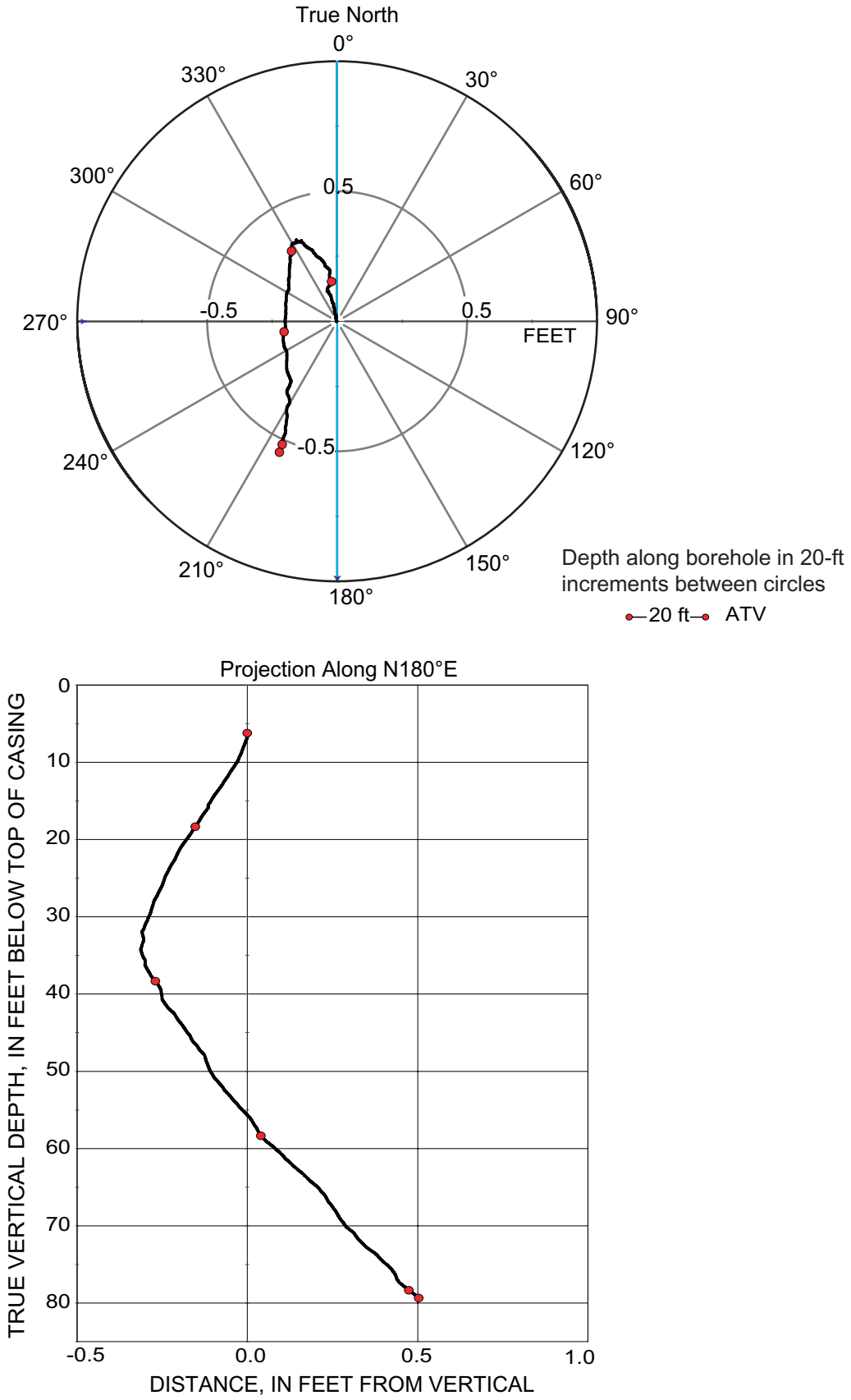


Figure 1H-2. Borehole deviation logs for borehole DW-33, near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer]

Table 1H–1. Interpretation of acoustic televiewer logs for borehole DW-33, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 1.98 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
33.98	10.36	76.5	347	1	E	Nearly horizontal	Bottom of casing
34.69	10.57	177.1	87	58	S	Steep	Minor fracture
34.80	10.61	8.04	278	84	N	Nearly vertical	Partial trace of fracture
36.92	11.25	299.26	209	63	NW	Steep	Fracture
37.77	11.51	115.16	25	48	SE	Moderate	Minor fracture
39.24	11.96	57.77	328	69	NE	Steep	Transmissive fracture
39.31	11.98	327.19	237	25	NW	Shallow	Minor fracture
40.87	12.46	190.17	100	64	S	Steep	Transmissive fracture
41.40	12.62	170.65	81	31	S	Moderate	Transmissive fracture
45.84	13.97	5.82	276	52	N	Steep	Minor fracture
46.56	14.19	156.18	66	42	SE	Moderate	Minor fracture
48.49	14.78	331.43	241	51	NW	Steep	Minor fracture
53.12	16.19	142.8	53	42	SE	Moderate	Fracture
54.82	16.71	166.14	76	37	S	Moderate	Minor fracture
56.36	17.18	58.37	328	74	NE	Nearly vertical	Minor fracture
57.86	17.63	334.96	245	38	NW	Moderate	Minor fracture
60.59	18.47	210.52	121	52	SW	Steep	Minor fracture
61.92	18.87	266.33	176	57	W	Steep	Fracture
66.15	20.16	170.87	81	54	S	Steep	Minor fracture
66.40	20.24	295.33	205	80	NW	Nearly vertical	Minor fracture
70.84	21.59	201.04	111	68	S	Steep	Fracture
75.00	22.86	202.83	113	60	SW	Steep	Minor fracture
75.91	23.14	56.81	327	54	NE	Steep	Minor fracture
76.57	23.34	217.87	128	49	SW	Moderate	Minor fracture
78.21	23.84	196.49	106	60	S	Steep	Minor fracture
79.24	24.15	189.56	100	66	S	Steep	Minor fracture
79.74	24.30	180.92	91	30	S	Shallow	Minor fracture

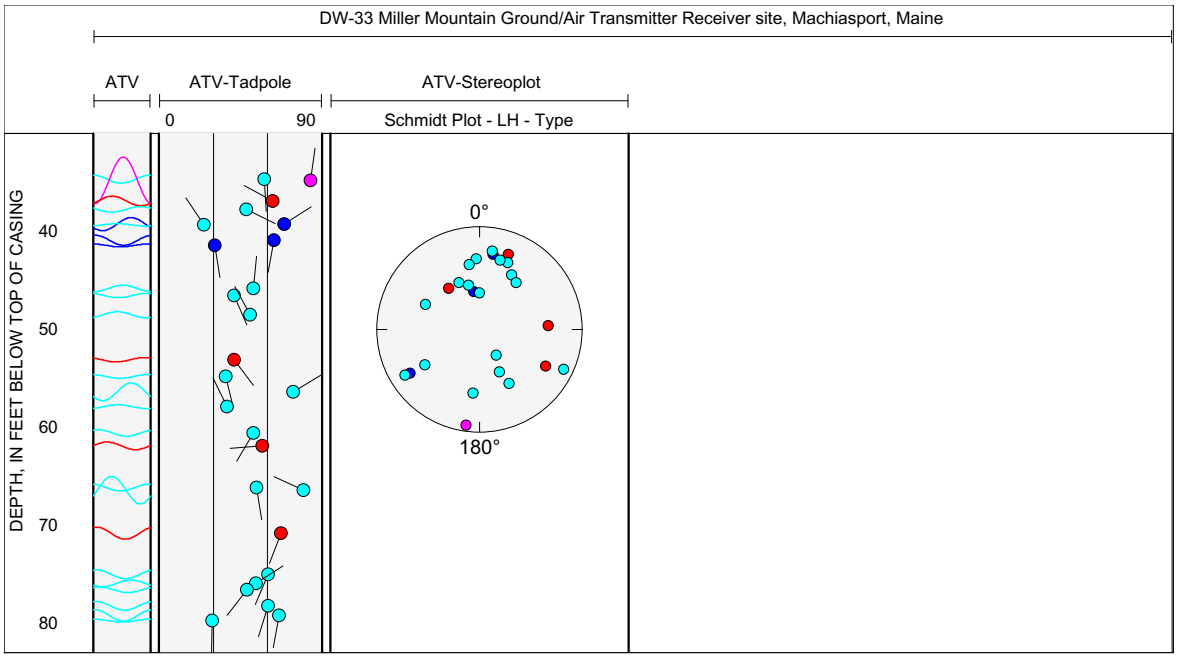


Figure 1H-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-33, near Machiasport, Maine.

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of Measuring Point	52.8	feet
Number of fractures	2	
Well Diameter	6	inches
Drawdown	0.97	feet
Depth to Ambient Water Level	3.97	feet

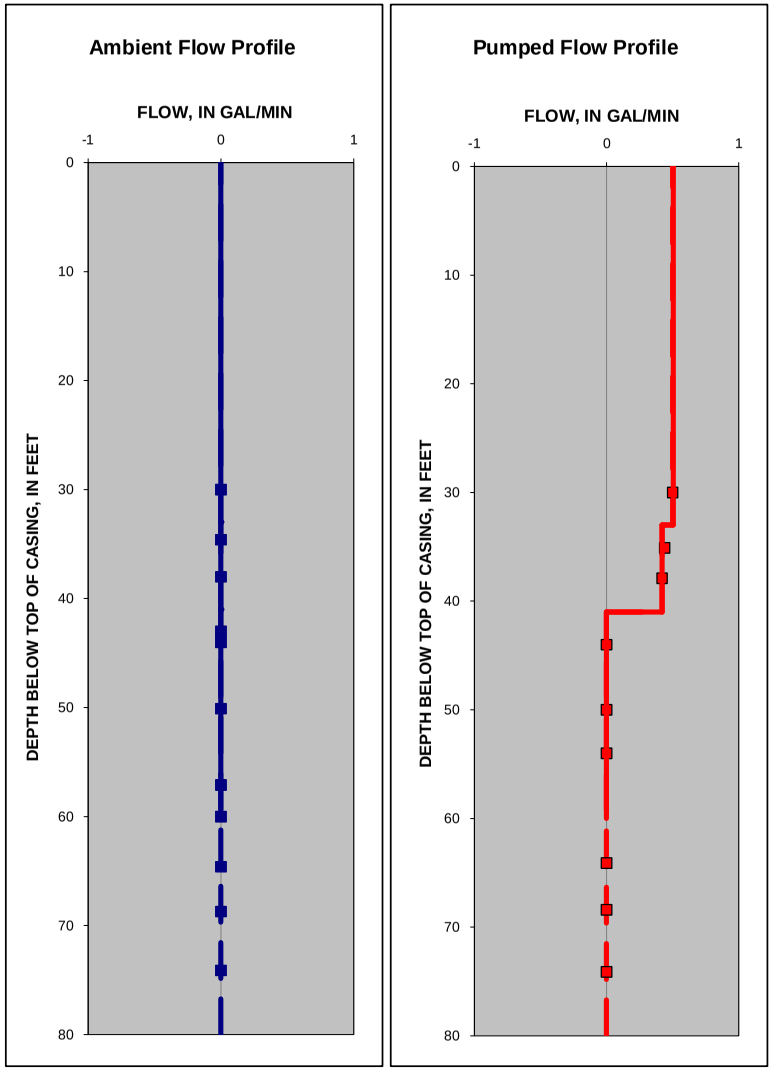
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)
2	34.0	0.00	0.50
1	41.0	0.00	0.42

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, Ambient water level	48.83	feet
Elevation, Pumped water level	47.86	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)	Zone trans-missivity (ft^2/d)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
2	34.0	0.000	0.506	14.0	3.97	48.830002	14
1	41.0	0.000	0.420	84.0	3.97	48.830002	86

Total borehole transmissivity	98.0	(ft^2/d)
Sum of squares error	0.000	$(gal/min)^2$
Root mean square error	0.004	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1H–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-33, near Machiasport, Maine.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]

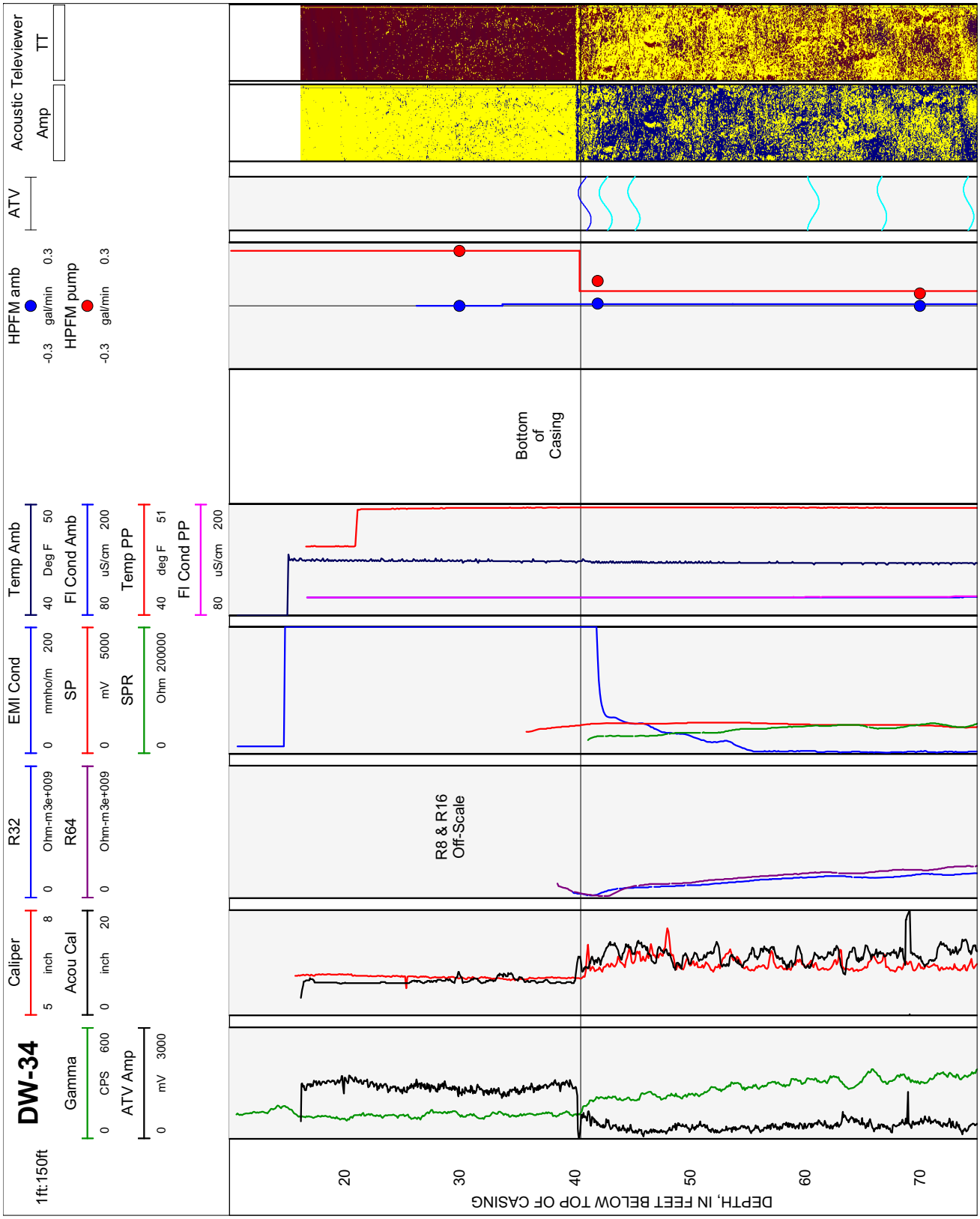


Figure 1I-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-34, near Machiasport, Maine.

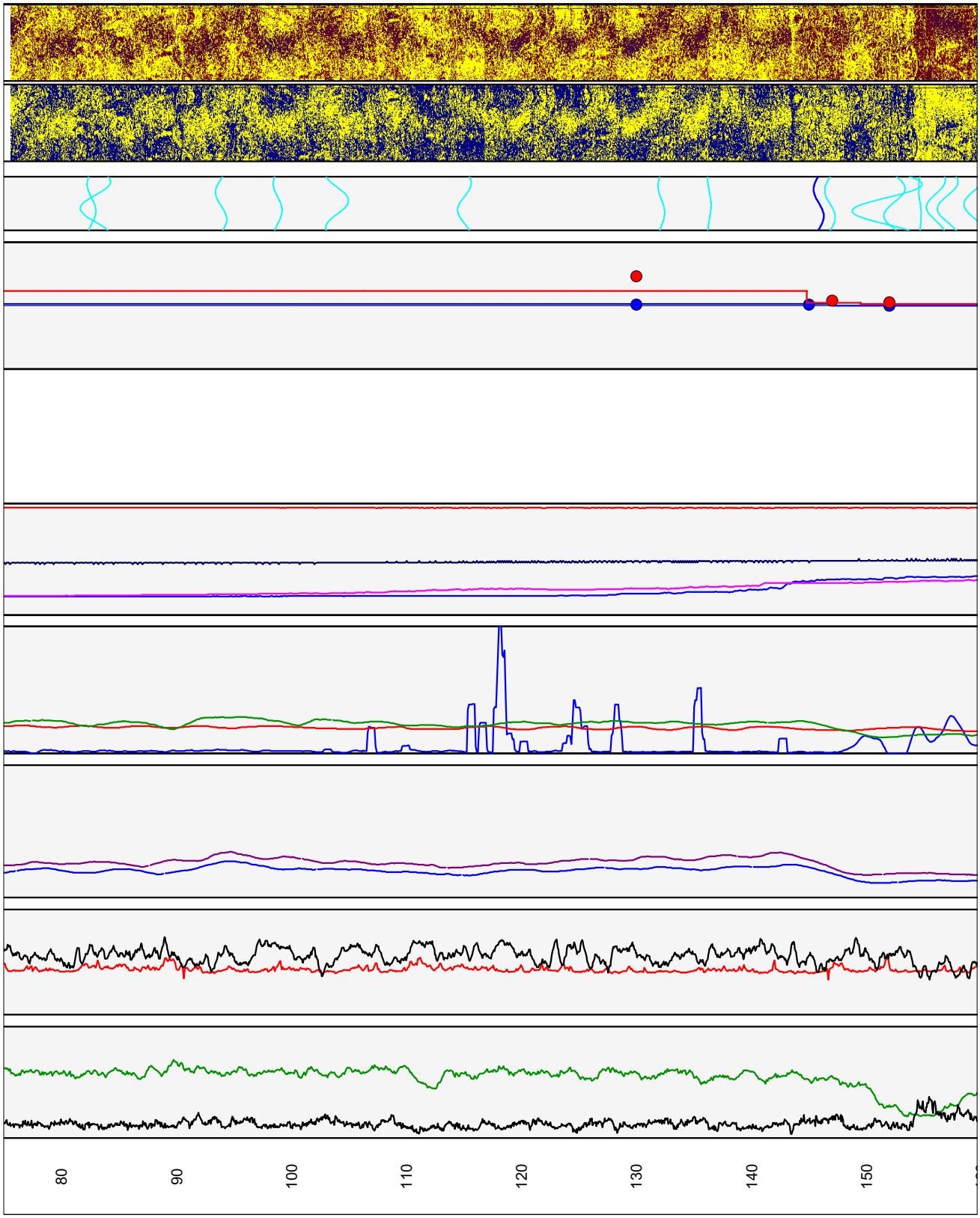


Figure 1I-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-34, near Machiasport, Maine.—Continued

Figure 1I-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-34, near Machiasport, Maine.—Continued

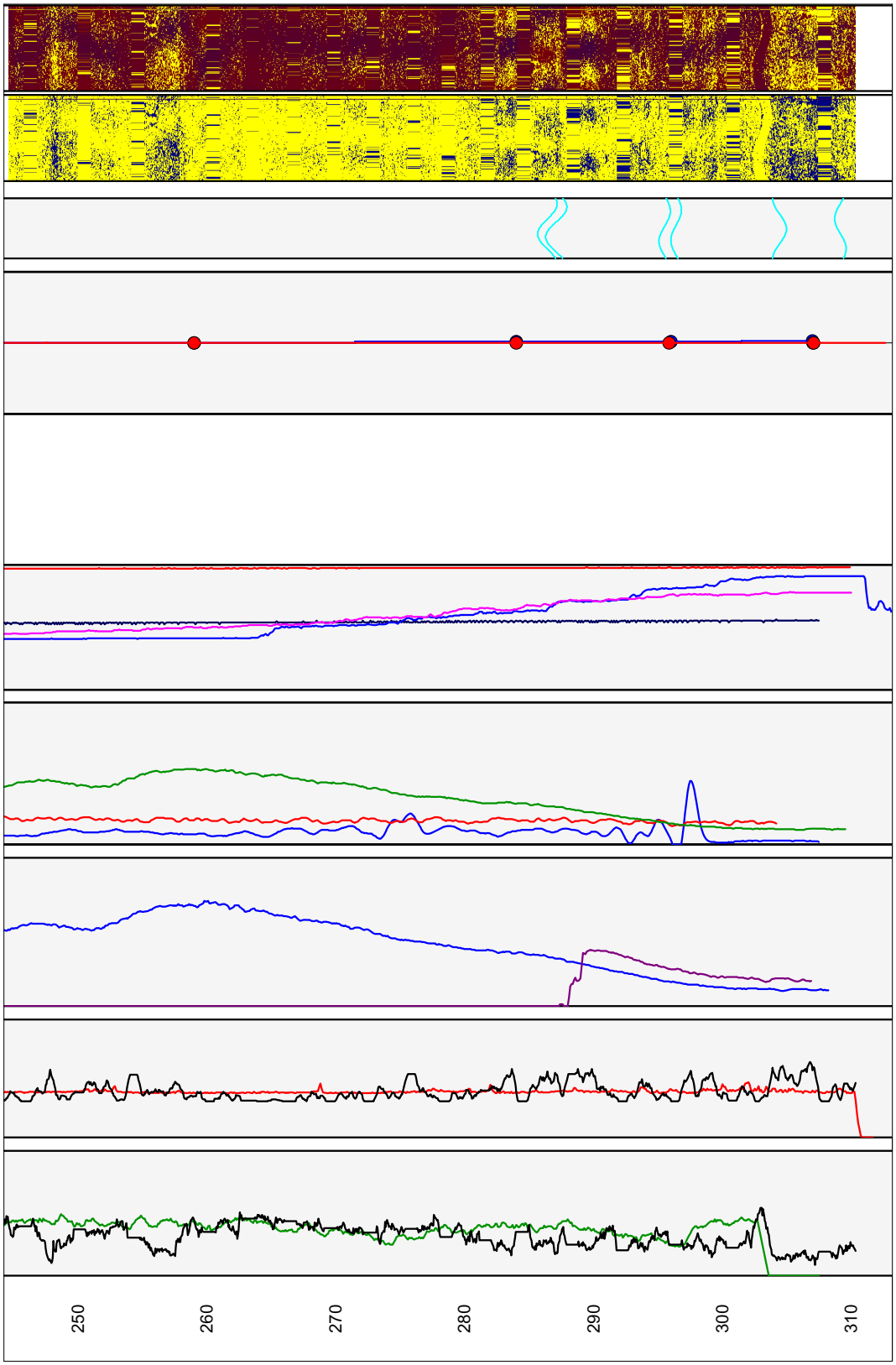


Figure 1I-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-34, near Machiasport, Maine.—Continued

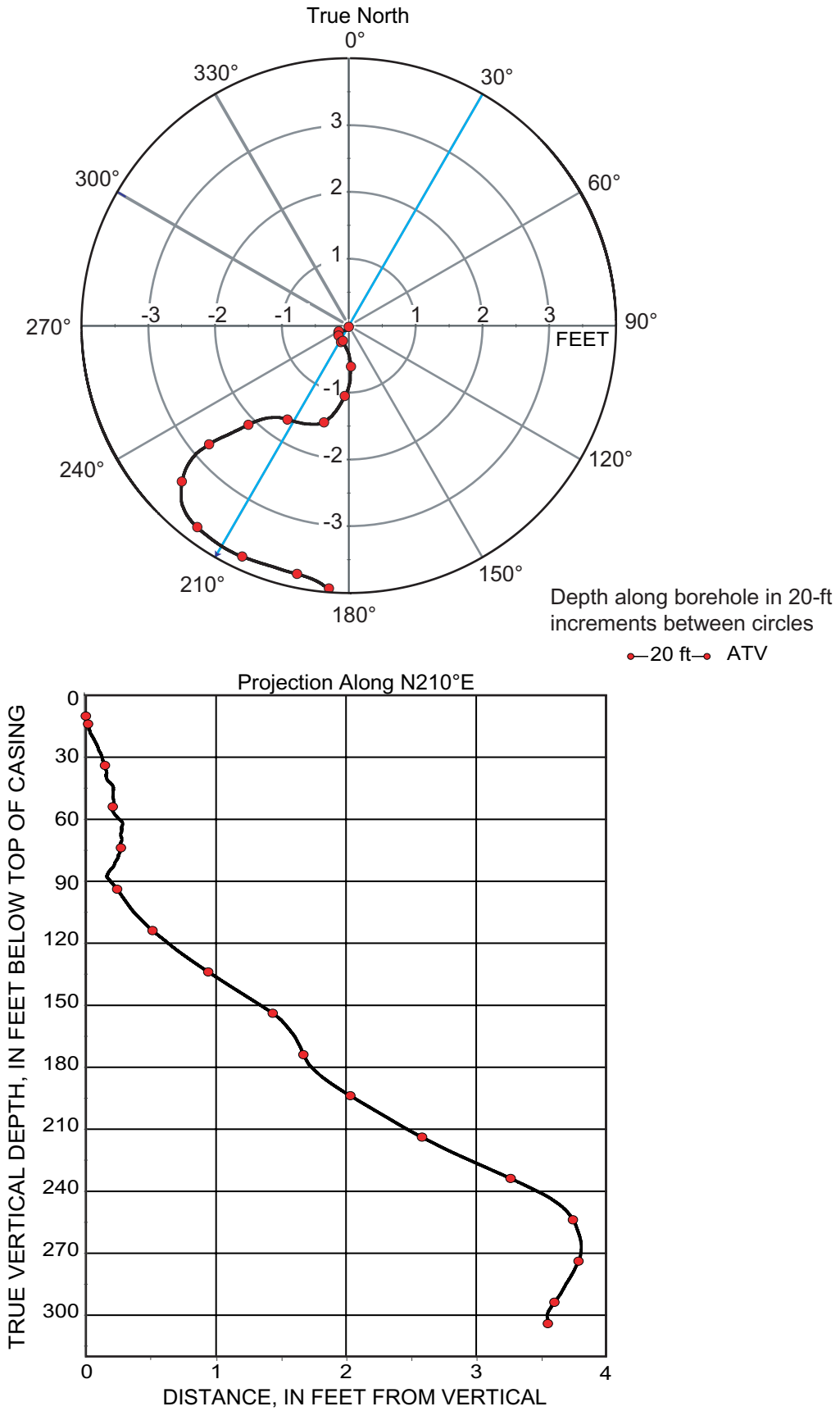


Figure 1I-2. Borehole deviation logs for borehole DW-34, near Machiasport, Maine. Blue line on radial plot (top is line of projection for vertical plot (bottom). Deviation (tilt) data interpolated from 95 to 295 feet below top of casing. [ft, foot; ATV, acoustic televiewer]

Table 1I–1. Interpretation of acoustic televiewer logs for borehole DW-34, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 2.25 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike; --, no measurement]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
40.50	12.34	--	--	--	--	--	Bottom of casing
40.87	12.46	72	342	66	E	Steep	Transmissive fracture
42.67	13.01	72	342	67	E	Steep	Minor fracture
45.16	13.76	80	350	65	E	Steep	Minor fracture
60.73	18.51	188	98	63	S	Steep	Minor fracture
66.71	20.33	91	1	58	E	Steep	Minor fracture
74.21	22.62	94	4	61	E	Steep	Minor fracture
82.59	25.17	131	41	57	SE	Steep	Minor fracture
82.92	25.27	326	236	78	NW	Nearly vertical	Minor fracture
93.85	28.60	74	344	63	E	Steep	Minor fracture
98.79	30.11	134	44	56	SE	Steep	Minor fracture
103.94	31.68	199	109	75	S	Nearly vertical	Minor fracture
115.01	35.05	317	227	67	NW	Steep	Minor fracture
132.14	40.27	118	28	49	SE	Moderate	Minor fracture
136.34	41.55	164	74	28	S	Shallow	Minor fracture
145.83	44.45	95	5	61	E	Steep	Transmissive fracture
146.80	44.74	87	357	62	E	Steep	Minor fracture
151.78	46.26	310	220	85	NW	Nearly vertical	Minor fracture
152.42	46.46	280	190	73	W	Nearly vertical	Minor fracture
154.62	47.13	97	7	26	E	Shallow	Minor fracture
156.02	47.55	335	245	73	NW	Nearly vertical	Minor fracture
157.06	47.87	324	234	74	NW	Nearly vertical	Minor fracture
159.30	48.55	355	265	74	N	Nearly vertical	Minor fracture
160.48	48.91	351	261	72	N	Nearly vertical	Minor fracture
165.62	50.48	352	262	65	N	Steep	Minor fracture
188.05	57.31	12	282	84	N	Nearly vertical	Minor fracture
212.39	64.73	112	22	14	E	Shallow	Minor fracture
240.87	73.41	239	149	23	SW	Shallow	Minor fracture
286.45	87.31	326	236	74	NW	Nearly vertical	Minor fracture
287.13	87.51	308	218	75	NW	Nearly vertical	Minor fracture
295.53	90.07	284	194	62	W	Steep	Minor fracture
296.44	90.35	290	200	61	W	Steep	Minor fracture
304.42	92.78	178	88	62	S	Steep	Minor fracture
309.17	94.23	57	327	60	NE	Steep	Minor fracture

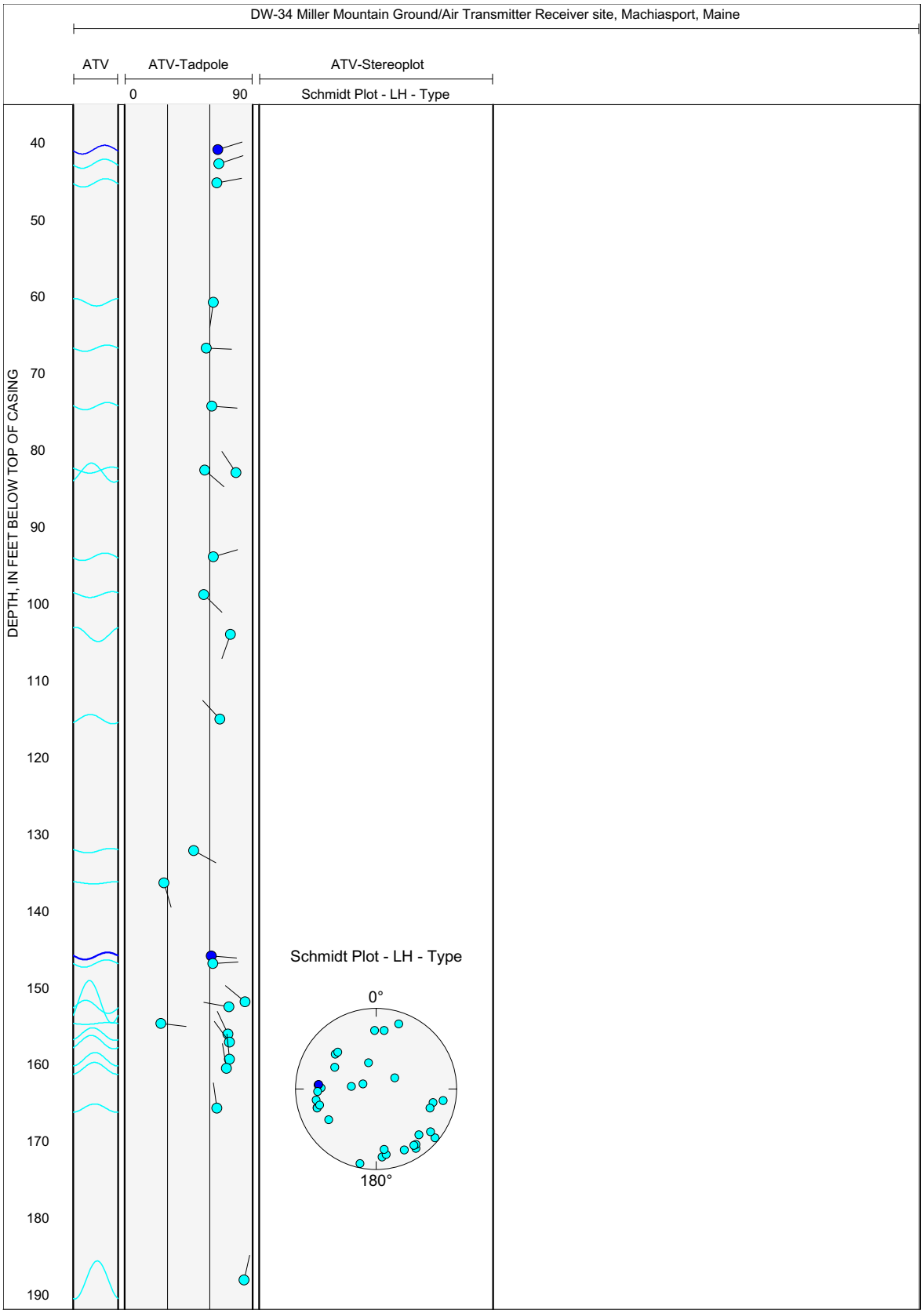


Figure 1I-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-34, near Machiasport, Maine.

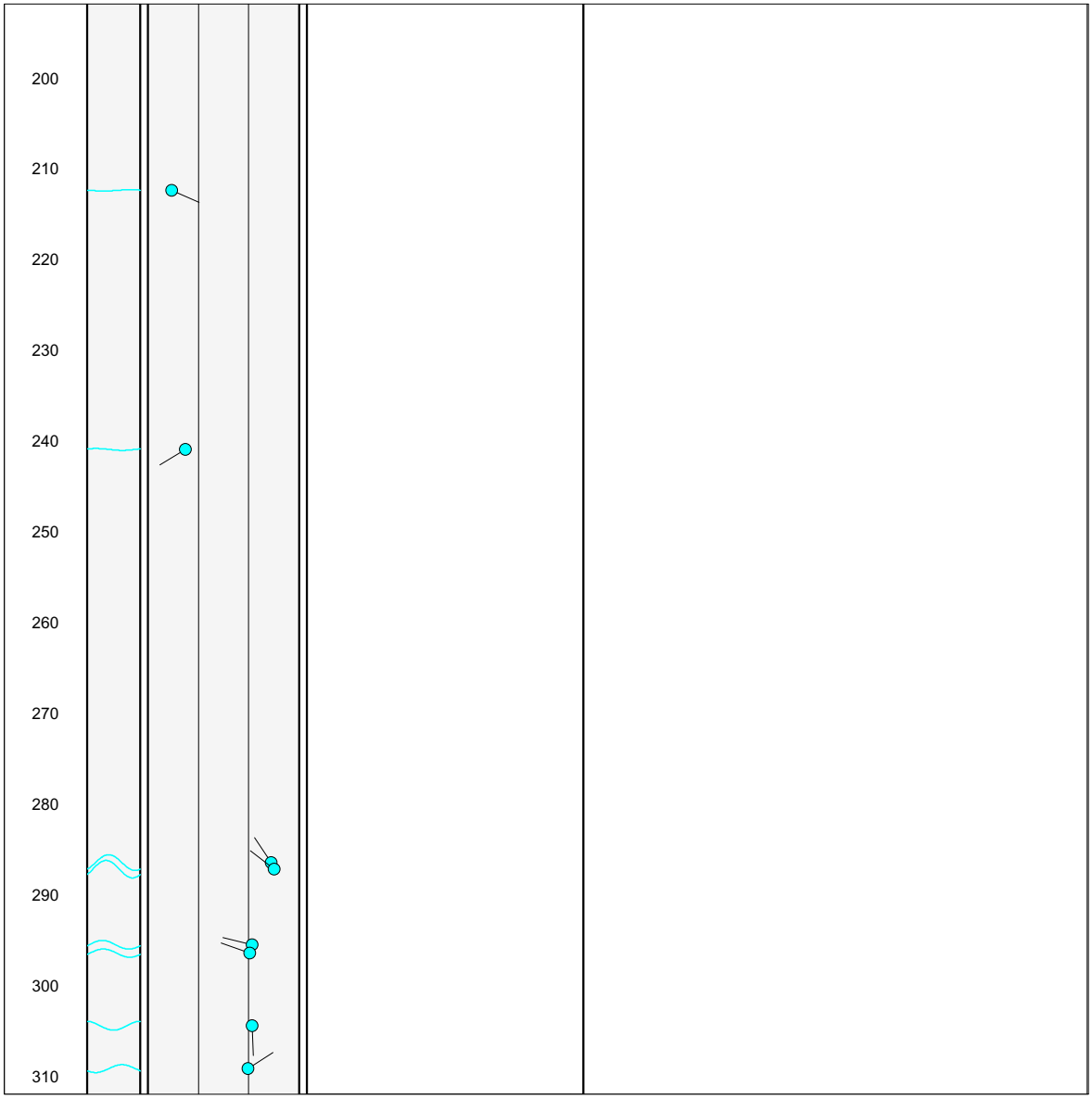


Figure 1I-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-34, near Machiasport, Maine.—Continued

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of measuring point	66.9	feet
Number of fractures	3	
Well diameter	6	inches
Drawdown	6.15	feet
Depth to ambient water level	8.4	feet

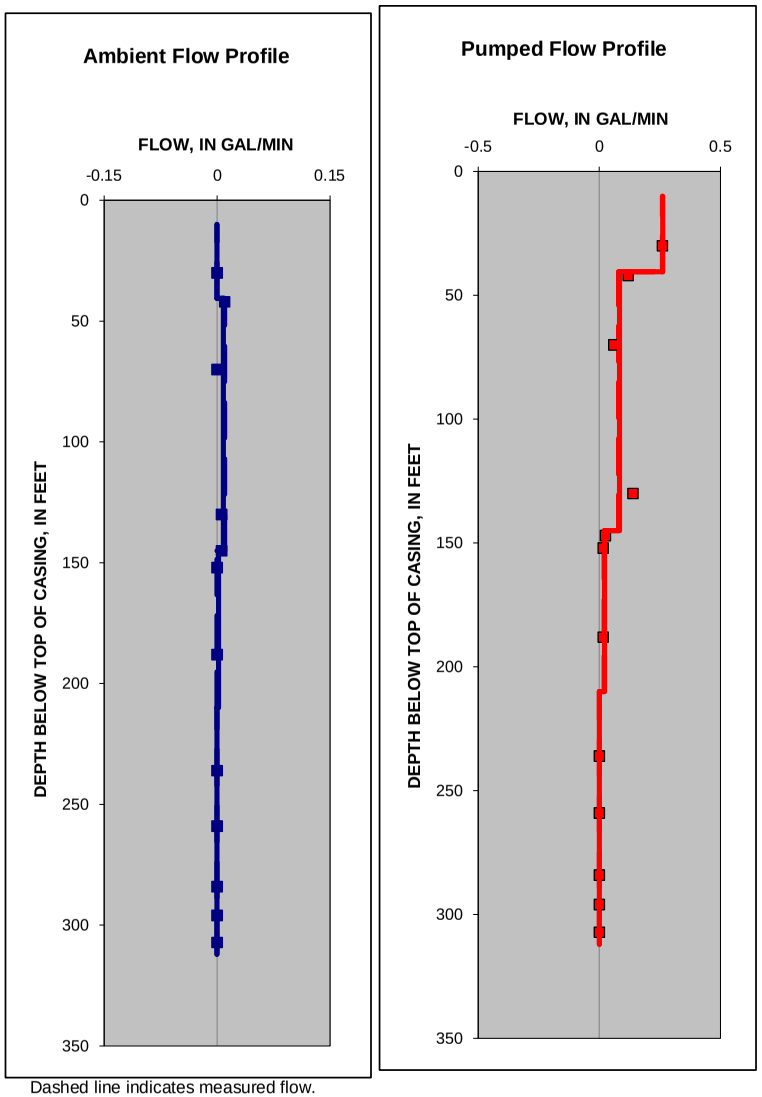
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)
3	40.5	0.000	0.260
2	145	0.010	0.080
1	210	0.000	0.020

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, ambient water level	58.50	feet
Elevation, pumped water level	52.35	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)	Zone trans-missivity (ft^2/d)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
3	40.5	0.000	0.262	6.00	8.65	58.25	75
2	145	0.009	0.084	1.50	7.65	59.25	19
1	210	0.002	0.022	0.48	7.65	59.25	6

Total borehole transmissivity	8.0	(ft^2/d)
Sum of squares error	0.00003	$(gal/min)^2$
Root mean square error	0.00298	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1I–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-34, near Machiasport, Maine.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]

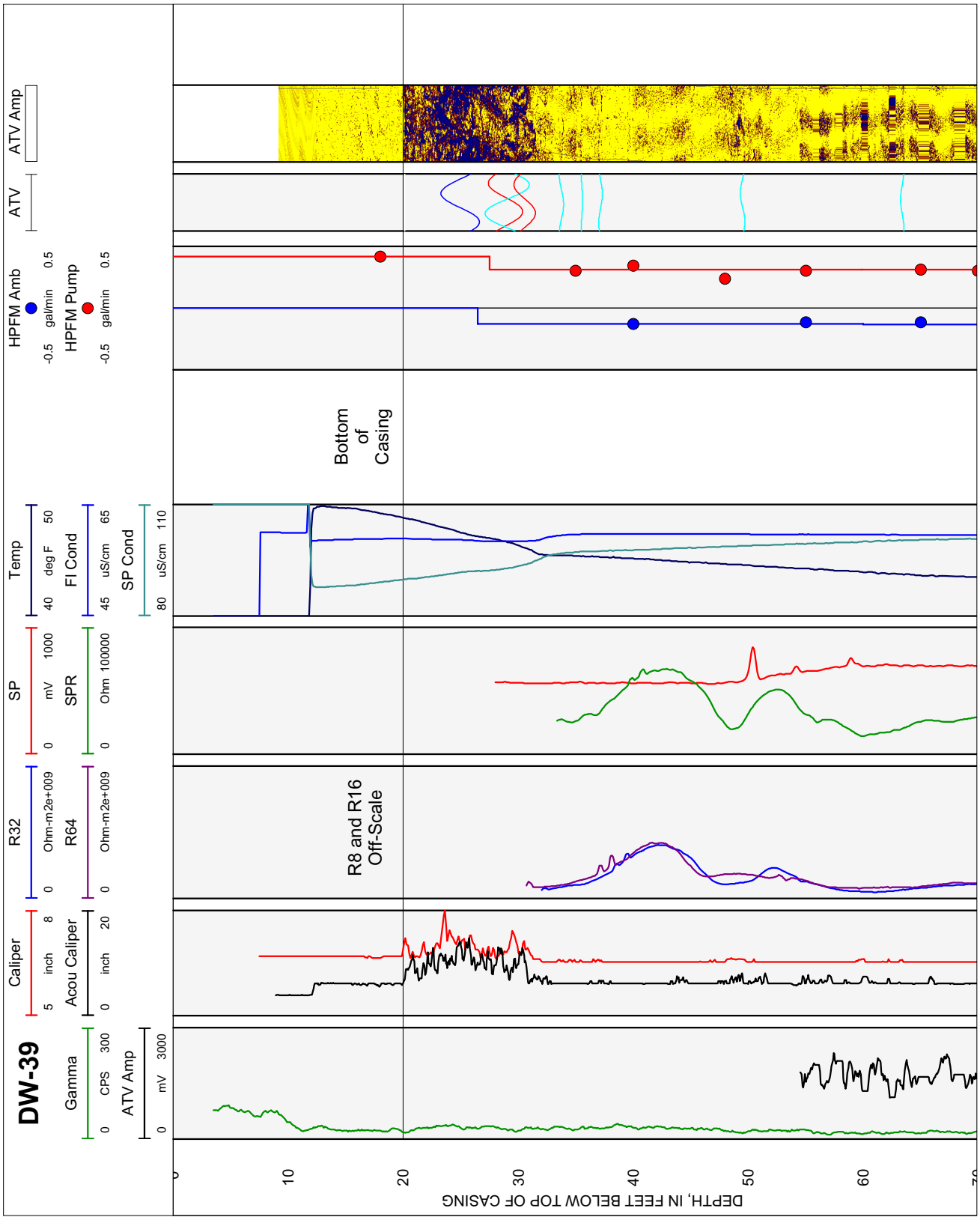


Figure 1J-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-39, near Machiasport, Maine.

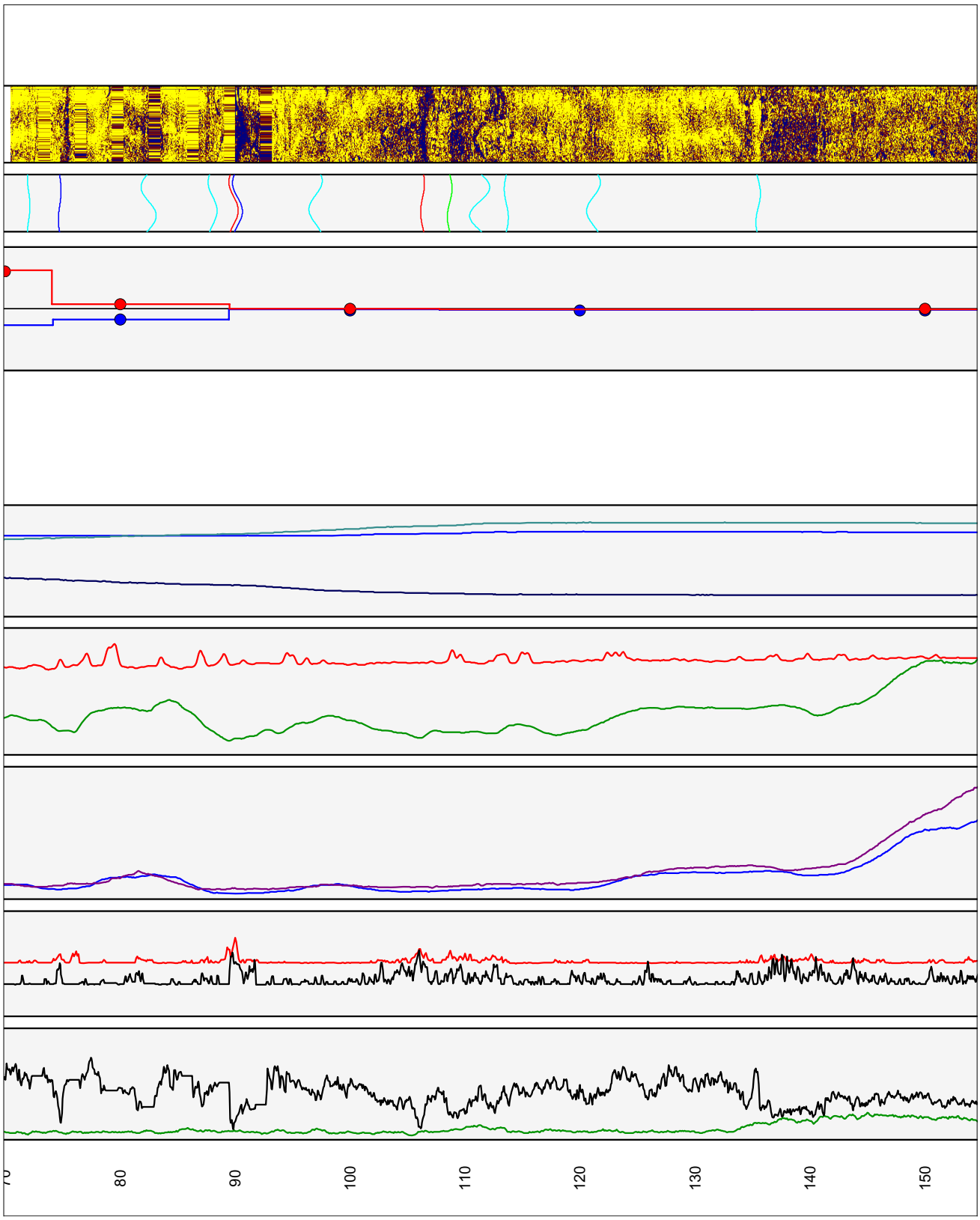


Figure 1J-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-39, near Machiasport, Maine.—Continued

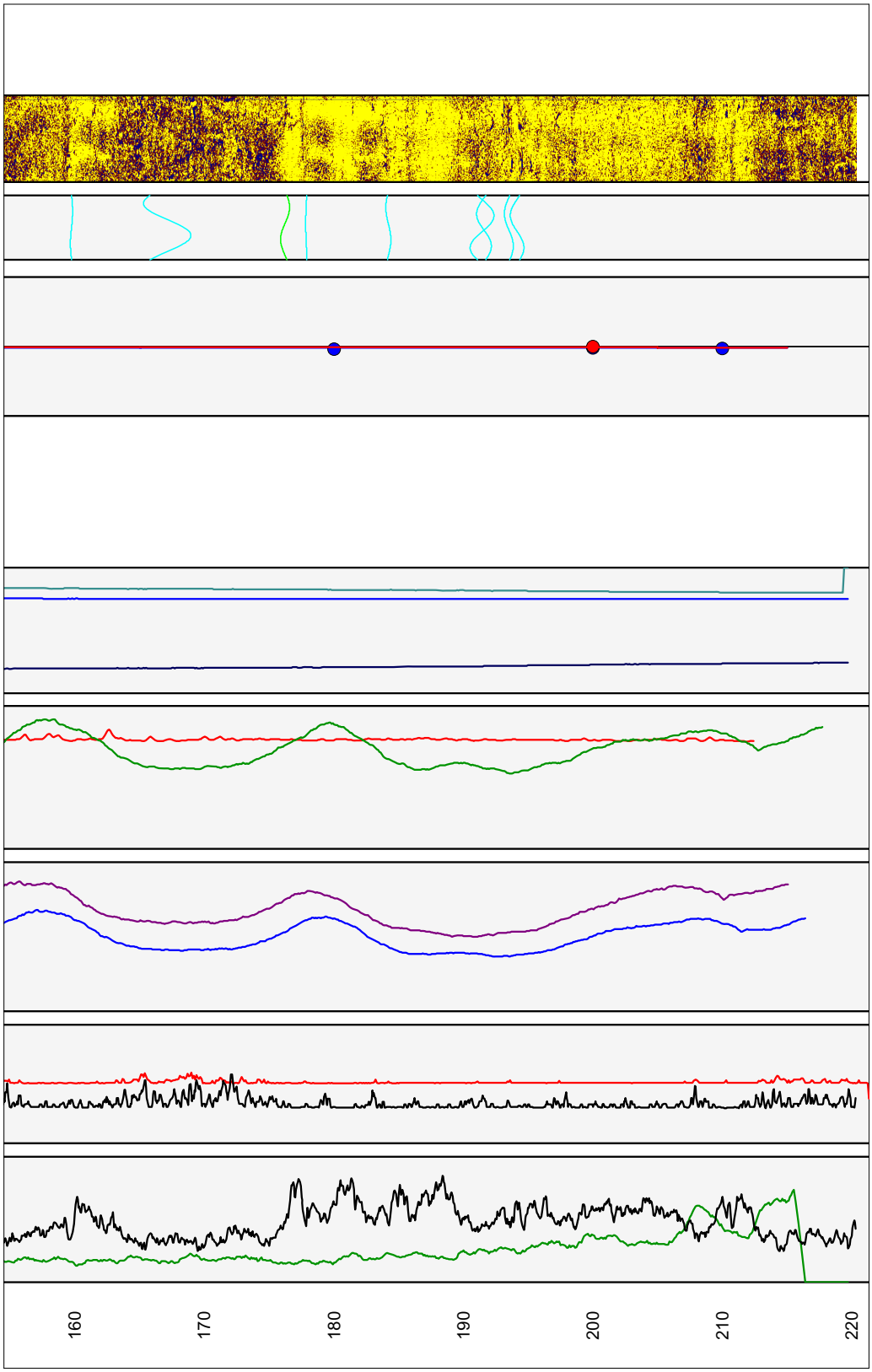


Figure 1J-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-39, near Machiasport, Maine.—Continued

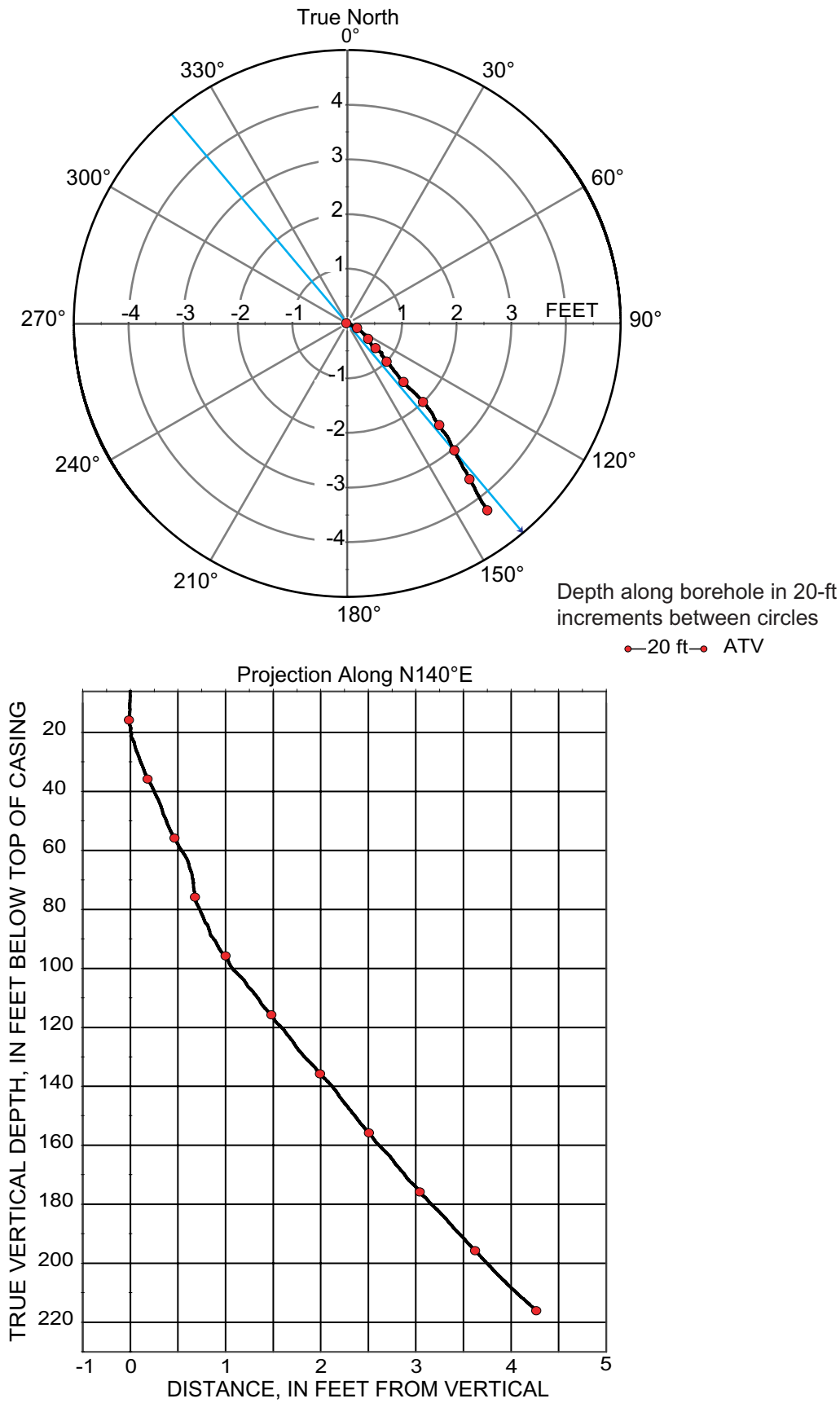


Figure 1J-2. Borehole deviation logs for borehole DW-39, near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer]

Table 1J–1. Interpretation of acoustic televiewer logs for borehole DW-39, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 2.18 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
20.14	6.14	0	270	0	N	Horizontal	Bottom of casing
24.93	7.60	57	327	81	NE	Nearly vertical	Transmissive fracture
28.88	8.80	122	32	80	SE	Nearly vertical	Large fracture
29.03	8.85	291	201	82	W	Nearly vertical	Minor fracture
30.56	9.31	113	23	75	SE	Nearly vertical	Large fracture
33.77	10.29	168	78	35	S	Moderate	Minor fracture
35.52	10.83	191	101	12	S	Shallow	Minor fracture
37.13	11.32	232	142	31	SW	Moderate	Minor fracture
49.50	15.09	59	329	38	NE	Moderate	Minor fracture
63.37	19.31	18	288	30	N	Shallow	Minor fracture
72.03	21.95	164	74	25	S	Shallow	Minor fracture
74.74	22.78	259	169	25	W	Shallow	Transmissive fracture
82.49	25.14	101	11	69	E	Steep	Minor fracture
88.06	26.84	132	42	56	SE	Steep	Minor fracture
89.88	27.39	133	43	57	SE	Steep	Large fracture
90.19	27.49	128	38	59	SE	Steep	Transmissive fracture
97.01	29.57	320	230	67	NW	Steep	Minor fracture
106.28	32.39	305	215	35	NW	Moderate	Large fracture
108.66	33.12	274	184	39	W	Moderate	Lithologic feature
111.29	33.92	281	191	75	W	Nearly vertical	Minor fracture
113.60	34.62	87	357	34	E	Moderate	Minor fracture
121.14	36.92	310	220	68	NW	Steep	Minor fracture
135.49	41.30	243	153	39	SW	Moderate	Minor fracture
159.77	48.70	276	186	18	W	Shallow	Minor fracture
167.11	50.93	136	46	81	SE	Nearly vertical	Minor fracture
176.22	53.71	295	205	55	NW	Steep	Lithologic feature
177.85	54.21	19	289	10	N	Nearly horizontal	Minor fracture
184.20	56.14	110	20	36	E	Moderate	Minor fracture
191.42	58.34	247	157	75	SW	Nearly vertical	Minor fracture
191.56	58.38	76	346	66	E	Steep	Minor fracture
193.51	58.98	76	346	53	E	Steep	Minor fracture
194.13	59.17	67	337	64	NE	Steep	Minor fracture

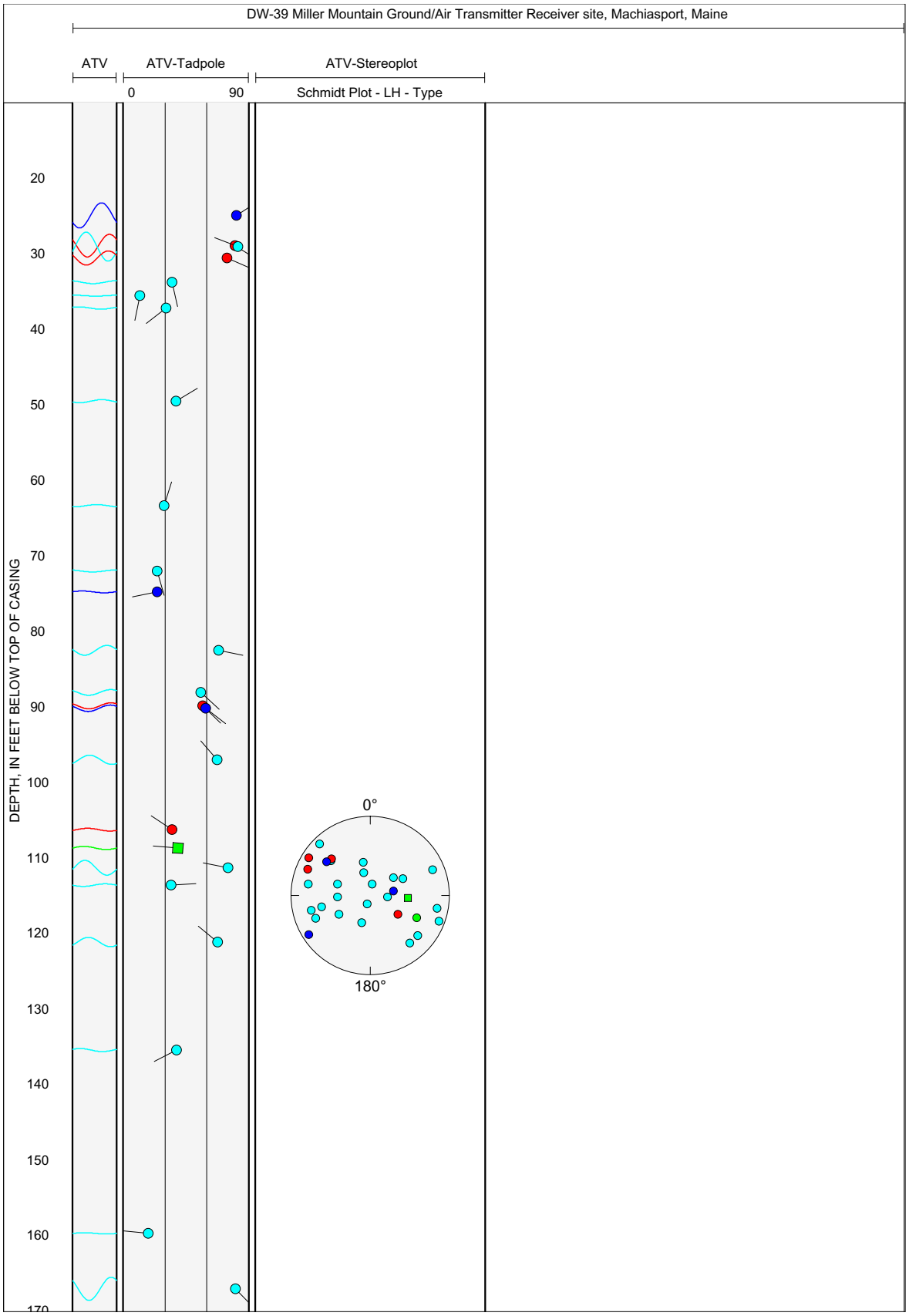


Figure 1J-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-39, near Machiasport, Maine.

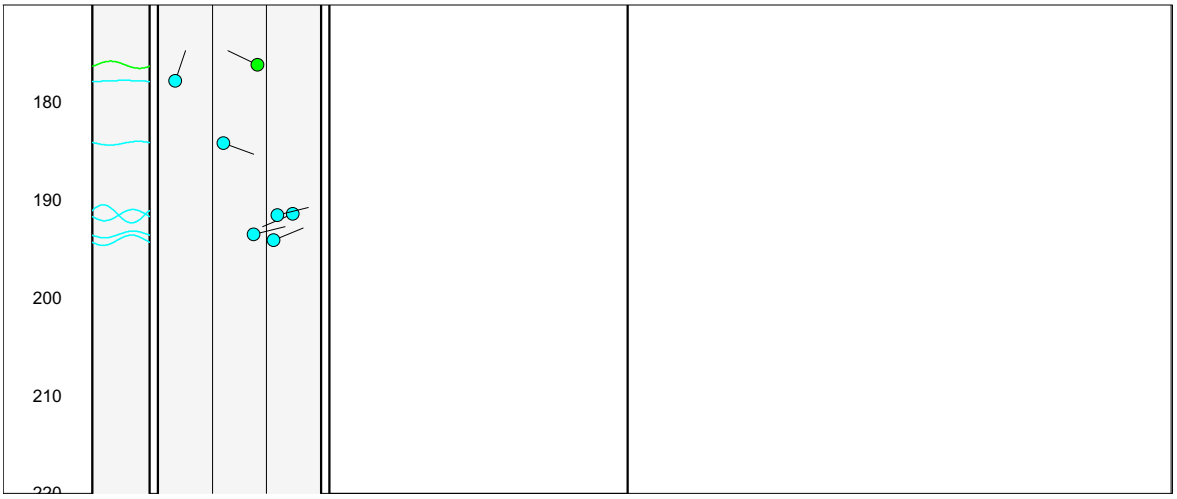


Figure 1J-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-39, near Machiasport, Maine.—Continued

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of measuring point	130	feet
Number of fractures	3	
Well diameter	6	inches
Drawdown	5.83	feet
Depth to ambient water level	11.67	feet

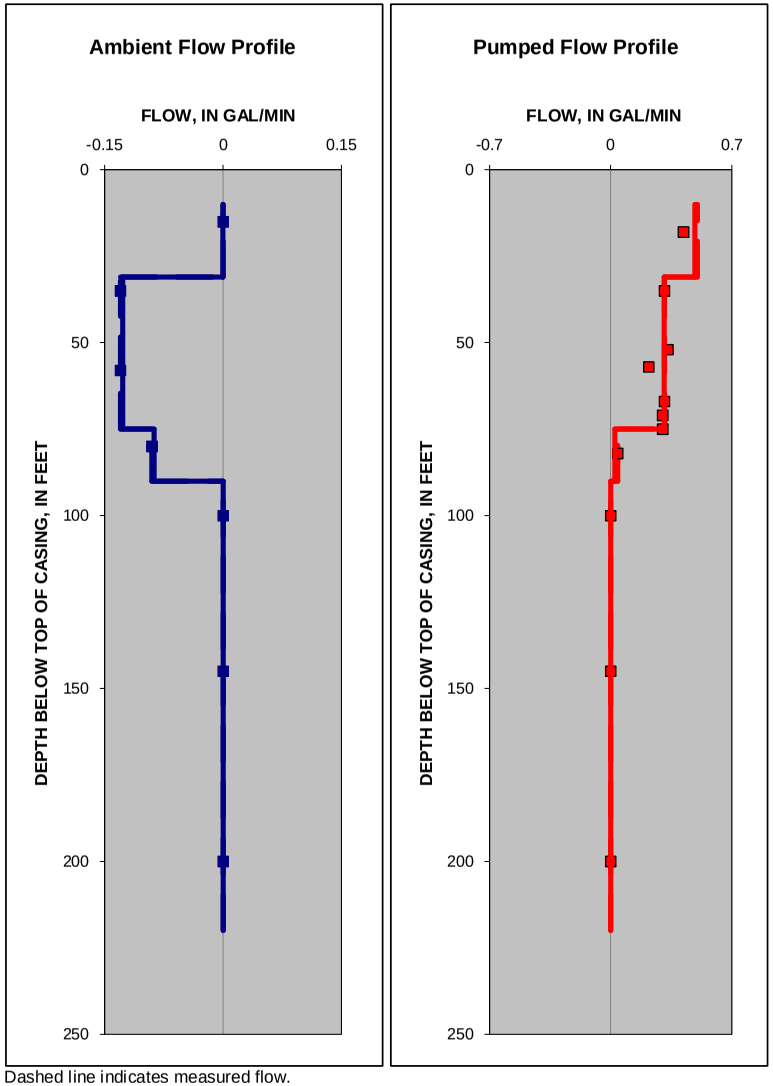
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)
3	31	0.000	0.500
2	75	-0.130	0.310
1	90	-0.090	0.040

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, ambient water level	118.33	feet
Elevation, pumped water level	112.50	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)	Zone trans-missivity (ft^2/d)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
3	31.0	0.000	0.486	1.6	-3.81	133.81	9
2	75.0	-0.127	0.309	13.0	12.19	117.81	70
1	90.0	-0.087	0.024	4.0	16.19	113.81	22

Total borehole transmissivity	18.6	(ft^2/d)
Sum of squares error	0.00046	$(gal/min)^2$
Root mean square error	0.01236649	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1J–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-39, near Machiasport, Maine.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]

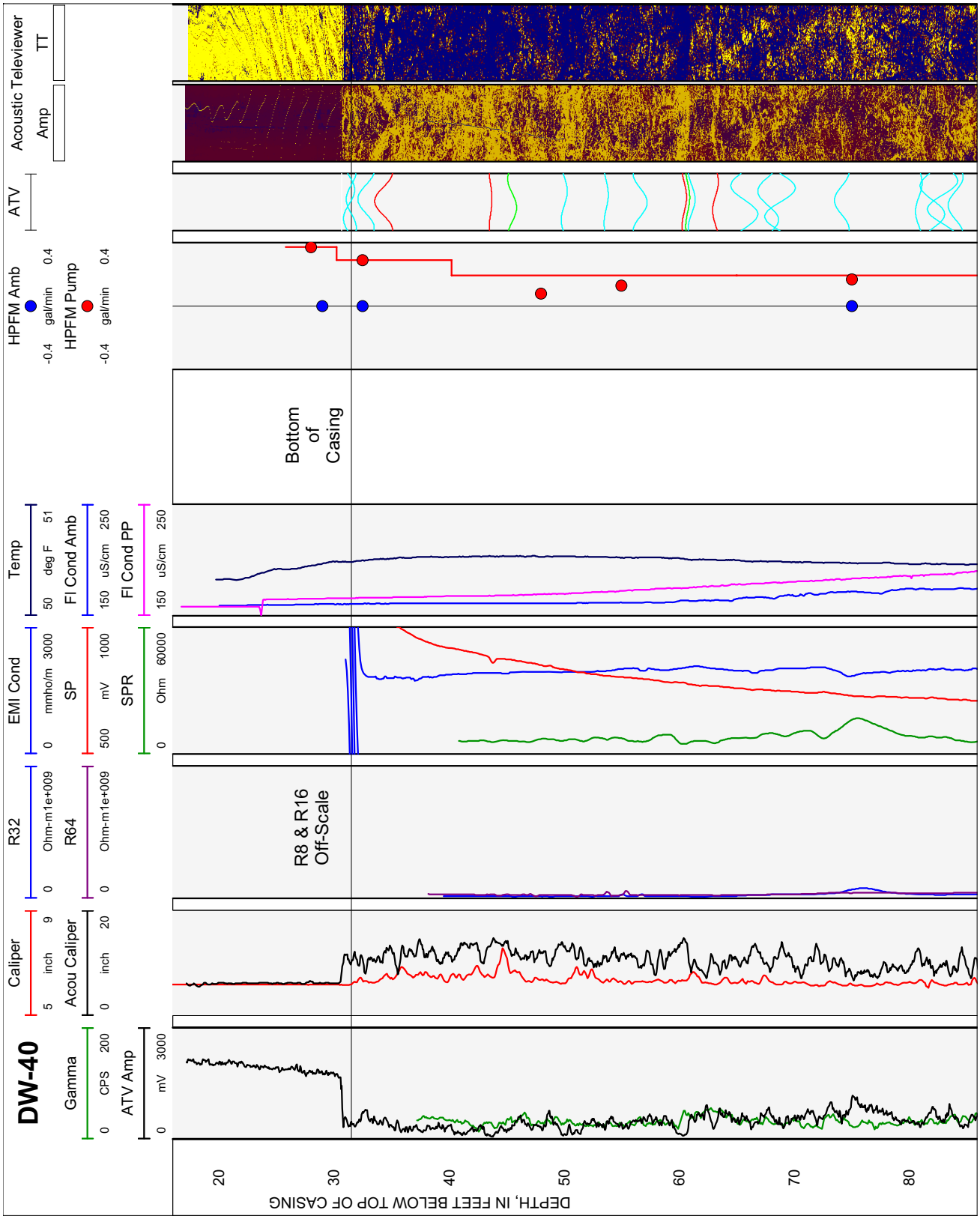


Figure 1K-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-40, near Machiasport, Maine.

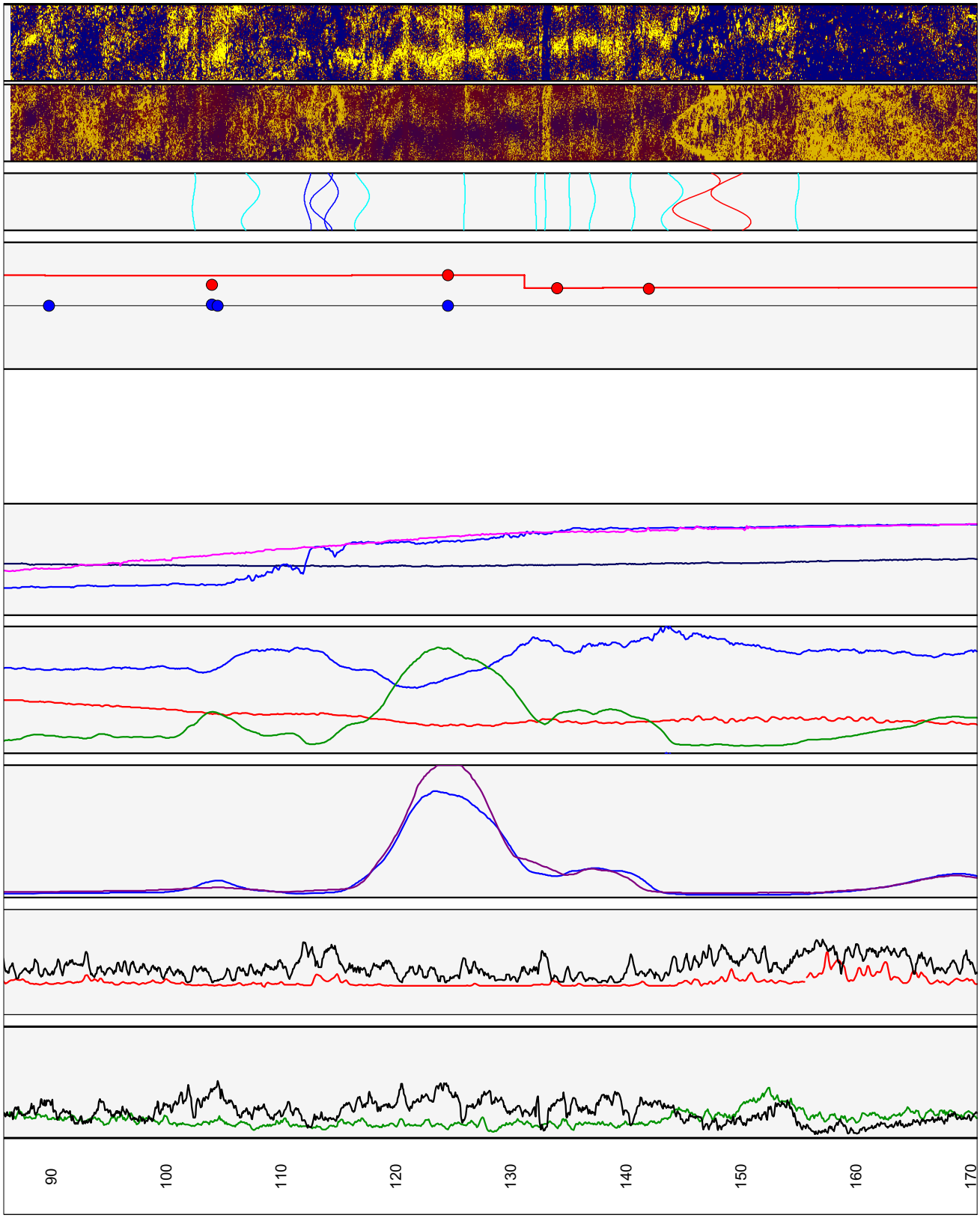


Figure 1K-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-40, near Machiasport, Maine.—Continued

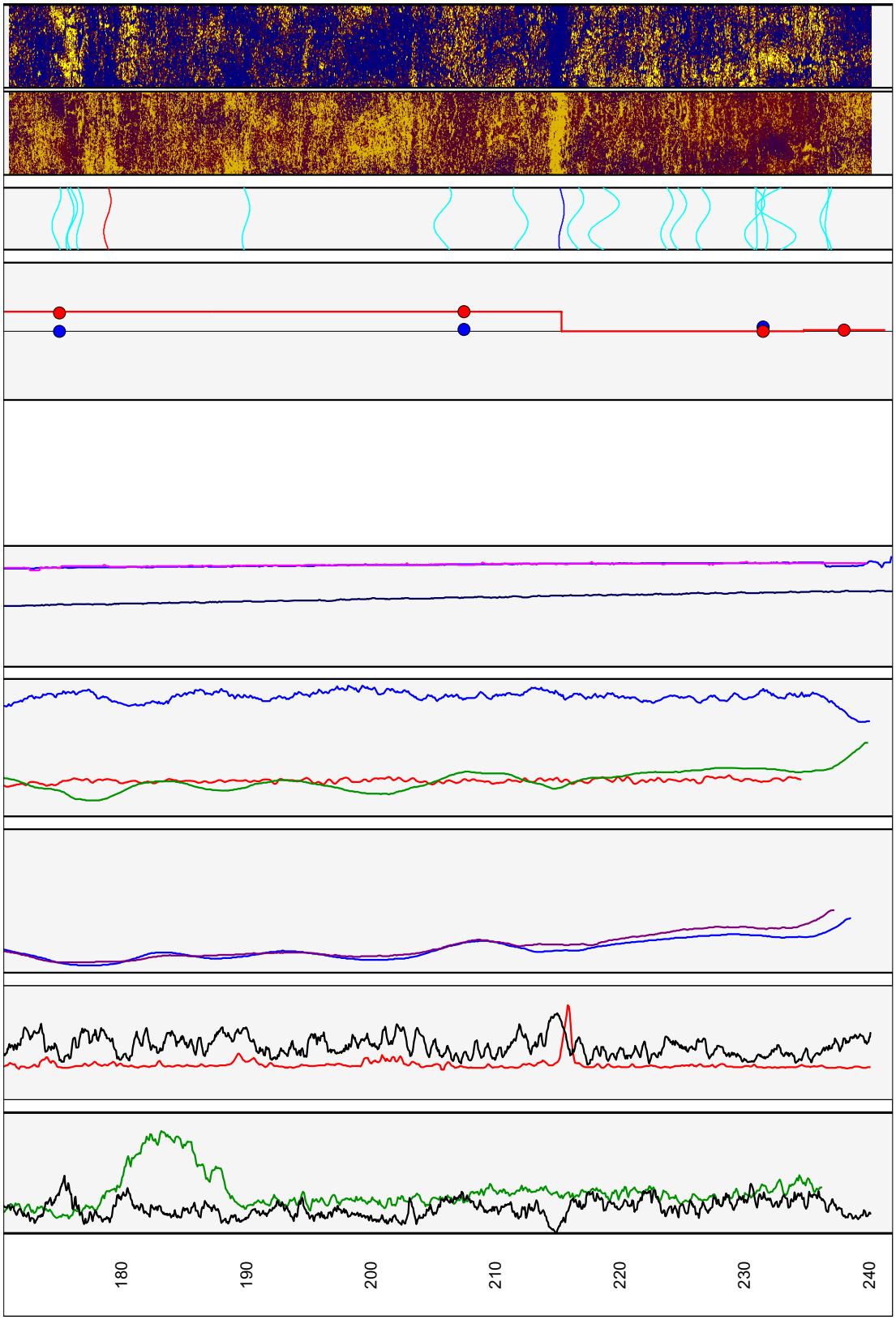


Figure 1K-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole DW-40, near Machiasport, Maine.—Continued

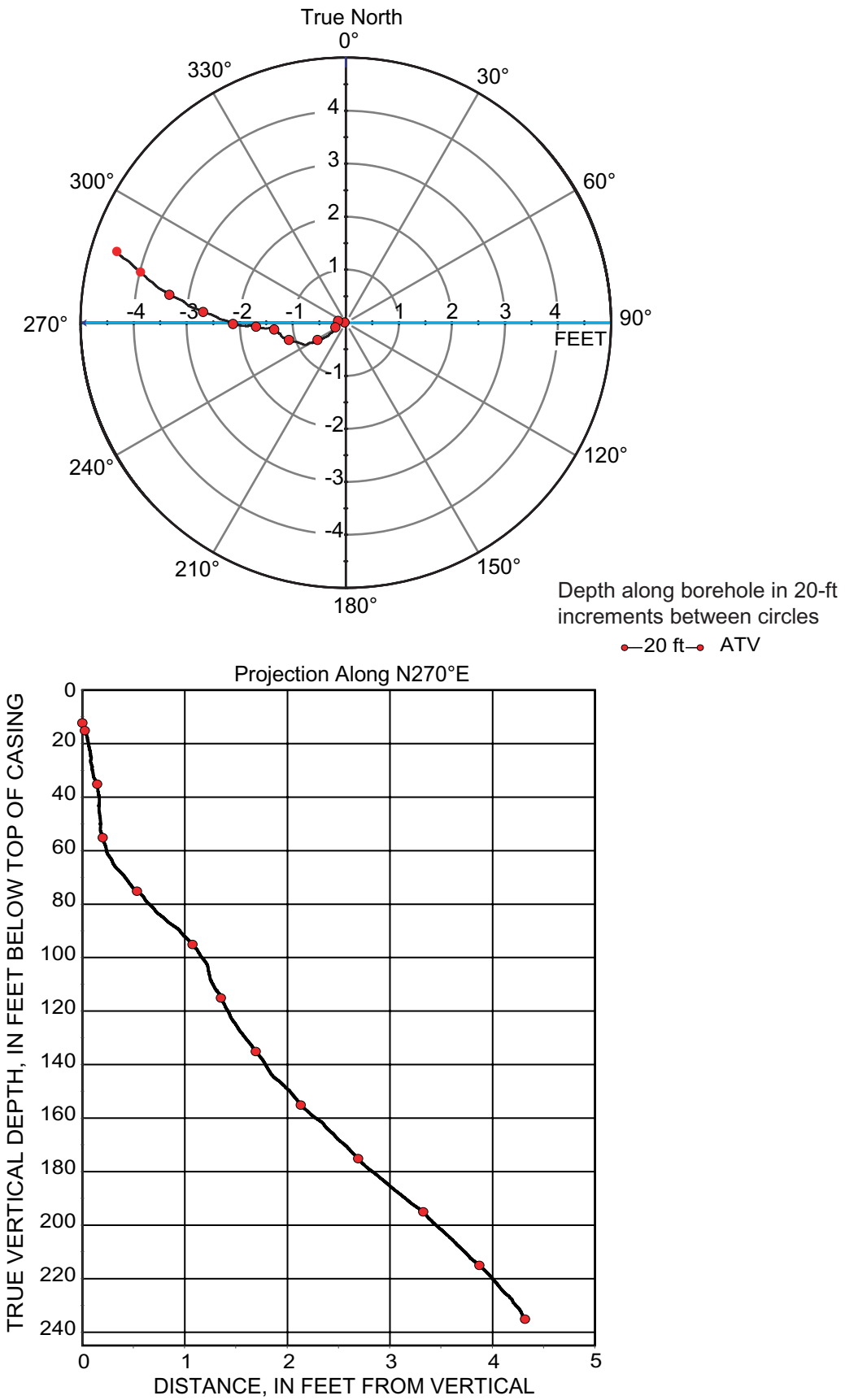


Figure 1K-2. Borehole deviation logs for borehole DW-40, near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer]

Table 1K–1. Interpretation of acoustic televiewer logs for borehole DW-40, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 2.45 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
30.68	9.35	207	117	1	SW	Nearly horizontal	Other
31.31	9.54	256	166	62	W	Steep	Minor fracture
31.50	9.60	17	287	60	N	Steep	Minor fracture
32.76	9.98	19	289	70	N	Nearly vertical	Minor fracture
34.29	10.45	6	276	72	N	Nearly vertical	Fracture
43.62	13.29	198	108	25	S	Shallow	Fracture
45.49	13.86	146	56	57	SE	Steep	Lithologic feature
50.03	15.25	248	158	45	W	Moderate	Minor fracture
53.63	16.35	226	136	36	SW	Moderate	Minor fracture
56.58	17.24	178	88	67	S	Steep	Minor fracture
60.43	18.42	211	121	37	SW	Moderate	Fracture
60.73	18.51	209	119	35	SW	Moderate	Lithologic feature
61.08	18.62	197	107	49	S	Moderate	Minor fracture
63.16	19.25	308	218	44	NW	Moderate	Fracture
65.65	20.01	104	14	78	E	Nearly vertical	Minor fracture
67.70	20.63	68	338	74	E	Nearly vertical	Minor fracture
68.77	20.96	269	179	79	W	Nearly vertical	Minor fracture
74.14	22.60	11	281	68	N	Steep	Minor fracture
80.83	24.64	301	211	48	NW	Moderate	Minor fracture
81.97	24.98	103	13	77	E	Nearly vertical	Minor fracture
82.90	25.27	315	225	79	NW	Nearly vertical	Minor fracture
84.00	25.60	339	249	69	N	Steep	Minor fracture
102.42	31.22	319	229	27	NW	Shallow	Minor fracture
107.34	32.72	240	150	72	SW	Nearly vertical	Minor fracture
112.31	34.23	24	294	49	NE	Moderate	Transmissive fracture
113.47	34.58	351	261	75	N	Nearly vertical	Transmissive fracture
114.40	34.87	241	151	67	SW	Steep	Transmissive fracture
117.06	35.68	214	124	68	SW	Steep	Minor fracture
125.92	38.38	227	137	11	SW	Shallow	Minor fracture
132.13	40.27	43	313	9	NE	Nearly horizontal	Minor fracture
132.98	40.53	135	45	10	SE	Nearly horizontal	Minor fracture
135.11	41.18	89	359	13	E	Shallow	Minor fracture
137.08	41.78	199	109	44	S	Moderate	Minor fracture
140.57	42.84	116	26	40	SE	Moderate	Minor fracture
144.01	43.89	247	157	75	SW	Nearly vertical	Minor fracture
146.11	44.53	311	221	83	NW	Nearly vertical	Fracture
149.12	45.45	55	325	82	NE	Nearly vertical	Fracture
154.88	47.21	298	208	34	NW	Moderate	Minor fracture
174.77	53.27	320	230	55	NW	Steep	Minor fracture
175.83	53.59	227	137	51	SW	Steep	Minor fracture
176.02	53.65	246	156	58	SW	Steep	Minor fracture
176.63	53.83	241	151	46	SW	Moderate	Minor fracture
178.82	54.50	285	195	48	W	Moderate	Fracture
189.94	57.89	241	151	50	SW	Moderate	Minor fracture
205.77	62.72	320	230	70	NW	Nearly vertical	Minor fracture
212.00	64.61	152	62	67	SE	Steep	Minor fracture
215.29	65.62	233	143	40	SW	Moderate	Transmissive fracture
216.43	65.96	293	203	69	NW	Steep	Minor fracture
218.68	66.65	267	177	78	W	Nearly vertical	Minor fracture
223.76	68.20	271	181	63	W	Steep	Minor fracture
224.70	68.49	266	176	68	W	Steep	Minor fracture
226.70	69.09	254	164	66	W	Steep	Minor fracture
230.82	70.35	271	181	73	W	Nearly vertical	Minor fracture
230.98	70.40	88	358	14	E	Shallow	Minor fracture
231.58	70.58	67	337	45	NE	Moderate	Minor fracture
232.56	70.88	78	348	81	E	Nearly vertical	Minor fracture
236.52	72.09	355	265	60	N	Steep	Minor fracture
236.64	72.12	327	237	27	NW	Shallow	Minor fracture

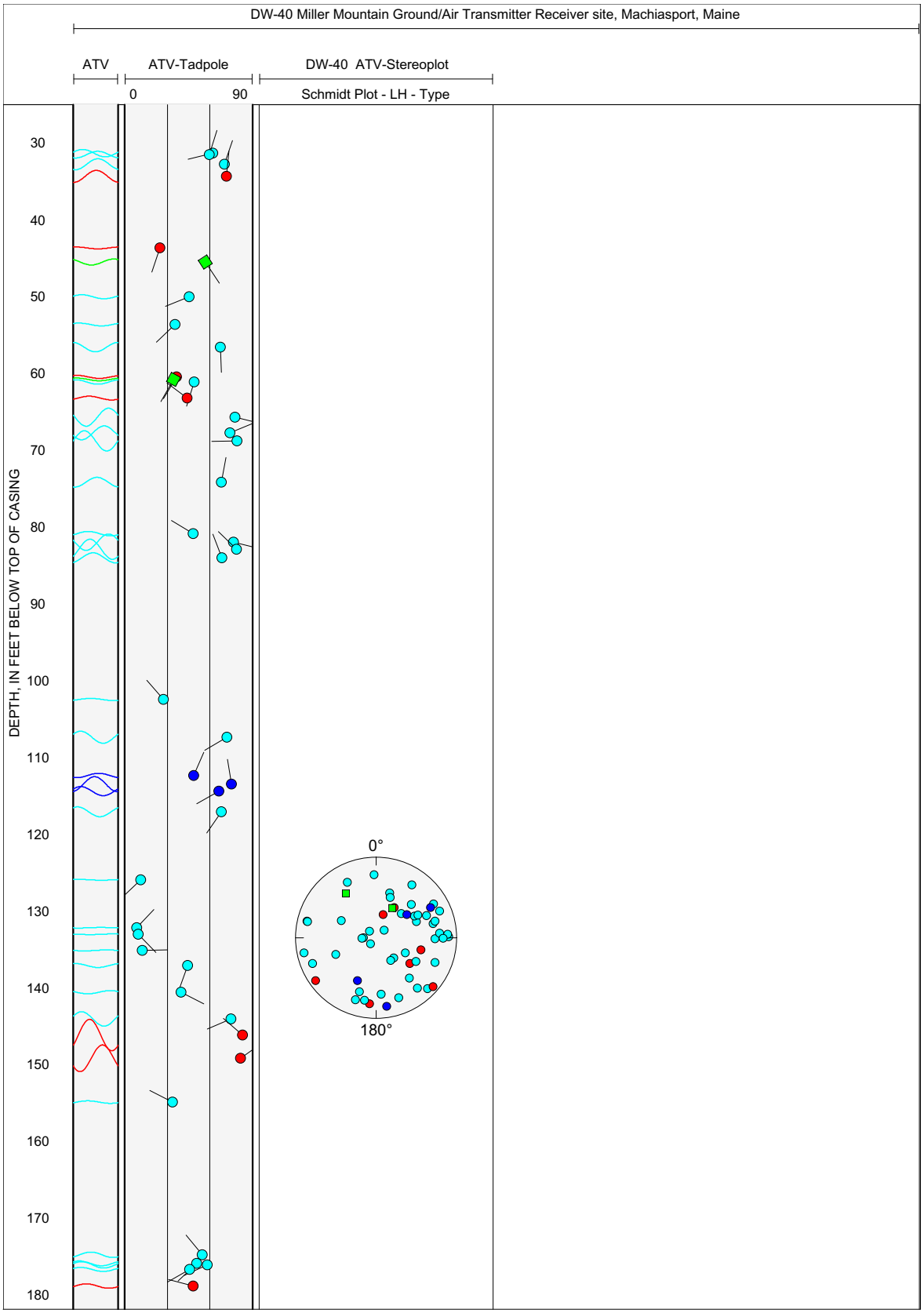


Figure 1K-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-40, near Machiasport, Maine.

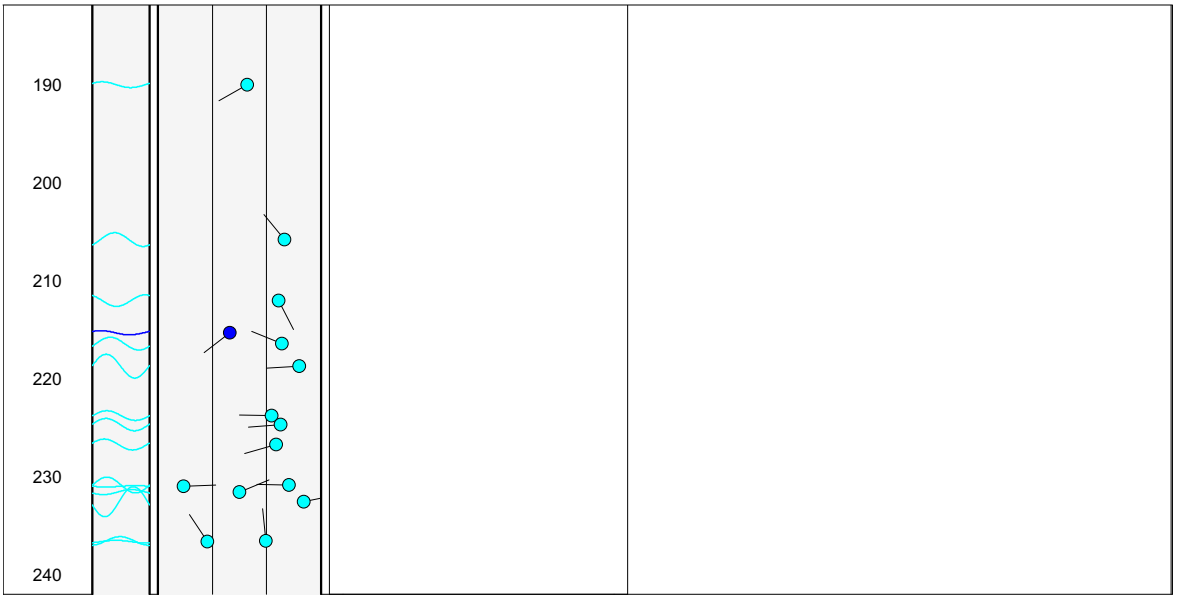


Figure 1K-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole DW-40, near Machiasport, Maine.—Continued

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of Measuring Point	92.56	feet
Number of fractures	3	
Well Diameter	6	inches
Drawdown	3.54	feet
Depth to Ambient Water Level	0.56	feet

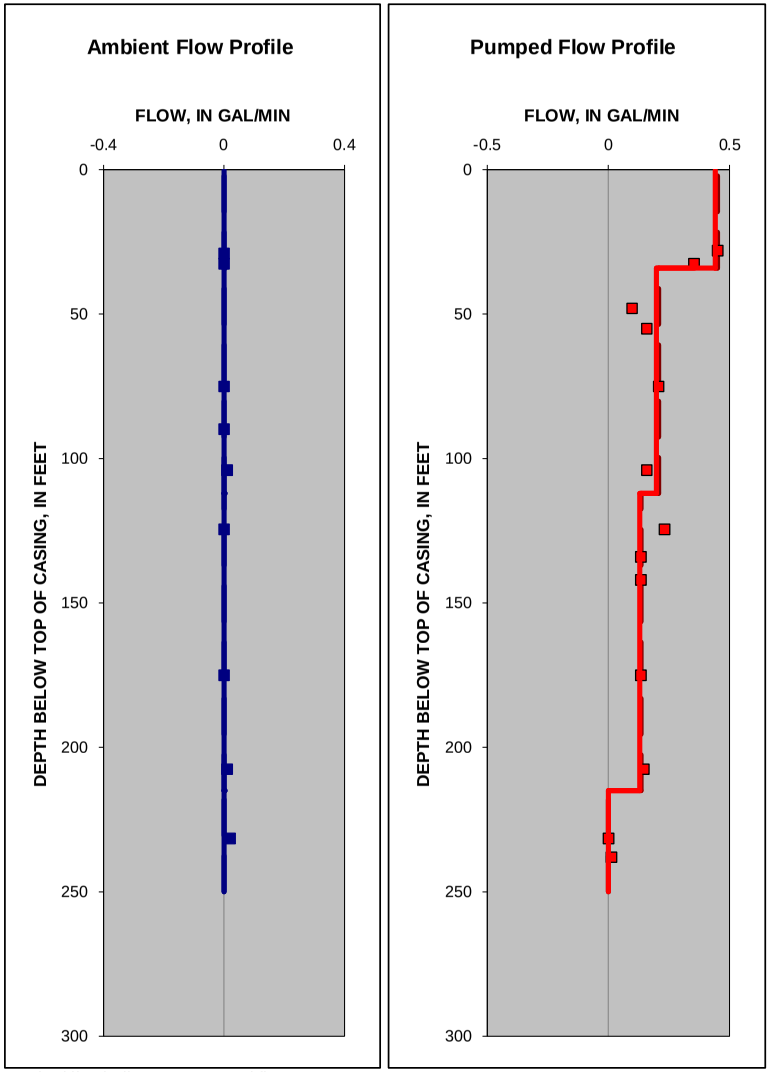
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)
3	34	0.0	0.450
2	112	0.0	0.207
1	215	0.0	0.134

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, Ambient water level	92.00	feet
Elevation, Pumped water level	88.46	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Pumped flow above fracture (gal/min)	Zone trans-missivity (ft^2/d)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
3	34	0	0.44	12.0	0.56	92.00	57
2	112	0	0.20	3.0	0.56	92.00	14
1	215	0	0.13	6.0	0.56	92.00	29

Total borehole transmissivity	21.0	(ft^2/d)
Sum of squares error	0.000	$(gal/min)^2$
Root mean square error	0.008	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1K–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole DW-40, near Machiasport, Maine.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]

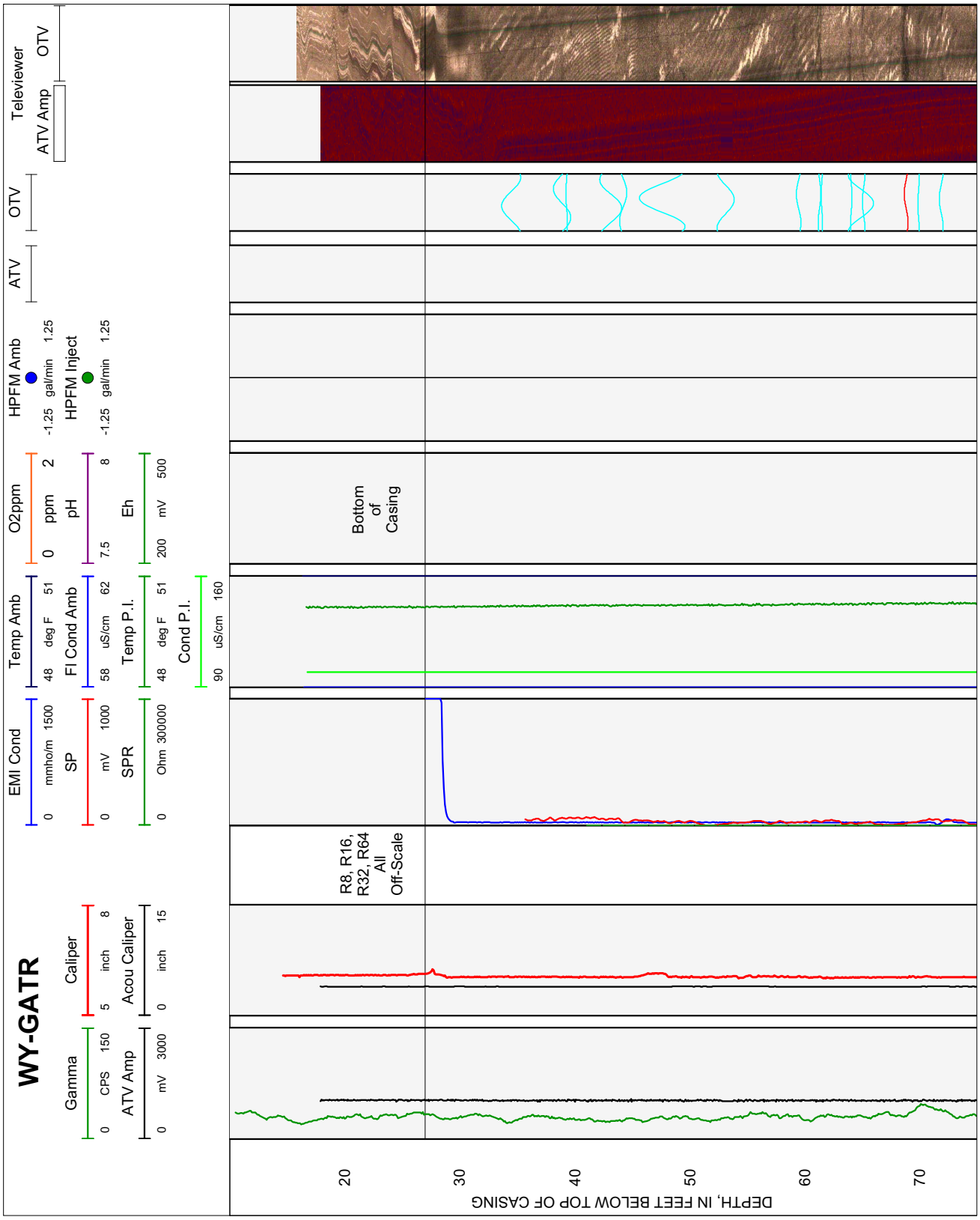


Figure 1L-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole WY-GATR, near Machiasport, Maine.

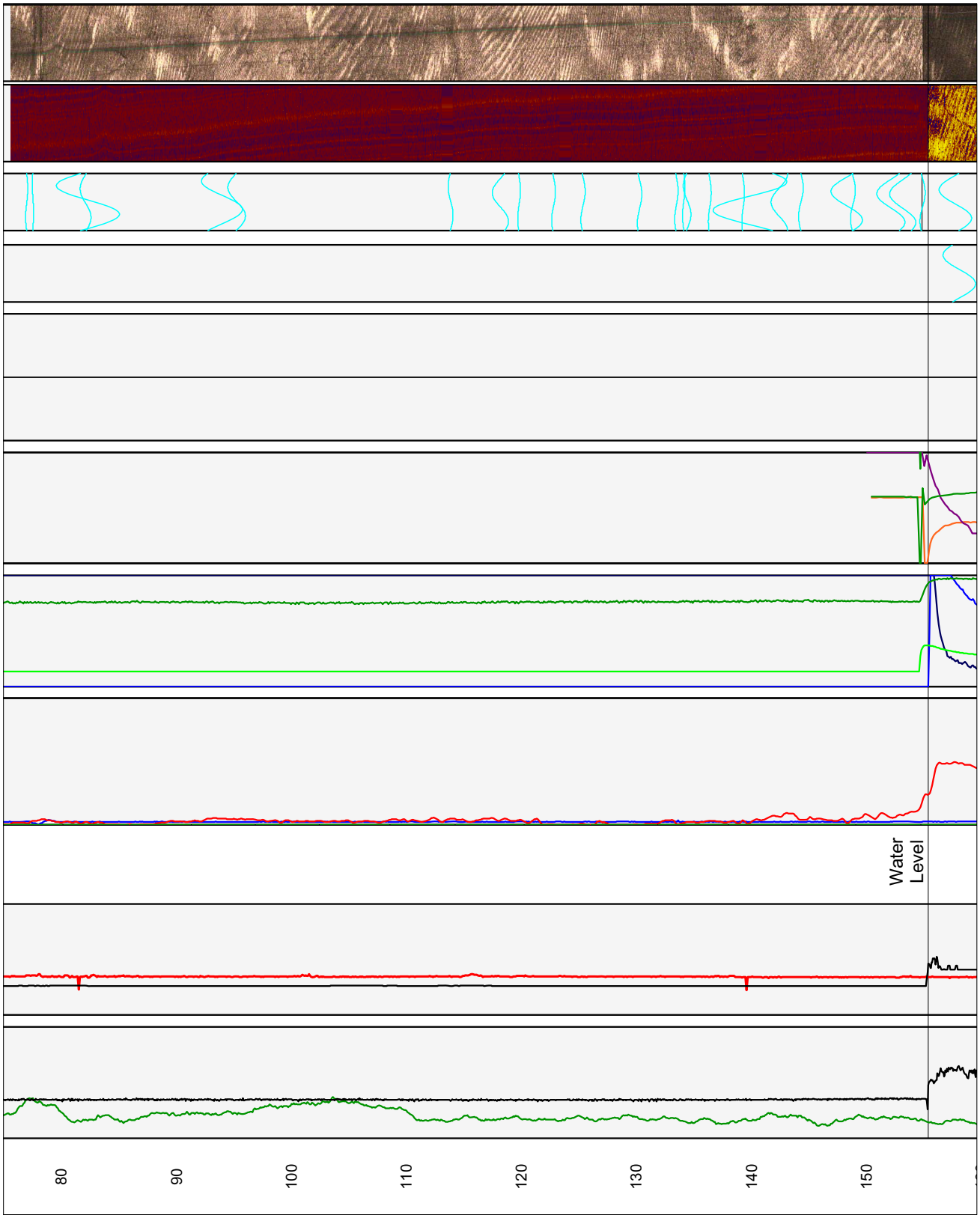


Figure 1L-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole WY-GATR, near Machiasport, Maine.—Continued

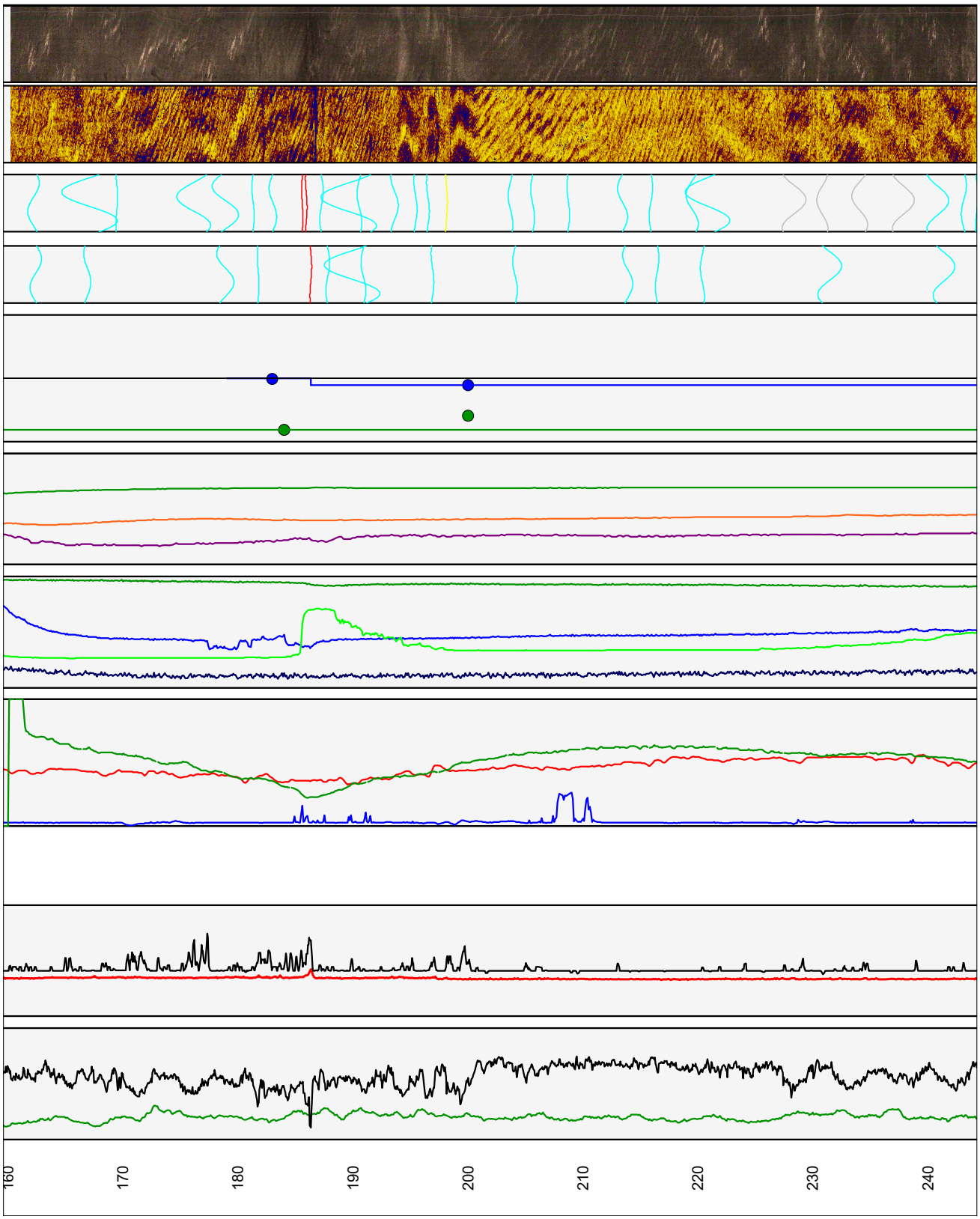


Figure 1L-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole WY-GATR, near Machiasport, Maine.—Continued

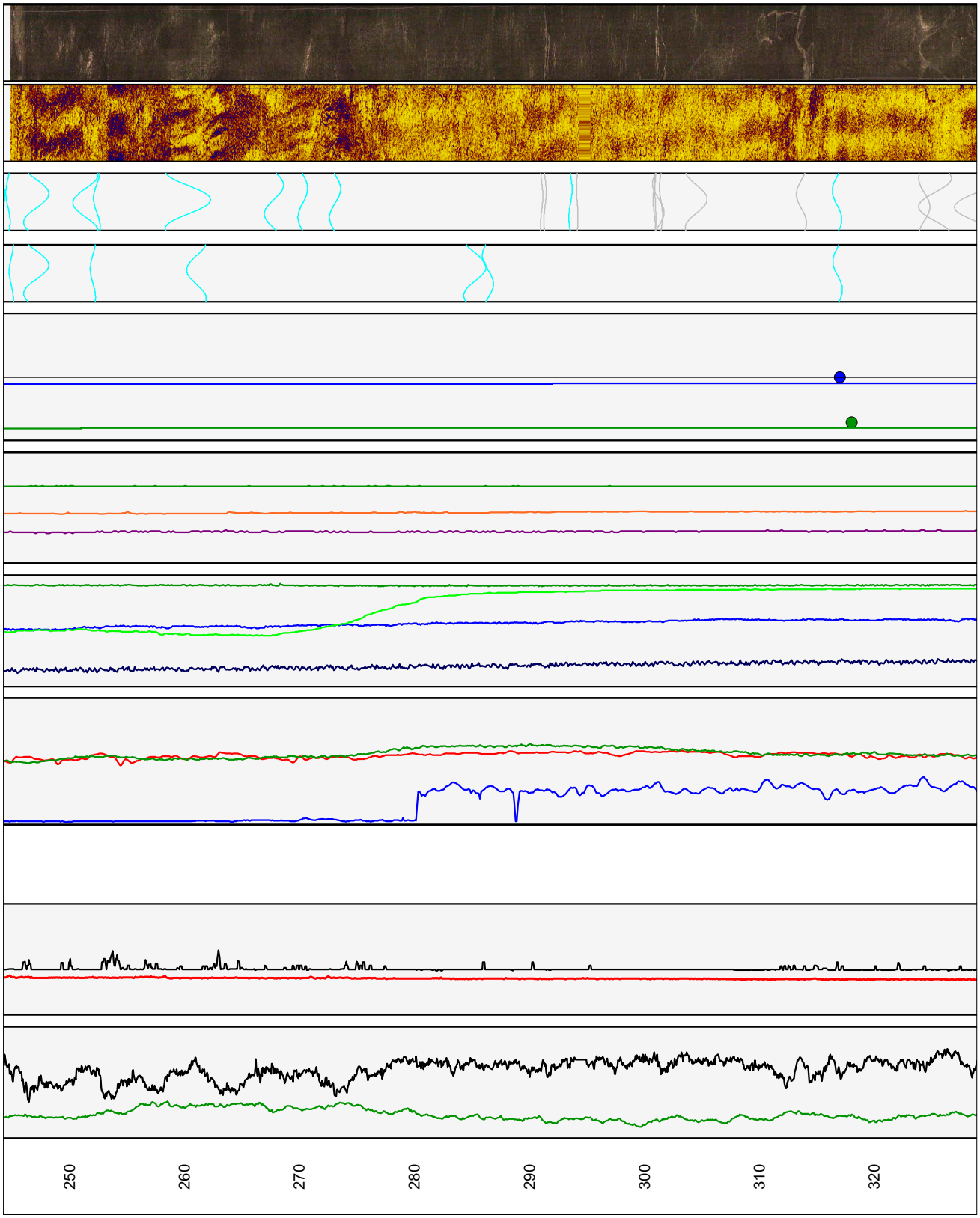


Figure 1L-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole WY-GATR, near Machiasport, Maine.—Continued

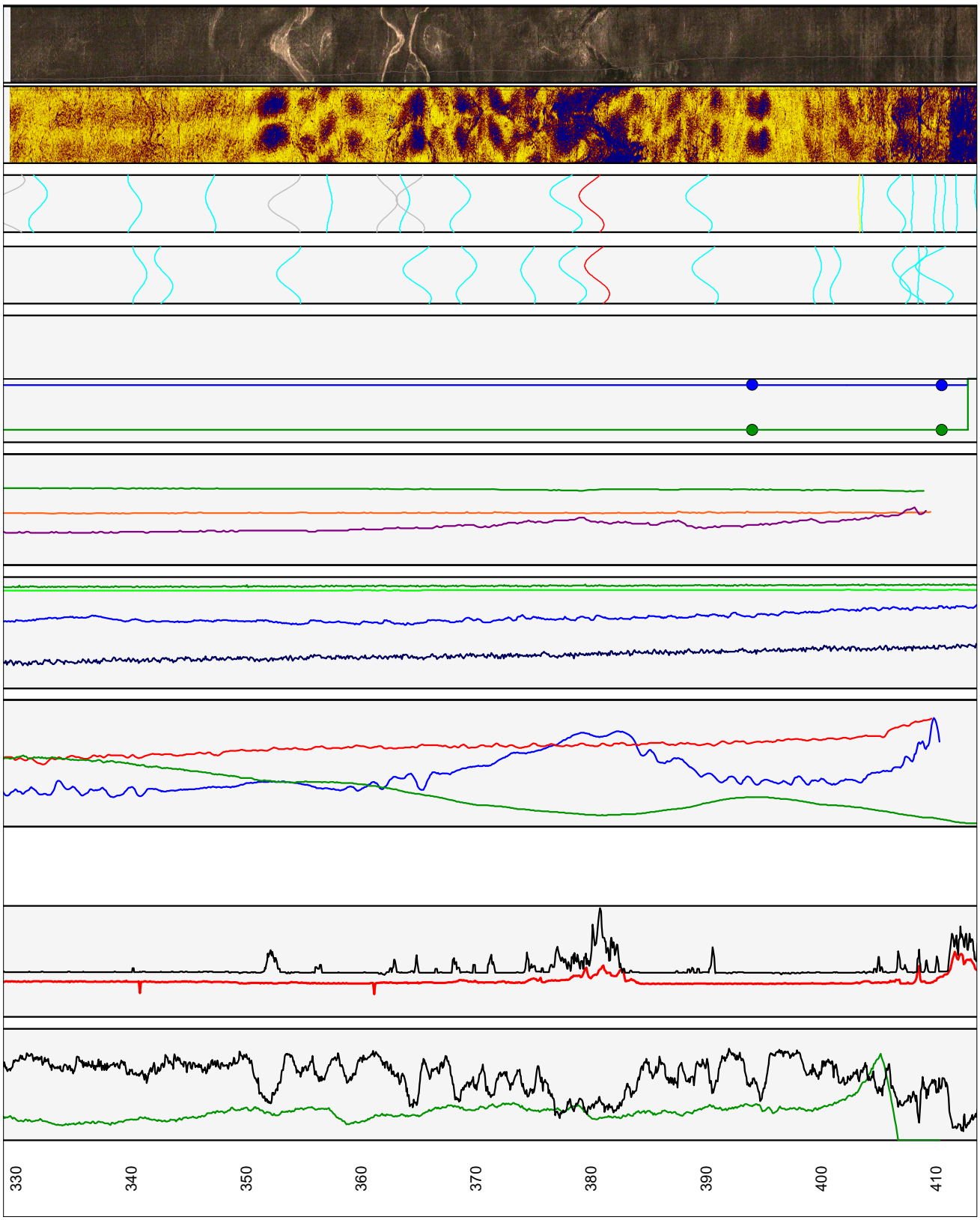


Figure 1L-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole WY-GATR, near Machiasport, Maine.—Continued

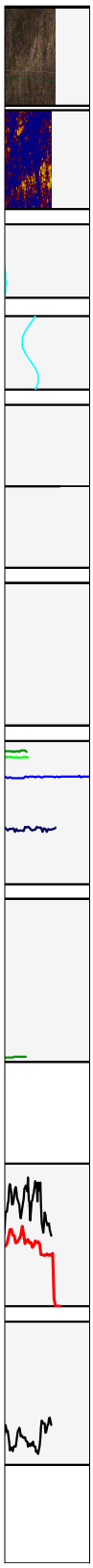


Figure 1L-1. Caliper, acoustic caliper, gamma, electromagnetic conductivity, fluid temperature, specific conductance, DO, pH, reduction oxidation, multi-space resistivity, oriented acoustic and optical borehole images, and heat-pulse flowmeter logs for borehole WY-GATR, near Machiasport, Maine.—Continued

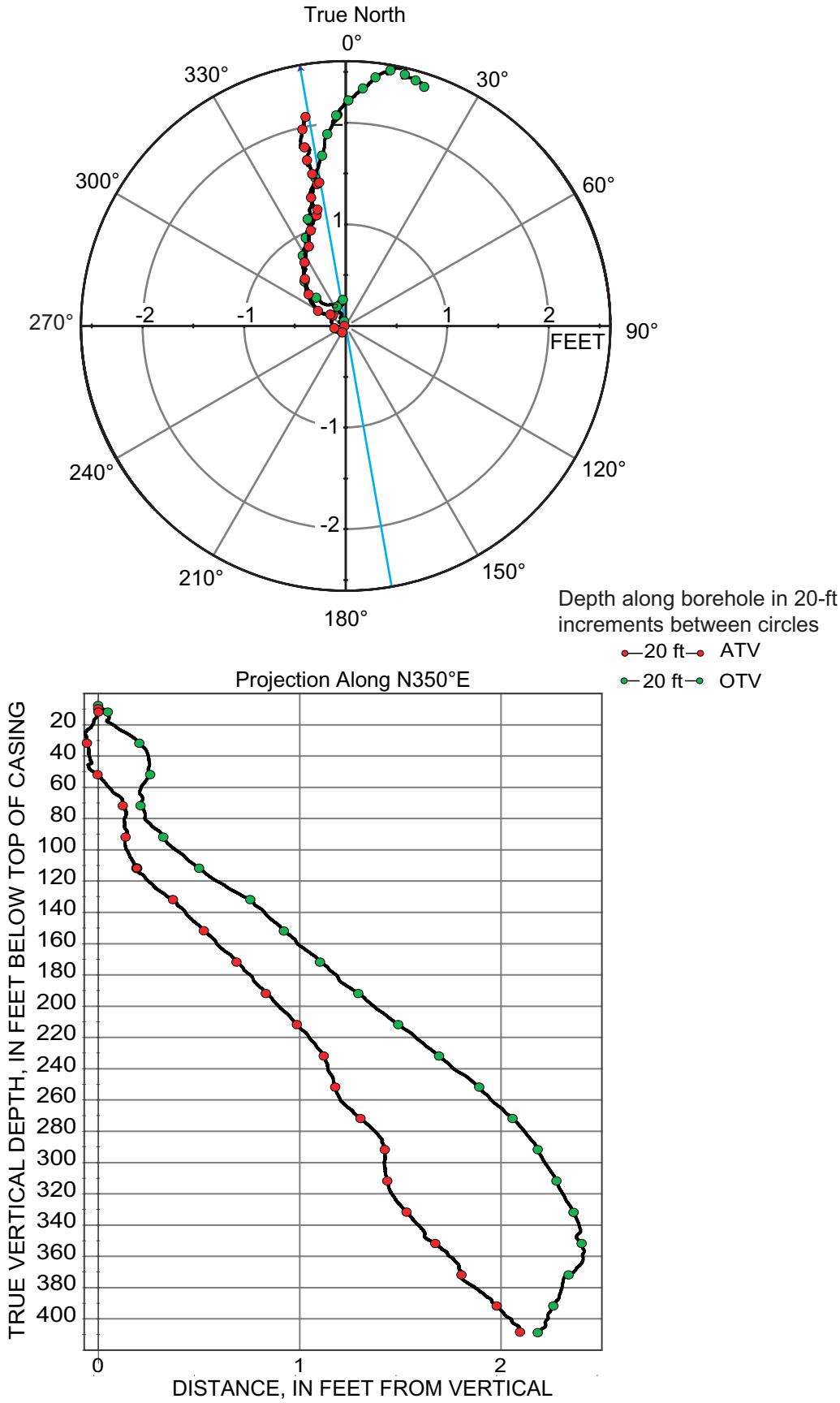


Figure 1L-2. Borehole deviation logs for borehole WY-GATR, near Machiasport, Maine. Blue line on radial plot (top) is line of projection for vertical plot (bottom).

[ft, foot; ATV, acoustic televiewer; OTV, optical televiewer]

Table 1L–1. Interpretation of acoustic televiewer logs for borehole WY-GATR, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 3.45 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
158.10	48.19	114.82	25	80	SE	Nearly vertical	Minor fracture
162.41	49.50	277.43	187	64	W	Steep	Minor fracture
166.87	50.86	132.29	42	50	SE	Moderate	Minor fracture
178.90	54.53	130.11	40	73	SE	Nearly vertical	Minor fracture
181.74	55.39	115.11	25	15	SE	Shallow	Minor fracture
186.35	56.80	224.23	134	17	SW	Shallow	Transmissive fracture
187.81	57.24	255.59	166	34	W	Moderate	Minor fracture
189.94	57.89	59.5	330	84	NE	Nearly vertical	Minor fracture
190.93	58.19	77.55	348	41	E	Moderate	Minor fracture
196.93	60.02	132.79	43	26	SE	Shallow	Minor fracture
204.11	62.21	82.09	352	39	E	Moderate	Minor fracture
213.87	65.18	121.79	32	59	SE	Steep	Minor fracture
216.44	65.97	281.71	192	31	W	Moderate	Minor fracture
220.36	67.16	37.35	307	34	NE	Moderate	Minor fracture
231.44	70.54	233.38	143	76	SW	Nearly vertical	Minor fracture
241.38	73.57	228.98	139	75	SW	Nearly vertical	Minor fracture
244.96	74.66	10.91	281	35	N	Moderate	Minor fracture
247.10	75.31	231.74	142	77	SW	Nearly vertical	Minor fracture
252.05	76.82	26.61	297	41	NE	Moderate	Minor fracture
261.04	79.56	20.69	291	73	N	Nearly vertical	Minor fracture
285.24	86.94	219.61	130	77	SW	Nearly vertical	Minor fracture
286.38	87.28	112.68	23	62	SE	Steep	Minor fracture
316.80	96.56	74.55	345	58	E	Steep	Minor fracture
340.78	103.86	183.16	93	67	S	Steep	Minor fracture
342.82	104.49	107.68	18	73	E	Nearly vertical	Minor fracture
353.70	107.80	5.96	276	76	N	Nearly vertical	Minor fracture
364.87	111.21	32.35	302	77	NE	Nearly vertical	Minor fracture
369.17	112.52	239.01	149	74	SW	Nearly vertical	Minor fracture
374.51	114.15	30.04	300	68	NE	Steep	Minor fracture
378.43	115.34	69.86	340	79	E	Nearly vertical	Minor fracture
380.54	115.98	59.81	330	78	NE	Nearly vertical	Large fracture
389.90	118.84	42.85	313	77	NE	Nearly vertical	Minor fracture
399.67	121.81	234.54	145	56	SW	Steep	Minor fracture
401.23	122.29	248.46	158	62	W	Steep	Minor fracture
407.01	124.05	62.62	333	71	NE	Nearly vertical	Minor fracture
408.05	124.37	325.65	236	77	NW	Nearly vertical	Minor fracture
408.47	124.50	246.75	157	17	SW	Shallow	Minor fracture
409.85	124.92	52.56	323	81	NE	Nearly vertical	Minor fracture
415.25	126.56	52.39	322	65	NE	Steep	Transmissive fracture

Table 1L–2. Interpretation of optical televiewer logs for borehole WY-GATR, near Machiasport, Maine.
[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 3.45 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
26.90	8.20	178.8	89	1	S	Nearly horizontal	Bottom of casing
34.47	10.51	338.18	248	72	N	Nearly vertical	Minor fracture
38.88	11.85	85.84	356	72	E	Nearly vertical	Minor fracture
39.27	11.97	58.41	328	13	NE	Shallow	Minor fracture
42.39	12.92	59.08	329	4	NE	Nearly horizontal	Minor fracture
43.14	13.15	143.61	54	75	SE	Nearly vertical	Minor fracture
44.19	13.47	241.88	152	51	SW	Steep	Minor fracture
47.61	14.51	28.19	298	82	NE	Nearly vertical	Minor fracture
53.13	16.19	198.67	109	71	S	Nearly vertical	Minor fracture
59.45	18.12	51.92	322	38	NE	Moderate	Minor fracture
61.26	18.67	234.48	144	25	SW	Shallow	Minor fracture
61.47	18.74	44.73	315	14	NE	Shallow	Minor fracture
64.06	19.52	212.89	123	15	SW	Shallow	Minor fracture
64.85	19.77	174.4	84	77	S	Nearly vertical	Minor fracture
65.13	19.85	5.86	276	25	N	Shallow	Minor fracture
68.82	20.98	53.9	324	33	NE	Moderate	Large fracture
69.91	21.31	351.48	261	15	N	Shallow	Minor fracture
71.87	21.90	22.19	292	34	N	Moderate	Minor fracture
76.97	23.46	265.91	176	19	W	Shallow	Minor fracture
77.52	23.63	108.92	19	12	E	Shallow	Minor fracture
82.12	25.03	83.34	353	62	E	Steep	Minor fracture
82.29	25.08	103.05	13	85	E	Nearly vertical	Minor fracture
93.98	28.64	132.95	43	82	SE	Nearly vertical	Minor fracture
95.26	29.03	92.8	3	72	E	Nearly vertical	Minor fracture
113.83	34.69	97.49	7	41	E	Moderate	Minor fracture
118.18	36.02	58.75	329	70	NE	Steep	Minor fracture
119.77	36.50	251.69	162	25	W	Shallow	Minor fracture
122.78	37.42	244.22	154	34	SW	Moderate	Minor fracture
125.37	38.21	246.65	157	37	SW	Moderate	Minor fracture
130.28	39.71	228.52	139	37	SW	Moderate	Minor fracture
133.48	40.68	249.54	160	29	W	Shallow	Minor fracture
134.09	40.87	272.31	182	22	W	Shallow	Minor fracture
134.41	40.97	102.02	12	52	E	Steep	Minor fracture
136.39	41.57	236.27	146	27	SW	Shallow	Minor fracture
139.26	42.44	234.1	144	26	SW	Shallow	Minor fracture
139.87	42.63	307.58	218	85	NW	Nearly vertical	Minor fracture
142.43	43.41	359.23	269	70	N	Nearly vertical	Minor fracture
144.31	43.98	268.54	179	38	W	Moderate	Minor fracture
148.27	45.19	66.9	337	79	NE	Nearly vertical	Minor fracture
148.85	45.37	254.36	164	40	W	Moderate	Minor fracture
152.13	46.37	53	323	78	NE	Nearly vertical	Minor fracture
153.18	46.69	50.9	321	77	NE	Nearly vertical	Minor fracture
154.85	47.20	203.47	113	1	SW	Nearly horizontal	Water level
154.90	47.21	238.85	149	43	SW	Moderate	Minor fracture
157.76	48.08	77.91	348	80	E	Nearly vertical	Minor fracture
162.22	49.44	306.6	217	63	NW	Steep	Minor fracture
167.08	50.92	69.31	339	84	E	Nearly vertical	Minor fracture
169.46	51.65	214.35	124	15	SW	Shallow	Minor fracture
176.13	53.68	40	310	79	NE	Nearly vertical	Minor fracture
178.92	54.53	106.34	16	77	E	Nearly vertical	Minor fracture
181.33	55.27	100.16	10	22	E	Shallow	Minor fracture
183.05	55.79	93.46	3	52	E	Steep	Minor fracture
185.58	56.56	88.46	358	11	E	Shallow	Transmissive fracture
185.94	56.67	154.72	65	17	SE	Shallow	Transmissive fracture
187.24	57.07	256.68	167	31	W	Moderate	Minor fracture
189.61	57.79	37.23	307	84	NE	Nearly vertical	Minor fracture
190.55	58.08	58.68	329	40	NE	Moderate	Minor fracture
193.62	59.01	165.46	75	52	S	Steep	Minor fracture

Table 1L–2. Interpretation of optical televiewer logs for borehole WY-GATR, near Machiasport, Maine.—Continued

[Televiewer data are corrected for deviation and magnetic declination, so orientations are relative to true north; depths are below top of casing, which is 3.45 feet above land surface; dip azimuth is given in degrees east of true north; strike is reported in right-hand-rule (RHR)-azimuthal degrees east of true north and where the direction of dip is 90 degrees to the right of strike]

Depth, in feet	Depth, in meters	Dip azimuth	Strike, in RHR	Dip	Dip direction	Dip descriptor	Comment
195.41	59.56	142.14	52	29	SE	Shallow	Minor fracture
196.51	59.89	130.35	40	26	SE	Shallow	Minor fracture
198.16	60.40	188.05	98	17	S	Shallow	Lithologic feature
203.69	62.08	46.53	317	38	NE	Moderate	Minor fracture
205.60	62.66	88.02	358	33	E	Moderate	Minor fracture
208.74	63.62	106.88	17	22	E	Shallow	Minor fracture
213.44	65.05	93.43	3	60	E	Steep	Minor fracture
215.92	65.81	277.25	187	31	W	Moderate	Minor fracture
219.52	66.91	50.09	320	64	NE	Steep	Minor fracture
220.84	67.31	70.87	341	82	E	Nearly vertical	Minor fracture
228.34	69.59	202.73	113	77	SW	Nearly vertical	Sealed fracture - felsic
230.82	70.35	18.58	289	62	N	Steep	Sealed fracture - felsic
234.05	71.33	44.56	315	69	NE	Steep	Sealed fracture - felsic
237.84	72.49	199.31	109	76	S	Nearly vertical	Sealed fracture - felsic
240.87	73.41	196.23	106	76	S	Nearly vertical	Minor fracture
243.12	74.10	291.44	201	42	W	Moderate	Minor fracture
244.26	74.45	221.9	132	21	SW	Shallow	Minor fracture
244.66	74.57	57.27	327	35	NE	Moderate	Minor fracture
247.10	75.31	231.85	142	78	SW	Nearly vertical	Minor fracture
251.38	76.62	354.56	265	76	N	Nearly vertical	Minor fracture
252.36	76.92	23.01	293	48	NE	Moderate	Minor fracture
260.28	79.33	194.05	104	83	S	Nearly vertical	Minor fracture
267.77	81.61	284.89	195	73	W	Nearly vertical	Minor fracture
270.29	82.38	263.76	174	59	W	Steep	Minor fracture
273.08	83.23	262.03	172	63	W	Steep	Minor fracture
291.05	88.71	216.92	127	21	SW	Shallow	Sealed fracture - felsic
291.35	88.80	241.38	151	22	SW	Shallow	Sealed fracture - felsic
293.55	89.47	259.85	170	30	W	Moderate	Minor fracture
294.15	89.65	85.65	356	15	E	Shallow	Sealed fracture - felsic
300.85	91.69	14.23	284	22	N	Shallow	Sealed fracture - felsic
300.95	91.73	72.41	342	8	E	Nearly horizontal	Sealed fracture - felsic
301.21	91.80	115.06	25	63	SE	Steep	Sealed fracture - felsic
301.45	91.88	94.14	4	28	E	Shallow	Sealed fracture - felsic
304.49	92.80	198.34	108	75	S	Nearly vertical	Sealed fracture - felsic
313.62	95.59	48.31	318	59	NE	Steep	Sealed fracture - felsic
316.75	96.54	70.55	341	58	E	Steep	Minor fracture
324.32	98.85	150.34	60	62	SE	Steep	Sealed fracture - felsic
325.25	99.13	330.42	240	80	NW	Nearly vertical	Sealed fracture - felsic
328.86	100.23	327.7	238	82	NW	Nearly vertical	Sealed fracture - felsic
331.88	101.15	241.29	151	73	SW	Nearly vertical	Minor fracture
340.33	103.73	159.64	70	67	S	Steep	Minor fracture
346.90	105.73	39.16	309	59	NE	Steep	Minor fracture
353.32	107.69	353.64	264	80	N	Nearly vertical	Sealed fracture - felsic
357.25	108.88	189.52	100	42	S	Moderate	Minor fracture
362.24	110.41	194.58	105	74	S	Nearly vertical	Sealed fracture - felsic
363.80	110.88	203.88	114	60	SW	Steep	Minor fracture
364.28	111.03	25.12	295	78	NE	Nearly vertical	Sealed fracture - felsic
368.62	112.35	230.02	140	74	SW	Nearly vertical	Minor fracture
377.81	115.15	68.02	338	80	E	Nearly vertical	Minor fracture
380.03	115.83	47.32	317	78	NE	Nearly vertical	Large fracture
389.39	118.68	43.94	314	77	NE	Nearly vertical	Minor fracture
403.29	122.92	37.1	307	17	NE	Shallow	Lithologic feature
403.62	123.02	264.95	175	17	W	Shallow	Minor fracture
406.54	123.91	62.44	332	72	NE	Nearly vertical	Minor fracture
407.93	124.33	247.96	158	17	W	Shallow	Minor fracture
409.91	124.93	267.6	178	19	W	Shallow	Minor fracture
410.68	125.17	274.33	184	21	W	Shallow	Minor fracture
411.78	125.50	106.27	16	15	E	Shallow	Transmissive fracture
413.47	126.02	73.31	343	26	E	Shallow	Transmissive fracture

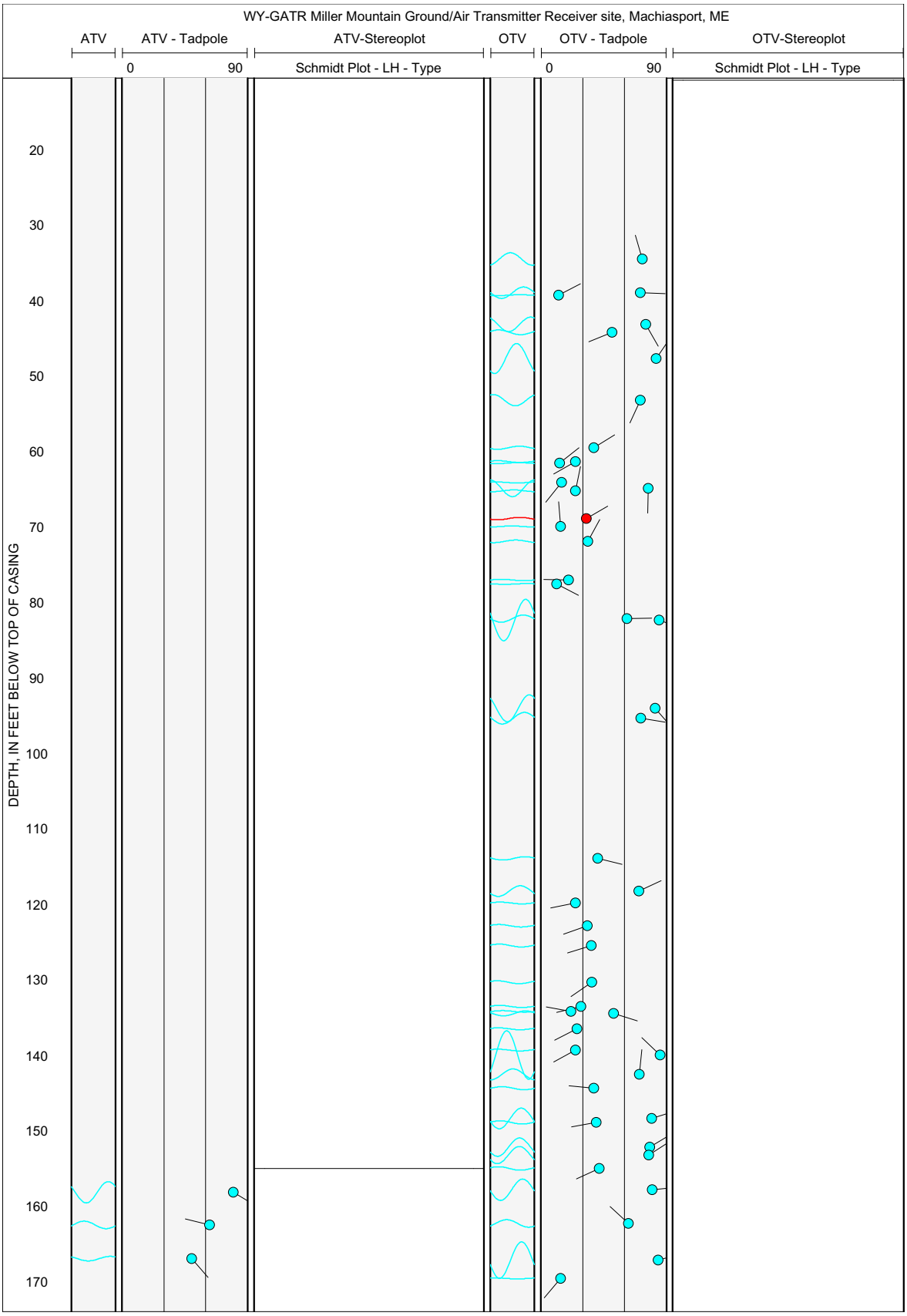


Figure 1L-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole WY-GATR, near Machiasport, Maine.

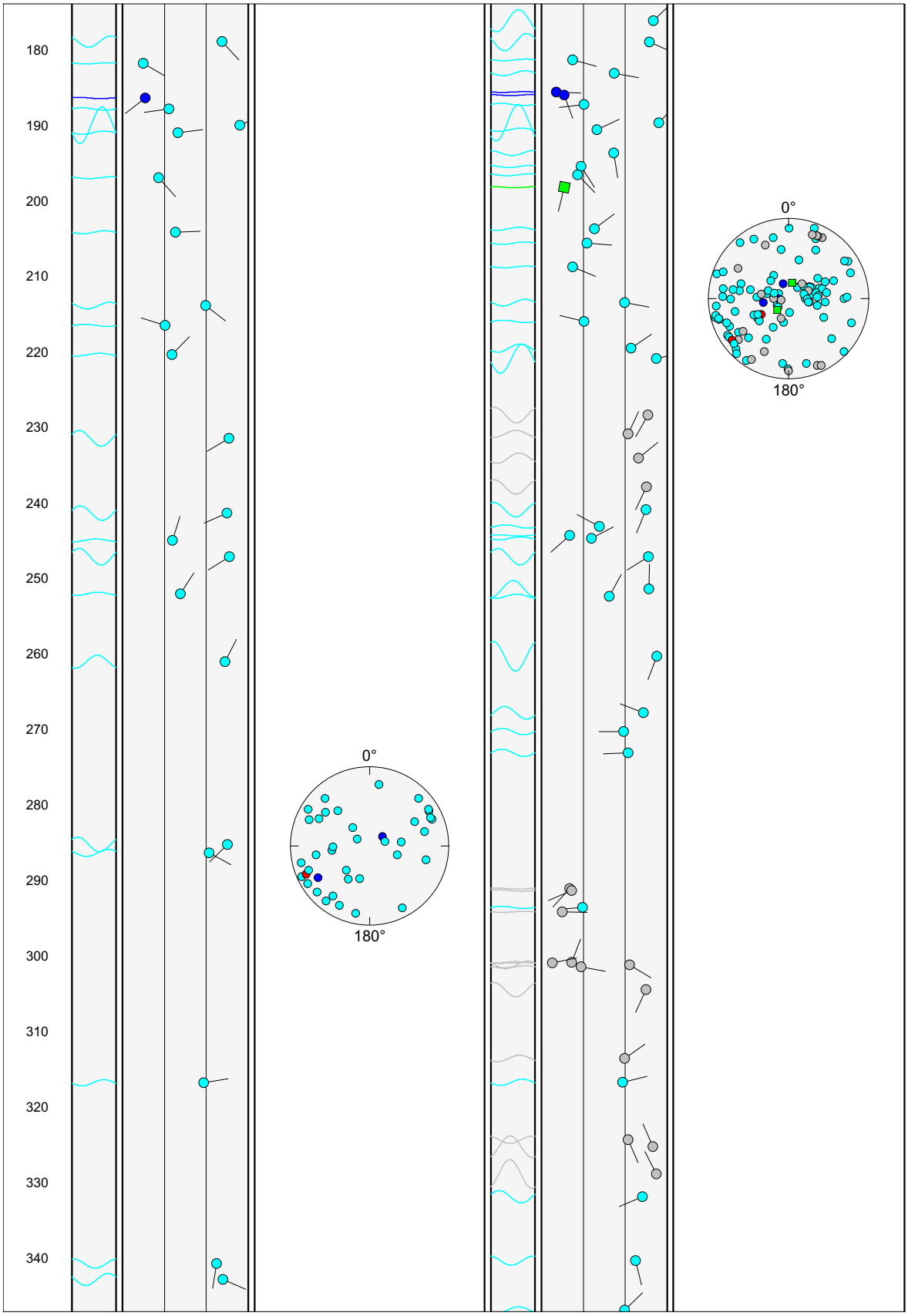


Figure 1L-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole WY-GATR, near Machiasport, Maine.—Continued

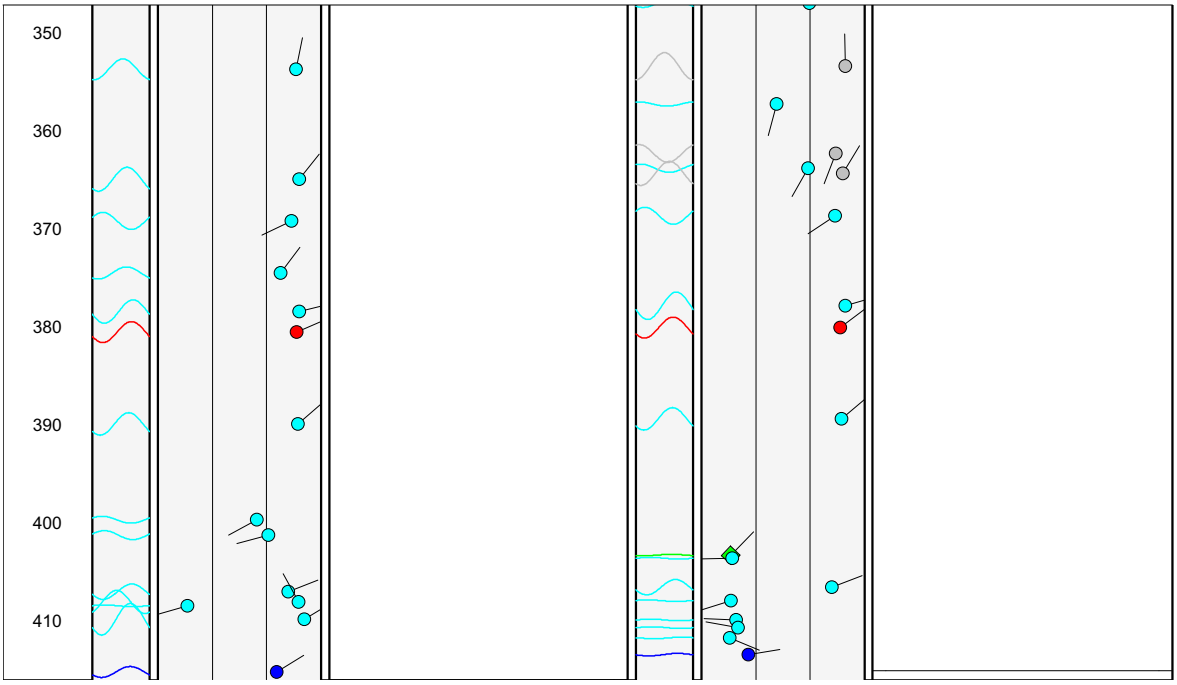


Figure 1L-3. Projection, tadpole, and stereoplots of interpretation of borehole image data for borehole WY-GATR, near Machiasport, Maine.—Continued

INTERPRETATION OF FLOWMETER DATA AND INPUT VALUES FOR FWRAP

Elevation of measuring point	272	feet
Number of fractures	2	
Well diameter	6	inches
Drawdown	-2.39	feet
Depth to ambient water level	153	feet

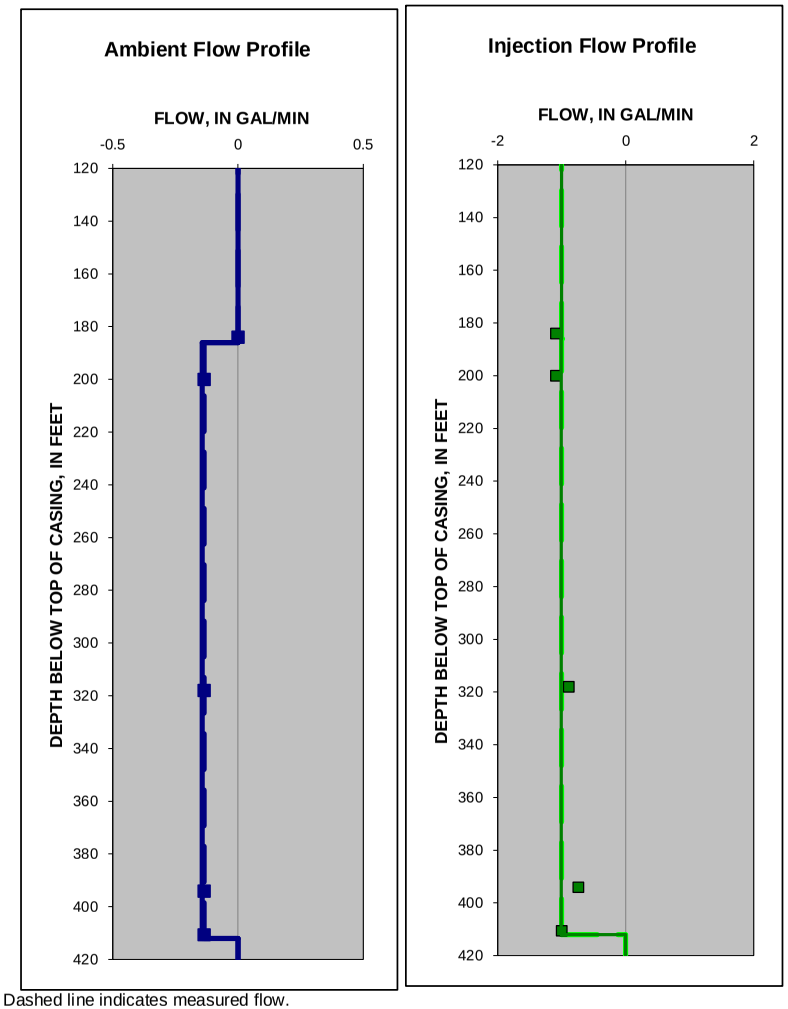
Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Injected flow above fracture (gal/min)
2	186	0.000	-1.000
1	412	-0.135	-1.000

MODELED OUTPUT RESULTS FROM FWRAP

Elevation, ambient water level	119.00	feet
Elevation, injected water level	121.39	feet

Fracture number	Depth (ft)	Ambient flow above fracture (gal/min)	Injected flow above fracture (gal/min)	Zone trans-missivity (gal/min)	Water level (ft)	Elevation of water level (ft)	Percent trans-missivity
2	186	0.000	-1.000	12	150.51	121.49	11
1	412	-0.142	-1.006	96	153.31	118.69	89

Total borehole transmissivity	108.0	(ft^2/d)
Sum of squares error	0.0001	$(gal/min)^2$
Root mean square error	0.0066	(gal/min)



Dashed line indicates measured flow.
Solid line indicates modeled flow.
Points indicate measured heat-pulse flowmeter data.

Figure 1L–4. Interpretation and modeling of heat-pulse flowmeter logs for borehole WY-GATR, near Machiasport, Maine.
[gal/min, gallon per minute; ft, feet; ft^2/d, feet squared per day; positive values of flow are upward flow, negative values of flow are downward flow]