APPENDIX H

DOWNHOLE GEOPHYSICAL RESULTS

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

08 Feb 2011

Tetra Tech EC, Inc.

Borehole: EB-1

Mountain Top, PA

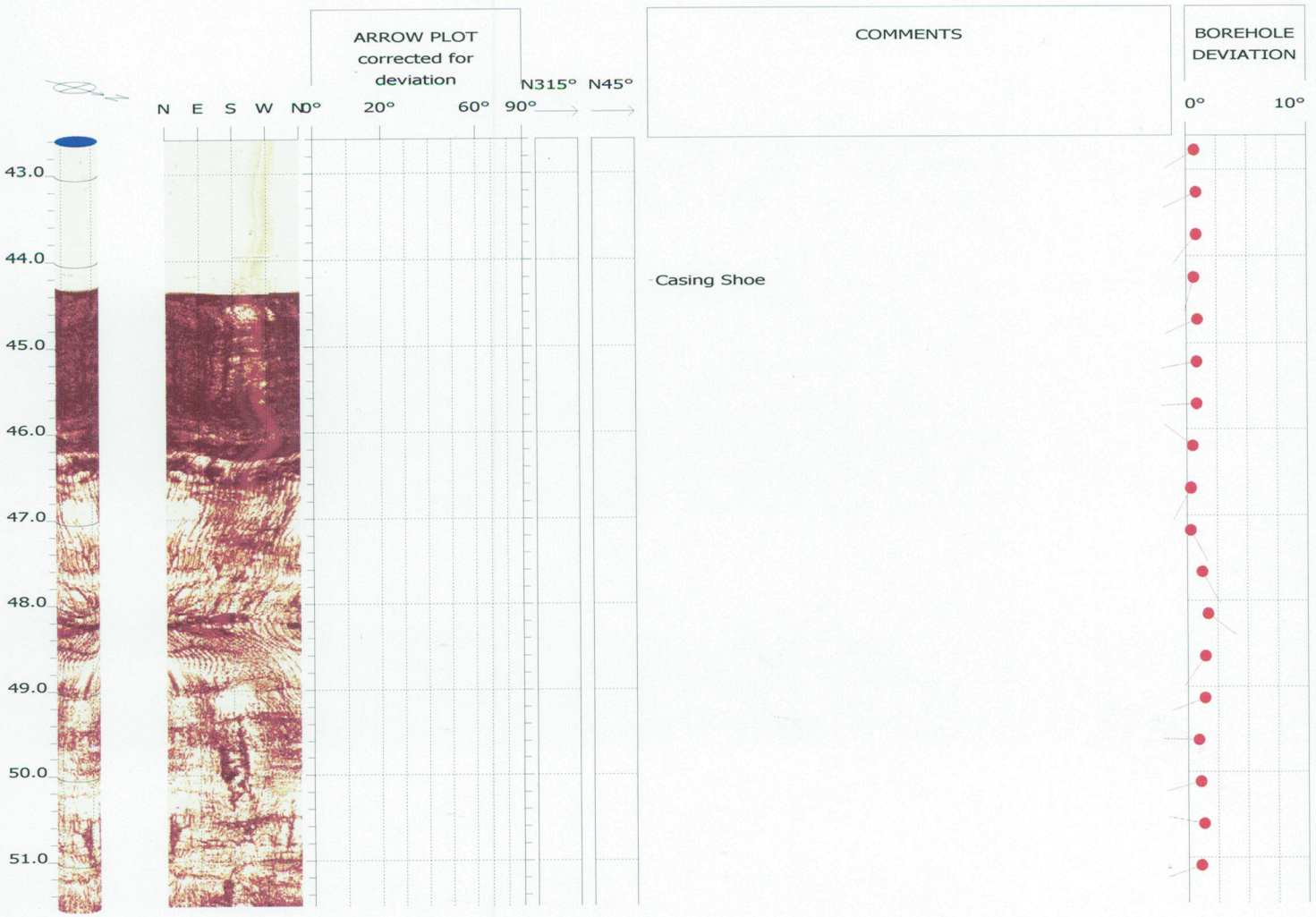
top of borehole.....
East: _
North:_
Elev: _

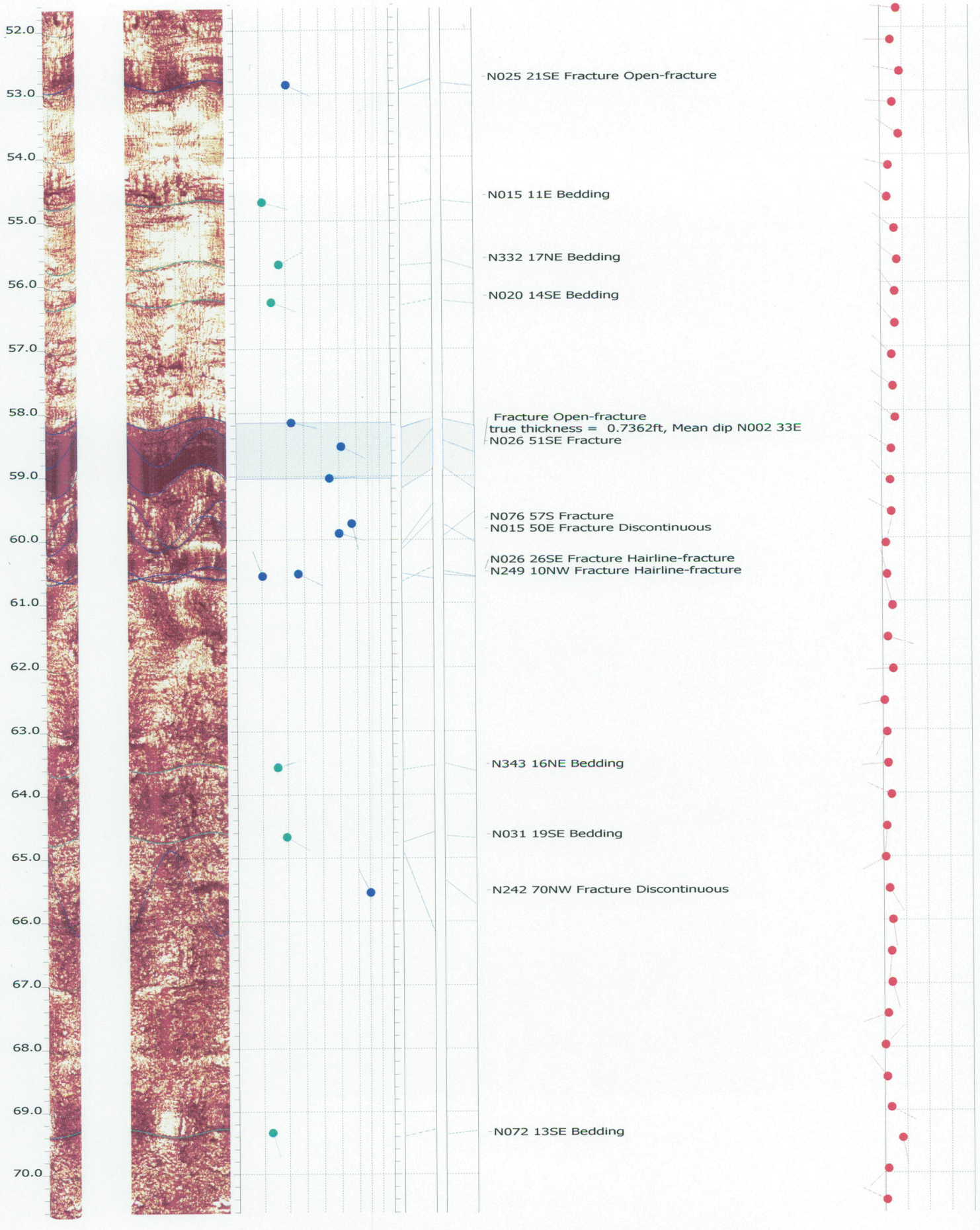
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

Zone from 199.480 to 42.480ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units

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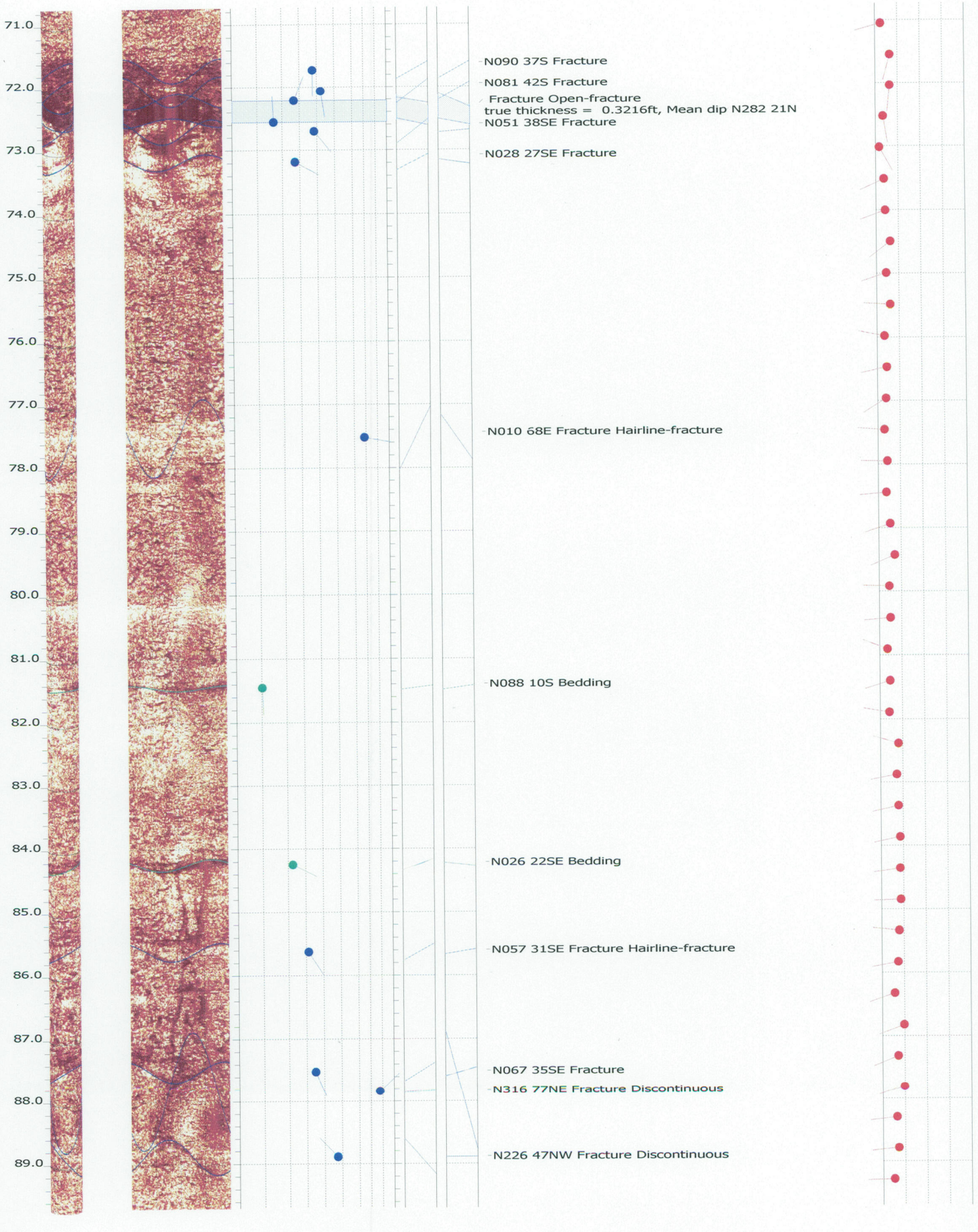
70.0
N025 21SE Fracture Open-fracture
N015 11E Bedding
N332 17NE Bedding
N020 14SE Bedding
Fracture Open-fracture
true thickness = 0.7362ft, Mean dip N002 33E
N026 51SE Fracture
N076 57S Fracture
N015 50E Fracture Discontinuous
N026 26SE Fracture Hairline-fracture
N249 10NW Fracture Hairline-fracture
N343 16NE Bedding
N031 19SE Bedding
N242 70NW Fracture Discontinuous
N072 13SE Bedding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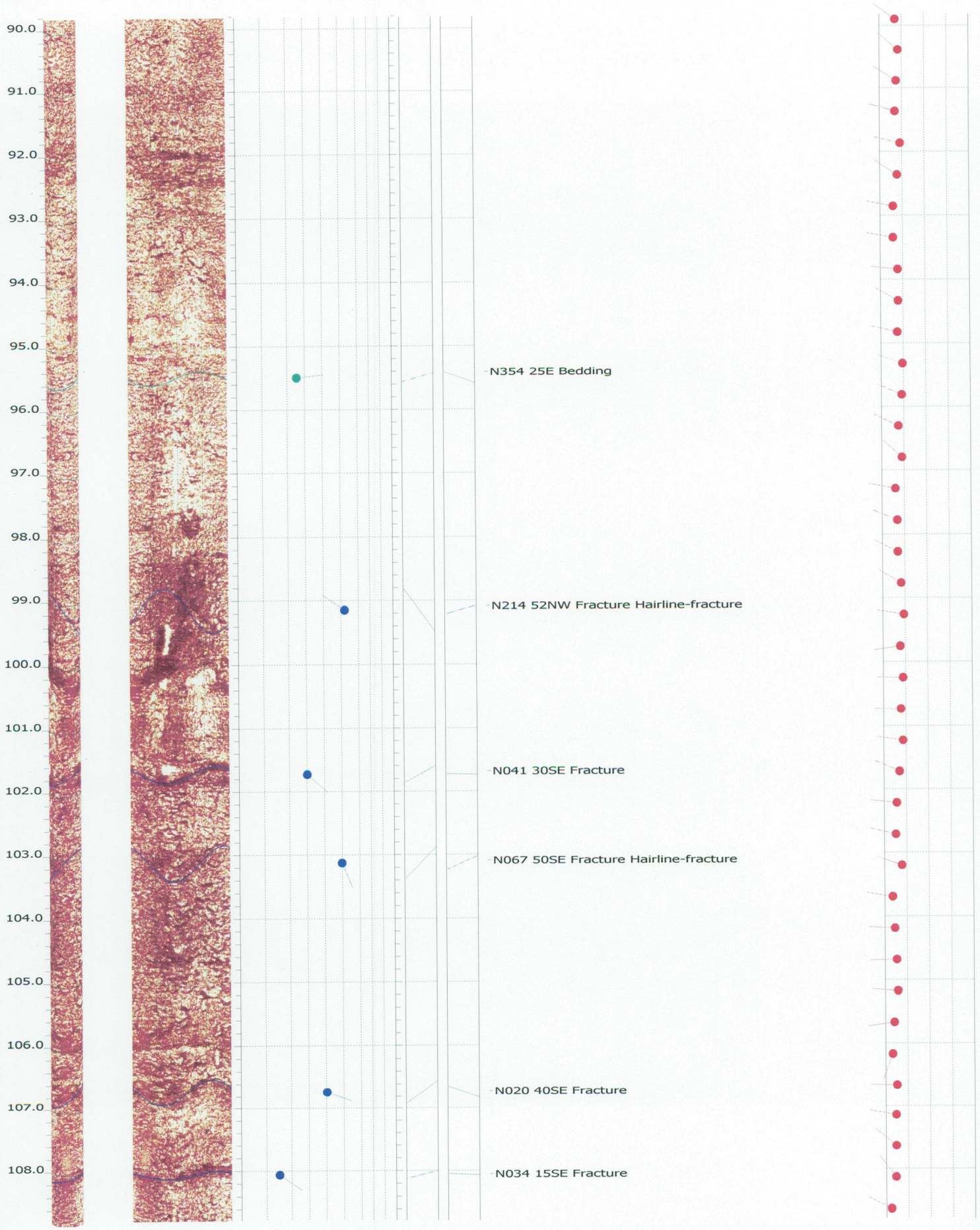
89.0
N090 37S Fracture
N081 42S Fracture
Fracture Open-fracture
true thickness = 0.3216ft, Mean dip N282 21N
N051 38SE Fracture
N028 27SE Fracture
N010 68E Fracture Hairline-fracture
N088 10S Bedding
N026 22SE Bedding
N057 31SE Fracture Hairline-fracture
N067 35SE Fracture
N316 77NE Fracture Discontinuous
N226 47NW Fracture Discontinuous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N354 25E Bedding
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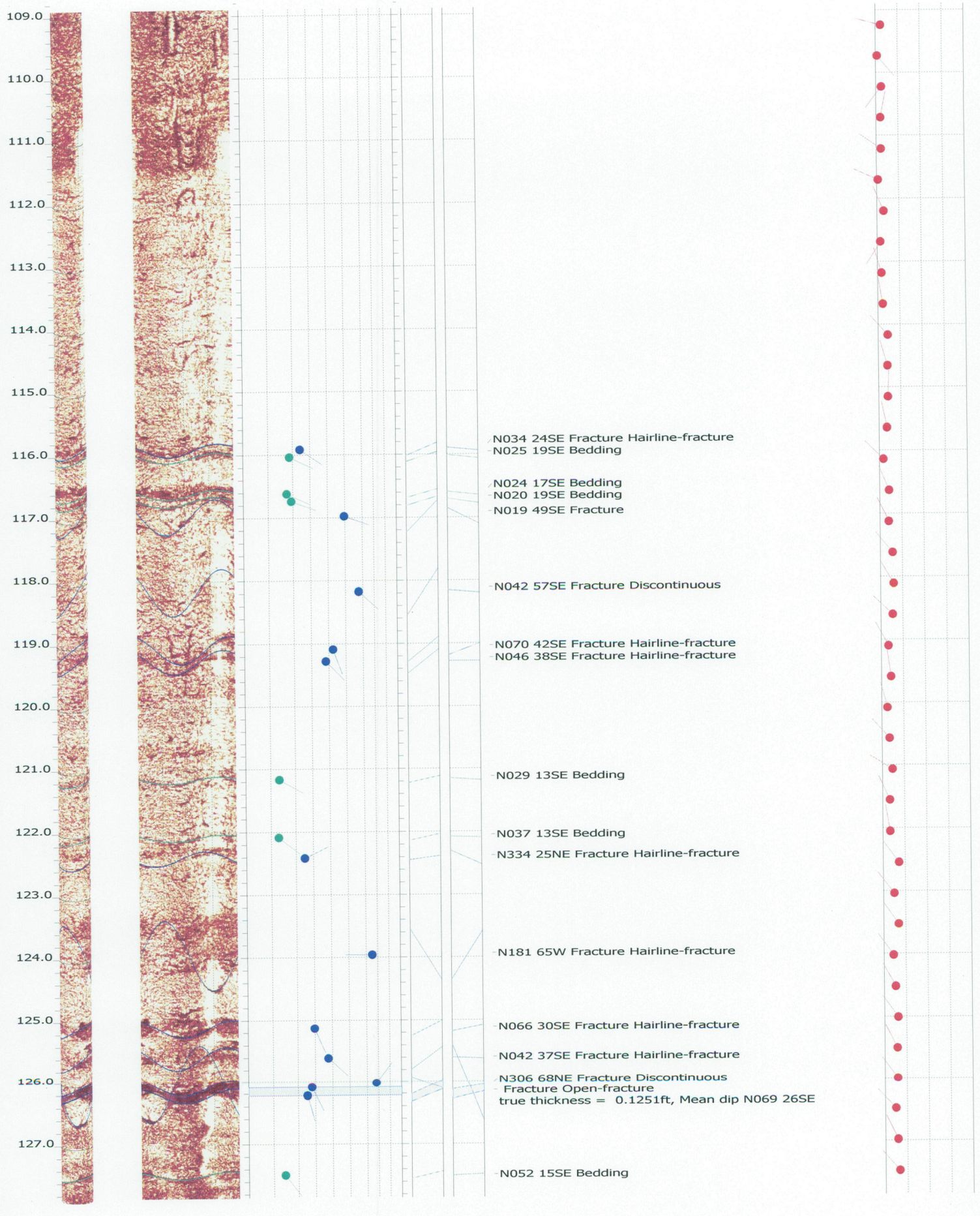
N067 50SE Fracture Hairline-fracture
N020 40SE Fracture
N034 15SE Fracture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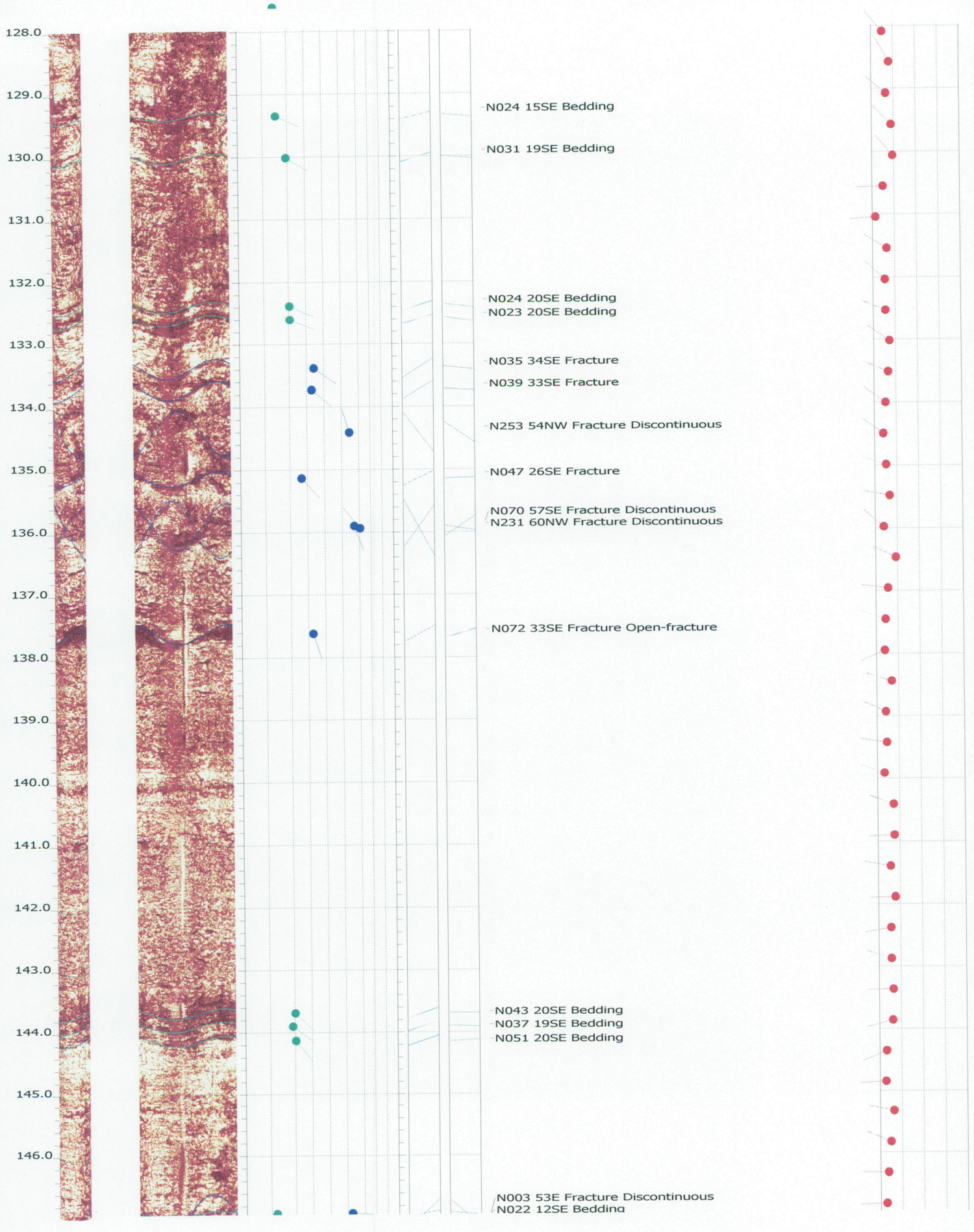
127.0
N034 24SE Fracture Hairline-fracture
N025 19SE Bedding
N024 17SE Bedding
N020 19SE Bedding
N019 49SE Fracture
N042 57SE Fracture Discontinuous
N070 42SE Fracture Hairline-fracture
N046 38SE Fracture Hairline-fracture
N029 13SE Bedding
N037 13SE Bedding
N334 25NE Fracture Hairline-fracture
N181 65W Fracture Hairline-fracture
N066 30SE Fracture Hairline-fracture
N042 37SE Fracture Hairline-fracture
N306 68NE Fracture Discontinuous
Fracture Open-fracture
true thickness = 0.1251ft, Mean dip N069 26SE
N052 15SE Bedding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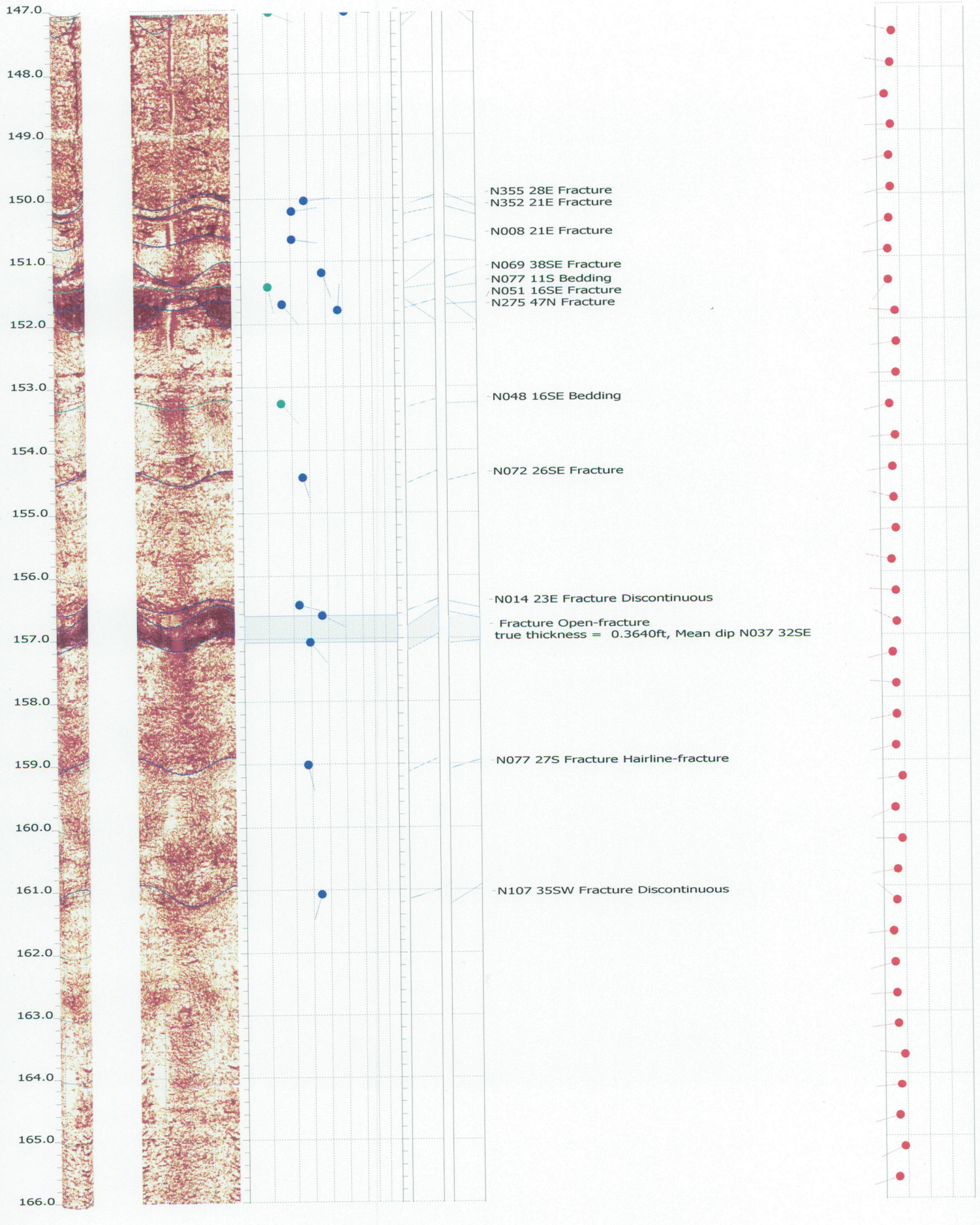
N024 15SE Bedding
N031 19SE Bedding
N024 20SE Bedding
N023 20SE Bedding
N035 34SE Fracture
N039 33SE Fracture
N253 54NW Fracture Discontinuous
N047 26SE Fracture
N070 57SE Fracture Discontinuous
N231 60NW Fracture Discontinuous
N072 33SE Fracture Open-fracture
N043 20SE Bedding
N037 19SE Bedding
N051 20SE Bedding
N003 53E Fracture Discontinuous
N022 12SE Bedding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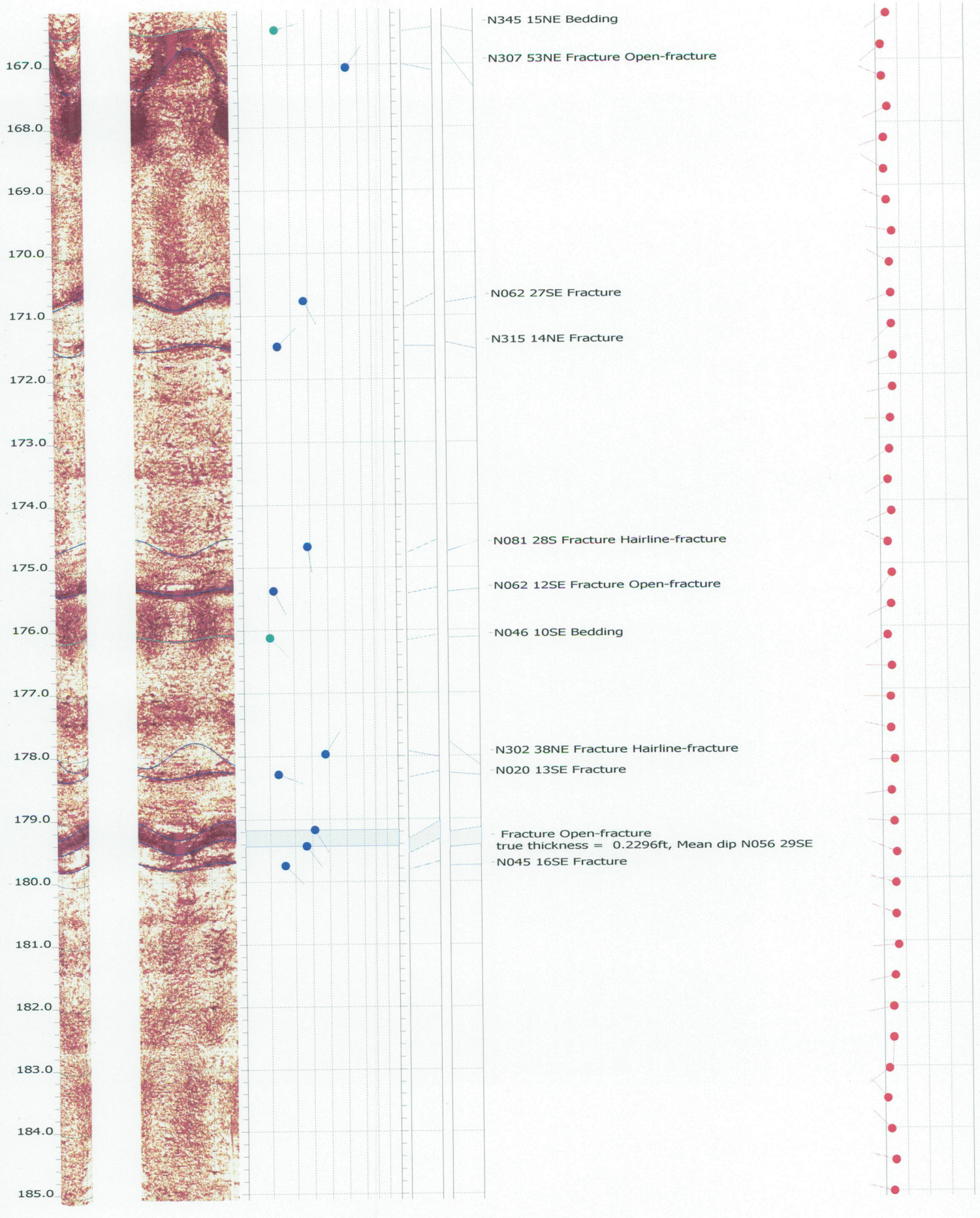
N352 21E Fracture
N008 21E Fracture
N069 38SE Fracture
N077 11S Bedding
N051 16SE Fracture
N275 47N Fracture
N048 16SE Bedding
N072 26SE Fracture
N014 23E Fracture Discontinuous
Fracture Open-fracture
true thickness = 0.3640ft, Mean dip N037 32SE
N077 27S Fracture Hairline-fracture
N107 35SW Fracture Discontinuous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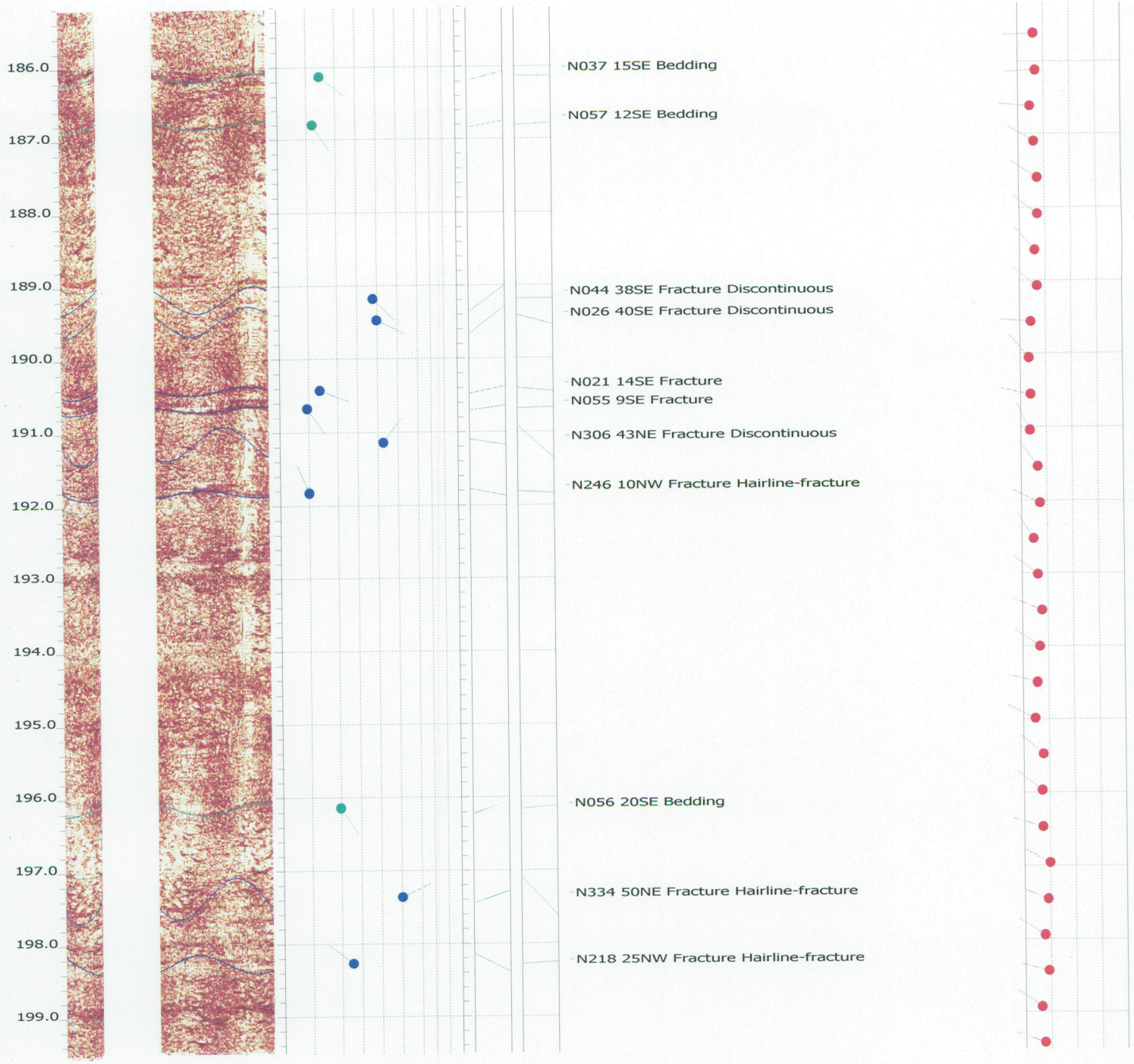
N345 15NE Bedding
N307 53NE Fracture Open-fracture
N062 27SE Fracture
N315 14NE Fracture
N081 28S Fracture Hairline-fracture
N062 12SE Fracture Open-fracture
N046 10SE Bedding
N302 38NE Fracture Hairline-fracture
N020 13SE Fracture
Fracture Open-fracture
true thickness = 0.2296ft, Mean dip N056 29SE
N045 16SE Fracture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N037 15SE Bedding
N057 12SE Bedding
N044 38SE Fracture Discontinuous
N026 40SE Fracture Discontinuous
N021 14SE Fracture
N055 9SE Fracture
N306 43NE Fracture Discontinuous
N246 10NW Fracture Hairline-fracture
N056 20SE Bedding
N334 50NE Fracture Hairline-fracture
N218 25NW Fracture Hairline-fracture

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

08 Feb 2011

Tetra Tech EC, Inc.

Borehole: EB-1

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

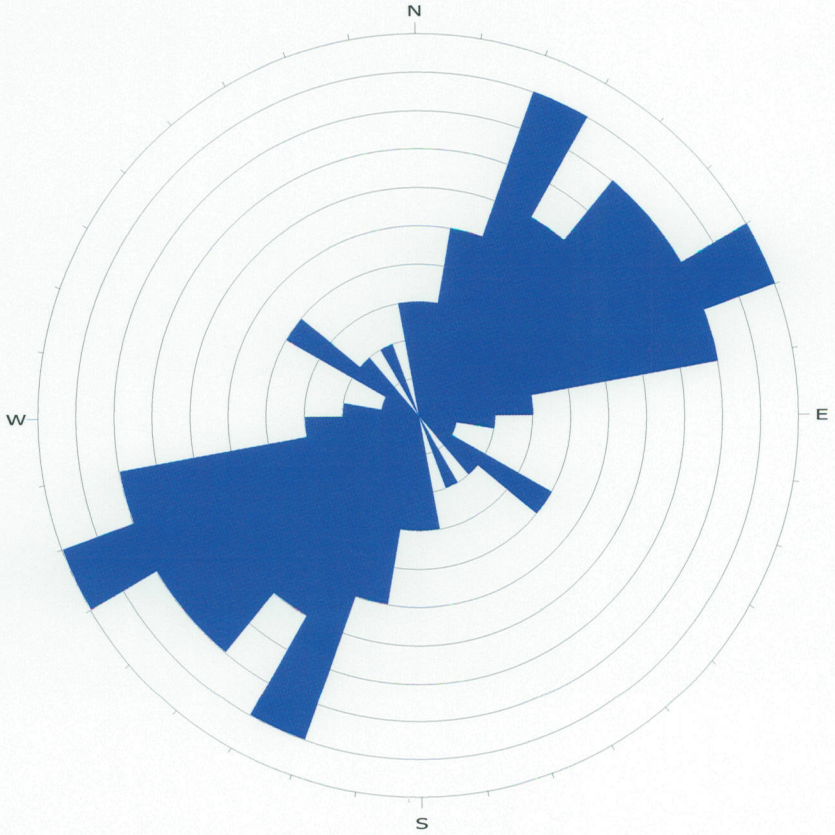
North ref. is true
Depth units are feet

Zone from 198.729 to 52.243ft

Interpretation 1

Dip data sets .....
BHTV dips

EB-1
52.243 - 198.729ft
Strike-direction, fracture rose-diagram



0 1 2 3 4 5 6 7 8 9 10

EB-1, Interpretation 1

Azimuth Incr = 10°
198.729 to 52.243ft
N = 75

08 Feb 2011

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

08 Feb 2011

Tetra Tech EC, Inc.

Borehole: EB-1

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

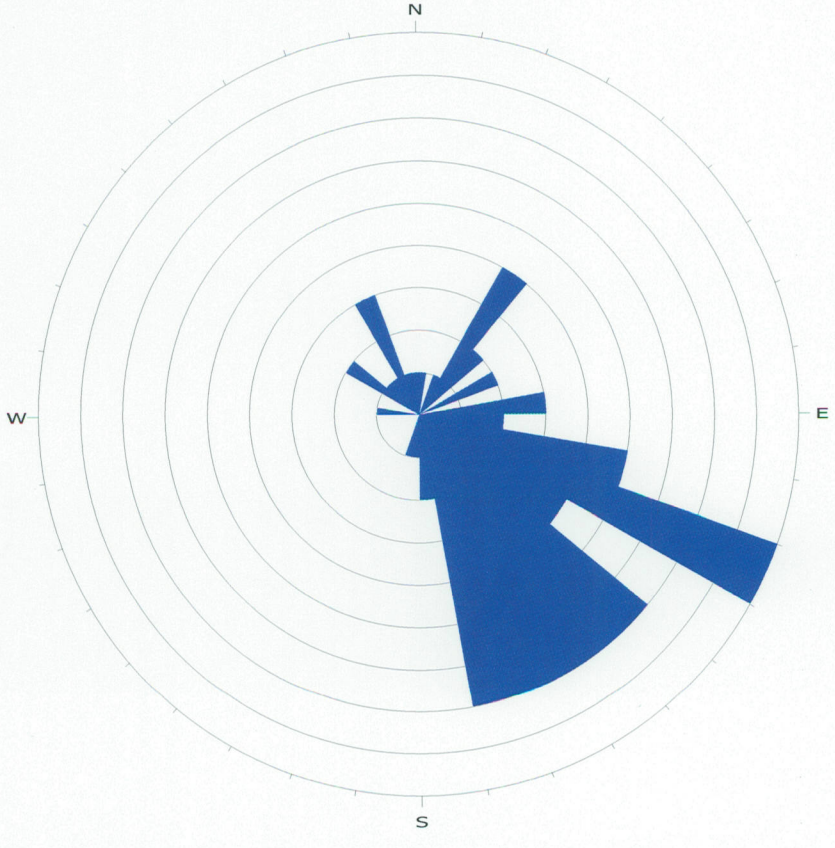
North ref. is true
Depth units are feet

Zone from 198.729 to 52.243ft

Interpretation 1

Dip data sets .....
BHTV dips

EB-1
52.243 - 198.729ft
Dip-azimuth, fracture rose-diagram



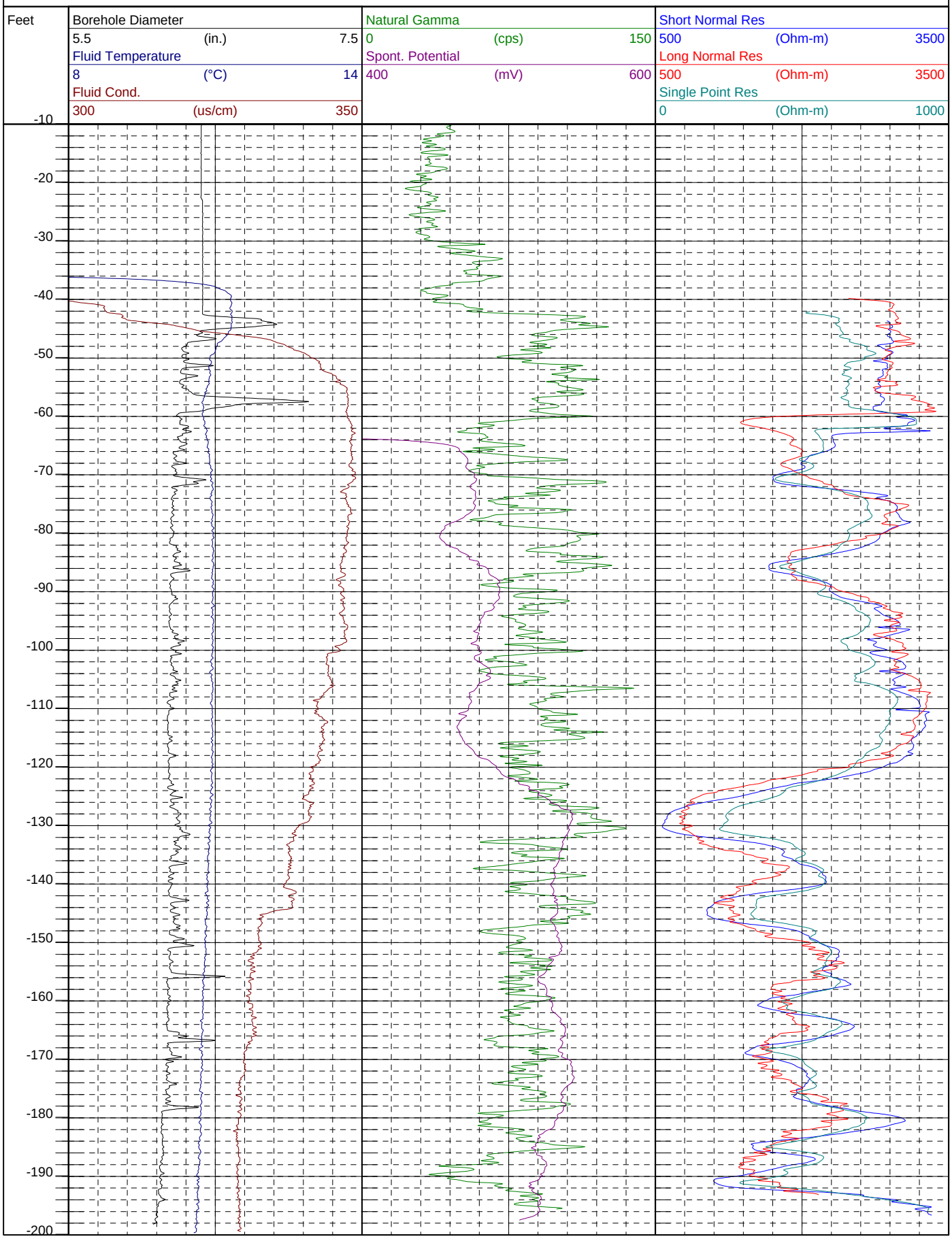
0 1 2 3 4 5 6 7 8 9

EB-1, Interpretation 1

Azimuth Incr = 10°
198.729 to 52.243ft
N = 75

08 Feb 2011

Well Name: Tetra Tech EC, Inc.: EB-1
Location: Mountain Top, PA
Reference: Ground Surface



EB-1 Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Thursday, January 6, 2011

Ambient Conditions

Depth (ft)	Run	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
51	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
65	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
	5	Ø	N/A	No flow		
78	1	0.052	up	Upward flow	**0.052**	>
	2	0.052	up	Upward flow		
	3	0.052	up	Upward flow		
	4	0.052	up	Upward flow		
94	1	0.065	up	Upward flow	**0.066**	>
	2	0.066	up	Upward flow		
	3	0.065	up	Upward flow		
	4	0.067	up	Upward flow		
	5	0.066	up	Upward flow		
	6	0.066	up	Upward flow		
120	1	0.064	up	Upward flow	**0.063**	<
	2	0.062	up	Upward flow		
	3	0.063	up	Upward flow		
	4	0.064	up	Upward flow		
	5	0.065	up	Upward flow		
	6	0.061	up	Upward flow		
	7	0.062	up	Upward flow		
	8	0.062	up	Upward flow		
160	1	0.035	up	Upward flow	**0.035**	<
	2	0.035	up	Upward flow		
	3	0.035	up	Upward flow		
	4	0.035	up	Upward flow		
172	1	Incon.	N/A	Inconclusive	N/A	<
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
	5	Ø	N/A	No flow		

Pumping Conditions: Pump set at ~ 50', Rate ~ 0.5 gpm

Depth (ft)	Run	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
51	*Station eliminated due to location of pump*					
65	1	0.312	up	Upward flow	**0.312**	<
	2	0.311	up	Upward flow		
	3	0.311	up	Upward flow		
	4	0.312	up	Upward flow		
	5	0.312	up	Upward flow		
78	1	0.312	up	Upward flow	**0.307**	
	2	0.312	up	Upward flow		
	3	0.312	up	Upward flow		
	4	0.300	up	Upward flow		
	5	0.300	up	Upward flow		
	6	0.300	up	Upward flow		
	7	0.312	up	Upward flow		
94	1	0.340	up	Upward flow	**0.340**	>
	2	0.340	up	Upward flow		
	3	0.340	up	Upward flow		
	4	0.340	up	Upward flow		
120	1	0.317	up	Upward flow	**0.317**	<
	2	0.317	up	Upward flow		
	3	0.576	up	Upward flow		
	4	0.317	up	Upward flow		
160	1	0.061	up	Upward flow	**0.070**	<
	2	0.061	up	Upward flow		
	3	0.062	up	Upward flow		
	4	0.062	up	Upward flow		
	5	0.088	up	Upward flow		
	6	0.088	up	Upward flow		
	7	0.087	up	Upward flow		
	8	0.062	up	Upward flow		
	9	0.062	up	Upward flow		
172	1	Ø	N/A	No flow	N/A	<
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		

Key:

- **Ø** No measurable flow
- **N/A** Not applicable
- < Inflow zone
- > Outflow zone
- Outlier (not included in average flow calculation)

EARTH DATA NORTHEAST, INC.

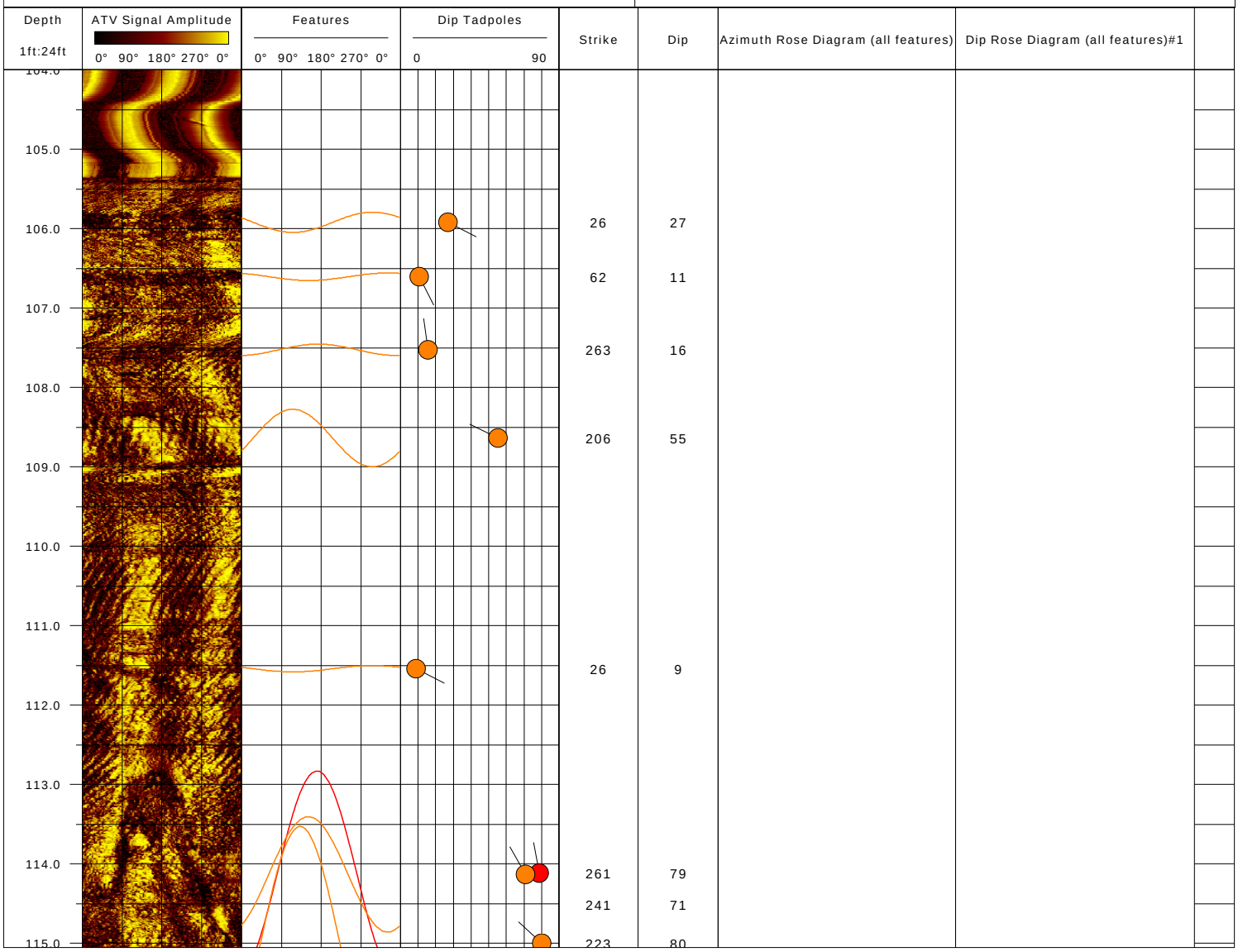
Client:	Tetra Tech, ECI
Location:	Mountain Top, PA
Well Name:	EB-2
Date:	January 20, 2011
Reference:	Ground Surface
Field Operator:	A. Kahler
City / County:	Mountain Top
State / Province:	PA
Country:	USA
Weather:	clear, cold, ~ 20 degF

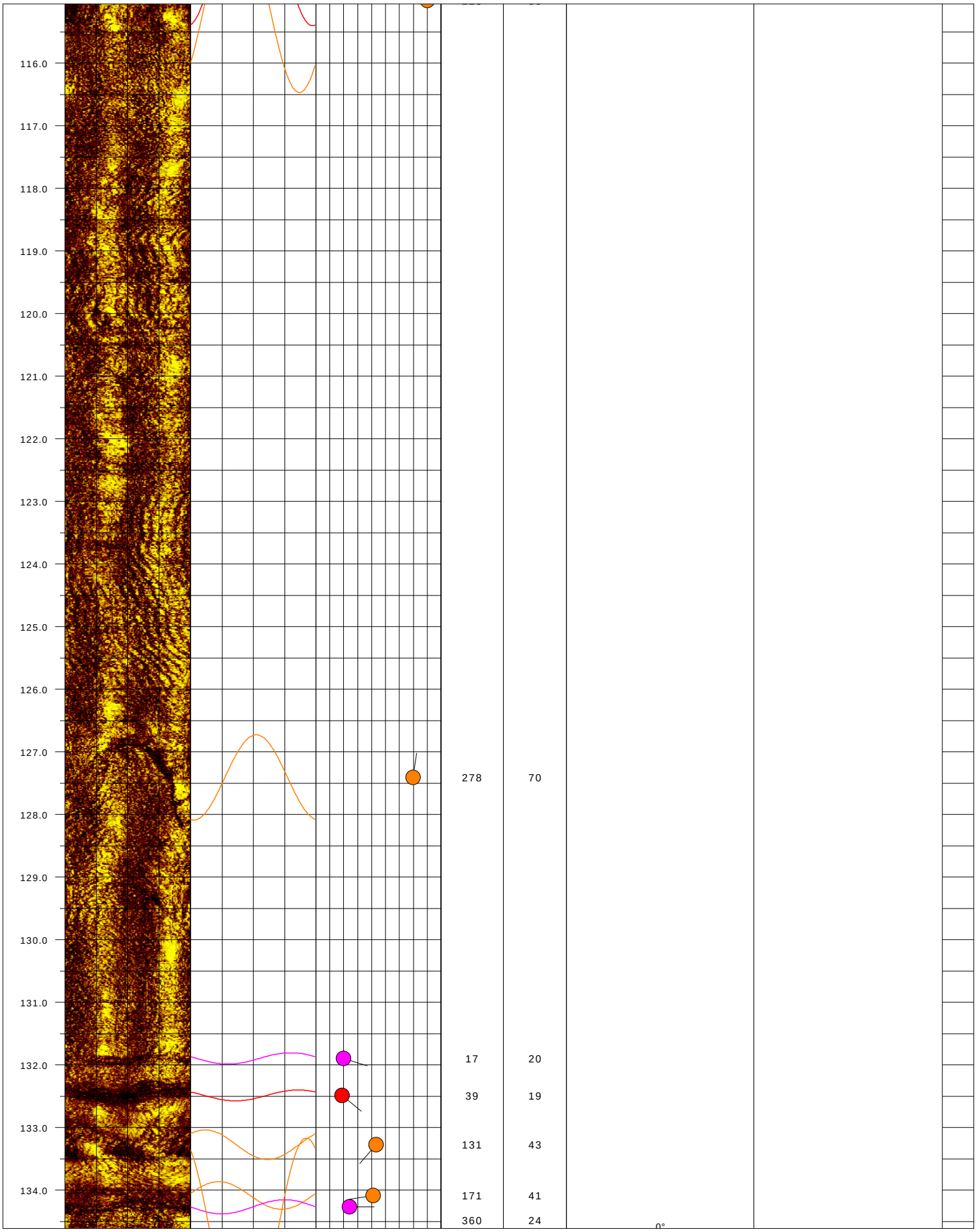
Tool:	ABI-40 / 2AIA-1000
Serial Number:	084801
Logging Speed:	~ 8 ft/min
Shop calibrations:	N/A
Field calibrations:	N/A

Major Open Joint / Fracture
Minor Open Joint / Fracture
Partially Open Joint / Fracture

Borehole Diameter:	6"
Static Water Level:	~ 40'
Casing Depth:	105.5'
Total Depth:	167.6'

Depth ratio:	1 : 24
Magnetic Declination:	-12.10 (12 deg 6 min W)
North reference:	True

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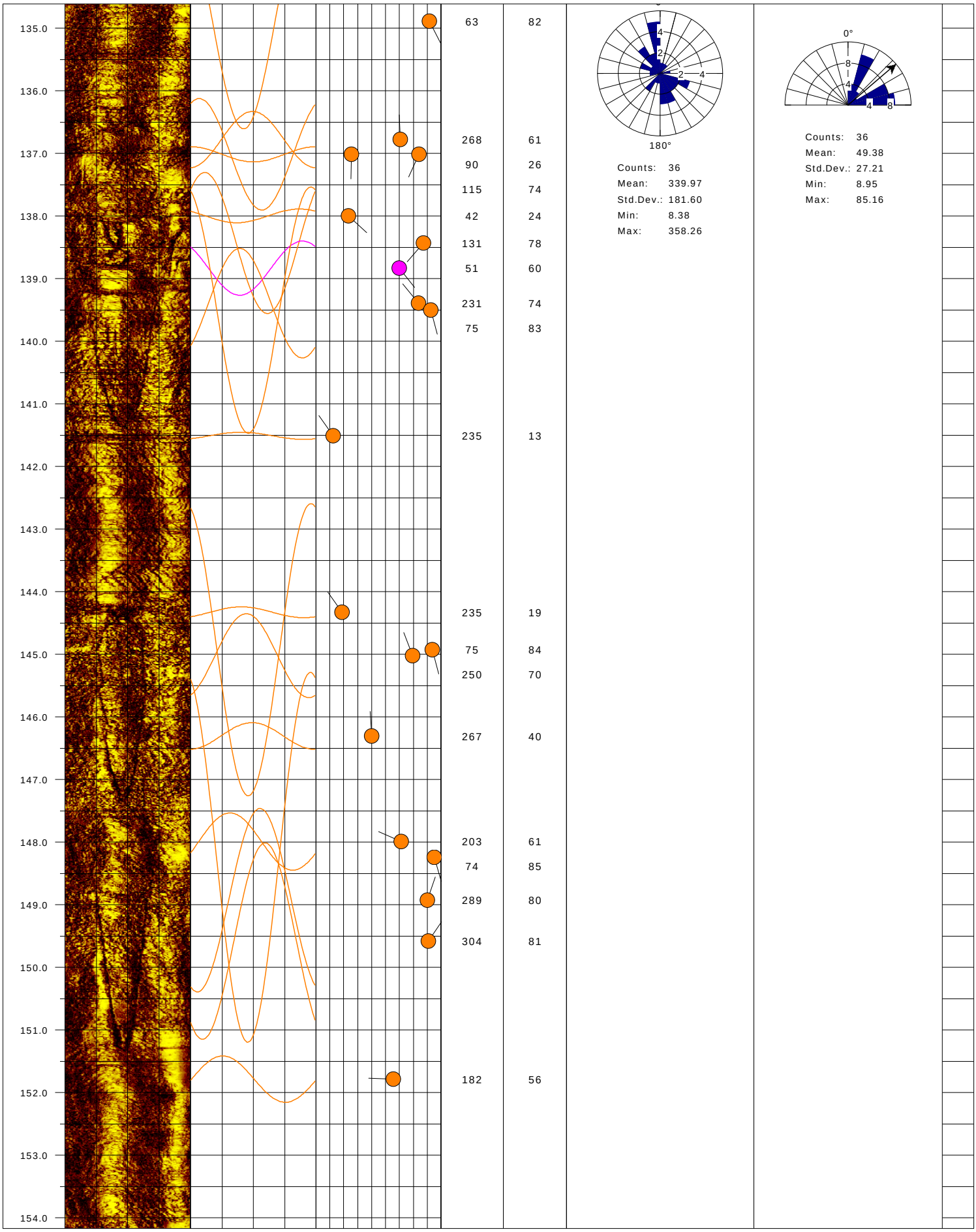
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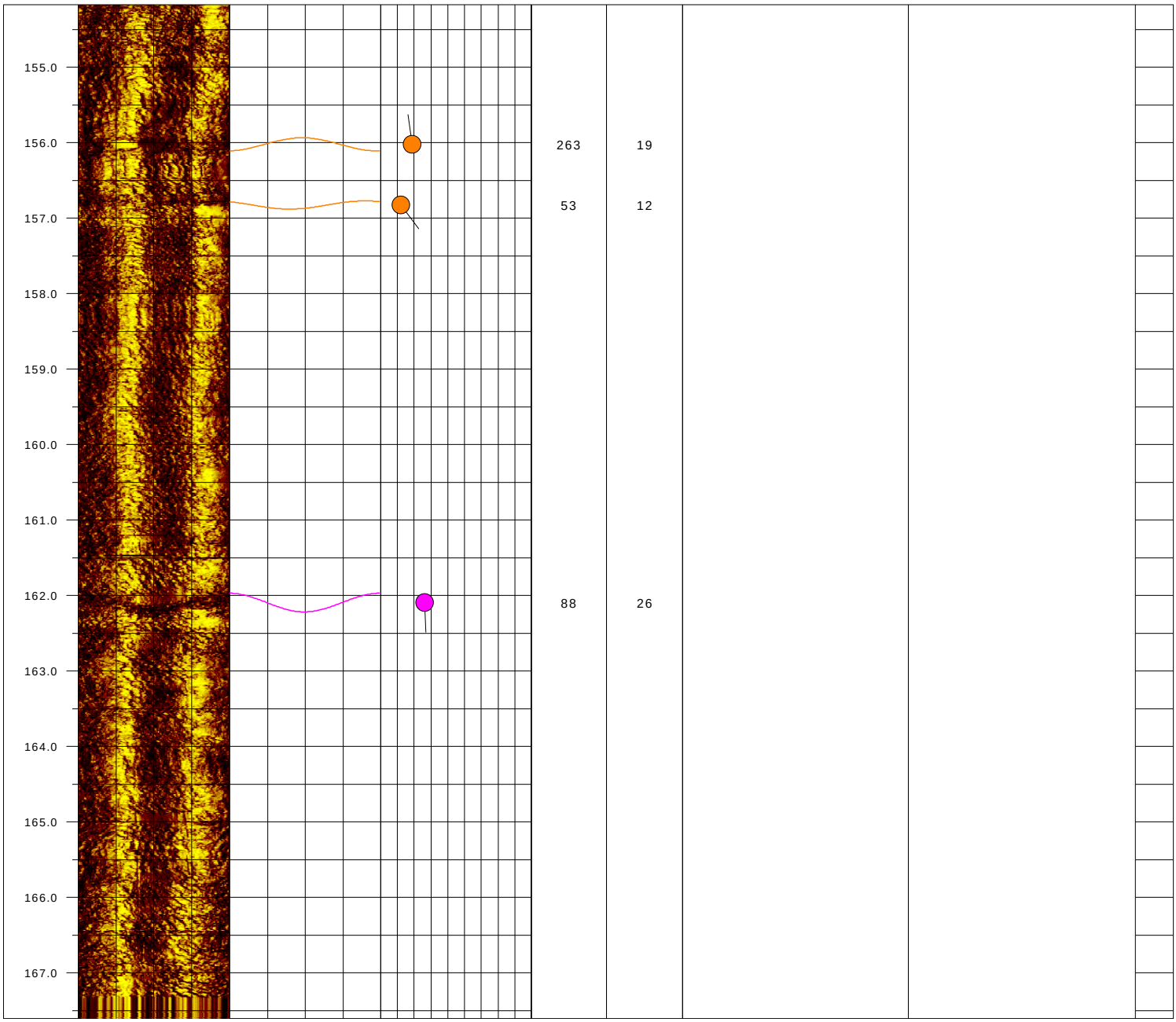
42 24
131 78
51 60
231 74
75 83
235 13
235 19
75 84
250 70
267 40
203 61
74 85
289 80
304 81
182 56
0°
180°
Counts: 36
Mean: 339.97
Std.Dev.: 181.60
Min: 8.38
Max: 358.26
Counts: 36
Mean: 49.38
Std.Dev.: 27.21
Min: 8.95
Max: 85.16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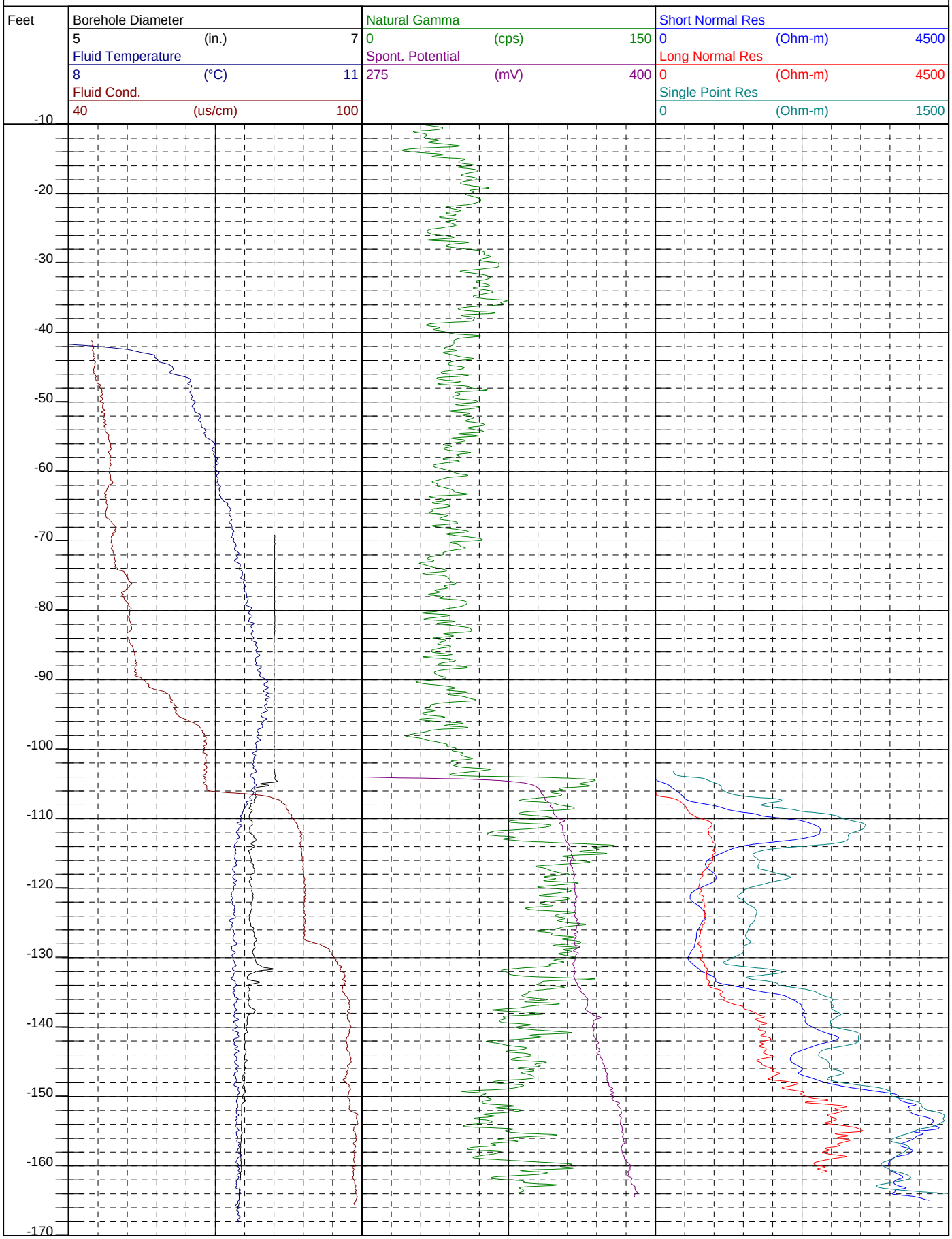
263
19
53
12
88
26

Well Name: Tetra Tech EC, Inc.: EB-2
Location: Mountain Top, PA
Reference: Ground Surface



EB-2 Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Tuesday, January 11, 2011

Ambient Conditions

Depth (ft)	Run	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
110	1	Ø	N/A	No flow	N/A	*No measurable flow discovered*
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
120	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
130	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
140	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
150	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		

Pumping Conditions: Pump set at ~ 60', Rate ~ 0.5 gpm

Depth (ft)	Run	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
110	1	0.278	up	Upward flow	**0.286**	>
	2	0.289	up	Upward flow		
	3	0.289	up	Upward flow		
	4	0.289	up	Upward flow		
120	1	0.371	up	Upward flow	**0.385**	
	2	0.390	up	Upward flow		
	3	0.390	up	Upward flow		
	4	0.390	up	Upward flow		
130	1	0.191	up	Upward flow	**0.198**	<
	2	0.196	up	Upward flow		
	3	0.202	up	Upward flow		
	4	0.196	up	Upward flow		
	5	0.202	up	Upward flow		
	6	0.202	up	Upward flow		
140	1	Ø	N/A	No flow	N/A	<
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
150	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		

Key:

- **Ø** No measurable flow
- **N/A** Not applicable
- < Inflow zone
- > Outflow zone
- Outlier (not included in average flow calculation)

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

08 Feb 2011

Tetra Tech EC, Inc.

Borehole: EB-3

Mountain Top, PA

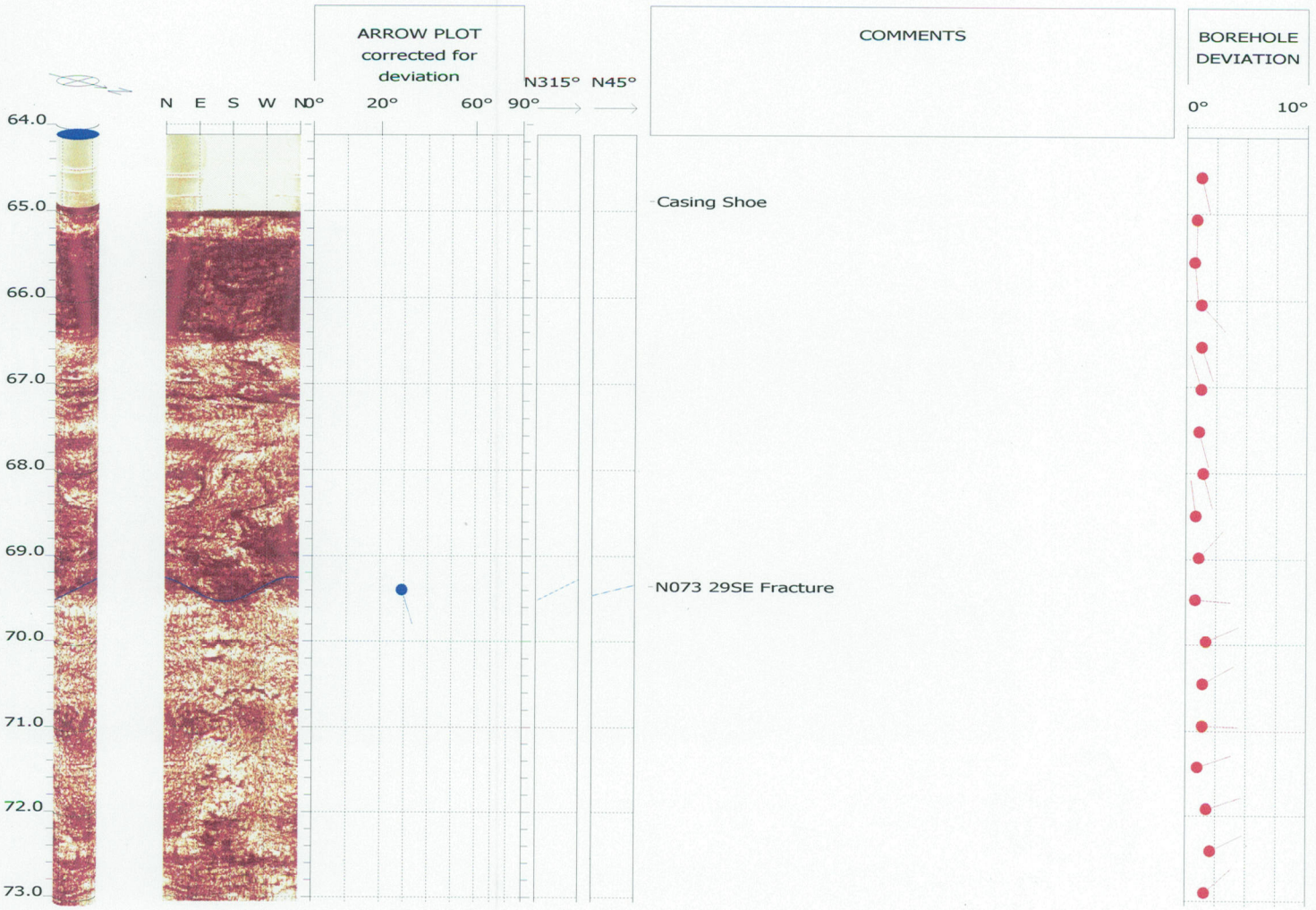
top of borehole.....
East: _
North:_
Elev: _

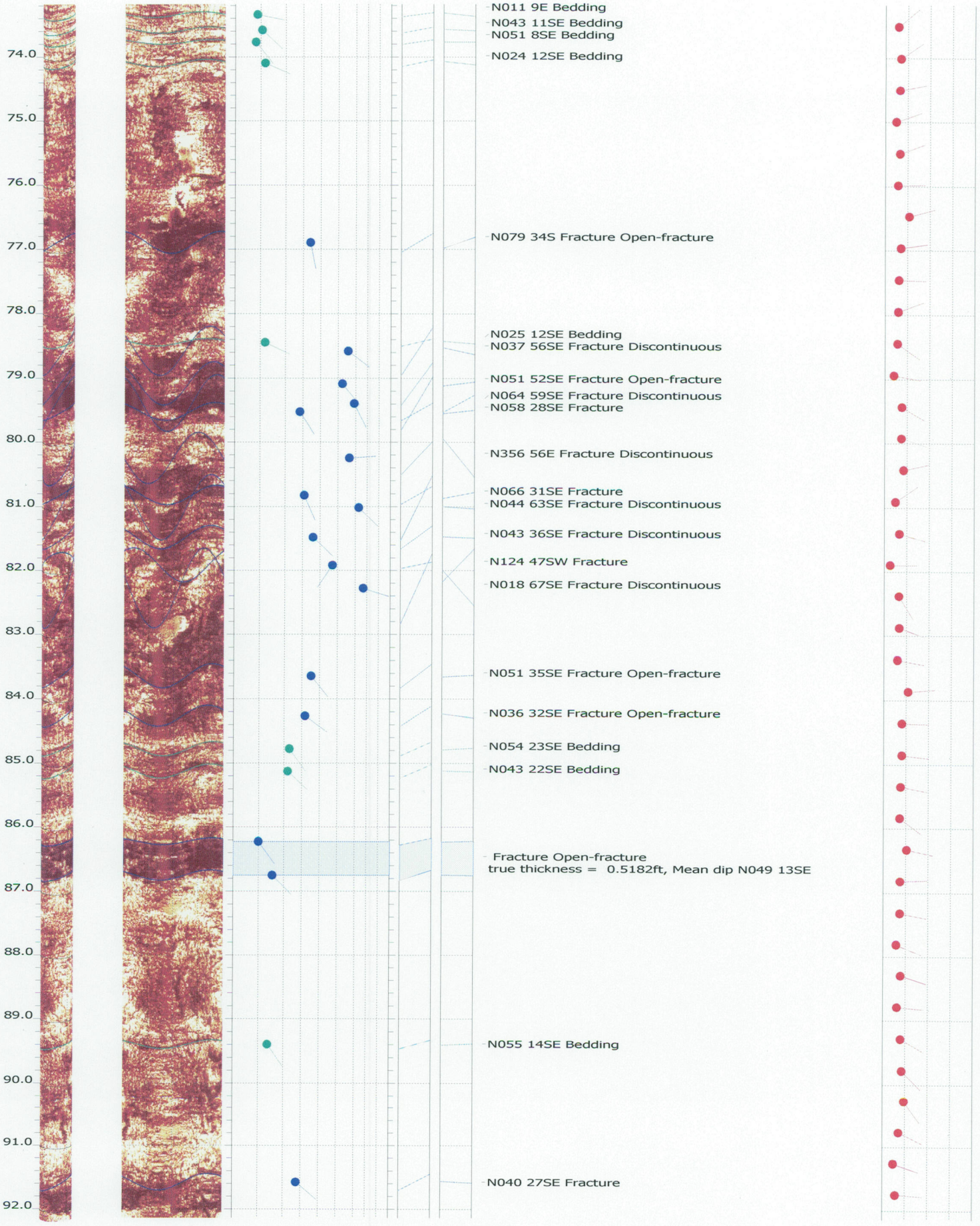
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

Zone from 200.000 to 64.000ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units

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N043 11SE Bedding
N051 8SE Bedding
N024 12SE Bedding
N079 34S Fracture Open-fracture
N025 12SE Bedding
N037 56SE Fracture Discontinuous
N051 52SE Fracture Open-fracture
N064 59SE Fracture Discontinuous
N058 28SE Fracture
N356 56E Fracture Discontinuous
N066 31SE Fracture
N044 63SE Fracture Discontinuous
N043 36SE Fracture Discontinuous
N124 47SW Fracture
N018 67SE Fracture Discontinuous
N051 35SE Fracture Open-fracture
N036 32SE Fracture Open-fracture
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true thickness = 0.5182ft, Mean dip N049 13SE
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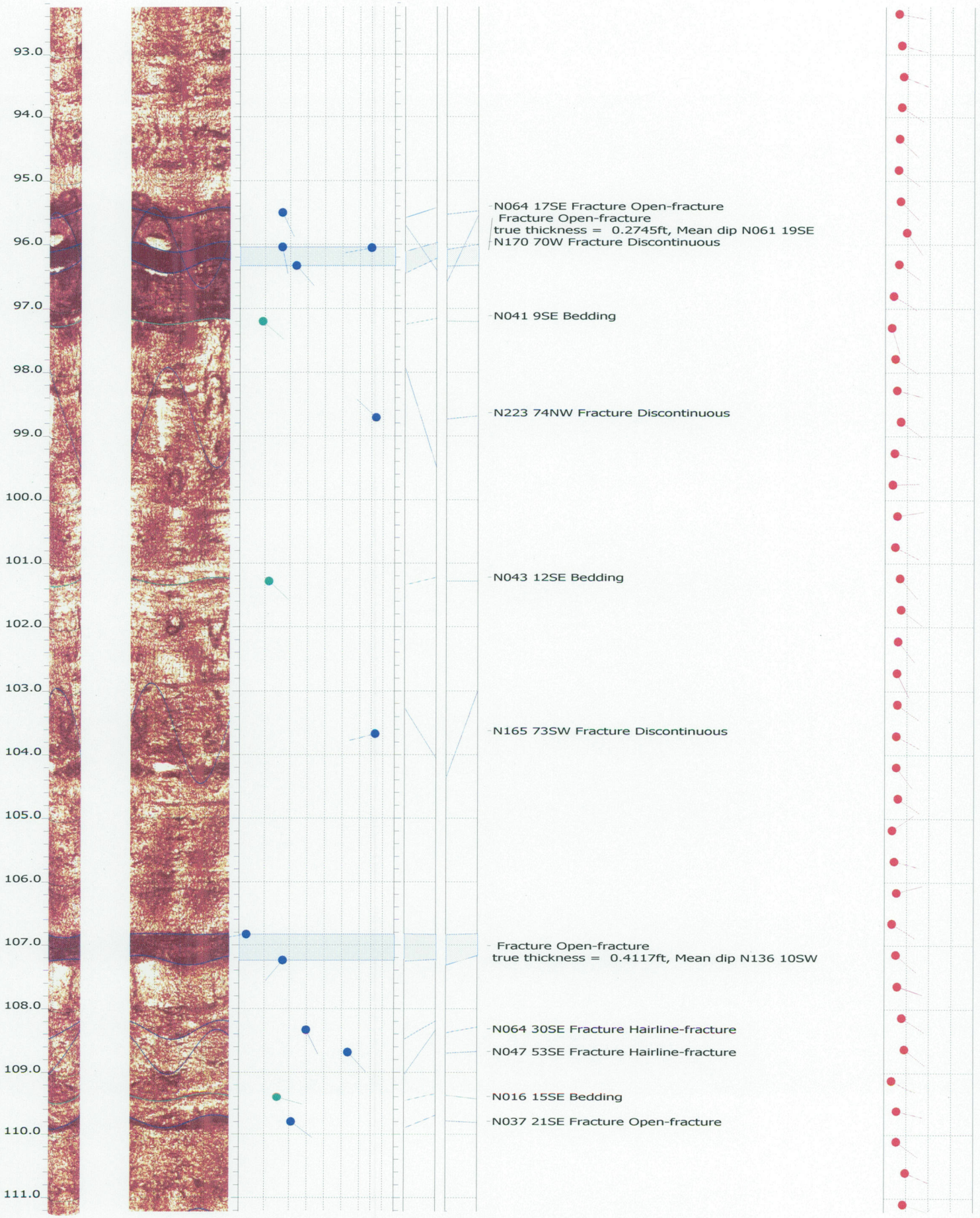
N040 27SE Fracture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N064 17SE Fracture Open-fracture
Fracture Open-fracture
true thickness = 0.2745ft, Mean dip N061 19SE
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N041 9SE Bedding
N223 74NW Fracture Discontinuous
N043 12SE Bedding
N165 73SW Fracture Discontinuous
Fracture Open-fracture
true thickness = 0.4117ft, Mean dip N136 10SW
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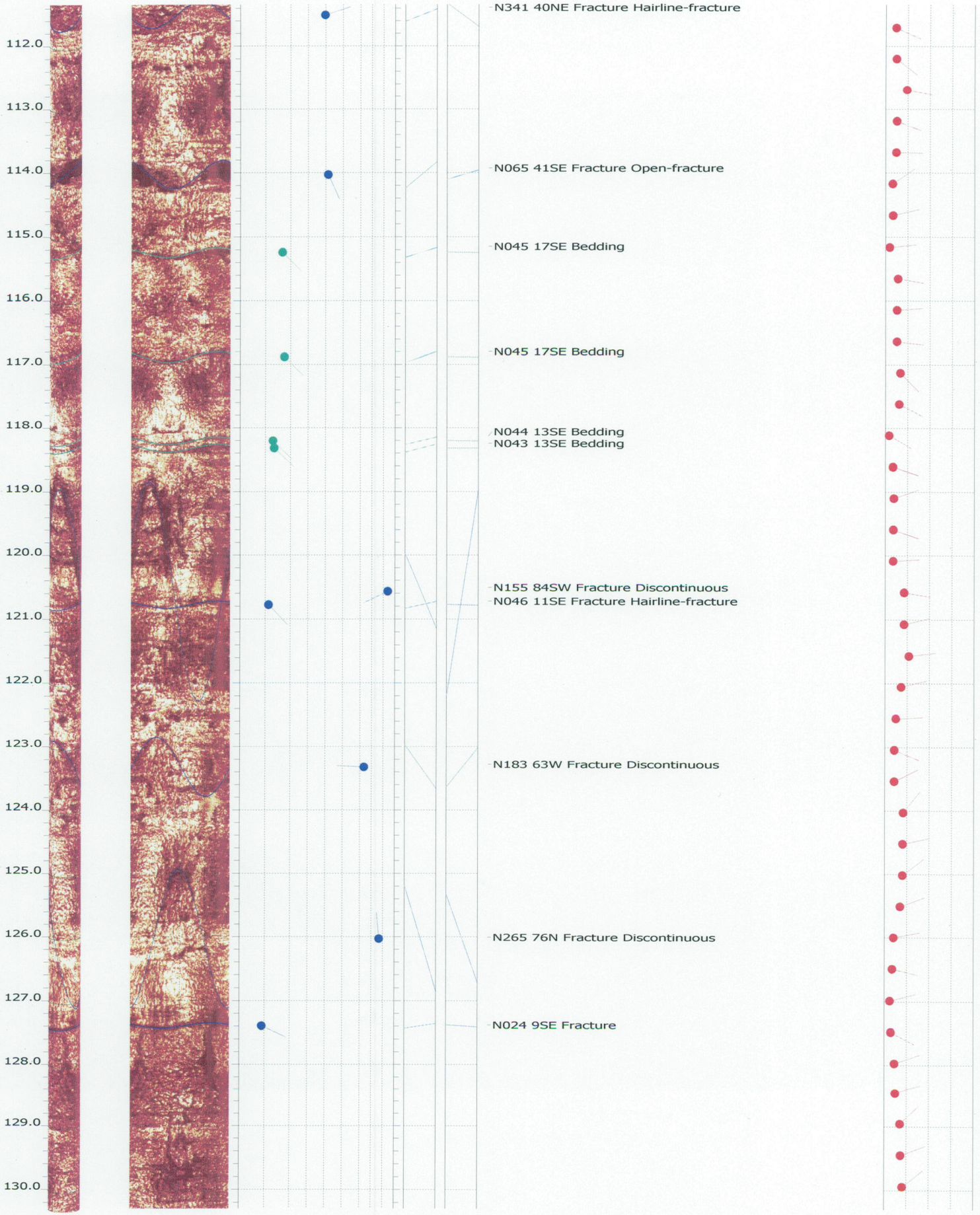
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N044 13SE Bedding
N043 13SE Bedding
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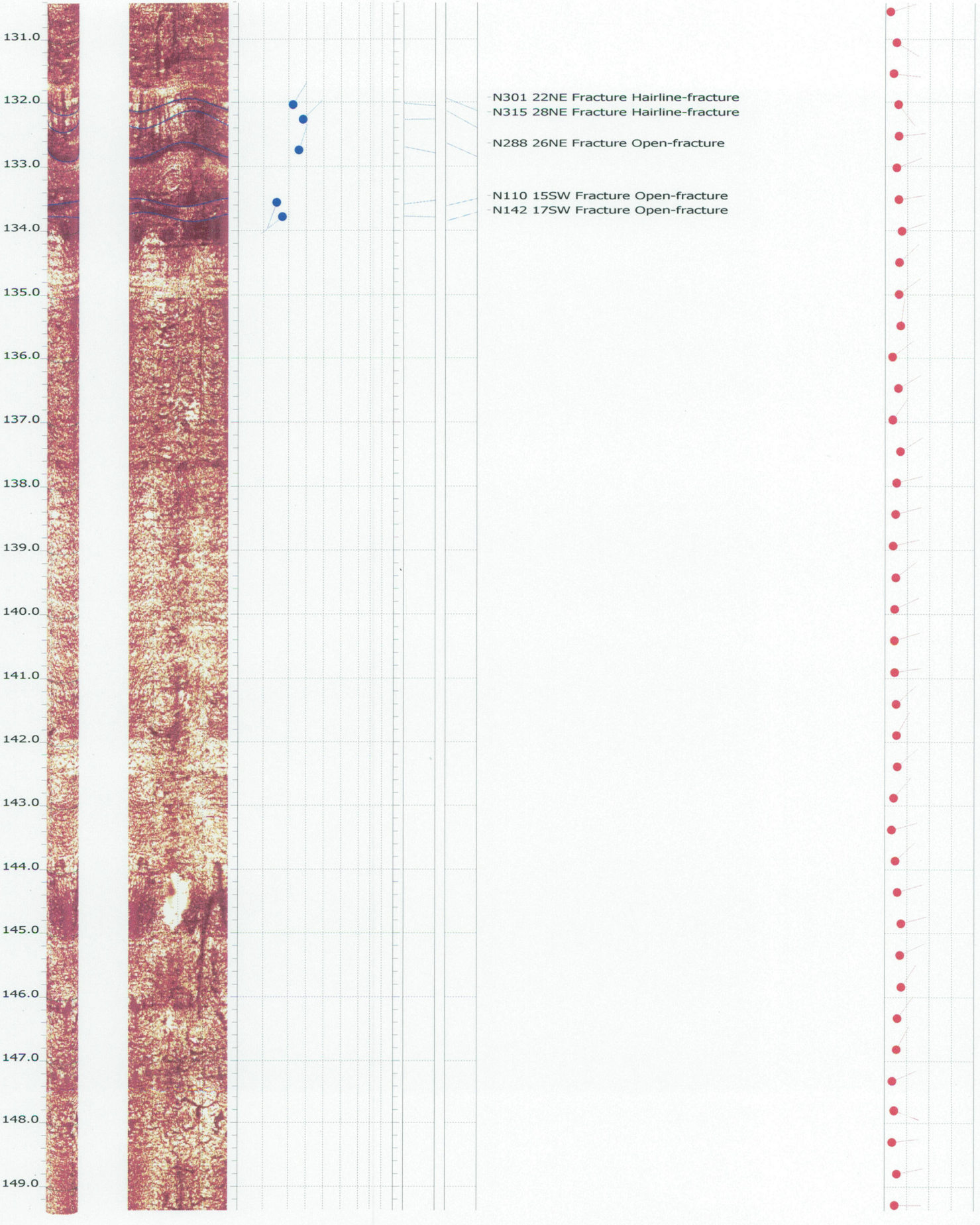
N024 9SE Fracture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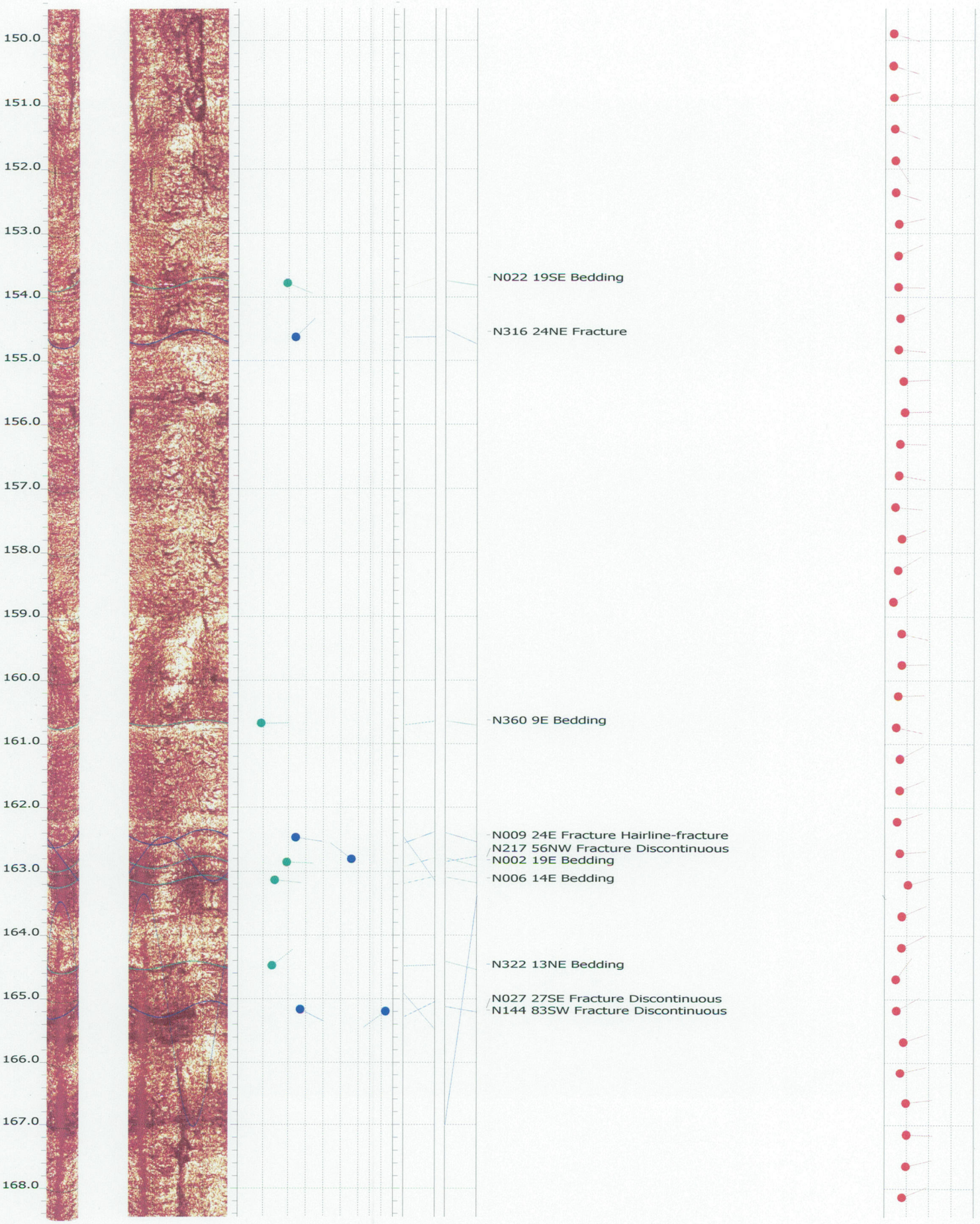
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N360 9E Bedding
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N002 19E Bedding
N006 14E Bedding
N322 13NE Bedding
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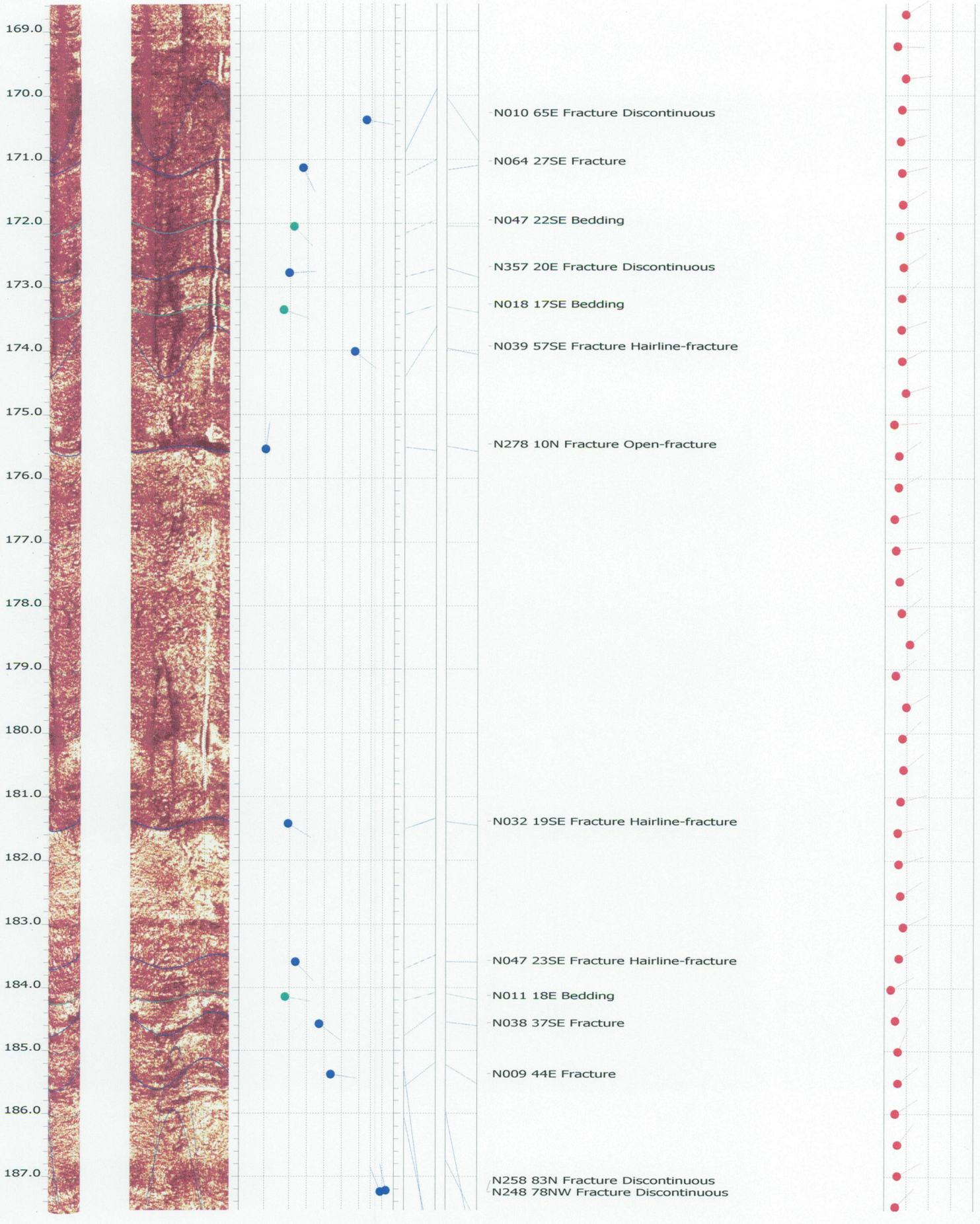
N144 83SW Fracture Discontinuous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N357 20E Fracture Discontinuous
N018 17SE Bedding
N039 57SE Fracture Hairline-fracture
N278 10N Fracture Open-fracture
N032 19SE Fracture Hairline-fracture
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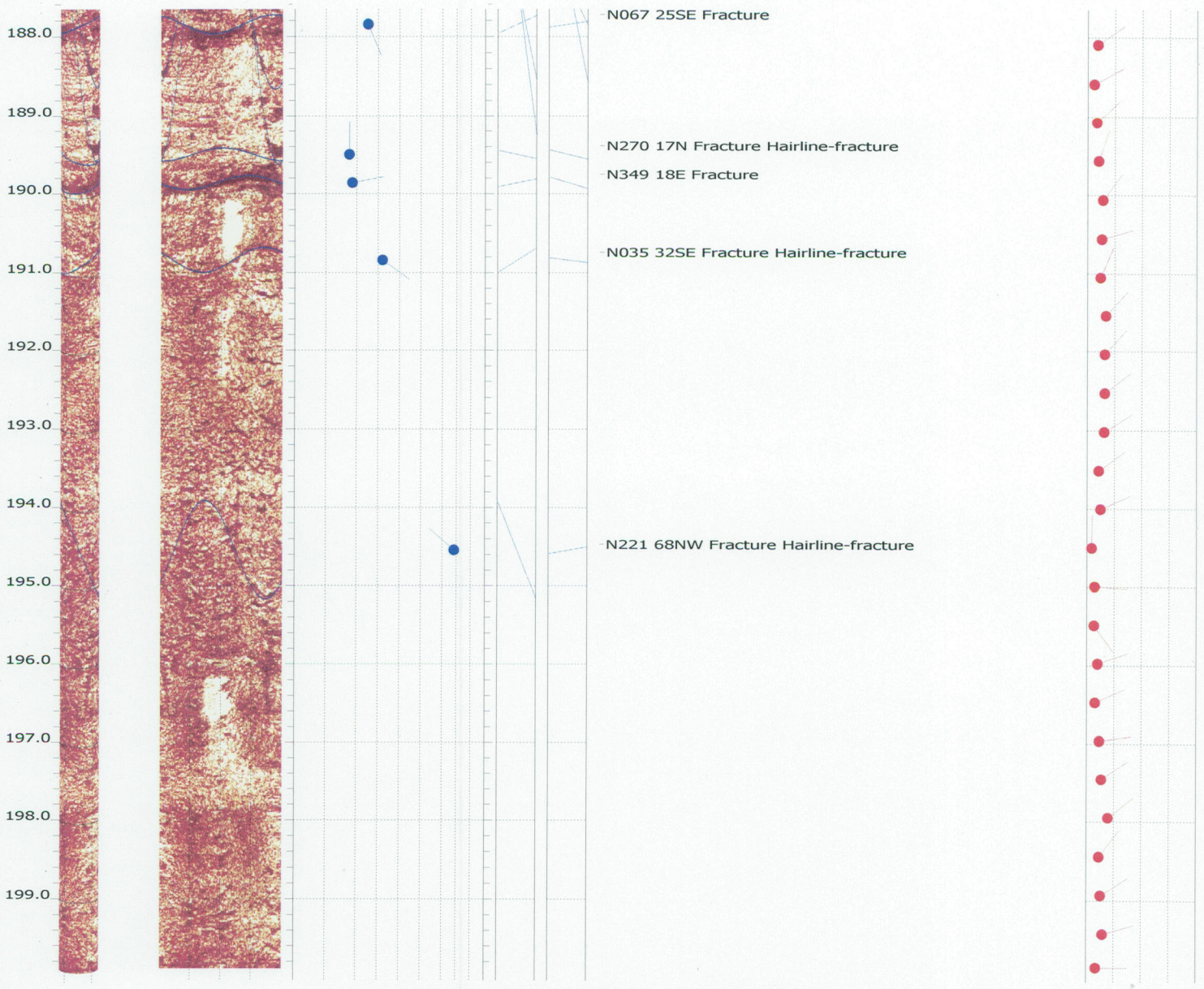
N009 44E Fracture
N258 83N Fracture Discontinuous
N248 78NW Fracture Discontinuous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N035 32SE Fracture Hairline-fracture
N221 68NW Fracture Hairline-fracture

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

08 Feb 2011

Tetra Tech EC, Inc.

Borehole: EB-3

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

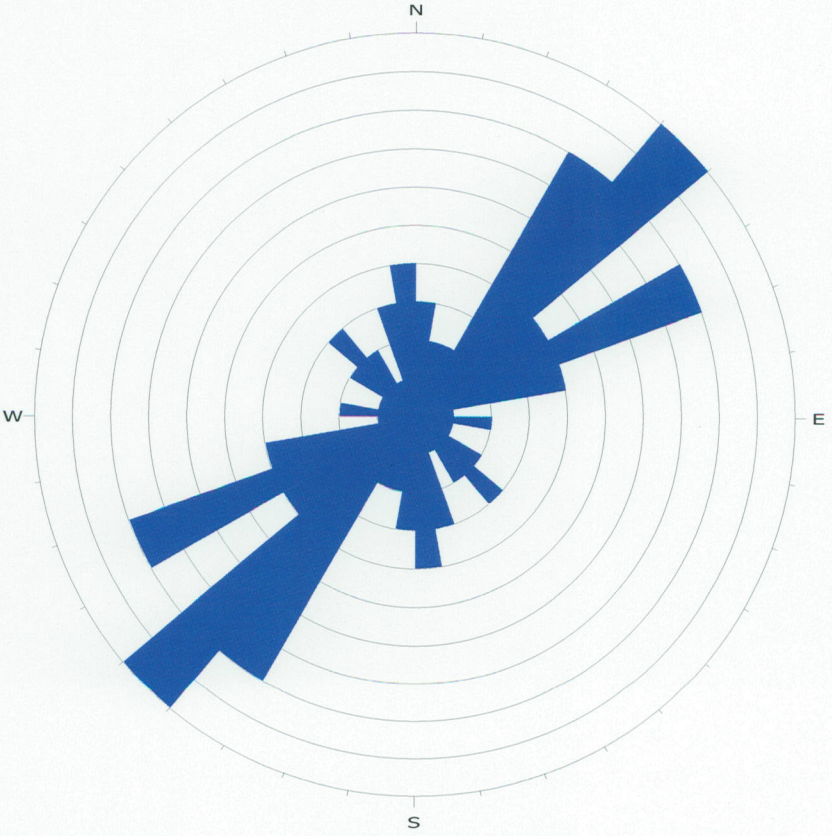
North ref. is true
Depth units are feet

Zone from 194.966 to 68.849ft

Interpretation 1

Dip data sets .....
BHTV dips

EB-3
68.849 - 194.966ft
Strike-direction, fracture rose-diagram



Azimuth Incr = 10°
N = 61

0 1 2 3 4 5 6 7 8 9 10

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

08 Feb 2011

Tetra Tech EC, Inc.

Borehole: EB-3

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

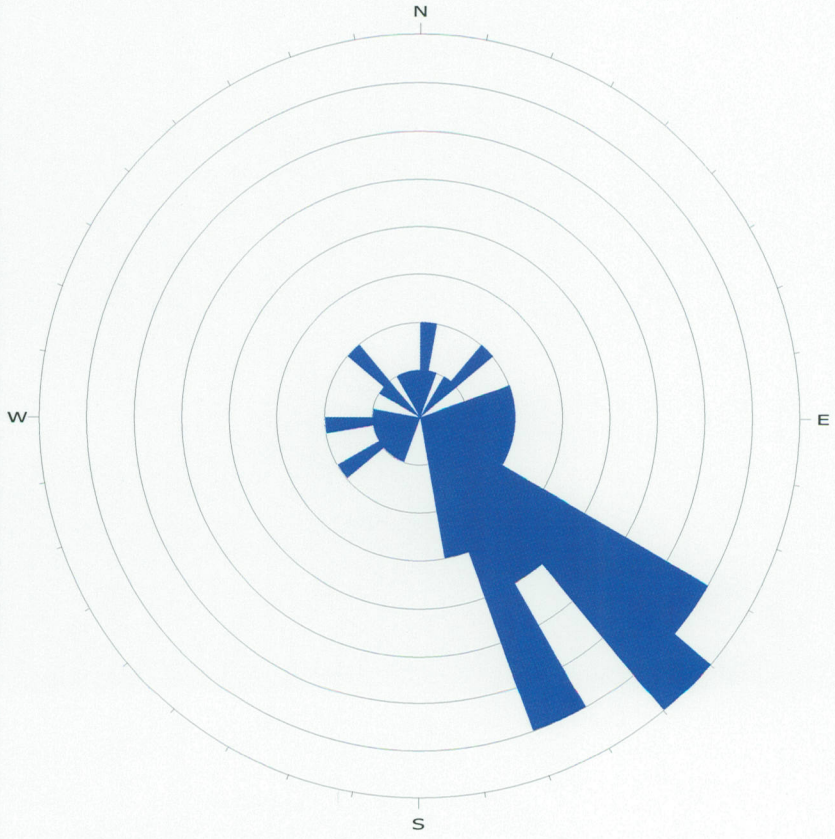
North ref. is true
Depth units are feet

Zone from 194.966 to 68.849ft

Interpretation 1

Dip data sets .....
BHTV dips

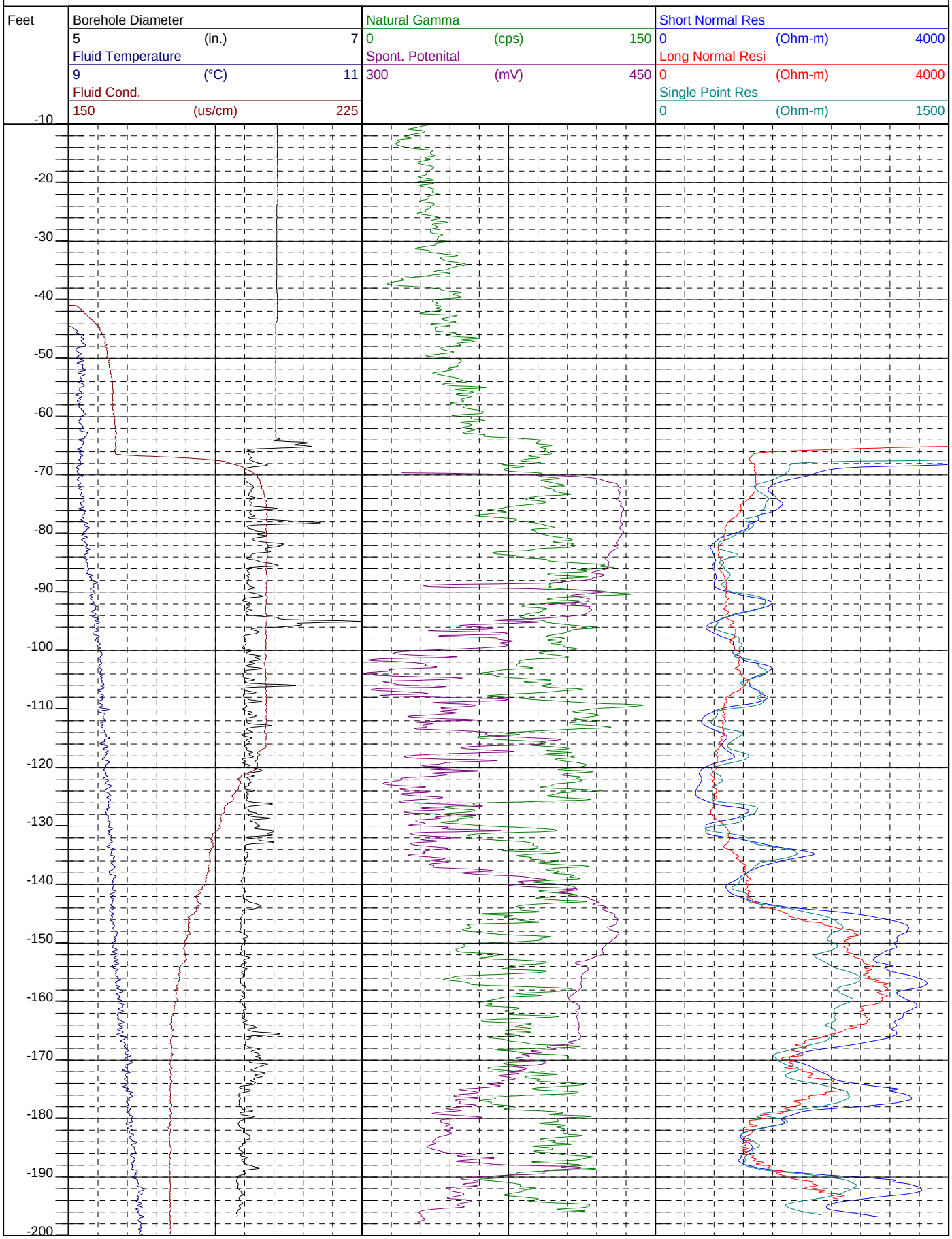
EB-3
68.849 - 194.966ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 61

0 1 2 3 4 5 6 7 8

Well Name: Tetra Tech EC, Inc.: EB-3
Location: Mountain Top, PA
Reference: Ground Surface



EB-3 Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Thursday-Friday, January 6-7, 2011

Ambient Conditions

Depth (ft)	Run	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
72	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
88	1	0.046	up	Upward flow	**0.041**	
	2	0.041	up	Upward flow		
	3	0.039	up	Upward flow		
	4	0.039	up	Upward flow		
	5	0.039	up	Upward flow		
98	1	0.052	up	Upward flow	**0.051**	>
	2	0.048	up	Upward flow		
	3	0.049	up	Upward flow		
	4	Incon.	Incon.	Inconclusive		
	5	0.047	up	Upward flow		
	6	0.049	up	Upward flow		
	7	0.071	up	Upward flow		
	8	0.050	up	Upward flow		
	9	0.048	up	Upward flow		
	10	0.049	up	Upward flow		
116	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
155	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
	5	Ø	N/A	No flow		
180	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		

Pumping Conditions: Pump set at ~ 55', Rate ~ 0.5 gpm

Depth (ft)	Run	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
72	1	0.409	up	Upward flow	**0.424**	
	2	0.431	up	Upward flow		
	3	0.431	up	Upward flow		
	4	0.431	up	Upward flow		
	5	0.409	up	Upward flow		
	6	0.431	up	Upward flow		
88	1	0.409	up	Upward flow	**0.409**	<
	2	0.409	up	Upward flow		
	3	0.409	up	Upward flow		
	4	0.509	up	Upward flow		
	5	0.409	up	Upward flow		
	6	0.409	up	Upward flow		
98	1	0.409	up	Upward flow	**0.424**	>
	2	0.409	up	Upward flow		
	3	0.431	up	Upward flow		
	4	0.431	up	Upward flow		
	5	0.431	up	Upward flow		
	6	0.431	up	Upward flow		
116	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
155	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		
180	1	Ø	N/A	No flow	N/A	
	2	Ø	N/A	No flow		
	3	Ø	N/A	No flow		
	4	Ø	N/A	No flow		

Key:

- **Ø** No measurable flow
- **N/A** Not applicable
- < Inflow zone
- > Outflow zone
- Outlier (not included in average flow calculation)

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

13 Oct 2011

Tetra Tech

Borehole: EB4

Mountain Top, PA

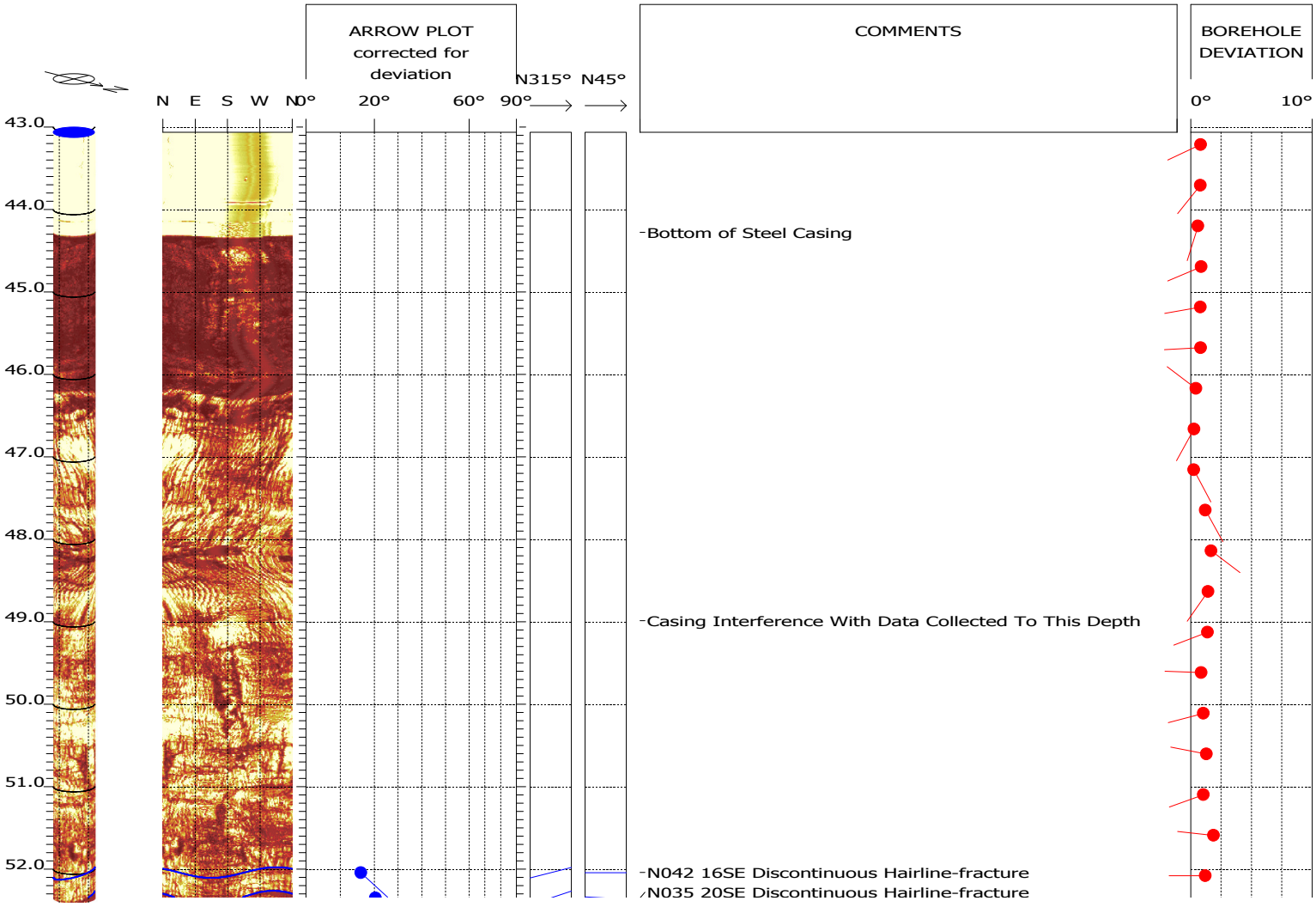
top of borehole.....
East: _
North:_
Elev: _

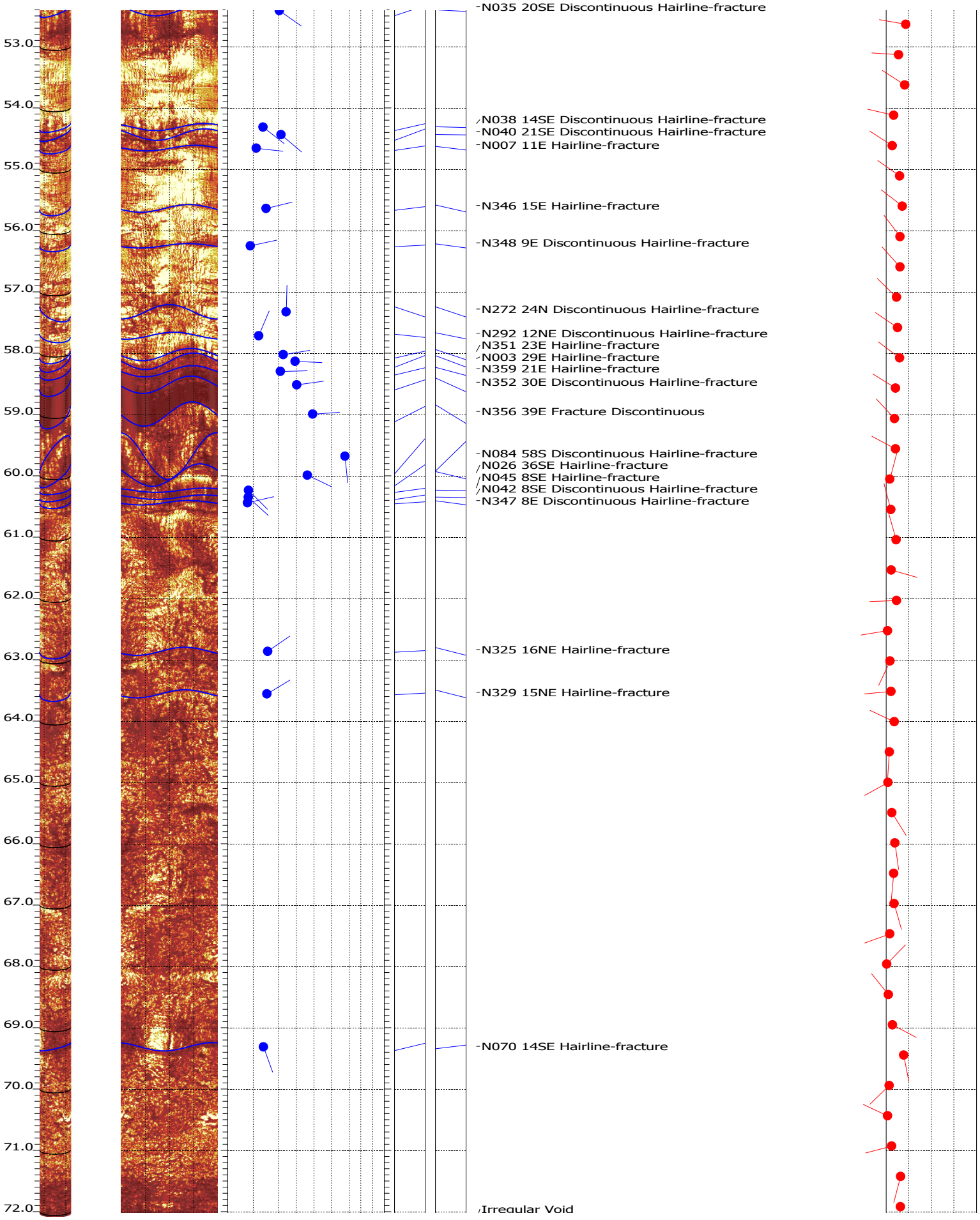
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

Zone from 200.000 to 43.000ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units

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-N038 14SE Discontinuous Hairline-fracture
-N040 21SE Discontinuous Hairline-fracture
-N007 11E Hairline-fracture
-N346 15E Hairline-fracture
-N348 9E Discontinuous Hairline-fracture
-N272 24N Discontinuous Hairline-fracture
-N292 12NE Discontinuous Hairline-fracture
-N351 23E Hairline-fracture
-N003 29E Hairline-fracture
-N359 21E Hairline-fracture
-N352 30E Discontinuous Hairline-fracture
-N356 39E Fracture Discontinuous
-N084 58S Discontinuous Hairline-fracture
-N026 36SE Hairline-fracture
-N045 8SE Hairline-fracture
-N042 8SE Discontinuous Hairline-fracture
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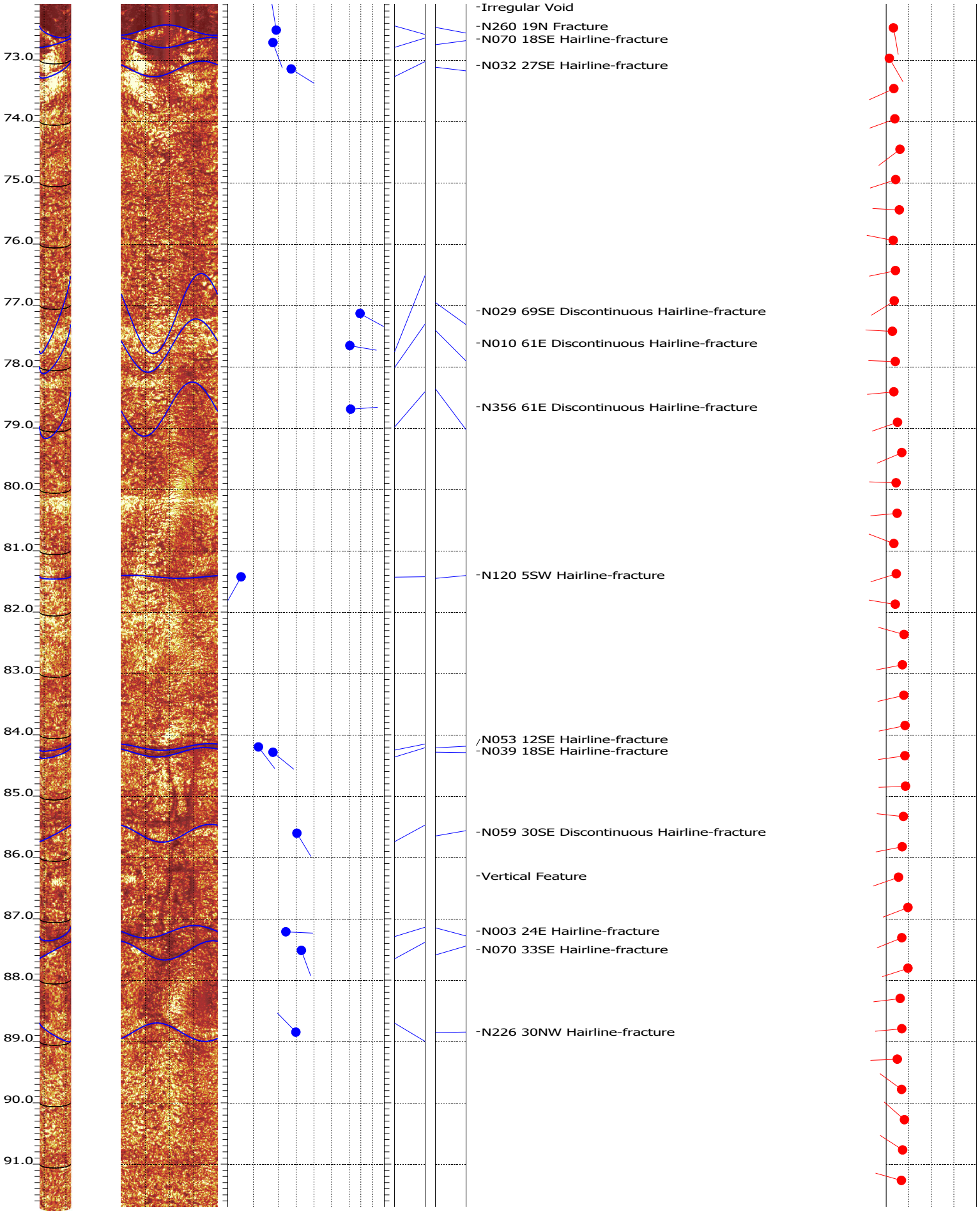
-N329 15NE Hairline-fracture
-N070 14SE Hairline-fracture
Irregular Void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-Irregular Void
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-N070 18SE Hairline-fracture
-N032 27SE Hairline-fracture
-N029 69SE Discontinuous Hairline-fracture
-N010 61E Discontinuous Hairline-fracture
-N356 61E Discontinuous Hairline-fracture
-N120 5SW Hairline-fracture
-N053 12SE Hairline-fracture
-N039 18SE Hairline-fracture
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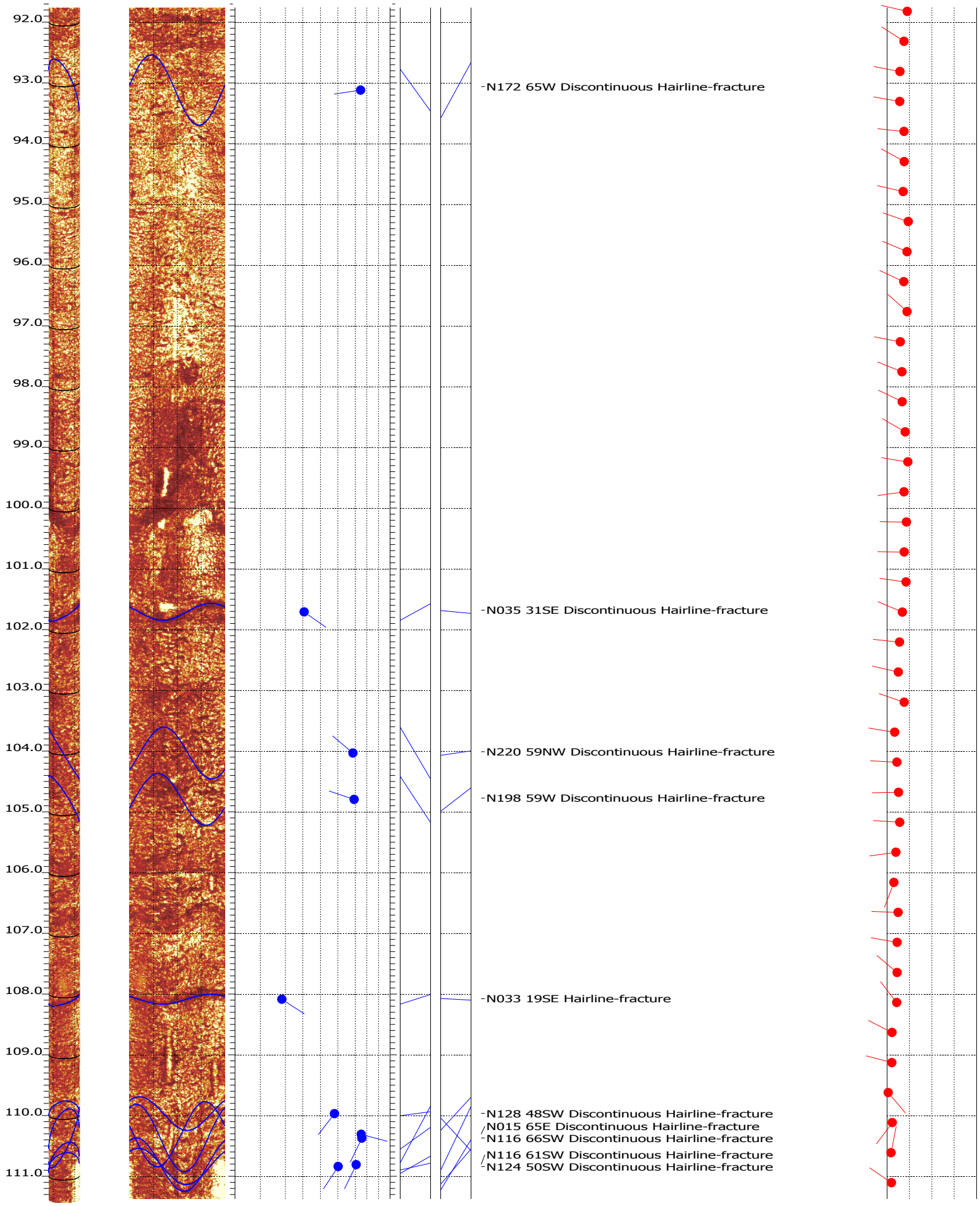
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-N220 59NW Discontinuous Hairline-fracture
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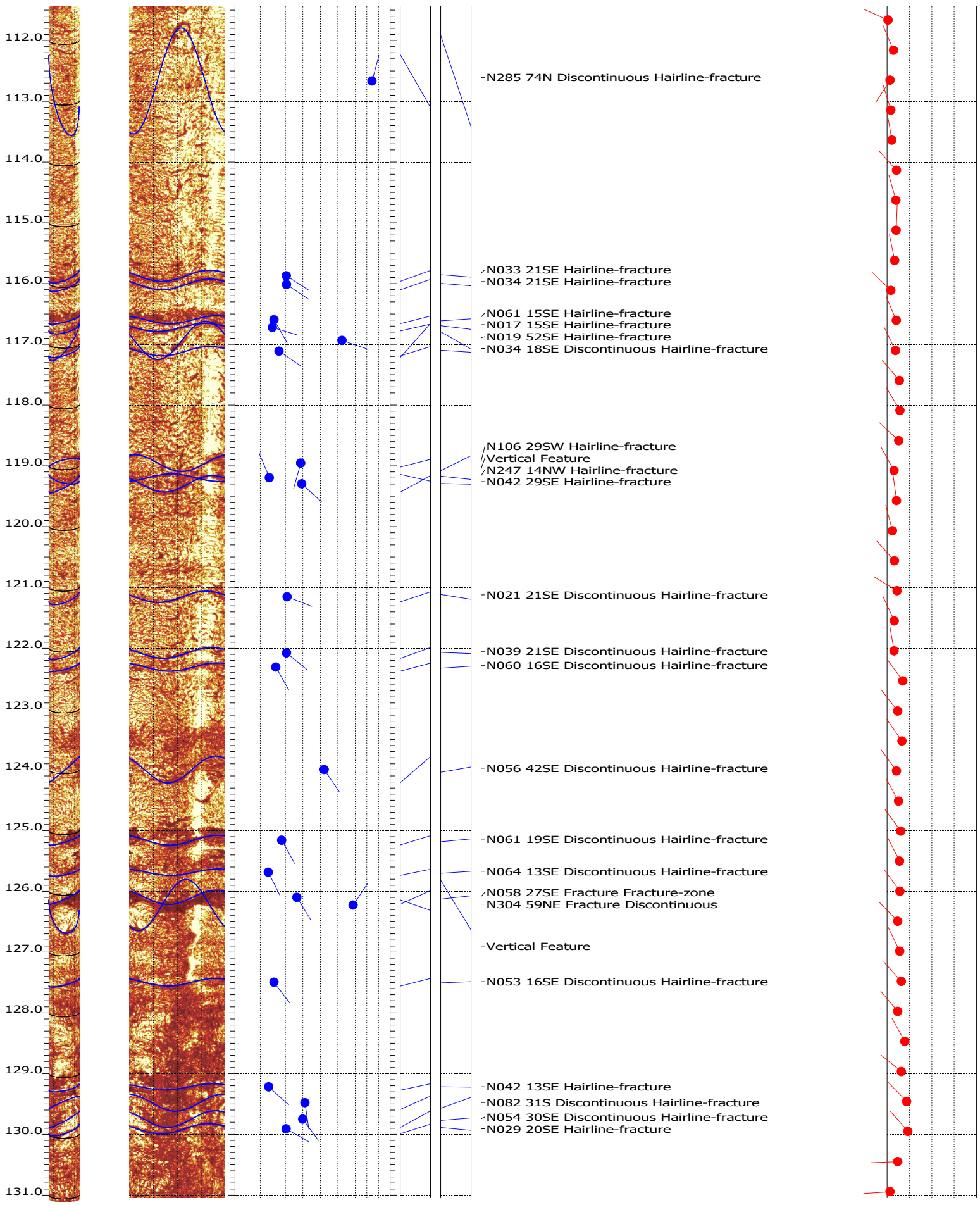
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-N039 21SE Discontinuous Hairline-fracture
-N060 16SE Discontinuous Hairline-fracture
-N056 42SE Discontinuous Hairline-fracture
-N061 19SE Discontinuous Hairline-fracture
-N064 13SE Discontinuous Hairline-fracture
N058 27SE Fracture Fracture-zone
-N304 59NE Fracture Discontinuous
-Vertical Feature
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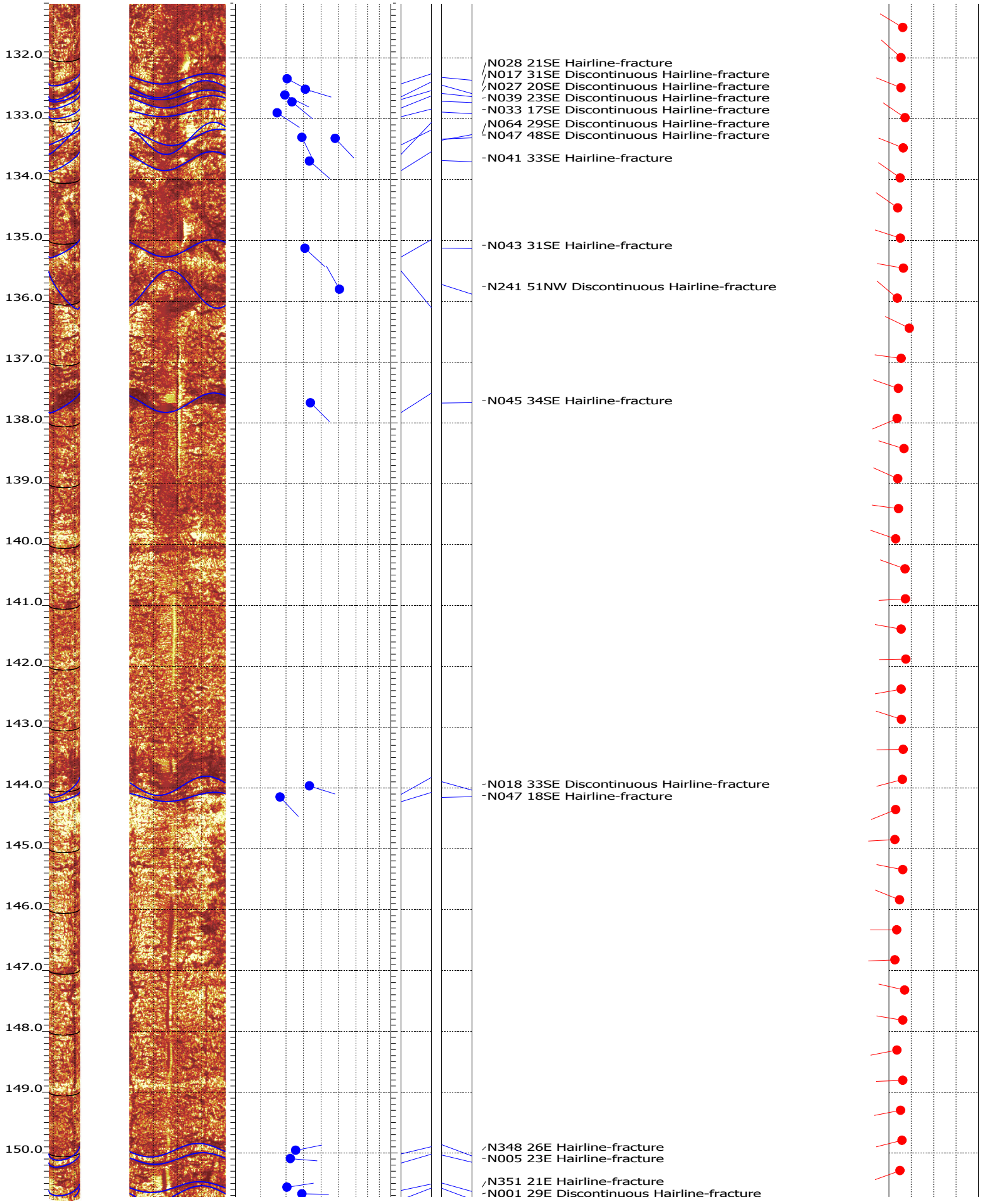
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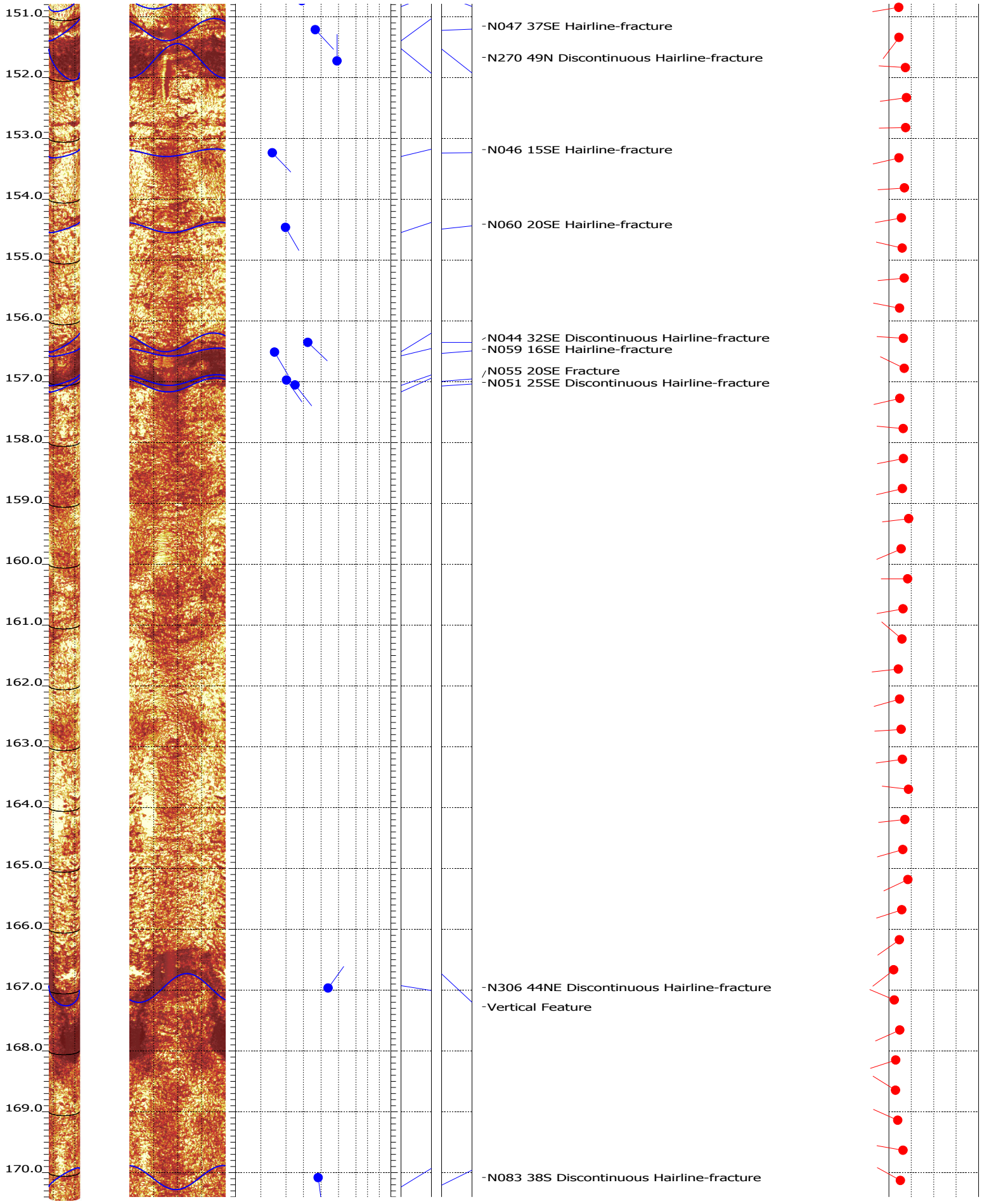
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-N270 49N Discontinuous Hairline-fracture
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-N060 20SE Hairline-fracture
-N044 32SE Discontinuous Hairline-fracture
-N059 16SE Hairline-fracture
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-Vertical Feature
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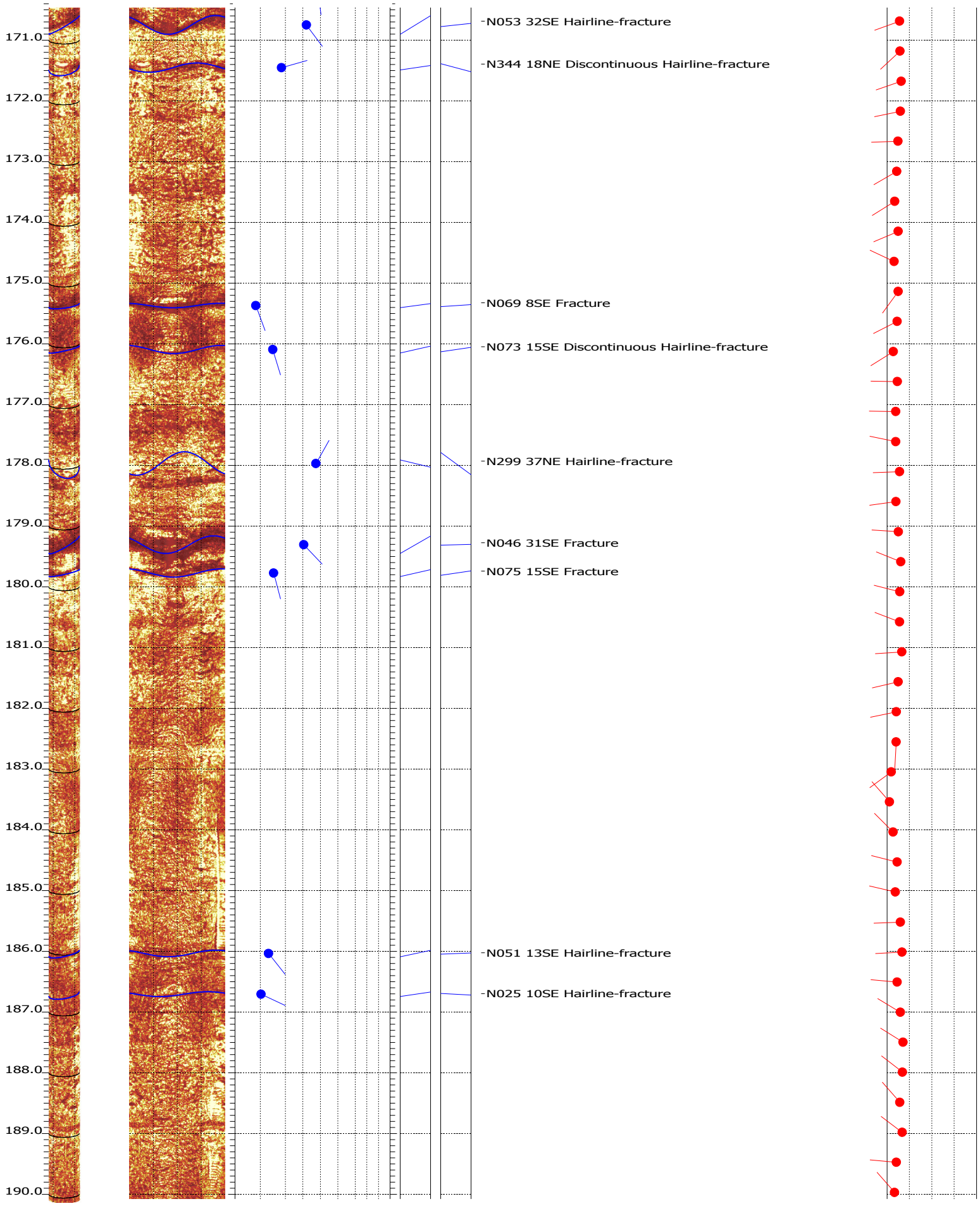
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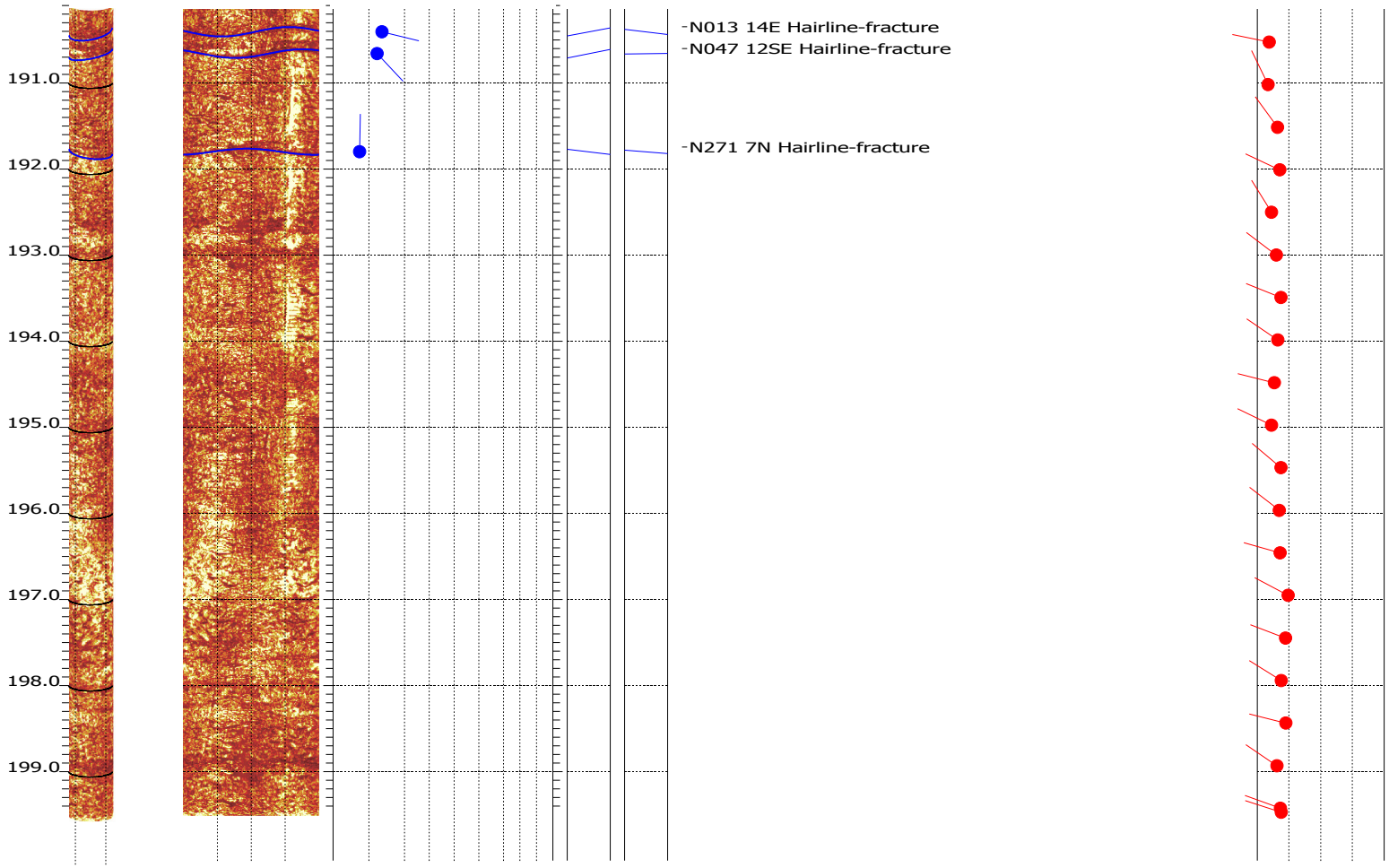
-N025 10SE Hairline-fracture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DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech

Borehole: EB4

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

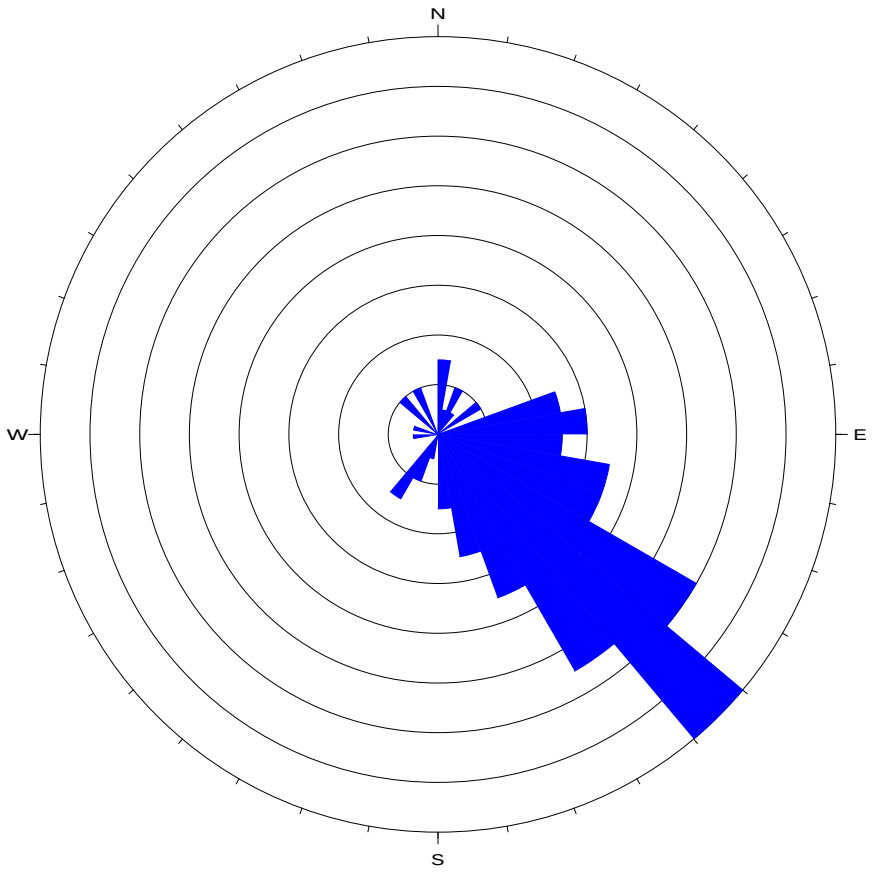
North ref. is true
Depth units are feet

Zone from 192.242 to 51.541ft

Interpretation 1

Dip data sets .....
BHTV dips

EB4
51.541 - 192.242ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 105

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DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech

Borehole: EB4

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

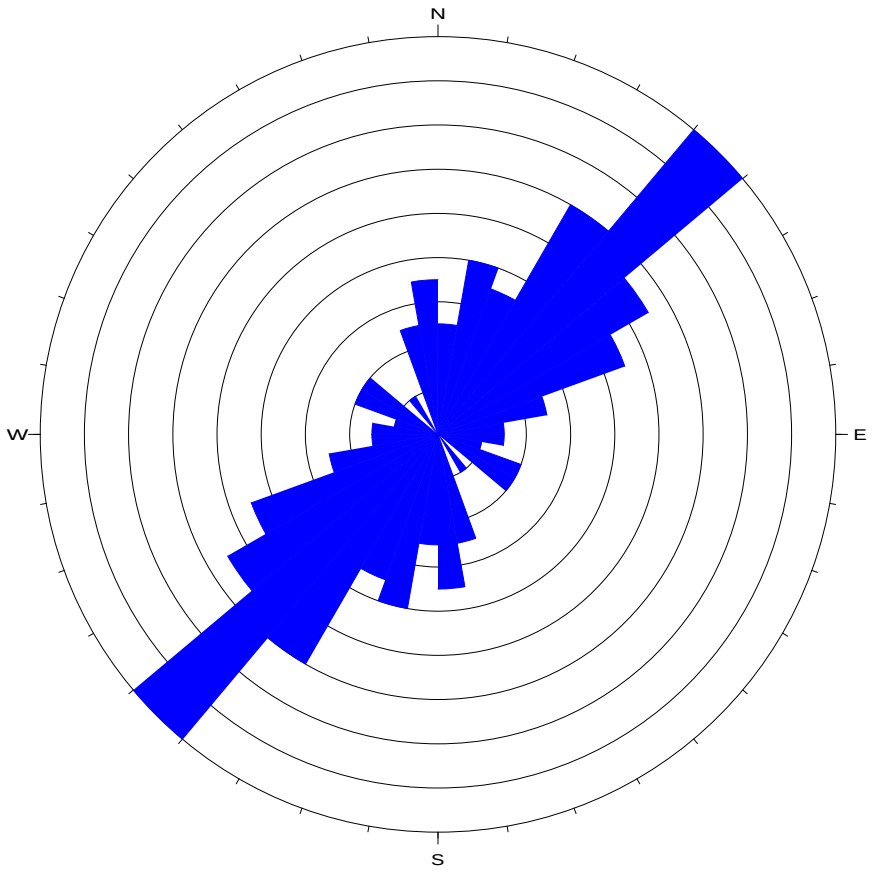
North ref. is true
Depth units are feet

Zone from 192.242 to 51.541ft

Interpretation 1

Dip data sets .....
BHTV dips

EB4
51.541 - 192.242ft
Strike-direction, fracture rose-diagram

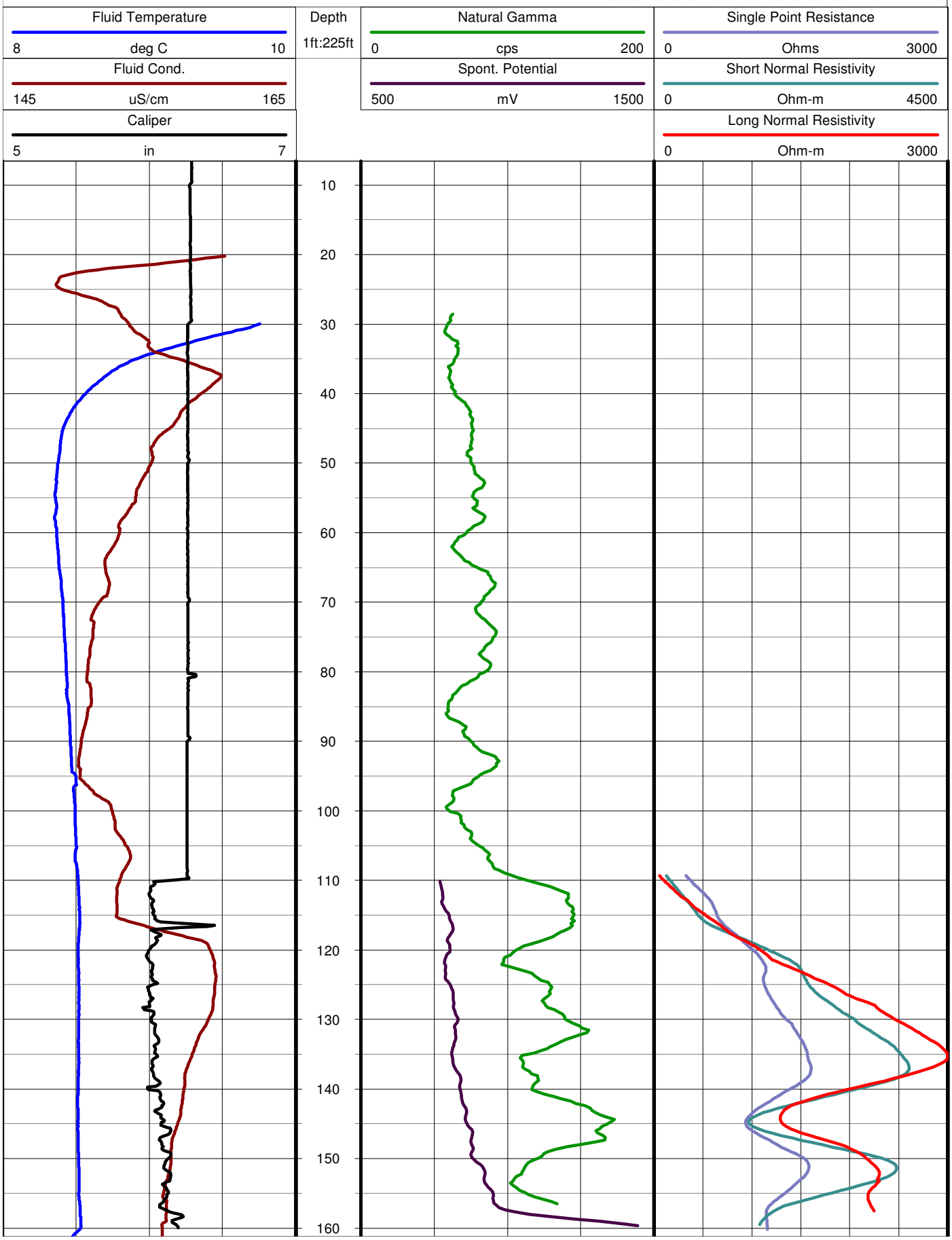


Azimuth Incr = 10°
N = 105

0 2 4 6 8 10 12 14 16 18

Company: Tetra Tech
Location: Mountain Top, Pa
Well Name: EB-4
Reference: Ground Level

EARTH DATA NORTHEAST, INC.



EB-4 Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Monday, September 19, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
112	1	8:55	Ø	N/A	No flow	N/A	
	2	8:55	Ø	N/A	No flow		
	3	8:56	Ø	N/A	No flow		
	4	8:57	Ø	N/A	No flow		
	5	8:57	Ø	N/A	No flow		
	6	8:58	Ø	N/A	No flow		
	7	8:59	Ø	N/A	No flow		
	8	8:59	Ø	N/A	No flow		
120	1	9:08	Ø	N/A	No flow	N/A	
	2	9:08	Ø	N/A	No flow		
	3	9:09	Ø	N/A	No flow		
	4	9:10	Ø	N/A	No flow		
	5	9:10	Ø	N/A	No flow		
	6	9:11	Ø	N/A	No flow		
	7	9:12	Ø	N/A	No flow		
	8	9:12	Ø	N/A	No flow		
130	1	9:20	Ø	N/A	No flow	N/A	
	2	9:20	Ø	N/A	No flow		
	3	9:21	Ø	N/A	No flow		
	4	9:22	Ø	N/A	No flow		
	5	9:22	Ø	N/A	No flow		
	6	9:23	Ø	N/A	No flow		
	7	9:24	Ø	N/A	No flow		
	8	9:24	Ø	N/A	No flow		
140	1	9:31	Ø	N/A	No flow	N/A	
	2	9:31	Ø	N/A	No flow		
	3	9:32	Ø	N/A	No flow		
	4	9:33	Ø	N/A	No flow		
	5	9:33	Ø	N/A	No flow		
	6	9:34	Ø	N/A	No flow		
	7	9:35	Ø	N/A	No flow		
	8	9:35	Ø	N/A	No flow		

Pumping Conditions: Pump set at ~ 40', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
112	1	10:31	0.509	up	Upward flow	**0.521**	<
	2	10:31	0.509	up	Upward flow		
	3	10:32	0.540	up	Upward flow		
	4	10:33	0.540	up	Upward flow		
	5	10:33	0.509	up	Upward flow		
	6	10:34	0.509	up	Upward flow		
	7	10:35	0.509	up	Upward flow		
	8	10:36	0.540	up	Upward flow		
120	1	10:19	Ø	N/A	No flow	N/A	
	2	10:20	Ø	N/A	No flow		
	3	10:20	Ø	N/A	No flow		
	4	10:21	Ø	N/A	No flow		
	5	10:22	Ø	N/A	No flow		
	6	10:23	Ø	N/A	No flow		
	7	10:23	Ø	N/A	No flow		
	8	10:24	Ø	N/A	No flow		
	9	10:25	Ø	N/A	No flow		
130	1	10:05	Ø	N/A	No flow	N/A	
	2	10:06	Ø	N/A	No flow		
	3	10:07	Ø	down	No flow		
	4	10:07	Ø	N/A	No flow		
	5	10:08	Ø	N/A	No flow		
	6	10:09	Ø	N/A	No flow		
	7	10:10	Ø	N/A	No flow		
	8	10:10	Ø	up	Incon.		
	9	10:11	Ø	up	Incon.		
	10	10:12	Ø	N/A	No flow		
140	1	9:56	Ø	N/A	No flow	N/A	
	2	9:57	Ø	N/A	No flow		
	3	9:57	Ø	N/A	No flow		
	4	9:58	Ø	N/A	No flow		
	5	9:59	Ø	N/A	No flow		
	6	9:59	Ø	N/A	No flow		
	7	10:00	Ø	N/A	No flow		
	8	10:01	Ø	N/A	No flow		

Key:		
	Ø	No measurable flow
	N/A	Not applicable
	<	Inflow zone (into borehole)
	>	Outflow zone (into formation)
		Used in average flow calculation
	Incon.	Inconclusive results

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

13 Oct 2011

Tetra Tech ECI

Borehole: MD-01

Mountain Top, PA

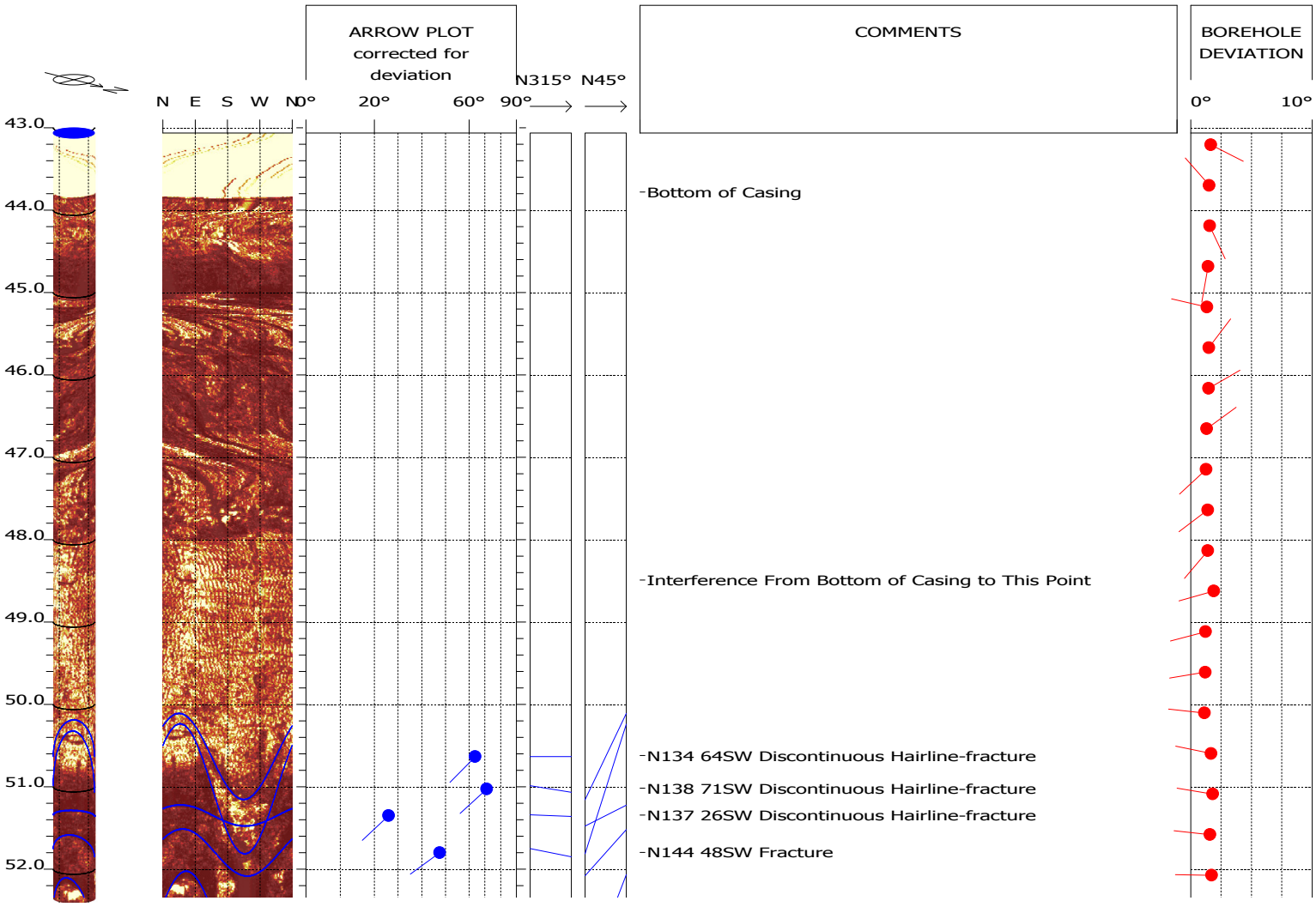
top of borehole.....
East: _
North:_
Elev: _

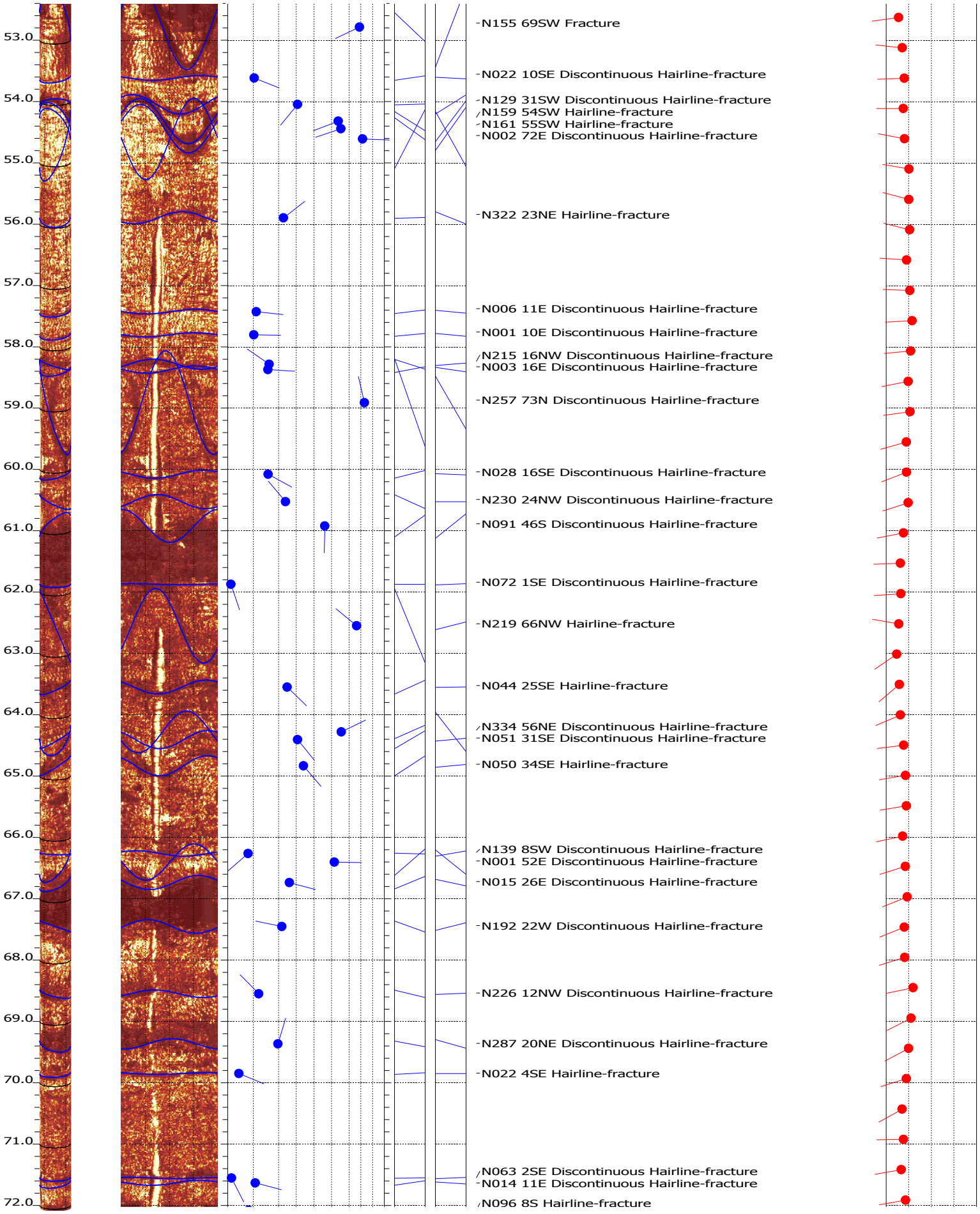
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

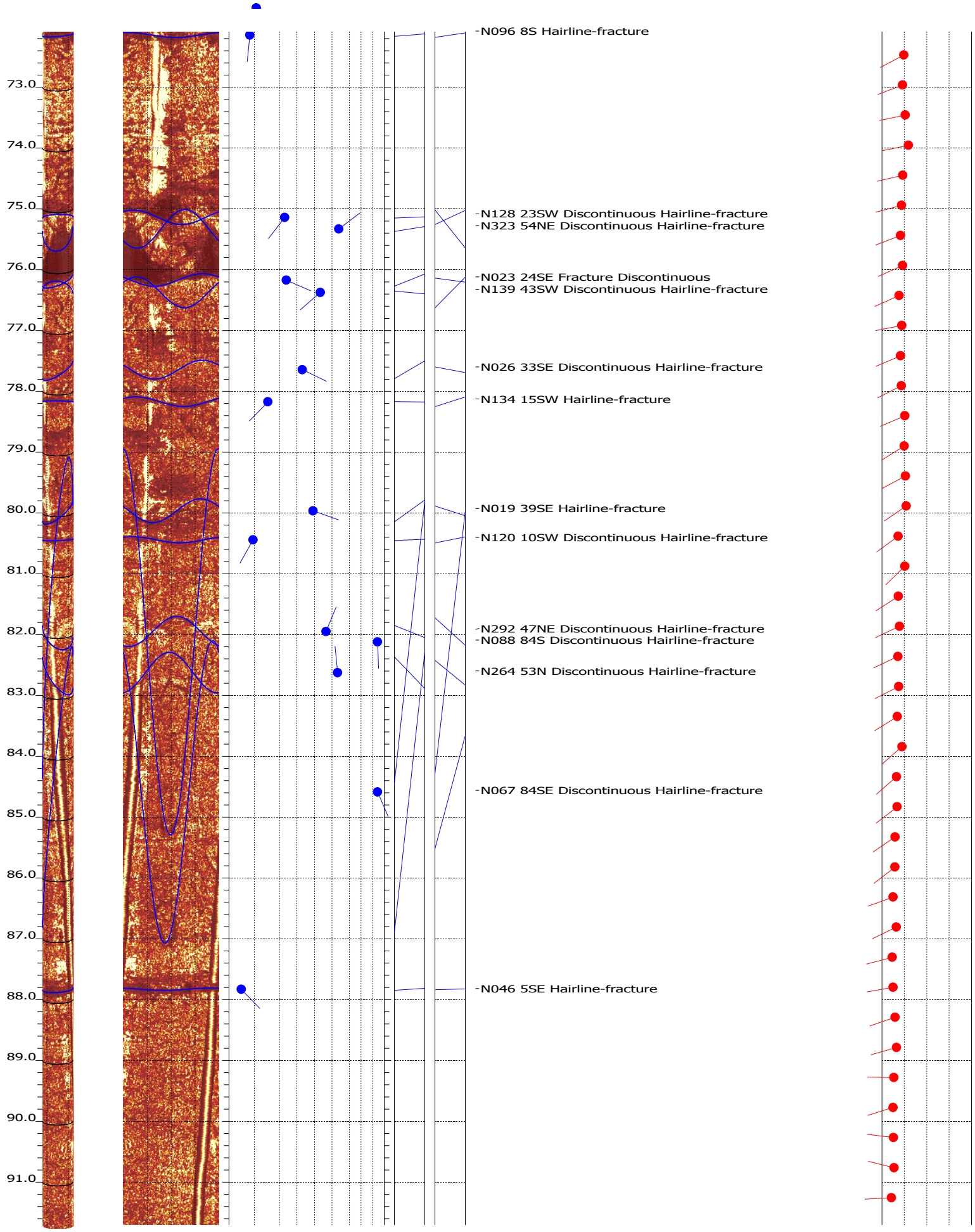
Zone from 95.000 to 43.000ft
Format: BHTV-NESWN

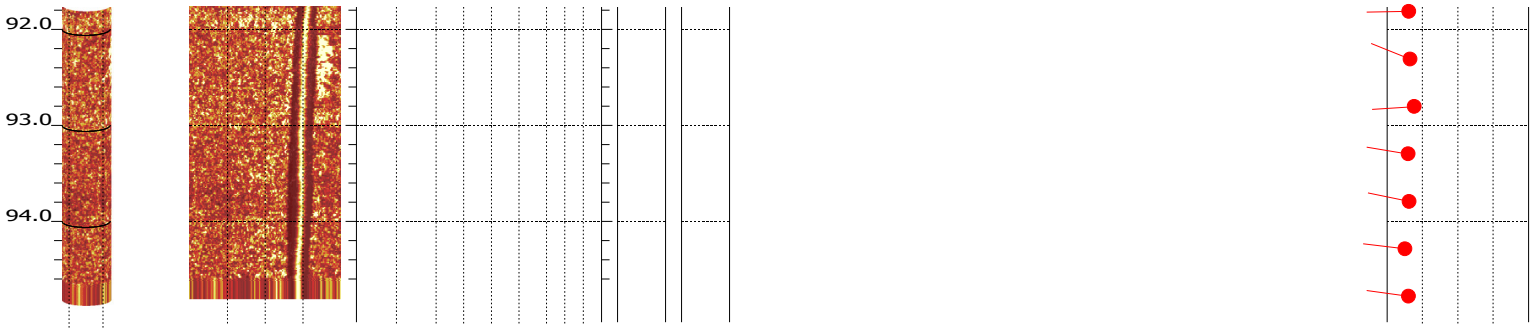
Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units




53.0
54.0
55.0
56.0
57.0
58.0
59.0
60.0
61.0
62.0
63.0
64.0
65.0
66.0
67.0
68.0
69.0
70.0
71.0
72.0
-N155 69SW Fracture
-N022 10SE Discontinuous Hairline-fracture
-N129 31SW Discontinuous Hairline-fracture
/N159 54SW Hairline-fracture
-N161 55SW Hairline-fracture
-N002 72E Discontinuous Hairline-fracture
-N322 23NE Hairline-fracture
-N006 11E Discontinuous Hairline-fracture
-N001 10E Discontinuous Hairline-fracture
/N215 16NW Discontinuous Hairline-fracture
-N003 16E Discontinuous Hairline-fracture
-N257 73N Discontinuous Hairline-fracture
-N028 16SE Discontinuous Hairline-fracture
-N230 24NW Discontinuous Hairline-fracture
-N091 46S Discontinuous Hairline-fracture
-N072 1SE Discontinuous Hairline-fracture
-N219 66NW Hairline-fracture
-N044 25SE Hairline-fracture
/N334 56NE Discontinuous Hairline-fracture
-N051 31SE Discontinuous Hairline-fracture
-N050 34SE Hairline-fracture
/N139 8SW Discontinuous Hairline-fracture
-N001 52E Discontinuous Hairline-fracture
-N015 26E Discontinuous Hairline-fracture
-N192 22W Discontinuous Hairline-fracture
-N226 12NW Discontinuous Hairline-fracture
-N287 20NE Discontinuous Hairline-fracture
-N022 4SE Hairline-fracture
/N063 2SE Discontinuous Hairline-fracture
-N014 11E Discontinuous Hairline-fracture
/N096 8S Hairline-fracture


73.0
74.0
75.0
76.0
77.0
78.0
79.0
80.0
81.0
82.0
83.0
84.0
85.0
86.0
87.0
88.0
89.0
90.0
91.0
-N096 8S Hairline-fracture
-N128 23SW Discontinuous Hairline-fracture
-N323 54NE Discontinuous Hairline-fracture
-N023 24SE Fracture Discontinuous
-N139 43SW Discontinuous Hairline-fracture
-N026 33SE Discontinuous Hairline-fracture
-N134 15SW Hairline-fracture
-N019 39SE Hairline-fracture
-N120 10SW Discontinuous Hairline-fracture
-N292 47NE Discontinuous Hairline-fracture
-N088 84S Discontinuous Hairline-fracture
-N264 53N Discontinuous Hairline-fracture
-N067 84SE Discontinuous Hairline-fracture
-N046 5SE Hairline-fracture


92.0
93.0
94.0

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: MD-01

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

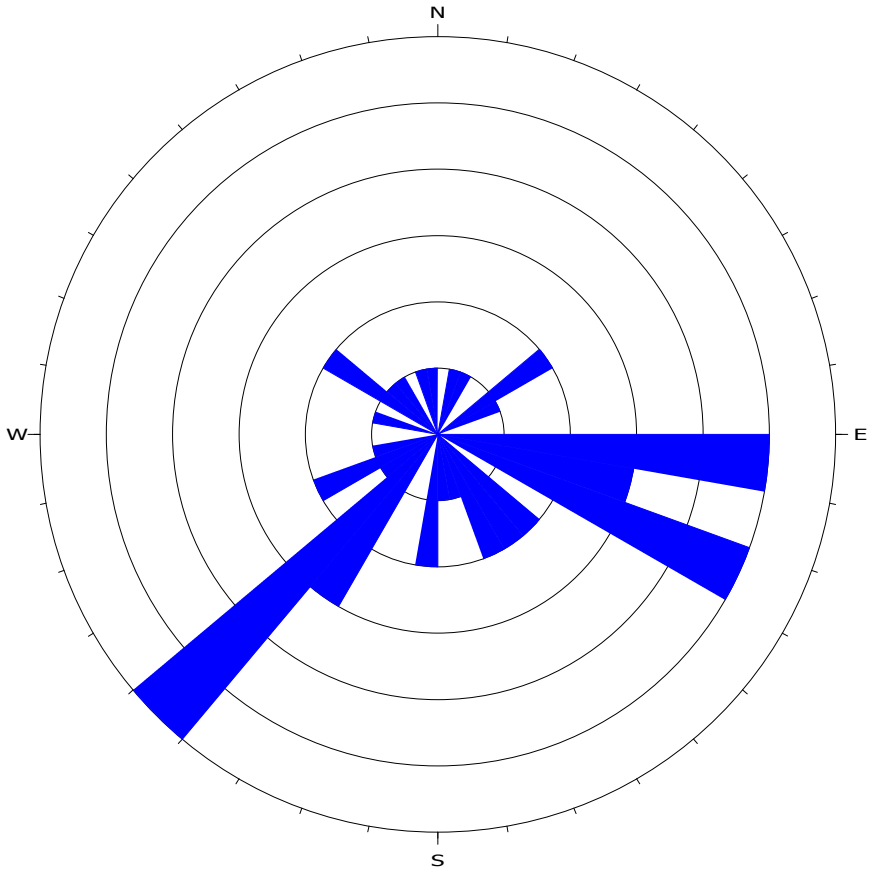
North ref. is true
Depth units are feet

Zone from 88.316 to 50.121ft

Interpretation 1

Dip data sets .....
BHTV dips

MD-01
50.121 - 88.316ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 48

0 1 2 3 4 5 6

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: MD-01

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

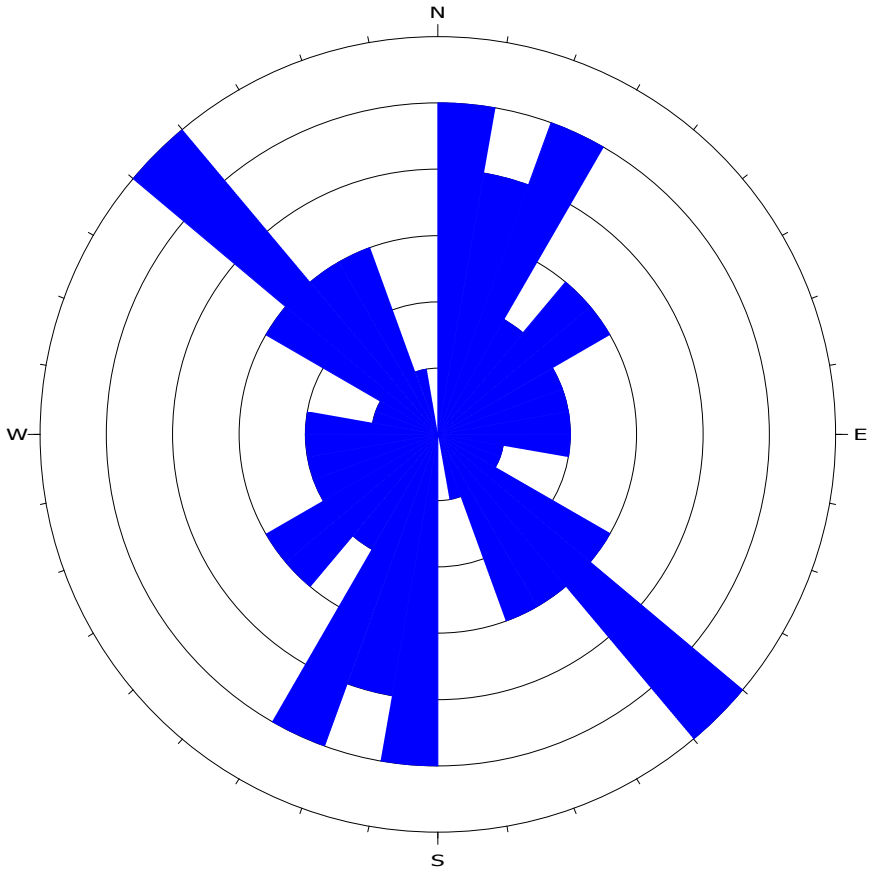
North ref. is true
Depth units are feet

Zone from 88.316 to 50.121ft

Interpretation 1

Dip data sets .....
BHTV dips

MD-01
50.121 - 88.316ft
Strike-direction, fracture rose-diagram

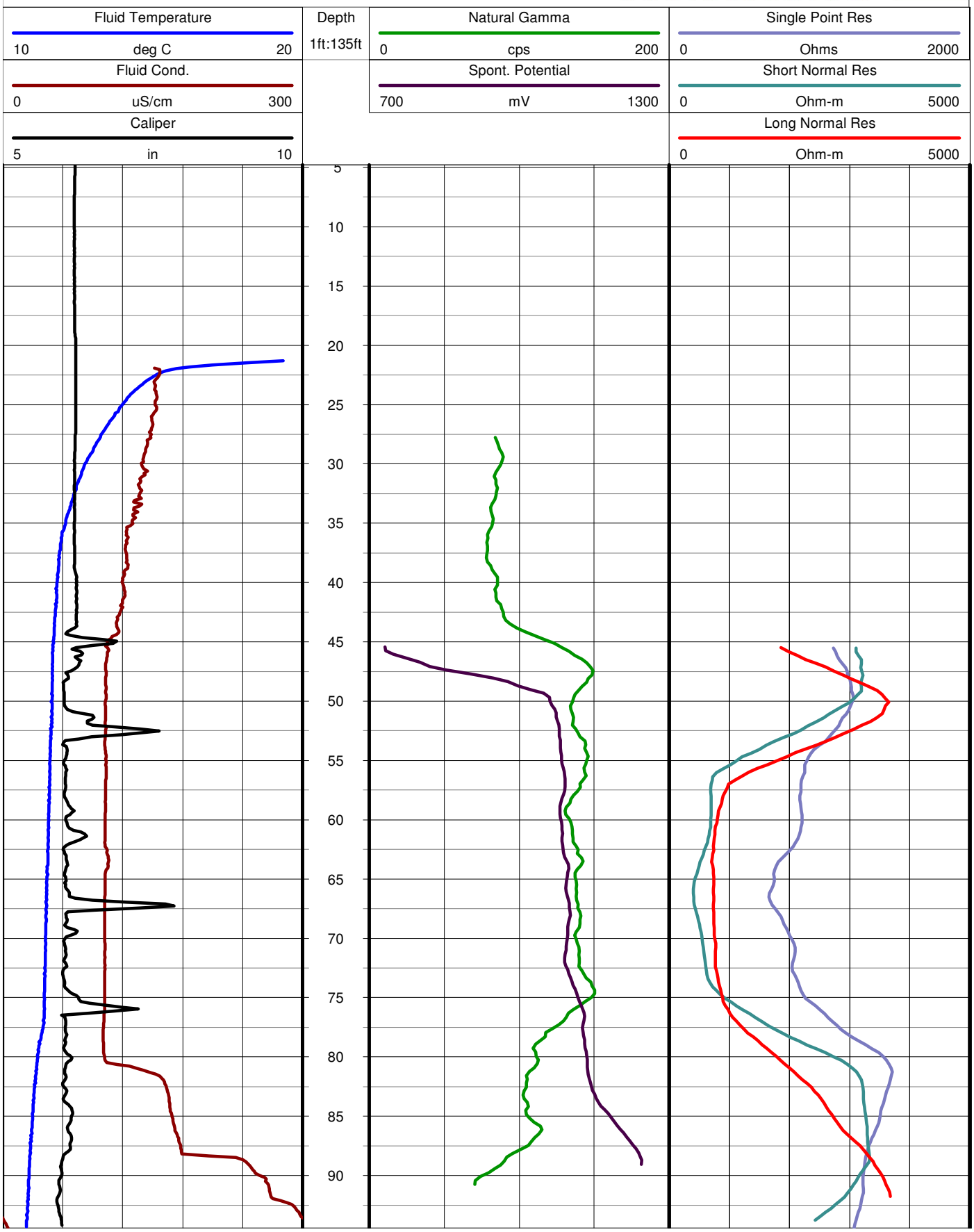


Azimuth Incr = 10°
N = 48

0 1 2 3 4 5 6

Company: Tetra Tech ECI
Location: Mountain Top, Pa
Well Name: MD-01
Reference: Ground Surface

EARTH DATA NORTHEAST, INC.



MD-01 Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Monday, September 19, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
							<
50	1	13:40	0.152	down	Downward Flow	0.146	
	2	13:40	0.144	down	Downward Flow		
	3	13:41	0.137	down	Downward Flow		
	4	13:42	0.152	down	Downward Flow		
	5	13:43	0.144	down	Downward Flow		
	6	13:43	0.156	down	Downward Flow		
	7	13:44	0.140	down	Downward Flow		
	8	13:45	0.144	down	Downward Flow		
							>
58	1	13:50	Ø	up	No flow	N/A	
	2	13:50	Ø	up	No flow		
	3	13:51	Ø	up	No flow		
	4	13:52	Ø	N/A	No flow		
	5	13:53	Ø	up	No flow		
	6	13:53	Ø	up	No flow		
	7	13:54	Ø	up	No flow		
	8	13:55	Ø	N/A	No flow		
65	1	14:00	Ø	N/A	No flow	N/A	
	2	14:00	Ø	down	No flow		
	3	14:01	Ø	up	No flow		
	4	14:02	Ø	N/A	No flow		
	5	14:02	Ø	up	No flow		
	6	14:03	Ø	up	No flow		
	7	14:04	Ø	N/A	No flow		
	8	14:05	Ø	N/A	No flow		
73	1	14:10	Ø	N/A	No flow	N/A	
	2	14:11	Ø	N/A	No flow		
	3	14:11	Ø	up	No flow		
	4	14:12	Ø	N/A	No flow		
	5	14:13	Ø	N/A	No flow		
	6	14:13	Ø	up	No flow		
	7	14:14	Ø	up	No flow		
	8	14:15	Ø	N/A	Incon.		
	9	14:15	Ø	N/A	No flow		
	10	14:16	Ø	up	Incon.		
	11	14:17	Ø	N/A	Incon.		
	12	14:18	Ø	N/A	No flow		
	13	14:18	Ø	N/A	No flow		
	14	14:19	Ø	N/A	No flow		
	15	14:20	Ø	N/A	No flow		
	16	14:20	Ø	N/A	No flow		
	17	14:21	Ø	up	No flow		

Pumping Conditions: Pump set at ~ 40', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
							<
50	1	15:18	< 0.027	down	Downward Flow	< 0.027	
	2	15:18	< 0.027	down	Downward Flow		
	3	15:19	< 0.027	down	Downward Flow		
	4	15:20	< 0.027	down	Downward Flow		
	5	15:20	< 0.027	down	Downward Flow		
	6	15:21	< 0.027	down	Downward Flow		
	7	15:22	< 0.027	down	Downward Flow		
	8	15:23	< 0.027	down	Downward Flow		
							>
58	1	15:07	Ø	N/A	No flow	N/A	
	2	15:08	Ø	N/A	No flow		
	3	15:09	Ø	N/A	No flow		
	4	15:09	Ø	N/A	No flow		
	5	15:10	Ø	N/A	No flow		
	6	15:11	Ø	N/A	No flow		
	7	15:12	Ø	up	No flow		
	8	15:12	Ø	N/A	Incon.		
65	1	14:58	Ø	N/A	No flow	N/A	
	2	14:59	Ø	N/A	No flow		
	3	14:59	Ø	N/A	No flow		
	4	15:00	Ø	up	No flow		
	5	15:01	Ø	up	No flow		
	6	15:01	Ø	N/A	No flow		
	7	15:02	Ø	up	Incon.		
	8	15:03	Ø	up	Incon.		
73	1	14:48	Ø	up	No flow	N/A	
	2	14:49	Ø	up	No flow		
	3	14:50	Ø	N/A	No flow		
	4	14:50	Ø	up	No flow		
	5	14:51	Ø	N/A	No flow		
	6	14:52	Ø	N/A	No flow		
	7	14:52	Ø	up	No flow		
	8	14:53	Ø	N/A	No flow		

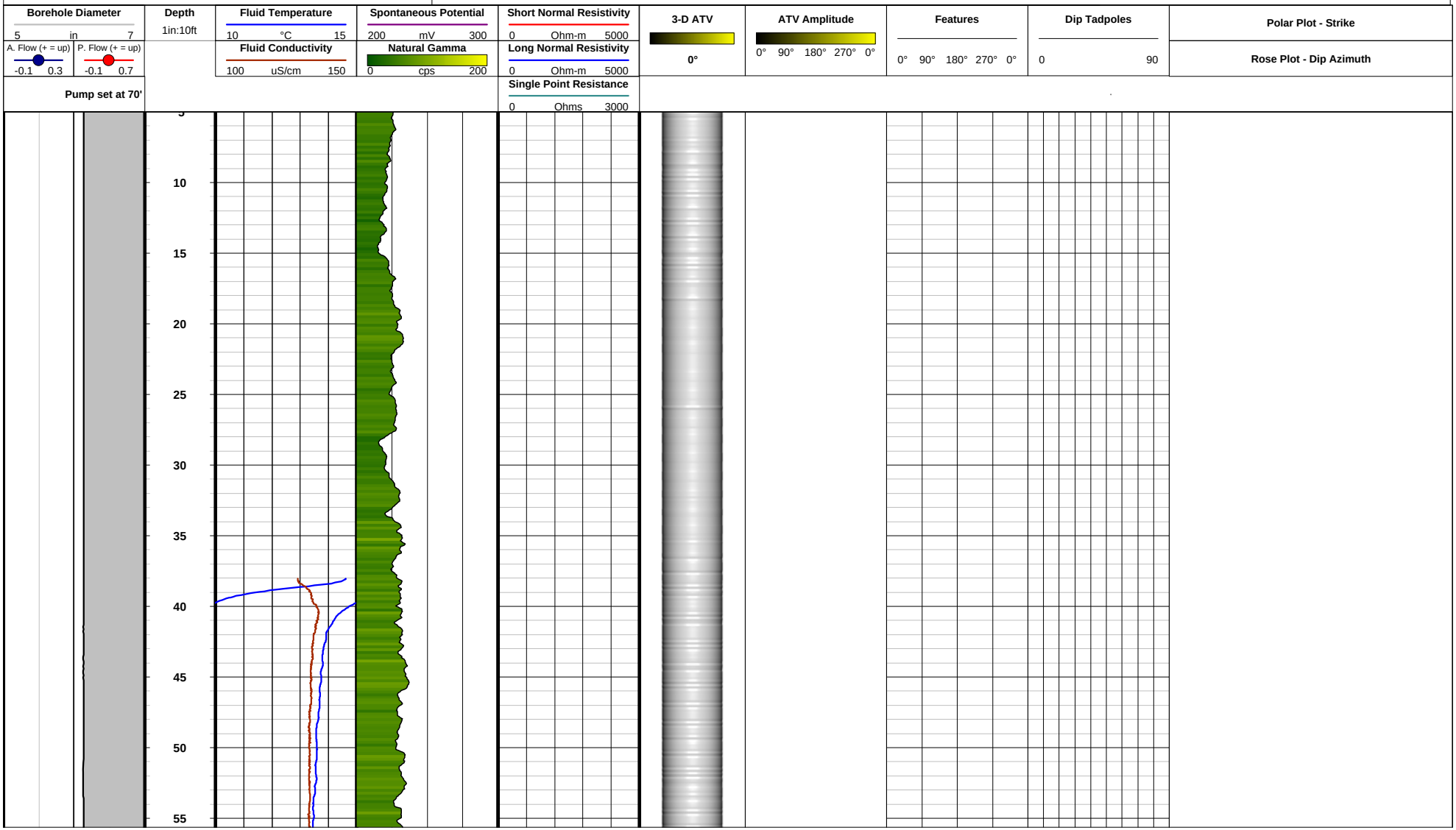
Key:		
	Ø	No measurable flow
	N/A	Not applicable
	<	Inflow zone (into borehole)
	>	Outflow zone (into formation)
		Used in average flow calculation
	Incon.	Inconclusive results

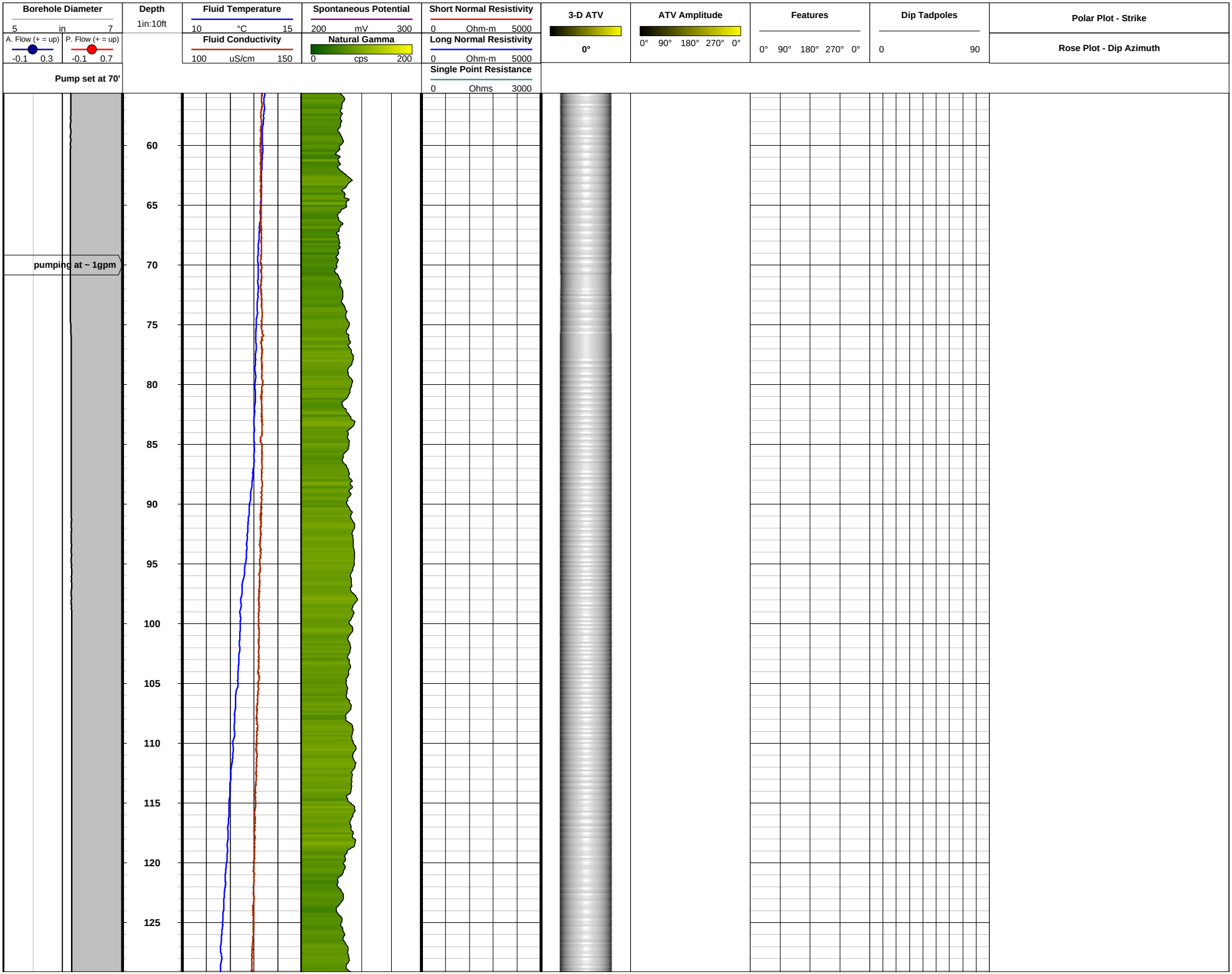
EDN
Earth Data Northeast, Inc.

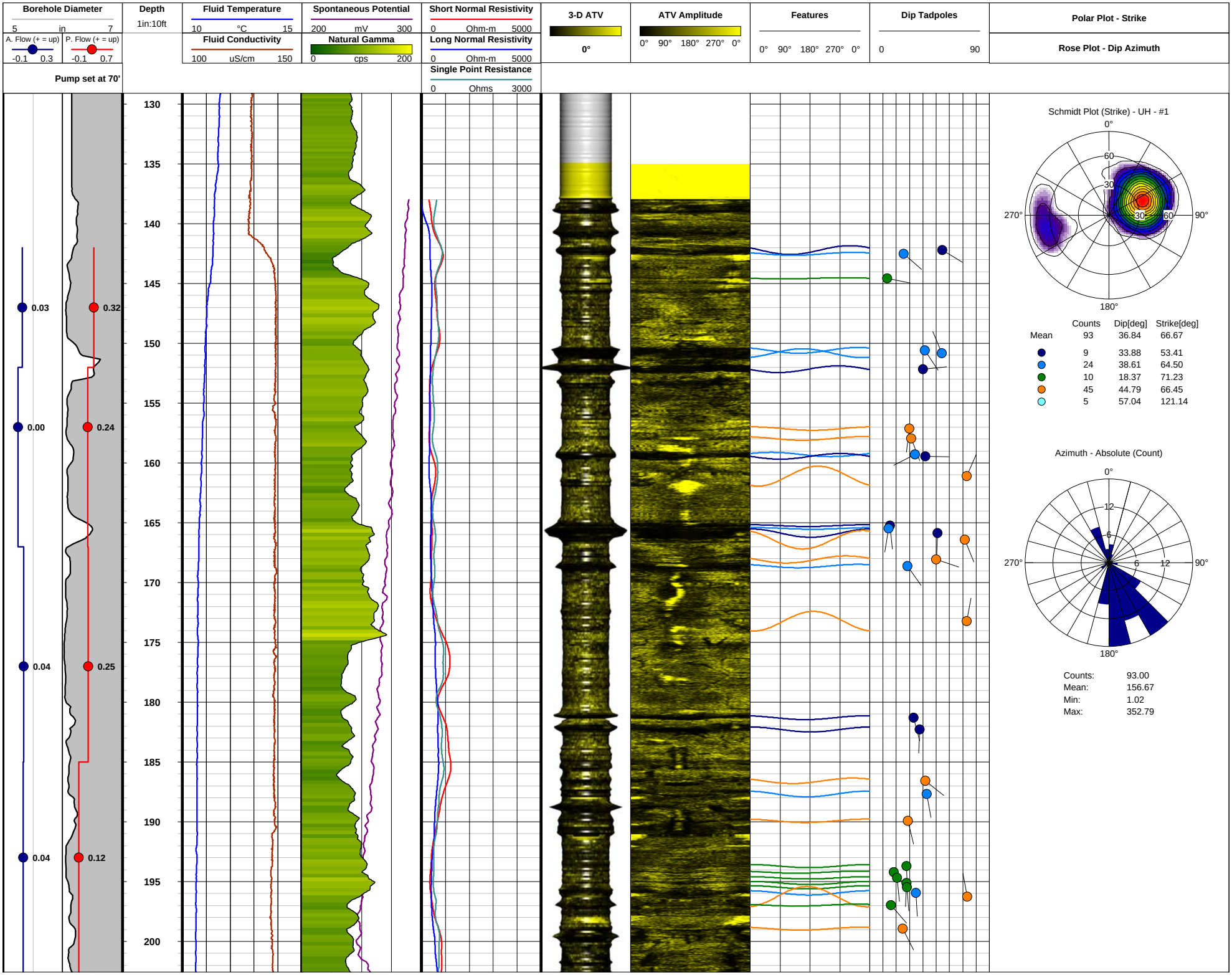
Client: **TTECI**
Location: **Mountain Top, PA**
Well Name: **RMW-01D**
Date: **09/05-09/06/12**
Depth Reference: **Ground Surface**
Magnetic Declination: **-12.09**
North reference: **True**

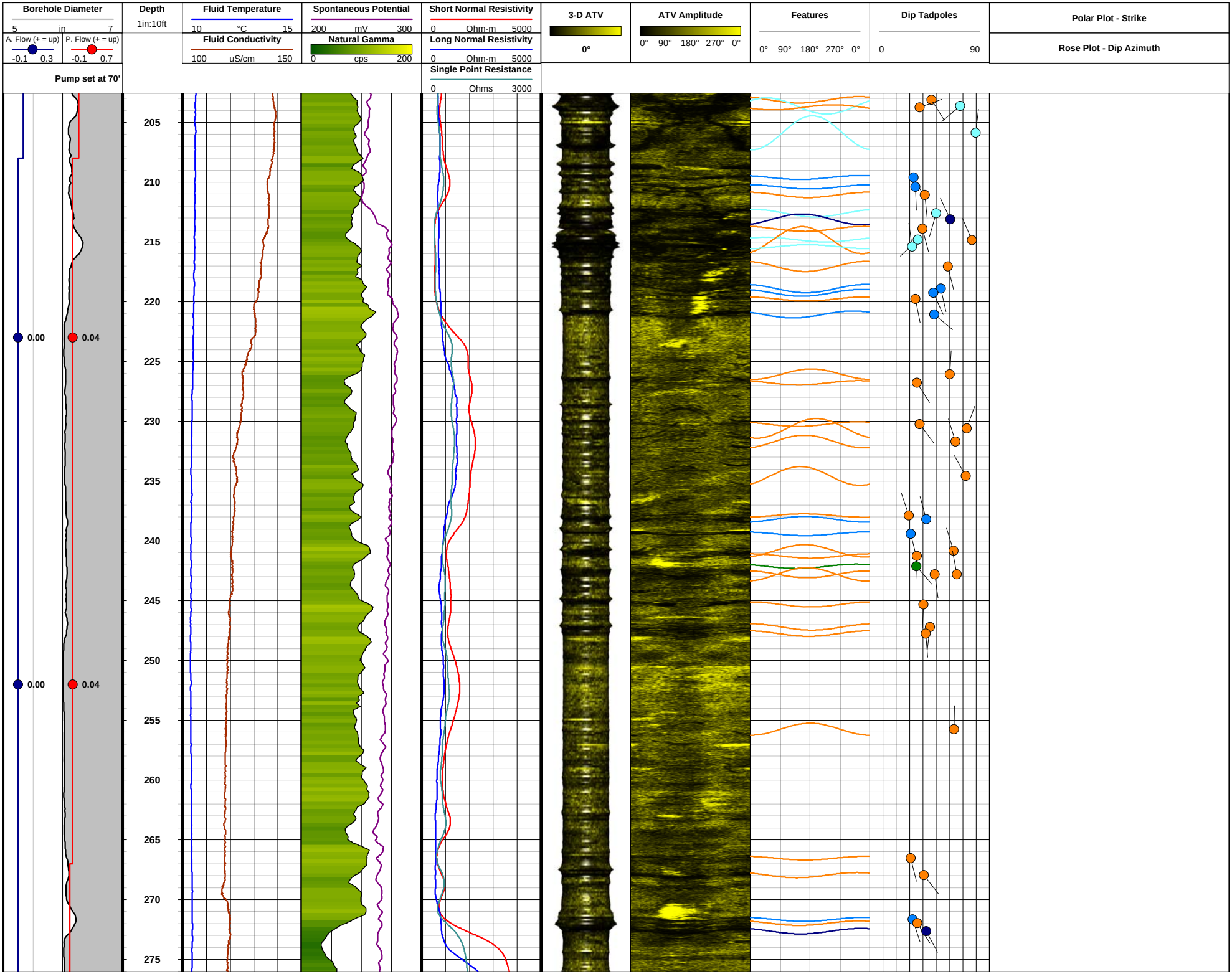
Borehole Diameter: **6"**
Static Water Level: **38'**
Casing Depth: **138'**
Total Depth: **328'**

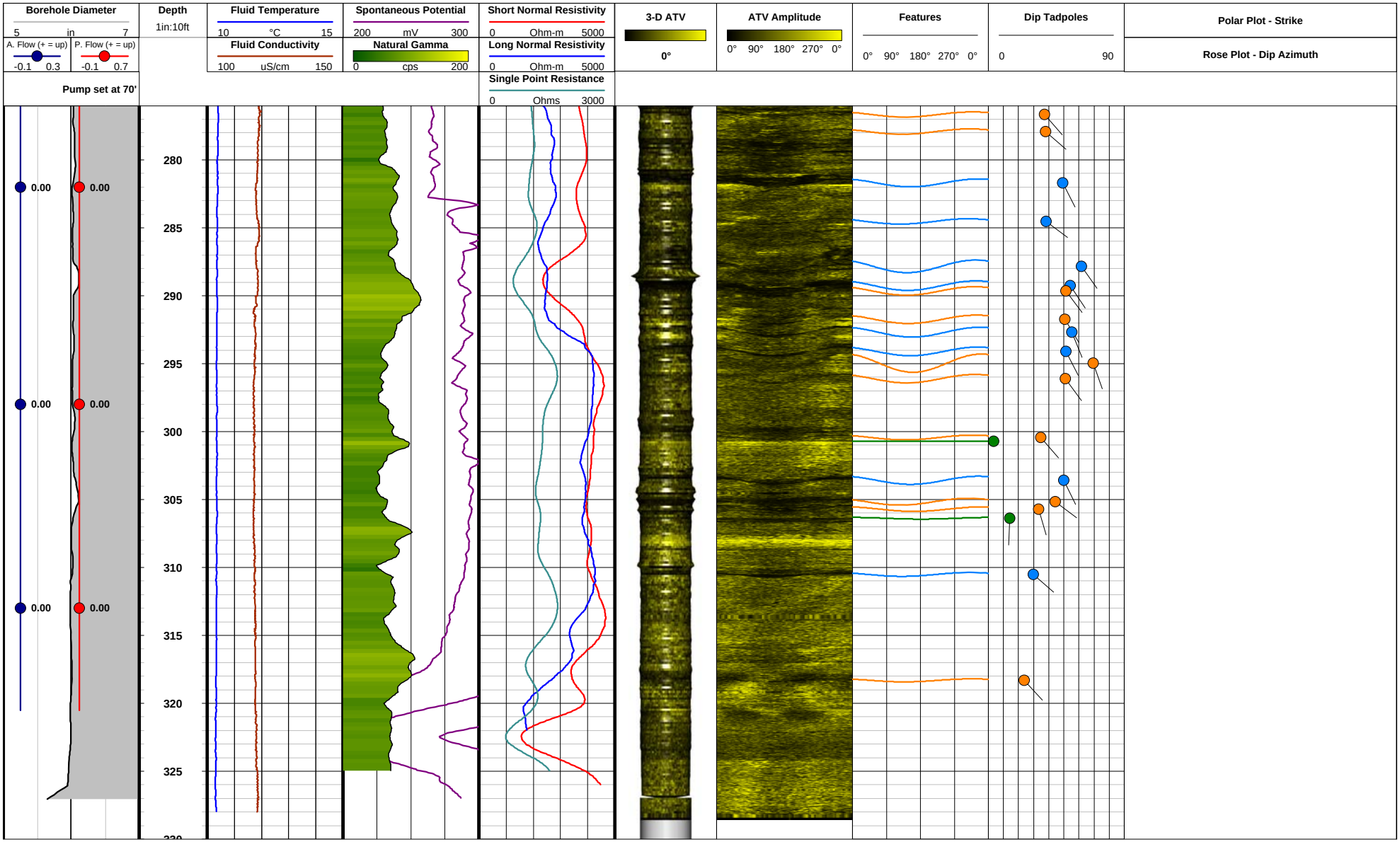
Fracture/Feature
Hairline Fracture/Feature
Discontinuous Fracture/Feature
Discontinuous Hairline Fracture/Feature
Bedding/Change in Lithology




Borehole Diameter
5 in 7
A. Flow (+ = up)
-0.1 0.3
P. Flow (+ = up)
-0.1 0.7
Pump set at 70'
Depth
1in:10ft
Fluid Temperature
10 °C 15
Fluid Conductivity
100 uS/cm 150
Spontaneous Potential
200 mV 300
Natural Gamma
0 cps 200
Short Normal Resistivity
0 Ohm-m 5000
Long Normal Resistivity
0 Ohm-m 5000
Single Point Resistance
0 Ohms 3000
3-D ATV
0°
ATV Amplitude
0° 90° 180° 270° 0°
Features
0° 90° 180° 270° 0°
Dip Tadpoles
0 90
Polar Plot - Strike
Rose Plot - Dip Azimuth
pumping at ~ 1gpm
60
65
70
75
80
85
90
95
100
105
110
115
120
125


Borehole Diameter
5 in 7
A. Flow (+ = up)
-0.1 0.3
P. Flow (+ = up)
-0.1 0.7
Pump set at 70'
Depth
1in:10ft
Fluid Temperature
10 °C 15
Fluid Conductivity
100 uS/cm 150
Spontaneous Potential
200 mV 300
Natural Gamma
0 cps 200
Short Normal Resistivity
0 Ohm-m 5000
Long Normal Resistivity
0 Ohm-m 5000
Single Point Resistance
0 Ohms 3000
3-D ATV
0°
ATV Amplitude
0° 90° 180° 270° 0°
Features
0° 90° 180° 270° 0°
Dip Tadpoles
0 90
Polar Plot - Strike
Rose Plot - Dip Azimuth
0.03
0.32
0.00
0.24
0.04
0.25
0.04
0.12
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
Schmidt Plot (Strike) - UH - #1
0°
90°
180°
270°
60
30
Counts Dip[deg] Strike[deg]
Mean 93 36.84 66.67
9 33.88 53.41
24 38.61 64.50
10 18.37 71.23
45 44.79 66.45
5 57.04 121.14
Azimuth - Absolute (Count)
0°
90°
180°
270°
12
6
Counts: 93.00
Mean: 156.67
Min: 1.02
Max: 352.79


Borehole Diameter
5 in 7
A. Flow (+ = up)
-0.1 0.3
P. Flow (+ = up)
-0.1 0.7
Pump set at 70'
Depth
1in:10ft
Fluid Temperature
10 °C 15
Fluid Conductivity
100 uS/cm 150
Spontaneous Potential
200 mV 300
Natural Gamma
0 cps 200
Short Normal Resistivity
0 Ohm-m 5000
Long Normal Resistivity
0 Ohm-m 5000
Single Point Resistance
0 Ohms 3000
3-D ATV
0°
ATV Amplitude
0° 90° 180° 270° 0°
Features
0° 90° 180° 270° 0°
Dip Tadpoles
0 90
Polar Plot - Strike
Rose Plot - Dip Azimuth
0.00
0.04
0.00
0.04
205
210
215
220
225
230
235
240
245
250
255
260
265
270
275


Borehole Diameter
5 in 7
A. Flow (+ = up)
-0.1 0.3
P. Flow (+ = up)
-0.1 0.7
Pump set at 70'
0.00
0.00
0.00
0.00
0.00
0.00
Depth
1in:10ft
280
285
290
295
300
305
310
315
320
325
Fluid Temperature
10 °C 15
Fluid Conductivity
100 uS/cm 150
Spontaneous Potential
200 mV 300
Natural Gamma
0 cps 200
Short Normal Resistivity
0 Ohm-m 5000
Long Normal Resistivity
0 Ohm-m 5000
Single Point Resistance
0 Ohms 3000
3-D ATV
0°
ATV Amplitude
0° 90° 180° 270° 0°
Features
0° 90° 180° 270° 0°
Dip Tadpoles
0 90
Polar Plot - Strike
Rose Plot - Dip Azimuth

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-2D

Mountain Top, Pa

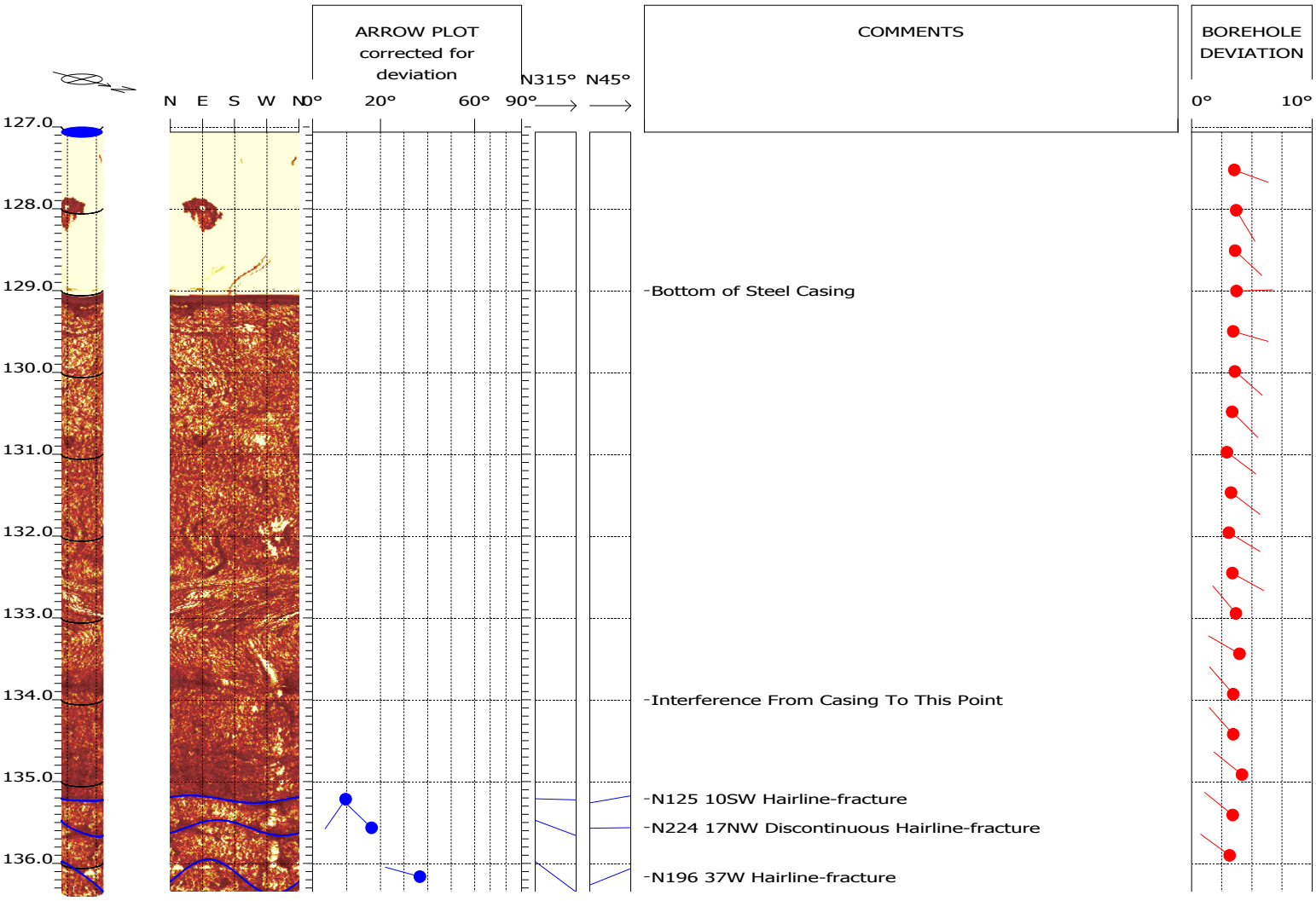
top of borehole.....
East: _
North:_
Elev: _

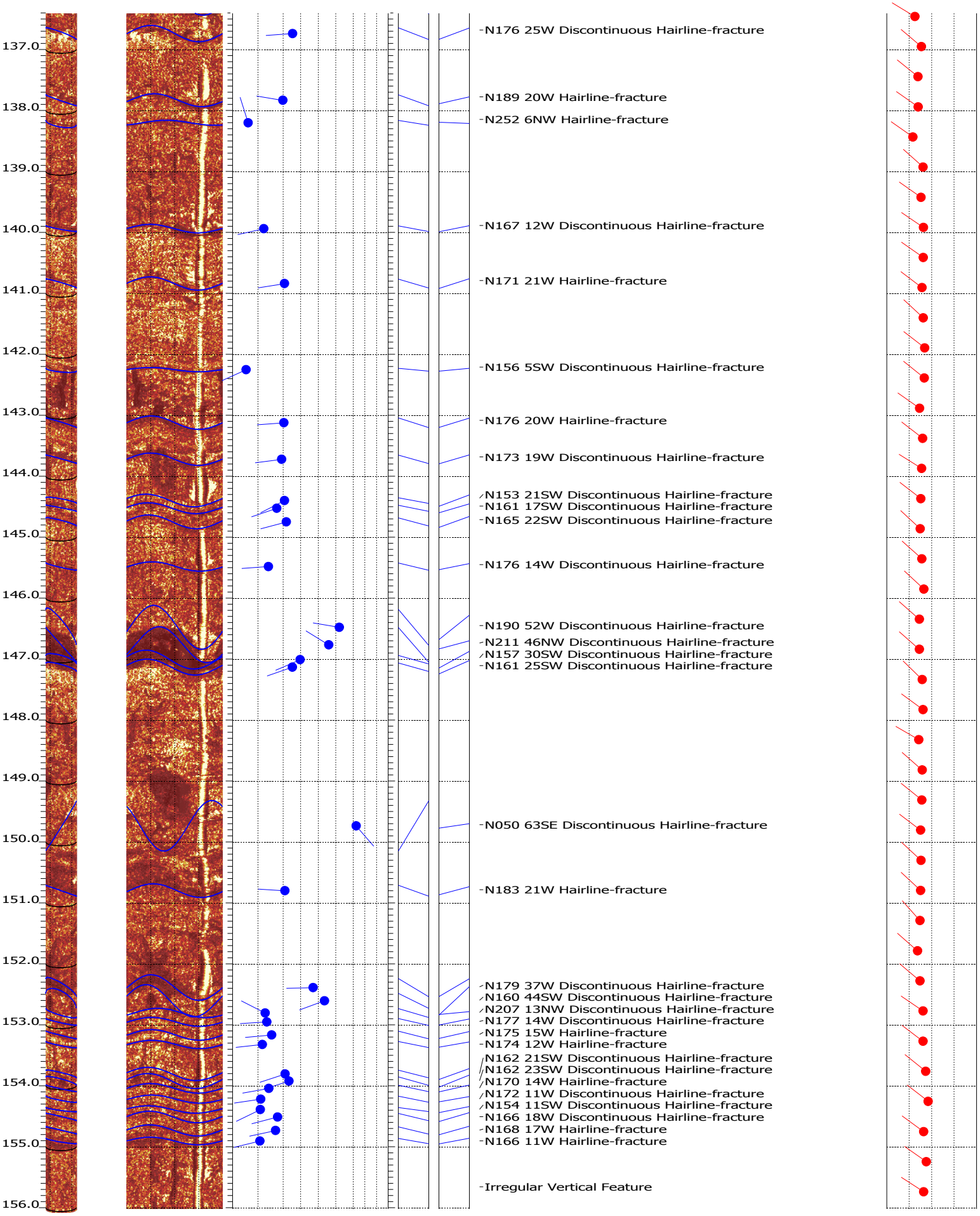
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

Zone from 200.000 to 127.000ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units

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-N176 25W Discontinuous Hairline-fracture
-N189 20W Hairline-fracture
-N252 6NW Hairline-fracture
-N167 12W Discontinuous Hairline-fracture
-N171 21W Hairline-fracture
-N156 5SW Discontinuous Hairline-fracture
-N176 20W Hairline-fracture
-N173 19W Discontinuous Hairline-fracture
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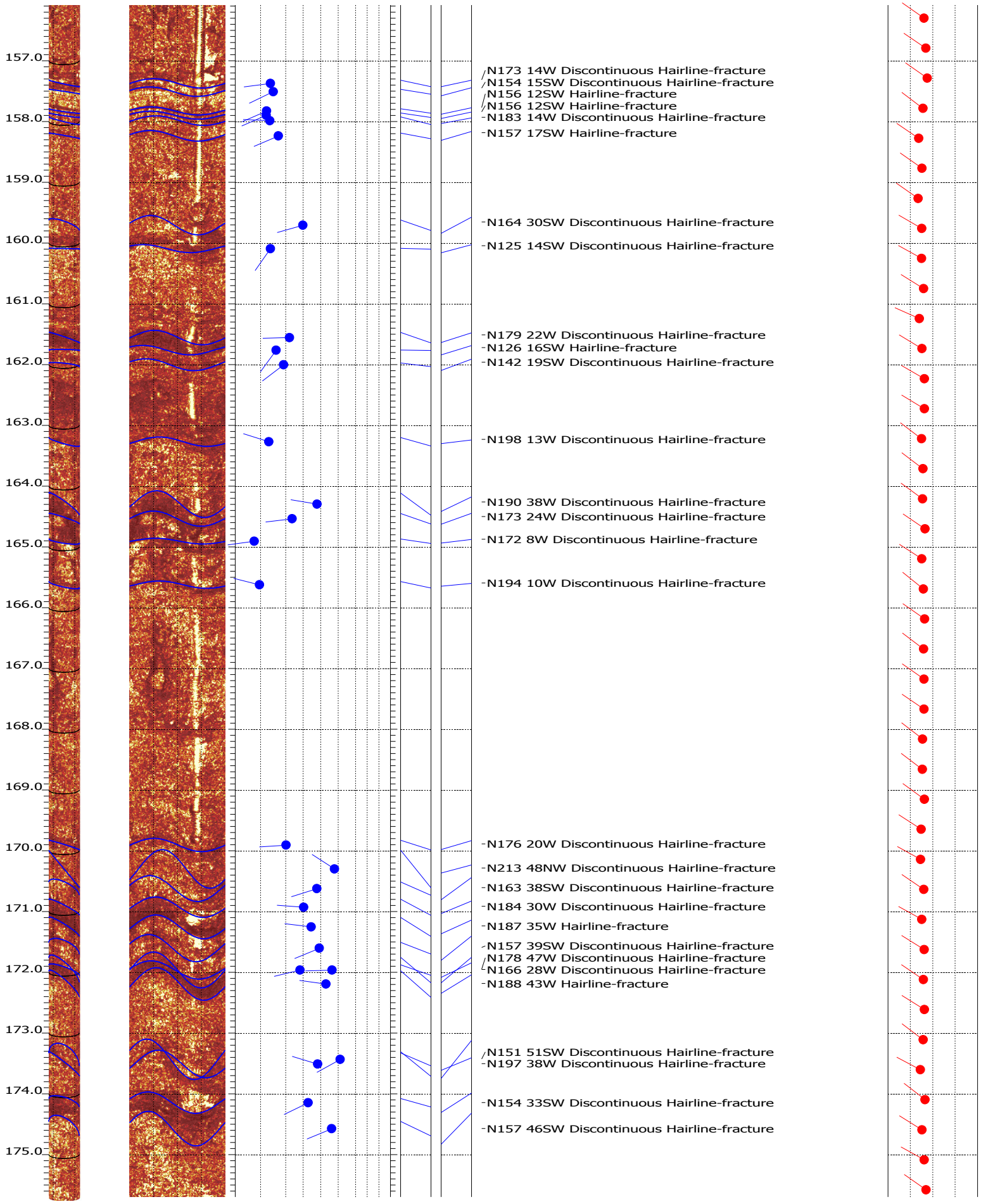
-N176 14W Discontinuous Hairline-fracture
-N190 52W Discontinuous Hairline-fracture
-N211 46NW Discontinuous Hairline-fracture
-N157 30SW Discontinuous Hairline-fracture
-N161 25SW Discontinuous Hairline-fracture
-N050 63SE Discontinuous Hairline-fracture
-N183 21W Hairline-fracture
-N179 37W Discontinuous Hairline-fracture
-N160 44SW Discontinuous Hairline-fracture
-N207 13NW Discontinuous Hairline-fracture
-N177 14W Discontinuous Hairline-fracture
-N175 15W Hairline-fracture
-N174 12W Hairline-fracture
-N162 21SW Discontinuous Hairline-fracture
-N162 23SW Discontinuous Hairline-fracture
-N170 14W Hairline-fracture
-N172 11W Discontinuous Hairline-fracture
-N154 11SW Discontinuous Hairline-fracture
-N166 18W Discontinuous Hairline-fracture
-N168 17W Hairline-fracture
-N166 11W Hairline-fracture
-Irregular Vertical Feature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N156 12SW Hairline-fracture
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N125 14SW Discontinuous Hairline-fracture
N179 22W Discontinuous Hairline-fracture
N126 16SW Hairline-fracture
N142 19SW Discontinuous Hairline-fracture
N198 13W Discontinuous Hairline-fracture
N190 38W Discontinuous Hairline-fracture
N173 24W Discontinuous Hairline-fracture
N172 8W Discontinuous Hairline-fracture
N194 10W Discontinuous Hairline-fracture
N176 20W Discontinuous Hairline-fracture
N213 48NW Discontinuous Hairline-fracture
N163 38SW Discontinuous Hairline-fracture
N184 30W Discontinuous Hairline-fracture
N187 35W Hairline-fracture
N157 39SW Discontinuous Hairline-fracture
N178 47W Discontinuous Hairline-fracture
N166 28W Discontinuous Hairline-fracture
N188 43W Hairline-fracture
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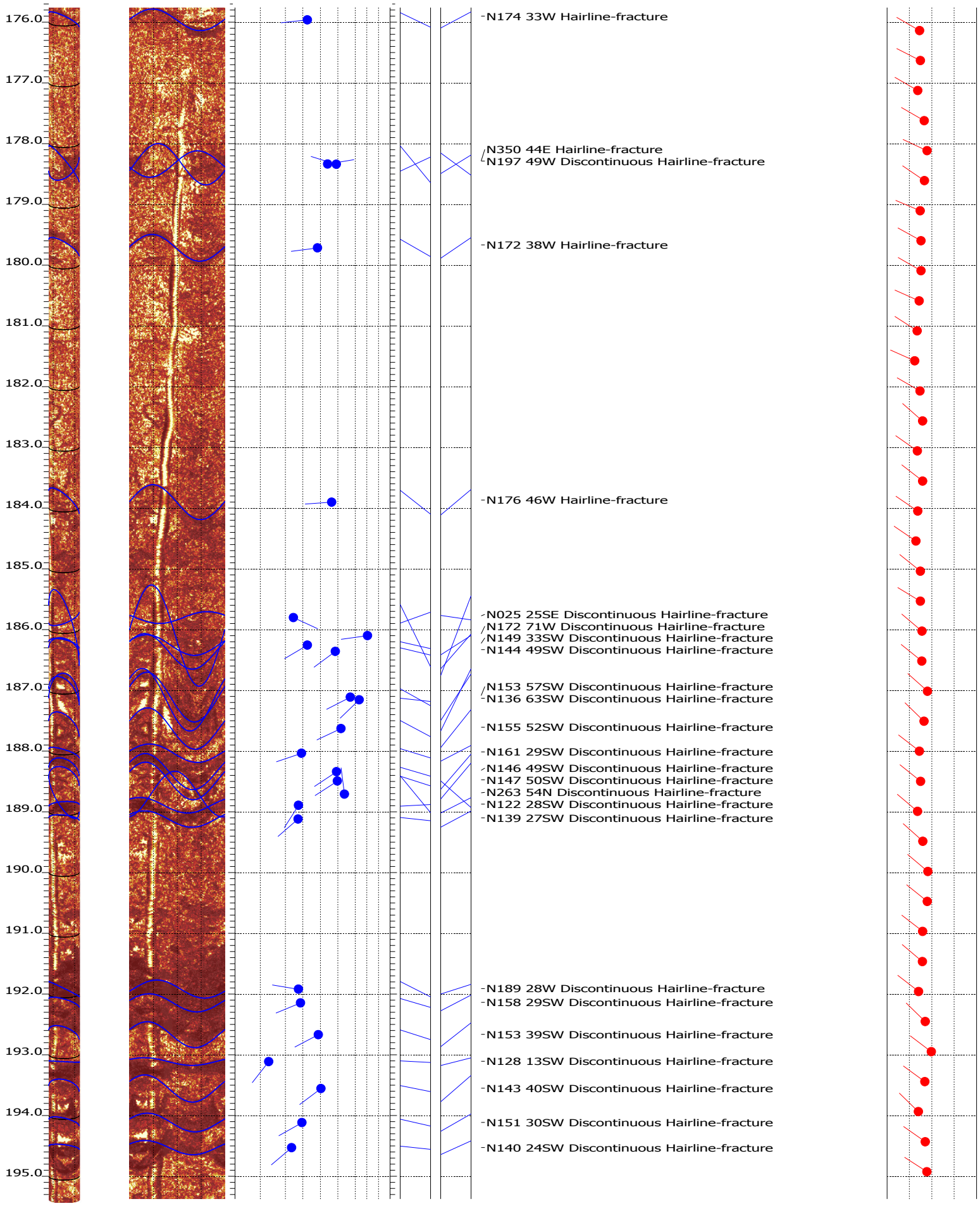
N157 46SW Discontinuous Hairline-fracture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N350 44E Hairline-fracture
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-N172 38W Hairline-fracture
-N176 46W Hairline-fracture
-N025 25SE Discontinuous Hairline-fracture
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N146 49SW Discontinuous Hairline-fracture
-N147 50SW Discontinuous Hairline-fracture
-N263 54N Discontinuous Hairline-fracture
-N122 28SW Discontinuous Hairline-fracture
-N139 27SW Discontinuous Hairline-fracture
-N189 28W Discontinuous Hairline-fracture
-N158 29SW Discontinuous Hairline-fracture
-N153 39SW Discontinuous Hairline-fracture
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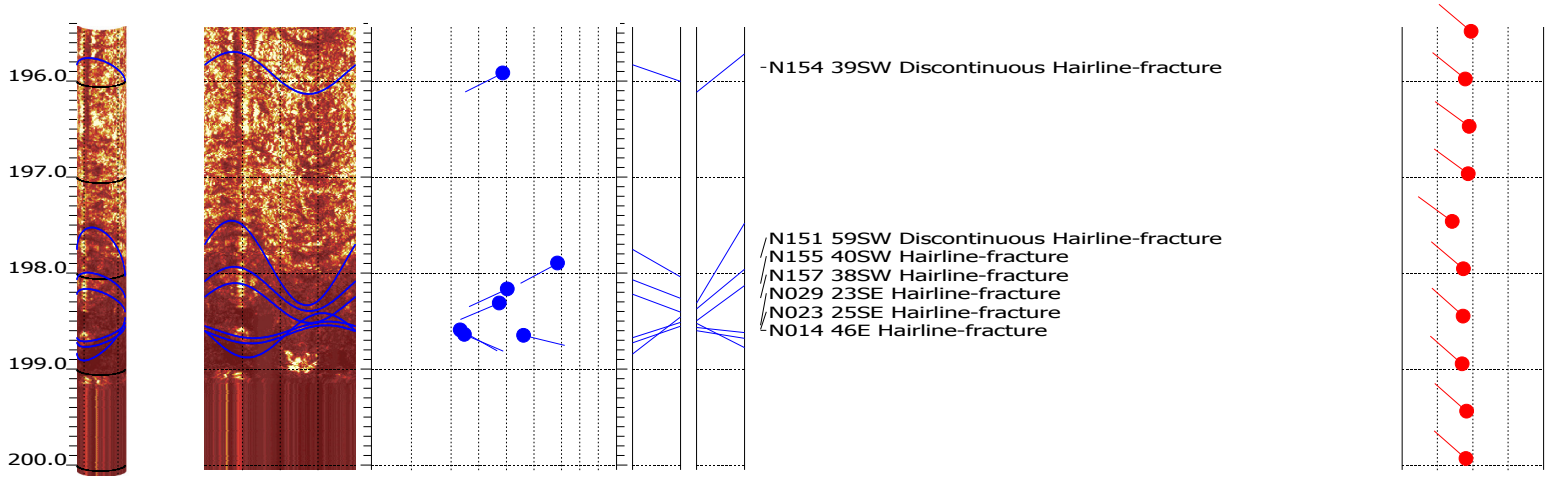
-N140 24SW Discontinuous Hairline-fracture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N157 38SW Hairline-fracture
N029 23SE Hairline-fracture
N023 25SE Hairline-fracture
N014 46E Hairline-fracture

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-2D

Mountain Top, Pa

top of borehole.....
East: _
North: _
Alt: _

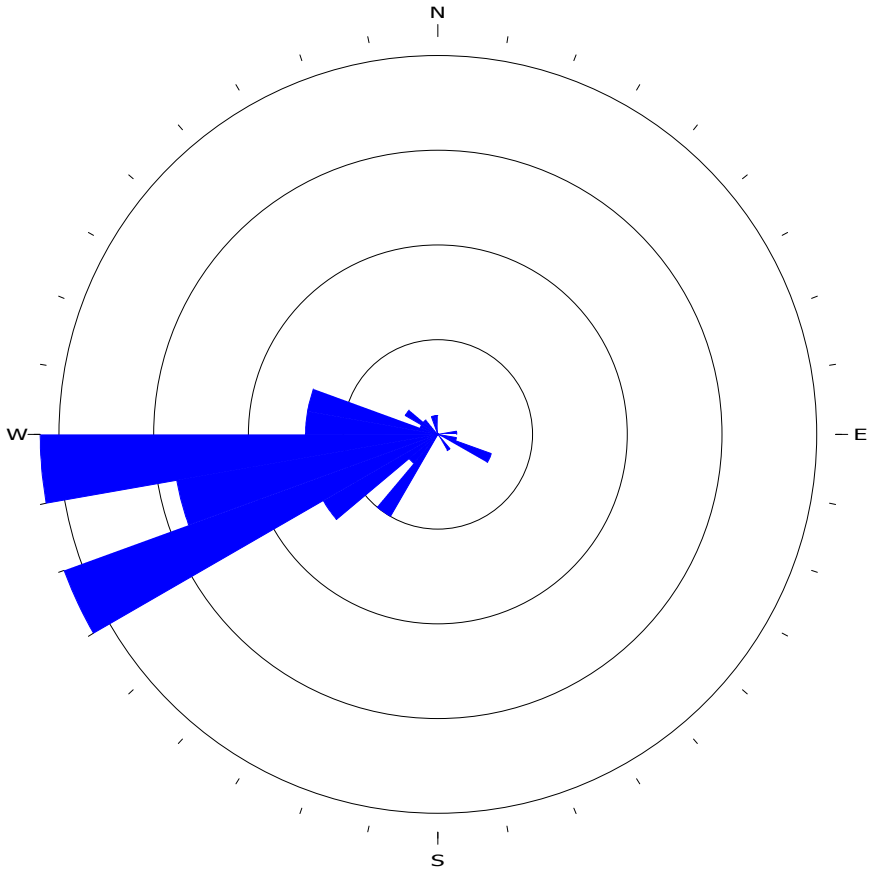
North ref. is true
Depth units are feet

Zone from 199.095 to 134.710ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-2D
134.710 - 199.095ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 96

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-2D

Mountain Top, Pa

top of borehole.....
East: _
North: _
Alt: _

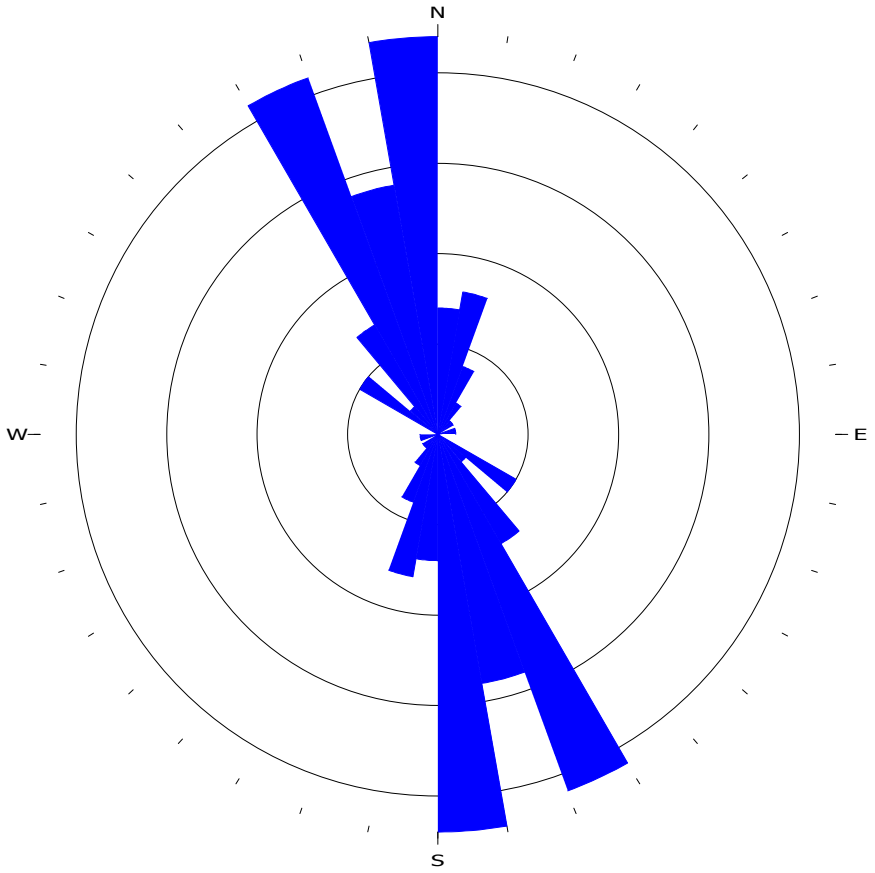
North ref. is true
Depth units are feet

Zone from 199.095 to 134.710ft

Interpretation 1

Dip data sets .....
BHTV dips

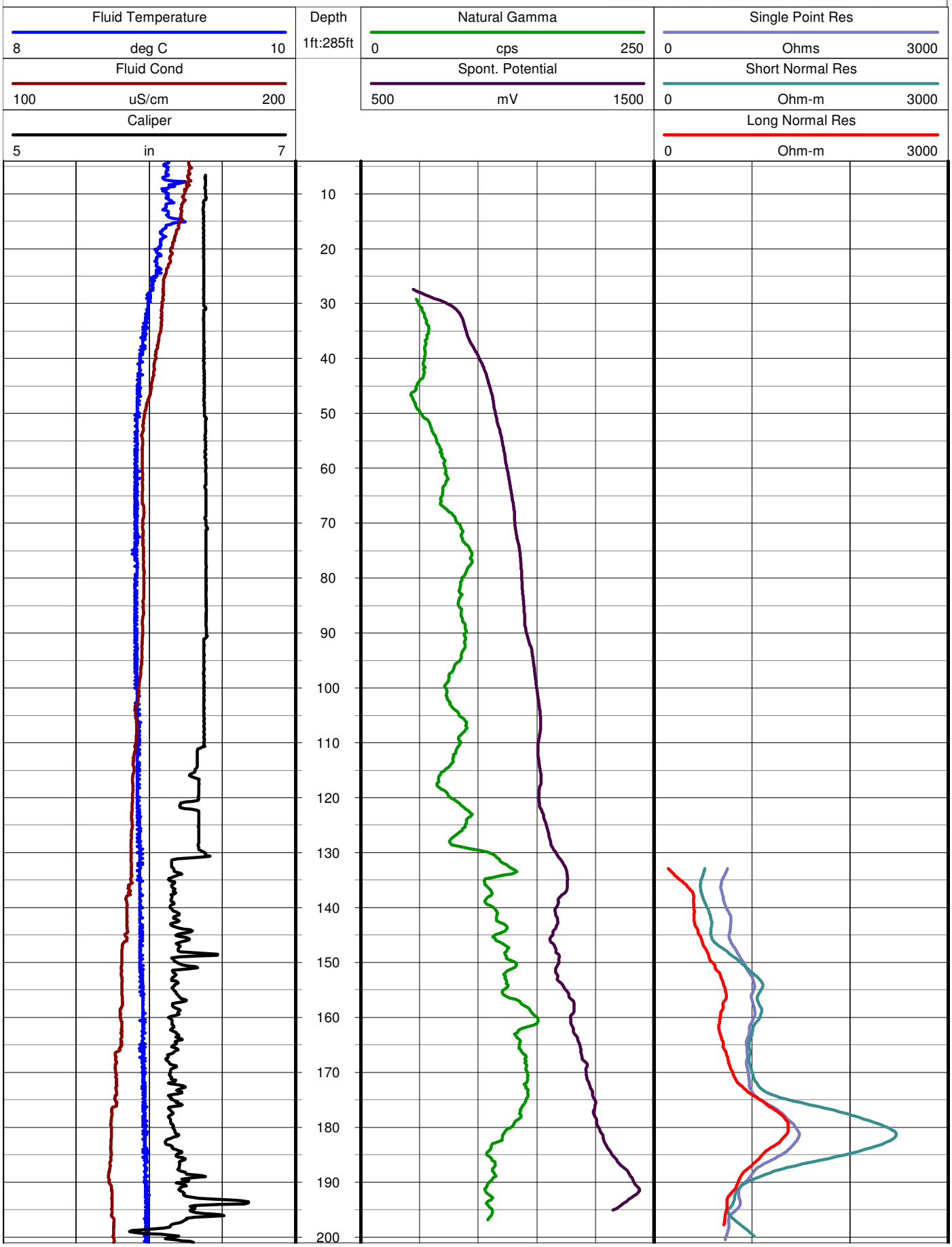
RMW-2D
134.710 - 199.095ft
Strike-direction, fracture rose-diagram



Azimuth Incr = 10°
N = 96

Company: Tetra Tech
Location: Mountain Top, Pa
Well Name: RMW-2D
Reference: Ground Level

EARTH DATA NORTHEAST, INC.



RMW-2D Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Monday, September 26, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
128	1	16:30	*	up	Upward flow	*	<
	2	16:31	*	up	Upward flow		
	3	16:32	*	up	Upward flow		
	4	16:32	*	up	Upward flow		
	5	16:33	*	up	Upward flow		
142	1	16:37	*	up	Upward flow	*	
	2	16:38	*	up	Upward flow		
	3	16:39	*	up	Upward flow		
	4	16:40	*	up	Upward flow		
	5	16:40	*	up	Upward flow		
154	1	16:46	Ø	N/A	No flow	Incon.	
	2	16:47	0.834	up	Upward flow		
	3	16:48	*	up	Upward flow		
	4	16:48	0.907	up	Upward flow		
	5	16:49	*	up	Upward flow		
171	1	16:54	Ø	N/A	No flow	**0.865**	
	2	16:54	0.853	up	Upward flow		
	3	16:55	0.916	up	Upward flow		
	4	16:56	0.835	up	Upward flow		
	5	16:57	0.854	up	Upward flow		
187	1	17:01	Ø	N/A	No flow	N/A	
	2	17:02	Ø	N/A	No flow		
	3	17:03	Ø	N/A	No flow		
	4	17:03	Ø	N/A	No flow		
	5	17:04	Ø	N/A	No flow		

Pumping Conditions: Pump set at ~ 30', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
128	1	17:49	Incon.	up	Incon.	Incon.	<
	2	17:50	Incon.	up	Incon.		
	3	17:50	Incon.	up	Incon.		
142	1	17:42	Incon.	up	Incon.	Incon.	
	2	17:43	Incon.	up	Incon.		
	3	17:43	Incon.	up	Incon.		
	4	17:44	Incon.	up	Incon.		
	5	17:45	Incon.	up	Incon.		
154	1	17:35	0.861	up	Upward flow	**0.904**	
	2	17:36	0.883	up	Upward flow		
	3	17:36	0.931	up	Upward flow		
	4	17:37	0.861	up	Upward flow		
	5	17:38	0.983	up	Upward flow		
171	1	17:28	*	up	Upward flow	Incon.	
	2	17:29	0.931	up	Upward flow		
	3	17:29	0.947	up	Upward flow		
	4	17:30	0.861	up	Upward flow		
	5	17:31	*	up	Upward flow		
187	1	17:22	Ø	N/A	No flow	N/A	
	2	17:23	Ø	N/A	No flow		
	3	17:23	Ø	N/A	No flow		
	4	17:24	Ø	N/A	No flow		
	5	17:25	Ø	N/A	No flow		

Key:

Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (into borehole)
>	Outflow zone (into formation)
	Used in average flow calculation
Incon.	Inconclusive results
*	Flow rate is outside of the tool's operating range (0.03-1.0 gpm)

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-3D

Mountain Top, PA

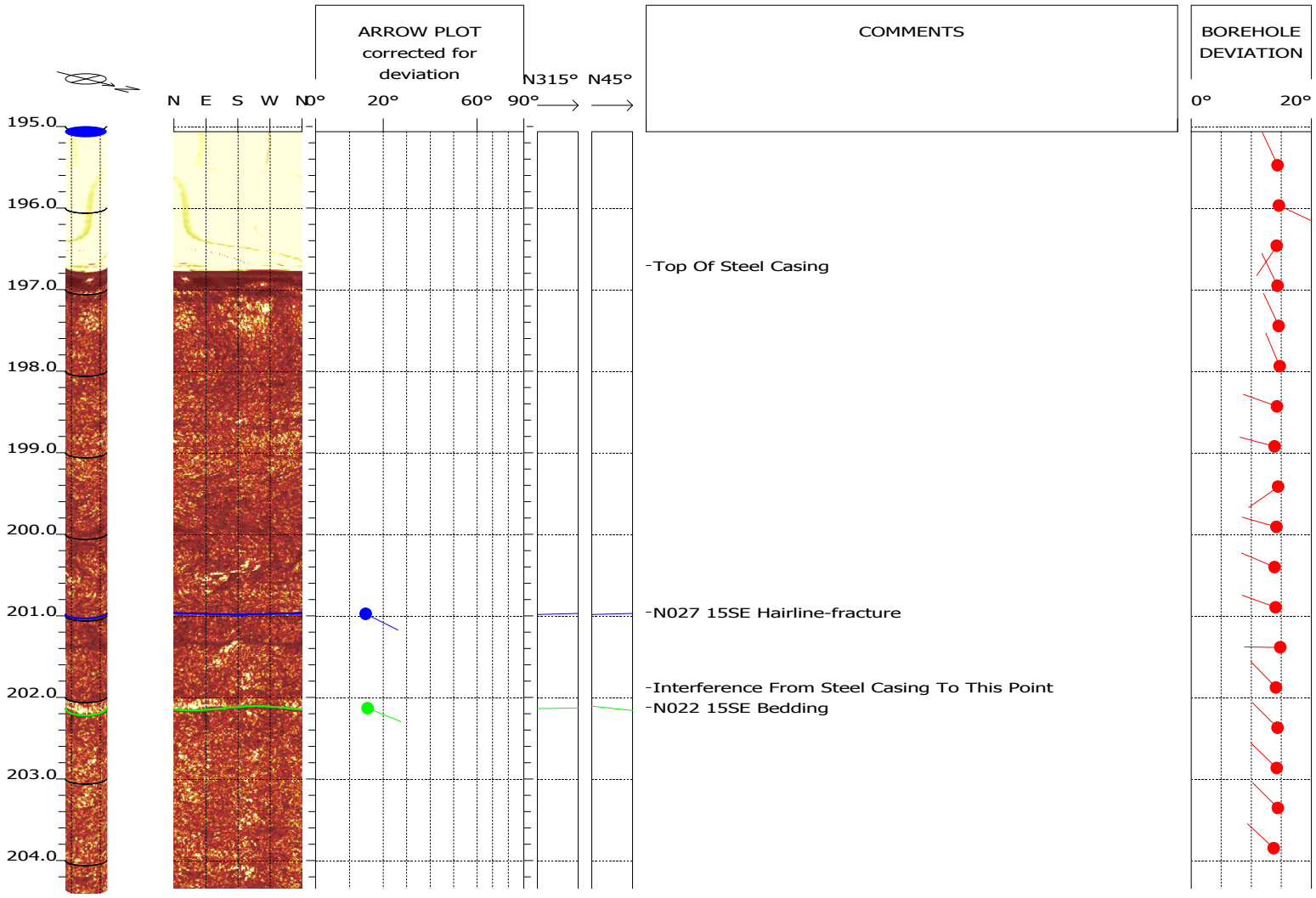
top of borehole.....
East: _
North:_
Elev: _

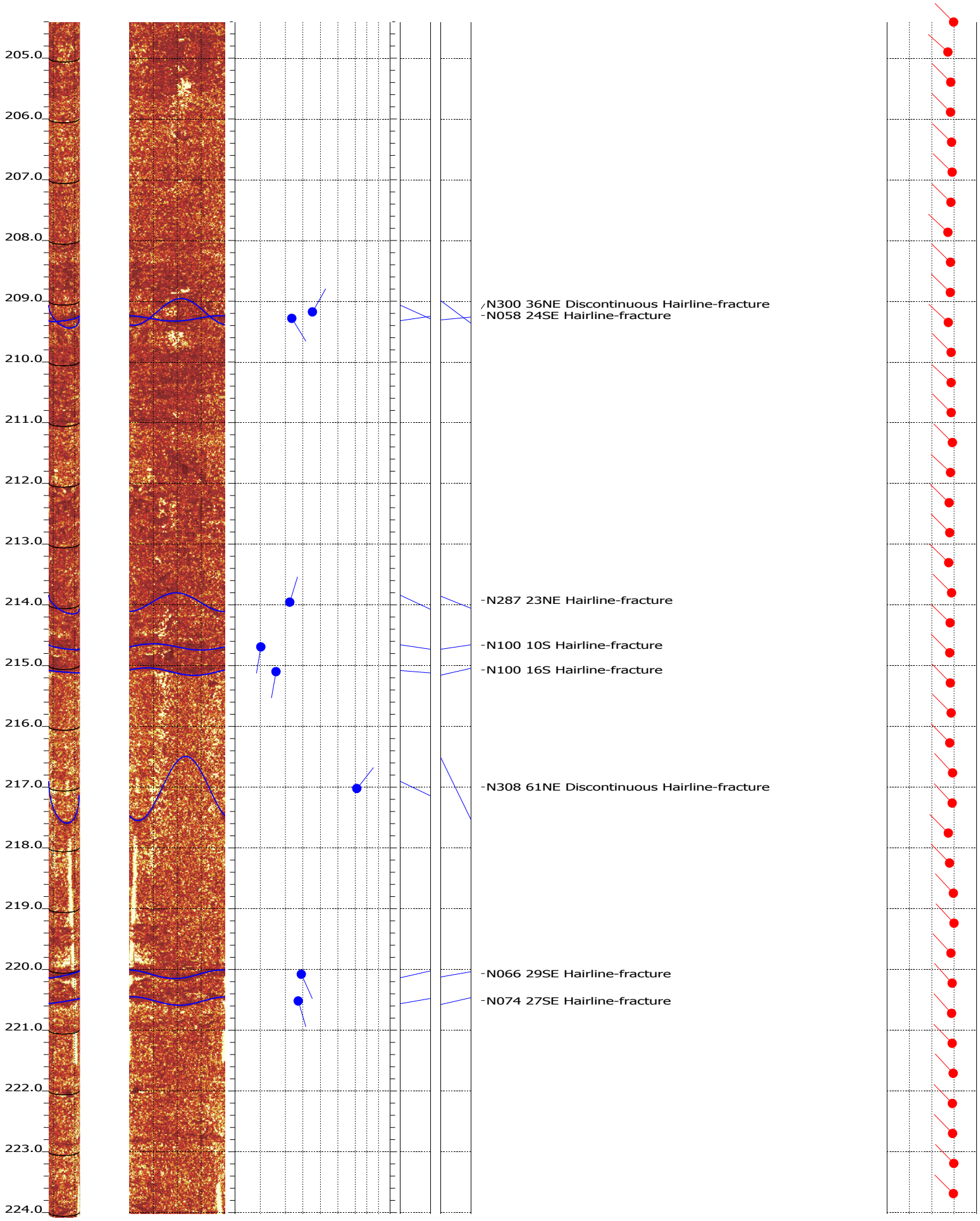
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

Zone from 236.000 to 195.000ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units

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N300 36NE Discontinuous Hairline-fracture
N058 24SE Hairline-fracture
N287 23NE Hairline-fracture
N100 10S Hairline-fracture
N100 16S Hairline-fracture
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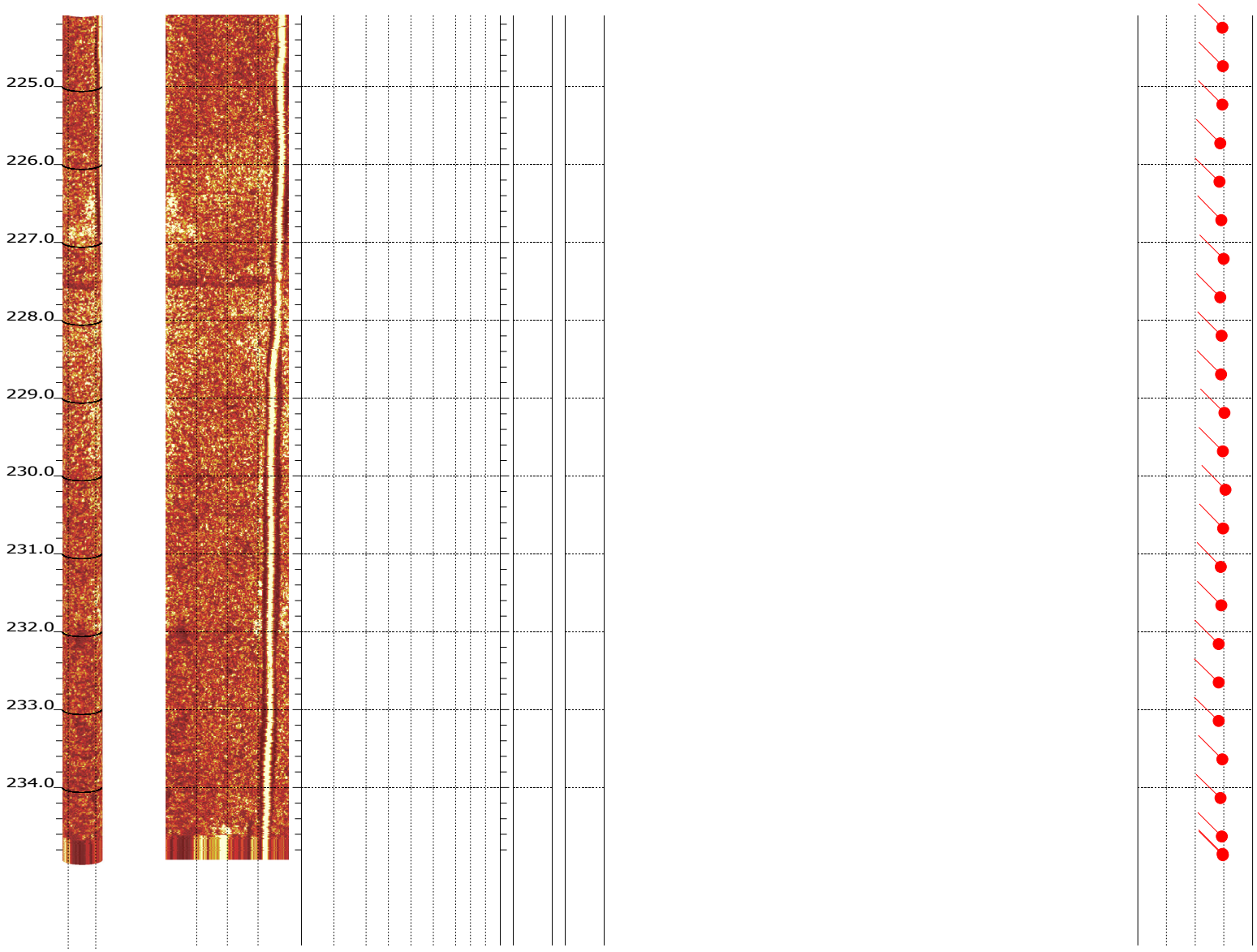
N066 29SE Hairline-fracture
N074 27SE Hairline-fracture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DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-3D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

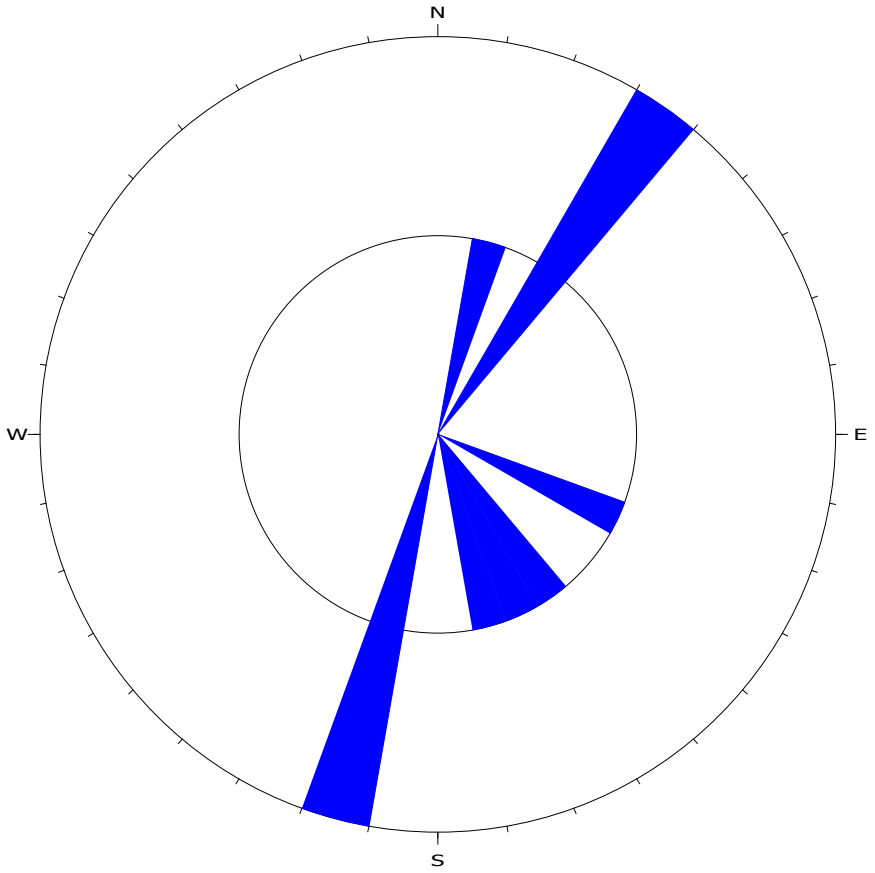
North ref. is true
Depth units are feet

Zone from 221.009 to 200.455ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-3D
200.455 - 221.009ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 9

0 1 2

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-3D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

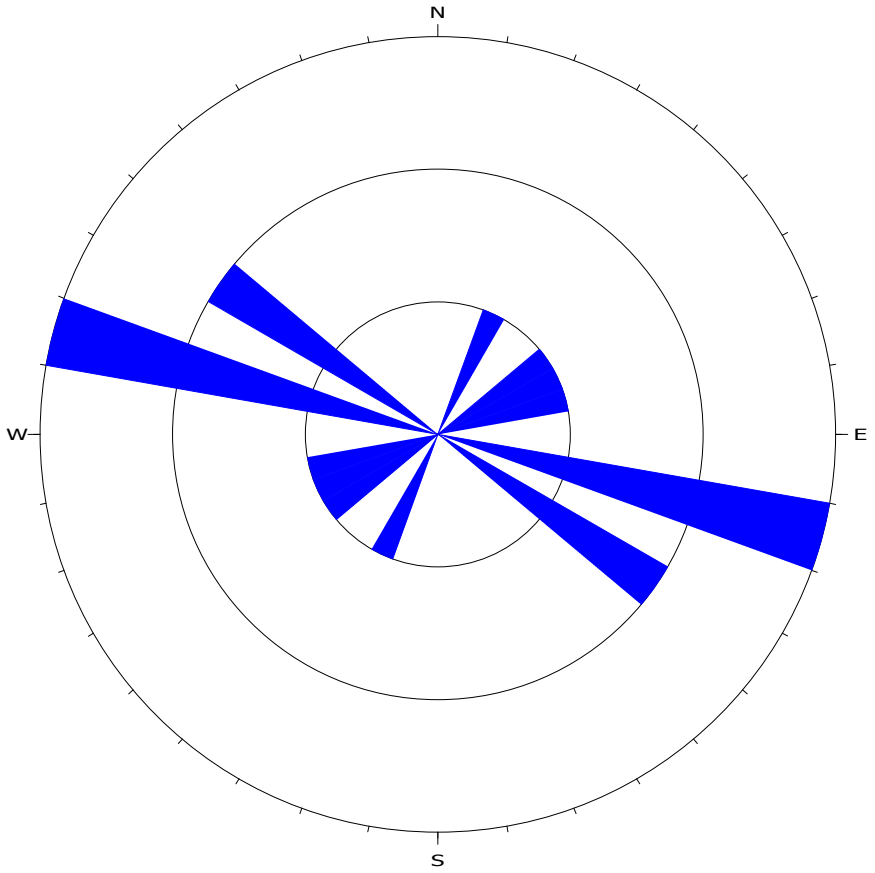
North ref. is true
Depth units are feet

Zone from 221.009 to 200.455ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-3D
200.455 - 221.009ft
Strike-direction, fracture rose-diagram



Azimuth Incr = 10°
N = 9

0 1 2 3

Company: Tetra Tech ECI
Location: Mountain Top, Pa
Well Name: RMW-3D
Reference: Ground Surface

EARTH DATA NORTHEAST, INC.

Fluid Temperature	Depth	Natural Gamma	Single Point Res
5 deg C 15	1ft:335ft	0 cps 200	0 Ohms 1000
Fluid Cond.		Spont. Potential	Short Normal Res
0 uS/cm 4000		550 mV 950	0 Ohm-m 5000
Caliper			Long Normal Res
6 in 7			0 Ohm-m 6500

RMW-3D Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Tuesday, September 27, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
200	1	11:21	Incon.	N/A	Incon.	N/A	
	2	11:22	Ø	N/A	No flow		
	3	11:23	Ø	N/A	No flow		
	4	11:24	Ø	N/A	No flow		
	5	11:25	Ø	N/A	No flow		
212	1	11:30	Ø	N/A	No flow	N/A	
	2	11:30	Ø	N/A	No flow		
	3	11:31	Ø	N/A	No flow		
	4	11:32	Ø	N/A	No flow		
	5	11:33	Ø	N/A	No flow		
220	1	11:37	Ø	N/A	No flow	N/A	
	2	11:38	Ø	N/A	No flow		
	3	11:39	Ø	N/A	No flow		
	4	11:39	Ø	N/A	No flow		
	5	11:40	Ø	N/A	No flow		
230	1	11:43	Ø	N/A	No flow	N/A	
	2	11:44	Ø	N/A	No flow		
	3	11:45	Ø	N/A	No flow		
	4	11:46	Ø	N/A	No flow		
	5	11:47	Ø	N/A	No flow		

Pumping Conditions: Pump set at ~ 30', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
200	1	12:21	Ø	N/A	No flow	N/A	
	2	12:24	Ø	N/A	No flow		
	3	12:25	Ø	N/A	No flow		
	4	12:25	Ø	N/A	No flow		
	5	12:27	Ø	N/A	No flow		
212	1	12:13	Ø	N/A	No flow	N/A	
	2	12:14	Ø	N/A	No flow		
	3	12:15	Ø	N/A	No flow		
	4	12:16	Ø	N/A	No flow		
	5	12:17	Ø	N/A	No flow		
220	1	12:06	Ø	N/A	No flow	N/A	
	2	12:07	Ø	N/A	No flow		
	3	12:07	Ø	N/A	No flow		
	4	12:08	Ø	N/A	No flow		
	5	12:09	Ø	N/A	No flow		
230	1	11:59	Ø	N/A	No flow	N/A	
	2	12:00	Ø	N/A	No flow		
	3	12:00	Ø	N/A	No flow		
	4	12:01	Ø	N/A	No flow		
	5	12:02	Ø	N/A	No flow		
	6	12:02	Ø	N/A	No flow		

Key:

Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (into borehole)
>	Outflow zone (into formation)
	Used in average flow calculation
Incon.	Inconclusive results
*	Flow rate is outside of the tool's operating range (0.03-1.0 gpm)

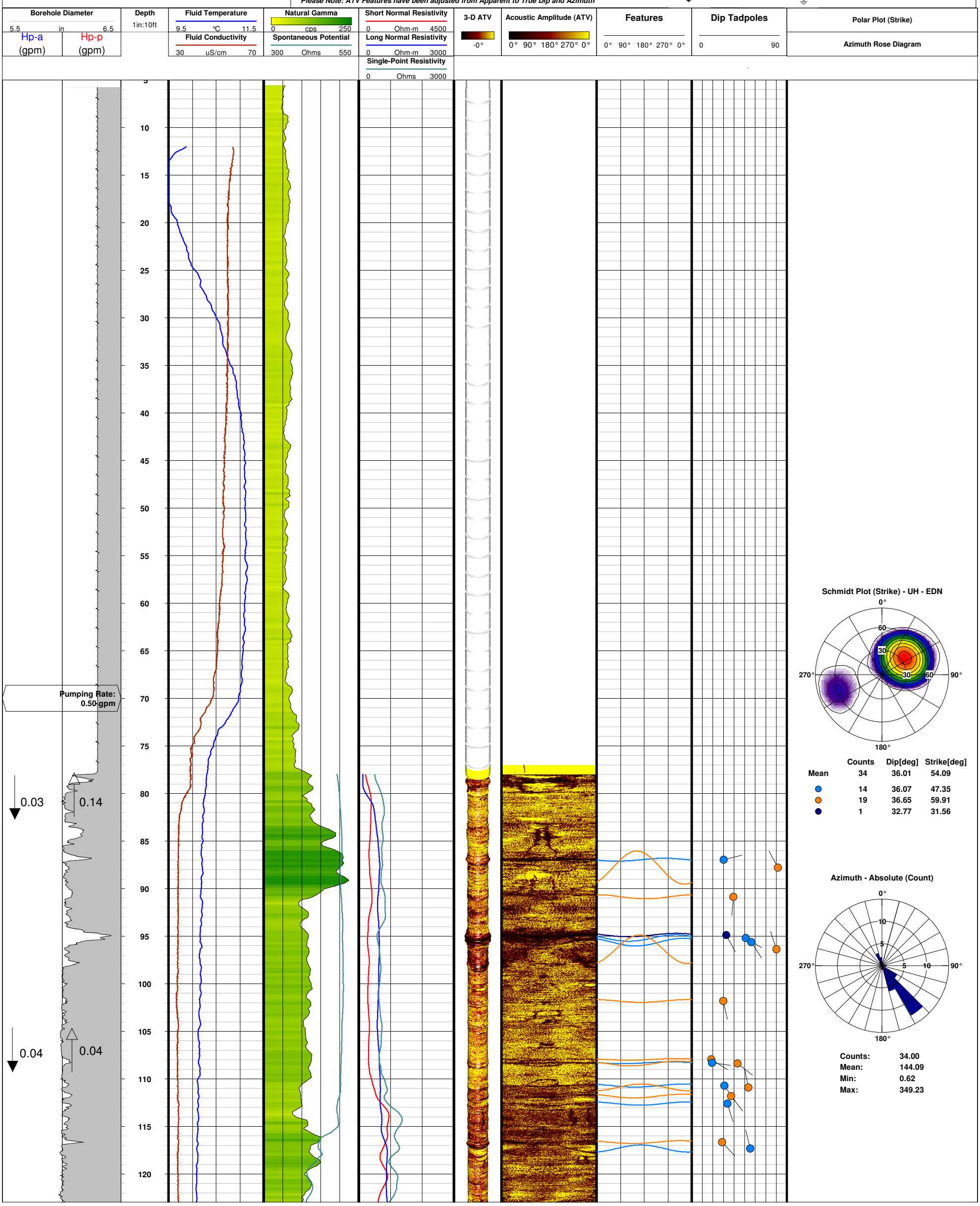
EDN
Earth Data Northeast, Inc.

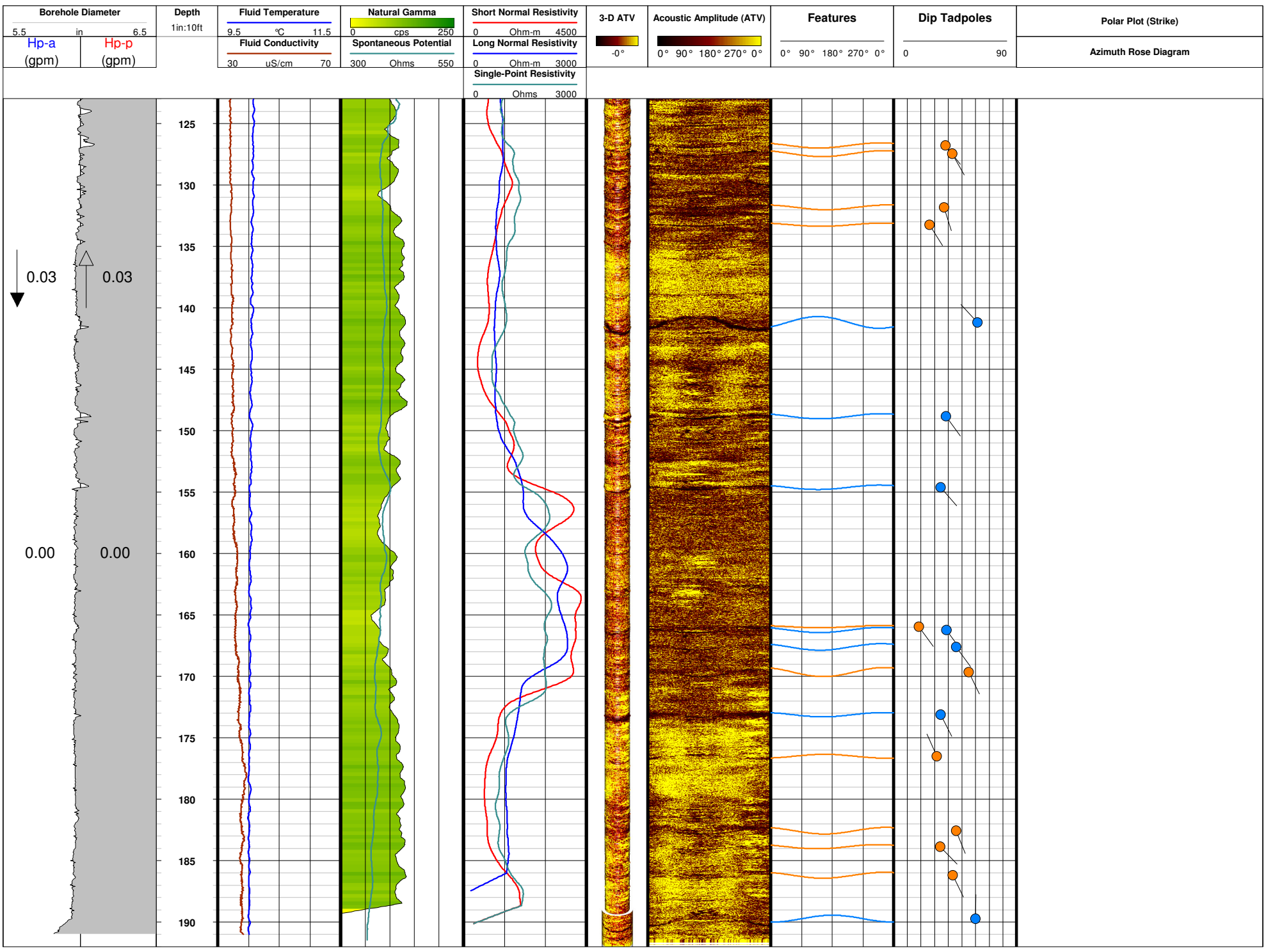
Client: **TTECI**
Location: **MOUNTAIN TOP, PA**
Well Name: **RMW-3S**
Date: **3/5/13**
Depth Reference: **GROUND SURFACE (2'STICK UP NOT USED)**
Magnetic Declination: **-12.11**
North reference: **True**

Borehole Diameter: **6.3"**
Static Water Level: **11.4'**
Casing Depth: **78'**
Total Depth: **181'**

Fracture/Feature
Hairline Fracture/Feature
Discontinuous Hairline Fracture/Feature
Vertical Flow Under Ambient Conditions
Vertical Flow Under Pumping conditions

Please Note: ATV Features have been adjusted from Apparent to True Dip and Azimuth




Borehole Diameter
5.5 in 6.5
Hp-a (gpm)
Hp-p (gpm)
Depth
1in:10ft
Fluid Temperature
9.5 °C 11.5
Fluid Conductivity
30 uS/cm 70
Natural Gamma
0 cps 250
Spontaneous Potential
300 Ohms 550
Short Normal Resistivity
0 Ohm-m 4500
Long Normal Resistivity
0 Ohm-m 3000
Single-Point Resistivity
0 Ohms 3000
3-D ATV
-0°
Acoustic Amplitude (ATV)
0° 90° 180° 270° 0°
Features
0° 90° 180° 270° 0°
Dip Tadpoles
0 90
Polar Plot (Strike)
Azimuth Rose Diagram
0.03
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0.00
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190

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-6D

Mountain Top, PA

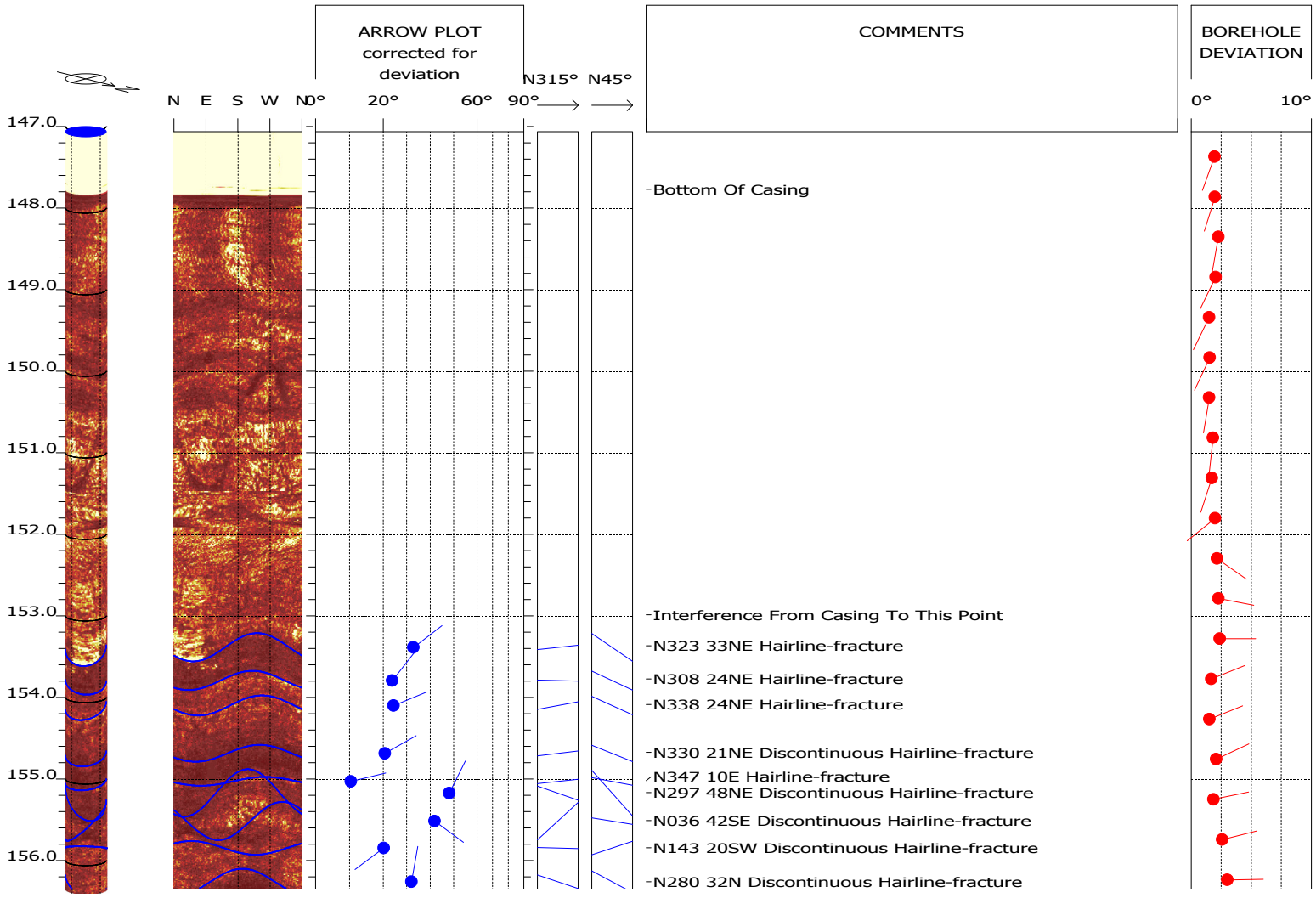
top of borehole.....
East: _
North:_
Elev: _

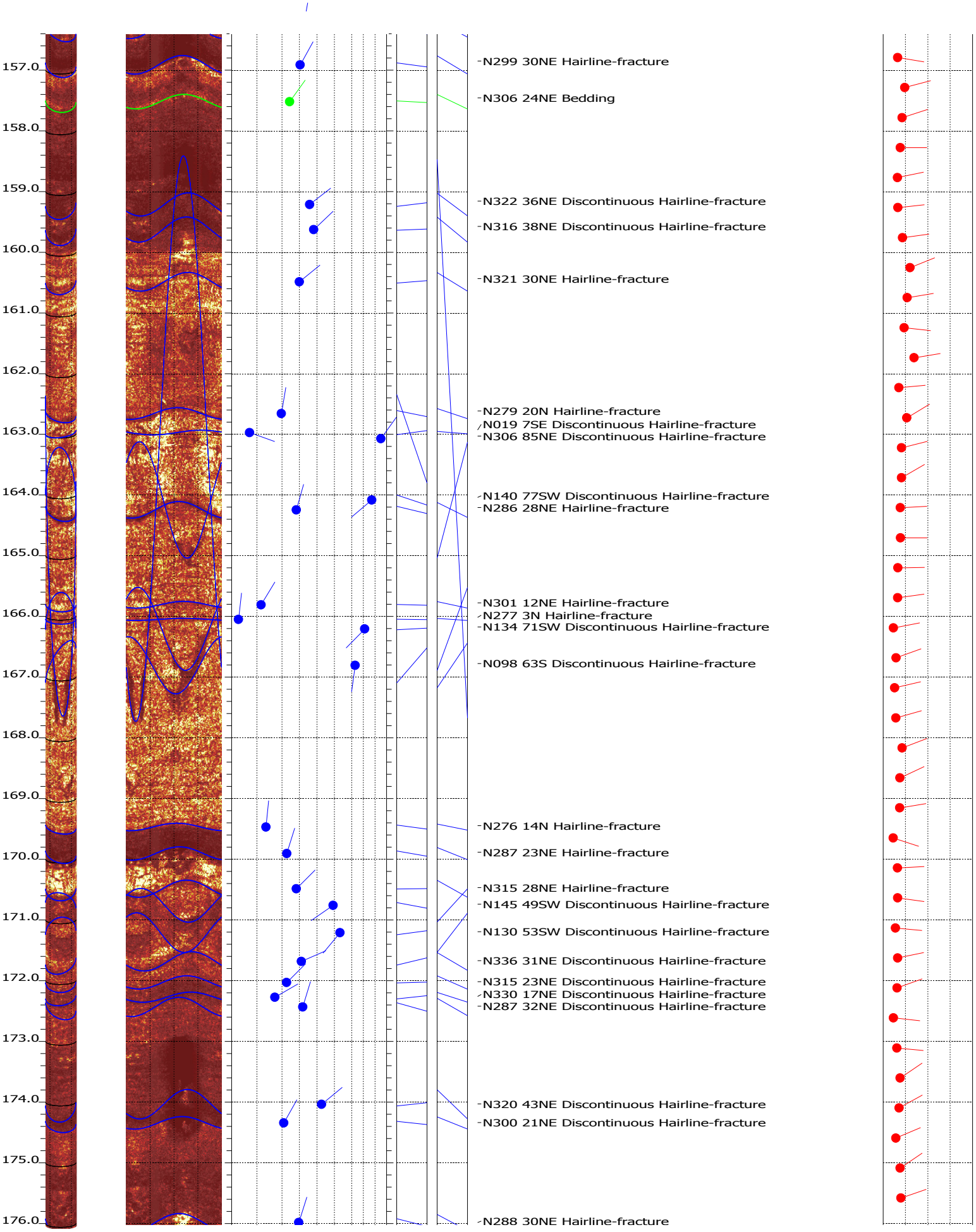
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

Zone from 196.000 to 147.000ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units

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-N299 30NE Hairline-fracture
-N306 24NE Bedding
-N322 36NE Discontinuous Hairline-fracture
-N316 38NE Discontinuous Hairline-fracture
-N321 30NE Hairline-fracture
-N279 20N Hairline-fracture
/N019 7SE Discontinuous Hairline-fracture
-N306 85NE Discontinuous Hairline-fracture
/N140 77SW Discontinuous Hairline-fracture
-N286 28NE Hairline-fracture
-N301 12NE Hairline-fracture
/N277 3N Hairline-fracture
-N134 71SW Discontinuous Hairline-fracture
-N098 63S Discontinuous Hairline-fracture
-N276 14N Hairline-fracture
-N287 23NE Hairline-fracture
-N315 28NE Hairline-fracture
-N145 49SW Discontinuous Hairline-fracture
-N130 53SW Discontinuous Hairline-fracture
-N336 31NE Discontinuous Hairline-fracture
-N315 23NE Discontinuous Hairline-fracture
/N330 17NE Discontinuous Hairline-fracture
-N287 32NE Discontinuous Hairline-fracture
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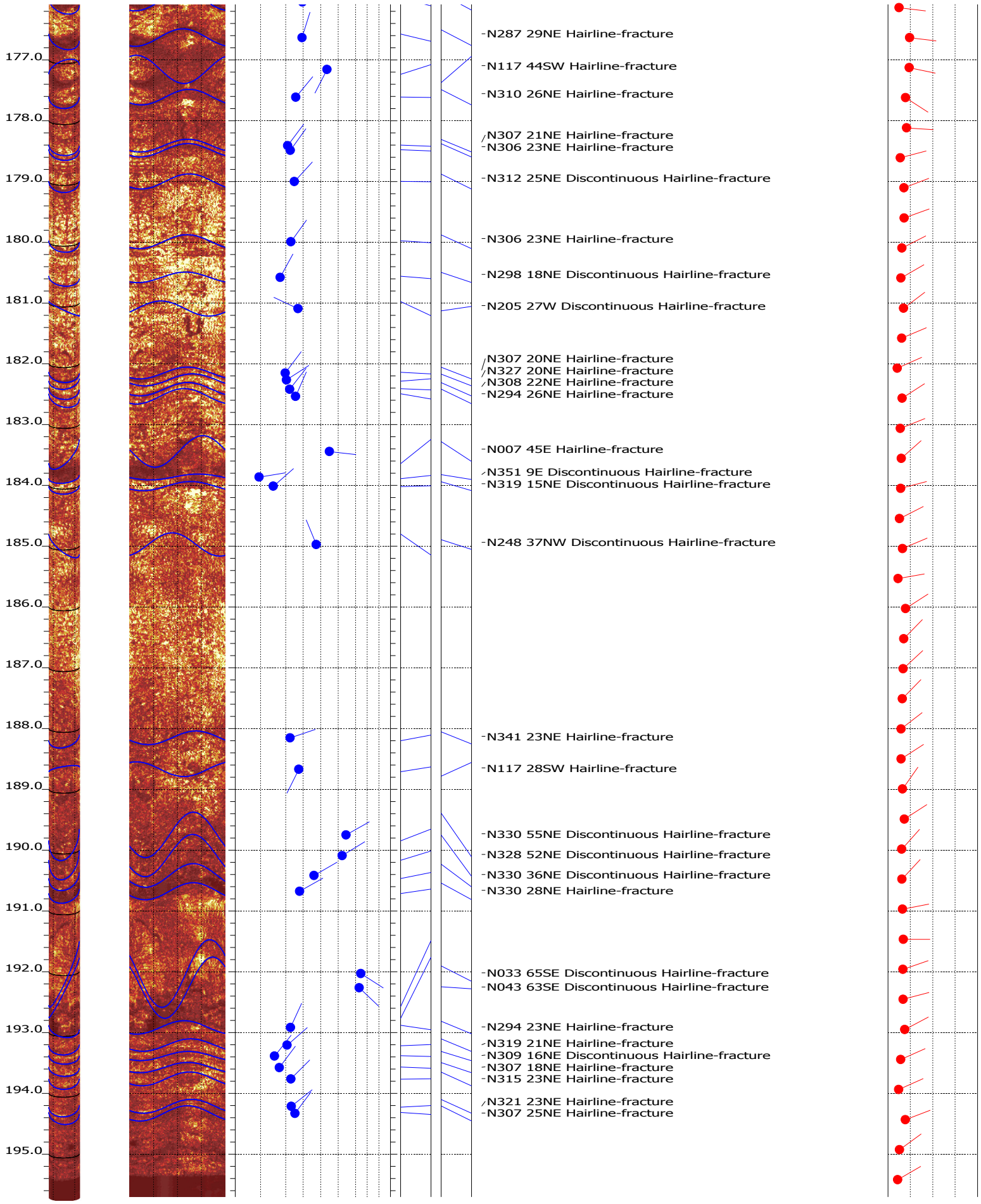
-N300 21NE Discontinuous Hairline-fracture
-N288 30NE Hairline-fracture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191.0
192.0
193.0
194.0
195.0
-N287 29NE Hairline-fracture
-N117 44SW Hairline-fracture
-N310 26NE Hairline-fracture
-N307 21NE Hairline-fracture
-N306 23NE Hairline-fracture
-N312 25NE Discontinuous Hairline-fracture
-N306 23NE Hairline-fracture
-N298 18NE Discontinuous Hairline-fracture
-N205 27W Discontinuous Hairline-fracture
-N307 20NE Hairline-fracture
-N327 20NE Hairline-fracture
-N308 22NE Hairline-fracture
-N294 26NE Hairline-fracture
-N007 45E Hairline-fracture
-N351 9E Discontinuous Hairline-fracture
-N319 15NE Discontinuous Hairline-fracture
-N248 37NW Discontinuous Hairline-fracture
-N341 23NE Hairline-fracture
-N117 28SW Hairline-fracture
-N330 55NE Discontinuous Hairline-fracture
-N328 52NE Discontinuous Hairline-fracture
-N330 36NE Discontinuous Hairline-fracture
-N330 28NE Hairline-fracture
-N033 65SE Discontinuous Hairline-fracture
-N043 63SE Discontinuous Hairline-fracture
-N294 23NE Hairline-fracture
-N319 21NE Hairline-fracture
-N309 16NE Discontinuous Hairline-fracture
-N307 18NE Hairline-fracture
-N315 23NE Hairline-fracture
-N321 23NE Hairline-fracture
-N307 25NE Hairline-fracture

196.0

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-6D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

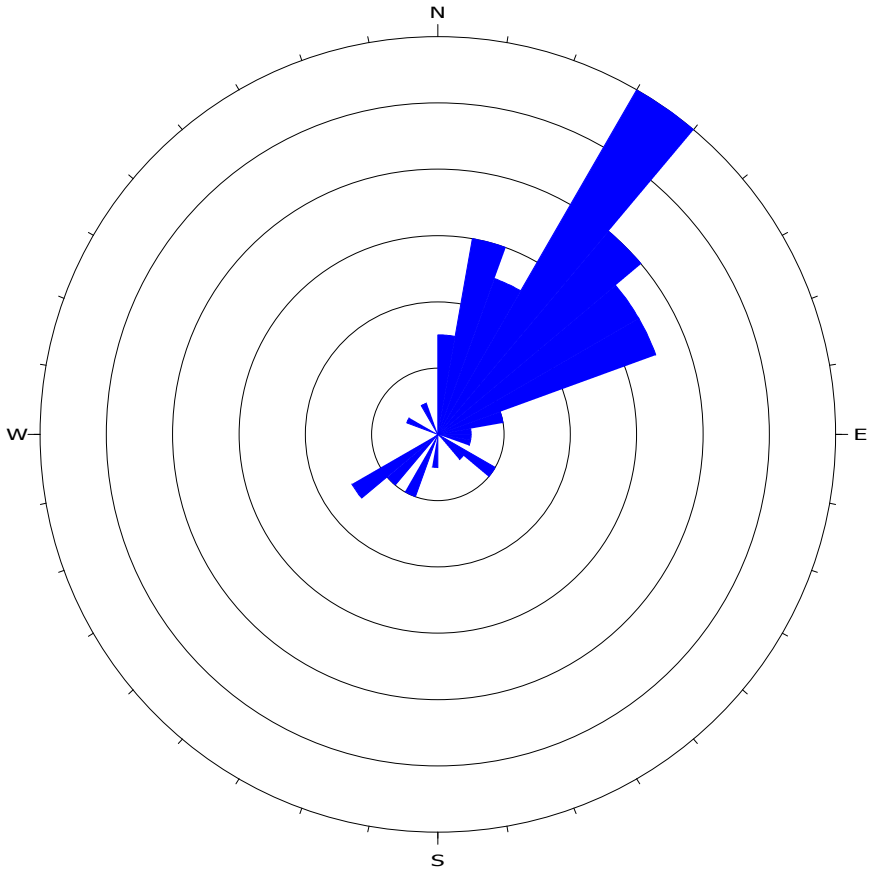
North ref. is true
Depth units are feet

Zone from 194.825 to 152.868ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-6D
152.868 - 194.825ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 66

0 2 4 6 8 10 12

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-6D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

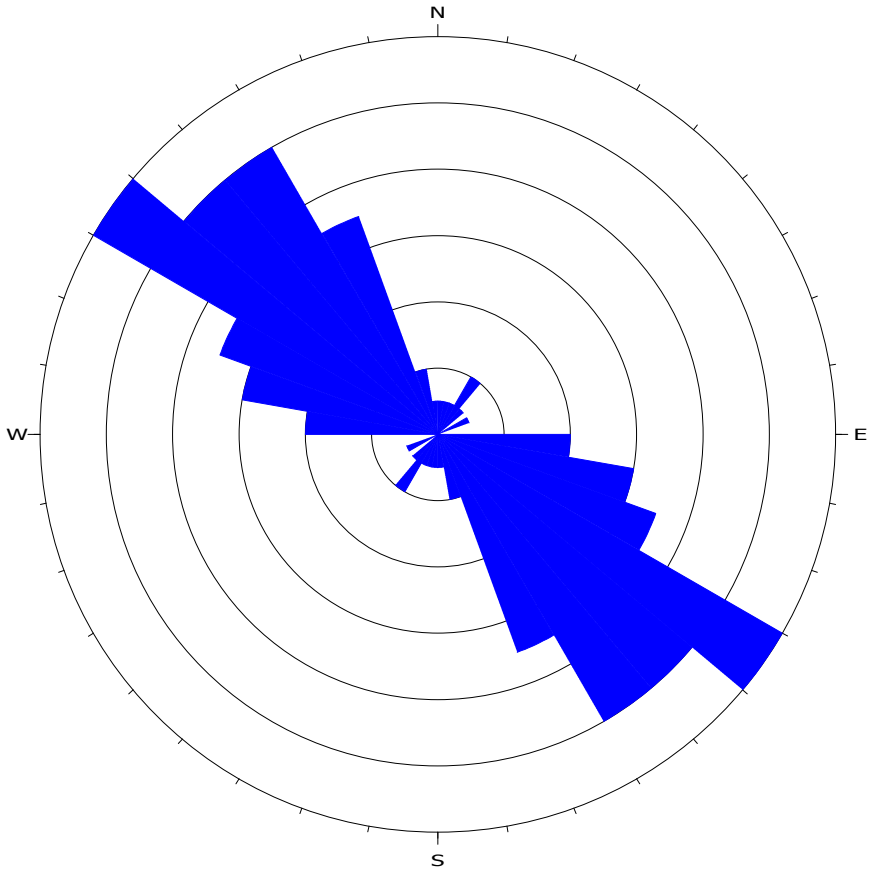
North ref. is true
Depth units are feet

Zone from 194.825 to 152.868ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-6D
152.868 - 194.825ft
Strike-direction, fracture rose-diagram

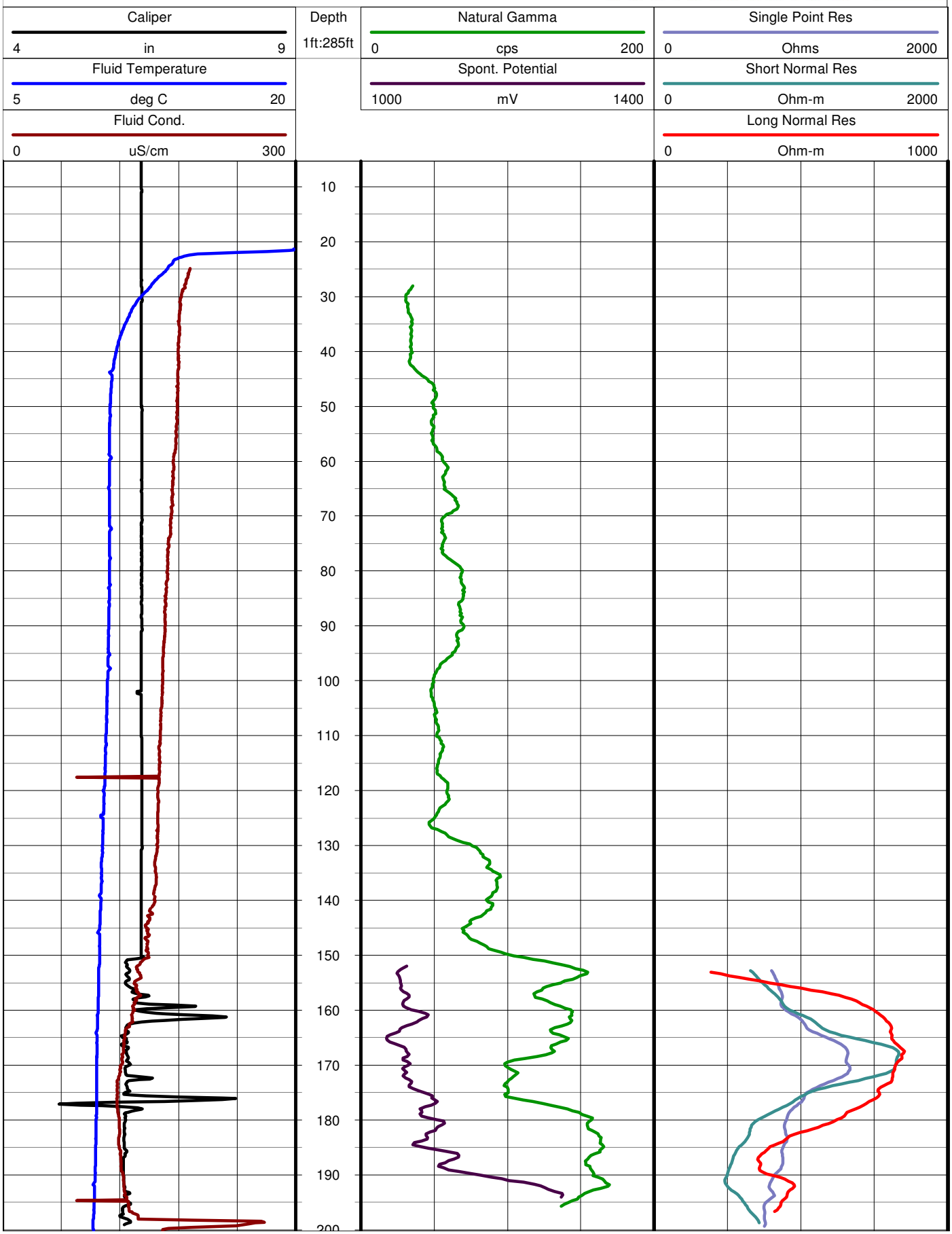


Azimuth Incr = 10°
N = 66

0 2 4 6 8 10 12

Company: Tetra Tech ECI
Location: Mountain Top, Pa
Well Name: RMW-6D
Reference: Ground Surface

EARTH DATA NORTHEAST, INC.



RMW-6D Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Friday, September 23, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
155	1	9:39	Ø	N/A	No flow	N/A	<
	2	9:40	Ø	N/A	No flow		
	3	9:41	Ø	N/A	No flow		
	4	9:41	Ø	N/A	No flow		
	5	9:42	Ø	N/A	No flow		
164	1	9:48	Ø	down	No flow	N/A	
	2	9:48	Ø	down	Incon.		
	3	9:49	Ø	up	No flow		
	4	9:50	Ø	up	No flow		
	5	9:51	0.040	down	Downward Flow		
	6	9:51	Ø	up	No flow		
	7	9:52	Ø	N/A	No flow		
	8	9:53	Ø	up	No flow		
	9	9:53	Ø	N/A	No flow		
171	1	9:59	Ø	N/A	No flow	N/A	
	2	9:59	Ø	up	No flow		
	3	10:00	Ø	N/A	No flow		
	4	10:01	Ø	N/A	No flow		
	5	10:01	Ø	N/A	No flow		
180	1	10:07	0.068	down	Downward Flow	**0.056**	
	2	10:08	0.056	down	Downward Flow		
	3	10:09	0.058	down	Downward Flow		
	4	10:10	0.053	down	Downward Flow		
	5	10:11	0.046	down	Downward Flow		
192	1	10:17	0.056	down	Downward Flow	Incon.	
	2	10:18	0.040	down	Downward Flow		
	3	10:18	Ø	N/A	No flow		
	4	10:19	Ø	N/A	No flow		
	5	10:20	Ø	N/A	No flow		
	6	10:21	Ø	N/A	No flow		
	7	10:22	Ø	down	No flow		
	8	10:23	0.033	down	Downward Flow		

Pumping Conditions: Pump set at ~ 30', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
155	1	11:25	1.000	up	Upward flow	Incon.	
	2	11:26	*	up	Upward flow		
	3	11:27	0.911	up	Upward flow		
	4	11:27	0.911	up	Upward flow		
	5	11:28	Ø	N/A	No flow		
	6	11:29	Ø	N/A	No flow		
164	1	11:18	0.911	up	Upward flow	**0.964**	
	2	11:19	1.000	up	Upward flow		
	3	11:20	1.000	up	Upward flow		
	4	11:20	0.911	up	Upward flow		
	5	11:21	1.000	up	Upward flow		<
171	1	11:05	0.911	up	Upward flow	**0.845**	
	2	11:06	0.911	up	Upward flow		
	3	11:07	1.000	up	Upward flow		
	4	11:07	0.911	up	Upward flow		
	5	11:08	0.826	up	Upward flow		
	6	11:09	0.779	up	Upward flow		
	7	11:10	0.834	up	Upward flow		
	8	11:11	0.757	up	Upward flow		
	9	11:12	0.757	up	Upward flow		
	10	11:13	0.768	up	Upward flow		<
180	1	10:56	0.032	down	Downward flow	**0.029**	
	2	10:57	0.031	down	Downward flow		
	3	10:58	0.028	down	Downward flow		
	4	10:59	0.029	down	Downward flow		
	5	11:00	0.027	down	Downward flow		
192	1	10:46	0.027	down	Downward flow	**0.033**	
	2	10:46	0.033	down	Downward flow		
	3	10:47	0.033	down	Downward flow		
	4	10:48	0.036	down	Downward flow		
	5	10:49	0.040	down	Downward flow		
	6	10:49	0.031	down	Downward flow		
	7	10:50	0.031	down	Downward flow		
	8	10:51	0.036	down	Downward flow		>

Please note: the probe's operating range is 0.03 to 1.0 gpm.
Any values presented outside of this range should be used for qualitative purposes only.

Key:

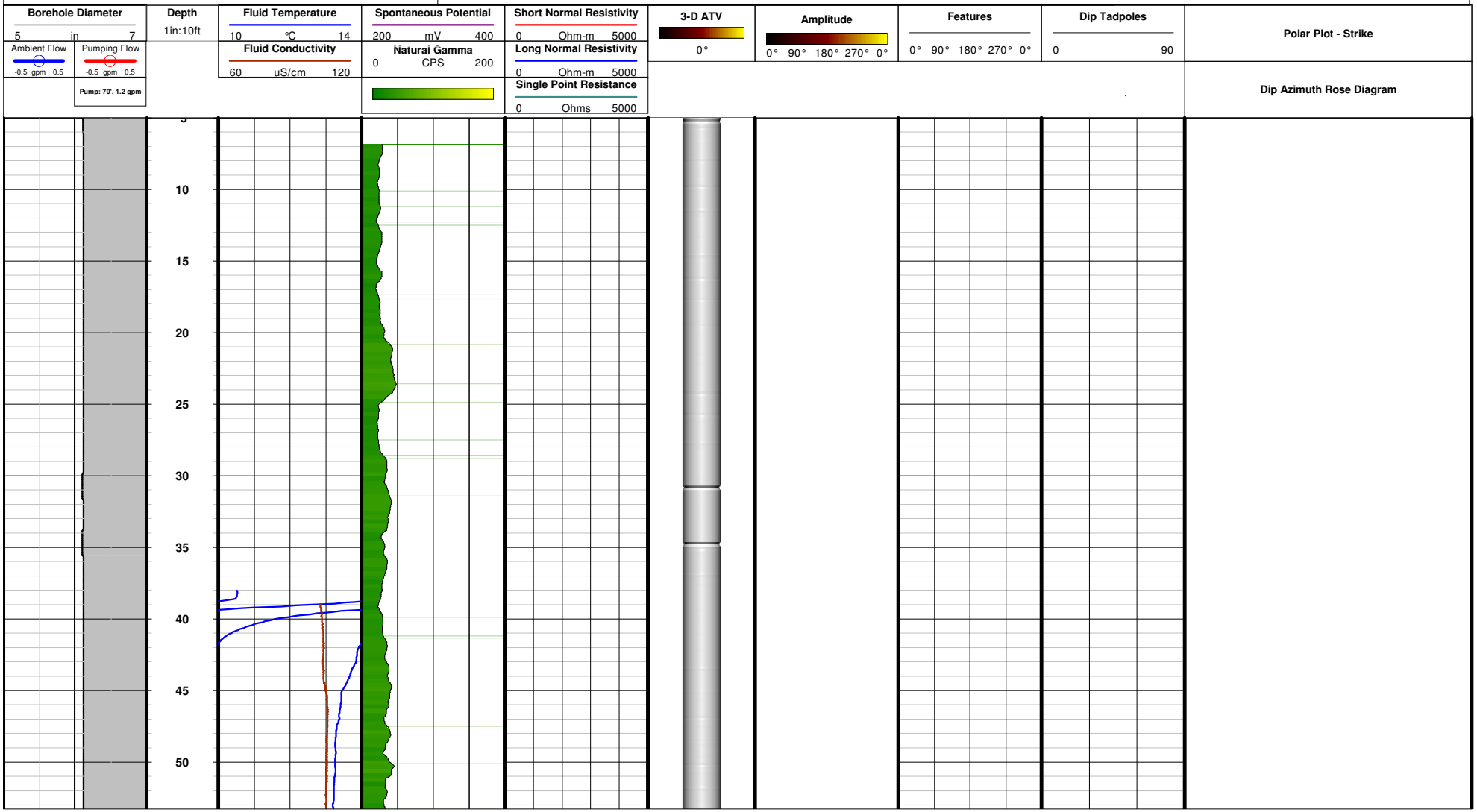
Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (into borehole)
>	Outflow zone (into formation)
	Used in average flow calculation
Incon.	Inconclusive results

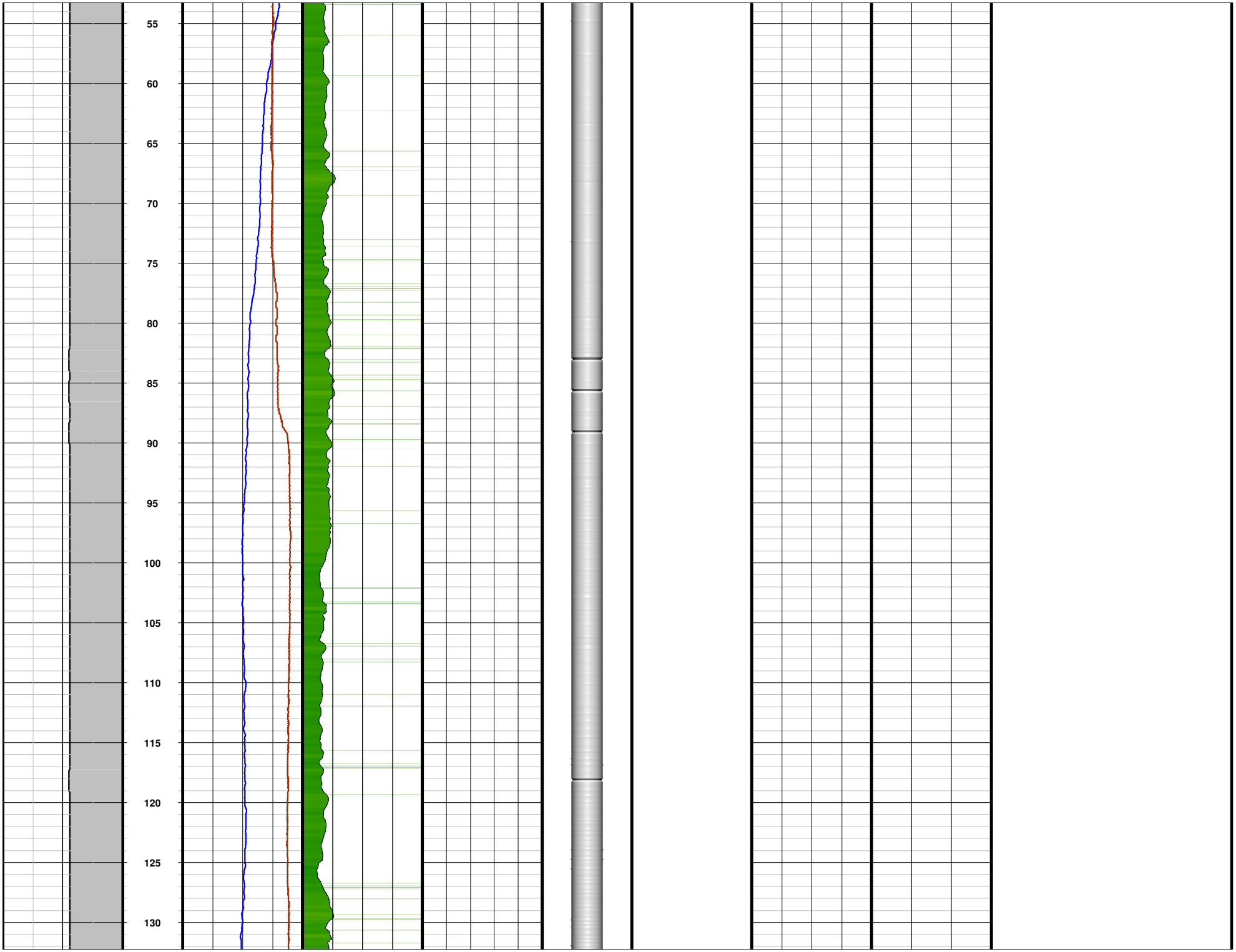
EDN
Earth Data Northeast, Inc.

Client: **Tetra Tech ECI**
Location: **Mountain Top, PA**
Well Name: **RMW-06D (REPLACEMENT)**
Date: **8-13-2012**
Depth Reference: **Top of Steel Casing**
Magnetic Declination: **-12.08**
North reference: **True**

Borehole Diameter: **6"**
Static Water Level: **38'**
Casing Depth: **150'**
Total Depth: **320'**

Minor Open Joint / Fracture
Partially Open Joint / Fracture
Bedding / Banding / Foliation

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60
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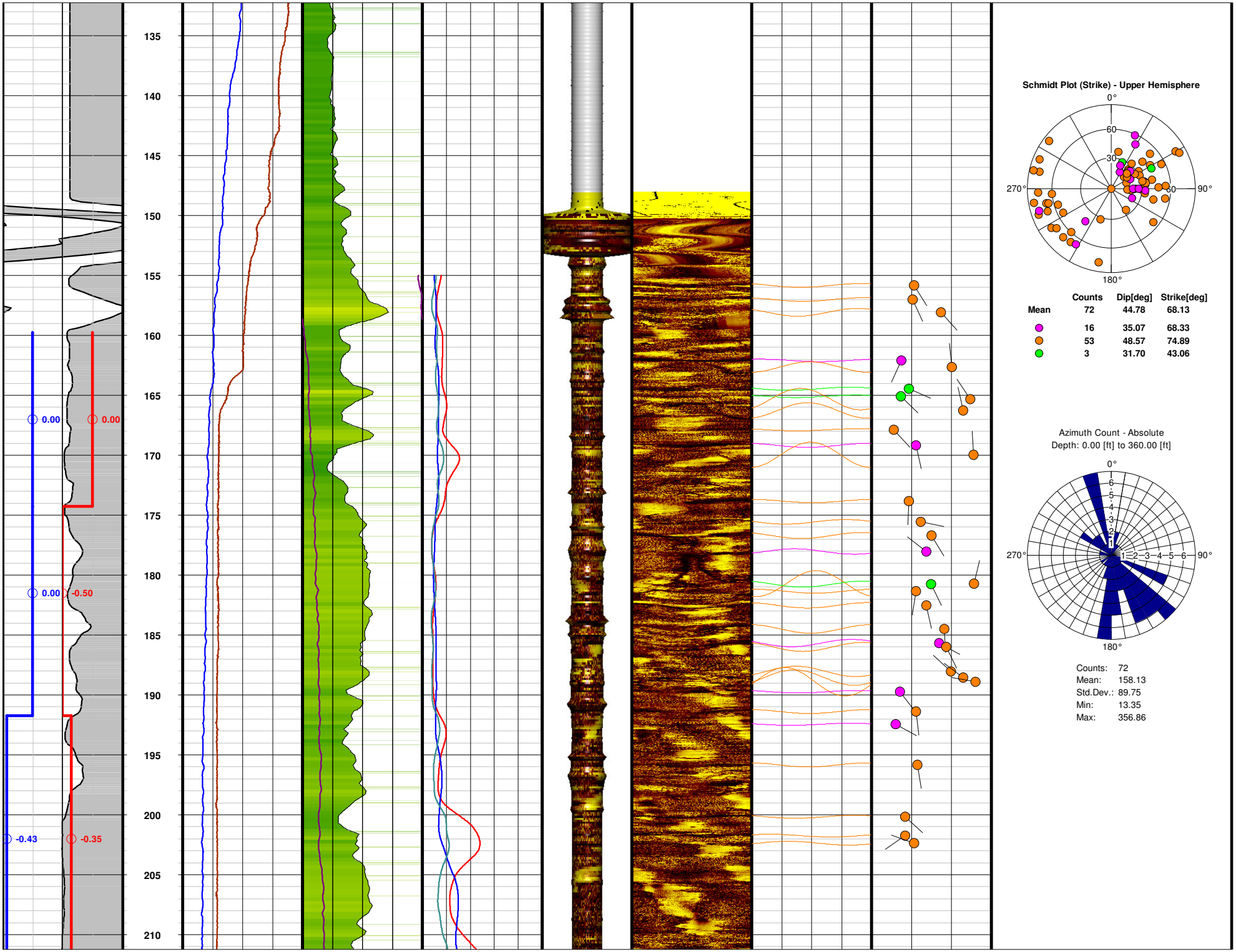
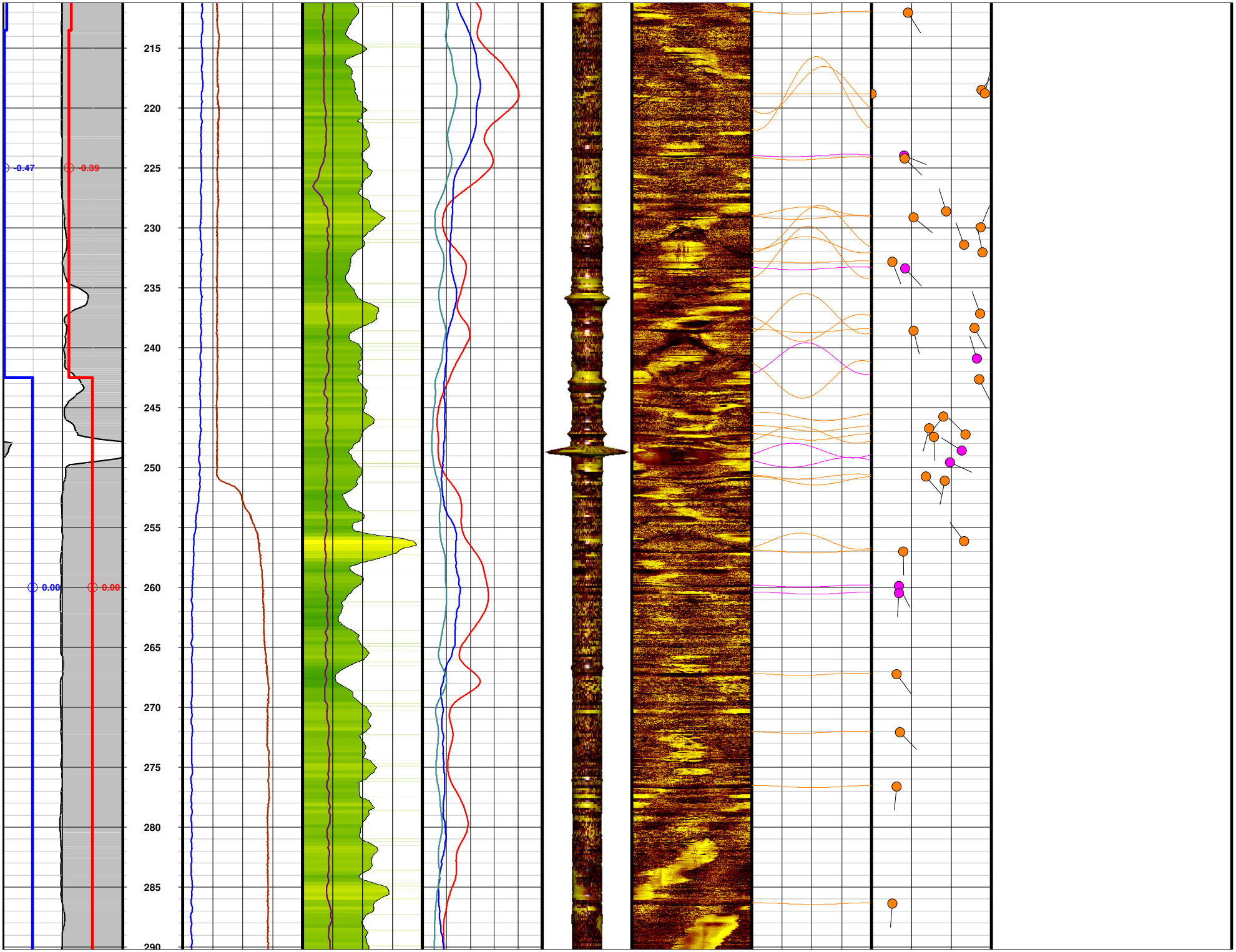
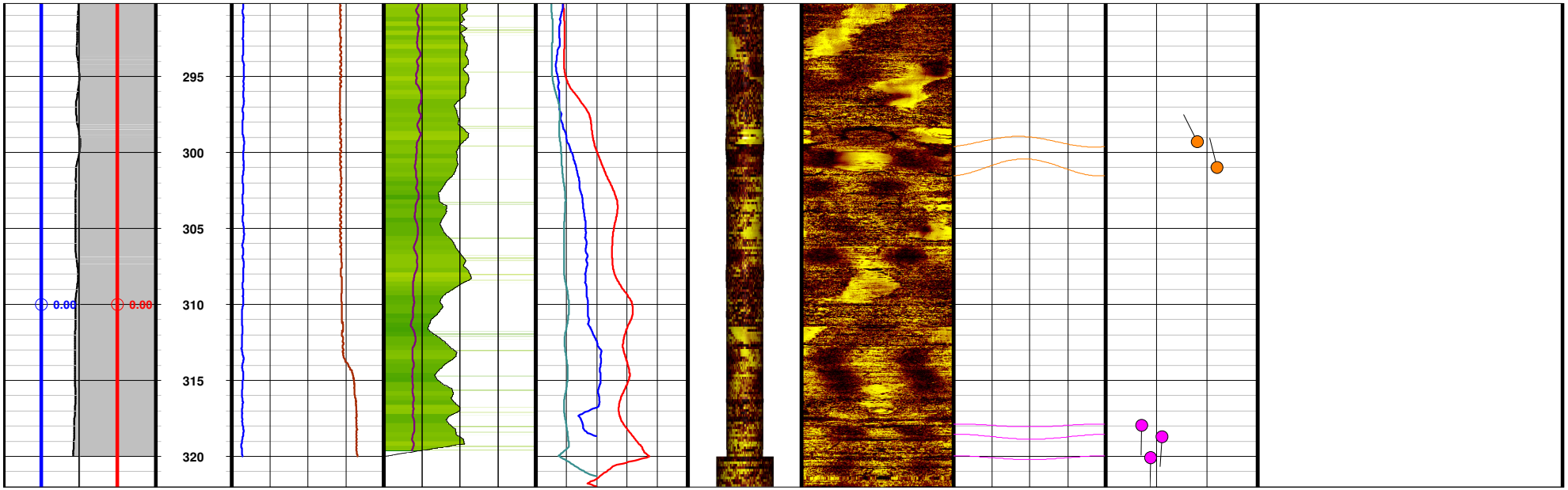
70
75
80
85
90
95
100
105
110
115
120
125
130


135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
0.00
0.00
0.00
-0.50
-0.43
-0.35
Schmidt Plot (Strike) - Upper Hemisphere
0°
90°
180°
270°
60
30
Counts Dip[deg] Strike[deg]
Mean 72 44.78 68.13
16 35.07 68.33
53 48.57 74.89
3 31.70 43.06
Azimuth Count - Absolute
Depth: 0.00 [ft] to 360.00 [ft]
Counts: 72
Mean: 158.13
Std.Dev.: 89.75
Min: 13.35
Max: 356.86


0.47
0.39
0.00
0.00
215
220
225
230
235
240
245
250
255
260
265
270
275
280
285
290

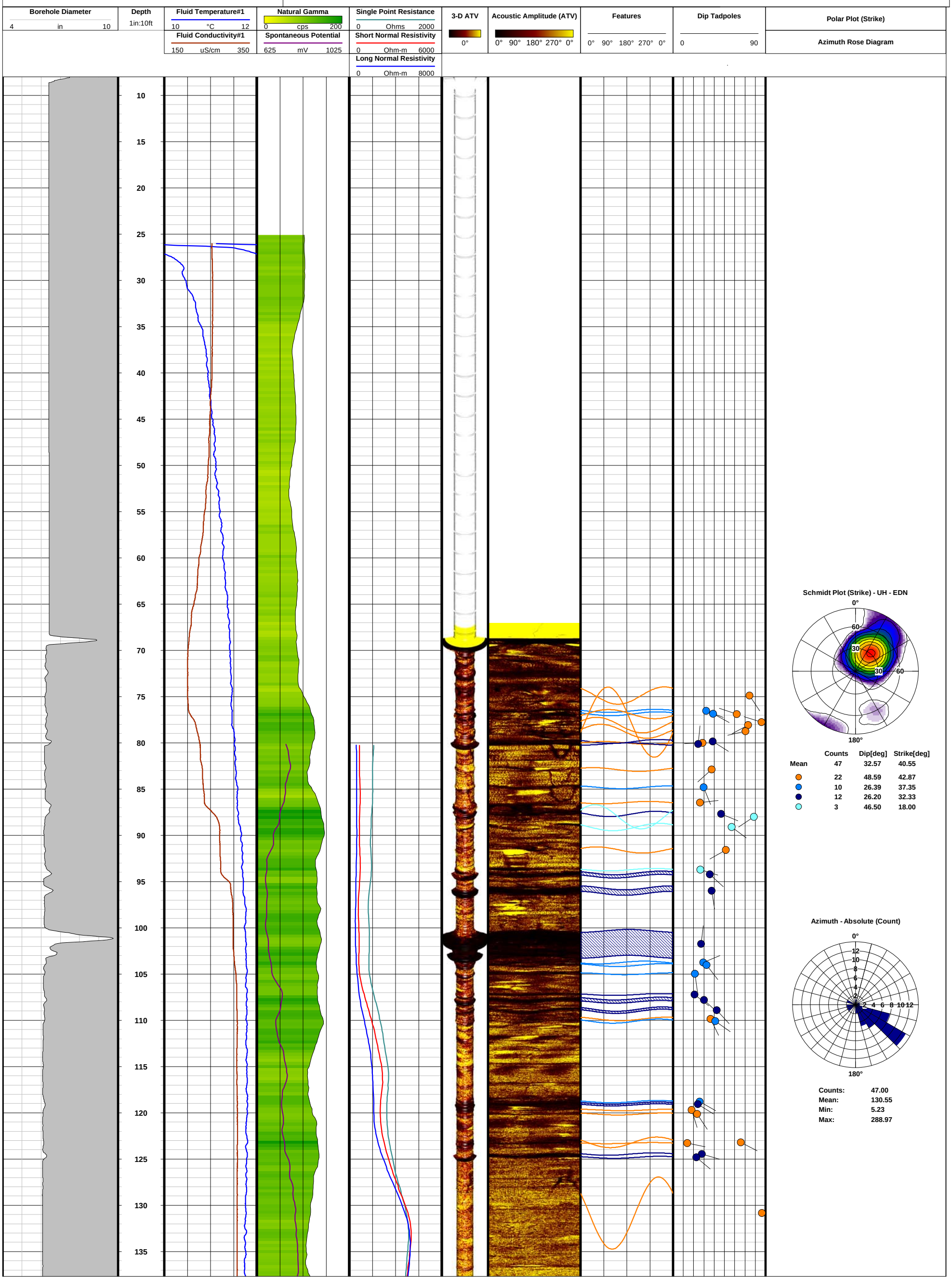

295
300
305
310
315
320
0.00
0.00

EDN
Earth Data Northeast, Inc.

Client: **TTECI**
Location: **Mountain Top, PA**
Well Name: **RMW-7D**
Date: **2/28/12**
Depth Reference: **Ground Surface**
Magnetic Declination: **-12.09**
North reference: **True**

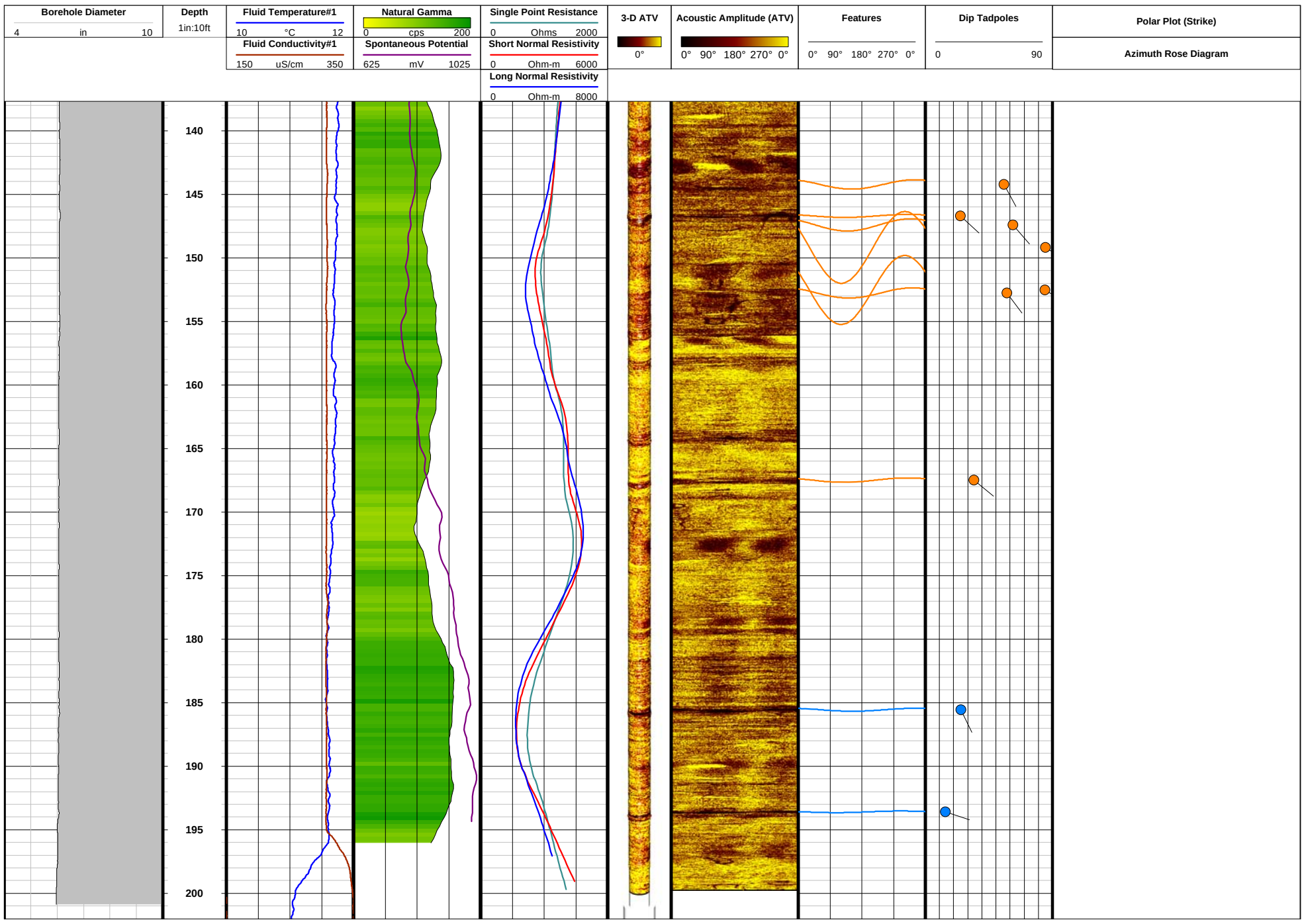
Borehole Diameter: **6" (nominal)**
Static Water Level: **26'**
Casing Depth: **68'**
Total Depth: **200'**

Fracture/Feature
Hairline Fracture/Feature
Discontinuous Fracture/Feature
Discontinuous Hairline Fracture/Feature



	Counts	Dip[deg]	Strike[deg]
Mean	47	32.57	40.55
	22	48.59	42.87
	10	26.39	37.35
	12	26.20	32.33
	3	46.50	18.00

Counts:	47.00
Mean:	130.55
Min:	5.23
Max:	288.97


Borehole Diameter
4 in 10
Depth
1in:10ft
Fluid Temperature#1
10 °C 12
Fluid Conductivity#1
150 uS/cm 350
Natural Gamma
0 cps 200
Spontaneous Potential
625 mV 1025
Single Point Resistance
0 Ohms 2000
Short Normal Resistivity
0 Ohm-m 6000
Long Normal Resistivity
0 Ohm-m 8000
3-D ATV
0°
Acoustic Amplitude (ATV)
0° 90° 180° 270° 0°
Features
0° 90° 180° 270° 0°
Dip Tadpoles
0 90
Polar Plot (Strike)
Azimuth Rose Diagram
140
145
150
155
160
165
170
175
180
185
190
195
200

RMW-7D Heat Pulse Summary

TTECI--Mountain Top, PA

Tuesday, February 28, 2012

Logging performed using the Mount Sopris Heat Pulse Flowmeter

Ambient Conditions

Depth (ft BGS)	Run	Clock Time (hours)	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
76	1	13:59	Ø	N/A	No flow	N/A	
	2	14:00	Ø	N/A	No flow		
	3	14:01	Ø	N/A	No flow		
90	1	14:04	0.138	down	Downward flow	**0.134**	<
	2	14:04	0.140	down	Downward flow		
	3	14:05	0.124	down	Downward flow		
114	1	14:09	0.119	down	Downward flow	**0.118**	>
	2	14:10	0.114	down	Downward flow		
	3	14:10	0.121	down	Downward flow		
	4	14:11	0.116	down	Downward flow		
128	1	14:15	0.101	down	Downward flow	**0.103**	>
	2	14:15	0.103	down	Downward flow		
	3	14:16	0.105	down	Downward flow		
150	1	14:20	0.114	down	Downward flow	**0.109**	
	2	14:21	0.111	down	Downward flow		
	3	14:22	0.101	down	Downward flow		
180	1	14:26	0.089	down	Downward flow	**0.089**	>
	2	14:26	0.086	down	Downward flow		
	3	14:27	0.092	down	Downward flow		
	4	14:29	0.089	down	Downward flow		

Pumping Conditions: Pump set at 50'; Rate: ~ 1.3 gpm

Depth (ft BGS)	Run	Clock Time (hours)	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
76	1	15:01	0.058	up	Upward flow	**0.057**	
	2	15:02	0.057	up	Upward flow		
	3	15:02	0.056	up	Upward flow		
90	1	14:57	Ø	N/A	No flow	N/A	<
	2	14:58	Ø	N/A	No flow		
	3	14:59	Ø	N/A	No flow		
114	1	14:53	0.453	down	Downward flow	**0.455**	<
	2	14:54	0.460	down	Downward flow		
	3	14:54	0.453	down	Downward flow		
128	1	14:49	0.319	down	Downward flow	**0.321**	>
	2	14:50	0.319	down	Downward flow		
	3	14:51	0.326	down	Downward flow		
150	1	14:45	0.398	down	Downward flow	**0.425**	<
	2	14:45	0.424	down	Downward flow		
	3	14:46	0.453	down	Downward flow		
180	1	14:40	0.065	down	Downward flow	**0.065**	>
	2	14:40	0.064	down	Downward flow		
	3	14:41	0.066	down	Downward flow		

Key:		
	Ø	No measurable flow
	N/A	Not applicable
	<	Inflow zone (into borehole)
	>	Outflow zone (into formation)
	Incon.	Inconclusive results
		Used in Average Fluid Velocity calculation

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-8D

Mountain Top, PA

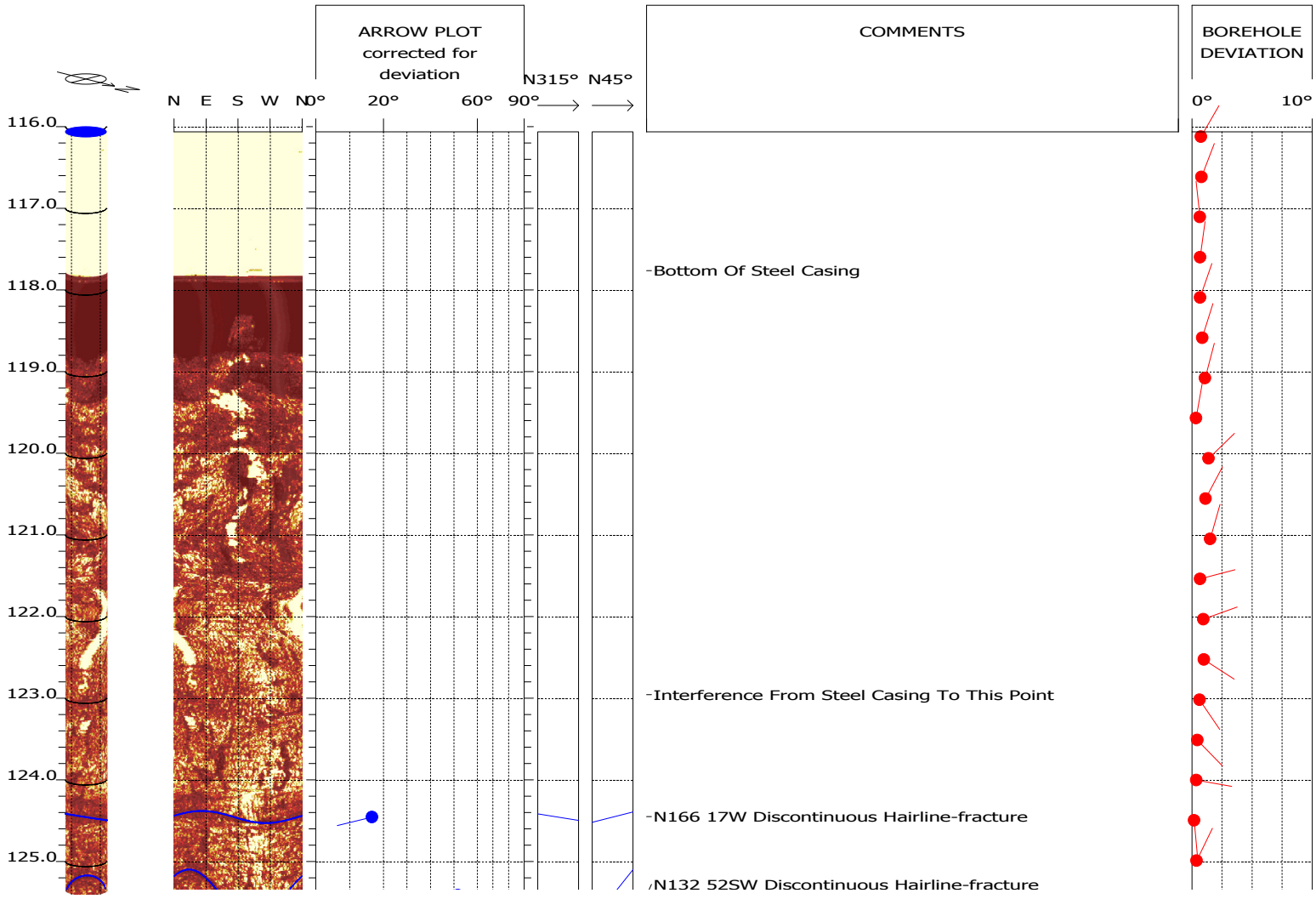
top of borehole.....
East: _
North:_
Elev: _

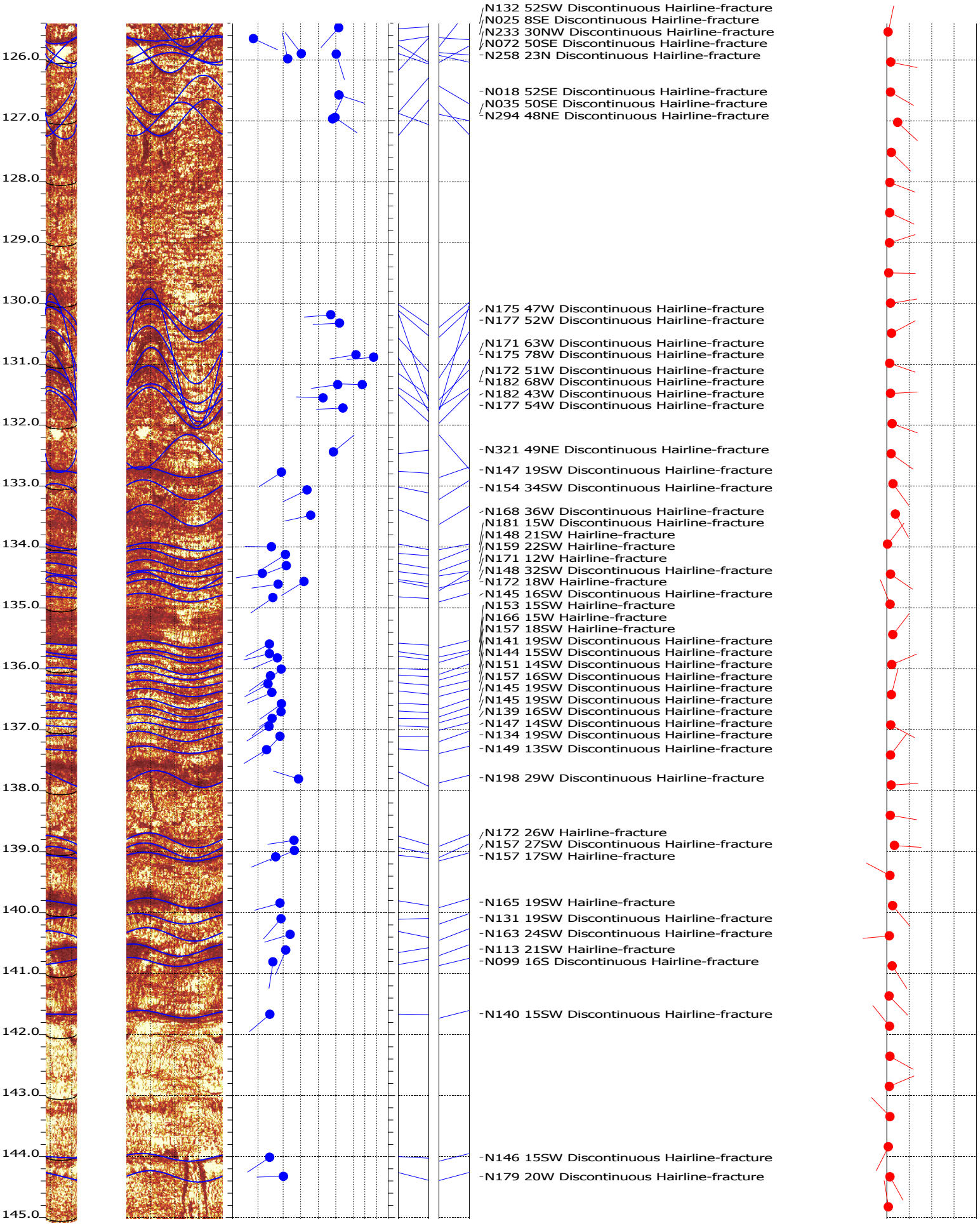
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

Zone from 186.000 to 116.000ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units

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130.0
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133.0
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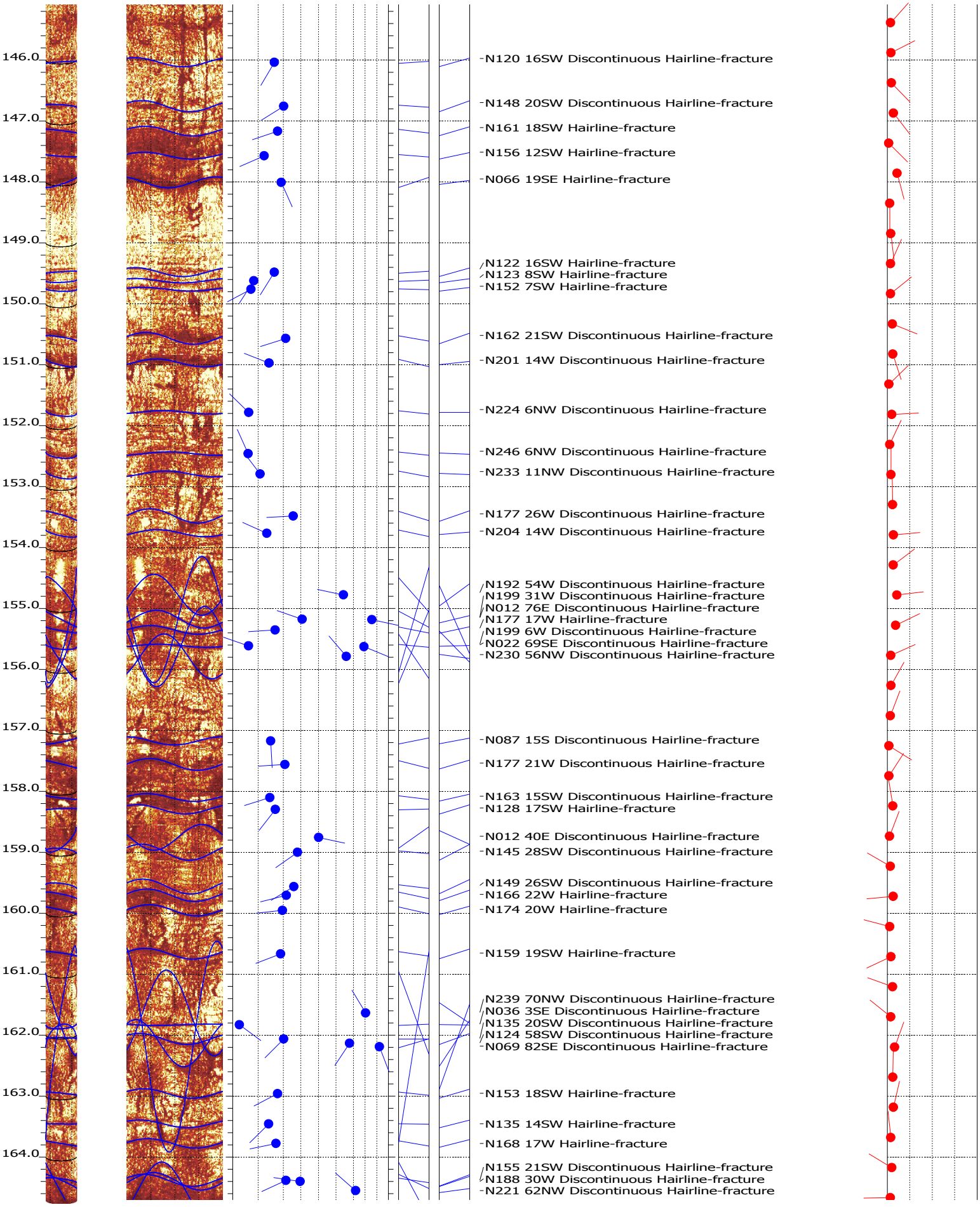
135.0
136.0
137.0
138.0
139.0
140.0
141.0
142.0
143.0
144.0
145.0
N132 52SW Discontinuous Hairline-fracture
N025 8SE Discontinuous Hairline-fracture
N233 30NW Discontinuous Hairline-fracture
N072 50SE Discontinuous Hairline-fracture
N258 23N Discontinuous Hairline-fracture
N018 52SE Discontinuous Hairline-fracture
N035 50SE Discontinuous Hairline-fracture
N294 48NE Discontinuous Hairline-fracture
N175 47W Discontinuous Hairline-fracture
N177 52W Discontinuous Hairline-fracture
N171 63W Discontinuous Hairline-fracture
N175 78W Discontinuous Hairline-fracture
N172 51W Discontinuous Hairline-fracture
N182 68W Discontinuous Hairline-fracture
N182 43W Discontinuous Hairline-fracture
N177 54W Discontinuous Hairline-fracture
N321 49NE Discontinuous Hairline-fracture
N147 19SW Discontinuous Hairline-fracture
N154 34SW Discontinuous Hairline-fracture
N168 36W Discontinuous Hairline-fracture
N181 15W Discontinuous Hairline-fracture
N148 21SW Hairline-fracture
N159 22SW Hairline-fracture
N171 12W Hairline-fracture
N148 32SW Discontinuous Hairline-fracture
N172 18W Hairline-fracture
N145 16SW Discontinuous Hairline-fracture
N153 15SW Hairline-fracture
N166 15W Hairline-fracture
N157 18SW Hairline-fracture
N141 19SW Discontinuous Hairline-fracture
N144 15SW Discontinuous Hairline-fracture
N151 14SW Discontinuous Hairline-fracture
N157 16SW Discontinuous Hairline-fracture
N145 19SW Discontinuous Hairline-fracture
N145 19SW Discontinuous Hairline-fracture
N139 16SW Discontinuous Hairline-fracture
N147 14SW Discontinuous Hairline-fracture
N134 19SW Discontinuous Hairline-fracture
N149 13SW Discontinuous Hairline-fracture
N198 29W Discontinuous Hairline-fracture
N172 26W Hairline-fracture
N157 27SW Discontinuous Hairline-fracture
N157 17SW Hairline-fracture
N165 19SW Hairline-fracture
N131 19SW Discontinuous Hairline-fracture
N163 24SW Discontinuous Hairline-fracture
N113 21SW Hairline-fracture
N099 16S Discontinuous Hairline-fracture
N140 15SW Discontinuous Hairline-fracture
N146 15SW Discontinuous Hairline-fracture
N179 20W Discontinuous Hairline-fracture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156.0
157.0
158.0
159.0
160.0
161.0
162.0
163.0
164.0
-N120 16SW Discontinuous Hairline-fracture
-N148 20SW Discontinuous Hairline-fracture
-N161 18SW Hairline-fracture
-N156 12SW Hairline-fracture
-N066 19SE Hairline-fracture
N122 16SW Hairline-fracture
N123 8SW Hairline-fracture
-N152 7SW Hairline-fracture
-N162 21SW Discontinuous Hairline-fracture
-N201 14W Discontinuous Hairline-fracture
-N224 6NW Discontinuous Hairline-fracture
-N246 6NW Discontinuous Hairline-fracture
-N233 11NW Discontinuous Hairline-fracture
-N177 26W Discontinuous Hairline-fracture
-N204 14W Discontinuous Hairline-fracture
N192 54W Discontinuous Hairline-fracture
N199 31W Discontinuous Hairline-fracture
N012 76E Discontinuous Hairline-fracture
N177 17W Hairline-fracture
N199 6W Discontinuous Hairline-fracture
N022 69SE Discontinuous Hairline-fracture
-N230 56NW Discontinuous Hairline-fracture
-N087 15S Discontinuous Hairline-fracture
-N177 21W Discontinuous Hairline-fracture
-N163 15SW Discontinuous Hairline-fracture
-N128 17SW Hairline-fracture
-N012 40E Discontinuous Hairline-fracture
-N145 28SW Discontinuous Hairline-fracture
N149 26SW Discontinuous Hairline-fracture
-N166 22W Hairline-fracture
-N174 20W Hairline-fracture
-N159 19SW Hairline-fracture
N239 70NW Discontinuous Hairline-fracture
N036 3SE Discontinuous Hairline-fracture
N135 20SW Discontinuous Hairline-fracture
N124 58SW Discontinuous Hairline-fracture
-N069 82SE Discontinuous Hairline-fracture
-N153 18SW Hairline-fracture
-N135 14SW Hairline-fracture
-N168 17W Hairline-fracture
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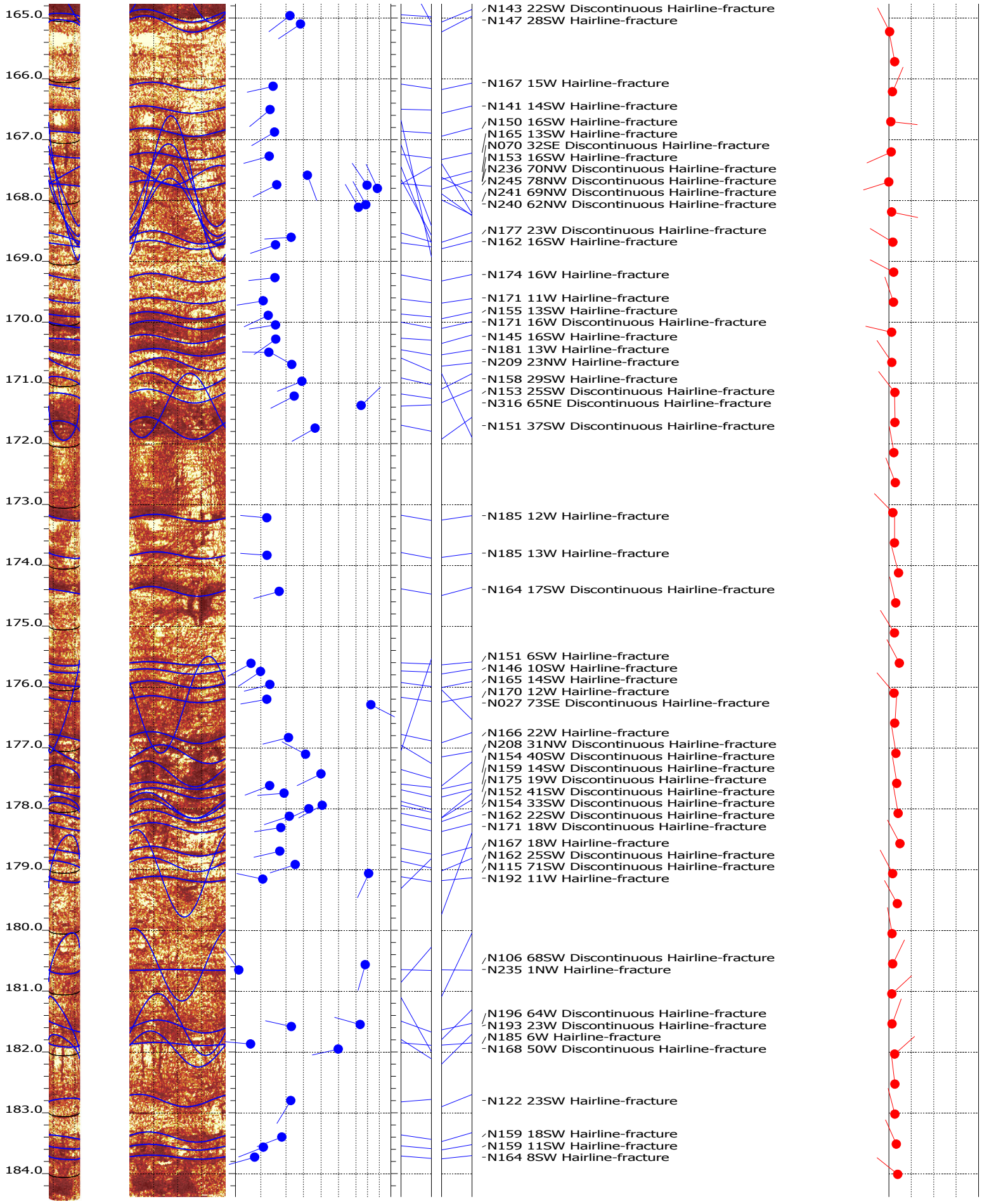
N188 30W Discontinuous Hairline-fracture
-N221 62NW Discontinuous Hairline-fracture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N167 15W Hairline-fracture
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N150 16SW Hairline-fracture
N165 13SW Hairline-fracture
N070 32SE Discontinuous Hairline-fracture
N153 16SW Hairline-fracture
N236 70NW Discontinuous Hairline-fracture
N245 78NW Discontinuous Hairline-fracture
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N240 62NW Discontinuous Hairline-fracture
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N316 65NE Discontinuous Hairline-fracture
N151 37SW Discontinuous Hairline-fracture
N185 12W Hairline-fracture
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N164 17SW Discontinuous Hairline-fracture
N151 6SW Hairline-fracture
N146 10SW Hairline-fracture
N165 14SW Hairline-fracture
N170 12W Hairline-fracture
N027 73SE Discontinuous Hairline-fracture
N166 22W Hairline-fracture
N208 31NW Discontinuous Hairline-fracture
N154 40SW Discontinuous Hairline-fracture
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N162 22SW Discontinuous Hairline-fracture
N171 18W Discontinuous Hairline-fracture
N167 18W Hairline-fracture
N162 25SW Discontinuous Hairline-fracture
N115 71SW Discontinuous Hairline-fracture
N192 11W Hairline-fracture
N106 68SW Discontinuous Hairline-fracture
N235 1NW Hairline-fracture
N196 64W Discontinuous Hairline-fracture
N193 23W Discontinuous Hairline-fracture
N185 6W Hairline-fracture
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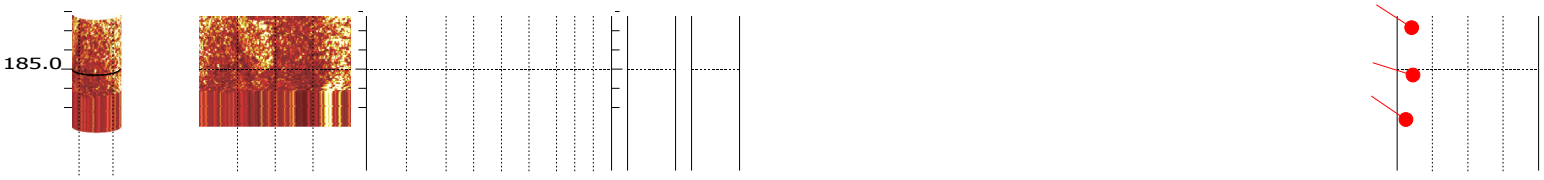
N159 11SW Hairline-fracture
N164 8SW Hairline-fracture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DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-8D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

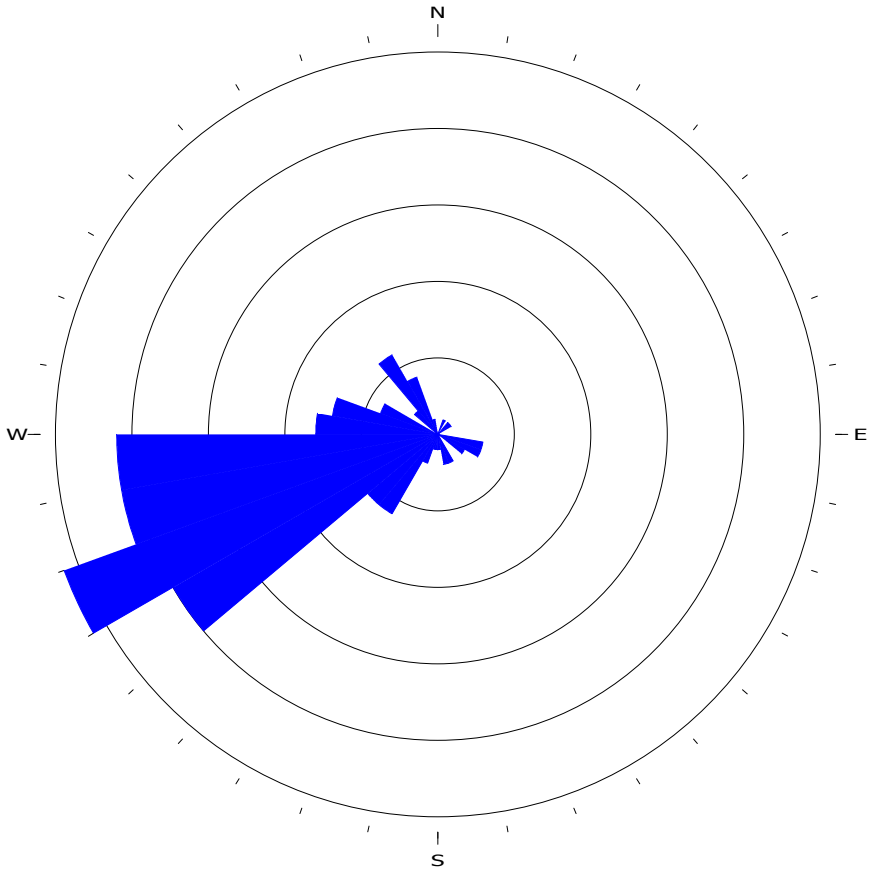
North ref. is true
Depth units are feet

Zone from 184.229 to 123.951ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-8D
123.951 - 184.229ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 152

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-8D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

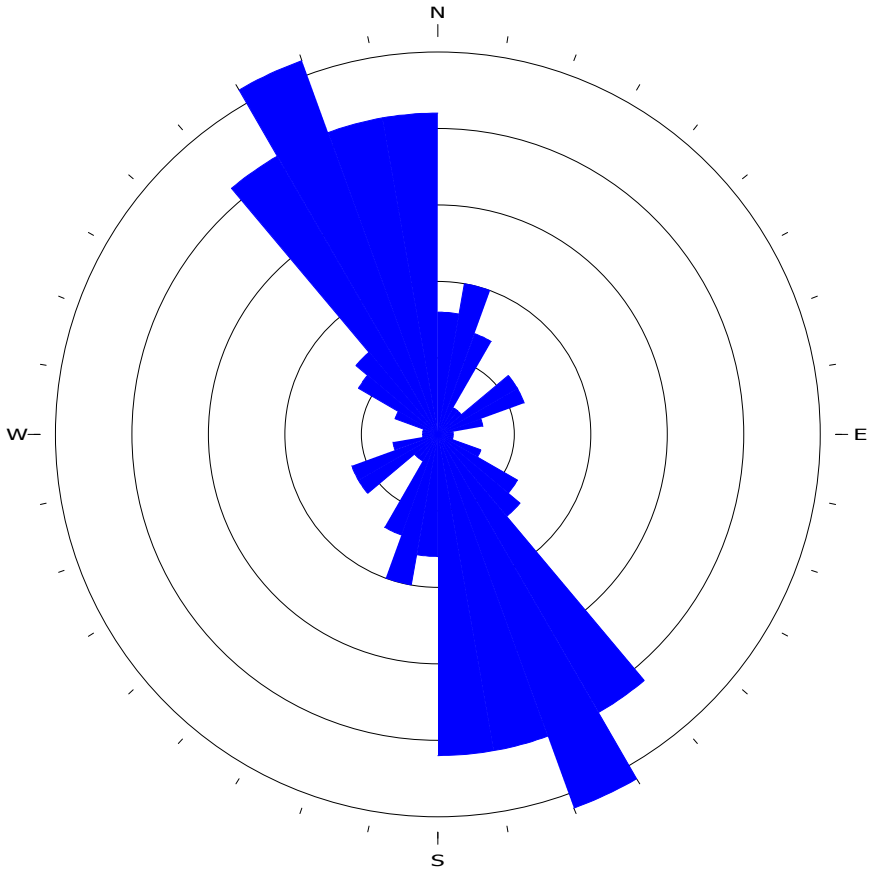
North ref. is true
Depth units are feet

Zone from 184.229 to 123.951ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-8D
123.951 - 184.229ft
Strike-direction, fracture rose-diagram

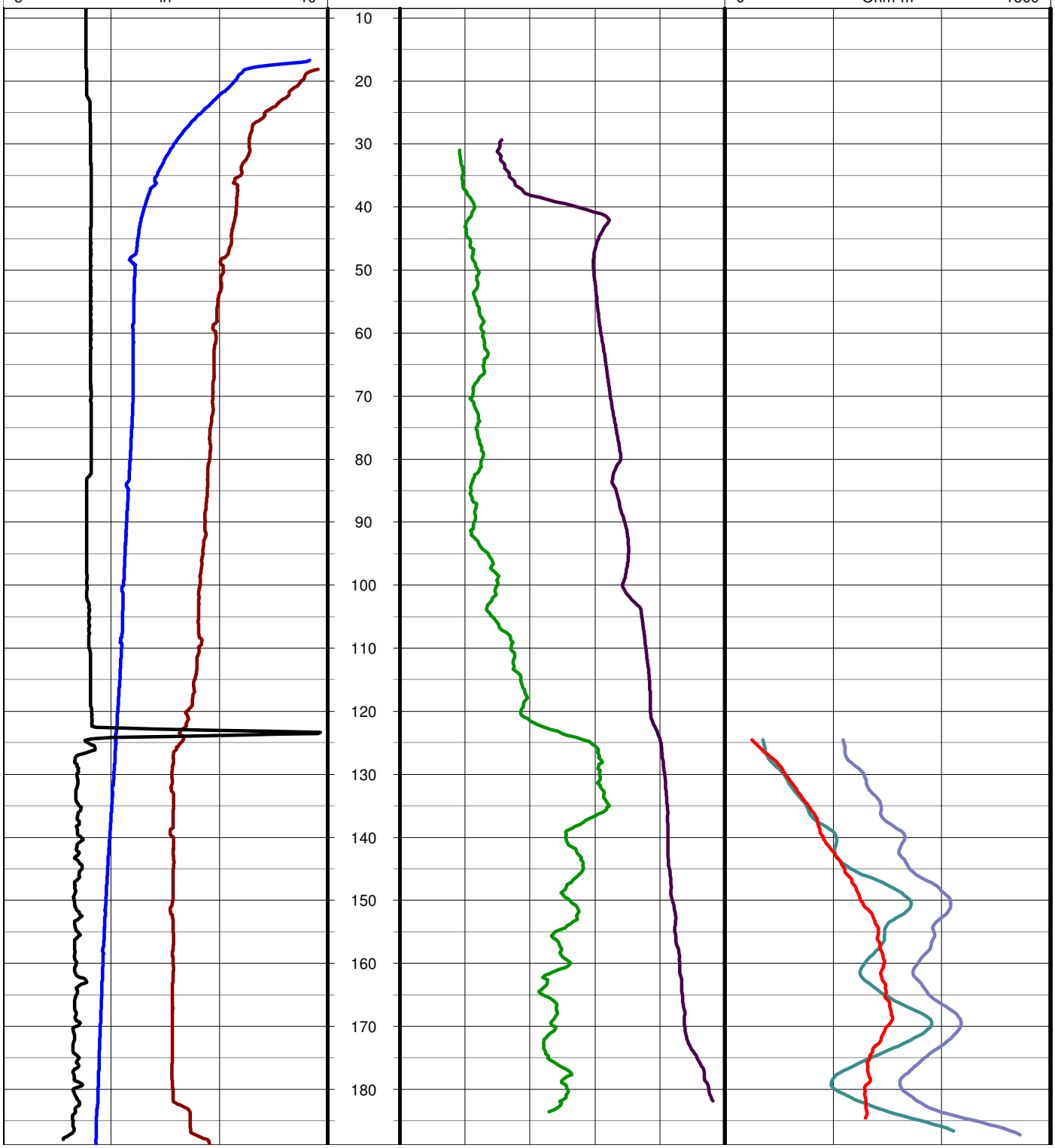


Azimuth Incr = 10°
N = 152

Company: Tetra Tech
Location: Mountain Top, Pa
Well Name: RMW-8D
Reference: Top of Steel Casing

EARTH DATA NORTHEAST, INC.

Fluid Temperature	Depth	Natural Gamma	Single Point Res
5 deg C 20	1ft:275ft	0 cps 250	0 Ohms 1500
Fluid Cond.		Spont. Potential	Short Normal Res
0 uS/cm 300		100 mV 1500	0 Ohm-m 2000
Caliper			Long Normal Res
5 in 10			0 Ohm-m 1500



RMW-8D Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Friday, September 23, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
							<
130	1	12:06	0.027	down	Downward Flow	0.022	
	2	12:07	0.021	down	Downward Flow		
	3	12:08	0.021	down	Downward Flow		
	4	12:08	0.022	down	Downward Flow		
	5	12:09	0.022	down	Downward Flow		
147	1	12:15	0.021	down	Downward Flow	0.021	
	2	12:15	0.027	down	Downward Flow		
	3	12:16	0.027	down	Downward Flow		
	4	12:17	0.022	down	Downward Flow		
	5	12:17	0.021	down	Downward Flow		
155	1	12:24	Incon.	N/A	Incon.	0.021	
	2	12:25	0.021	down	Downward Flow		
	3	12:26	0.021	down	Downward Flow		
	4	12:27	0.021	down	Downward Flow		
	5	12:27	0.022	down	Downward Flow		
							>
164	1	12:35	Ø	N/A	No flow	N/A	
	2	12:35	Ø	N/A	No flow		
	3	12:36	Ø	N/A	No flow		
	4	12:37	Ø	up	No flow		
	5	12:38	Ø	N/A	No flow		
170	1	12:44	0.018	N/A	Downward Flow	N/A	
	2	12:45	0.018	N/A	Downward Flow		
	3	12:45	Ø	N/A	No flow		
	4	12:46	Ø	N/A	No flow		
	5	12:47	Ø	N/A	No flow		

**Please note: the lower limit of the probe's operating range is 0.03 gpm*

Pumping Conditions: Pump set at ~ 50', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
130	1	1:38	0.207	up	Upward Flow	0.207	
	2	1:39	0.202	up	Upward Flow		
	3	1:39	0.207	up	Upward Flow		
	4	1:40	0.214	up	Upward Flow		
	5	1:41	0.207	up	Upward Flow		
							>
147	1	1:29	0.234	up	Upward Flow	0.239	
	2	1:30	0.242	up	Upward Flow		
	3	1:31	0.242	up	Upward Flow		
	4	1:32	0.242	up	Upward Flow		
	5	1:33	0.234	up	Upward Flow		
							<
155	1	1:20	0.186	up	Upward Flow	0.189	
	2	1:21	0.191	up	Upward Flow		
	3	1:22	0.186	up	Upward Flow		
	4	1:23	0.191	up	Upward Flow		
	5	1:23	0.191	up	Upward Flow		
							<
164	1	1:13	0.105	up	Upward Flow	0.108	
	2	1:14	0.109	up	Upward Flow		
	5	1:15	0.109	up	Upward Flow		
	4	1:15	0.109	up	Upward Flow		
	5	1:16	0.109	up	Upward Flow		
							<
170	1	1:05	0.072	up	Upward Flow	0.077	
	2	1:06	0.077	up	Upward Flow		
	3	1:07	0.077	up	Upward Flow		
	4	1:08	0.078	up	Upward Flow		
	5	1:08	0.079	up	Upward Flow		
							<

Key:

Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (into borehole)
>	Outflow zone (into formation)
	Used in average flow calculation
Incon.	Inconclusive results

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

04 Apr 2012

TTECI

Borehole: RMW-9D

Mountain Top, PA

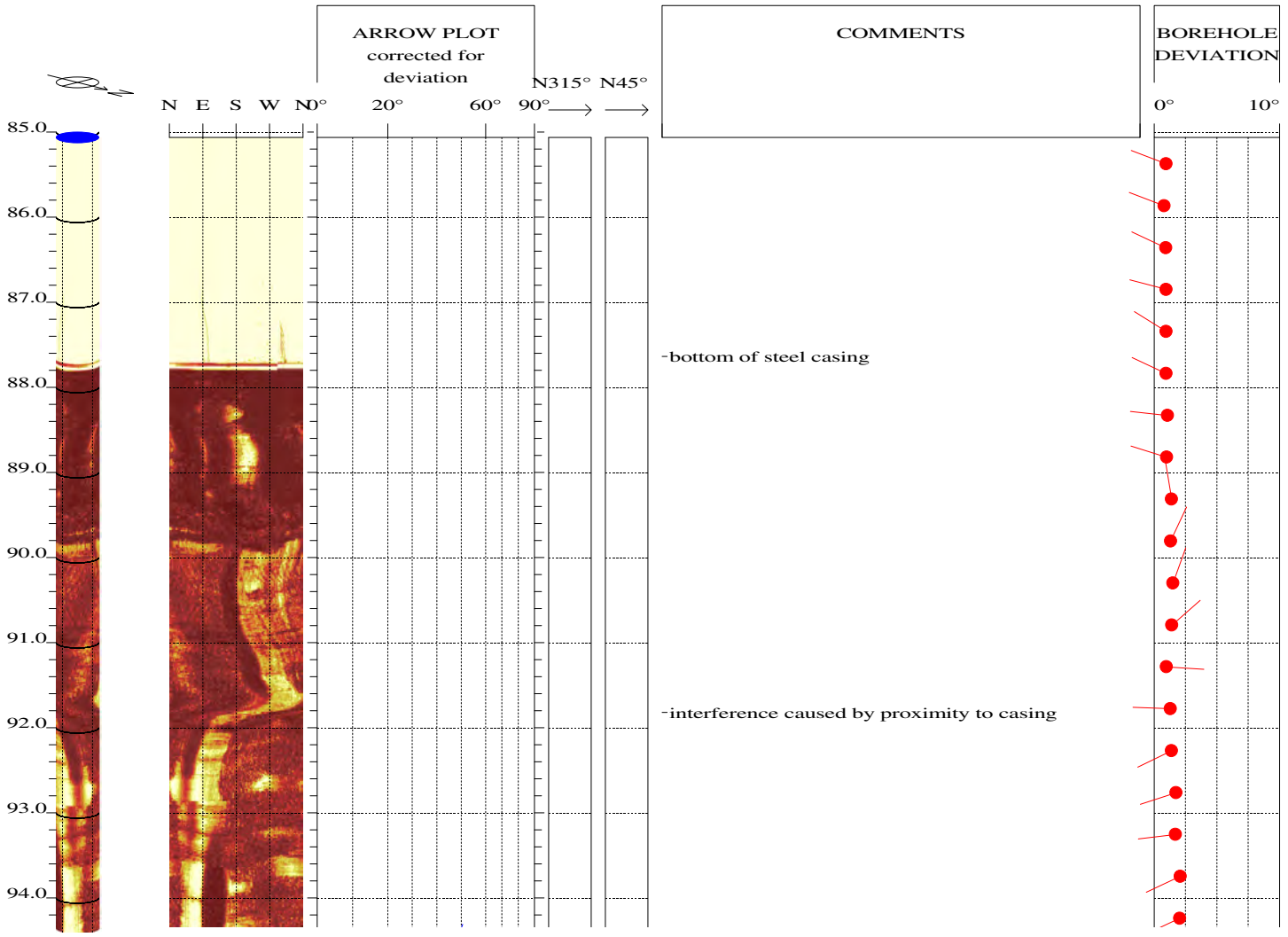
top of borehole.....
East: _
North:
Elev:_

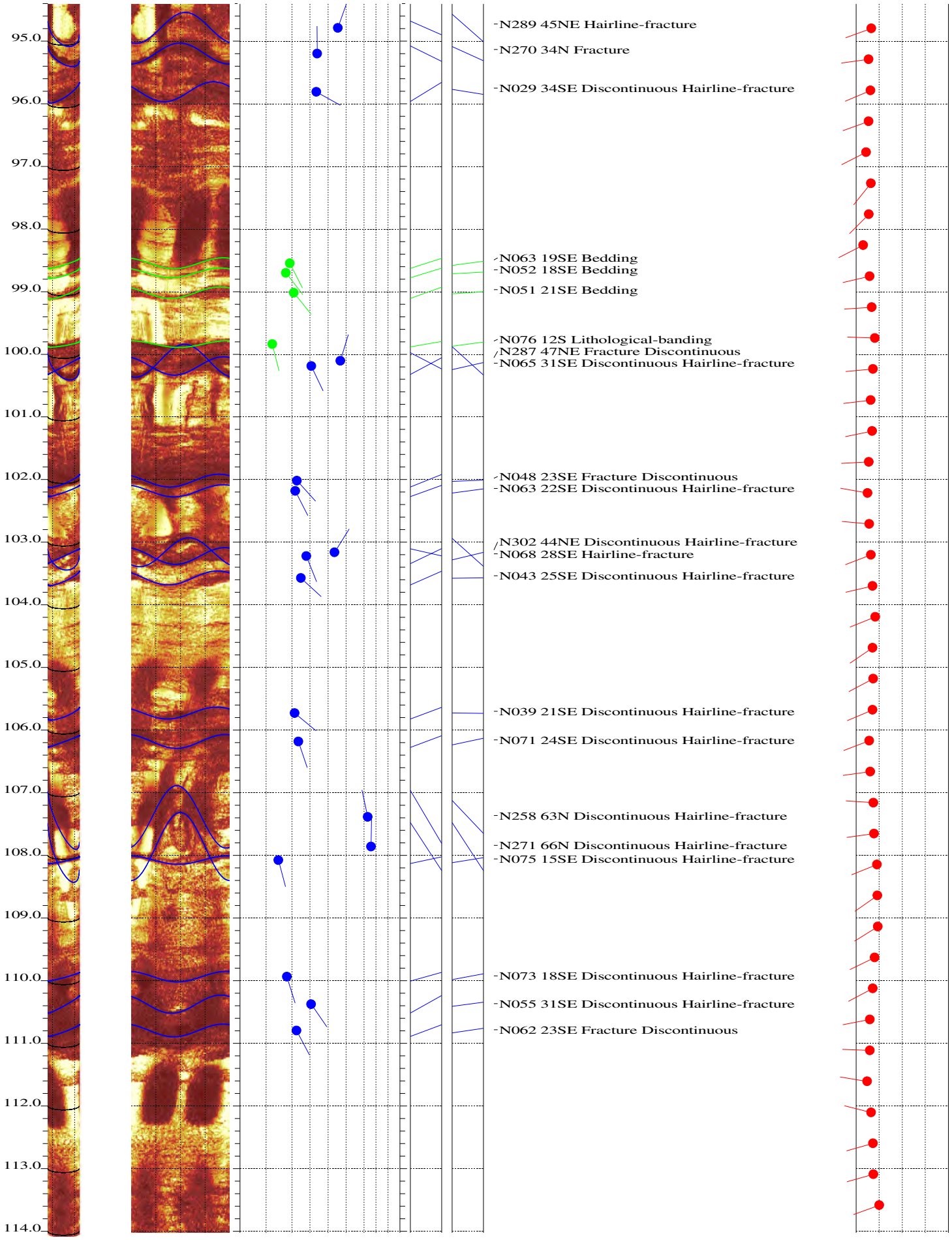
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

Zone from 247.000 to 85.000ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units

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N289 45NE Hairline-fracture
N270 34N Fracture
N029 34SE Discontinuous Hairline-fracture
N063 19SE Bedding
N052 18SE Bedding
N051 21SE Bedding
N076 12S Lithological-banding
N287 47NE Fracture Discontinuous
N065 31SE Discontinuous Hairline-fracture
N048 23SE Fracture Discontinuous
N063 22SE Discontinuous Hairline-fracture
N302 44NE Discontinuous Hairline-fracture
N068 28SE Hairline-fracture
N043 25SE Discontinuous Hairline-fracture
N039 21SE Discontinuous Hairline-fracture
N071 24SE Discontinuous Hairline-fracture
N258 63N Discontinuous Hairline-fracture
N271 66N Discontinuous Hairline-fracture
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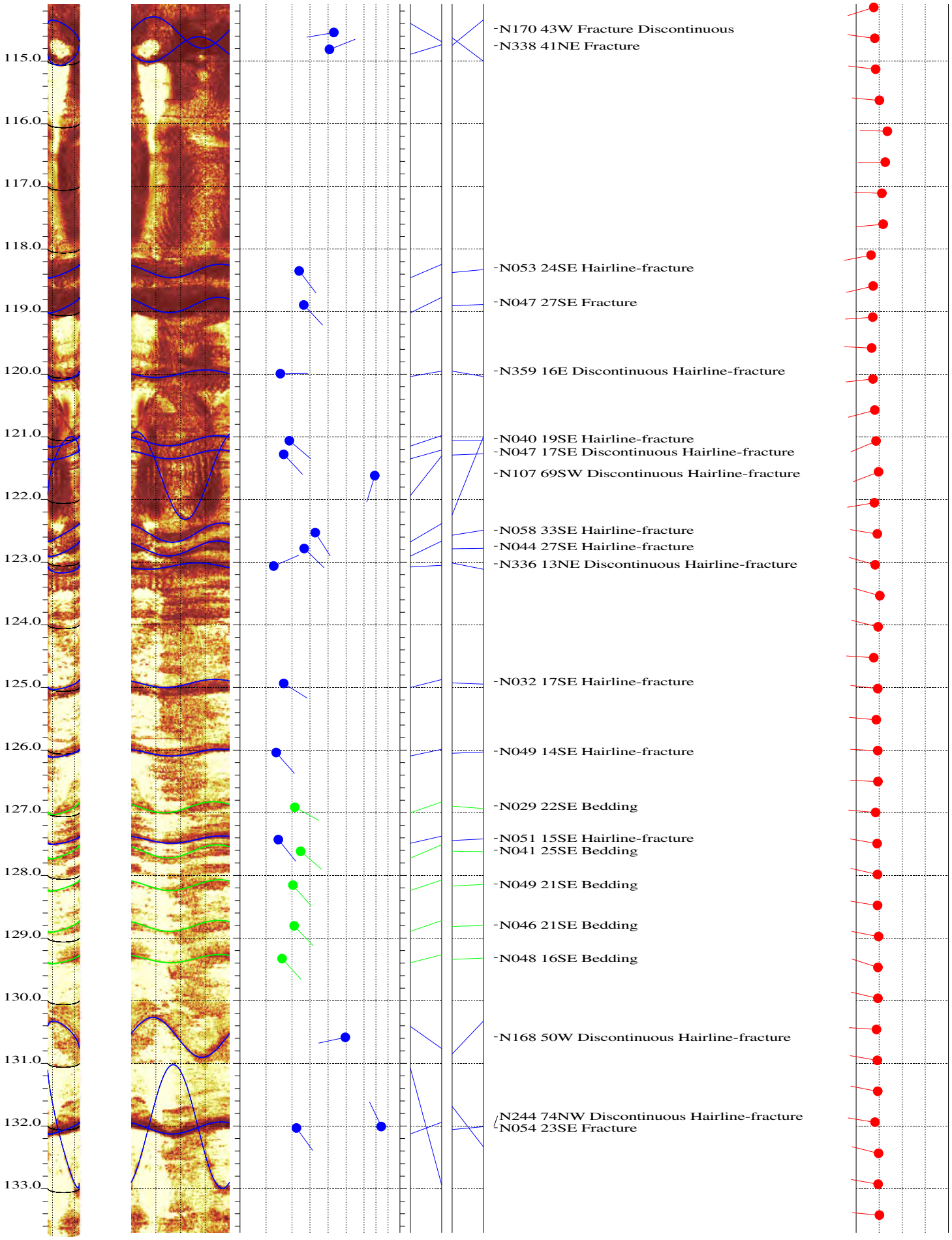
N055 31SE Discontinuous Hairline-fracture
N062 23SE Fracture Discontinuous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-N338 41NE Fracture
-N053 24SE Hairline-fracture
-N047 27SE Fracture
-N359 16E Discontinuous Hairline-fracture
-N040 19SE Hairline-fracture
-N047 17SE Discontinuous Hairline-fracture
-N107 69SW Discontinuous Hairline-fracture
-N058 33SE Hairline-fracture
-N044 27SE Hairline-fracture
-N336 13NE Discontinuous Hairline-fracture
-N032 17SE Hairline-fracture
-N049 14SE Hairline-fracture
-N029 22SE Bedding
-N051 15SE Hairline-fracture
-N041 25SE Bedding
-N049 21SE Bedding
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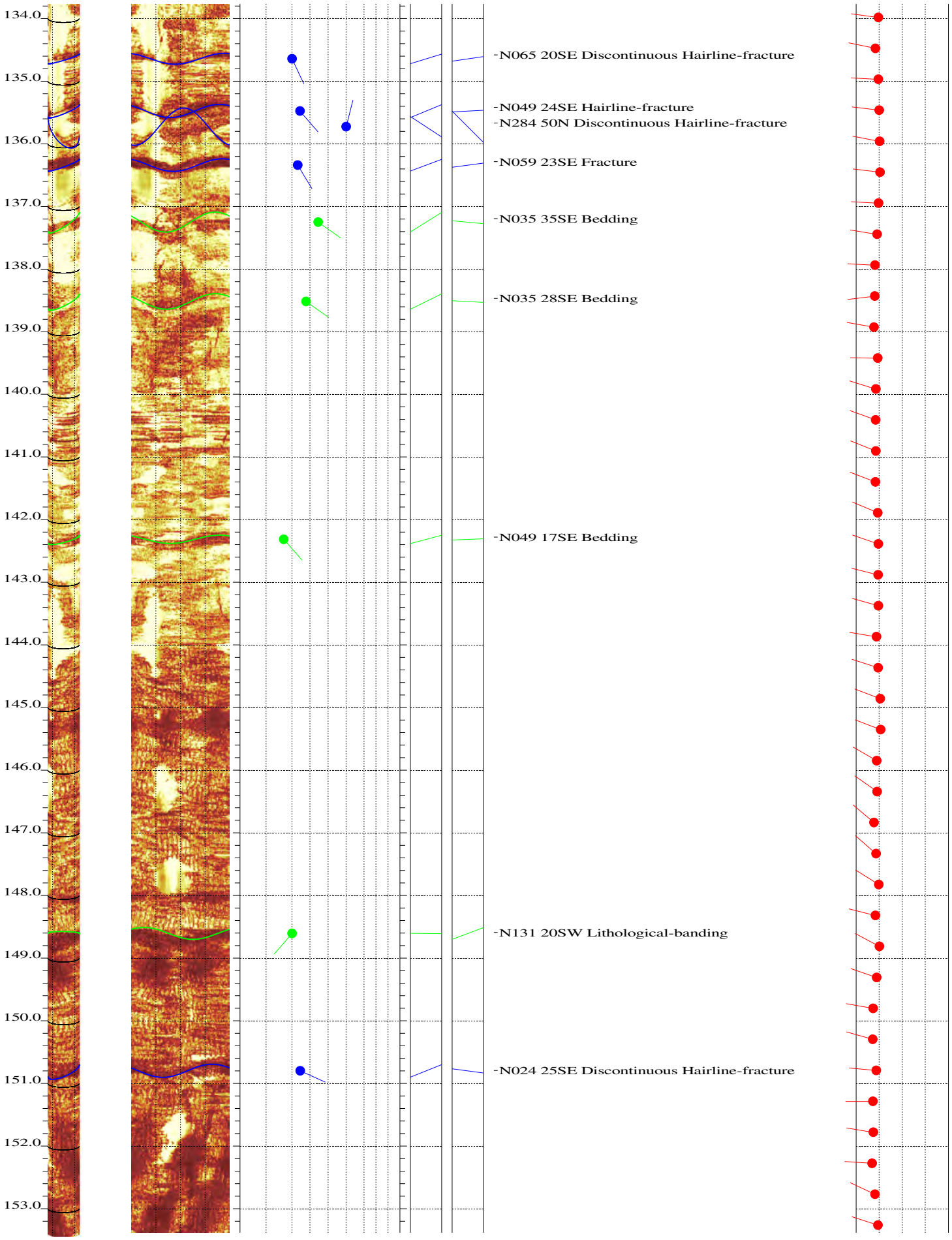
-N168 50W Discontinuous Hairline-fracture
-N244 74NW Discontinuous Hairline-fracture
-N054 23SE Fracture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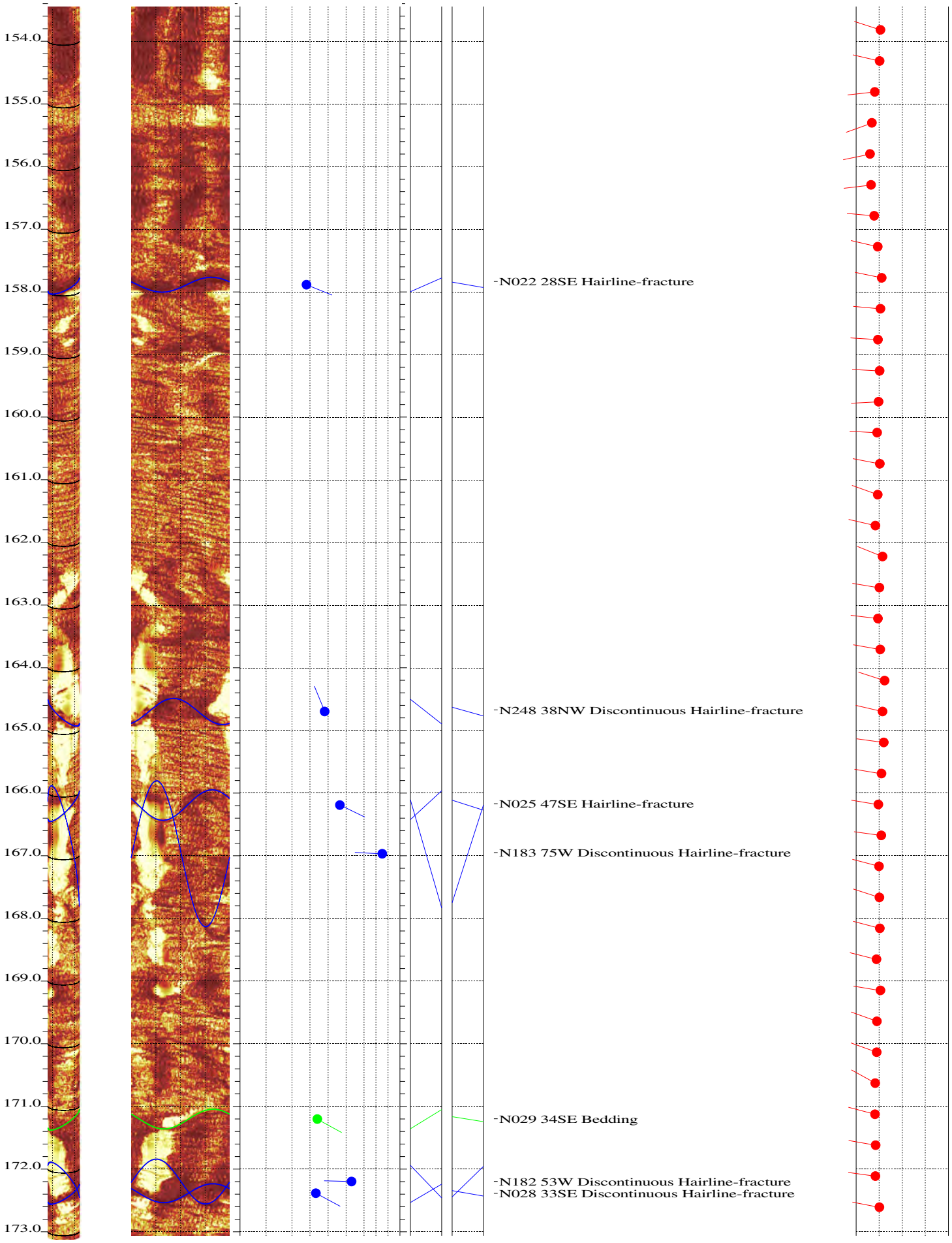
-N065 20SE Discontinuous Hairline-fracture
-N049 24SE Hairline-fracture
-N284 50N Discontinuous Hairline-fracture
-N059 23SE Fracture
-N035 35SE Bedding
-N035 28SE Bedding
-N049 17SE Bedding
-N131 20SW Lithological-banding
-N024 25SE Discontinuous Hairline-fracture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-N022 28SE Hairline-fracture
-N248 38NW Discontinuous Hairline-fracture
-N025 47SE Hairline-fracture
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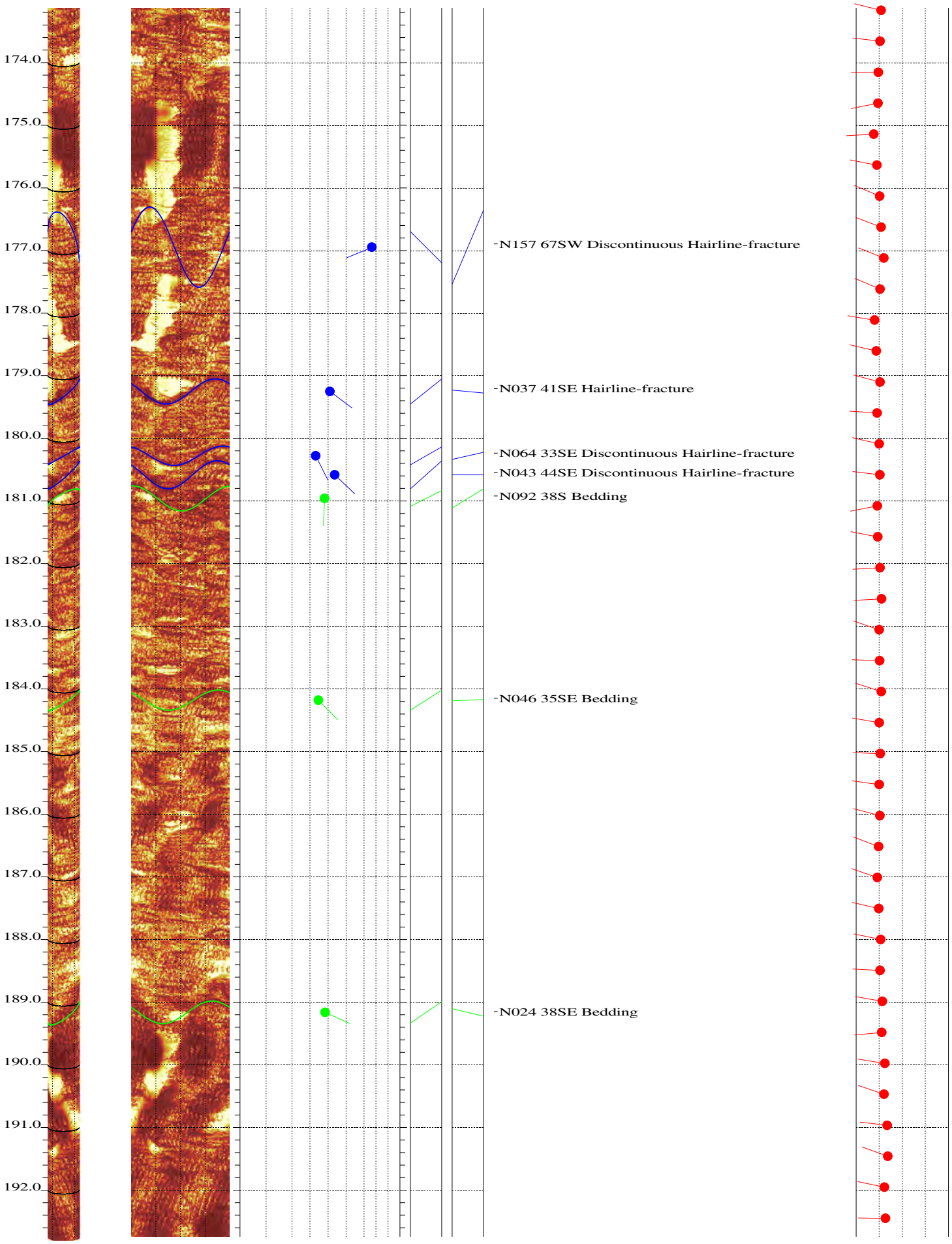
-N028 33SE Discontinuous Hairline-fracture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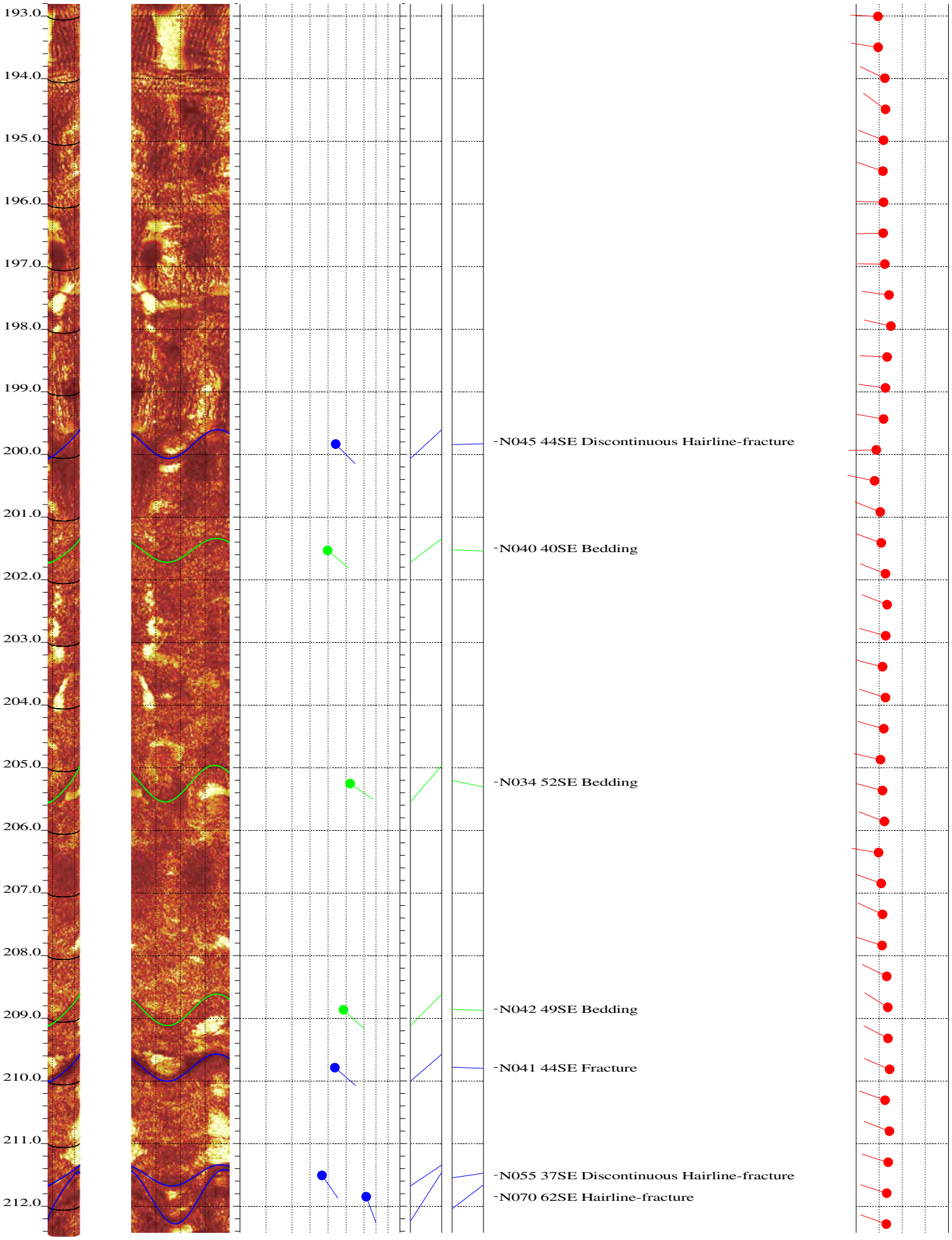
-N037 41SE Hairline-fracture
-N064 33SE Discontinuous Hairline-fracture
-N043 44SE Discontinuous Hairline-fracture
-N092 38S Bedding
-N046 35SE Bedding
-N024 38SE Bedding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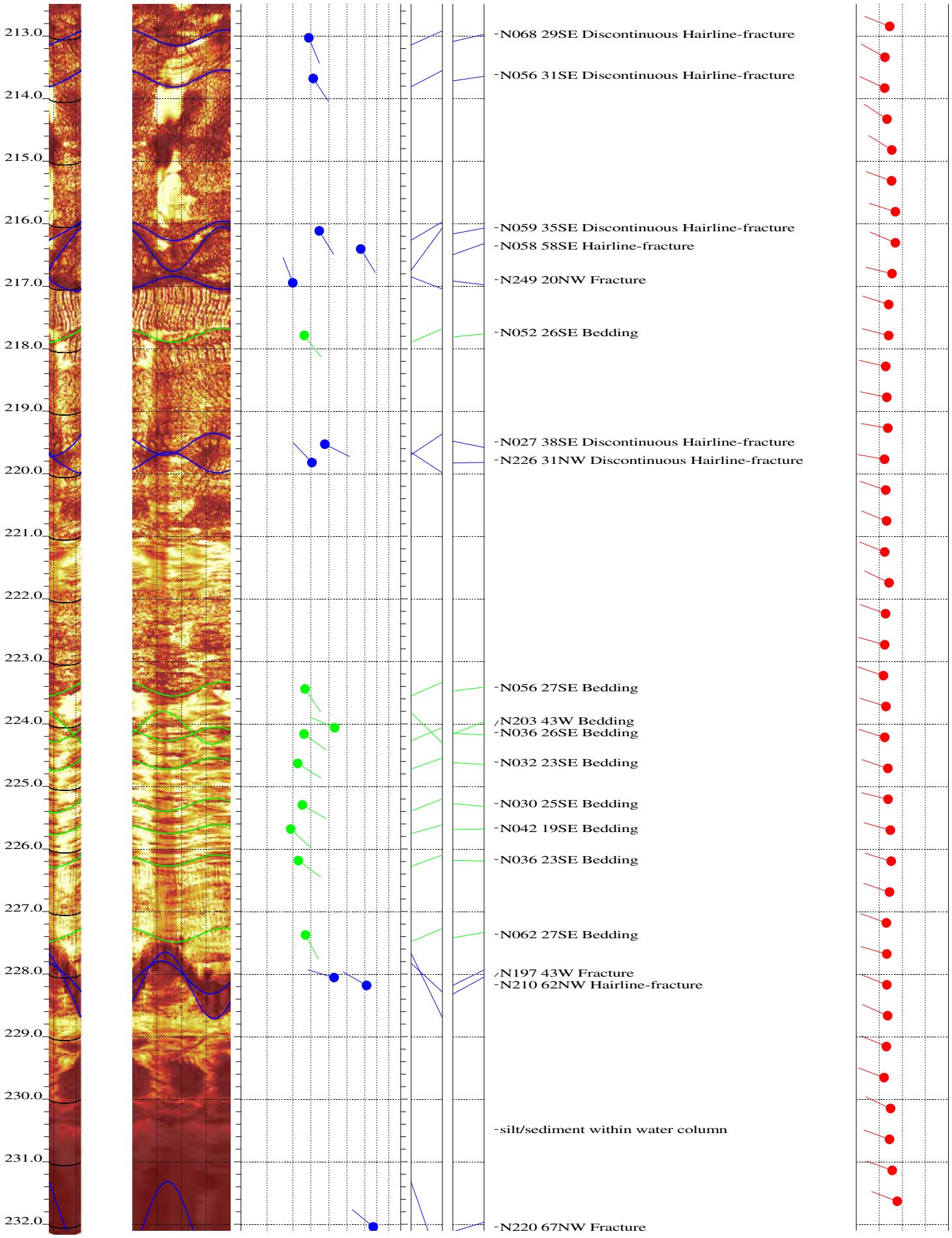
-N045 44SE Discontinuous Hairline-fracture
-N040 40SE Bedding
-N034 52SE Bedding
-N042 49SE Bedding
-N041 44SE Fracture
-N055 37SE Discontinuous Hairline-fracture
-N070 62SE Hairline-fracture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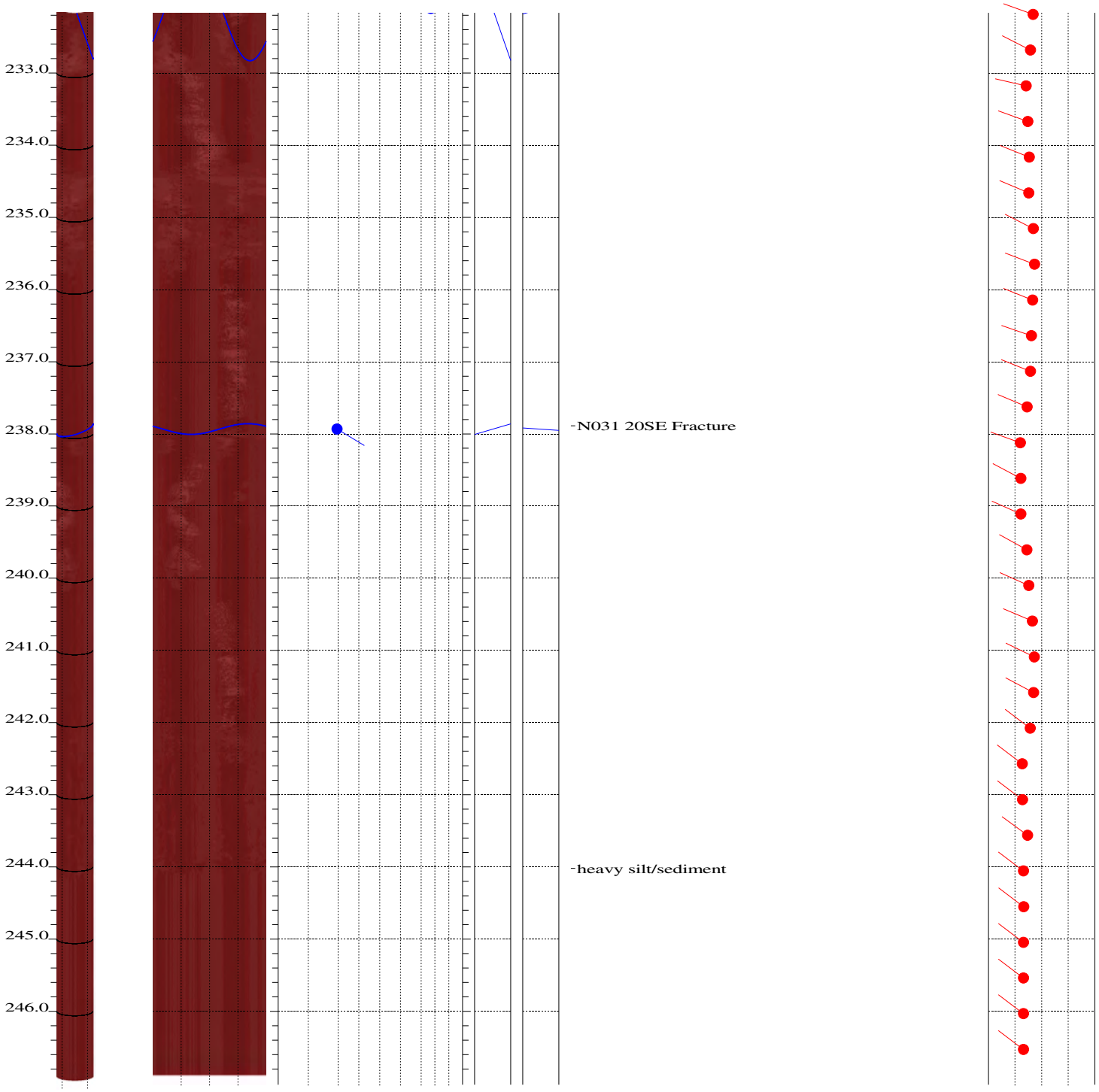
-N068 29SE Discontinuous Hairline-fracture
-N056 31SE Discontinuous Hairline-fracture
-N059 35SE Discontinuous Hairline-fracture
-N058 58SE Hairline-fracture
-N249 20NW Fracture
-N052 26SE Bedding
-N027 38SE Discontinuous Hairline-fracture
-N226 31NW Discontinuous Hairline-fracture
-N056 27SE Bedding
-N203 43W Bedding
-N036 26SE Bedding
-N032 23SE Bedding
-N030 25SE Bedding
-N042 19SE Bedding
-N036 23SE Bedding
-N062 27SE Bedding
-N197 43W Fracture
-N210 62NW Hairline-fracture
-silt/sediment within water column
-N220 67NW Fracture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-N031 20SE Fracture
-heavy silt/sediment

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

04 Apr 2012

TTECI

Borehole: RMW-9D

Mountain Top, PA

top of borehole.....
East:
North:
Alt: _

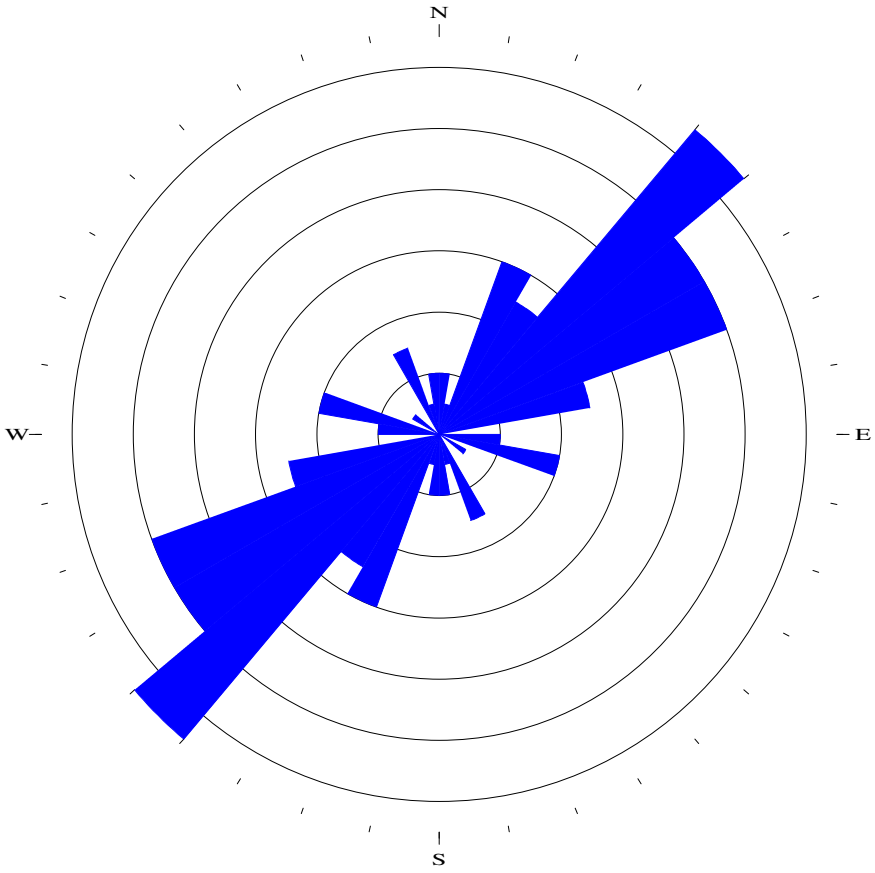
North ref. is true
Depth units are feet

Zone from 238.390 to 94.229ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-9D
94.229 - 238.390ft
Strike-direction, fracture rose-diagram



Azimuth Incr = 10°
N = 65

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

04 Apr 2012

TTECI

Borehole: RMW-9D

Mountain Top, PA

top of borehole.....
East:
North:
Alt: _

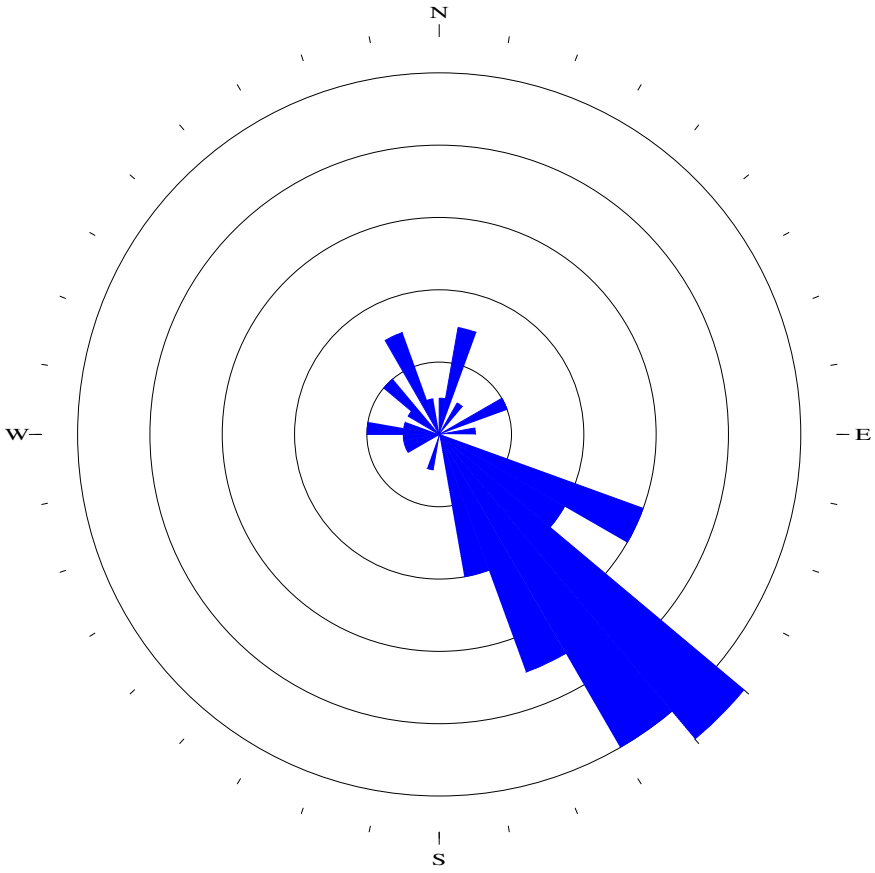
North ref. is true
Depth units are feet

Zone from 238.390 to 94.229ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-9D
94.229 - 238.390ft
Dip-azimuth, fracture rose-diagram

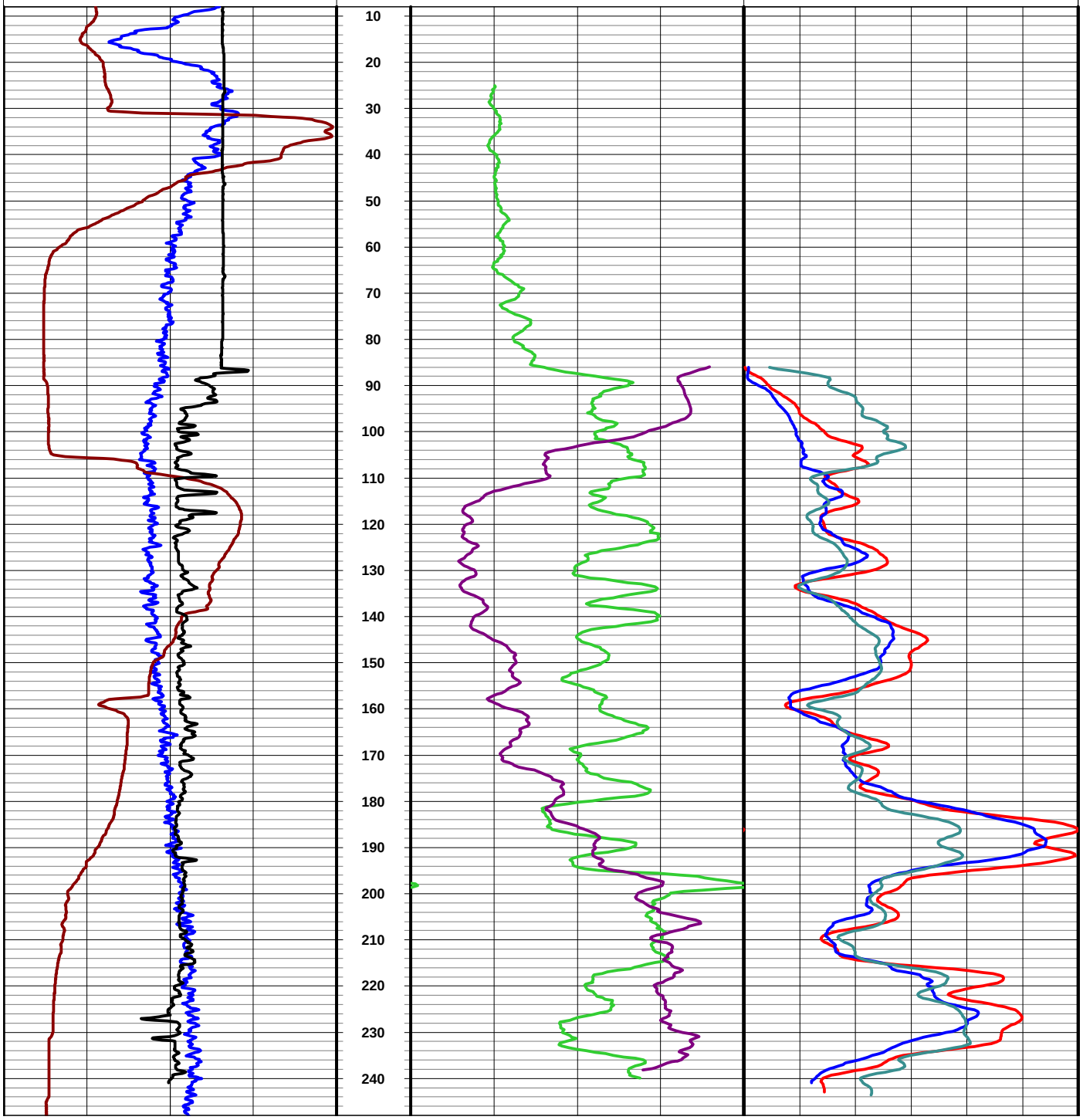


Azimuth Incr = 10°
N = 65

Company: TTECI
Location: Mountain Top, PA
Well Name: RMW-9D
Reference: Ground Surface, 03/27/12

EARTH DATA NORTHEAST, INC.

Fluid Temperature	Depth	Natural Gamma	Short Normal Resistivity
9.5 deg C 10.5	1ft:385ft	0 cps 200	0 Ohm-m 6000
Fluid Conductivity		**Spontaneous Potential**	**Long Normal Resistivity**
0 uS/cm 800		300 mV 700	0 Ohm-m 6000
Borehole Diameter			**Single Point Resistance**
5 in 7			0 Ohms 3000



RMW-9D Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Thursday, September 22, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
94	1	13:45	0.060	up	Upward Flow	**0.063**	>
	2	13:46	0.059	up	Upward Flow		
	3	13:46	0.066	up	Upward Flow		
	4	13:47	0.064	up	Upward Flow		
	5	13:47	0.064	up	Upward Flow		
99	1	13:51	0.068	up	Upward Flow	**0.073**	
	2	13:52	0.072	up	Upward Flow		
	3	13:52	0.077	up	Upward Flow		
	4	13:53	0.075	up	Upward Flow		
	5	13:54	0.074	up	Upward Flow		
111	1	13:59	Ø	N/A	No flow	N/A	<
	2	14:00	Ø	N/A	No flow		
	3	14:00	Ø	N/A	No flow		
	4	14:01	Ø	N/A	No flow		
	5	14:02	Ø	N/A	No flow		
122	1	14:07	Ø	N/A	No flow	N/A	
	2	14:08	Ø	N/A	No flow		
	3	14:09	Ø	N/A	No flow		
	4	14:09	Ø	N/A	No flow		
	5	14:10	Ø	N/A	No flow		
134	1	14:16	Ø	N/A	No flow	N/A	
	2	14:17	Ø	N/A	No flow		
	3	14:18	Ø	N/A	No flow		
	4	14:18	Ø	N/A	No flow		
	5	14:19	Ø	down	No flow		
	6	14:20	Ø	N/A	No flow		

Pumping Conditions: Pump set at ~ 50', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
94	1	15:09	0.234	up	Upward Flow	**0.247**	<
	2	15:10	0.242	up	Upward Flow		
	3	15:13	0.234	up	Upward Flow		
	4	15:13	0.242	up	Upward Flow		
	5	15:14	0.259	up	Upward Flow		
	6	15:15	0.268	up	Upward Flow		
99	1	15:02	0.214	up	Upward Flow	**0.241**	
	2	15:03	0.312	up	Upward Flow		
	3	15:03	0.220	up	Upward Flow		
	4	15:04	0.227	up	Upward Flow		
	5	15:05	0.234	up	Upward Flow		
111	1	14:54	0.061	up	Upward Flow	**0.060**	<
	2	14:55	0.056	up	Upward Flow		
	3	14:56	0.061	up	Upward Flow		
	4	14:56	0.062	up	Upward Flow		
	5	14:57	0.059	up	Upward Flow		
122	1	14:43	Ø	N/A	No flow	N/A	<
	2	14:44	Ø	up	No flow		
	3	14:45	Ø	up	No flow		
	4	14:46	Ø	up	No flow		
	5	14:46	Ø	up	No flow		
	6	14:47	Ø	up	No flow		
134	1	14:37	Ø	N/A	No flow	N/A	
	2	14:38	Ø	N/A	No flow		
	3	14:39	Ø	N/A	No flow		
	4	14:40	Ø	N/A	No flow		
	5	14:40	Ø	N/A	No flow		

Key:

Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (into borehole)
>	Outflow zone (into formation)
	Used in average flow calculation
Incon.	Inconclusive results

RMW-9D Heat Pulse Summary Table- Deepened (3rd Log)

Tetra Tech ECI--Mountain Top, PA

Tuesday, March 27, 2012

Ambient Conditions

Depth (ft)	Run	Pick Time (Hours)	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
200	1	3:16	Ø	None	No Flow	0.02675	
	2	3:17	0.031	Down	Downward Flow		
	3	3:18	0.022	Down	Downward Flow		
	4	3:18	0.026	Down	Downward Flow		
	5	3:19	0.028	Down	Downward Flow		
218	1	3:22	0.017	Down	Downward Flow	0.0426	
	2	3:24	0.048	Down	Downward Flow		
	3	3:25	0.046	Down	Downward Flow		
	4	3:26	0.05	Down	Downward Flow		
	5	3:26	0.052	Down	Downward Flow		
226	1	3:30	Ø	None	No Flow	N/A	
	2	3:30	Ø	None	No Flow	N/A	
	3	3:31	Ø	None	No Flow	N/A	
	4	3:32	Ø	None	No Flow	N/A	
236	1	3:34	Ø	None	No Flow	N/A	
	2	3:35	Ø	None	No Flow	N/A	
	3	3:36	Ø	None	No Flow	N/A	

Pumping Conditions: Pump set at ~ 10', Rate ~ 1 gpm

Depth (ft)	Run	Pick Time (Hours)	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
200	1	3:56	Ø	None	No Flow	N/A	
	2	3:55	Ø	None	No Flow	N/A	
	3	3:55	Ø	None	No Flow	N/A	
218	1	3:52	Ø	None	No Flow	N/A	
	2	3:51	Ø	None	No Flow	N/A	
	3	3:51	Ø	None	No Flow	N/A	
226	1	3:49	Ø	None	No Flow	N/A	
	2	3:48	Ø	None	No Flow	N/A	
	3	3:47	Ø	None	No Flow	N/A	
236	1	3:45	Ø	None	No Flow	N/A	
	2	3:45	Ø	None	No Flow	N/A	
	3	3:44	Ø	None	No Flow	N/A	

Key:

Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (Into Borehole)
>	Outflow zone (Into Formation)
	Outlier (not included in average flow calculation)
*	Flow is not within range of Tool

EARTH DATA NORTHEAST, INC.

Client:	TTECI
Location:	Church Road TCE Site
Well Name:	RMW-10D
Date:	3-9-2012
Reference:	Ground Surface
Field Operator:	Mike Yamrick
City / County:	Mountain Top
State / Province:	Pennsylvania
Country:	Luzerne
Weather:	Cold/Flurries

Tool:

Serial Number:

Logging Speed: 10 ft/min

Shop calibrations:

Field calibrations:

Major Open Joint / Fracture

Minor Open Joint / Fracture

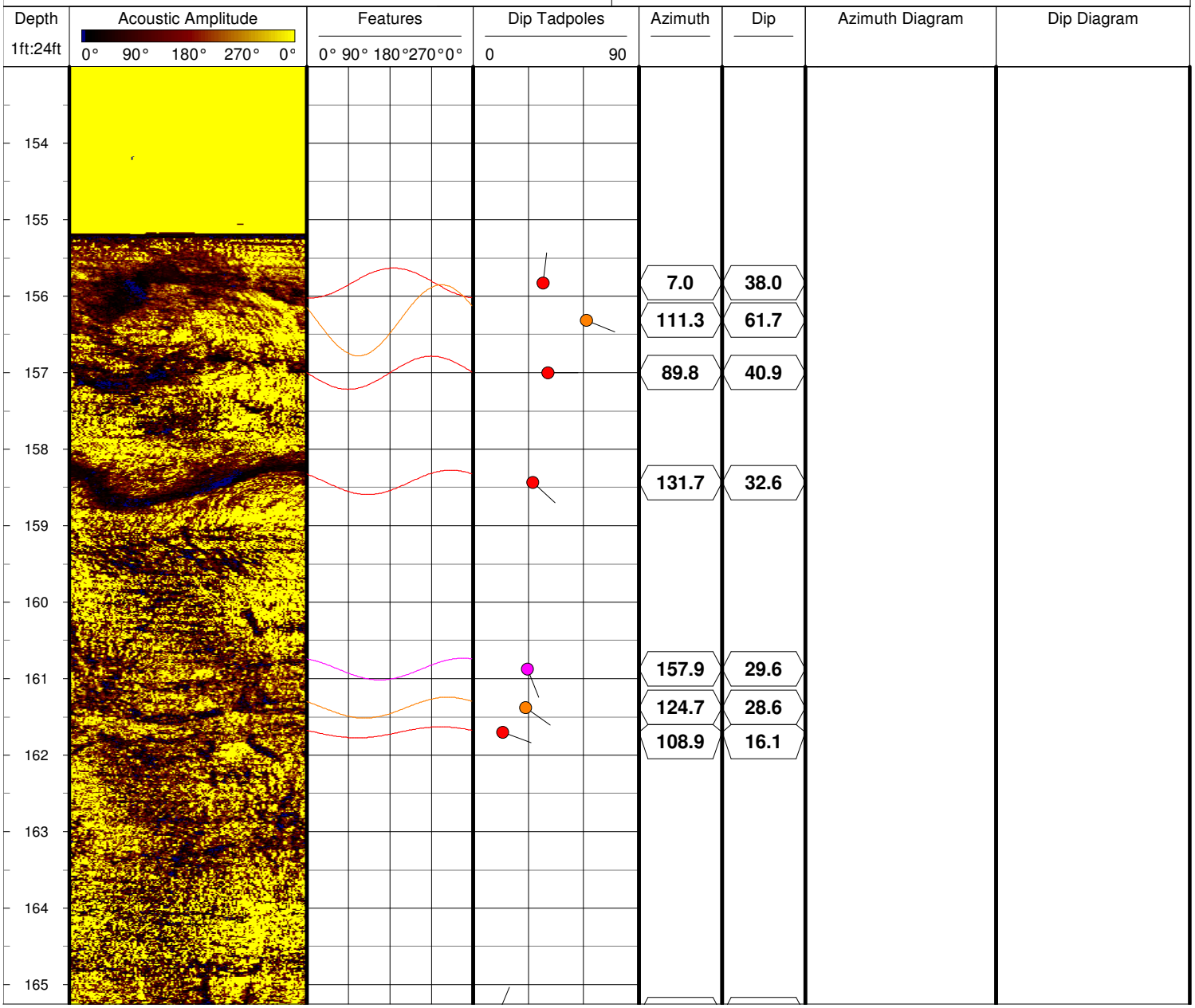
Partially Open Joint / Fracture

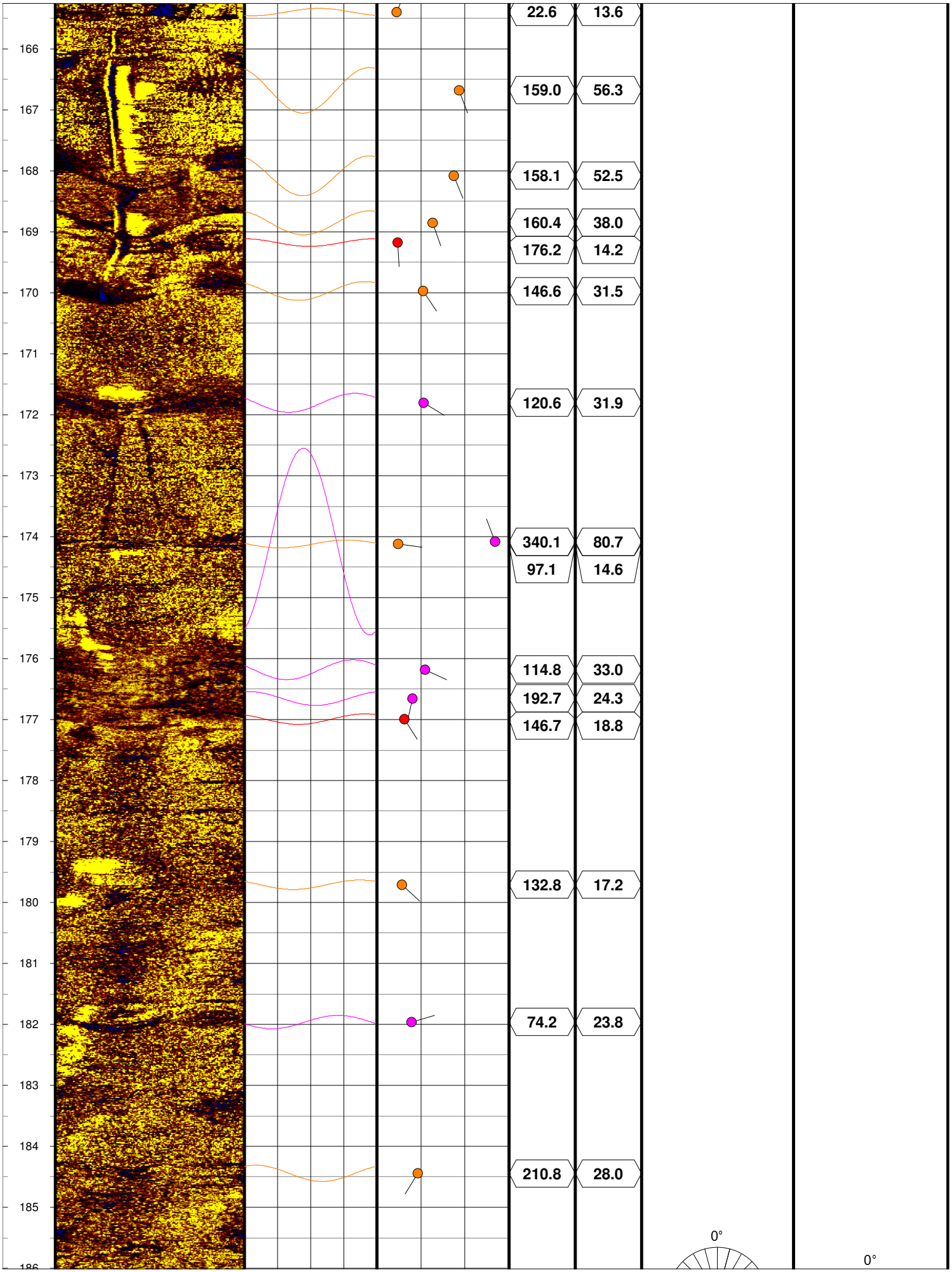
Borehole Diameter:	6"
Static Water Level:	17'
Casing Depth:	155'
Total Depth:	221'

Depth ratio: 1 :

Magnetic Declination: -12.083

North reference: True

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22.6
13.6
159.0
56.3
158.1
52.5
160.4
38.0
176.2
14.2
146.6
31.5
120.6
31.9
340.1
80.7
97.1
14.6
114.8
33.0
192.7
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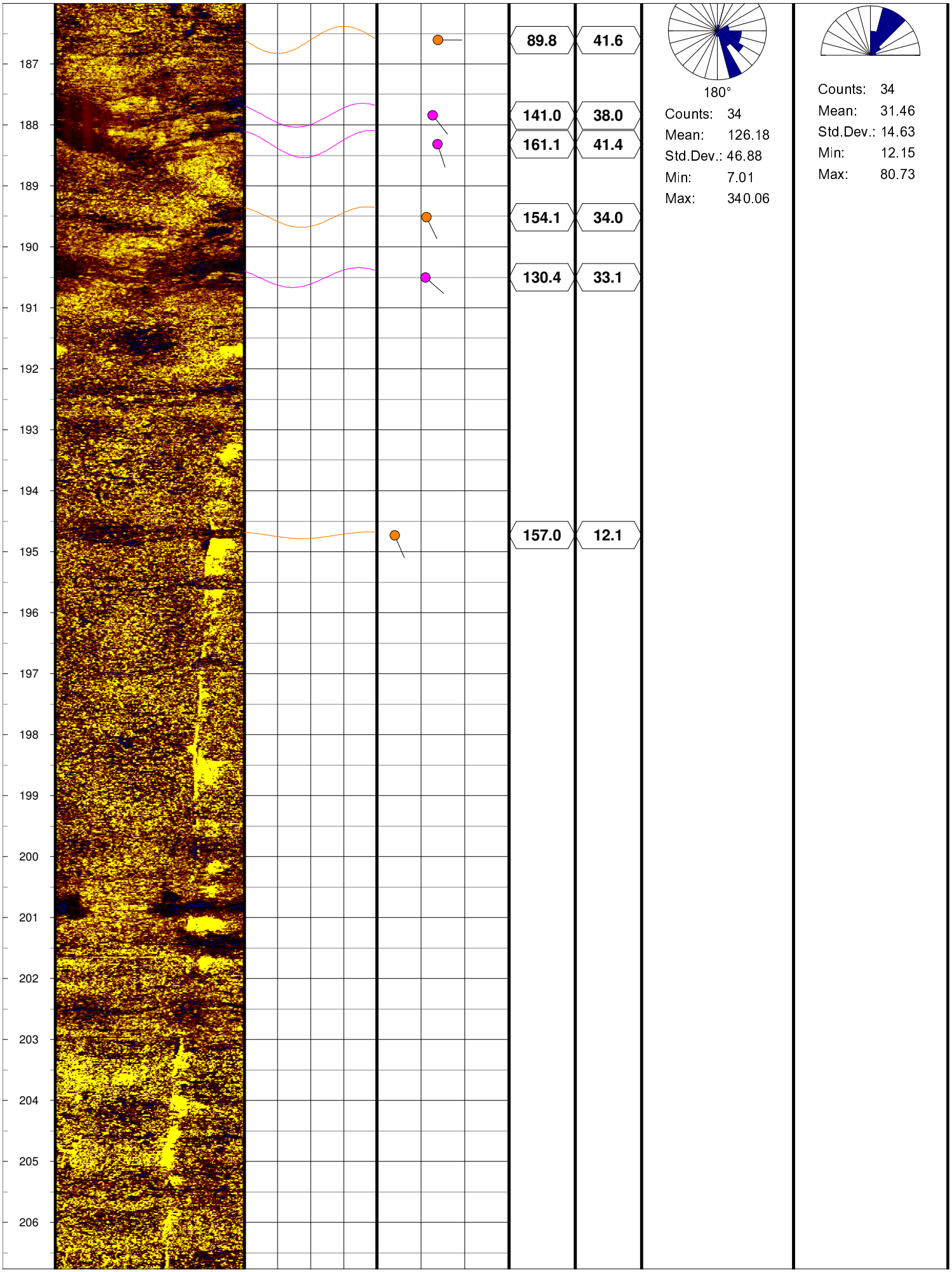
132.8
17.2
74.2
23.8
210.8
28.0
0°
0°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200
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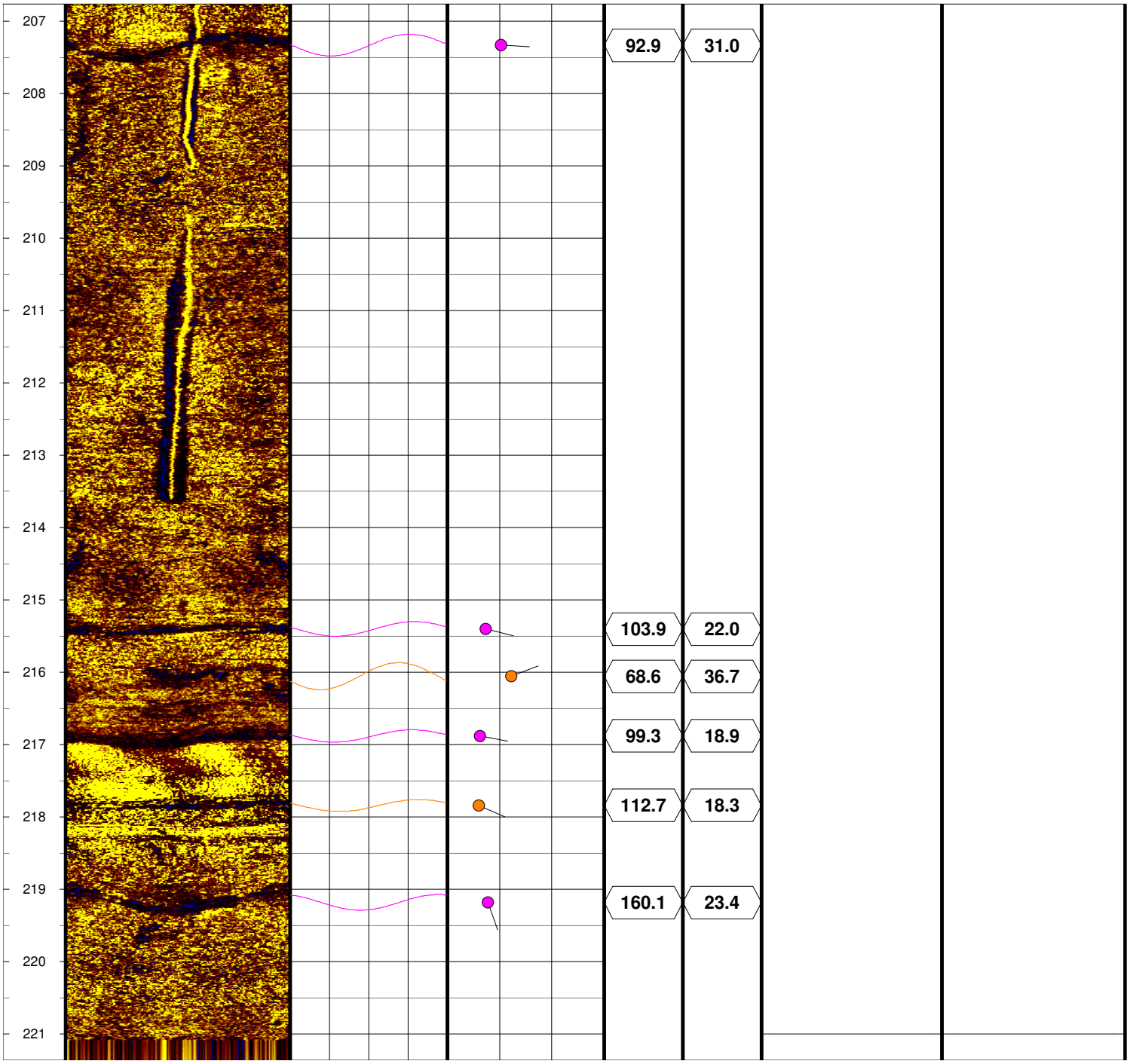
202
203
204
205
206
89.8
41.6
141.0
38.0
161.1
41.4
154.1
34.0
130.4
33.1
157.0
12.1
180°
Counts: 34
Mean: 126.18
Std.Dev.: 46.88
Min: 7.01
Max: 340.06
Counts: 34
Mean: 31.46
Std.Dev.: 14.63
Min: 12.15
Max: 80.73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208
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211
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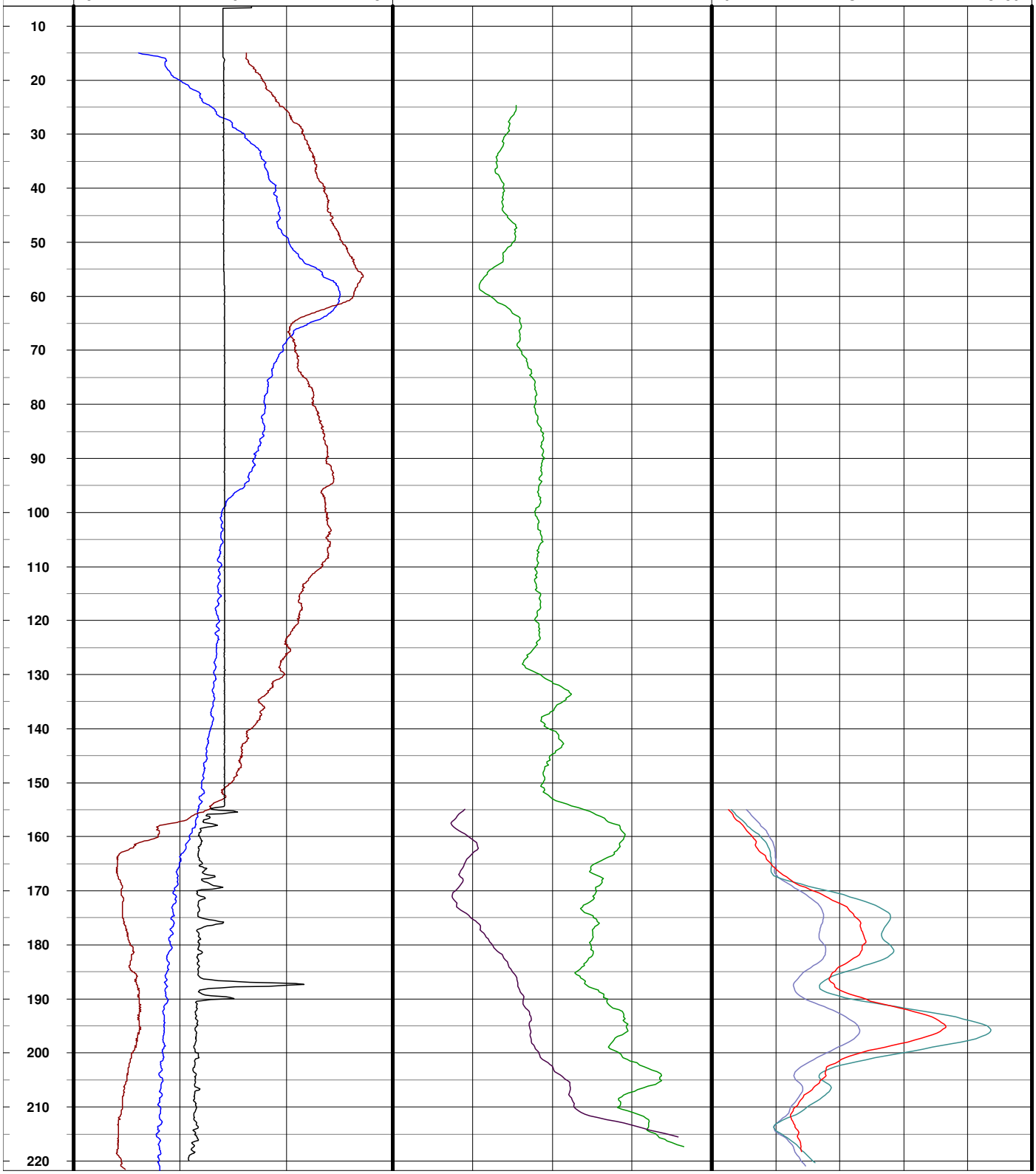
213
214
215
216
217
218
219
220
221
92.9
31.0
103.9
22.0
68.6
36.7
99.3
18.9
112.7
18.3
160.1
23.4

Company: TTECI
Location: Mountain Top, PA
Well Name: RMW-10D
Reference: Ground Surface

EARTH DATA NORTHEAST, INC.

Depth 1ft:315ft	Fluid Temperature 9 ℃ 12	Natural Gamma 0 cps 200	Single Point Res 0 Ohms 3750
	Fluid Conductivity 150 uS/cm 180	Spont. Potential 700 mV 1500	Short Normal Res 0 Ohm-m 5000
	Borehole Diameter 5 Inch 8		Long Normal Res 0 Ohm-m 3750



RMW-10D Heat Pulse Summary Table

TTECI -- Mountain Top, PA

Friday, March 09, 2012

Logging performed using the Mount Sopris Heat Pulse Flowmeter

Ambient Conditions

Depth (ft)	Run	Pick Time (Hours)	Fluid Velocity (ft/min)	Direction of Curve	Comments	Avg. Fluid Velocity (ft/min)	Flow Zones
163	1	13:43	Ø	N/A	No flow	N/A	
	2	13:43	Ø	N/A	No flow		
	3	13:44	Ø	N/A	No flow		
173	1	13:47	Ø	N/A	No flow	N/A	
	2	13:47	0.035	Up	No flow		
	3	13:48	Ø	N/A	No flow		
	4	13:49	0.029	Up	No flow		
	5	13:49	Ø	N/A	No flow		
183	1	13:54	Ø	N/A	No flow	N/A	
	2	13:54	Ø	N/A	No flow		
	3	13:55	Ø	N/A	No flow		
196	1	13:59	Ø	N/A	No flow	N/A	
	2	13:59	Ø	N/A	No flow		
	3	14:00	Ø	N/A	No flow		
210	1	14:03	Ø	N/A	No flow	Incon	
	2	14:03	0.027	Down	No flow		
	3	14:04	0.027	Down	No flow		
	4	14:05	0.035	Up	No flow		
	5	14:05	0.035	Up	No flow		

**Please note the operating range of the tool is from .03 - 1 GPM.*
Values out of this range should not be used for quantitative purposes.

Pumping Conditions: Pump set at ~ 40', Rate ~ 1 gpm

Depth (ft)	Run	Pick Time (Hours)	Fluid Velocity (ft/min)	Direction of Curve	Comments	Avg. Fluid Velocity (ft/min)	Flow Zones
163	1	14:39	0.045	Up	Upward Flow	0.044	
	2	14:38	0.045	Up	Upward Flow		
	3	14:38	0.043	Up	Upward Flow		
173	5	14:35	0.035	Up	No flow	Incon	<
	4	14:35	0.027	Down	No flow		
	3	14:34	0.027	Down	No flow		
	2	14:33	Ø	N/A	No flow		
	1	14:33	Ø	N/A	No flow		
183	5	14:30	0.035	Up	Upward Flow	0.037	>
	4	14:30	0.035	Up	Upward Flow		
	3	14:29	0.027	Down	Downward Flow		
	2	14:28	0.041	Up	Upward Flow		
	1	14:28	Ø	N/A	Upward Flow		
196	5	14:24	Ø	N/A	No flow	Incon	<
	4	14:24	0.018	Down	No flow		
	3	14:23	0.019	Down	No flow		
	2	14:22	0.035	Up	No flow		
	1	14:22	Ø	N/A	No flow		
210	4	14:19	0.027	Down	Downward Flow	0.027	<
	3	14:18	0.027	Down	Downward Flow		
	2	14:17	0.027	Down	Downward Flow		
	1	14:17	Ø	N/A	No flow		

Key:

Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (Into Borehole)
>	Outflow zone (Into Formation)
	Used in average flow calculation

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-11D

Mountain Top, PA

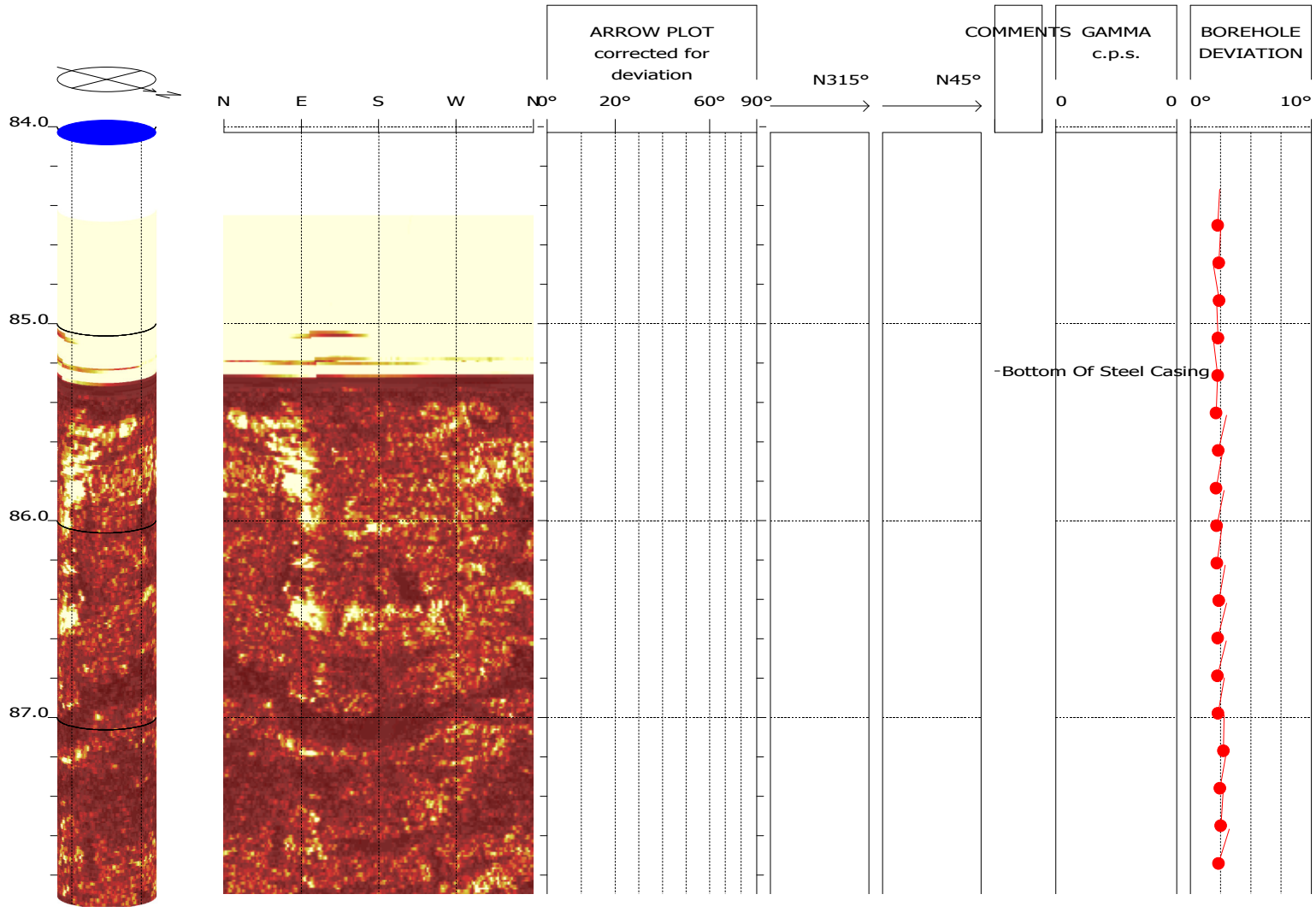
top of borehole.....
East: _
North:_
Elev: _

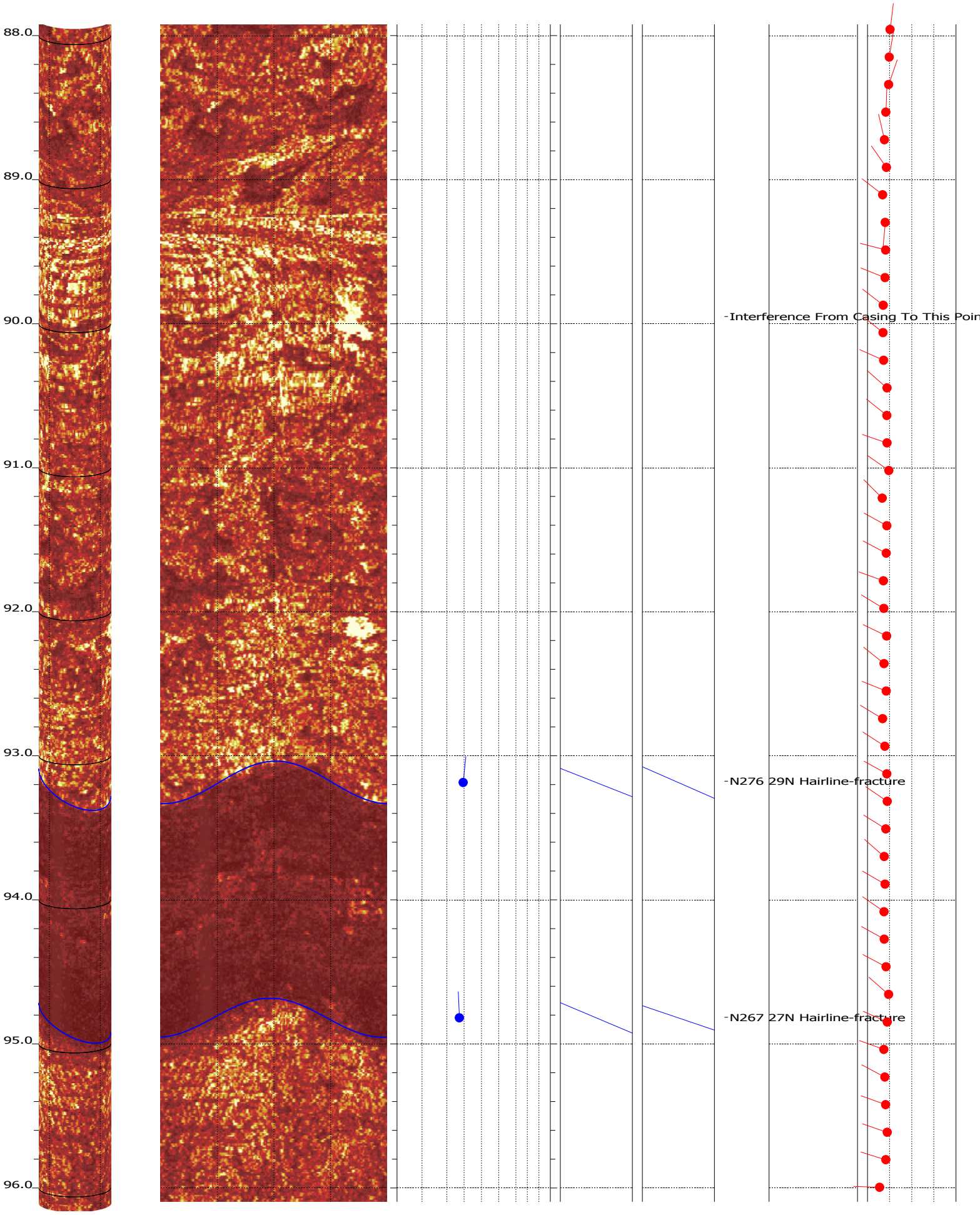
North ref. is
Depth units are feet
Vertical scale: 1/10
Horiz scale = 1.00x Vert scale

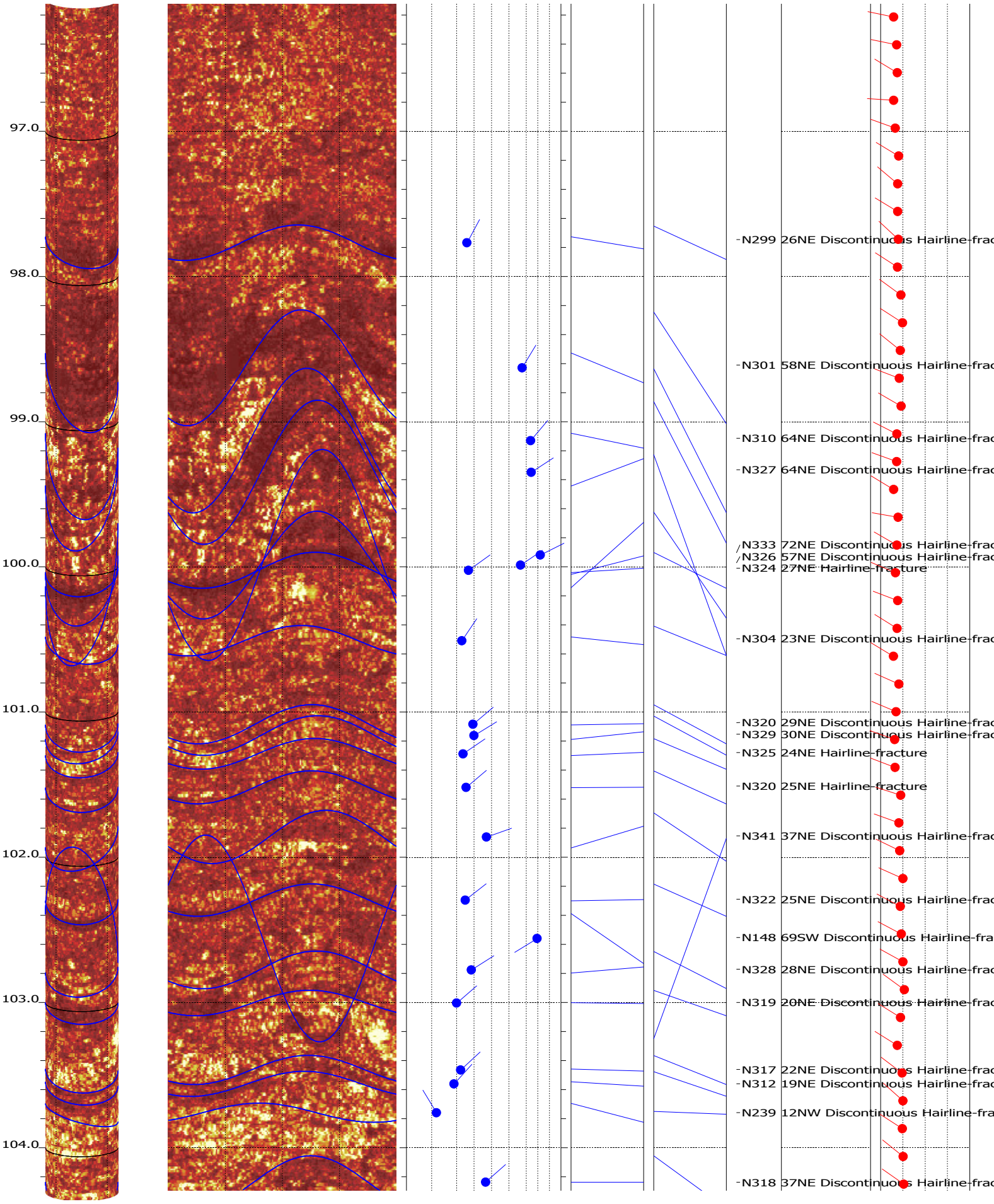
Zone from 162.000 to 84.000ft
Format: BHTV-NESWN

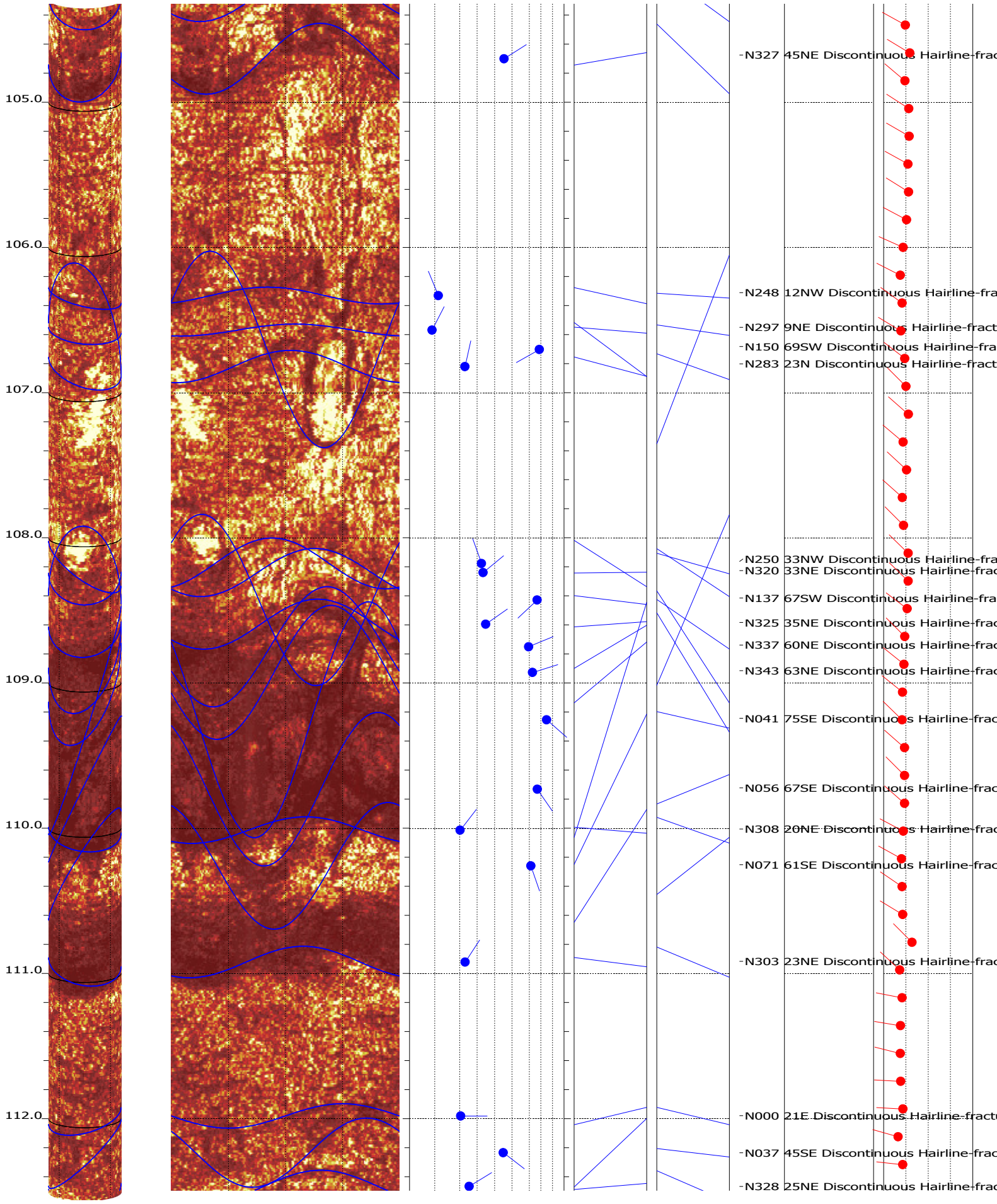
Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units




88.0
89.0
90.0
91.0
92.0
93.0
94.0
95.0
96.0
-Interference From Casing To This Poin
-N276 29N Hairline-fracture
-N267 27N Hairline-fracture


97.0
98.0
99.0
100.0
101.0
102.0
103.0
104.0
N299 26NE Discontinuous Hairline-frac
N301 58NE Discontinuous Hairline-frac
N310 64NE Discontinuous Hairline-frac
N327 64NE Discontinuous Hairline-frac
N333 72NE Discontinuous Hairline-frac
N326 57NE Discontinuous Hairline-frac
N324 27NE Hairline-fracture
N304 23NE Discontinuous Hairline-frac
N320 29NE Discontinuous Hairline-frac
N329 30NE Discontinuous Hairline-frac
N325 24NE Hairline-fracture
N320 25NE Hairline-fracture
N341 37NE Discontinuous Hairline-frac
N322 25NE Discontinuous Hairline-frac
N148 69SW Discontinuous Hairline-fra
N328 28NE Discontinuous Hairline-frac
N319 20NE Discontinuous Hairline-frac
N317 22NE Discontinuous Hairline-frac
N312 19NE Discontinuous Hairline-frac
N239 12NW Discontinuous Hairline-fra
N318 37NE Discontinuous Hairline-frac


105.0
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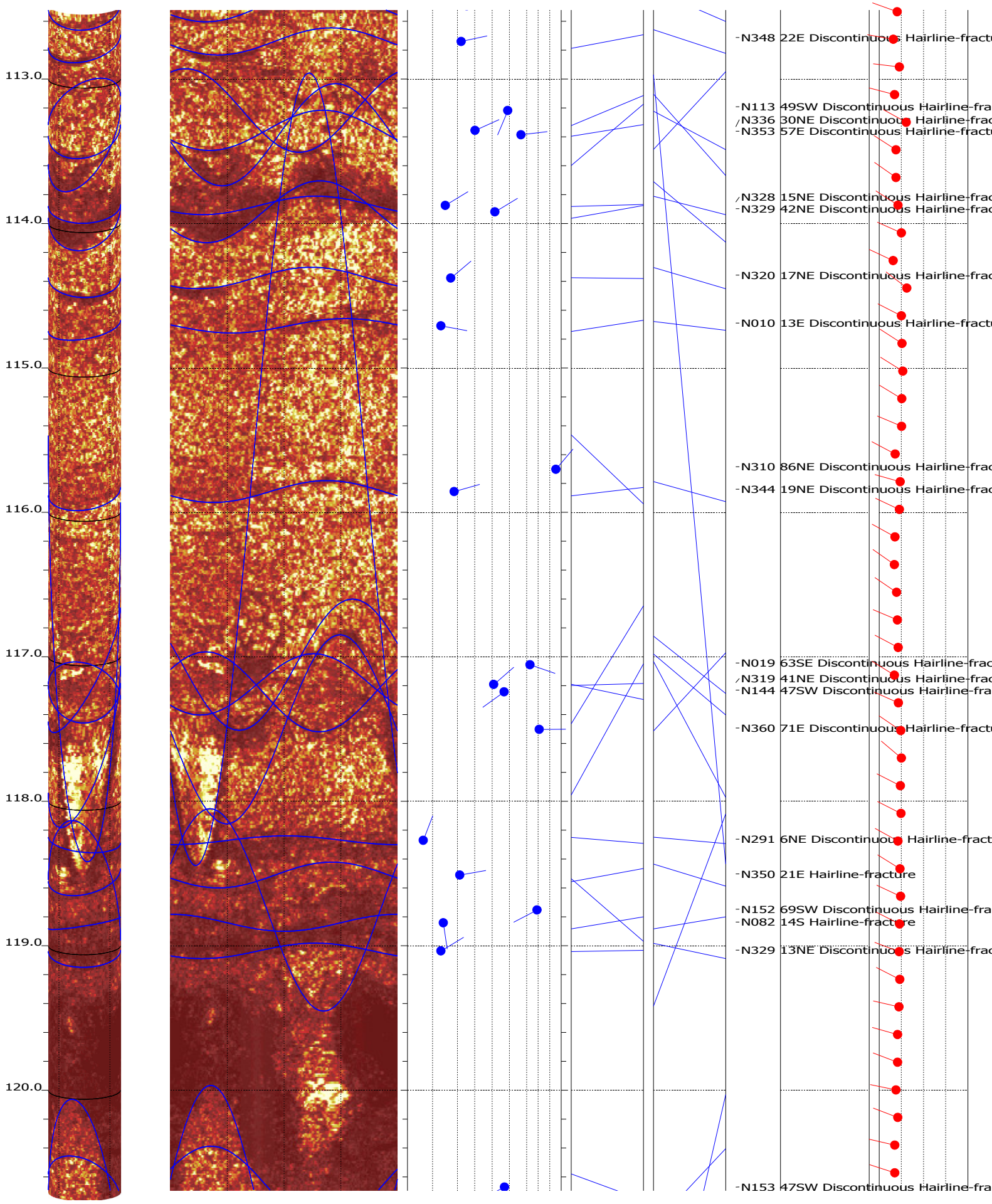
110.0
111.0
112.0
N327 45NE Discontinuous Hairline-frac
N248 12NW Discontinuous Hairline-fra
N297 9NE Discontinuous Hairline-fract
N150 69SW Discontinuous Hairline-fra
N283 23N Discontinuous Hairline-fract
N250 33NW Discontinuous Hairline-fra
N320 33NE Discontinuous Hairline-frac
N137 67SW Discontinuous Hairline-fra
N325 35NE Discontinuous Hairline-frac
N337 60NE Discontinuous Hairline-frac
N343 63NE Discontinuous Hairline-frac
N041 75SE Discontinuous Hairline-frac
N056 67SE Discontinuous Hairline-frac
N308 20NE Discontinuous Hairline-frac
N071 61SE Discontinuous Hairline-frac
N303 23NE Discontinuous Hairline-frac
N000 21E Discontinuous Hairline-fract
N037 45SE Discontinuous Hairline-frac
N328 25NE Discontinuous Hairline-frac


113.0
114.0
115.0
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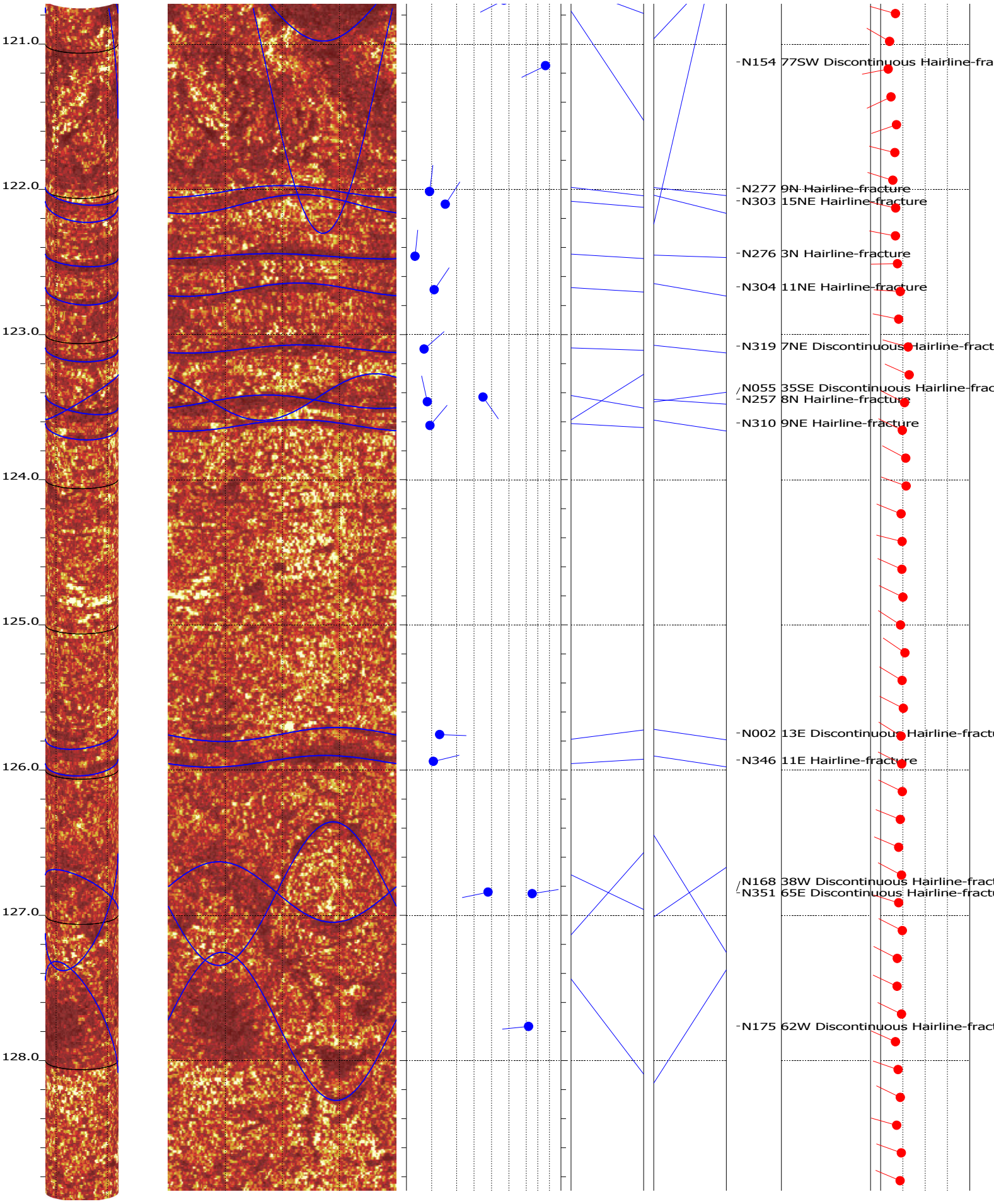
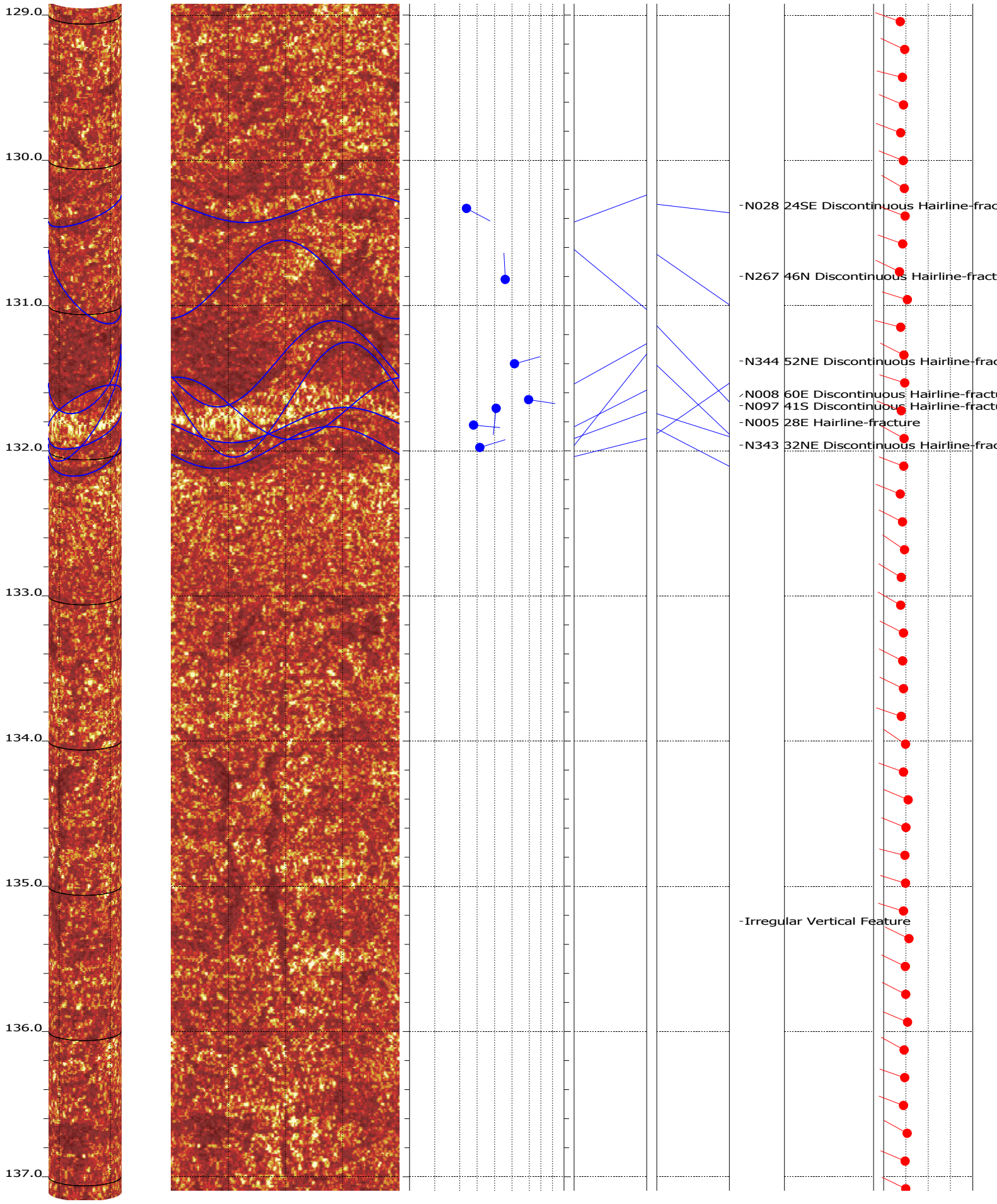
117.0
118.0
119.0
120.0
-N348 22E Discontinuous Hairline-fract
-N113 49SW Discontinuous Hairline-fra
-N336 30NE Discontinuous Hairline-frac
-N353 57E Discontinuous Hairline-fract
-N328 15NE Discontinuous Hairline-frac
-N329 42NE Discontinuous Hairline-frac
-N320 17NE Discontinuous Hairline-frac
-N010 13E Discontinuous Hairline-fract
-N310 86NE Discontinuous Hairline-frac
-N344 19NE Discontinuous Hairline-frac
-N019 63SE Discontinuous Hairline-frac
-N319 41NE Discontinuous Hairline-frac
-N144 47SW Discontinuous Hairline-fra
-N360 71E Discontinuous Hairline-fract
-N291 6NE Discontinuous Hairline-fract
-N350 21E Hairline-fracture
-N152 69SW Discontinuous Hairline-fra
-N082 14S Hairline-fracture
-N329 13NE Discontinuous Hairline-frac
-N153 47SW Discontinuous Hairline-fra


121.0
122.0
123.0
124.0
125.0
126.0
127.0
128.0
N154 77SW Discontinuous Hairline-fra
N277 9N Hairline-fracture
N303 15NE Hairline-fracture
N276 3N Hairline-fracture
N304 11NE Hairline-fracture
N319 7NE Discontinuous Hairline-fract
N055 35SE Discontinuous Hairline-frac
N257 8N Hairline-fracture
N310 9NE Hairline-fracture
N002 13E Discontinuous Hairline-fract
N346 11E Hairline-fracture
N168 38W Discontinuous Hairline-fract
N351 65E Discontinuous Hairline-fract
N175 62W Discontinuous Hairline-fract


129.0
130.0
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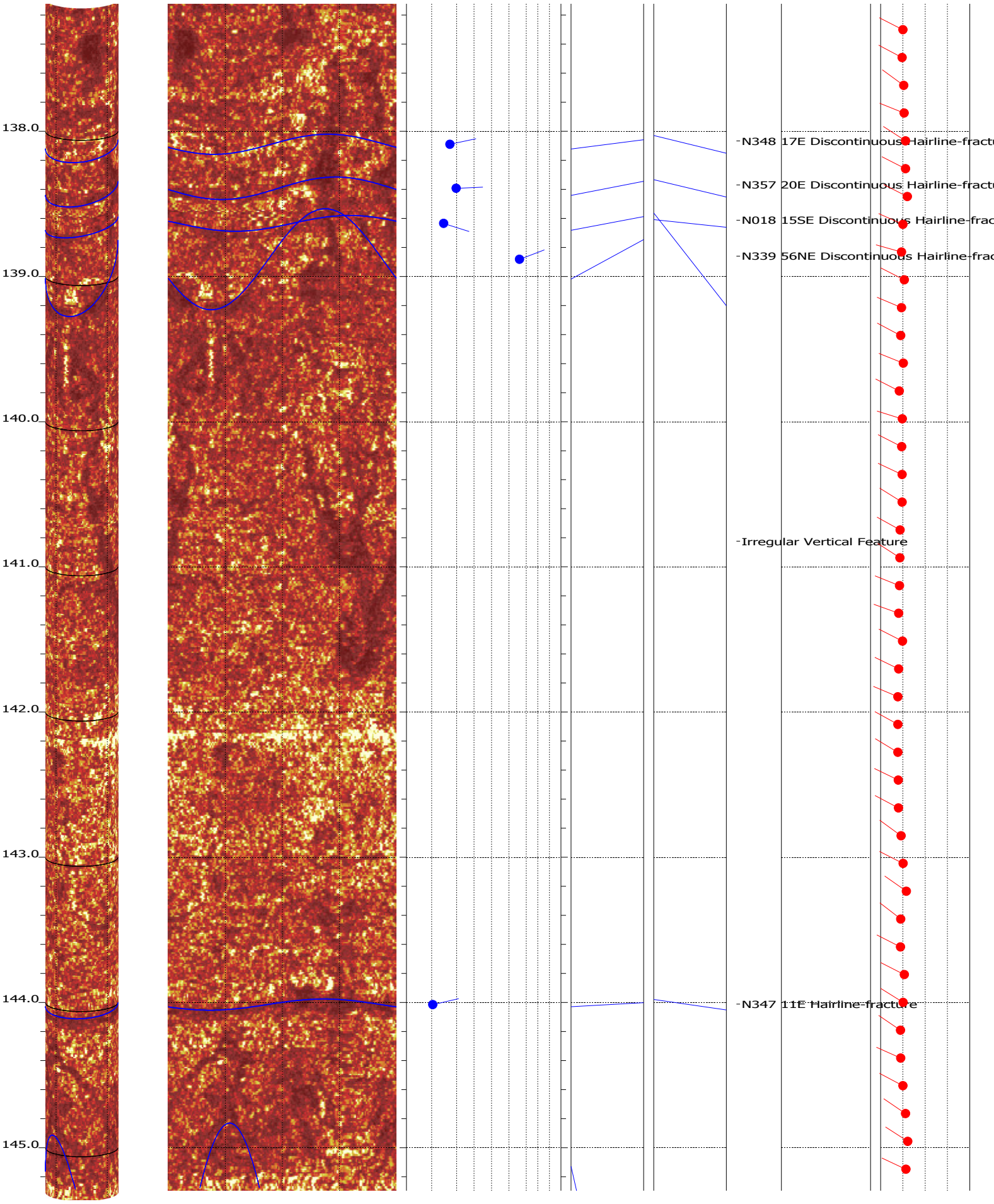
132.0
133.0
134.0
135.0
136.0
137.0
-N028 24SE Discontinuous Hairline-frac
-N267 46N Discontinuous Hairline-fract
-N344 52NE Discontinuous Hairline-frac
-N008 60E Discontinuous Hairline-fract
-N097 41S Discontinuous Hairline-fract
-N005 28E Hairline-fracture
-N343 32NE Discontinuous Hairline-frac
-Irregular Vertical Feature


138.0
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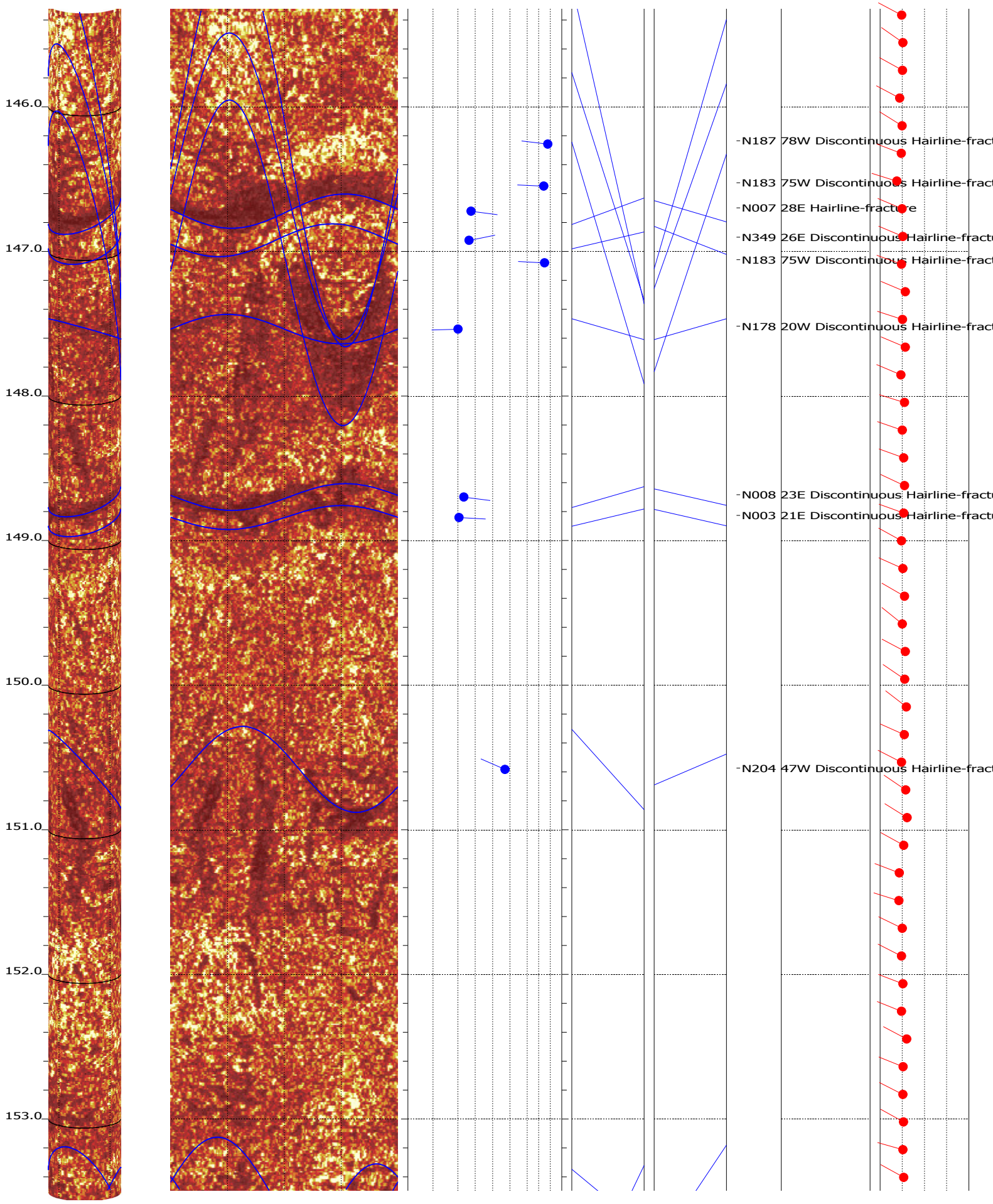
141.0
142.0
143.0
144.0
145.0
N348 17E Discontinuous Hairline-fract
N357 20E Discontinuous Hairline-fract
N018 15SE Discontinuous Hairline-frac
N339 56NE Discontinuous Hairline-frac
Irregular Vertical Feature
N347 11E Hairline-fracture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151.0
152.0
153.0
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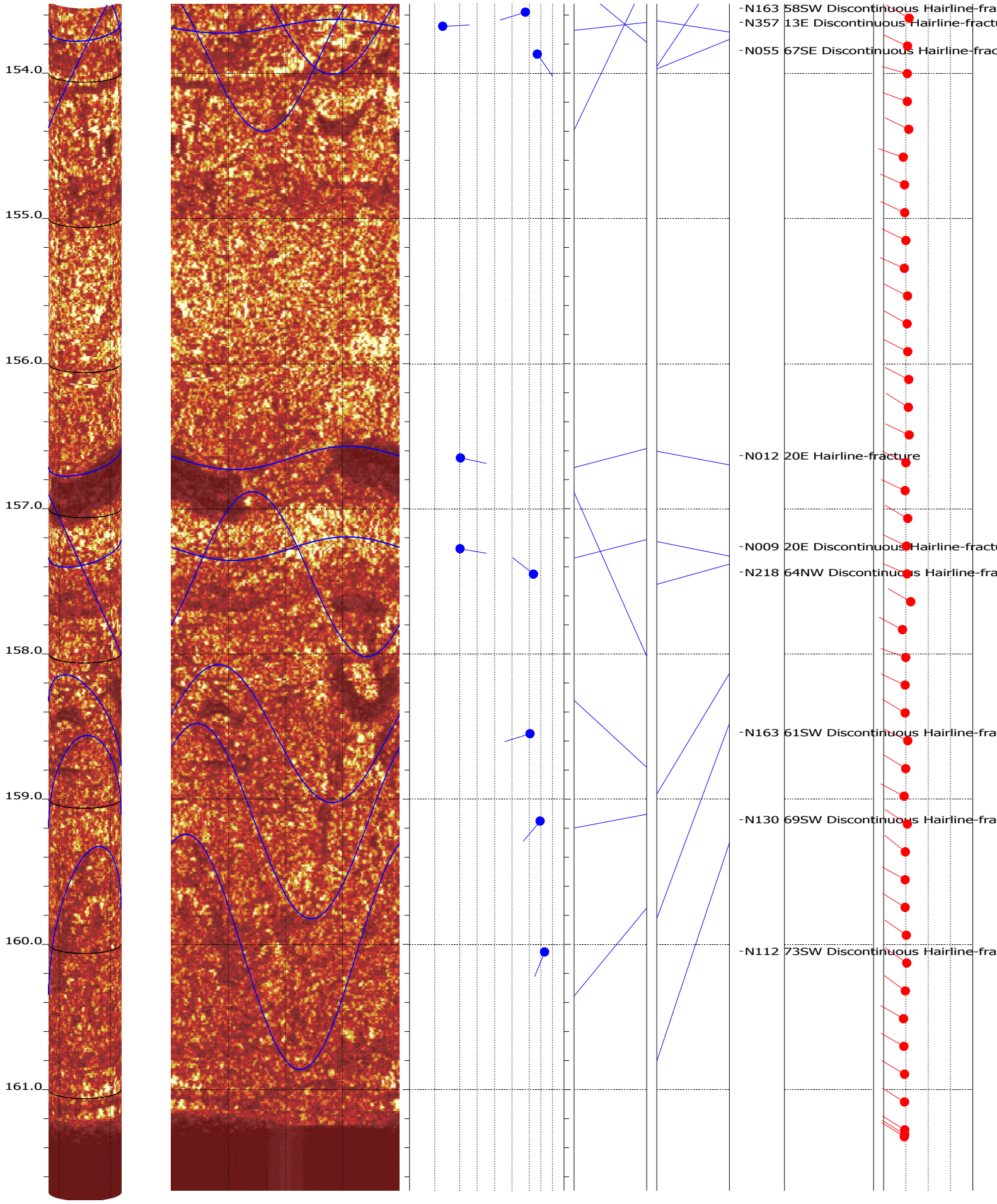
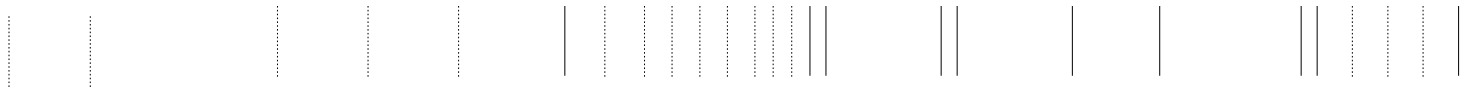
-N183 75W Discontinuous Hairline-fract
-N007 28E Hairline-fracture
-N349 26E Discontinuous Hairline-fract
-N183 75W Discontinuous Hairline-fract
-N178 20W Discontinuous Hairline-fract
-N008 23E Discontinuous Hairline-fract
-N003 21E Discontinuous Hairline-fract
-N204 47W Discontinuous Hairline-fract


154.0
155.0
156.0
157.0
158.0
159.0
160.0
161.0
-N163 58SW Discontinuous Hairline-fra
-N357 13E Discontinuous Hairline-fract
-N055 67SE Discontinuous Hairline-frac
-N012 20E Hairline-fracture
-N009 20E Discontinuous Hairline-fract
-N218 64NW Discontinuous Hairline-fra
-N163 61SW Discontinuous Hairline-fra
-N130 69SW Discontinuous Hairline-fra
-N112 73SW Discontinuous Hairline-fra



DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-11D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

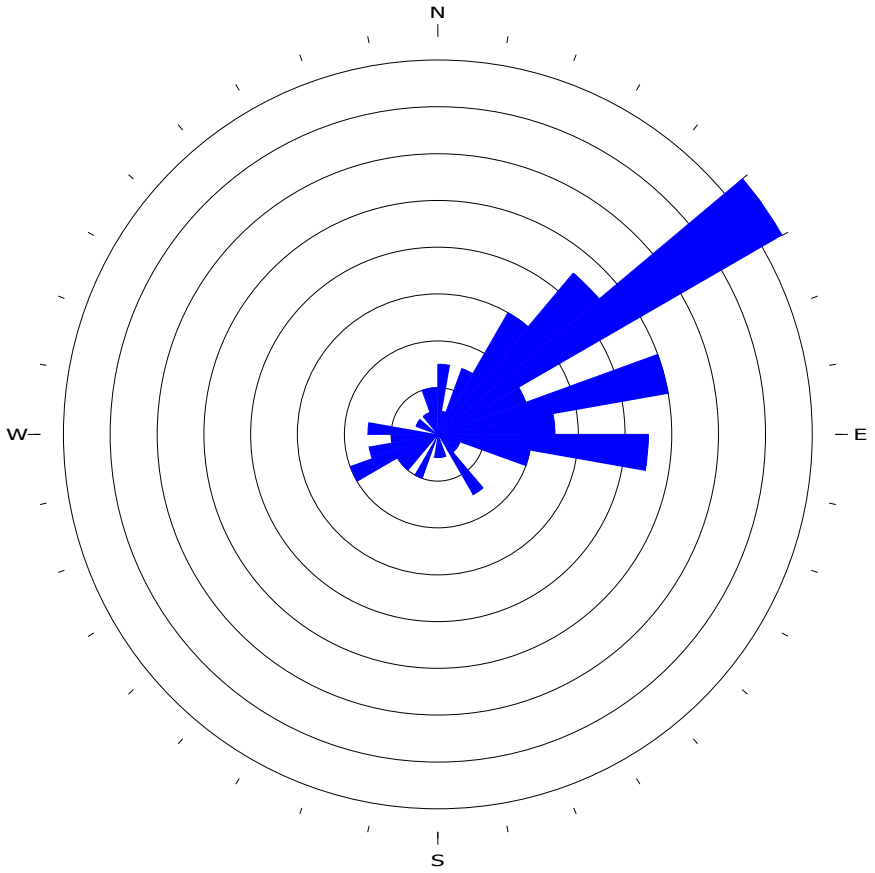
North ref. is true
Depth units are feet

Zone from 160.547 to 92.676ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-11D
92.676 - 160.547ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 106

0 2 4 6 8 10 12 14 16

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

13 Oct 2011

Tetra Tech ECI

Borehole: RMW-11D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

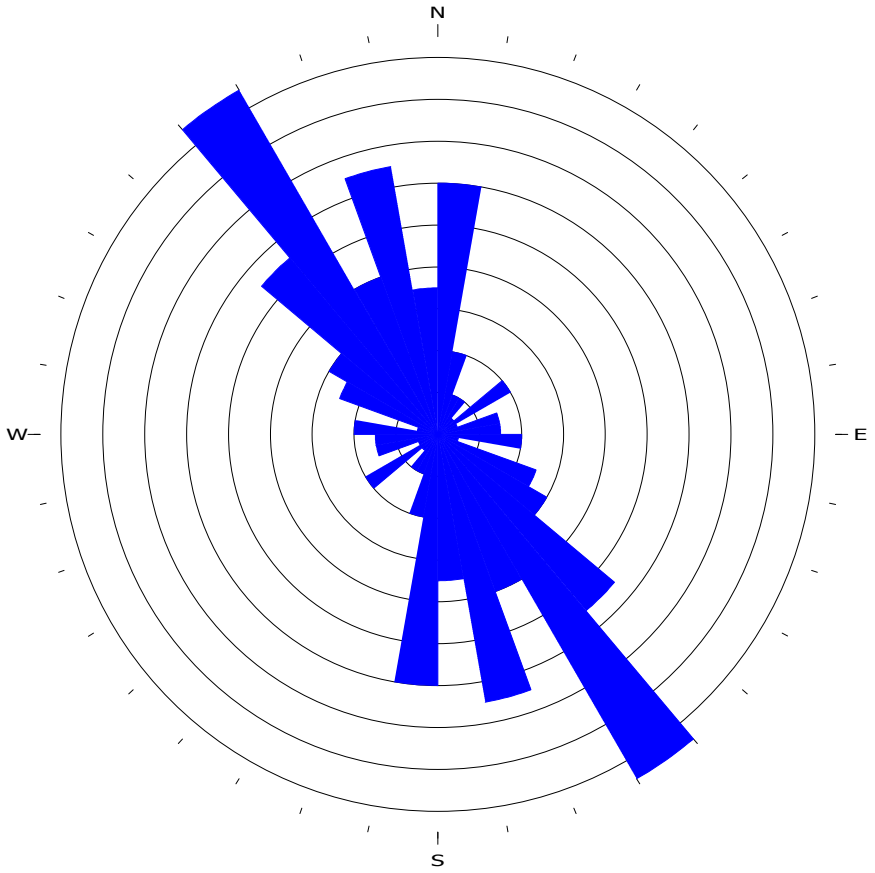
North ref. is true
Depth units are feet

Zone from 160.547 to 92.676ft

Interpretation 1

Dip data sets .....
BHTV dips

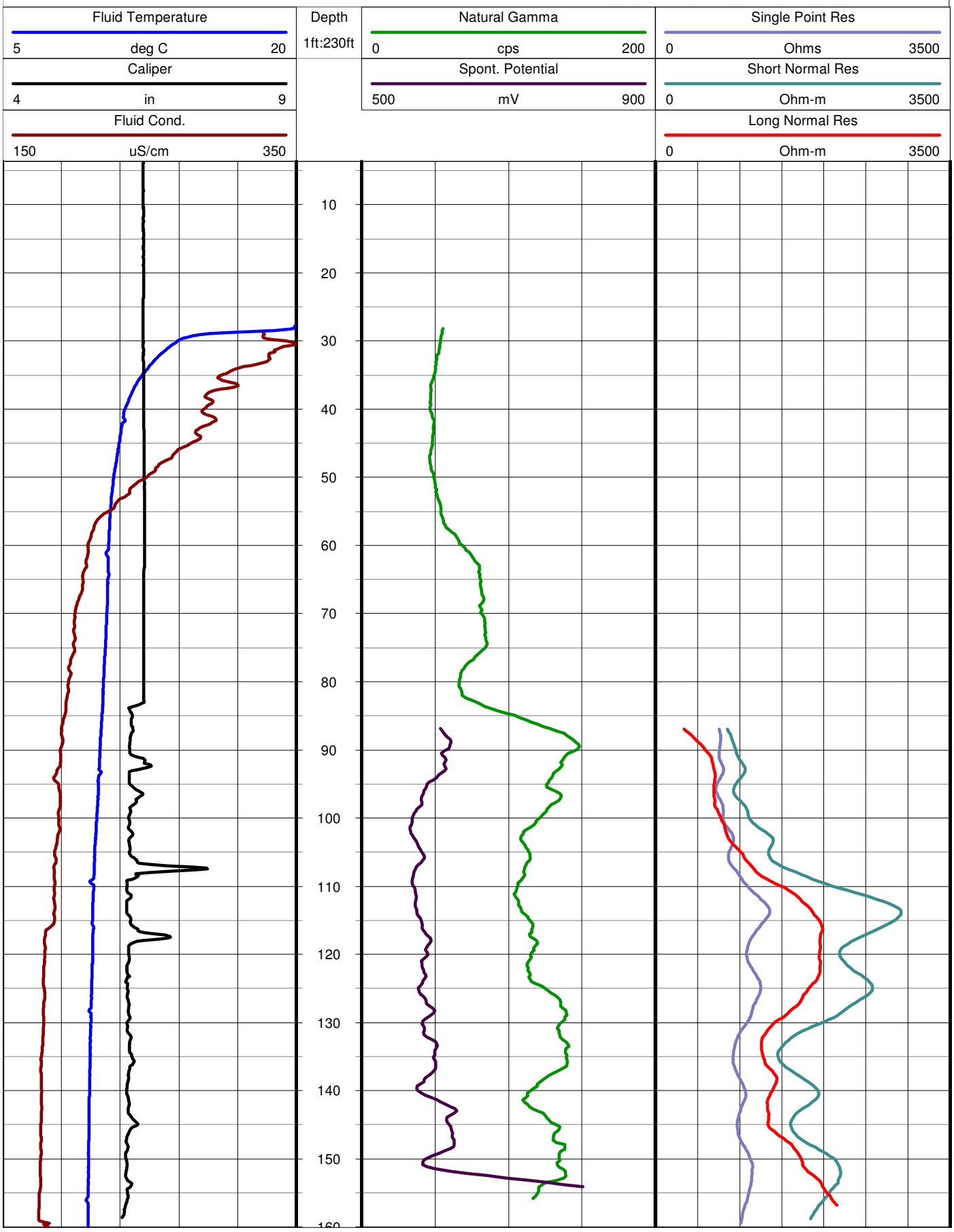
RMW-11D
92.676 - 160.547ft
Strike-direction, fracture rose-diagram



Azimuth Incr = 10°
N = 106

Company: Tetra Tech ECI
Location: Mountain Top, Pa
Well Name: RMW-11D
Reference: Ground Surface

EARTH DATA NORTHEAST, INC.



RMW-11D Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Thursday, September 22, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
88	1	8:55	Ø	N/A	No flow	N/A	
	2	8:56	Ø	up	No flow		
	3	8:56	Ø	down	No flow		
	4	8:57	Ø	N/A	No flow		
	5	8:58	Ø	down	No flow		
	6	8:58	Ø	down	No flow		
	7	8:59	Ø	N/A	No flow		
98	1	9:01	Ø	N/A	No flow	N/A	
	2	9:04	Ø	N/A	No flow		
	3	9:04	Ø	N/A	No flow		
	4	9:05	Ø	N/A	No flow		
	5	9:06	Ø	N/A	No flow		
	6	9:06	Ø	N/A	No flow		
114	1	9:11	Ø	N/A	No flow	N/A	
	2	9:12	Ø	down	No flow		
	3	9:13	Ø	up	No flow		
	4	9:13	Ø	N/A	No flow		
	5	9:14	Ø	N/A	No flow		
	6	9:15	Ø	N/A	No flow		
	7	9:15	Ø	N/A	No flow		
130	1	9:22	Ø	N/A	No flow	N/A	
	2	9:22	Ø	N/A	No flow		
	3	9:23	Ø	N/A	No flow		
	4	9:24	Ø	down	No flow		
	5	9:24	Ø	N/A	No flow		
	6	9:25	Ø	N/A	No flow		
	7	9:26	Ø	N/A	No flow		
140	1	9:32	Ø	N/A	No flow	N/A	
	2	9:32	Ø	N/A	No flow		
	3	9:33	Ø	N/A	No flow		
	4	9:34	Ø	N/A	No flow		
	5	9:34	Ø	up	No flow		
	6	9:35	Ø	N/A	No flow		
150	1	9:40	Ø	N/A	No flow	N/A	
	2	9:41	Ø	N/A	No flow		
	3	9:42	Ø	N/A	No flow		
	4	9:42	Ø	N/A	No flow		
	5	9:43	Ø	N/A	No flow		
	6	9:44	Ø	N/A	No flow		

Pumping Conditions: Pump set at ~ 50', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
88	1	11:04	0.096	up	Upward Flow	0.099	<
	2	11:04	0.100	up	Upward Flow		
	3	11:05	0.100	up	Upward Flow		
	4	11:06	0.100	up	Upward Flow		
	5	11:06	0.100	up	Upward Flow		
	6	11:07	0.100	up	Upward Flow		
98	1	10:52	Ø	N/A	No flow	N/A	
	2	10:52	Ø	up	Incon.		
	3	10:53	Ø	N/A	No flow		
	4	10:54	Ø	down	No flow		
	5	10:54	Ø	up	Incon.		
	6	10:55	Ø	N/A	No flow		
	7	10:56	Ø	N/A	No flow		
	8	10:56	Ø	N/A	No flow		
	9	10:57	Ø	N/A	No flow		
	10	10:58	Ø	N/A	No flow		
114	1	10:39	Ø	N/A	No flow	N/A	
	2	10:39	Ø	N/A	No flow		
	3	10:40	Ø	down	No flow		
	4	10:41	Ø	N/A	No flow		
	5	10:41	Ø	down	No flow		
	6	10:42	Ø	up	No flow		
	7	10:43	Ø	up	No flow		
	8	10:44	Ø	N/A	No flow		
	9	10:44	Ø	N/A	No flow		
	10	10:45	Ø	up	No flow		
	11	10:46	Ø	up	No flow		
	12	10:46	Ø	N/A	No flow		
130	1	10:27	Ø	N/A	No flow	N/A	
	2	10:27	Ø	N/A	No flow		
	3	10:27	Ø	down	No flow		
	4	10:28	Ø	down	No flow		
	5	10:29	Ø	up	No flow		
	6	10:30	Ø	N/A	No flow		
	7	10:30	Ø	down	No flow		
	8	10:31	Ø	up	No flow		
	9	10:32	Ø	N/A	No flow		
	10	10:33	Ø	N/A	No flow		
	11	10:33	Ø	up	No flow		
	12	10:34	Ø	N/A	No flow		
140	1	10:18	Ø	N/A	No flow	N/A	
	2	10:18	Ø	up	No flow		
	3	10:19	Ø	down	No flow		
	4	10:20	Ø	N/A	No flow		
	5	10:20	Ø	N/A	No flow		
	6	10:21	Ø	N/A	No flow		
	7	10:22	Ø	N/A	No flow		
	8	10:22	Ø	N/A	No flow		
150	1	10:08	Ø	N/A	No flow	N/A	
	2	10:09	Ø	N/A	No flow		
	3	10:10	Ø	down	Incon.		
	4	10:10	Ø	down	Incon.		
	5	10:11	Ø	down	No flow		
	6	10:12	Ø	down	No flow		
	7	10:12	Ø	down	No flow		
	8	10:13	Ø	N/A	No flow		
	9	10:14	Ø	down	Incon.		

Key:

Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (into borehole)
>	Outflow zone (into formation)
	Used in average flow calculation
Incon.	Inconclusive results

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

14 Oct 2011

Tetra Tech ECI

Borehole: RMW- 12D

Mountain Top, PA

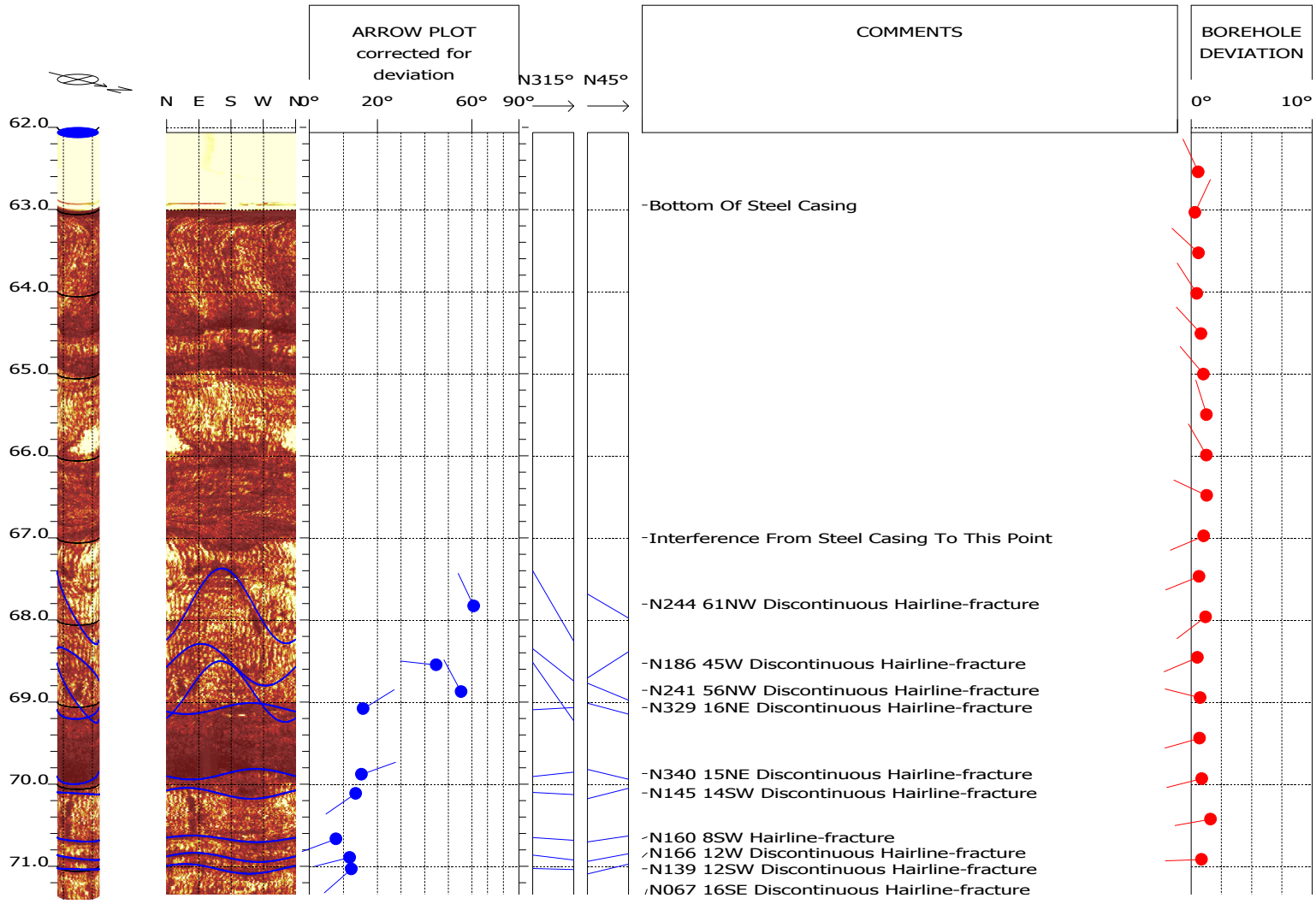
top of borehole.....
East: _
North:_
Elev: _

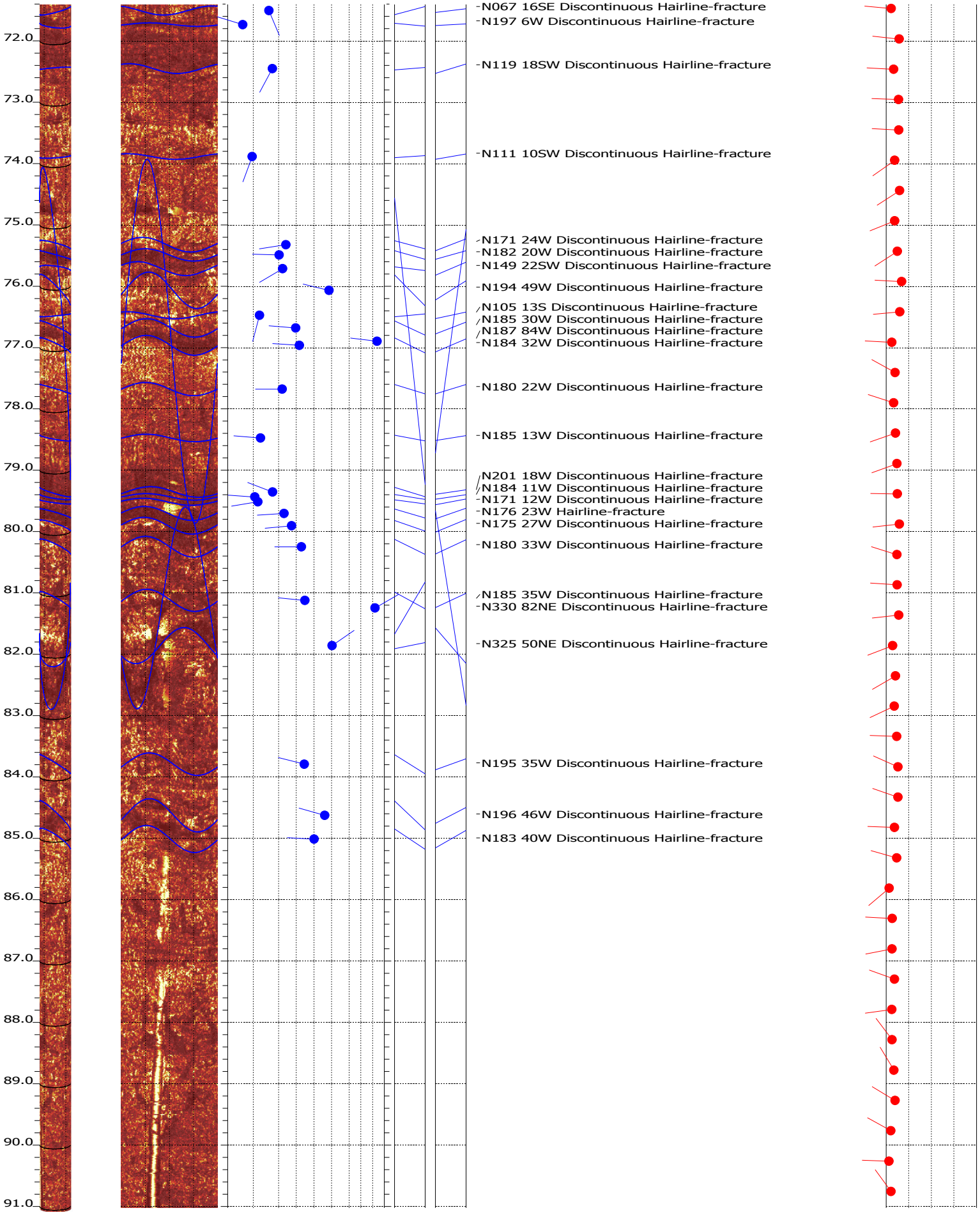
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

Zone from 152.000 to 62.000ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units

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86.0
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88.0
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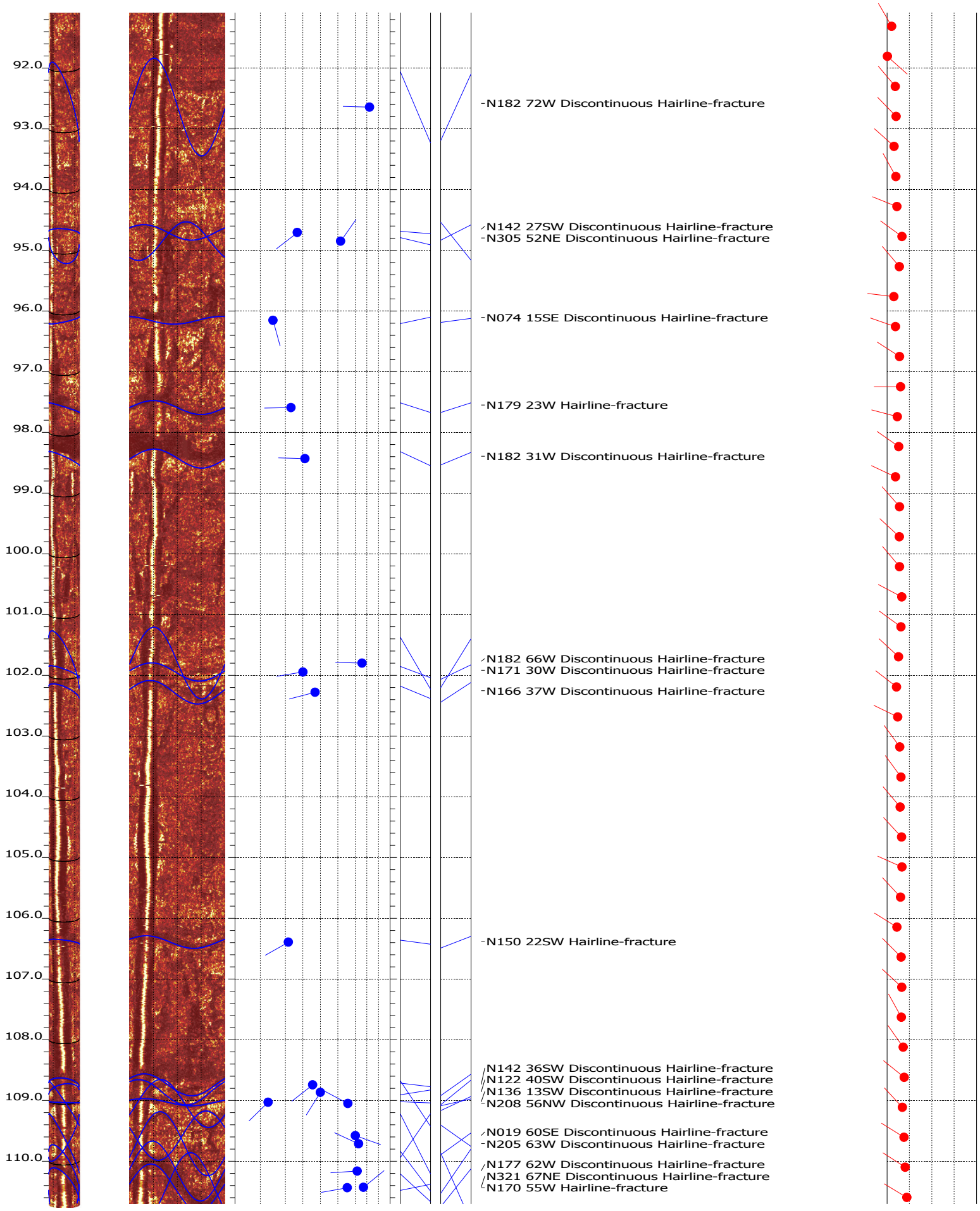
90.0
91.0
-N067 16SE Discontinuous Hairline-fracture
-N197 6W Discontinuous Hairline-fracture
-N119 18SW Discontinuous Hairline-fracture
-N111 10SW Discontinuous Hairline-fracture
-N171 24W Discontinuous Hairline-fracture
-N182 20W Discontinuous Hairline-fracture
-N149 22SW Discontinuous Hairline-fracture
-N194 49W Discontinuous Hairline-fracture
-N105 13S Discontinuous Hairline-fracture
-N185 30W Discontinuous Hairline-fracture
-N187 84W Discontinuous Hairline-fracture
-N184 32W Discontinuous Hairline-fracture
-N180 22W Discontinuous Hairline-fracture
-N185 13W Discontinuous Hairline-fracture
-N201 18W Discontinuous Hairline-fracture
-N184 11W Discontinuous Hairline-fracture
-N171 12W Discontinuous Hairline-fracture
-N176 23W Hairline-fracture
-N175 27W Discontinuous Hairline-fracture
-N180 33W Discontinuous Hairline-fracture
-N185 35W Discontinuous Hairline-fracture
-N330 82NE Discontinuous Hairline-fracture
-N325 50NE Discontinuous Hairline-fracture
-N195 35W Discontinuous Hairline-fracture
-N196 46W Discontinuous Hairline-fracture
-N183 40W Discontinuous Hairline-fracture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108.0
109.0
110.0
N182 72W Discontinuous Hairline-fracture
N142 27SW Discontinuous Hairline-fracture
N305 52NE Discontinuous Hairline-fracture
N074 15SE Discontinuous Hairline-fracture
N179 23W Hairline-fracture
N182 31W Discontinuous Hairline-fracture
N182 66W Discontinuous Hairline-fracture
N171 30W Discontinuous Hairline-fracture
N166 37W Discontinuous Hairline-fracture
N150 22SW Hairline-fracture
N142 36SW Discontinuous Hairline-fracture
N122 40SW Discontinuous Hairline-fracture
N136 13SW Discontinuous Hairline-fracture
N208 56NW Discontinuous Hairline-fracture
N019 60SE Discontinuous Hairline-fracture
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N177 62W Discontinuous Hairline-fracture
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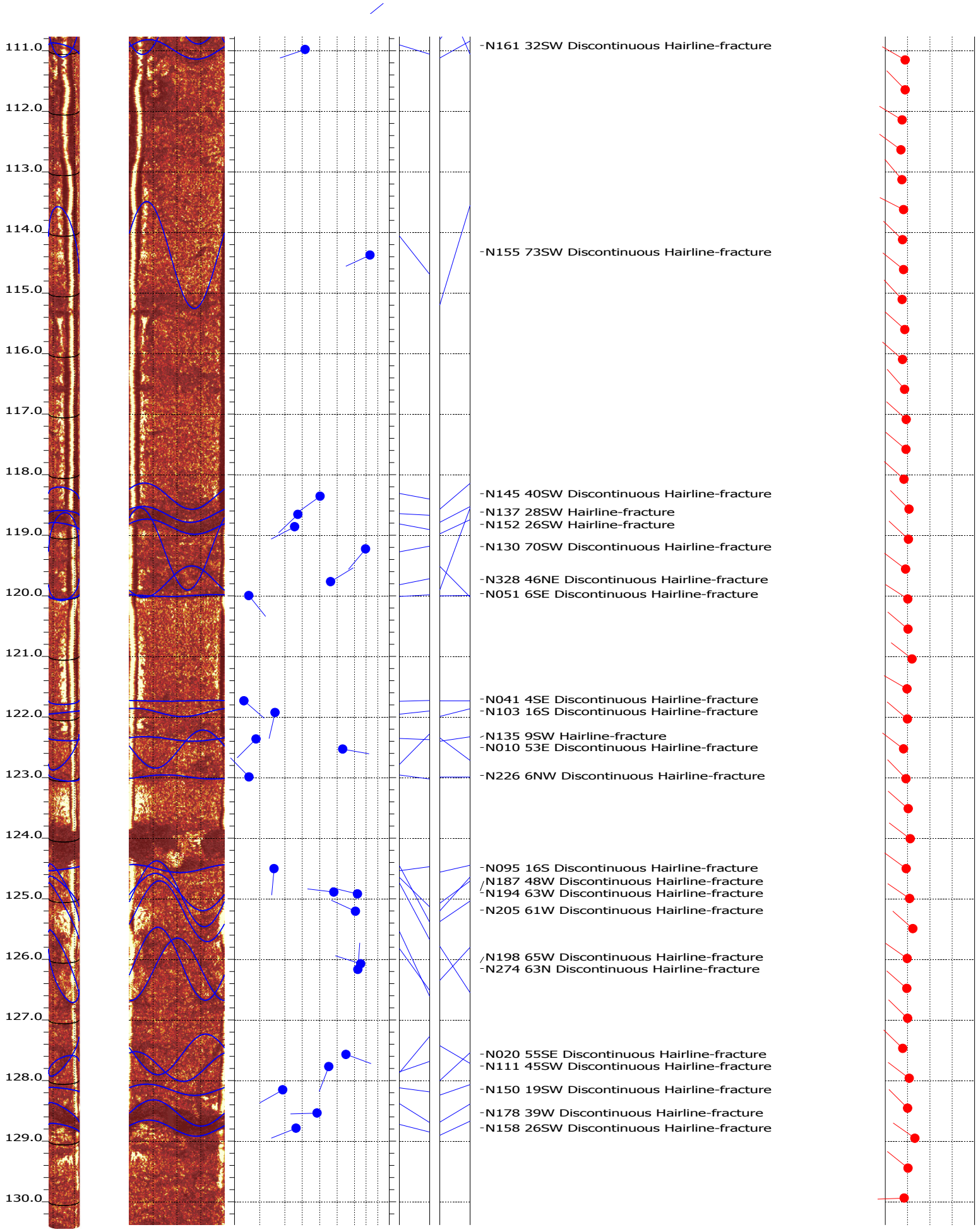
N170 55W Hairline-fracture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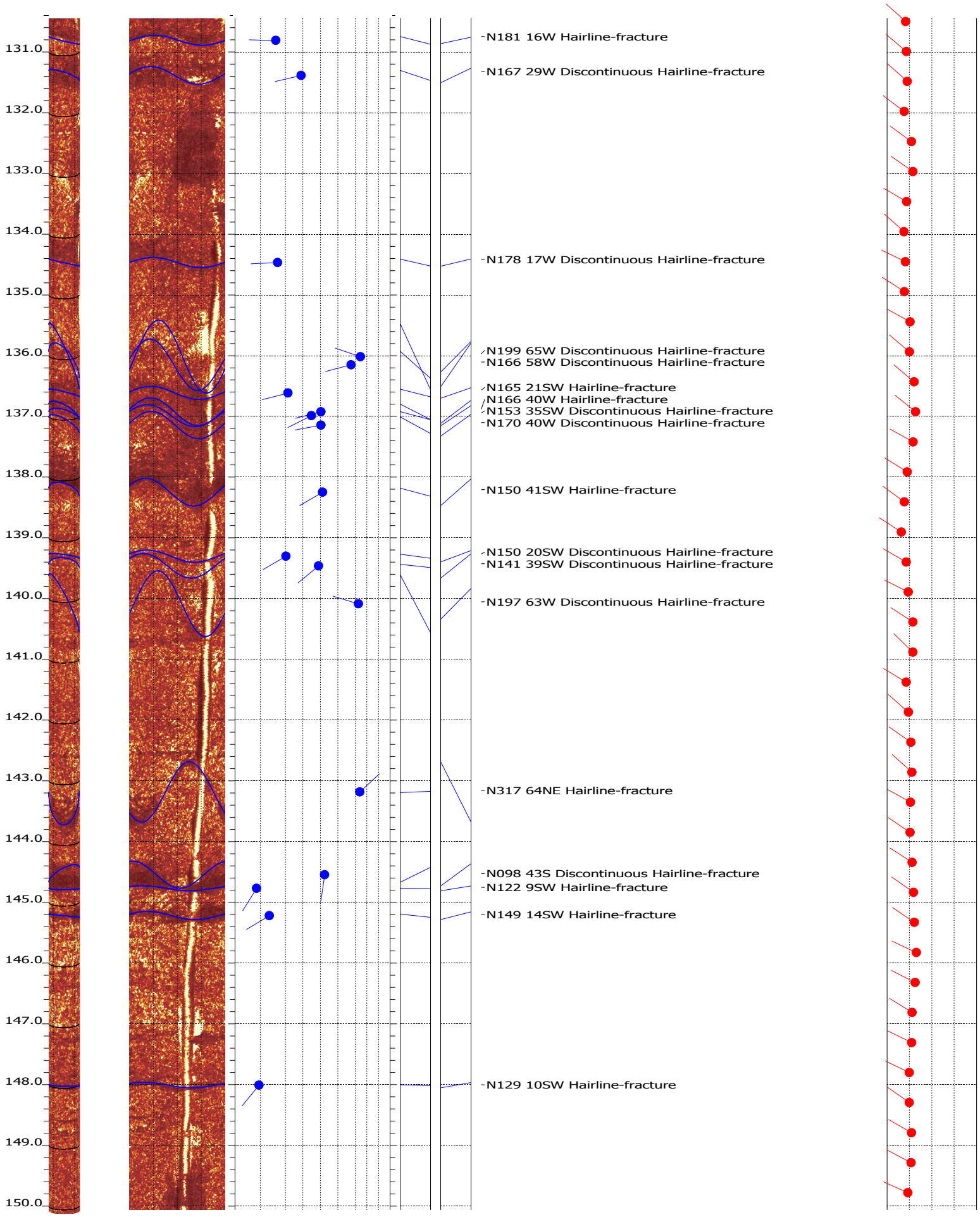
-N161 32SW Discontinuous Hairline-fracture
-N155 73SW Discontinuous Hairline-fracture
-N145 40SW Discontinuous Hairline-fracture
-N137 28SW Hairline-fracture
-N152 26SW Hairline-fracture
-N130 70SW Discontinuous Hairline-fracture
-N328 46NE Discontinuous Hairline-fracture
-N051 6SE Discontinuous Hairline-fracture
-N041 4SE Discontinuous Hairline-fracture
-N103 16S Discontinuous Hairline-fracture
-N135 9SW Hairline-fracture
-N010 53E Discontinuous Hairline-fracture
-N226 6NW Discontinuous Hairline-fracture
-N095 16S Discontinuous Hairline-fracture
-N187 48W Discontinuous Hairline-fracture
-N194 63W Discontinuous Hairline-fracture
-N205 61W Discontinuous Hairline-fracture
-N198 65W Discontinuous Hairline-fracture
-N274 63N Discontinuous Hairline-fracture
-N020 55SE Discontinuous Hairline-fracture
-N111 45SW Discontinuous Hairline-fracture
-N150 19SW Discontinuous Hairline-fracture
-N178 39W Discontinuous Hairline-fracture
-N158 26SW Discontinuous Hairline-fracture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150.0
-N181 16W Hairline-fracture
-N167 29W Discontinuous Hairline-fracture
-N178 17W Discontinuous Hairline-fracture
N199 65W Discontinuous Hairline-fracture
-N166 58W Discontinuous Hairline-fracture
N165 21SW Hairline-fracture
N166 40W Hairline-fracture
N153 35SW Discontinuous Hairline-fracture
-N170 40W Discontinuous Hairline-fracture
-N150 41SW Hairline-fracture
N150 20SW Discontinuous Hairline-fracture
-N141 39SW Discontinuous Hairline-fracture
-N197 63W Discontinuous Hairline-fracture
-N317 64NE Hairline-fracture
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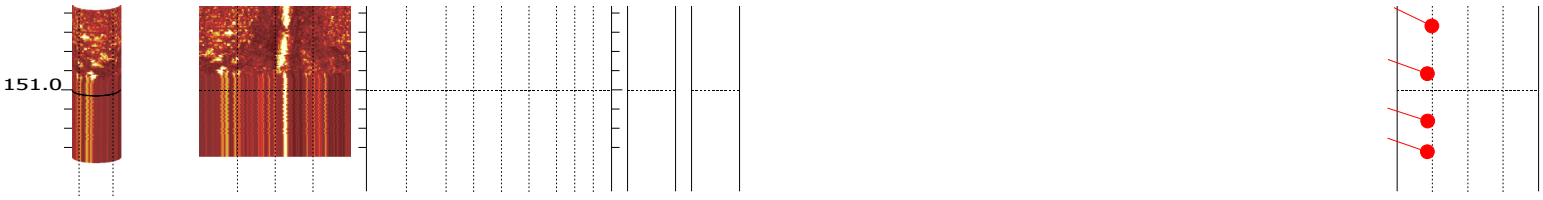
-N122 9SW Hairline-fracture
-N149 14SW Hairline-fracture
-N129 10SW Hairline-fracture


151.0

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

14 Oct 2011

Tetra Tech ECI

Borehole: RMW-12D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

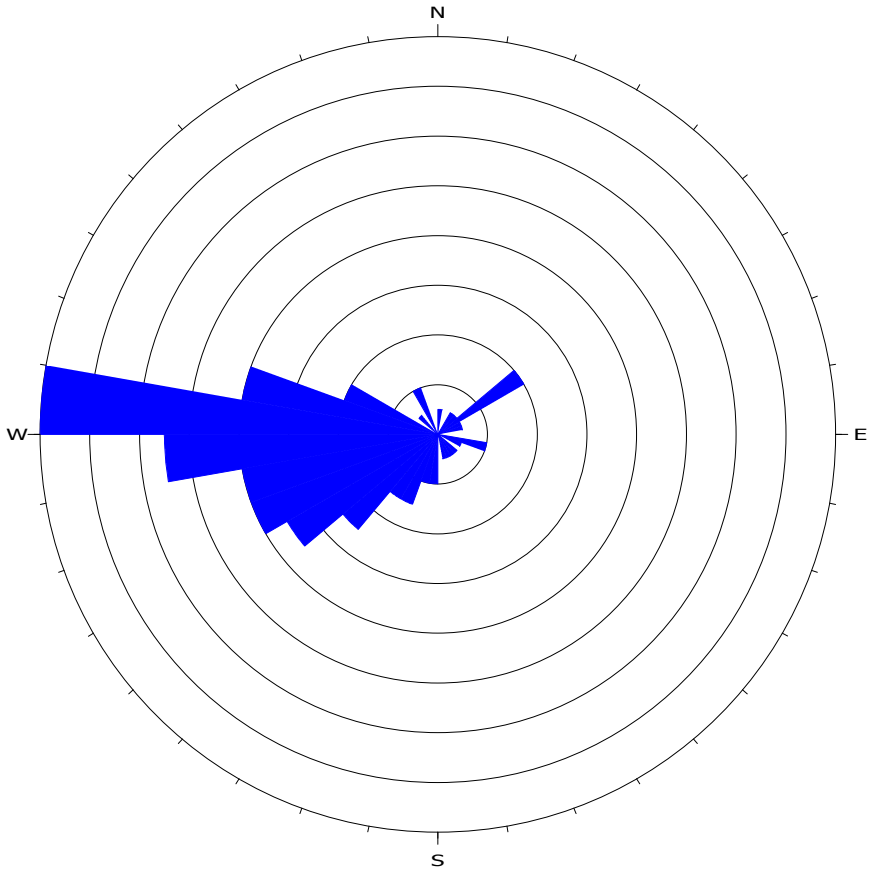
North ref. is true
Depth units are feet

Zone from 148.503 to 67.307ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW- 12D
67.307 - 148.503ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 96

0 2 4 6 8 10 12 14 16

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

14 Oct 2011

Tetra Tech ECI

Borehole: RMW- 12D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

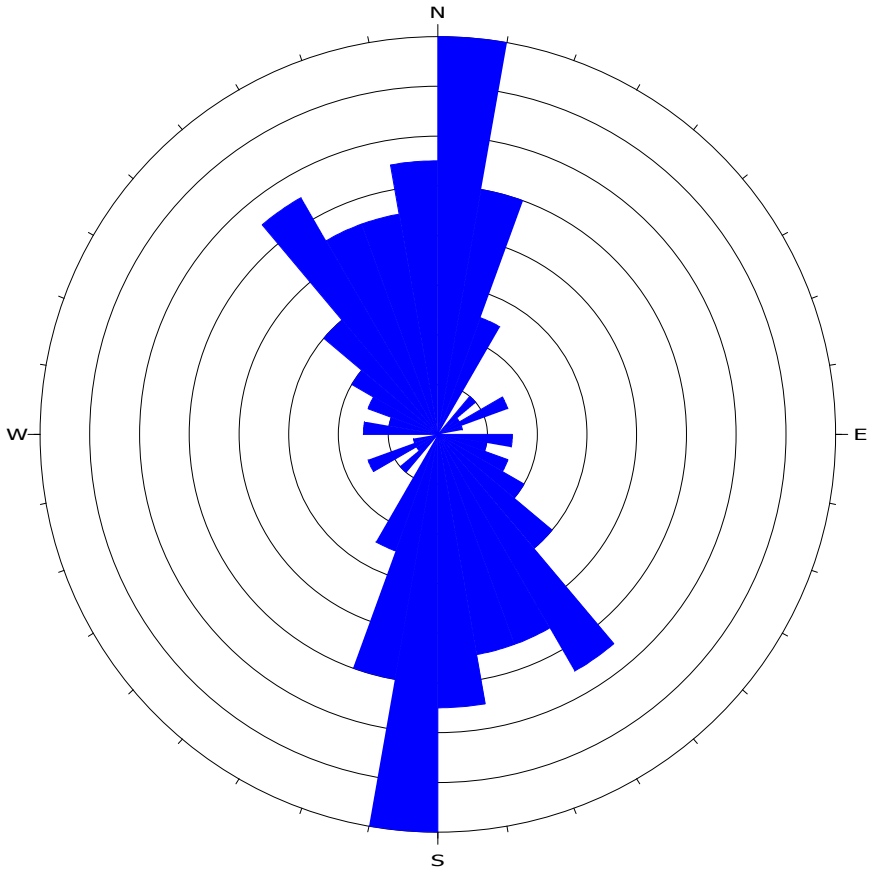
North ref. is true
Depth units are feet

Zone from 148.503 to 67.307ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW- 12D
67.307 - 148.503ft
Strike-direction, fracture rose-diagram

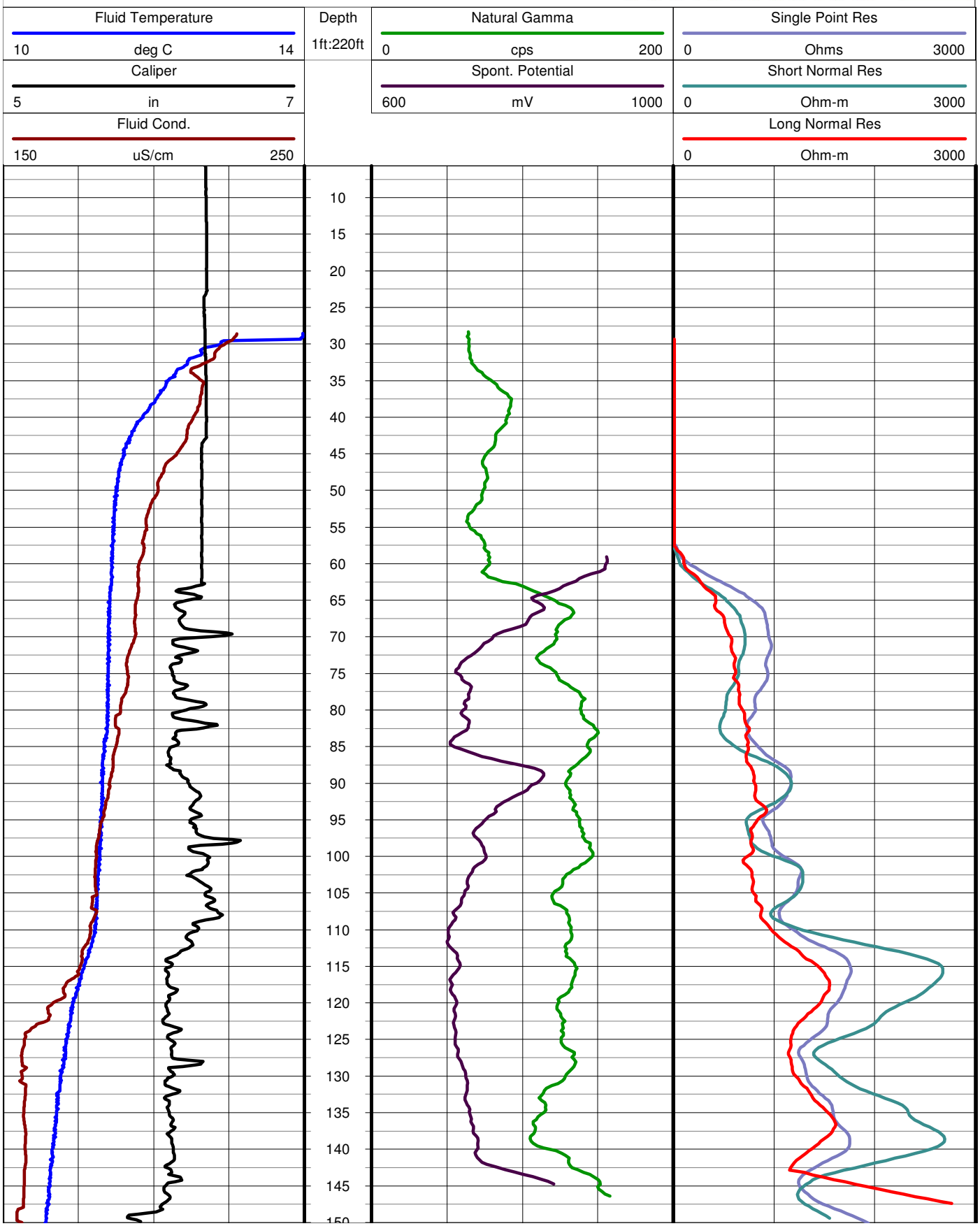


Azimuth Incr = 10°
N = 96

0 2 4 6 8 10 12 14 16

Company: Tetra Tech ECI
Location: Mountain Top, Pa
Well Name: RMW-12D
Reference: Ground Surface

EARTH DATA NORTHEAST, INC.



RMW-12D Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Wednesday, September 21, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
							<
68	1	14:18	0.137	down	Downward flow	**0.145**	
	2	14:18	0.144	down	Downward flow		
	3	14:19	0.148	down	Downward flow		
	4	14:20	0.148	down	Downward flow		
	5	14:20	0.148	down	Downward flow		
							<
86	1	14:25	0.253	down	Downward flow	**0.257**	
	2	14:25	0.253	down	Downward flow		
	3	14:26	0.253	down	Downward flow		
	4	14:27	0.264	down	Downward flow		
	5	14:27	0.264	down	Downward flow		
							>
102	1	14:33	0.107	down	Downward flow	**0.111**	
	2	14:33	0.107	down	Downward flow		
	3	14:34	0.114	down	Downward flow		
	4	14:35	0.111	down	Downward flow		
	5	14:35	0.114	down	Downward flow		
							>
120	1	14:41	< 0.027	down	Downward flow	**< 0.027**	
	2	14:42	< 0.027	down	Downward flow		
	3	14:42	< 0.027	down	Downward flow		
	4	14:43	< 0.027	down	Downward flow		
	5	14:44	< 0.027	down	Downward flow		
							>
135	1	14:49	Ø	N/A	No flow	N/A	
	2	14:49	Ø	down	No flow		
	3	14:50	Ø	down	No flow		
	4	14:51	Ø	down	No flow		
	5	14:52	Ø	down	No flow		

Key:

Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (into borehole)
>	Outflow zone (into formation)
	Used in average flow calculation
Incon.	Inconclusive results

Pumping Conditions: Pump set at ~ 50', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
68	*Station eliminated due to lack of purge water storage*						
86	1	15:39	Ø	N/A	No flow	N/A	
	2	15:39	Ø	down	No flow		
	3	15:40	Ø	up	No flow		
	4	15:41	Ø	up	No flow		
	5	15:42	Ø	N/A	No flow		
	6	15:42	Ø	down	No flow		
	7	15:43	Ø	up	Incon.		
	8	15:44	Ø	up	Incon.		
	9	15:44	Ø	up	Incon.		
	10	15:45	Ø	up	No flow		
	11	15:46	Ø	N/A	No flow		
	12	15:47	Ø	N/A	No flow		
	13	15:47	Ø	N/A	No flow		
102	1	15:27	Ø	N/A	No flow	N/A	
	2	15:27	Ø	N/A	No flow		
	3	15:28	Ø	N/A	No flow		
	4	15:29	< 0.027	down	Downward flow		
	5	15:30	Ø	N/A	No flow		
	6	15:30	Ø	N/A	No flow		
	7	15:31	Ø	N/A	No flow		
	8	15:32	Ø	N/A	No flow		
120	1	15:18	Ø	N/A	No flow	N/A	
	2	15:18	Ø	N/A	No flow		
	3	15:19	Ø	N/A	No flow		
	4	15:20	Ø	N/A	No flow		
	5	15:20	Ø	N/A	No flow		
135	1	15:11	Ø	N/A	No flow	N/A	
	2	15:11	Ø	N/A	No flow		
	3	15:12	Ø	N/A	No flow		
	4	15:13	Ø	N/A	No flow		
	5	15:13	Ø	N/A	No flow		

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

14 Oct 2011

ROBERTSON GEOLOGGING TECHNOLOGY

Borehole: RMW-13D

Mountain Top, PA

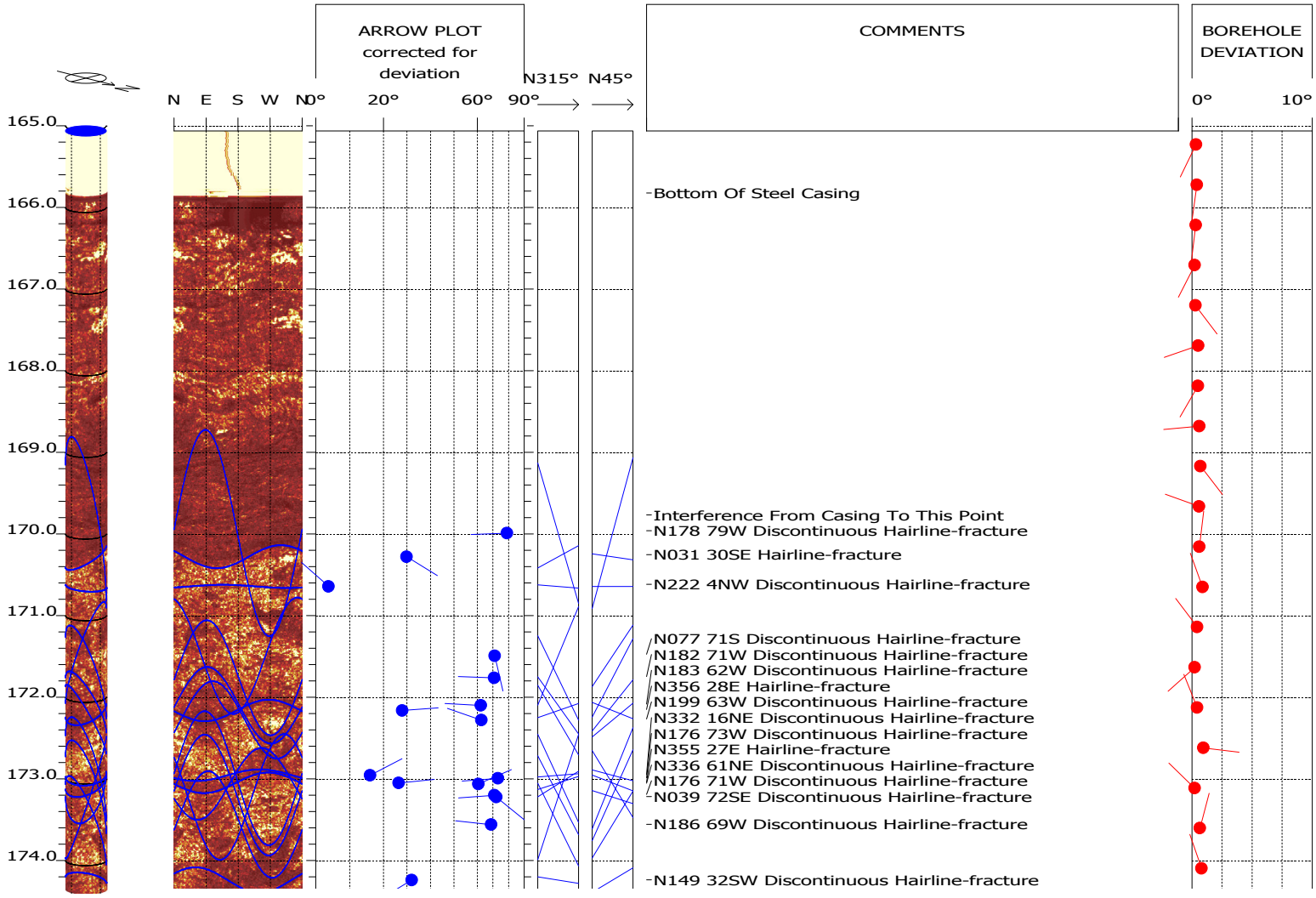
top of borehole.....
East: _
North:_
Elev: _

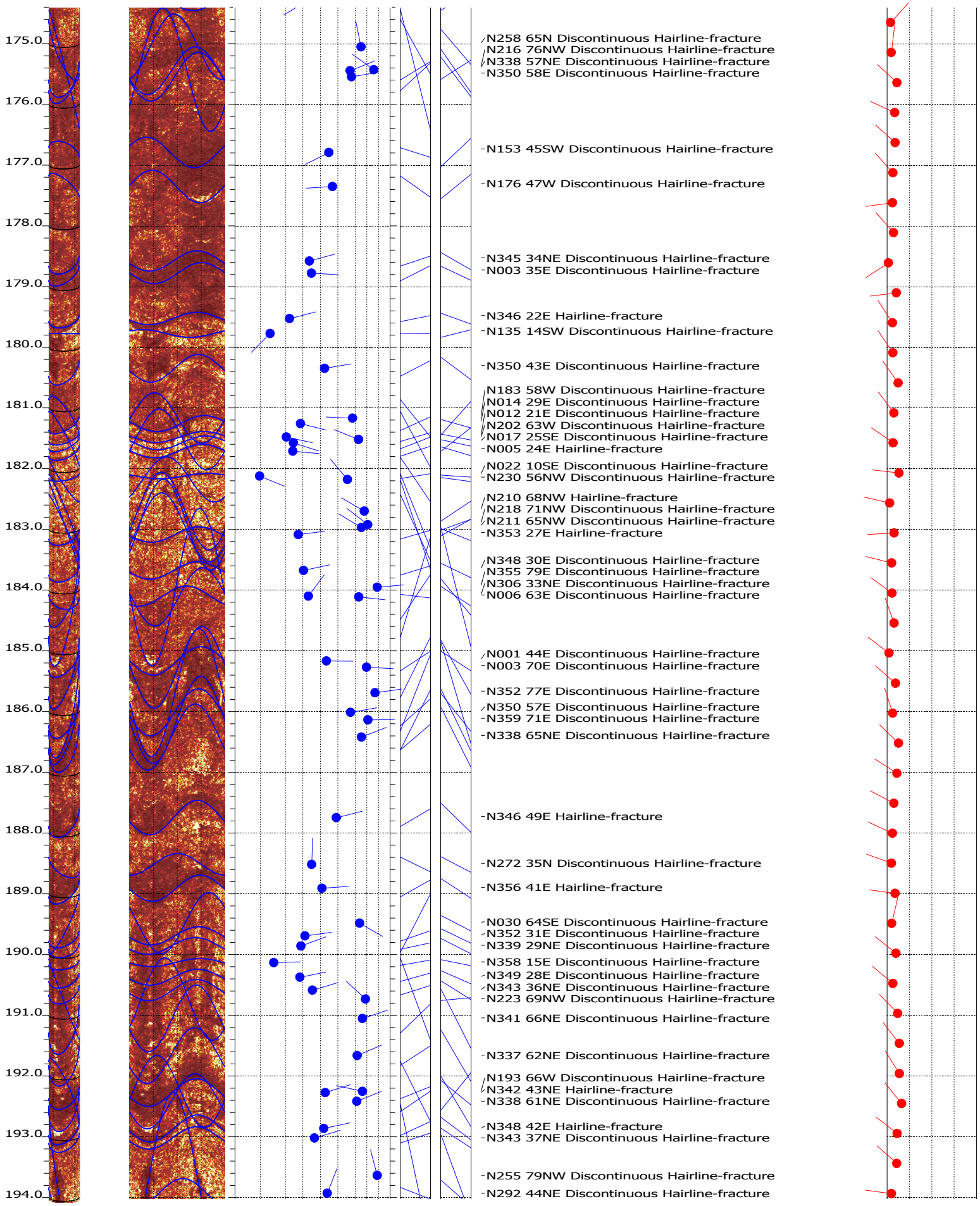
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

Zone from 197.000 to 165.000ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units

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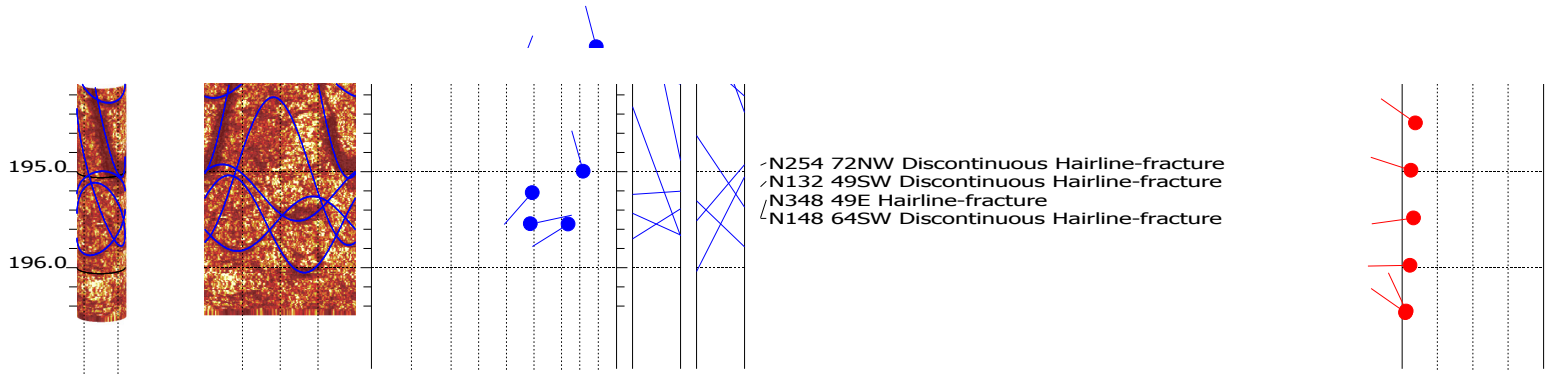
194.0
N258 65N Discontinuous Hairline-fracture
N216 76NW Discontinuous Hairline-fracture
N338 57NE Discontinuous Hairline-fracture
N350 58E Discontinuous Hairline-fracture
N153 45SW Discontinuous Hairline-fracture
N176 47W Discontinuous Hairline-fracture
N345 34NE Discontinuous Hairline-fracture
N003 35E Discontinuous Hairline-fracture
N346 22E Hairline-fracture
N135 14SW Discontinuous Hairline-fracture
N350 43E Discontinuous Hairline-fracture
N183 58W Discontinuous Hairline-fracture
N014 29E Discontinuous Hairline-fracture
N012 21E Discontinuous Hairline-fracture
N202 63W Discontinuous Hairline-fracture
N017 25SE Discontinuous Hairline-fracture
N005 24E Hairline-fracture
N022 10SE Discontinuous Hairline-fracture
N230 56NW Discontinuous Hairline-fracture
N210 68NW Hairline-fracture
N218 71NW Discontinuous Hairline-fracture
N211 65NW Discontinuous Hairline-fracture
N353 27E Hairline-fracture
N348 30E Discontinuous Hairline-fracture
N355 79E Discontinuous Hairline-fracture
N306 33NE Discontinuous Hairline-fracture
N006 63E Discontinuous Hairline-fracture
N001 44E Discontinuous Hairline-fracture
N003 70E Discontinuous Hairline-fracture
N352 77E Discontinuous Hairline-fracture
N350 57E Discontinuous Hairline-fracture
N359 71E Discontinuous Hairline-fracture
N338 65NE Discontinuous Hairline-fracture
N346 49E Hairline-fracture
N272 35N Discontinuous Hairline-fracture
N356 41E Hairline-fracture
N030 64SE Discontinuous Hairline-fracture
N352 31E Discontinuous Hairline-fracture
N339 29NE Discontinuous Hairline-fracture
N358 15E Discontinuous Hairline-fracture
N349 28E Discontinuous Hairline-fracture
N343 36NE Discontinuous Hairline-fracture
N223 69NW Discontinuous Hairline-fracture
N341 66NE Discontinuous Hairline-fracture
N337 62NE Discontinuous Hairline-fracture
N193 66W Discontinuous Hairline-fracture
N342 43NE Hairline-fracture
N338 61NE Discontinuous Hairline-fracture
N348 42E Hairline-fracture
N343 37NE Discontinuous Hairline-fracture
N255 79NW Discontinuous Hairline-fracture
N292 44NE Discontinuous Hairline-fracture


195.0
196.0
N254 72NW Discontinuous Hairline-fracture
N132 49SW Discontinuous Hairline-fracture
N348 49E Hairline-fracture
N148 64SW Discontinuous Hairline-fracture

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

14 Oct 2011

ROBERTSON GEOLOGGING TECHNOLOGY

Borehole: RMW-13D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

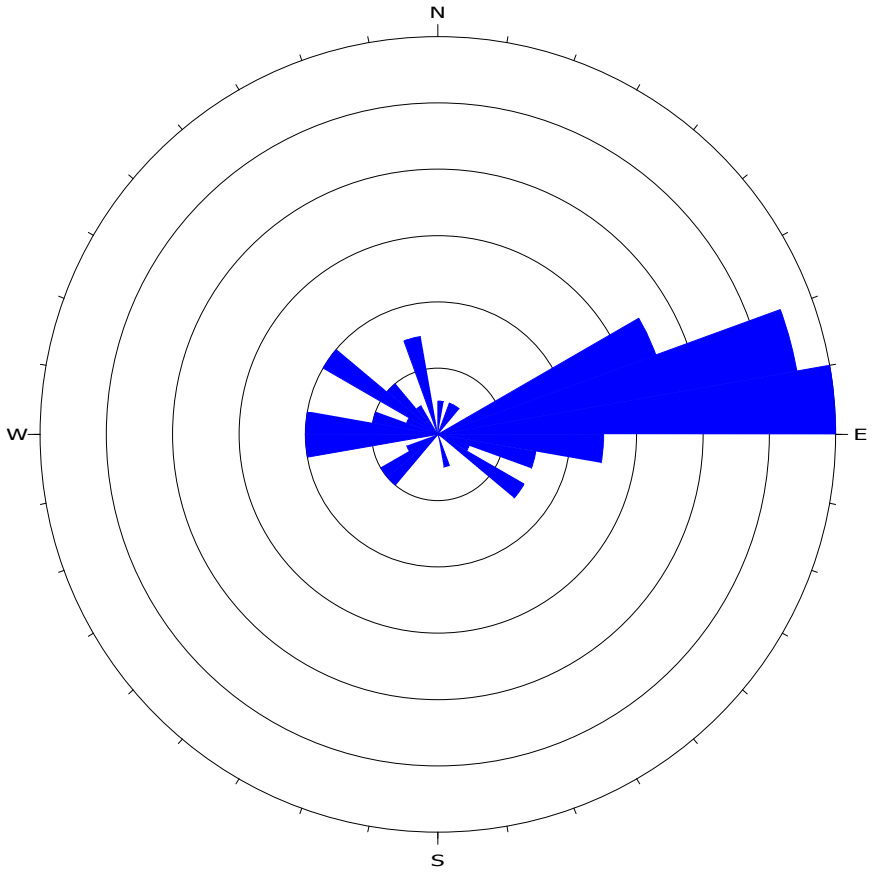
North ref. is true
Depth units are feet

Zone from 195.989 to 169.461ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-13D
169.461 - 195.989ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 72

0 2 4 6 8 10 12

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

14 Oct 2011

ROBERTSON GEOLOGGING TECHNOLOGY

Borehole: RMW-13D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

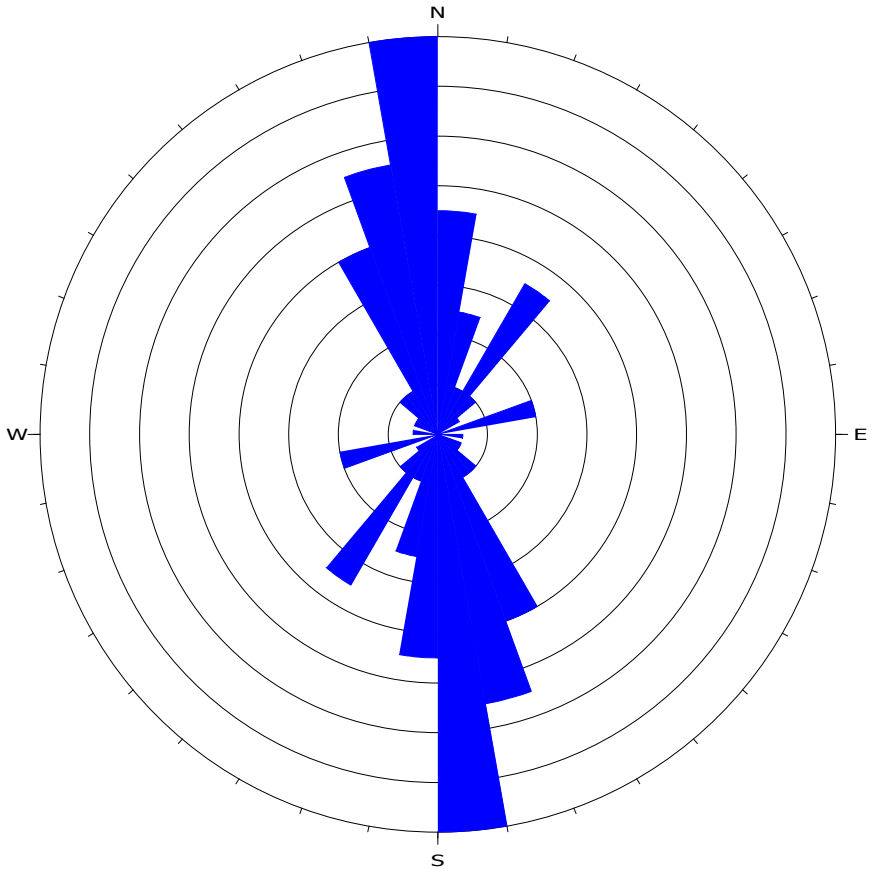
North ref. is true
Depth units are feet

Zone from 195.989 to 169.461ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-13D
169.461 - 195.989ft
Strike-direction, fracture rose-diagram



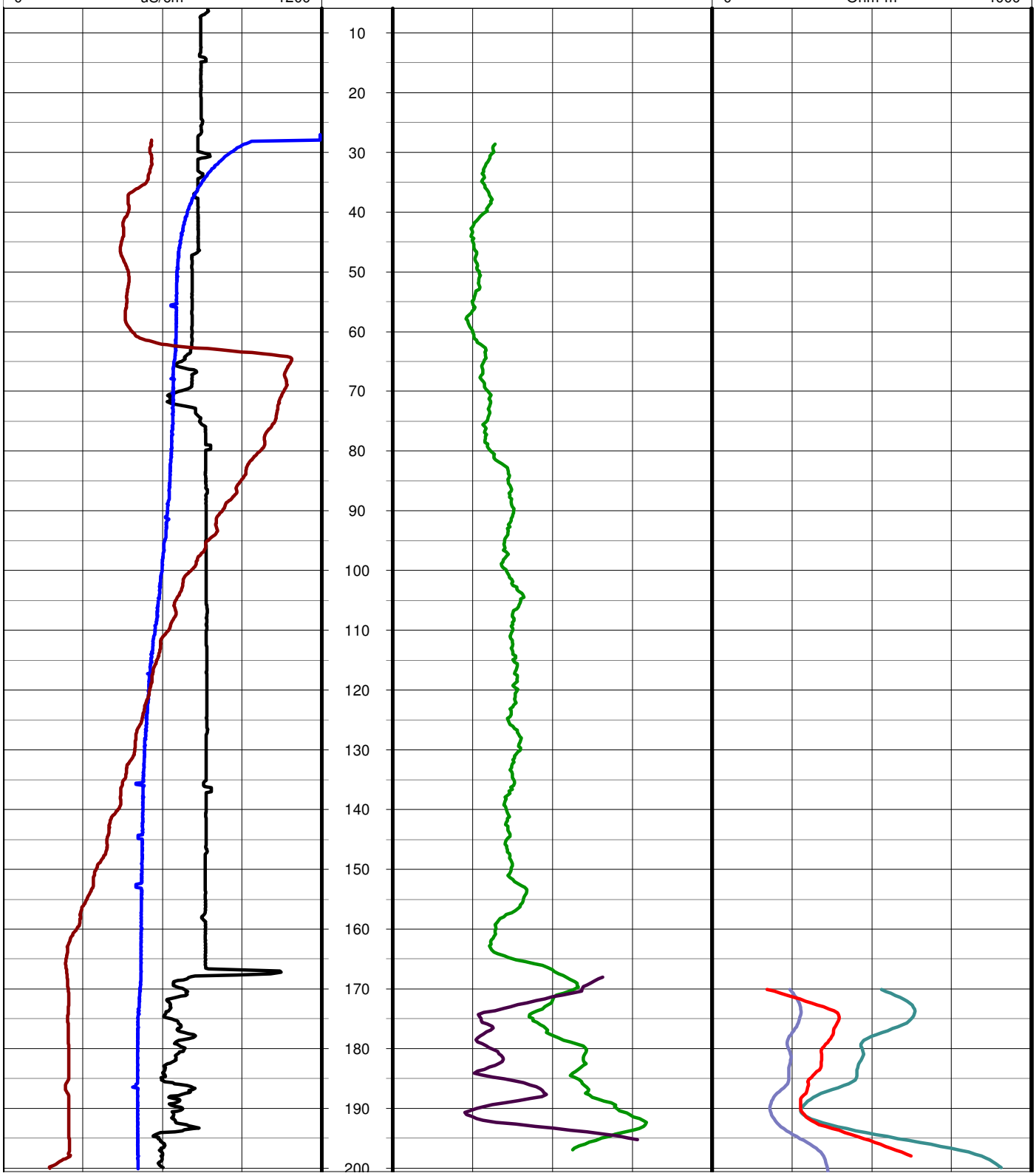
Azimuth Incr = 10°
N = 72

0 2 4 6 8 10 12 14 16

Company: Tetra Tech ECI
Location: Mountain Top, Pa
Well Name: RMW-13D
Reference: Ground Surface

EARTH DATA NORTHEAST, INC.

Caliper	Depth	Natural Gamma	Single Point Res
5 in 7	1ft:285ft	0 cps 200	0 Ohms 4000
Fluid Temperature		Spont. Potential	Short Normal Res
5 deg C 15		400 mV 600	0 Ohm-m 4000
Fluid Cond.			Long Normal Res
0 uS/cm 1200			0 Ohm-m 4000



RMW-13D Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Wednesday, September 21, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
174	1	9:21	0.033	down	Downward flow	Incon.	
	2	9:21	Ø	N/A	No flow		
	3	9:22	Ø	down	No flow		
	4	9:23	Ø	down	No flow		
	5	9:24	0.034	down	Downward flow		
	6	9:24	Ø	N/A	No flow		
	7	9:25	Ø	N/A	No flow		
	8	9:26	Ø	down	No flow		
184	1	9:31	Ø	N/A	No flow	N/A	
	2	9:31	Ø	N/A	No flow		
	3	9:32	Ø	N/A	No flow		
	4	9:33	Ø	N/A	No flow		
	5	9:34	Ø	N/A	No flow		
	6	9:34	Ø	N/A	No flow		
	7	9:35	Ø	N/A	No flow		
	8	9:36	Ø	N/A	No flow		
192	1	9:45	0.040	up	Upward flow	Incon.	
	2	9:46	Ø	N/A	No flow		
	3	9:47	0.038	up	Upward flow		
	4	9:48	0.038	up	Upward flow		
	5	9:48	Ø	up	No flow		
	6	9:49	0.039	up	Upward flow		
	7	9:49	Ø	up	No flow		
	8	9:50	0.066	down	Downward flow		
	9	9:51	0.036	up	Upward flow		
	10	9:52	Ø	up	No flow		

Pumping Conditions: Pump set at ~ 40', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
174	1	10:41	0.102	up	Upward flow	0.109	<
	2	10:41	0.109	up	Upward flow		
	3	10:42	0.109	up	Upward flow		
	4	10:43	0.114	up	Upward flow		
	5	10:43	0.112	up	Upward flow		
184	1	10:32	0.045	up	Upward flow	0.042	
	2	10:33	0.047	up	Upward flow		
	3	10:34	Ø	N/A	No flow		
	4	10:34	0.040	up	Upward flow		
	5	10:35	0.035	up	Upward flow		
	6	10:36	0.049	up	Upward flow		
	7	10:37	0.035	up	Upward flow		
192	1	10:15	Ø	N/A	No flow	Incon.	
	2	10:15	0.033	down	Downward flow		
	3	10:16	Ø	up	No flow		
	4	10:17	< 0.035	up	Upward flow		
	5	10:17	Ø	up	No flow		
	6	10:18	Ø	N/A	No flow		
	7	10:19	Ø	N/A	No flow		
	8	10:20	Ø	N/A	No flow		
	9	10:20	< 0.035	up	Upward flow		
	10	10:21	Ø	up	No flow		
	11	10:22	Ø	N/A	No flow		
	12	10:22	< 0.035	up	Upward flow		

Key:

Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (into borehole)
>	Outflow zone (into formation)
	Used in average flow calculation
Incon.	Inconclusive results

BHTV DATA PROCESSING
RGLDIP vsn 6.1
INTERPRETED BHTV DIPS LOG

14 Oct 2011

Tetra Tech ECI

Borehole: RMW-14D

Mountain Top, PA

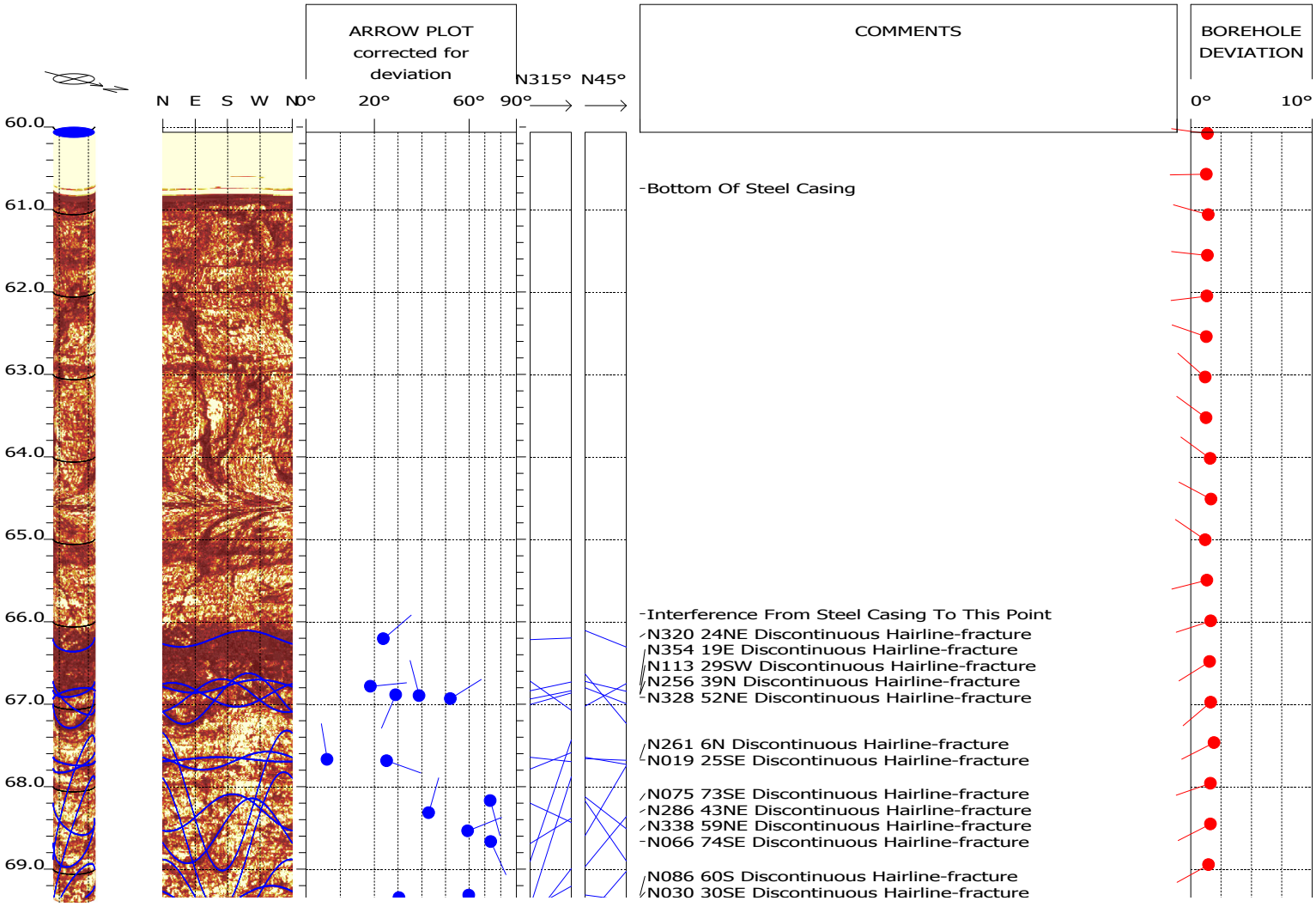
top of borehole.....
East: _
North:_
Elev: _

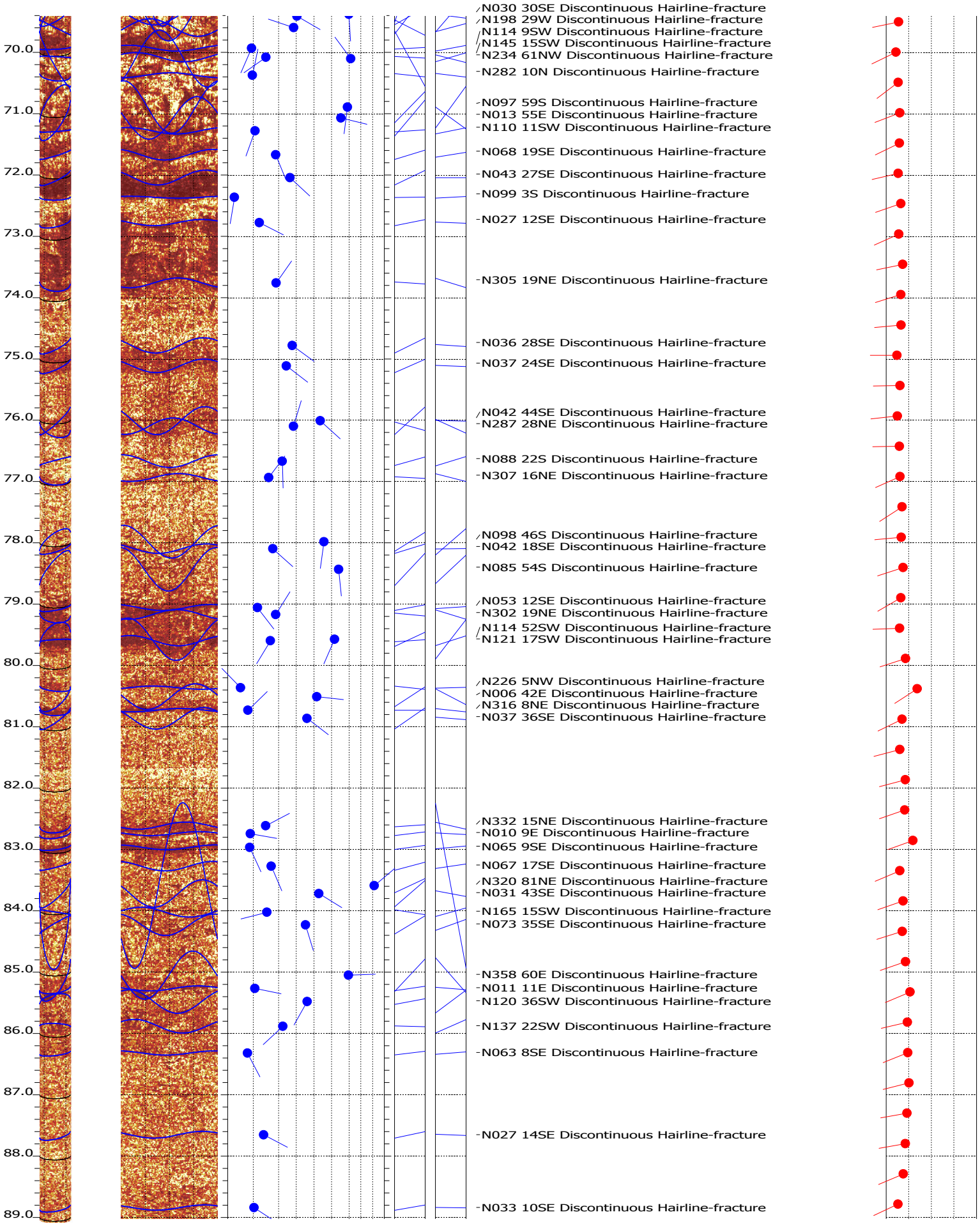
North ref. is true
Depth units are feet
Vertical scale: 1/24
Horiz scale = 1.00x Vert scale

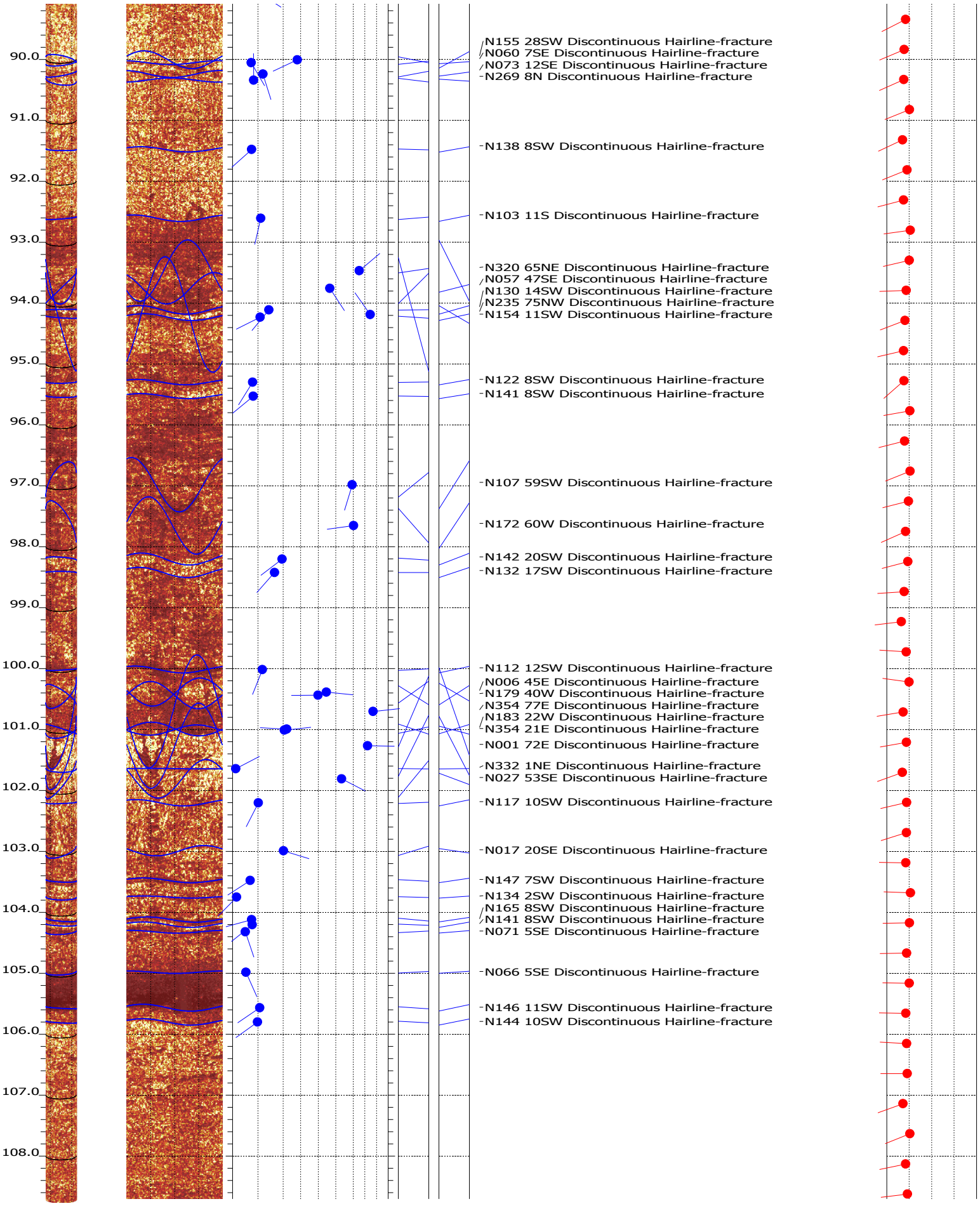
Zone from 60.000 to 130.000ft
Format: BHTV-NESWN

Borehole diam: 6.000inch
Vertical = borehole-axis
Image: Amplitude

BEDDING
FRACTURE
Identified units




70.0
71.0
72.0
73.0
74.0
75.0
76.0
77.0
78.0
79.0
80.0
81.0
82.0
83.0
84.0
85.0
86.0
87.0
88.0
89.0
N030 30SE Discontinuous Hairline-fracture
N198 29W Discontinuous Hairline-fracture
N114 9SW Discontinuous Hairline-fracture
N145 15SW Discontinuous Hairline-fracture
N234 61NW Discontinuous Hairline-fracture
N282 10N Discontinuous Hairline-fracture
N097 59S Discontinuous Hairline-fracture
N013 55E Discontinuous Hairline-fracture
N110 11SW Discontinuous Hairline-fracture
N068 19SE Discontinuous Hairline-fracture
N043 27SE Discontinuous Hairline-fracture
N099 3S Discontinuous Hairline-fracture
N027 12SE Discontinuous Hairline-fracture
N305 19NE Discontinuous Hairline-fracture
N036 28SE Discontinuous Hairline-fracture
N037 24SE Discontinuous Hairline-fracture
N042 44SE Discontinuous Hairline-fracture
N287 28NE Discontinuous Hairline-fracture
N088 22S Discontinuous Hairline-fracture
N307 16NE Discontinuous Hairline-fracture
N098 46S Discontinuous Hairline-fracture
N042 18SE Discontinuous Hairline-fracture
N085 54S Discontinuous Hairline-fracture
N053 12SE Discontinuous Hairline-fracture
N302 19NE Discontinuous Hairline-fracture
N114 52SW Discontinuous Hairline-fracture
N121 17SW Discontinuous Hairline-fracture
N226 5NW Discontinuous Hairline-fracture
N006 42E Discontinuous Hairline-fracture
N316 8NE Discontinuous Hairline-fracture
N037 36SE Discontinuous Hairline-fracture
N332 15NE Discontinuous Hairline-fracture
N010 9E Discontinuous Hairline-fracture
N065 9SE Discontinuous Hairline-fracture
N067 17SE Discontinuous Hairline-fracture
N320 81NE Discontinuous Hairline-fracture
N031 43SE Discontinuous Hairline-fracture
N165 15SW Discontinuous Hairline-fracture
N073 35SE Discontinuous Hairline-fracture
N358 60E Discontinuous Hairline-fracture
N011 11E Discontinuous Hairline-fracture
N120 36SW Discontinuous Hairline-fracture
N137 22SW Discontinuous Hairline-fracture
N063 8SE Discontinuous Hairline-fracture
N027 14SE Discontinuous Hairline-fracture
N033 10SE Discontinuous Hairline-fracture


90.0
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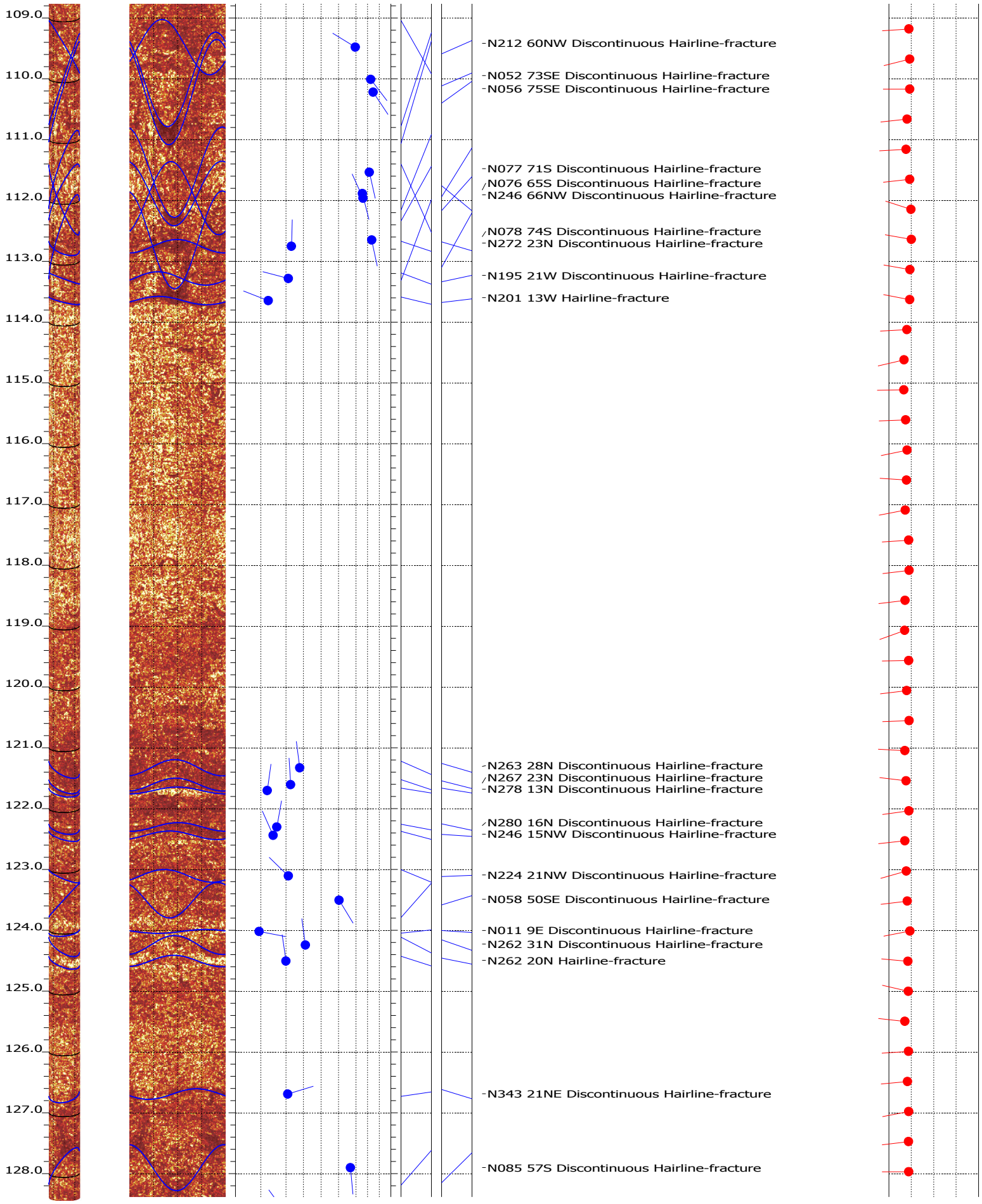
100.0
101.0
102.0
103.0
104.0
105.0
106.0
107.0
108.0
N155 28SW Discontinuous Hairline-fracture
N060 7SE Discontinuous Hairline-fracture
N073 12SE Discontinuous Hairline-fracture
N269 8N Discontinuous Hairline-fracture
N138 8SW Discontinuous Hairline-fracture
N103 11S Discontinuous Hairline-fracture
N320 65NE Discontinuous Hairline-fracture
N057 47SE Discontinuous Hairline-fracture
N130 14SW Discontinuous Hairline-fracture
N235 75NW Discontinuous Hairline-fracture
N154 11SW Discontinuous Hairline-fracture
N122 8SW Discontinuous Hairline-fracture
N141 8SW Discontinuous Hairline-fracture
N107 59SW Discontinuous Hairline-fracture
N172 60W Discontinuous Hairline-fracture
N142 20SW Discontinuous Hairline-fracture
N132 17SW Discontinuous Hairline-fracture
N112 12SW Discontinuous Hairline-fracture
N006 45E Discontinuous Hairline-fracture
N179 40W Discontinuous Hairline-fracture
N354 77E Discontinuous Hairline-fracture
N183 22W Discontinuous Hairline-fracture
N354 21E Discontinuous Hairline-fracture
N001 72E Discontinuous Hairline-fracture
N332 1NE Discontinuous Hairline-fracture
N027 53SE Discontinuous Hairline-fracture
N117 10SW Discontinuous Hairline-fracture
N017 20SE Discontinuous Hairline-fracture
N147 7SW Discontinuous Hairline-fracture
N134 2SW Discontinuous Hairline-fracture
N165 8SW Discontinuous Hairline-fracture
N141 8SW Discontinuous Hairline-fracture
N071 5SE Discontinuous Hairline-fracture
N066 5SE Discontinuous Hairline-fracture
N146 11SW Discontinuous Hairline-fracture
N144 10SW Discontinuous Hairline-fracture


109.0
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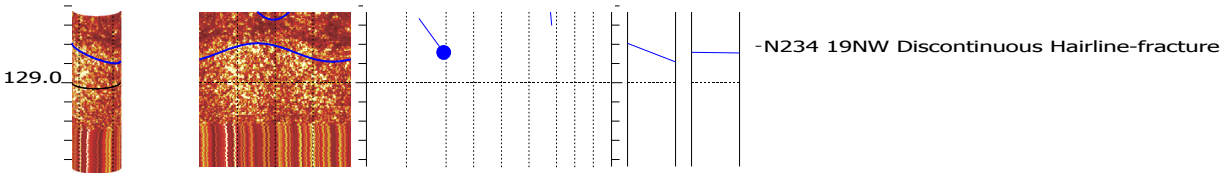
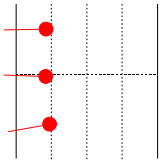
111.0
112.0
113.0
114.0
115.0
116.0
117.0
118.0
119.0
120.0
121.0
122.0
123.0
124.0
125.0
126.0
127.0
128.0
-N212 60NW Discontinuous Hairline-fracture
-N052 73SE Discontinuous Hairline-fracture
-N056 75SE Discontinuous Hairline-fracture
-N077 71S Discontinuous Hairline-fracture
/N076 65S Discontinuous Hairline-fracture
-N246 66NW Discontinuous Hairline-fracture
/N078 74S Discontinuous Hairline-fracture
-N272 23N Discontinuous Hairline-fracture
-N195 21W Discontinuous Hairline-fracture
-N201 13W Hairline-fracture
-N263 28N Discontinuous Hairline-fracture
/N267 23N Discontinuous Hairline-fracture
-N278 13N Discontinuous Hairline-fracture
/N280 16N Discontinuous Hairline-fracture
-N246 15NW Discontinuous Hairline-fracture
-N224 21NW Discontinuous Hairline-fracture
-N058 50SE Discontinuous Hairline-fracture
-N011 9E Discontinuous Hairline-fracture
-N262 31N Discontinuous Hairline-fracture
-N262 20N Hairline-fracture
-N343 21NE Discontinuous Hairline-fracture
-N085 57S Discontinuous Hairline-fracture


129.0
-N234 19NW Discontinuous Hairline-fracture



DIP DATA INTERPRETATION
RGLDIP vsn 6.1
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

14 Oct 2011

Tetra Tech ECI

Borehole: RMW-14D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

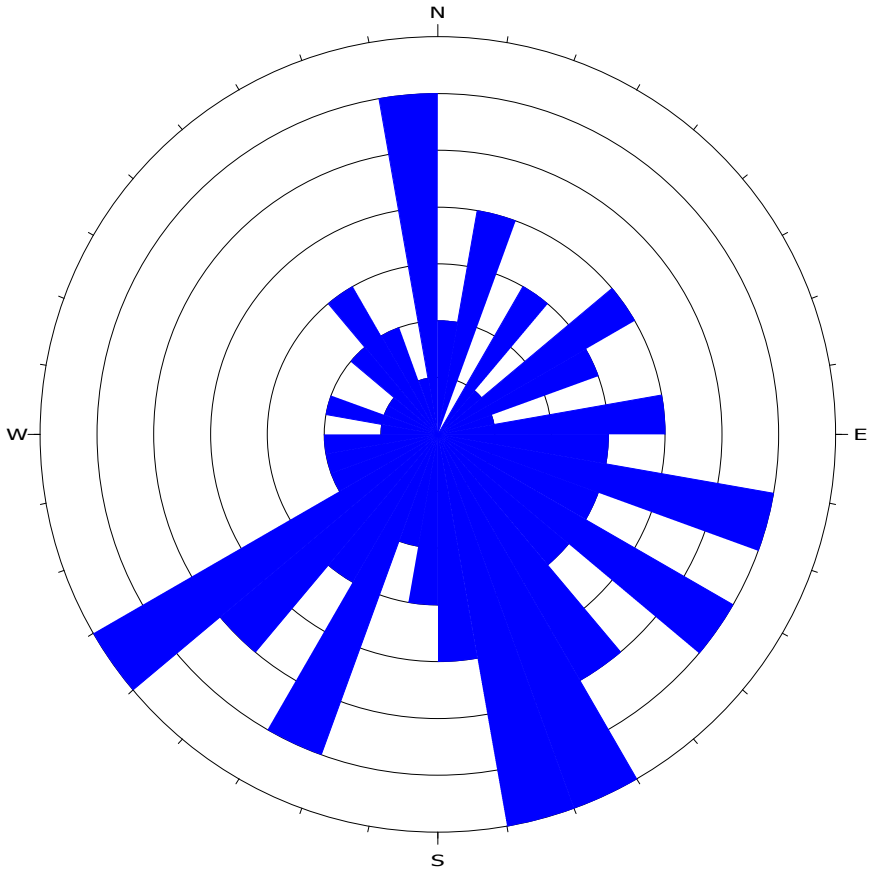
North ref. is true
Depth units are feet

Zone from 129.123 to 65.684ft

Interpretation 1

Dip data sets .....
BHTV dips

RMW-14D
65.684 - 129.123ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 117

0 1 2 3 4 5 6 7

DIP DATA INTERPRETATION
RGLDIP vsn 6.1
STRIKE-DIRECTION, FRACTURE ROSE-DIAGRAM

14 Oct 2011

Tetra Tech ECI

Borehole: RMW-14D

Mountain Top, PA

top of borehole.....
East: _
North: _
Alt: _

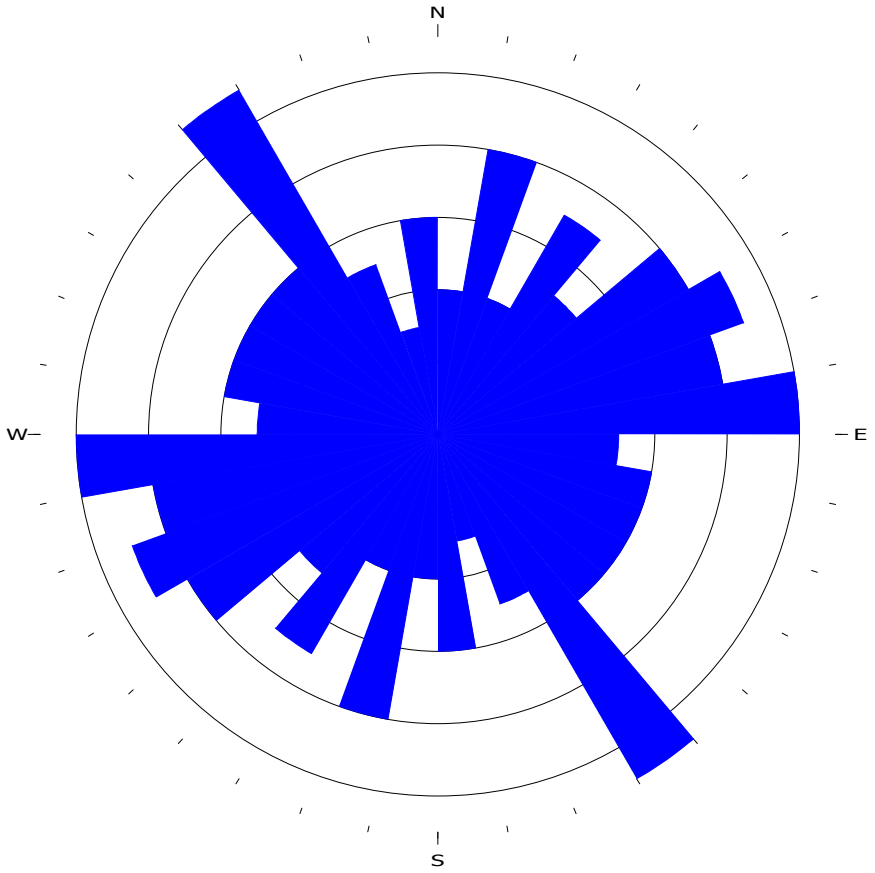
North ref. is true
Depth units are feet

Zone from 129.123 to 65.684ft

Interpretation 1

Dip data sets .....
BHTV dips

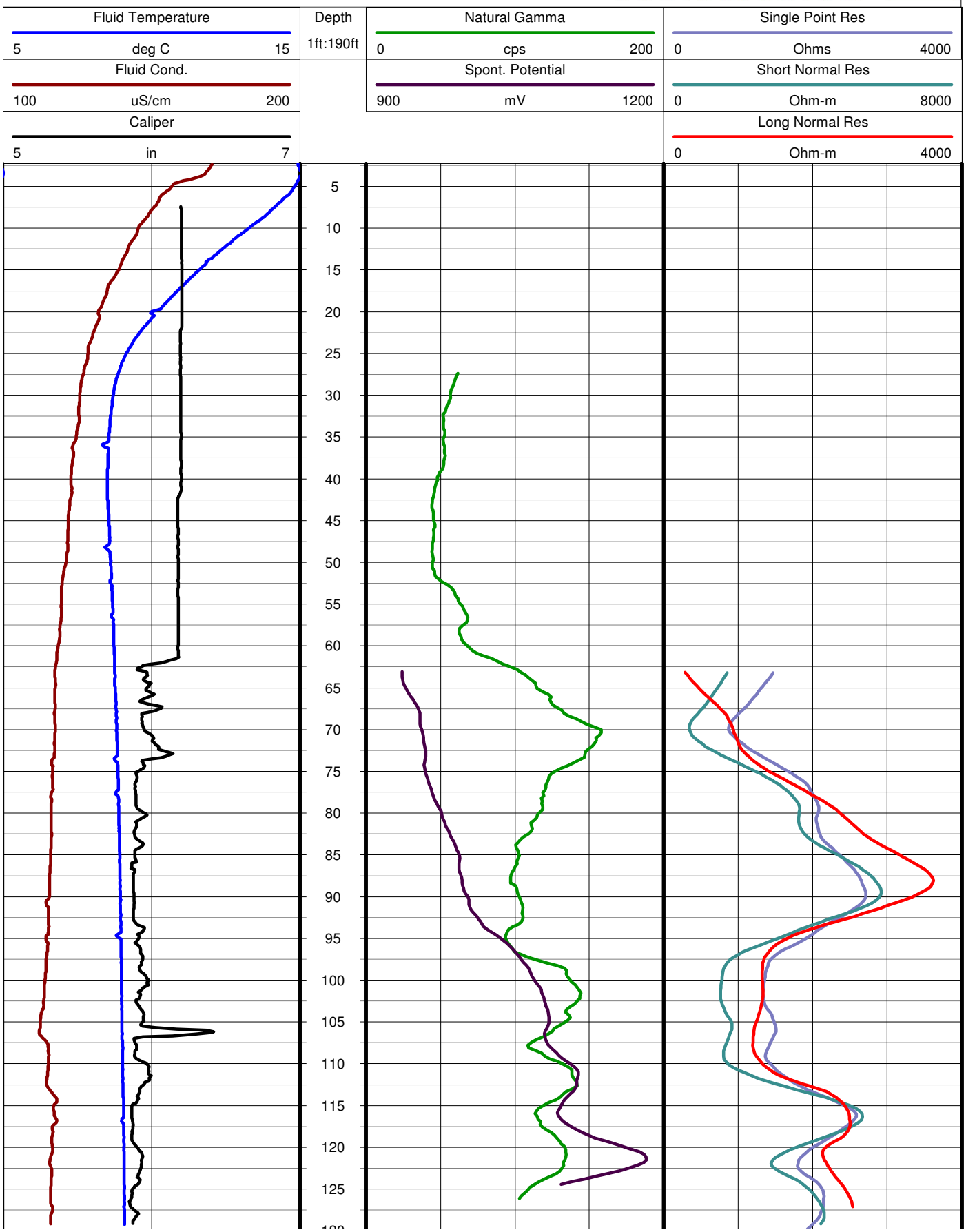
RMW-14D
65.684 - 129.123ft
Strike-direction, fracture rose-diagram



Azimuth Incr = 10°
N = 117

Company: Tetra Tech ECI
Location: Mountain Top, Pa
Well Name: RMW-14D
Reference: Ground Surface

EARTH DATA NORTHEAST, INC.



RMW-14D Heat Pulse Summary Table

Tetra Tech ECI--Mountain Top, PA

Tuesday, September 20, 2011

Ambient Conditions

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
70	1	14:05	0.048	up	Upward flow	**0.048**	
	2	14:05	0.048	up	Upward flow		
	3	14:06	0.048	up	Upward flow		
	4	14:07	0.048	up	Upward flow		
	5	14:07	0.048	up	Upward flow		
78	1	14:11	0.042	up	Upward flow	**0.043**	
	2	14:11	0.043	up	Upward flow		
	3	14:12	0.042	up	Upward flow		
	4	14:13	0.043	up	Upward flow		
	5	14:13	0.043	up	Upward flow		
	6	14:14	0.043	up	Upward flow		
90	1	14:24	0.052	up	Upward flow	**0.053**	>
	2	14:24	0.053	up	Upward flow		
	3	14:25	0.052	up	Upward flow		
	4	14:26	0.053	up	Upward flow		
	5	14:27	0.053	up	Upward flow		
104	1	14:34	0.040	up	Upward flow	**0.040**	<
	2	14:34	0.041	up	Upward flow		
	3	14:35	0.041	up	Upward flow		
	4	14:36	0.040	up	Upward flow		
	5	14:36	0.040	up	Upward flow		
118	1	14:42	Ø	N/A	No flow	N/A	<
	2	14:42	Ø	N/A	No flow		
	3	14:43	Incon.	down	Incon.		
	4	14:44	Incon.	down	Incon.		
	5	14:45	Ø	up	No flow		
	6	14:45	Ø	N/A	No flow		
	7	14:46	Ø	N/A	No flow		
	8	14:47	Ø	N/A	No flow		

Pumping Conditions: Pump set at ~ 40', Rate ~ 1 gpm

Depth (ft)	Run	Time	Fluid Velocity (gpm)	Direction of Curve	Comments	Avg. Fluid Velocity (gpm)	Flow Zones
70	1	15:51	0.072	up	Upward flow	**0.074**	
	2	15:51	0.079	up	Upward flow		
	3	15:52	0.073	up	Upward flow		
	4	15:53	0.074	up	Upward flow		
	5	15:53	0.074	up	Upward flow		
78	1	15:43	0.071	up	Upward flow	**0.071**	
	2	15:43	0.068	up	Upward flow		
	3	15:44	0.071	up	Upward flow		
	4	15:45	0.073	up	Upward flow		
	5	15:45	0.071	up	Upward flow		<
90	1	15:35	0.064	up	Upward flow	**0.065**	
	2	15:35	0.065	up	Upward flow		
	3	15:36	0.064	up	Upward flow		
	4	15:37	0.064	up	Upward flow		
	5	15:37	0.067	up	Upward flow		
	6	15:38	0.065	up	Upward flow		>
104	1	15:28	0.075	up	Upward flow	**0.075**	
	2	15:28	0.074	up	Upward flow		
	3	15:29	0.076	up	Upward flow		
	4	15:30	0.076	up	Upward flow		
	5	15:30	0.075	up	Upward flow		<
118	1	15:17	Ø	N/A	No flow	N/A	
	2	15:17	Ø	N/A	No flow		
	3	15:18	< 0.035	up	Incon.		
	4	15:19	< 0.027	down	Incon.		
	5	15:20	Ø	N/A	No flow		
	6	15:20	Ø	N/A	No flow		
	7	15:21	Ø	N/A	No flow		

Please note: the probe's operating range is 0.03 to 1.0 gpm.
Any values presented outside of this range should be used for qualitative purposes only.

Key:

Ø	No measurable flow
N/A	Not applicable
<	Inflow zone (into borehole)
>	Outflow zone (into formation)
	Used in average flow calculation
Incon.	Inconclusive results