


OBI/ABI Image Log SummaryHole MW-14


Malcolm PirniePhoenix, Maricopa County, Az


Image Features Rotated 11.5 deg E for Magnetic Declination to True North
Feature Dip is from 0 to 90 deg (0 = Horizontal, 90 = Vertical) Logged: June 10, 2008





Optical and Acoustic Image Features Legend


- 


In-filled Fracture/joint or vein
- 


Major fracture - distinct wide fracture/joint continuous around circumference of hole
- 

Bedding - apparent bedding; rock boundary; banding or foliation feature
- 

Fluid level in boreohle
- 


Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.
- 

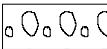
Distinct probable fracture/joint continuous over a portion of the circumference of hole - usually terminated at another fracture interesection
- 

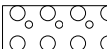
Minor fracture - thin or discontinuous fracture/joint around circumference of hole
- 

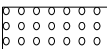
Bottom of Casing


VFx Lithology Legend

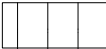
- 


Breccia or Conglomerate
- 


Large Vugs/Vesicles (> 6")
- 

Medium Vugs/Vesicles (2-6")
- 

Small Vugs/Vesicles (< 2")
- 

>2 Near Vertical Fxs
- 

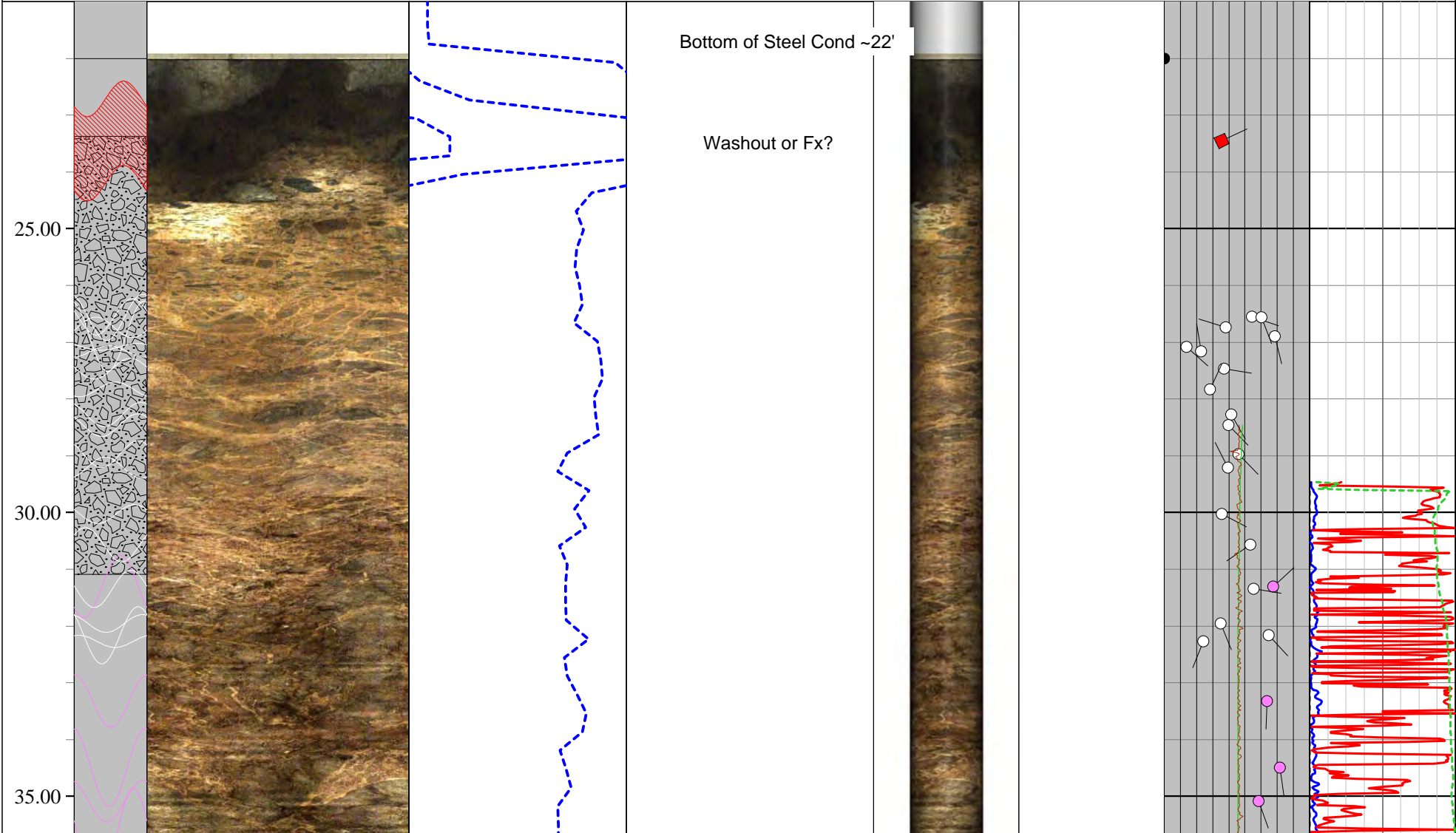
2 Near Vertical Fxs
- 

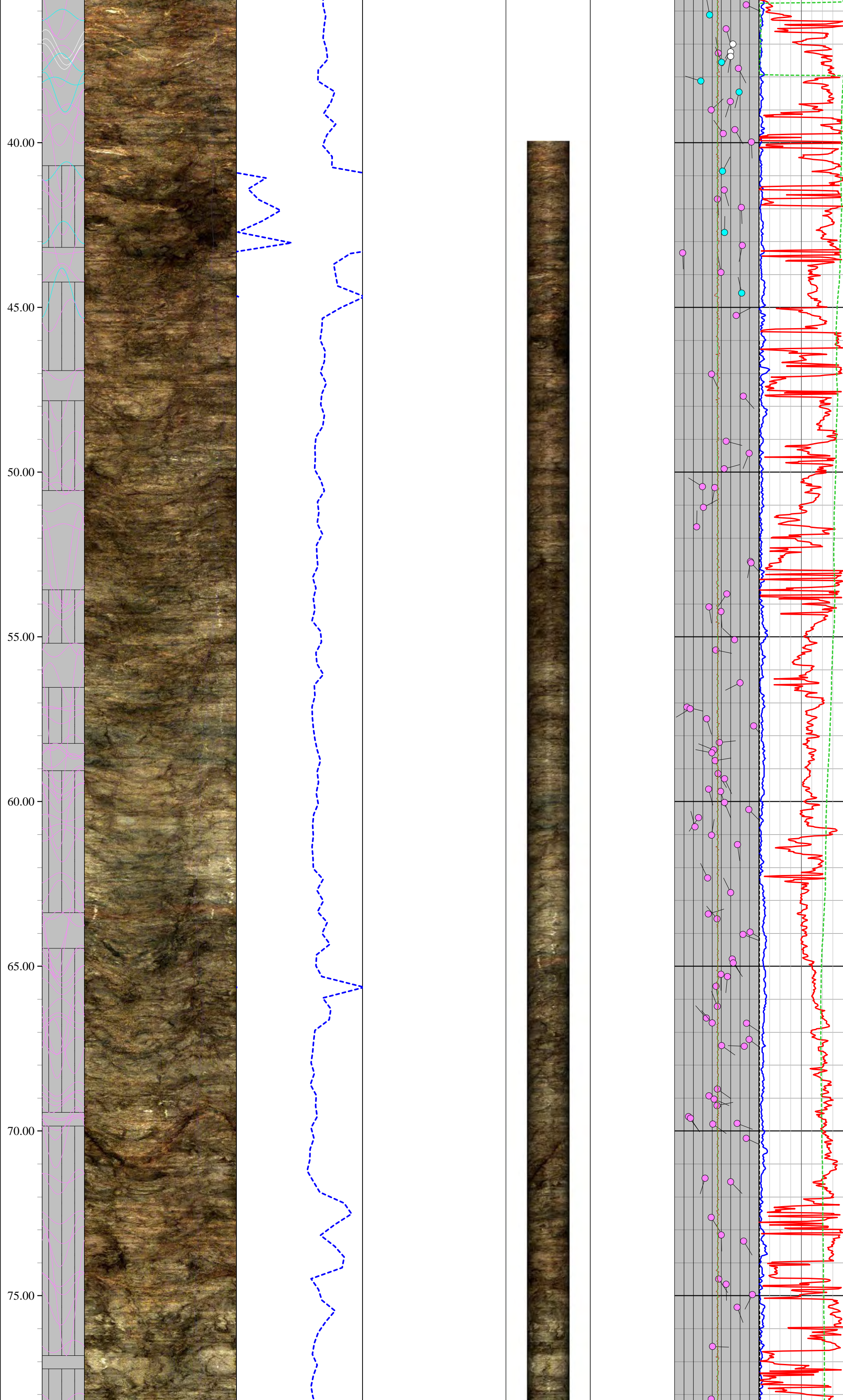
2 Wide Near Vertical Fxs
- 

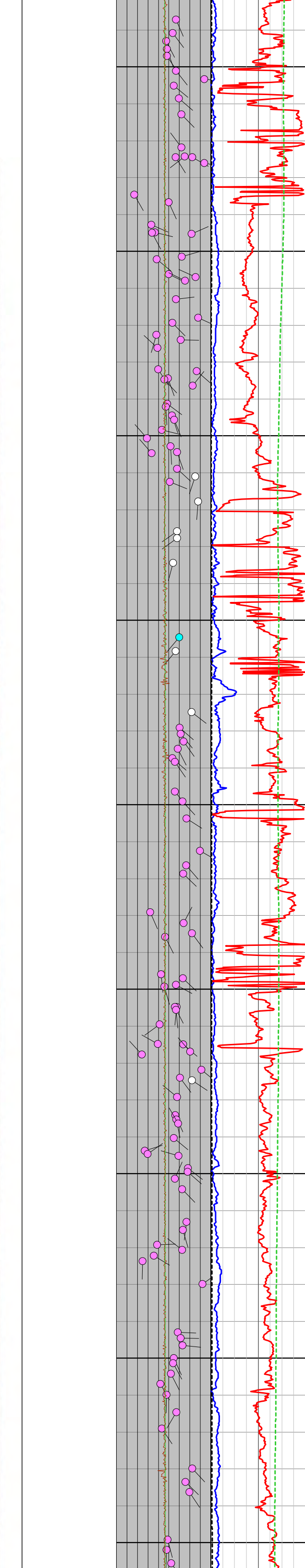
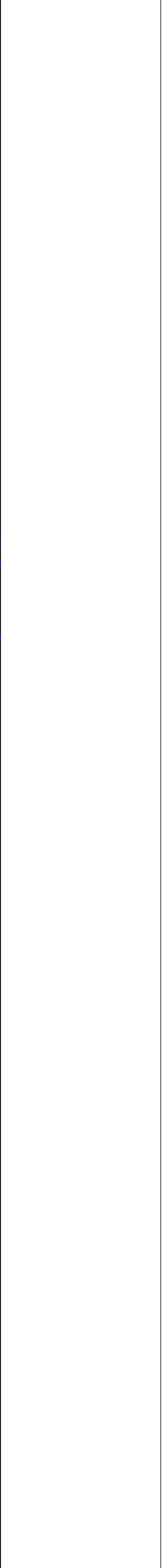
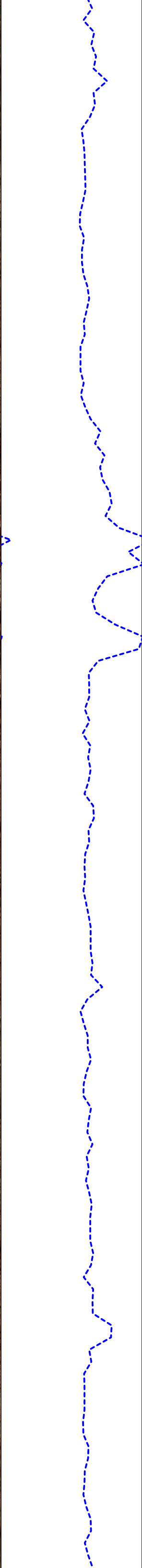
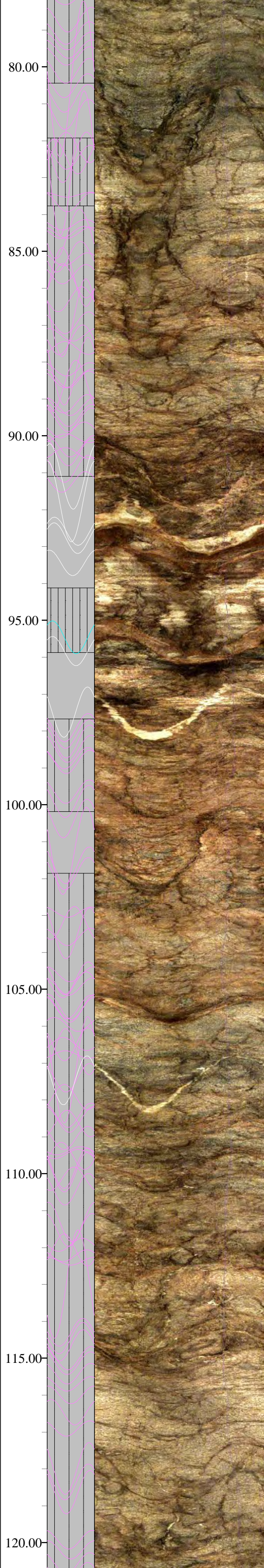
Drilling Induced Fxs

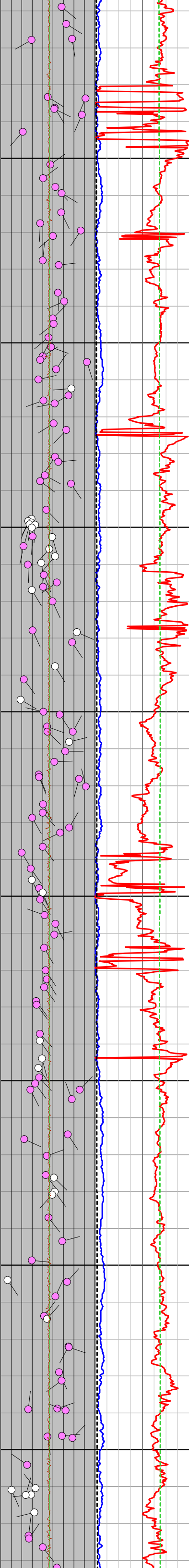
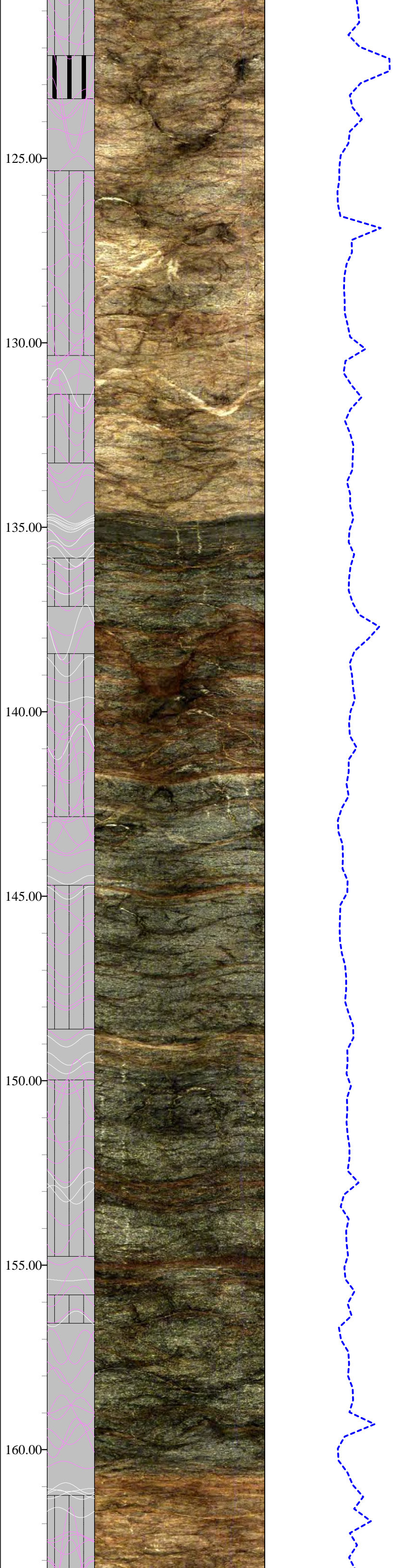
Depth 1ft:30ft	Picks DIPA	Image-NM Oriented Mag North					Centralized TT Oriented Mag North					Amplitude Oriented Mag North					3D-OBI	3D-ABI	Features DIPT		Tilt Merged OBI-ABI	
		0°	90°	180°	270°	0°	0°	90°	180°	270°	0°	0°	90°	180°	270°	0°	0°	0	90	0	deg	8
	VFx						Caliper												Mag.Field Merged OBI-ABI		Azimuth Merged OBI-ABI	
	ARI						4 inches 6												0 uT 90		0 deg 360	
							Min Acoustic Caliper												Gravity Merged OBI-ABI		CA	
							4 in 6												0.8 G 1.2		0 deg 360	
							Ave Acoustic Caliper														CD	
							4 in 6														0 [ft] 20	
							Breakouts															

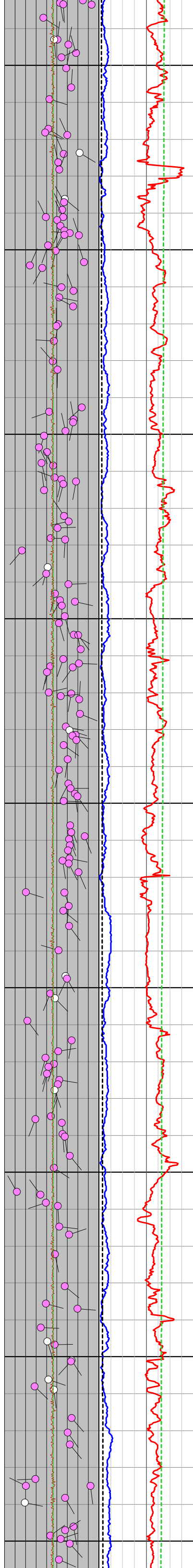
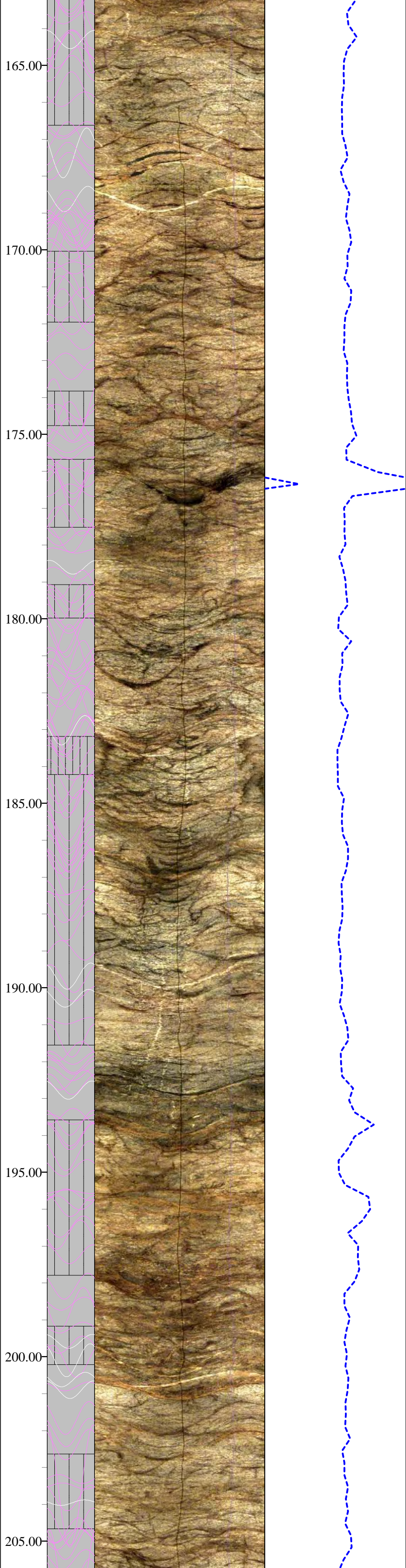
MW-14 ABI-OBI

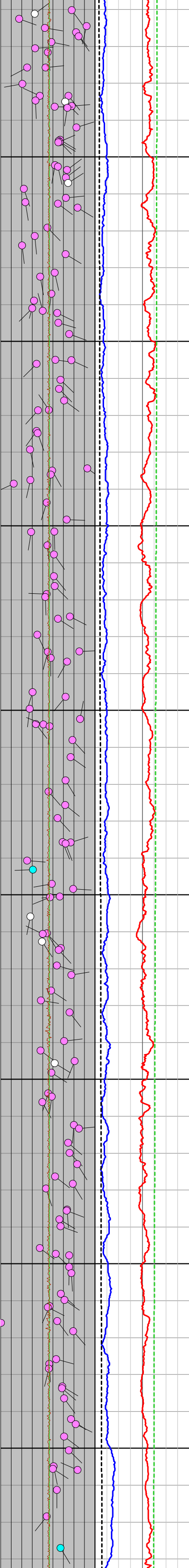
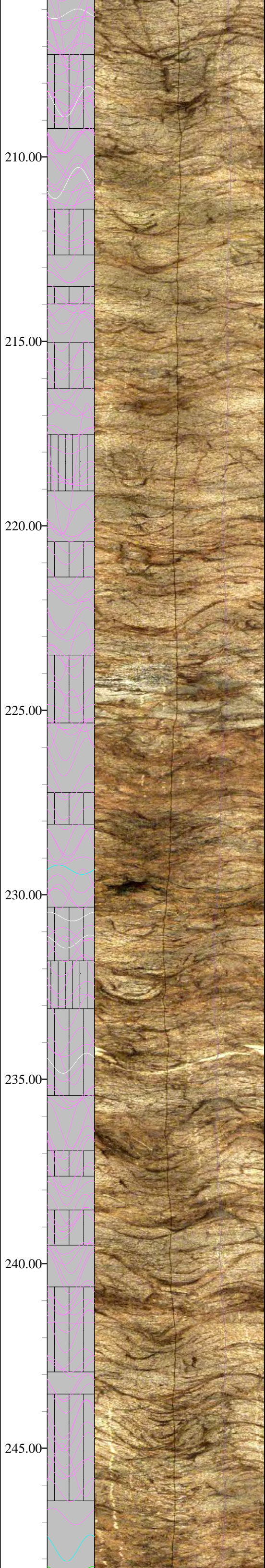


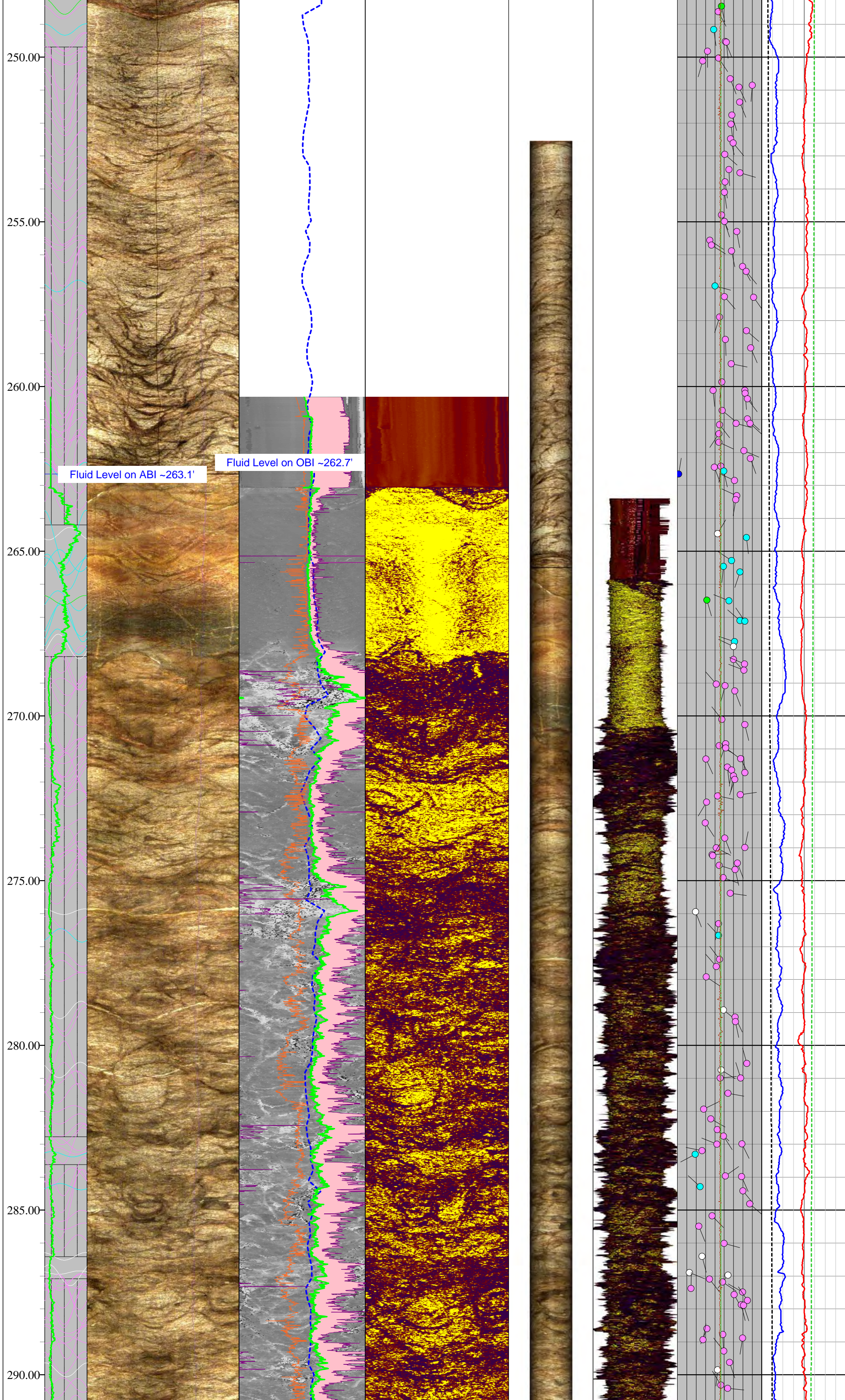


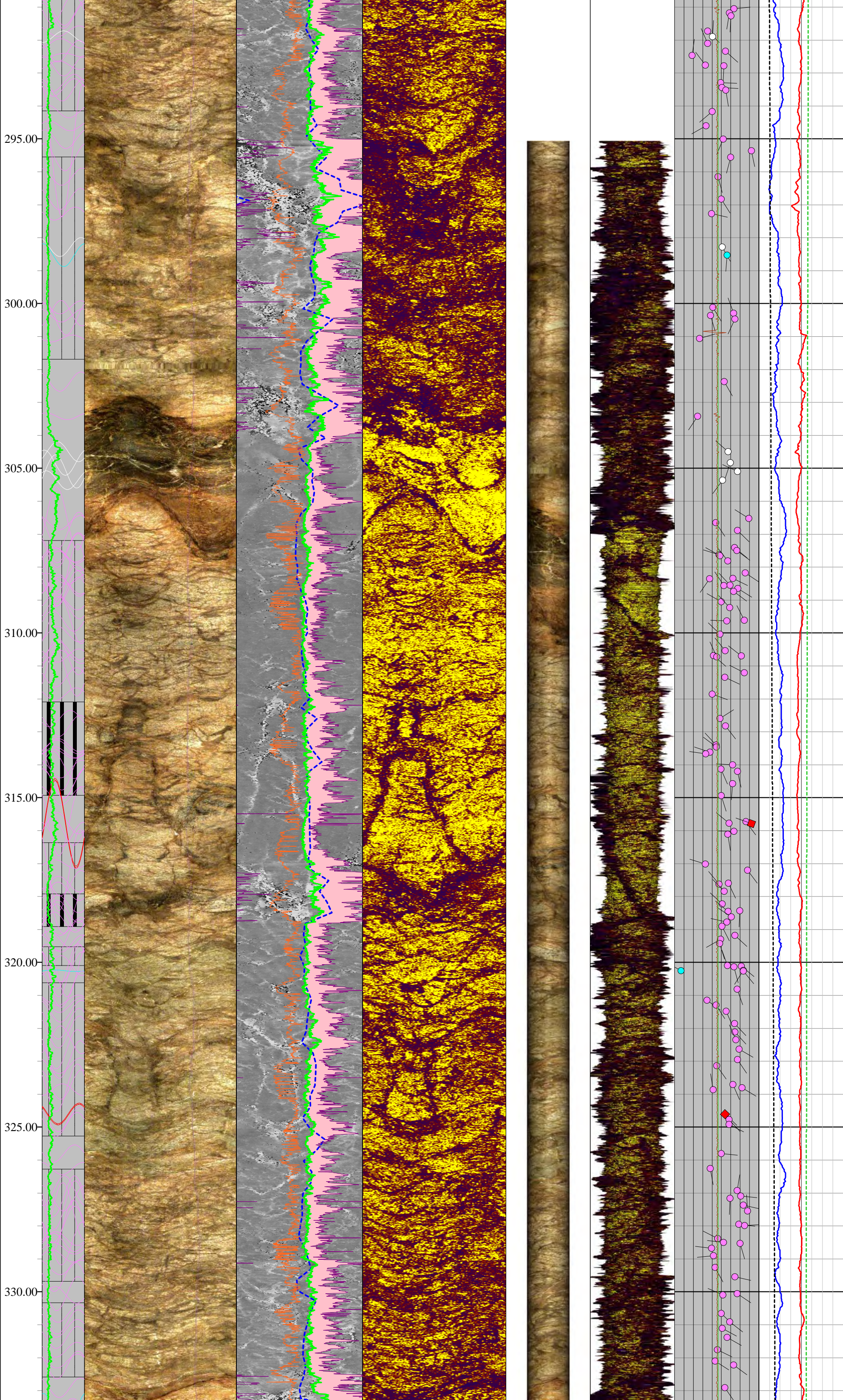


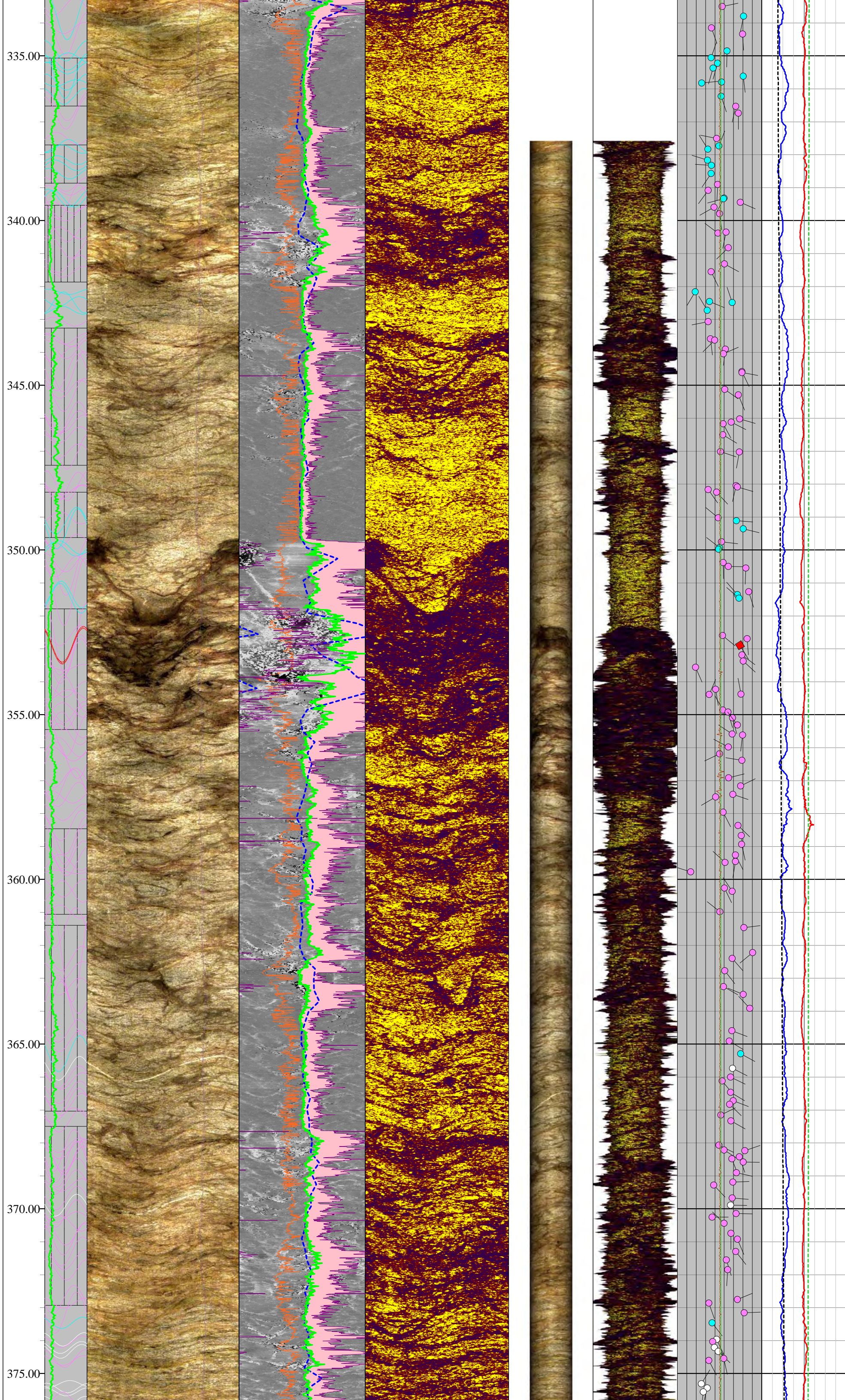


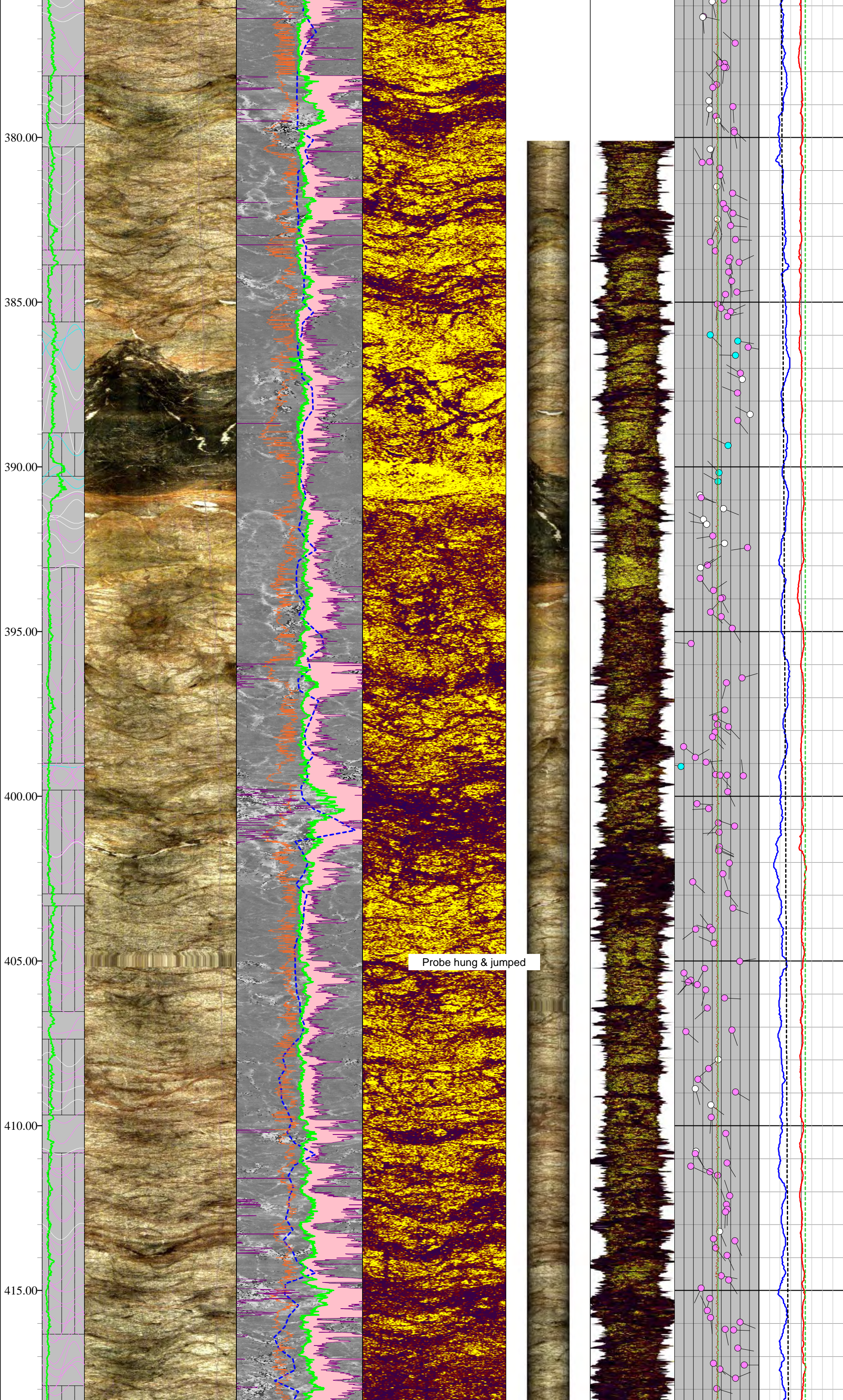


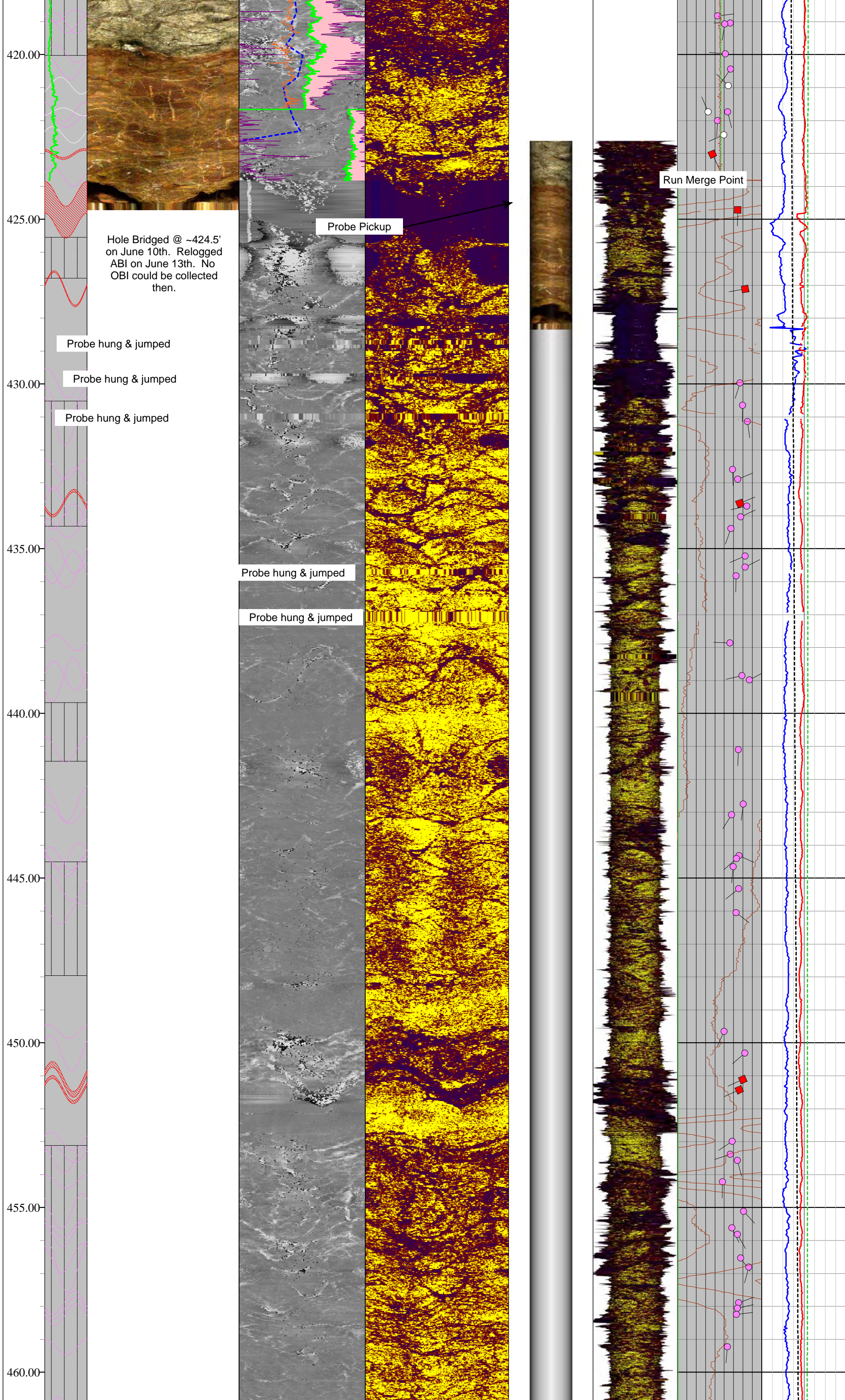


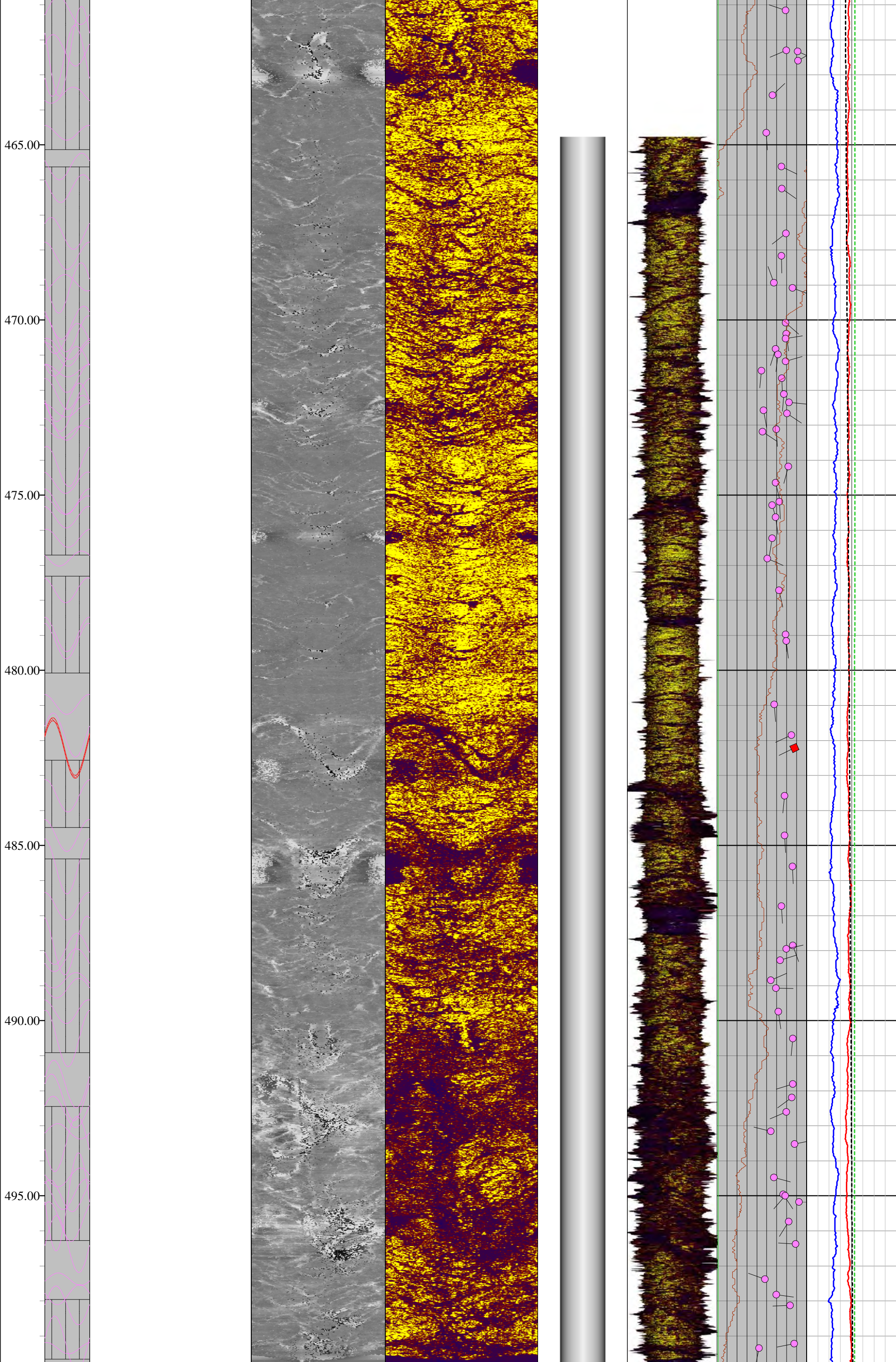










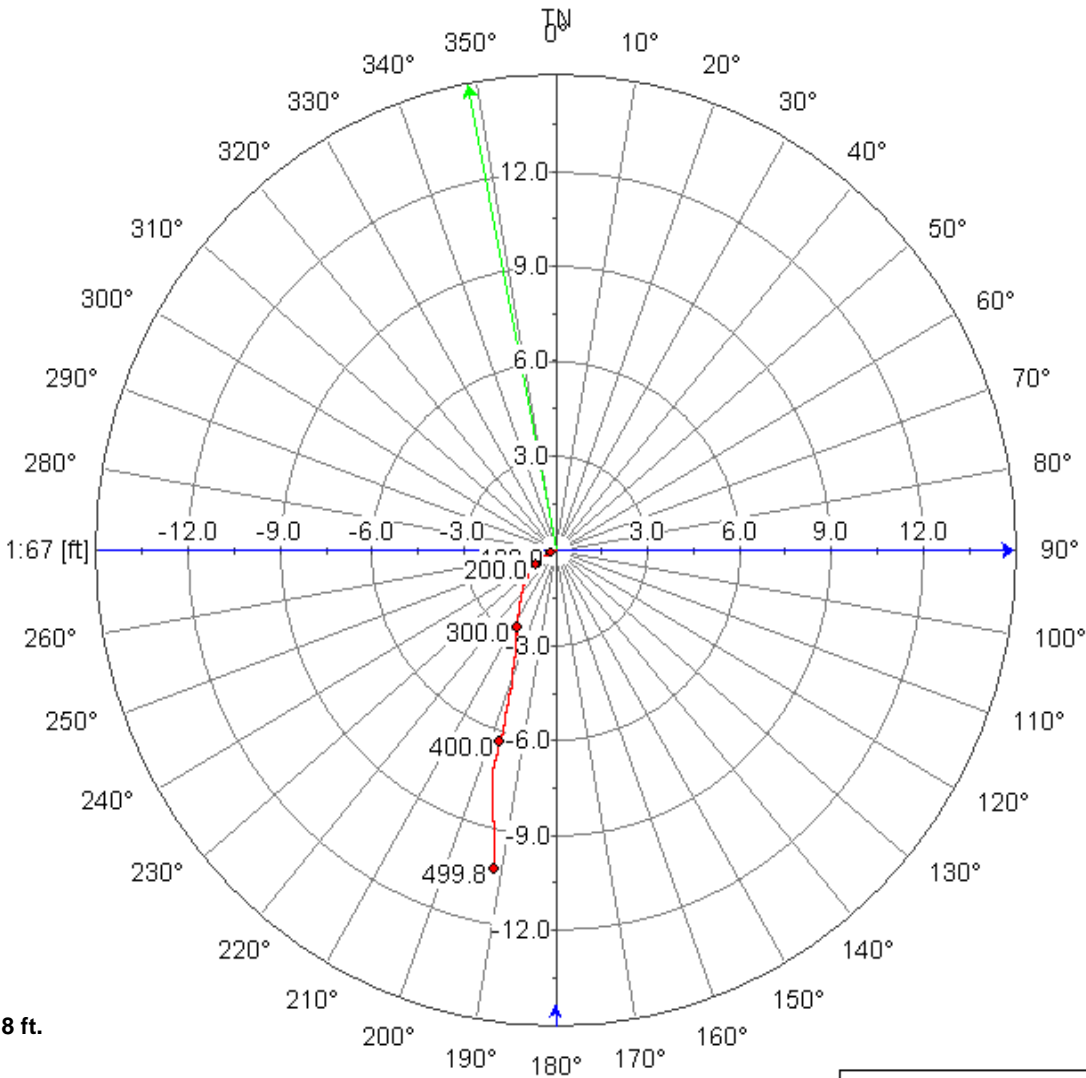


MW-14 ABI-OBI

	Breakouts					
	<div></div>					
	Ave Acoustic Caliper				CD	
	4	in	6		0	20
	Max Acoustic Caliper				CA	
	<div></div>				Gravity	

				4 in 6						Merged OBI-ABI		-----	
		ARI				Min Acoustic Caliper				0.8 G 1.2		0 deg 360	
				4 in 6						Mag.Field		Azimuth	
		VFx				Caliper				Merged OBI-ABI		Merged OBI-ABI	
				4 inches 6						0 uT 90		0 deg 360	
Depth	Picks	Image-NM		Centralized TT		Amplitude		3D-OBI	3D-ABI	Features		Tilt	
		DIPA		Oriented Mag North		Oriented Mag North				Dipt		Merged OBI-ABI	
1ft:30ft		0° 90° 180° 270° 0°		0° 90° 180° 270° 0°		0° 90° 180° 270° 0°		0°	0°	0 90		0 deg 8	

MW-14-ABI-OBI Image Summary Bull's Eye Deviation Plot

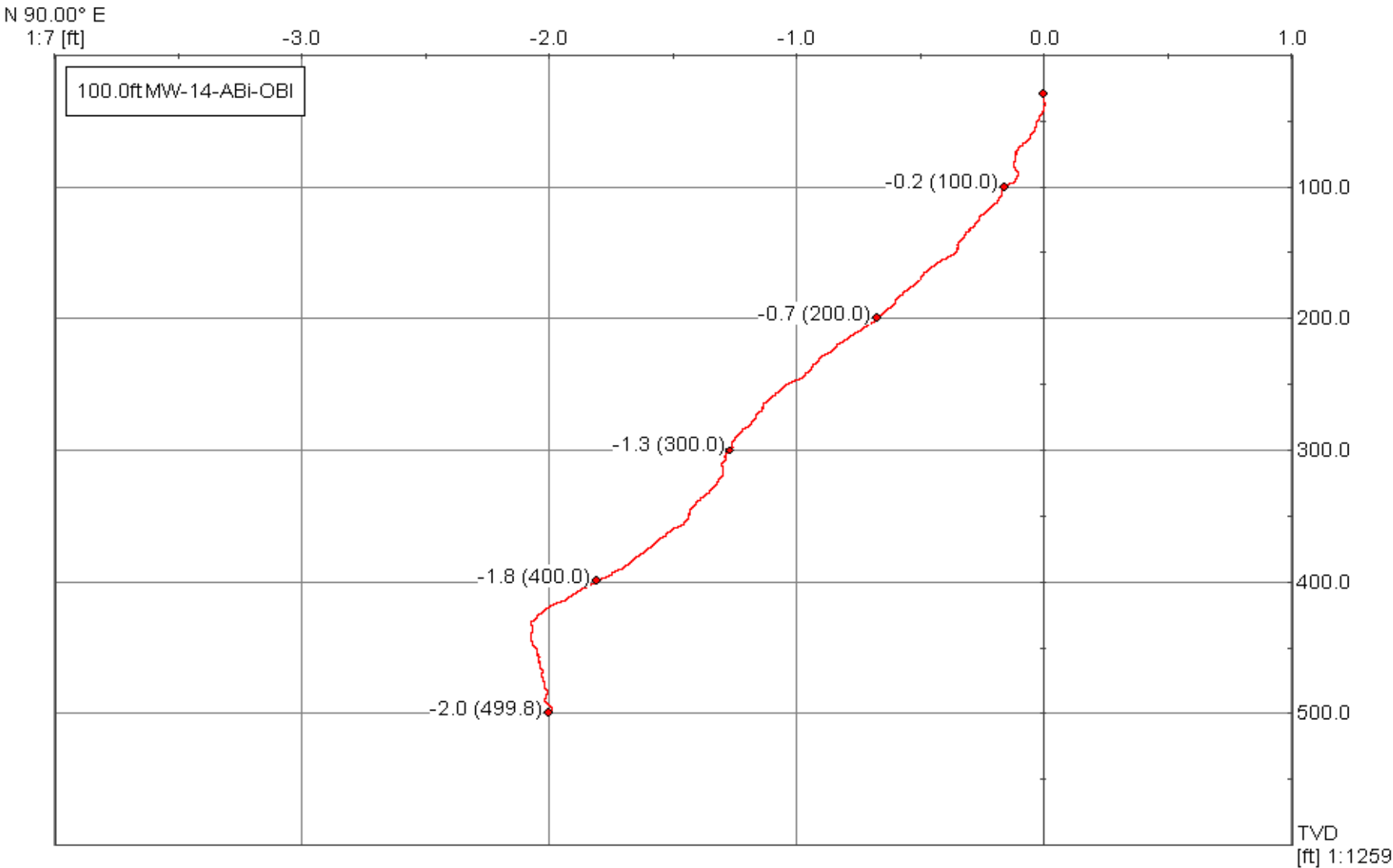


Measured Depth = 29.5 to 499.8 ft.
Closure Distance = 10.24 ft.
Closure Angle = 191.27 deg
True Vertical Depth = 499.59 ft.
Radius of Curvature Deviation Algorithm
Corrected for 11 deg E Magnetic Declination to True North

7-24-08, RECC

100.0ft MW-14-ABI-OBI

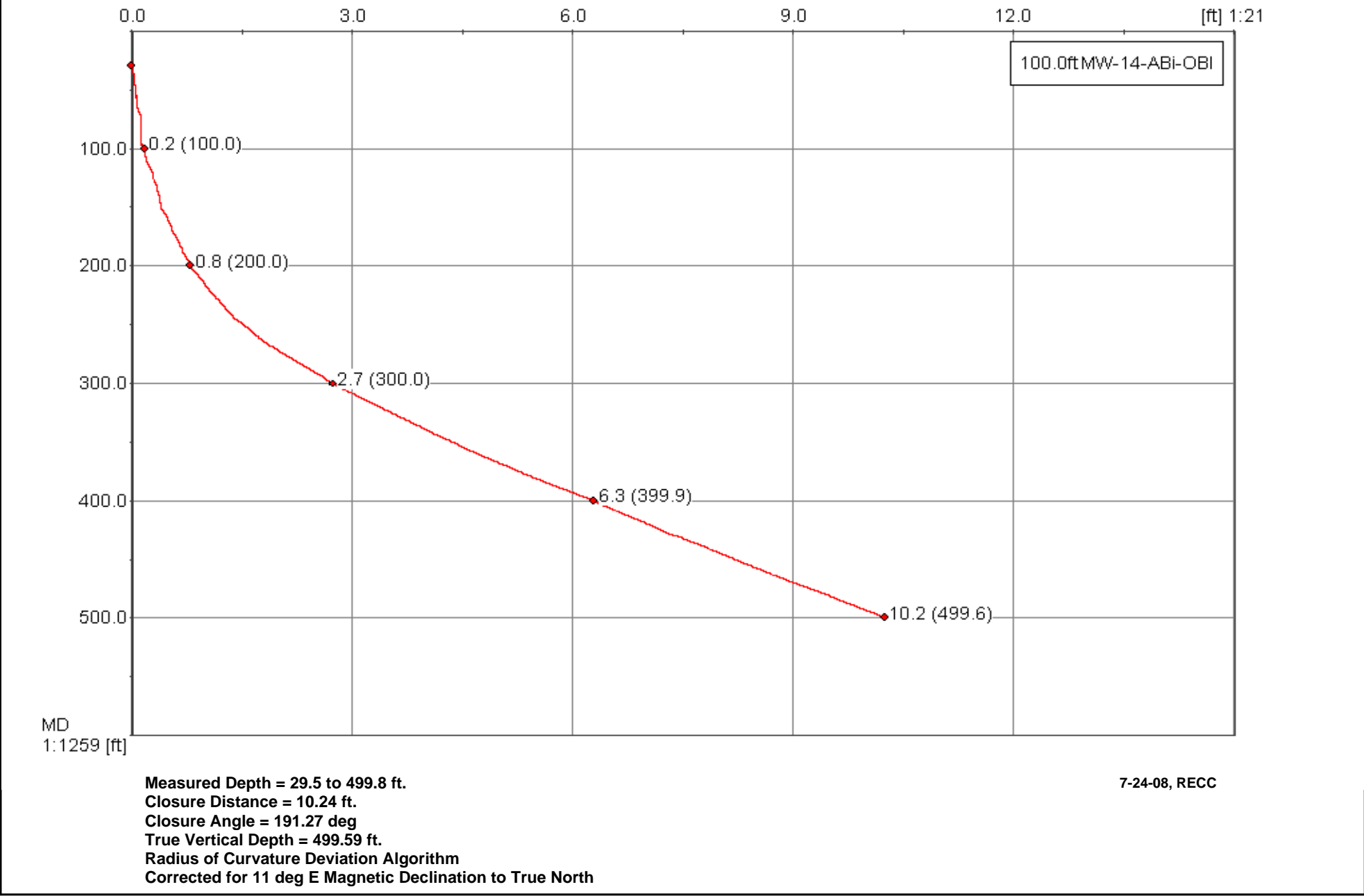
MW-14-ABI-OBI Image Summary E-W Vertical Section Deviation Plot



Measured Depth = 29.5 to 499.8 ft.
Closure Distance = 10.24 ft.
Closure Angle = 191.27 deg
True Vertical Depth = 499.59 ft.
Radius of Curvature Deviation Algorithm
Corrected for 11 deg E Magnetic Declination to True North

7-24-08, RECC

MW-14-ABI-OBI Image Summary Closure Section Deviation Plot



Optical and Acoustic Image Summary Legend

Mnemonics and Comments

- Picks

= planar features picked on optical or acoustic borehole image shown as colored sinusoid (color designation shown on header) DIPA = dip apparent hole axis
- VFxs

= Near Vertical Fractures, highly fractured zones and Fanglomerate or Breccia zones
- ARI

= Acoustic Reflectance Index or relative rock hardness from ABI Amplitude log. Plotted 0 (soft) to 1500 (harder) as green line.
- OBI Image-NM

= 2D plot of optical image oriented to magnetic north. Plotted from left to Right N-E-S-W-N
- Centralized TT

= 2D plot of acoustic image travel time with probe position centralized. Plotted from left to Right N-E-S-W-N
- 3-Arm

= 3-arm mechanical caliper of hole diameter plotted from 4-6 inches (blue line)
- Min-Acoustic Caliper

= minimum acoustic caliper of hole diameter calculated from Travel Time data and plotted as orange line from 4 to 6 inches.
- Max-Acoustic Caliper

= maximum acoustic caliper of hole diameter calculated from Travel Time data and plotted as purple line from 4 to 6 inches.
- Avg-Acoustic Caliper

= average acoustic caliper of hole diameter calculated from Travel Time data and plotted as bright green line from 4 to 6 inches.
- Breakouts

= pink shaded zone between Avg-Acoustic Caliper and Max-Acoustic Caliper calculated from Travel Time data showing borehole enlargement..
- Amplitude

= 2D plot of unfiltered acoustic image amplitude oriented to magnetic north. Plotted from left to Right N-E-S-W-N
- Amp-High Pass

= 2D plot of acoustic image amplitude with High Pass Normalization Filtering (can be toggled on/off) Plotted from left to Right N-E-S-W-N
- 3D-OBI

= 3D cylindrical projection of OBI image looking from the North.
- 3D-ABI

= 3D cylindrical projection of OBI image looking from the North.
- Tadpole

= tadpole plot of the image feature picks (fractures and bedding planes); plotted from 0 to 90 dip - see legend above. DIPT = True orientation; features corrected for hole deviation
- Magn. Field

= Total magnetic field strength as measured by fluxgate magnetometer in OBI or ABI deviation sensor - plotted 0-90 uT. (green line)
- Gravity

= Total gravity (probe acceleration) as measured by 3-axis accelerometers in ABI deviation sensor - plotted 0.8-1.2 g. (brown line)
- Azimuth

= direction of tool tilt plotted 0 to 360 deg; represents borehole deviation direction (red line)
- Tilt

= tool tilt (vertical = 0 and horizontal = 90) plotted 0 to 8 deg ; represents borehole deviation tilt from vertical. (blue line)
- CA

= Closure angle.= horizontal angle from hole to vertical projected collar location; plotted from 0 to 360 deg (dashed green line)
- CD

= Closure Distance.= distance in feet in a horizontal plane from the borehole to vertical projected collar location; plotted from 0 to 20 ft. (dotted black line)
- Prepared by Robert E. Crowder

Rev 8-1-2008

COMPANYMALCOLM PERNIE

WELL IDMW-16

FIELDUPCO
COUNTYMARICOPA
STATEARIZONA

TYPE OF LOGSABI TELEVIEWER
MORE:3-ARM CALIPER

LOCATION

SEC
TWP
R&E

PERMANENT DATUM
LOG MEAS FROM
GROUND LEVEL

DOUBLING MEAS FROM
DATE06/30/11

RUN NO1
TYPE LOGABI
DEPTH/DIPLBLR510 FT

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

DEPTH/LOGGR307.5 FT
MAX REC. TEMP. N/A

MagField
Gravity
Tadpole
DIPT

Tilt
Azimuth
Deg

3D
0°

Picks
DIPA

Vfx
Bx

Amplitude1-NM
Oriented Mag North
ARI

Centralized TT
Oriented Mag North
Caliper

Max Acoustic Caliper
Ave Acoustic Caliper
Enlargements

Depth
in2ft

Fluid Level -251.0'

Major Lithology

GP - Silty sand w/ sand
GP - Sandy Gravel
BR - Granodiorite

Acoustic Image Features Legend

Vfx Lithology Legend

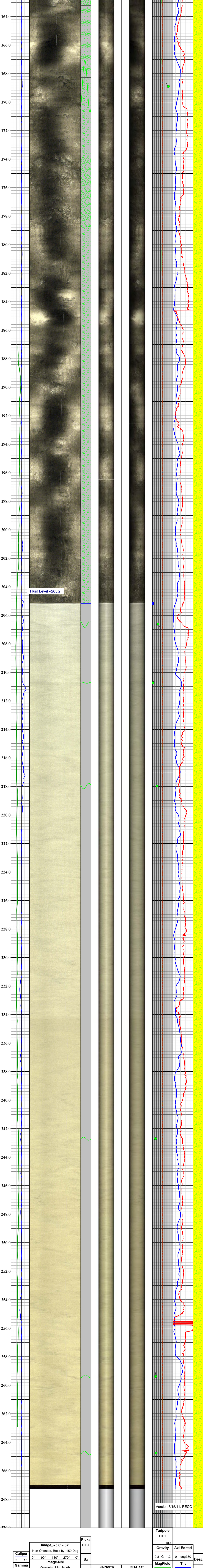
Major Lithology

GP - Silty sand w/ sand
GP - Sandy Gravel
BR - Granodiorite

Acoustic Image Features Legend

Vfx Lithology Legend

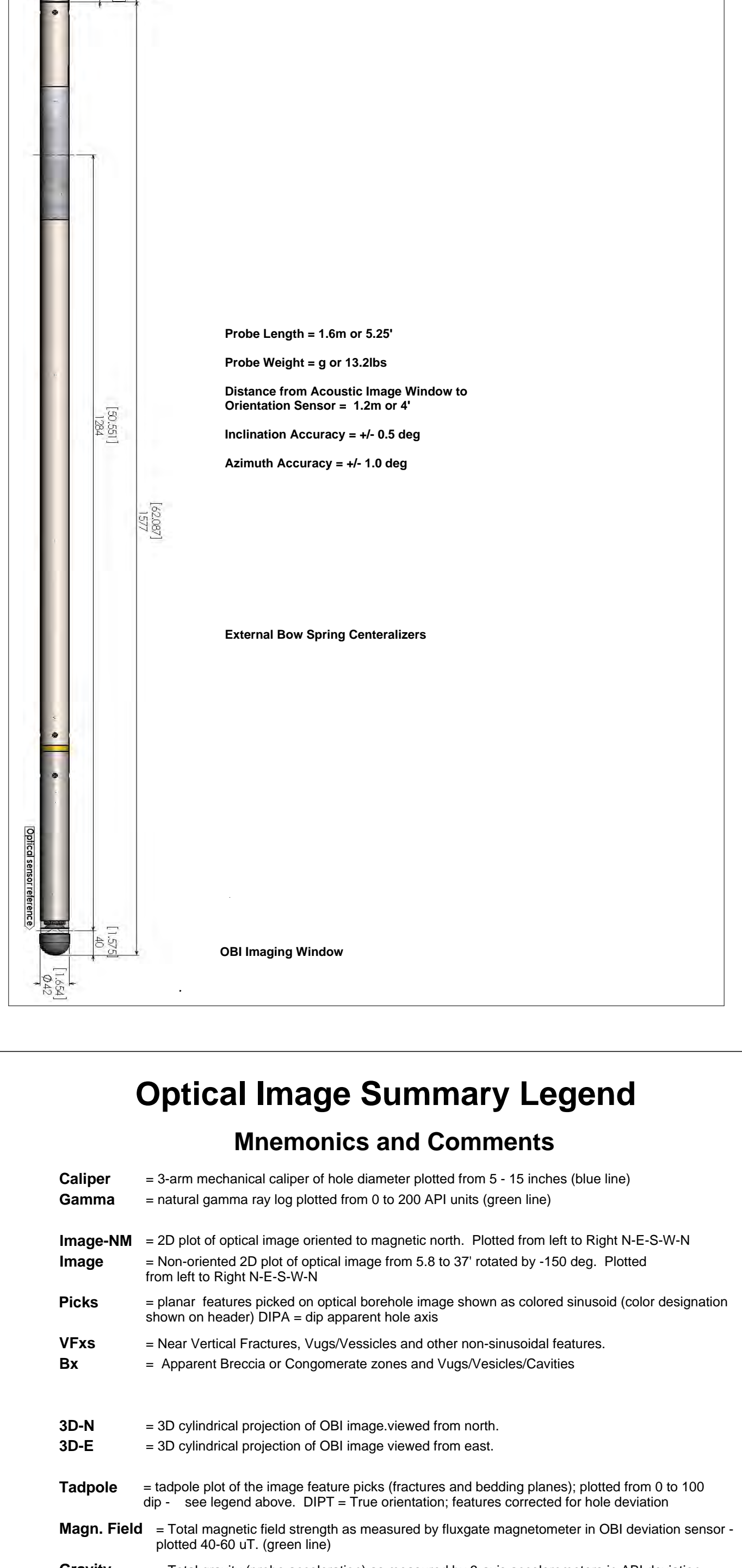
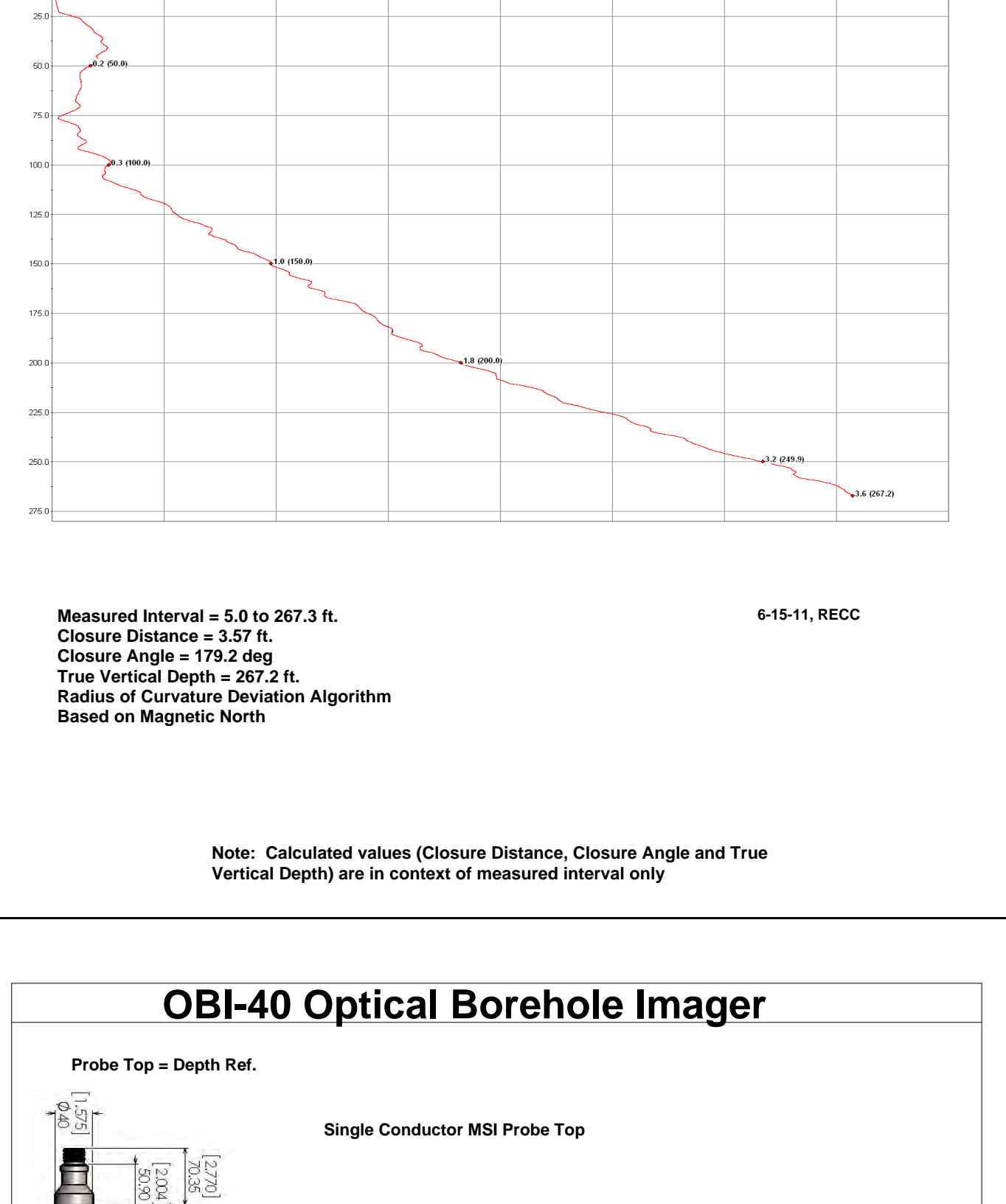
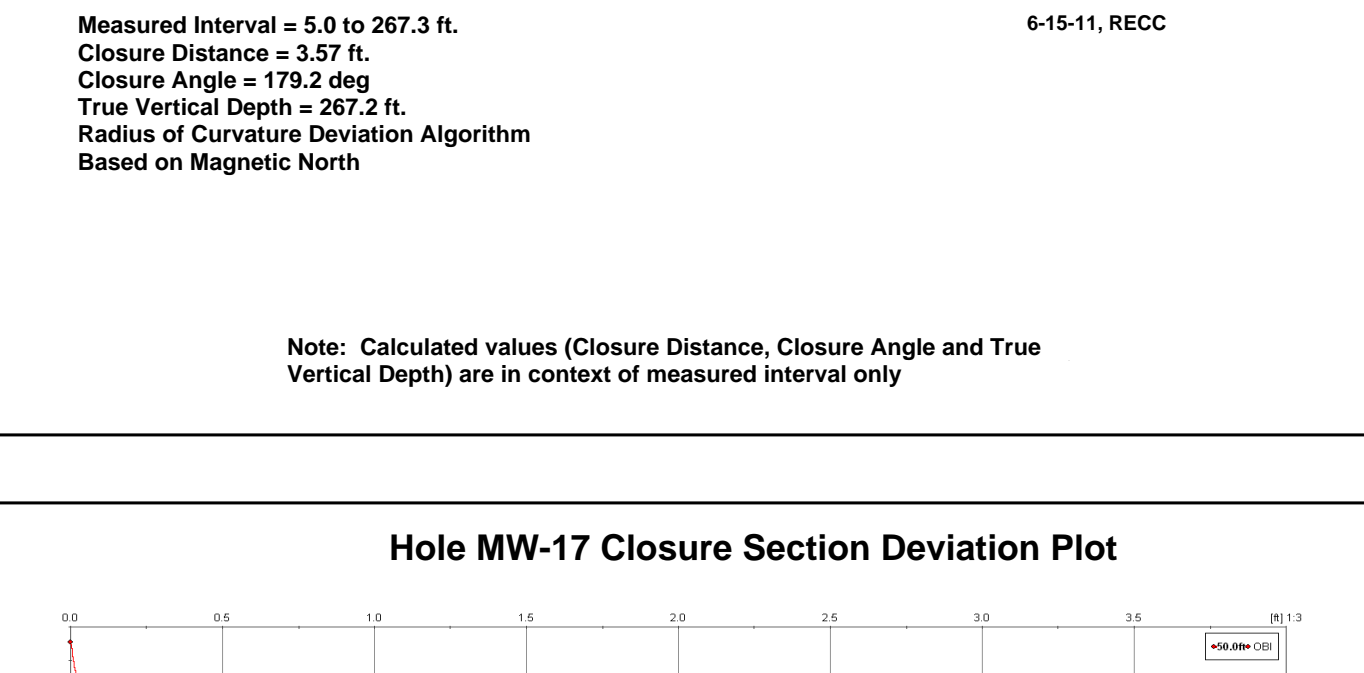
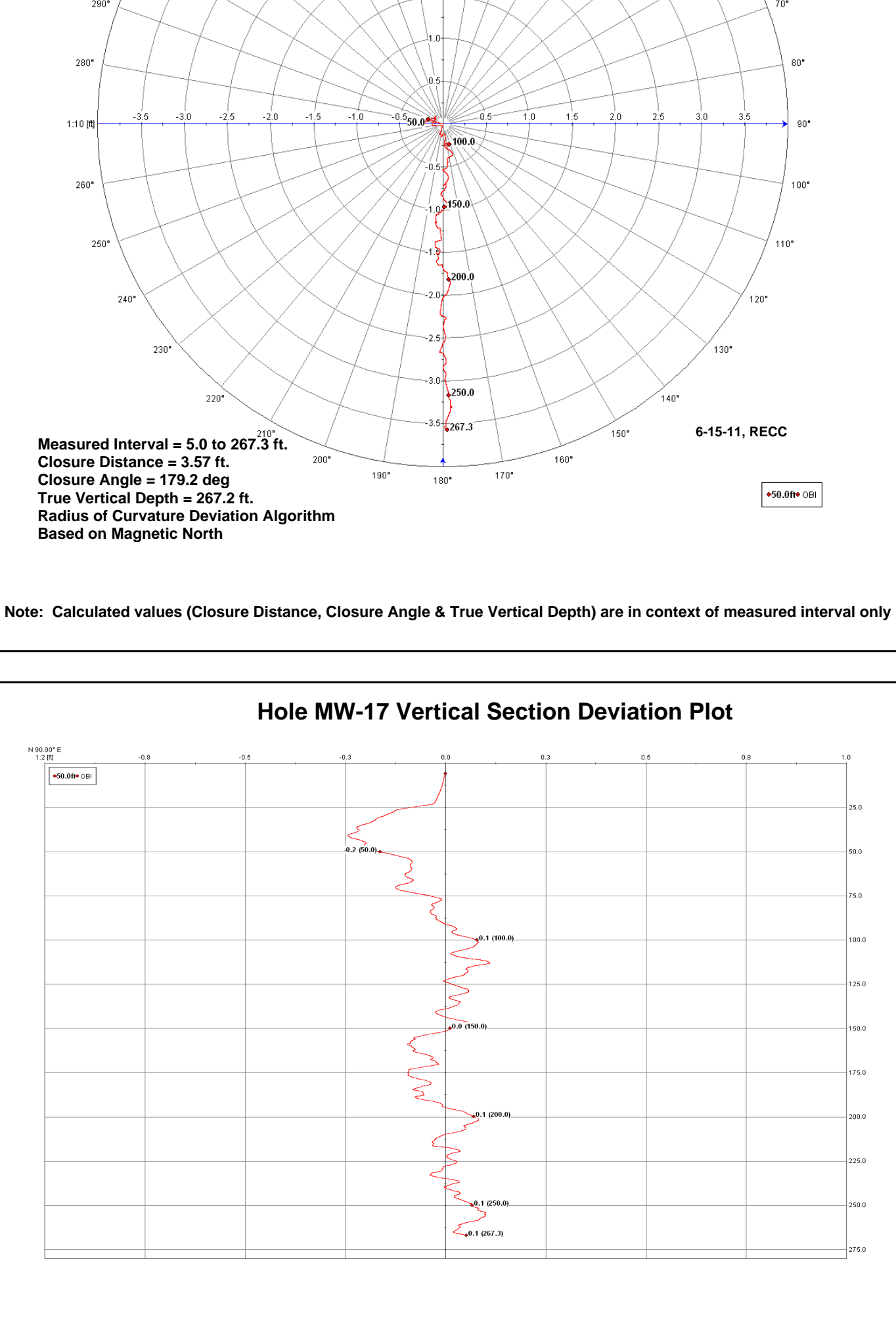
Major Lithology



Depth	0	200	Orientation Map View		VFX	0°	90°	40	uT	60	0 degrees	8	Lith
			0°	90°	180°	270°	0°						
1in2ft	MW-17 OBI Summary												

Hole MW-17 Bull's Eye Deviation Plot

MW-17 OBI Summary



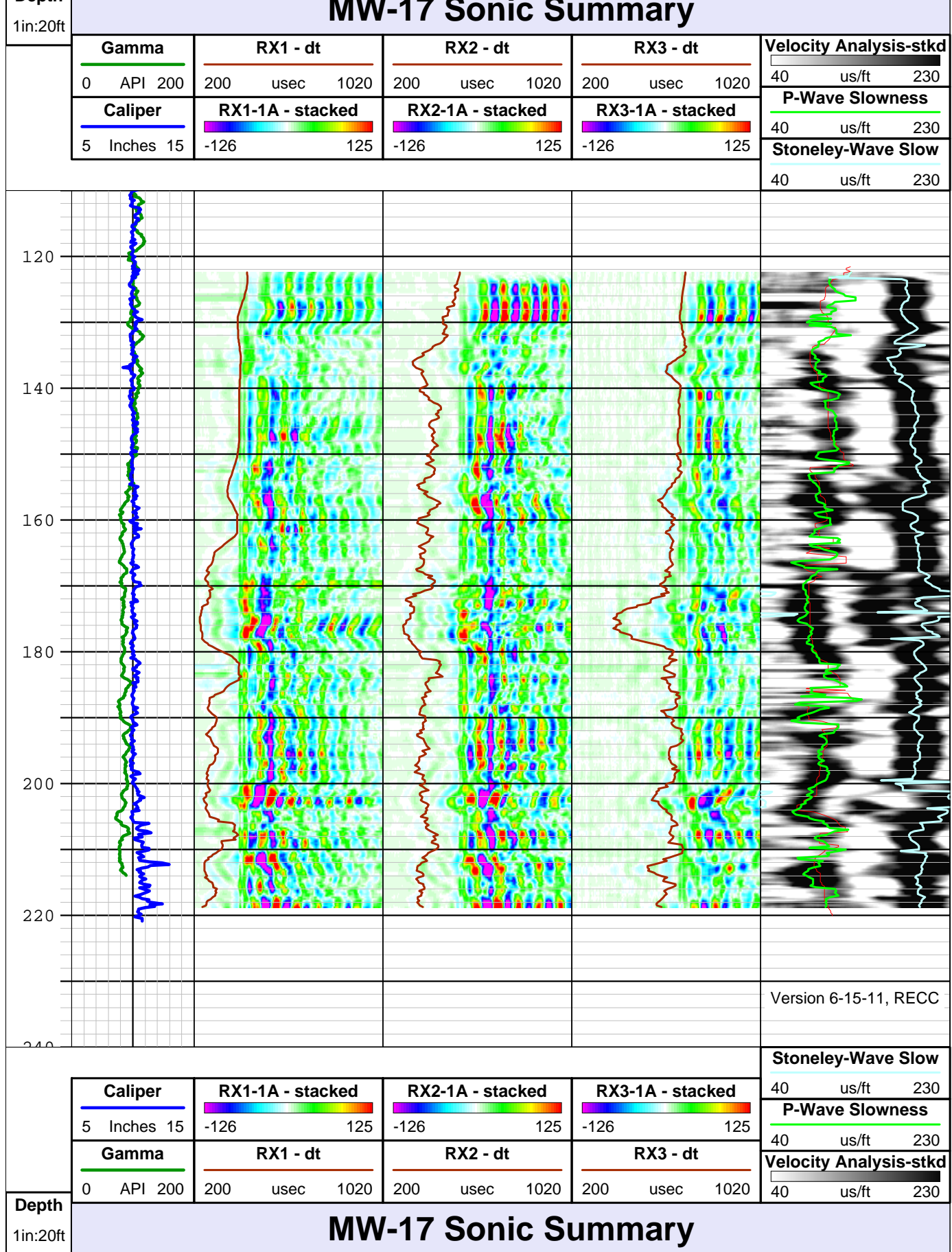
Optical Image Summary Legend

Mnemonics and Comments

- Caliper** = 3-arm mechanical caliper of hole diameter plotted from 5 - 15 inches (blue line)
- Gamma** = natural gamma ray log plotted from 0 to 200 API units (green line)
- Image-NM** = 2D plot of optical image oriented to magnetic north. Plotted from left to Right N-E-S-W-N
- Image** = Non-oriented 2D plot of optical image from 5.8 to 37' rotated by -150 deg. Plotted from left to Right N-E-S-W-N
- Picks** = planar features picked on optical borehole image shown as colored sinusoid (color designation shown on header) DIPA = dip apparent hole axis
- VFXs** = Near Vertical Fractures, Vugs/Vesicles and other non-sinusoidal features.
- Bx** = Apparent Breccia or Conglomerate zones and Vugs/Vesicles/Cavities
- 3D-N** = 3D cylindrical projection of OBI image viewed from north.
- 3D-E** = 3D cylindrical projection of OBI image viewed from east.
- Tadpole** = tadpole plot of the image feature picks (fractures and bedding planes); plotted from 0 to 100 dip - see legend above. DIPT = True orientation; features corrected for hole deviation
- Magn. Field** = Total magnetic field strength as measured by fluxgate magnetometer in OBI deviation sensor - plotted 40-60 uT, (green line)
- Gravity** = Total gravity (probe acceleration) as measured by 3-axis accelerometers in ABI deviation sensor - plotted 0.8-1.2 g, (brown line)
- Azimuth-edit** = direction of tool tilt plotted 0 to 360 deg; edited for magnetic influence - represents borehole deviation direction (red line)
- Tilt** = tool tilt (vertical = 0 and horizontal = 90) plotted 0 to 8 deg; represents borehole deviation tilt from vertical, (blue line)
- RBR** = Rotational Bearing Reference - difference between high side and marker position on probe; plotted as purple line from 0 to 360 deg.
- Desc** = major/principal lithology description based on geologic descriptions provided by Pirnie staff.
- Lith** = major/principal lithology symbol based on geologic descriptions provided by Pirnie staff.
- Bulls Eye Plot** = 2D plan view of drill hole path determined from magnetic sensor package in OBI an ABI probes -- referenced to Magnetic North
- Vertical Profile** = 2D view of drill hole path projected on E-W plane from magnetic sensor package in OBI an ABI probes -- reference to Magnetic North-- Radius of Curvature desurveying algorithm
- Closure Profile** = 2D projection of drill hole path of depth versus closure distance referenced to magnetic north



COMPANY MALCOLM PIRNIE WELL ID MW-17 FIELD PHOENIX COUNTY MARICOPA STATE ARIZONA									
TYPE OF LOGS: 50 MM SONIC-3 RX MORE: CALIPER LOCATION									
OTHER SERVICES 3-ARM CALIPER E-LOGS GAMMA-TEMP GUARD RESISTIVITY OB-40 NEUTRON									
SEC		TWP		RGE		K.B. D.F. G.L.			
PERMANENT DATUM LOG MEAS. FROM GROUND LEVEL ABOVE PERM. DATUM									
DRILLING MEAS. FROM									
DATE		04-02-11		TYPE FLUID IN HOLE		FRESH WATER			
RUN No		1		SALINITY		N/A			
TYPE LOG		50 MM SONIC		DENSITY		N/A			
DEPTH-DRILLER		228 FT		LEVEL		160 FT			
DEPTH-LOGGER		223 FT		MAX. REC. TEMP.		Deg C			
BTM LOGGED INTERVAL		220 FT		IMAGE ORIENTED TO		N/A			
TOP LOGGED INTERVAL		150 FT		SAMPLE INTERVAL		0.25			
DRILLER / RIG#		YELLOW JACKET		LOGGING TRUCK		TRUCK # 400			
RECORDED BY / Logging Eng.		K. MITCHELL		TOOL STRINGSN		ALT 50 MM SONIC - 3RX			
WITNESSED BY		MALCOLM PIRNIE, C. LEGG		LOG TIME/ON SITE/OFF SITE		7:00 AM			
RUN		BOREHOLE RECORD		CASING RECORD					
NO.		BIT FROM TO		SIZE		WGT.		FROM TO	
1		15" SURFACE		20 FT		12" STEEL		SURFACE 21 FT	
2		10" 20 FT		TOTAL DEPTH					
COMMENTS:									



Full Waveform Sonic Summary Legend

Mnemonics and Comments

- Gamma** = natural gamma ray log plotted from 0 to 200 API units (green line)
- Caliper** = 3-arm mechanical caliper of hole diameter plotted from 5-15 inches (blue line)
- RX1-1A-stacked** = color variable density display of 0.6m Rx waveform; stacked over 5 waveforms and plotted from 100 to 1020 uSec.
- RX1 - dt** = Manual P-wave travel time pick. Plotted 100 to 1020 uSec (brown line).
- RX2-1A-stacked** = color variable density display of 0.8m Rx waveform; stacked over 5 waveforms and plotted from 100 to 1020 uSec.
- RX2 - dt** = Manual P-wave travel time pick. Plotted 100 to 1020 uSec (brown line).
- RX3-1A-stacked** = color variable density display of 1.0m Rx waveform; stacked over 5 waveforms and plotted from 100 to 1020 uSec.
- RX3 - dt** = Manual P-wave travel time pick. Plotted 100 to 1020 uSec (brown line).
- Velocity Analysis-- stkd** = gray scale variable density display of velocity semblance waveform of the stacked waveforms; plotted from 40 to 230 uSec/ft.
- P-Wave Slowness** = apparent P-wave transit time or slowness from maximum energy peak on semblance velocity waveform in uSec/ft (green line).
- Stoneley-Wave Slow** = apparent Stoneley-wave transit time or slowness from maximum energy peak on semblance velocity waveform in uSec/ft. (light blue line).

Prepared by Robert E. Crowder

Ver 6-15-11

OBI Image Log Summary

Hole MW-18

Malcolm Pirnie

Phoenix, Maricopa County, Az

Image Features Oriented to Magnetic North and not Corrected for Magnetic Declination

Feature Dip is from 0 to 90 deg (0 = Horizontal, 90 = Vertical) Logged: Sept. 17, 2009



Optical Image Features Legend

- Major Fracture/Joint - distinct wide fracture/joint continuous around circumference of hole
- Minor Fracture/Joint - thin or discontinuous fracture/joint around circumference of hole
- Partially Open Fracture/Joint
- In-filled Fracture/Joint or Vein
- Bedding - apparent bedding; rock boundary; banding or foliation feature
- Bottom of Casing
- Fluid level in boreohle
- Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.
- Distinct probable Fracture/Joint continuous over a portion of the circumference of hole - usually terminated at another fracture interesection

VFx Lithology Legend

- Breccia or Conglomerate
- Large Vugs/Vesicles (> 6")
- Medium Vugs/Vesicles (2-6")
- Small Vugs/Vesicles (< 2")
- 2 Near Vertical Fxs
- 2 Wide Near Vertical Fxs
- Breakouts
- Drilling Induced Fxs
- Conglomerate - mud matrix supported
- Conglomerate - clast supported
- Conglomerate - sand matrix supported
- >2 Near Vertical Fxs

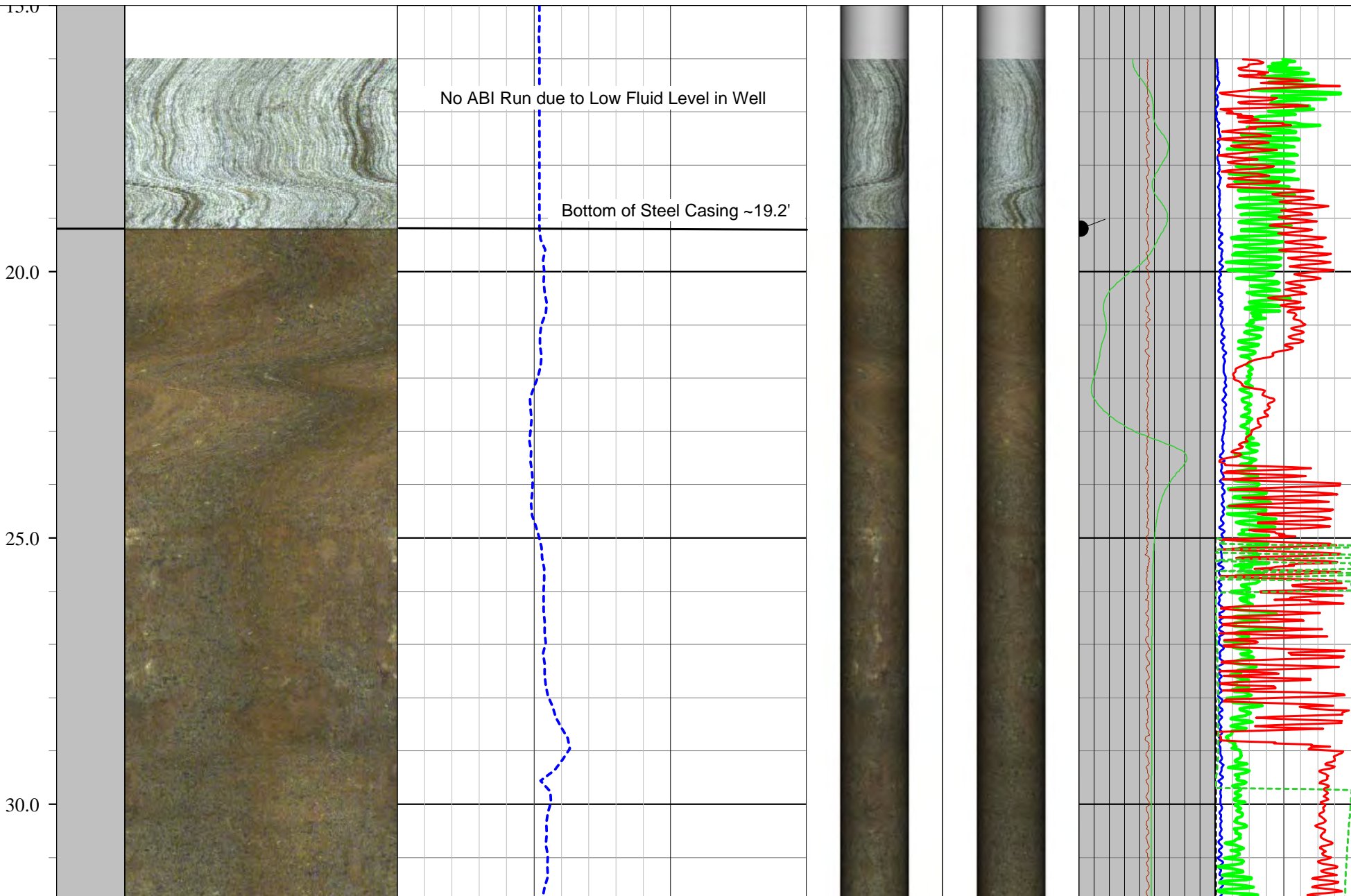
Depth	Picks	OBI Image	3-Arm Caliper		3D-North	3D-East	MagField	Tilt
1in:2.5ft	DIPA	Oriented to Mag North			0°	90°	0° to 90°	0° to 90°

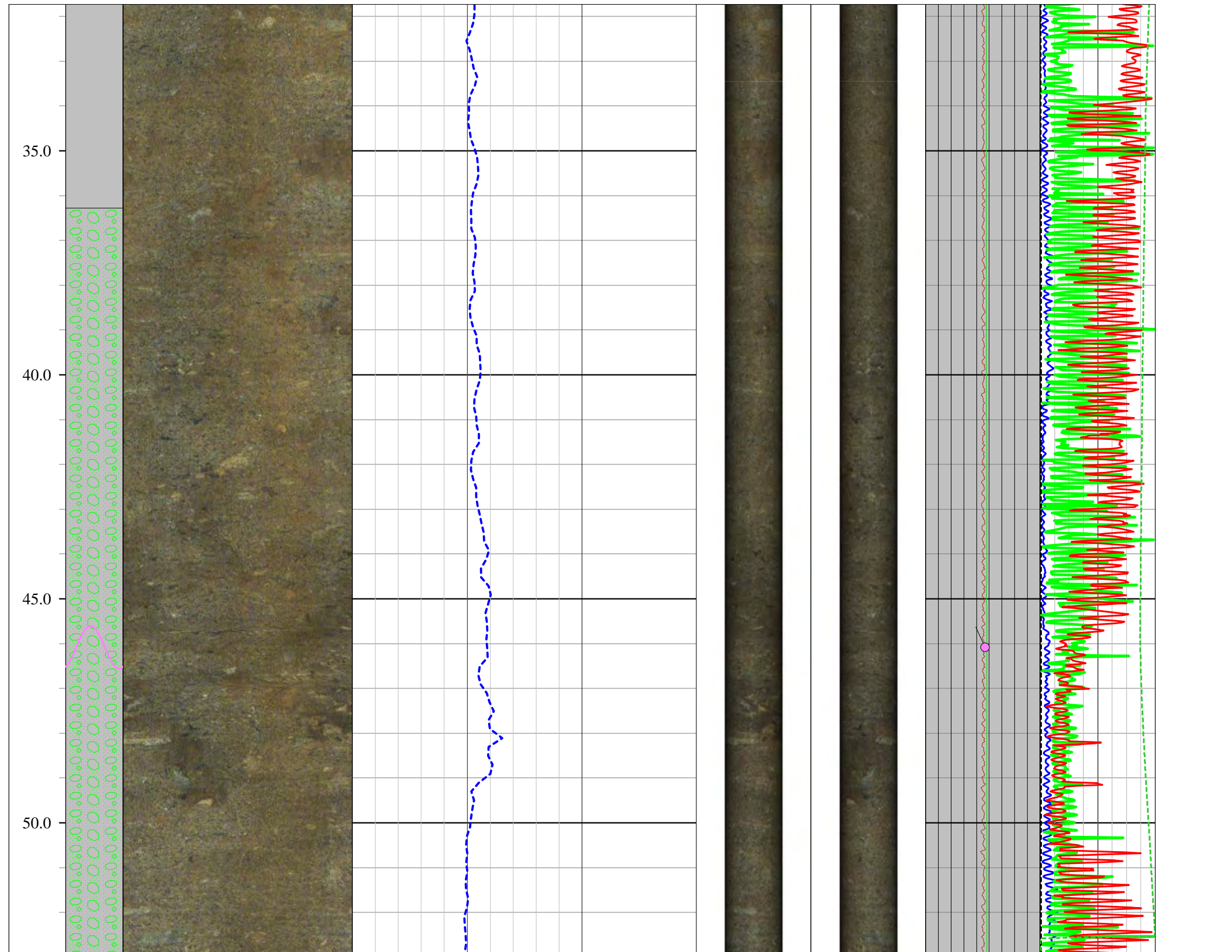
	0°	90°	180°	270°	0°
VFx					

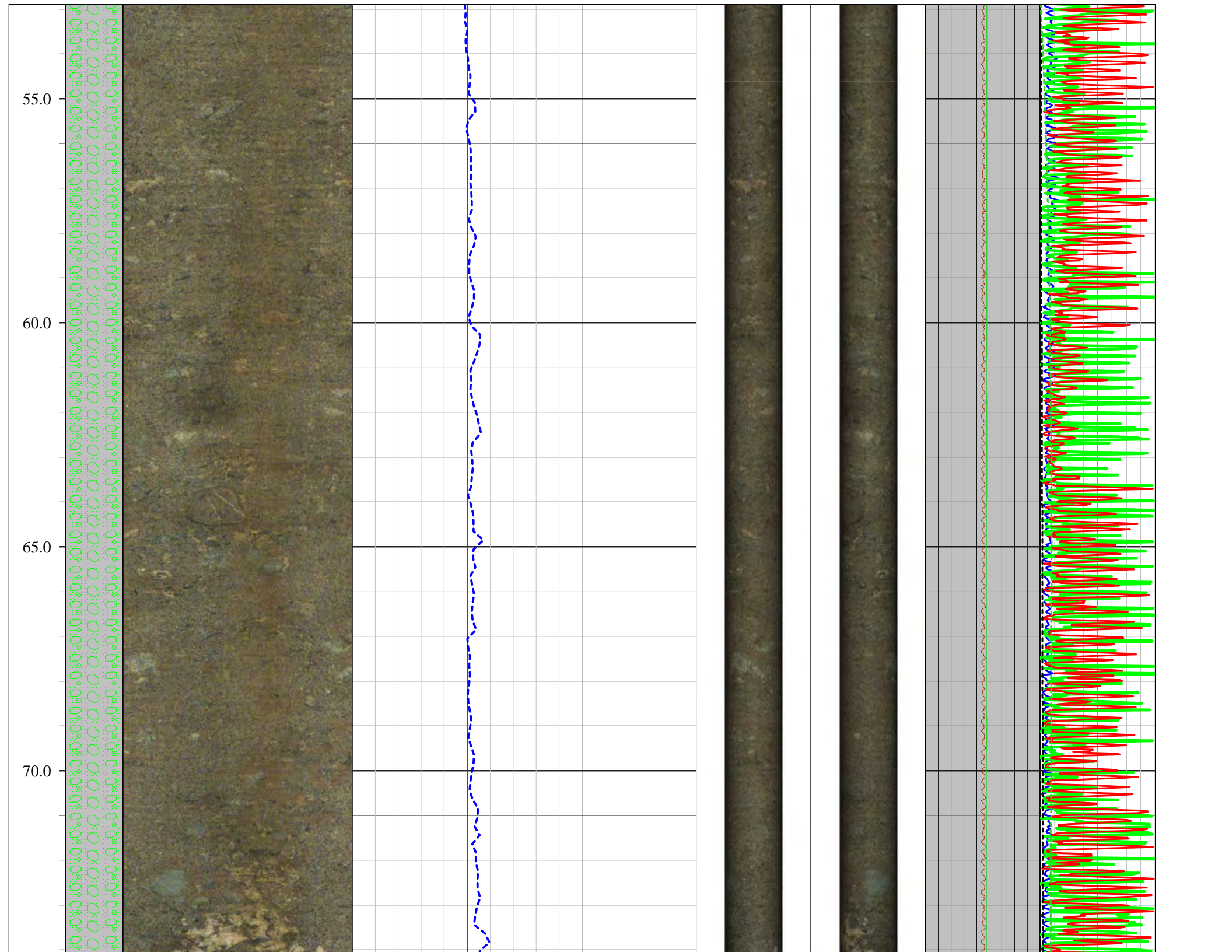
5	inches	15
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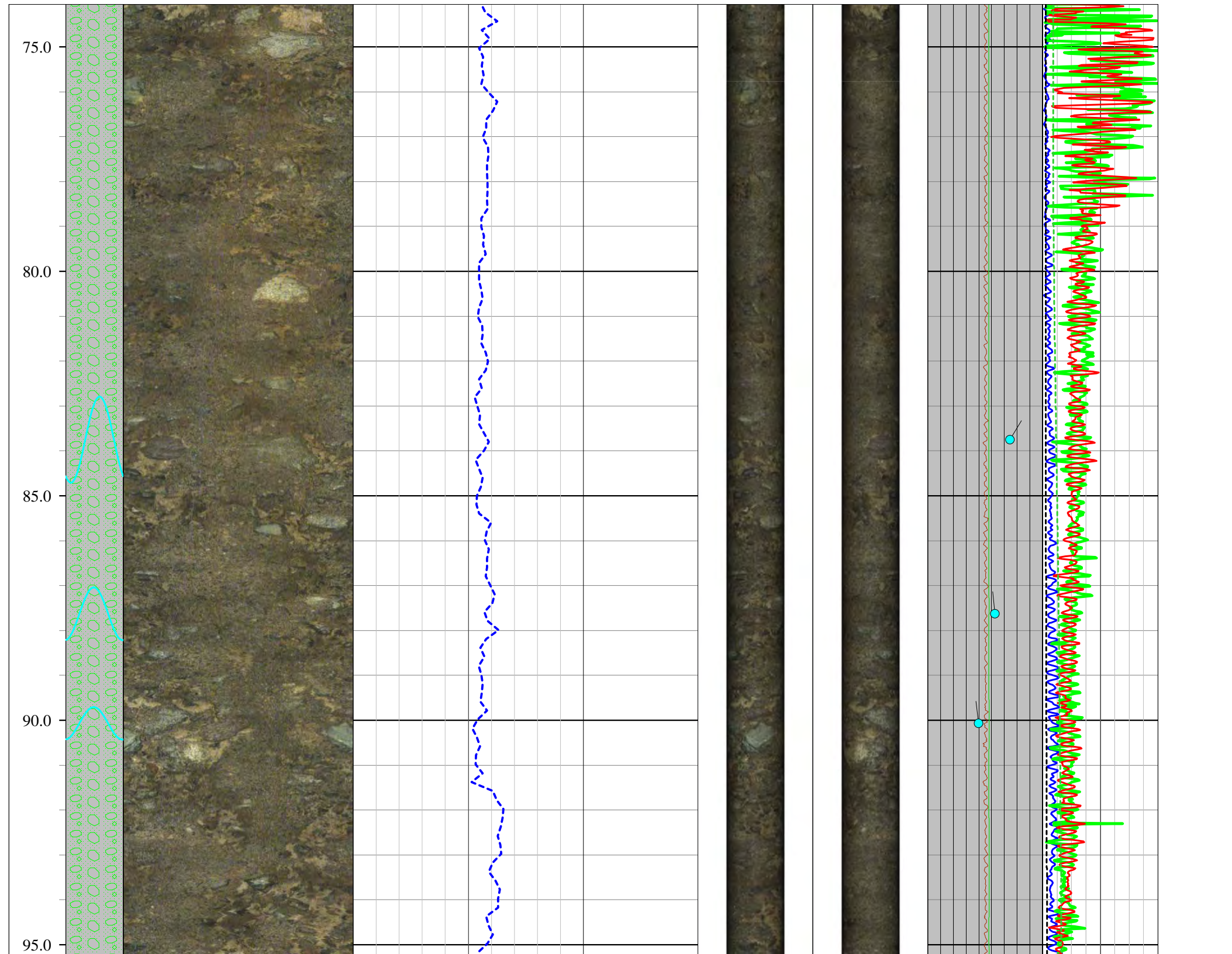
0	01	90	0	deg	8
Gravity			Azimuth		
0.8	G	1.2	0	deg	360
Tadpole			CD		
DIPT			0	[ft]	8
0		90	CA		
			0	deg	360

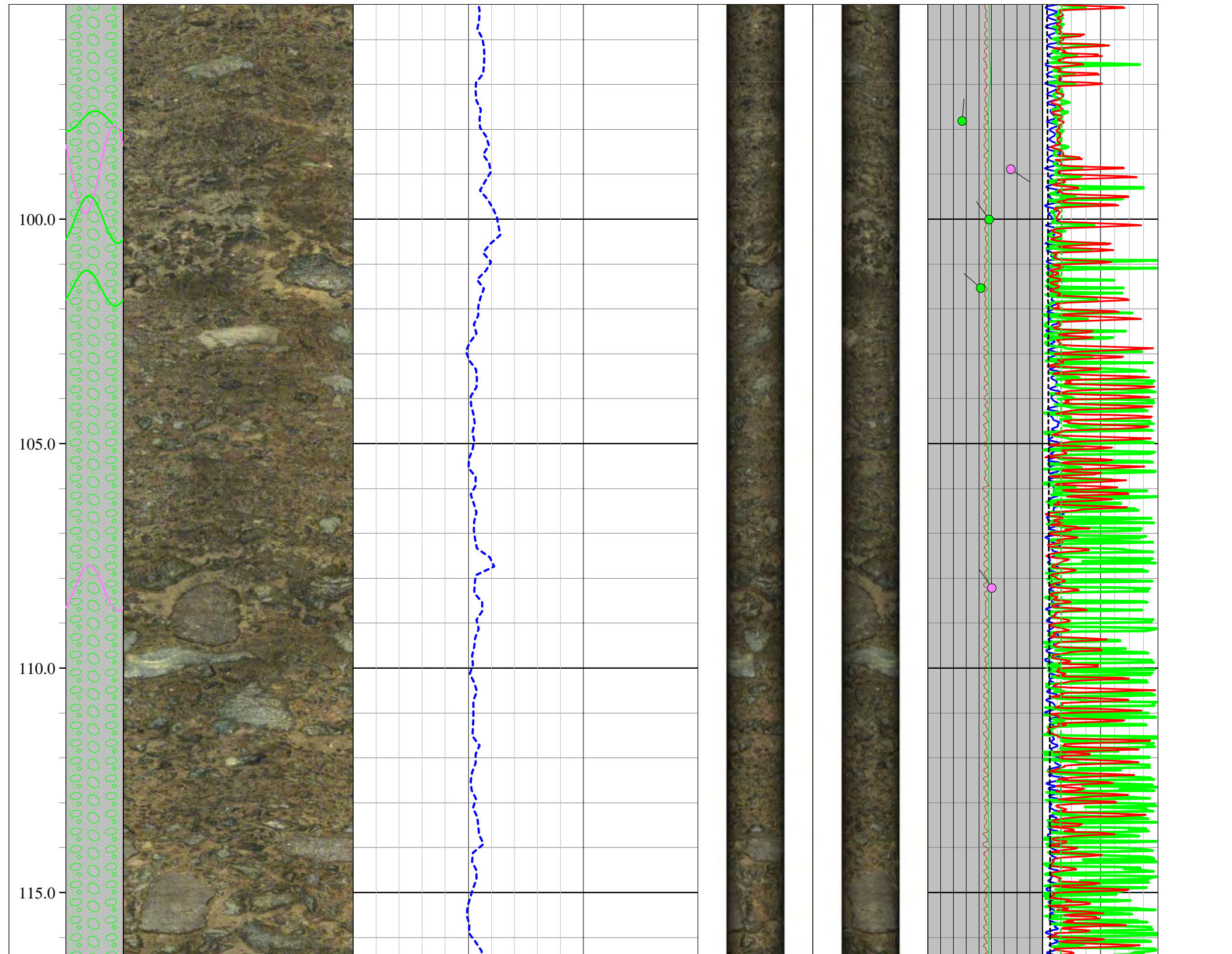
MW-18 OBI

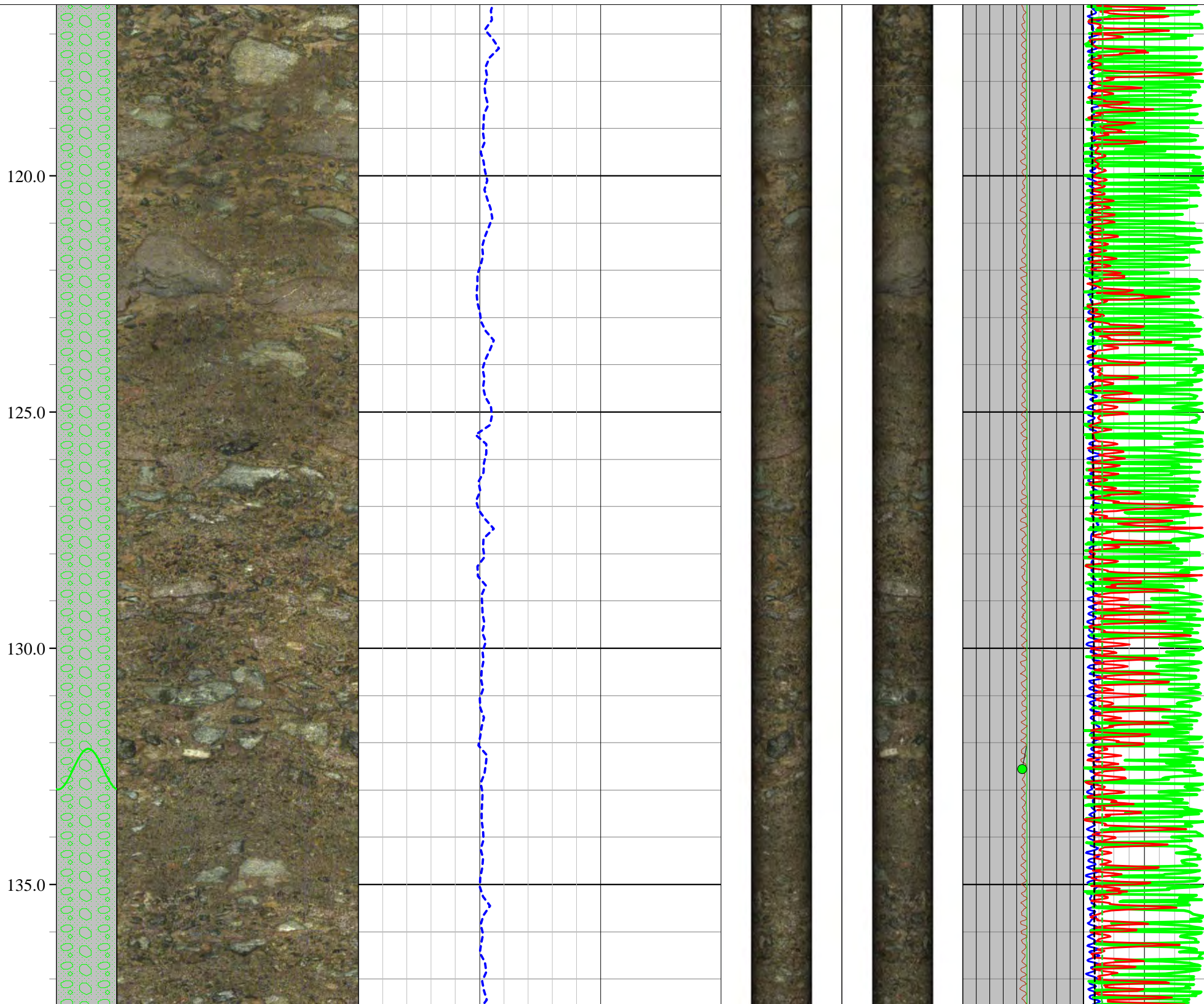


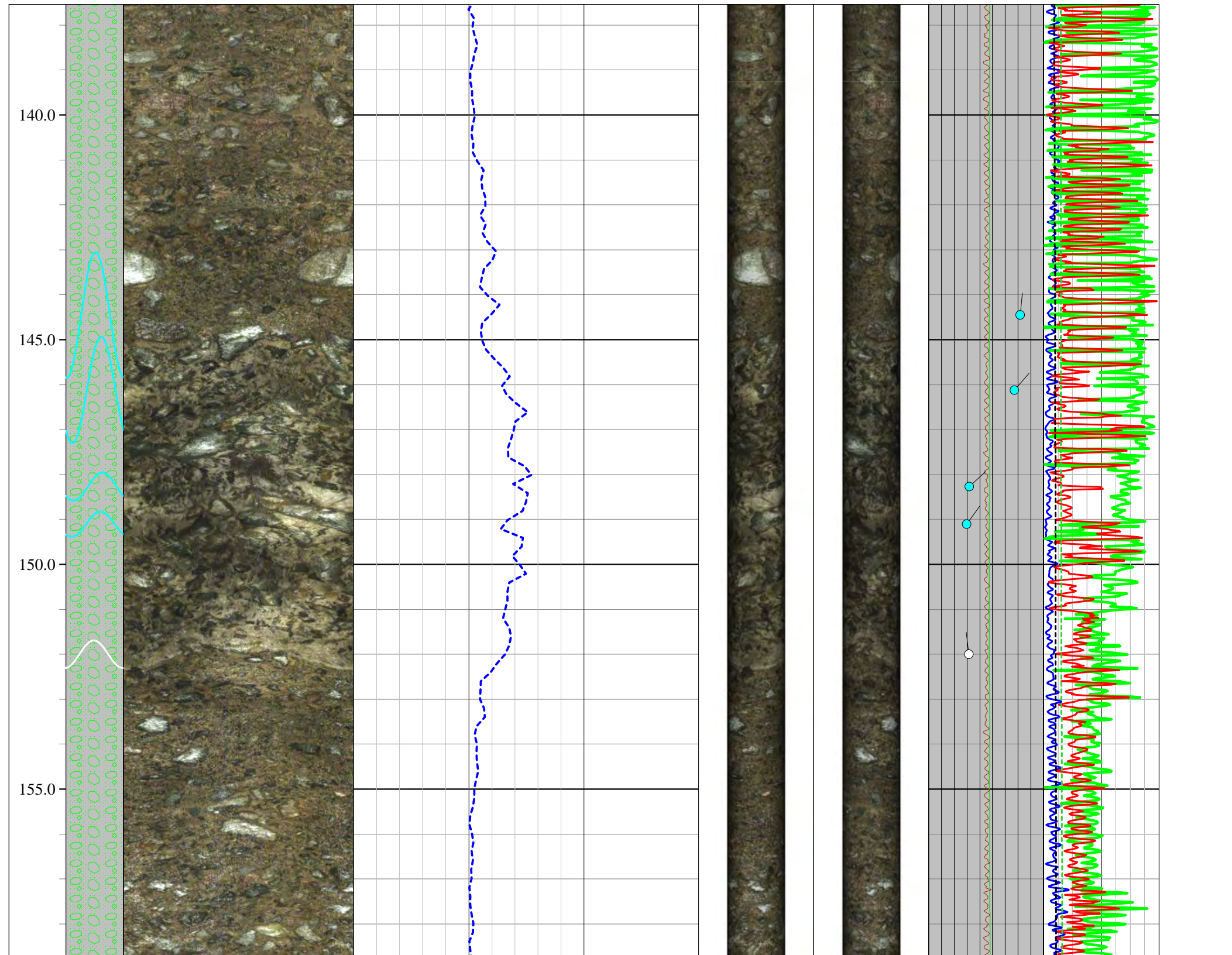


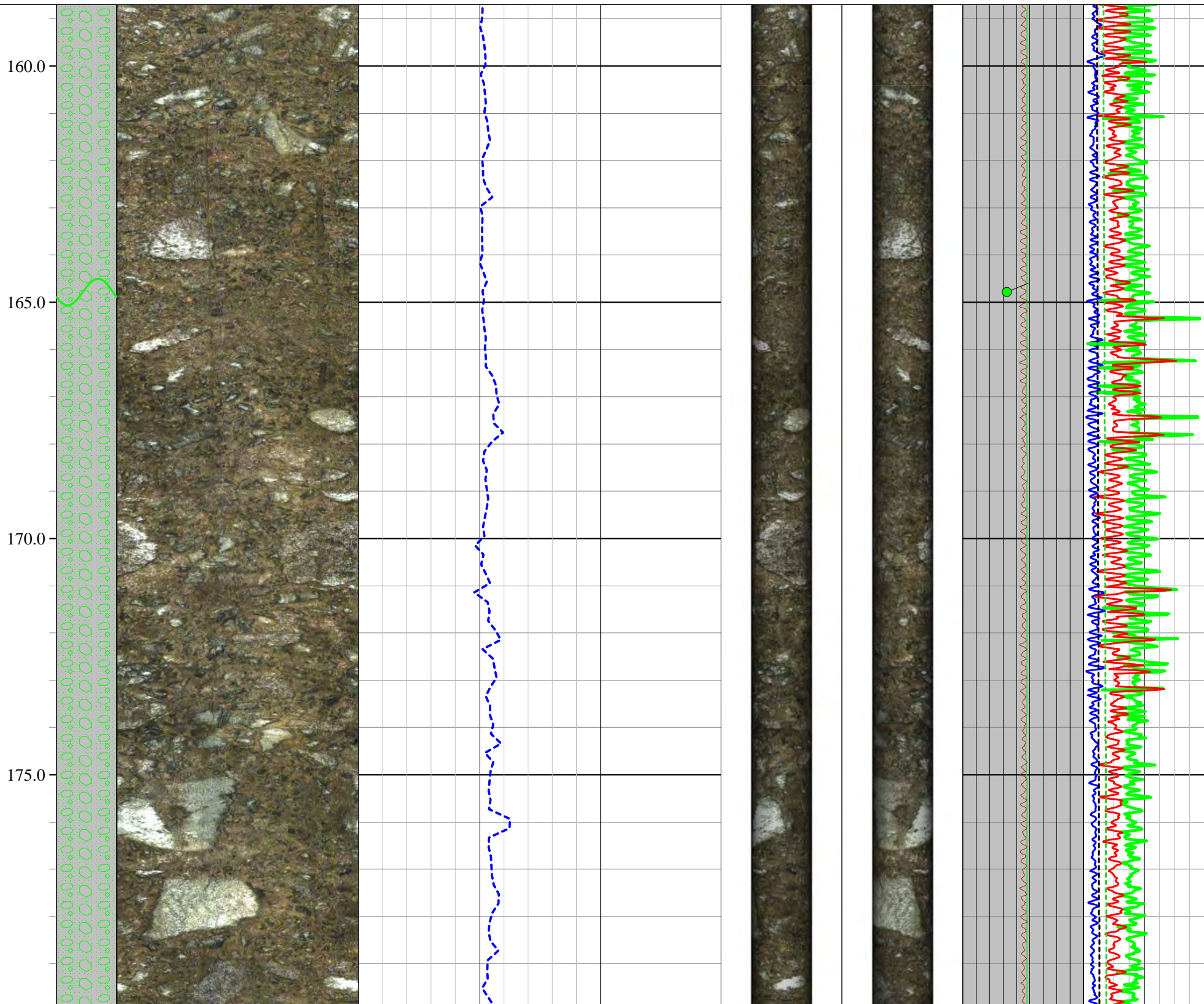


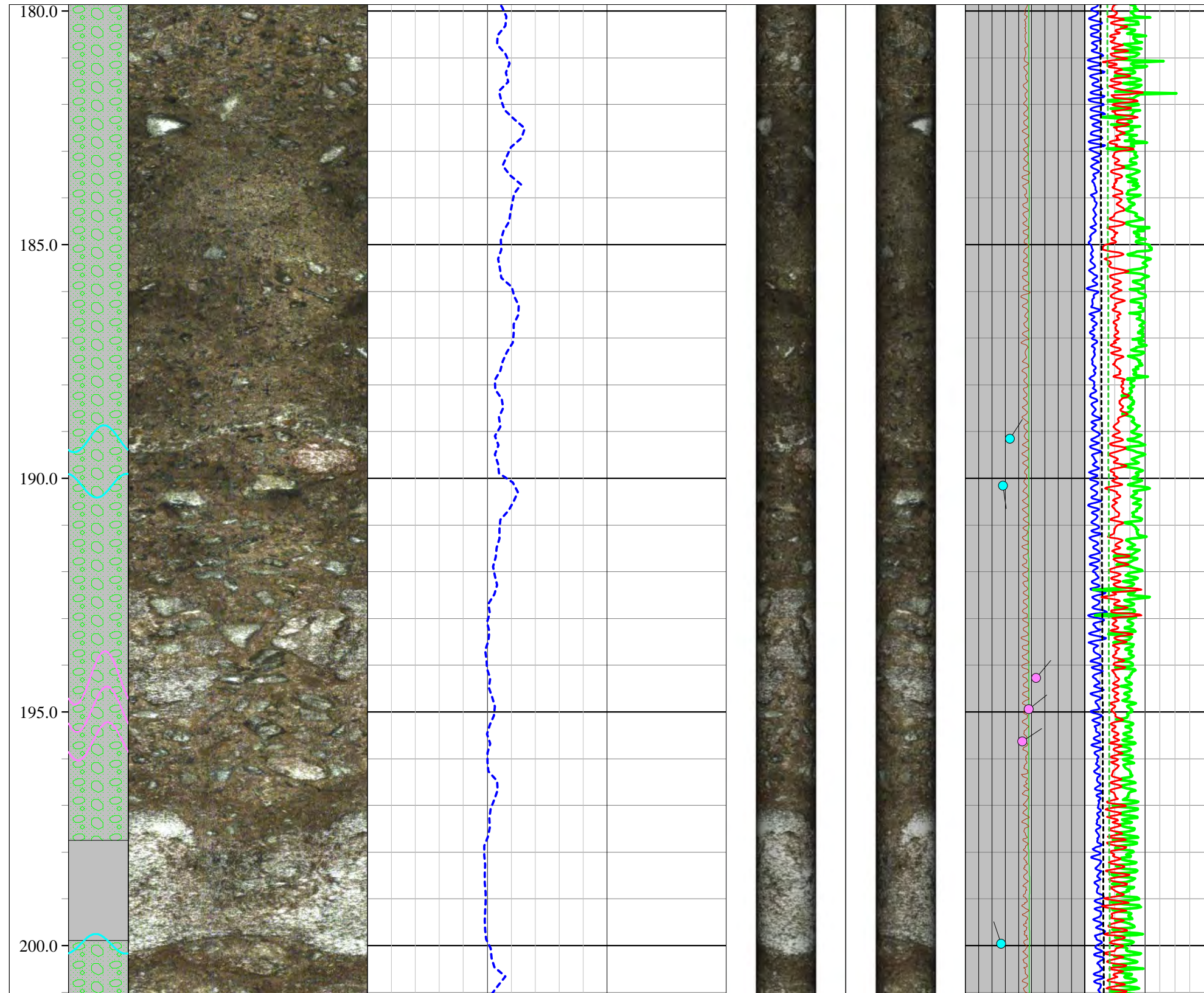


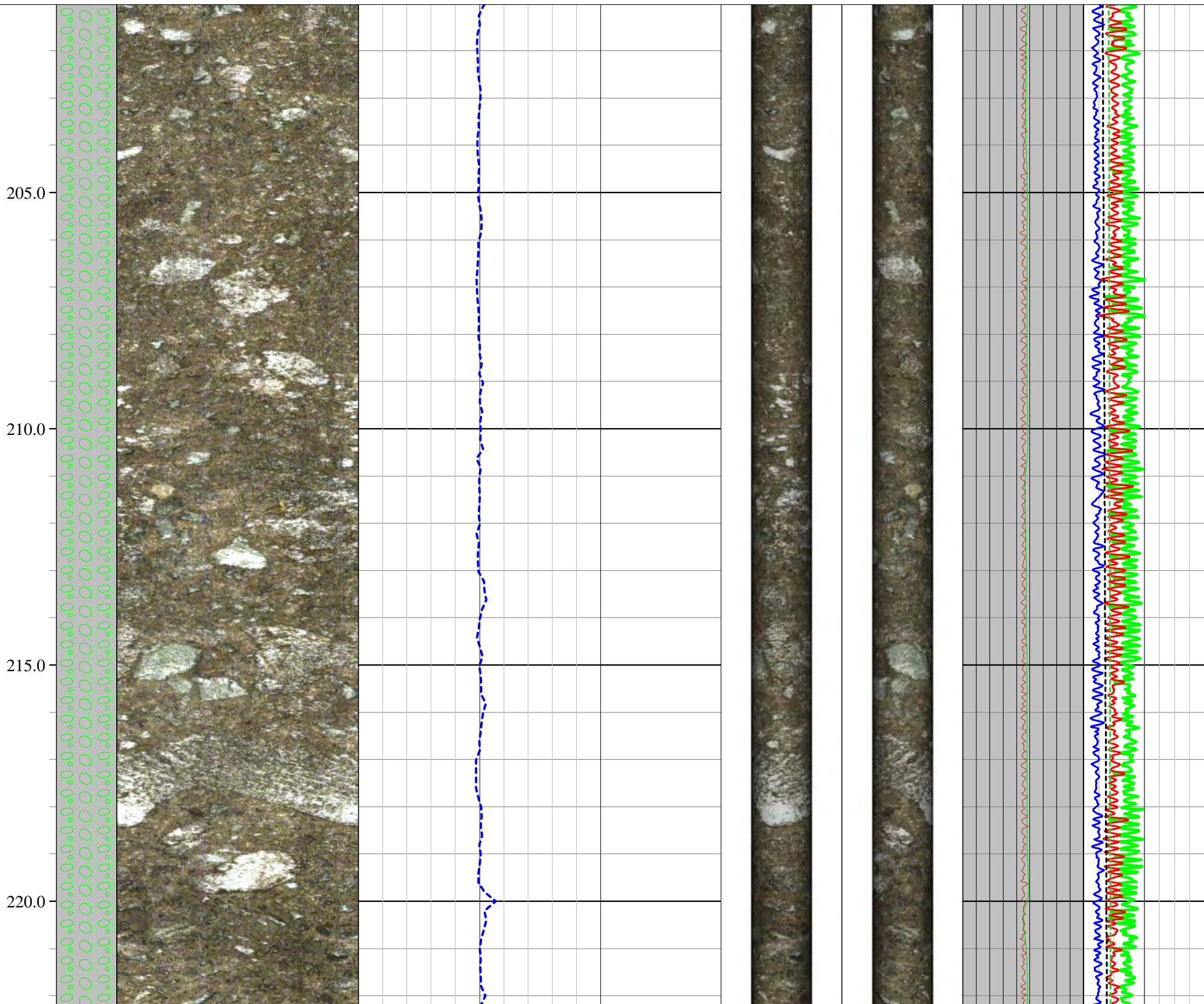


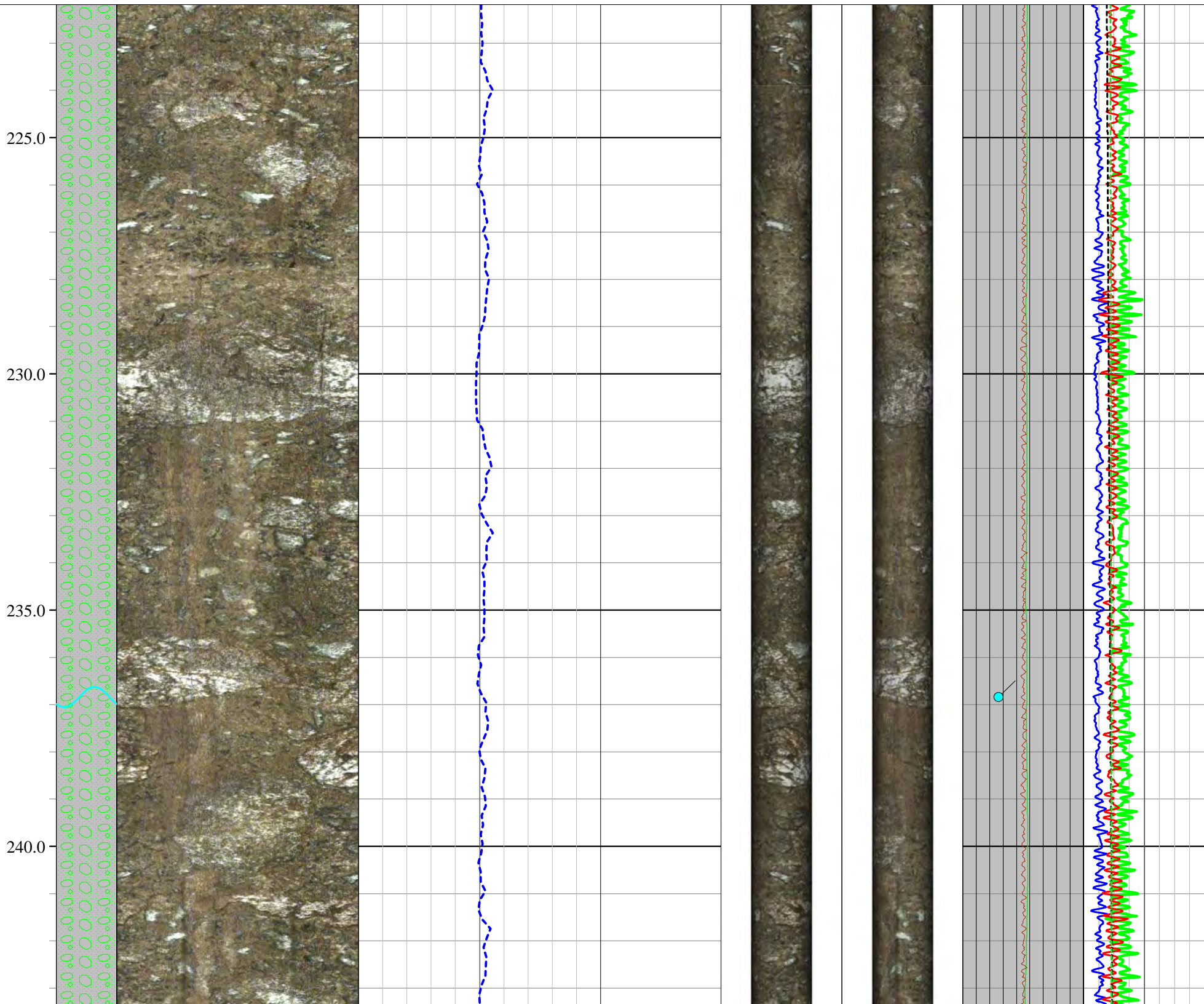


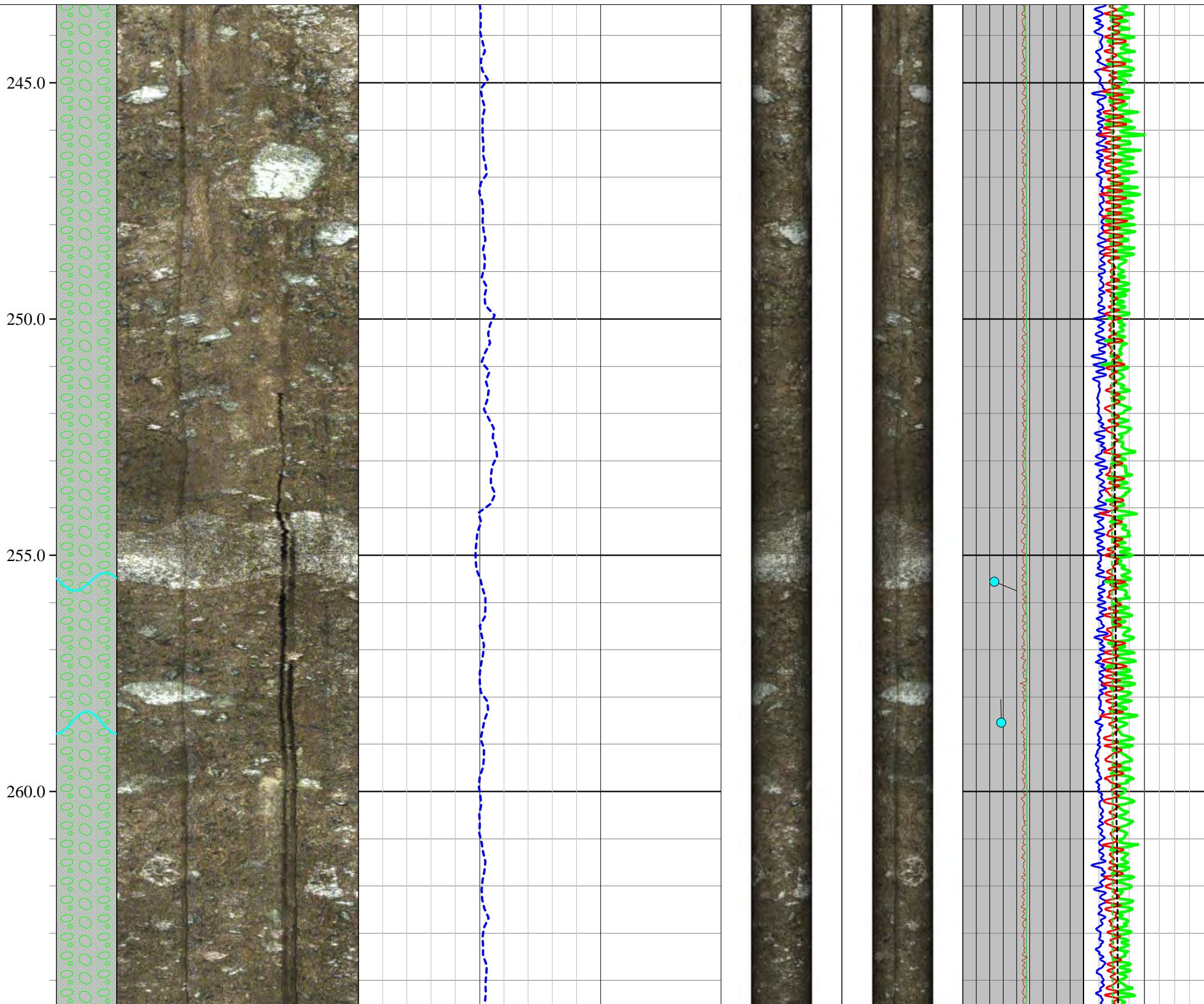


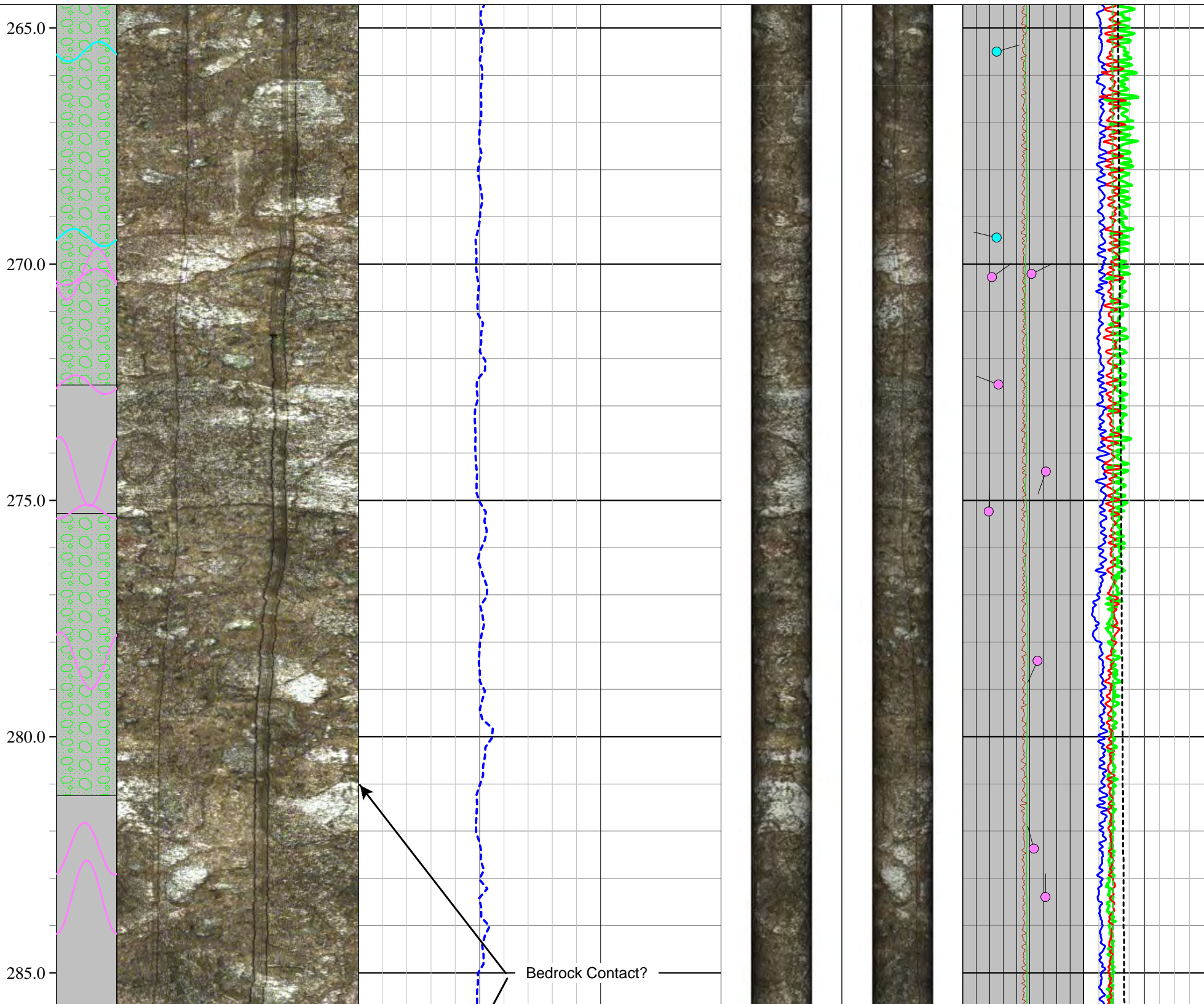


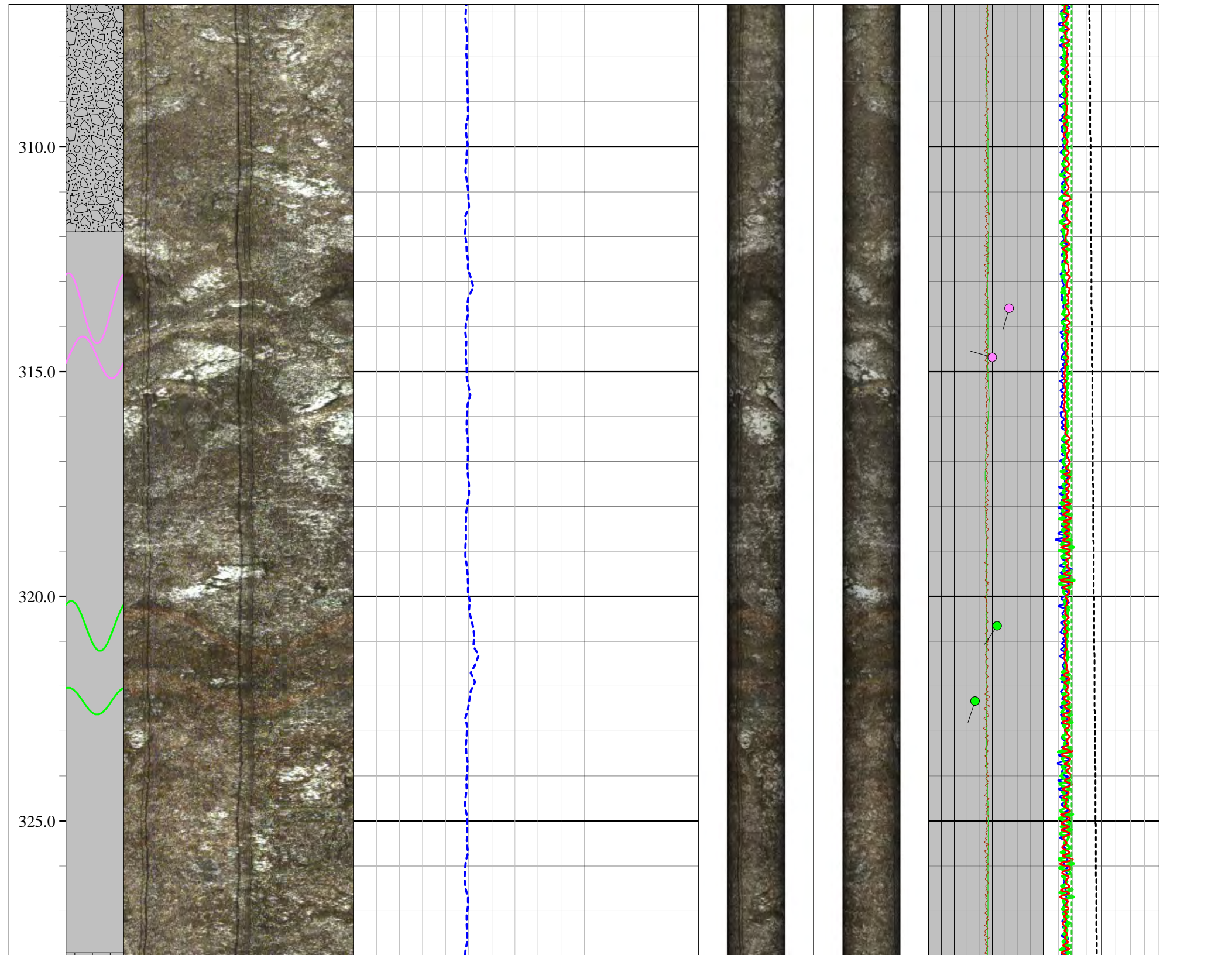


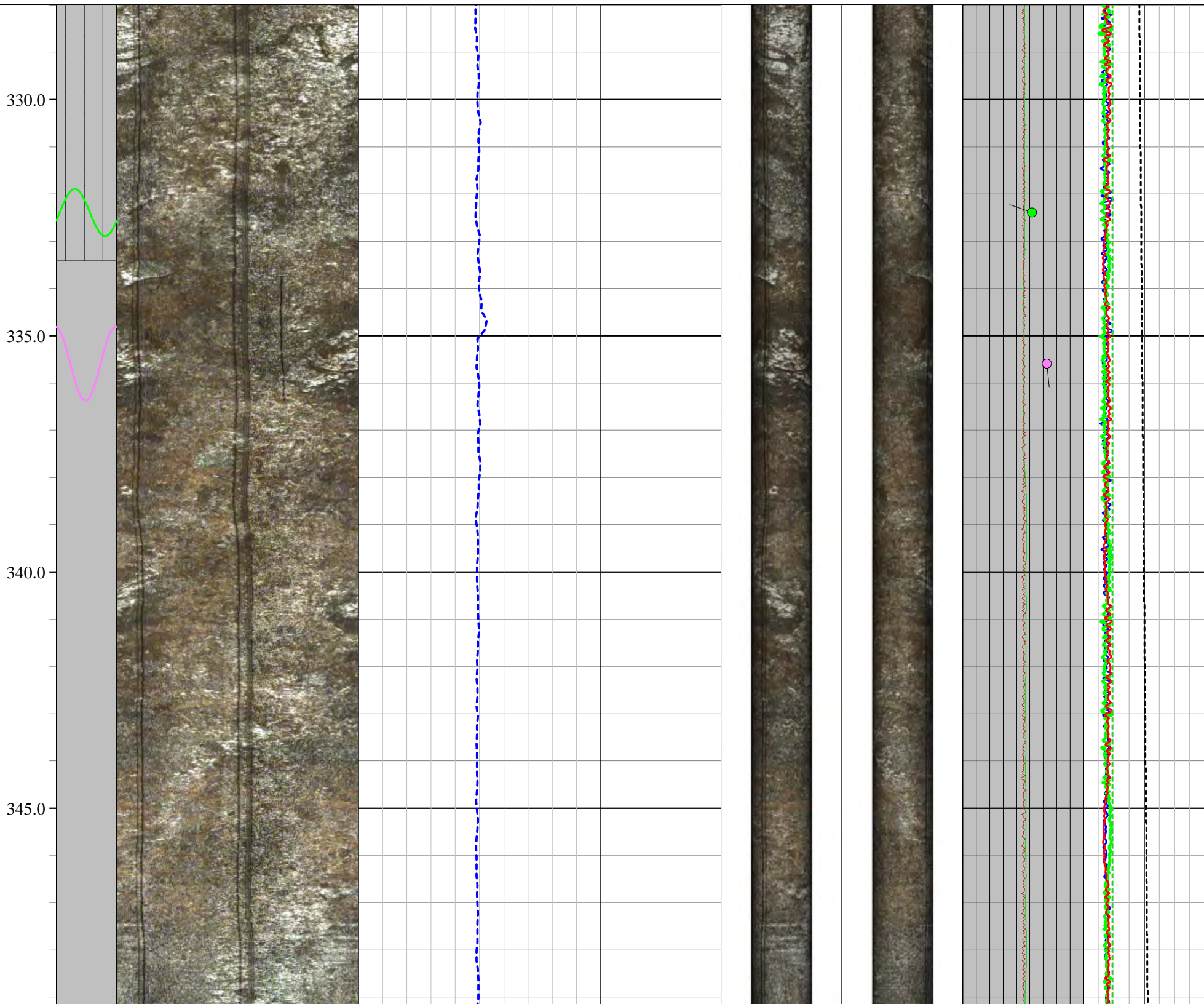


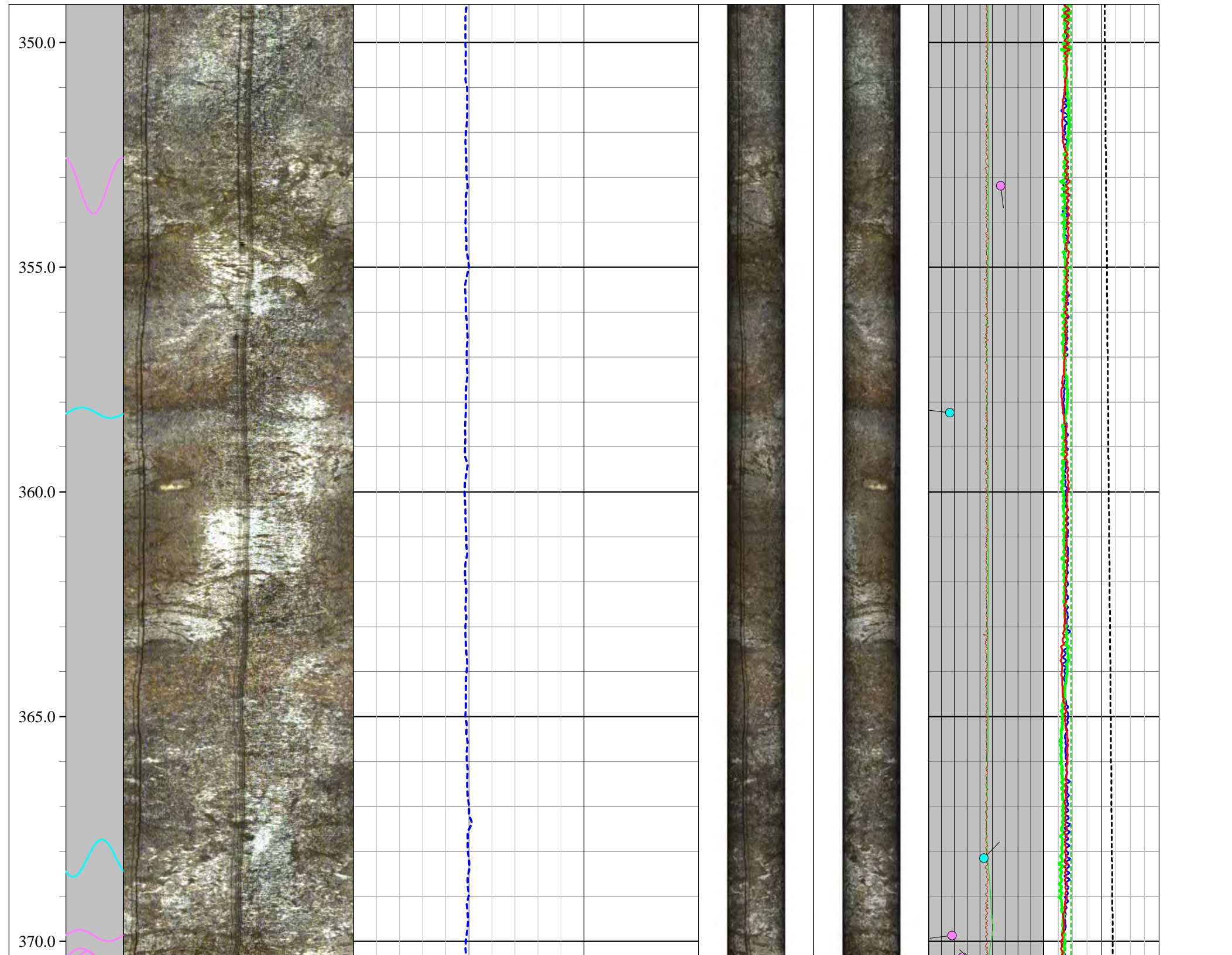


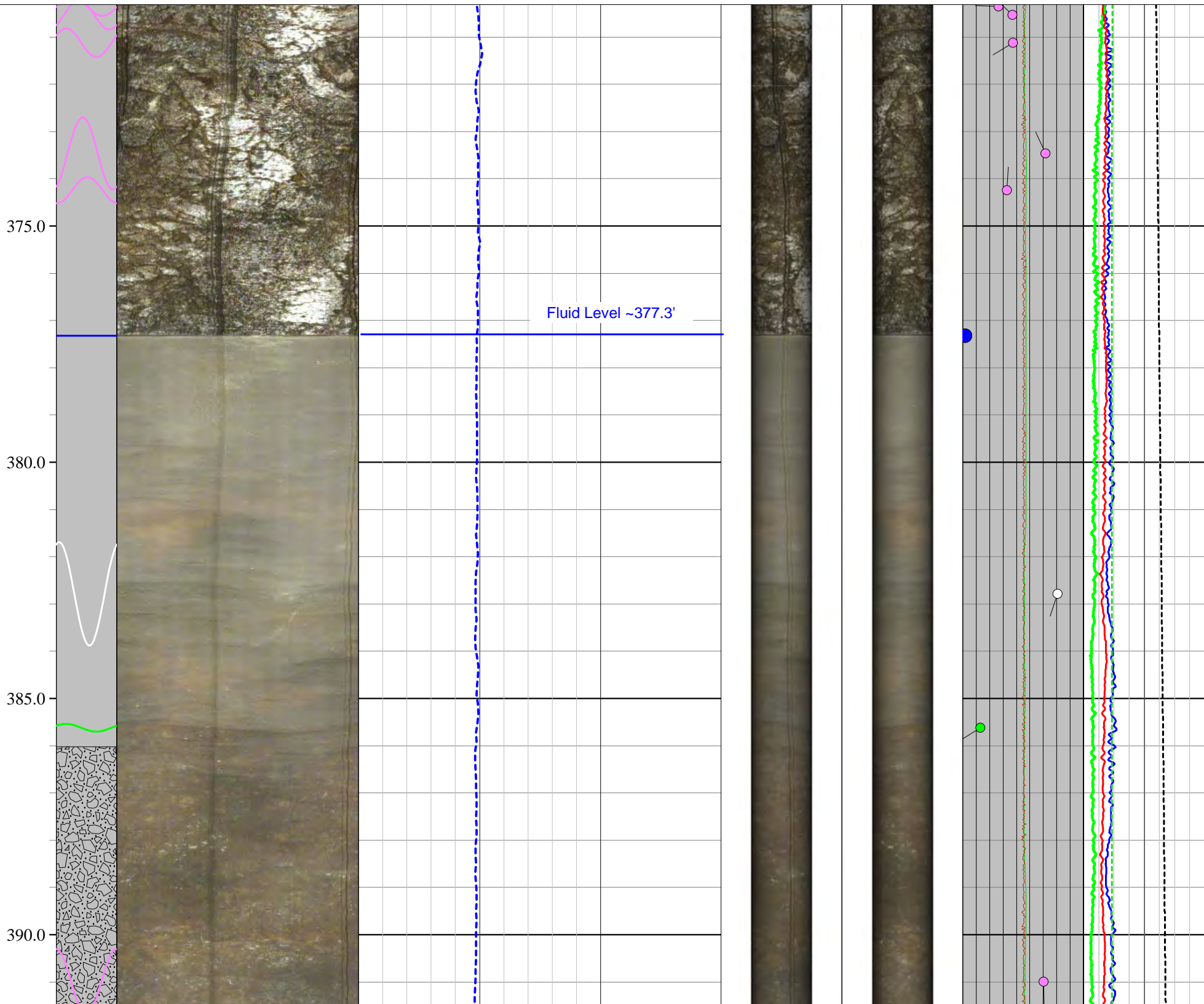


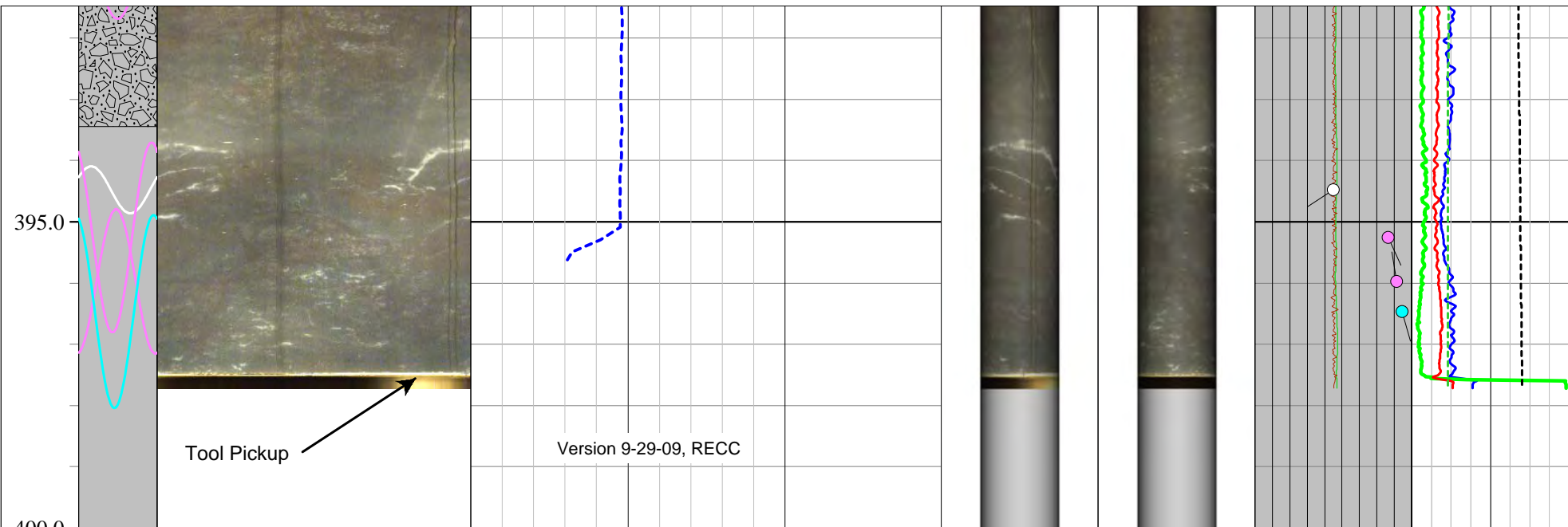








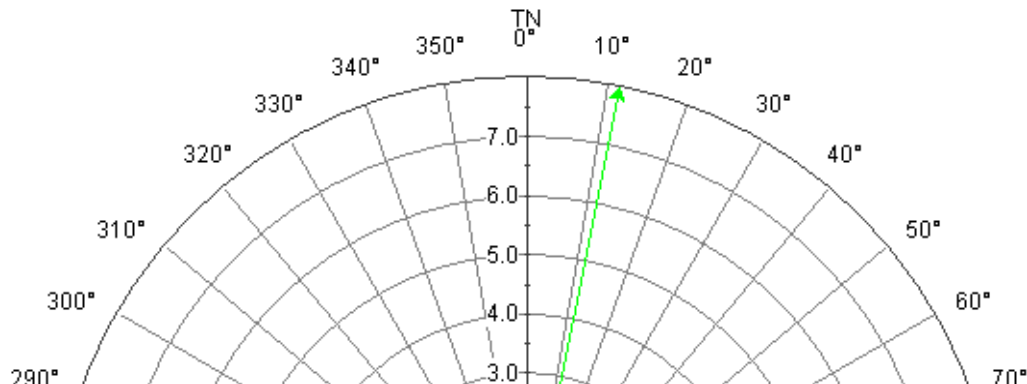


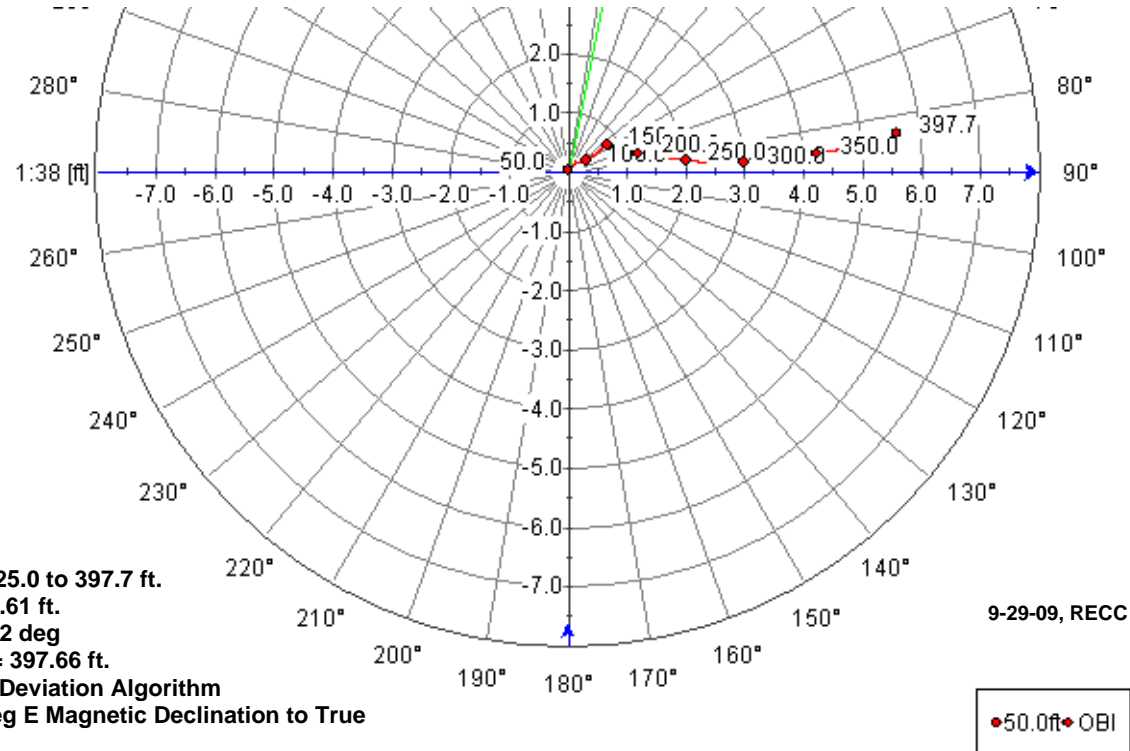


MW-18 OBI

		VFx Picks DIPA		OBI Image Oriented to Mag North		3-Arm Caliper 5 inches 15		3D-North 0°		3D-East 90°		Tadpole DIPT 0 90	CA 0 deg 360
												Gravity 0.8 G 1.2	CD 0 [ft] 8
Depth 1in:2.5ft												MagField 0 uT 90	Azimuth 0 deg 360
		0° 90° 180° 270° 0°										Tilt 0 deg 8	

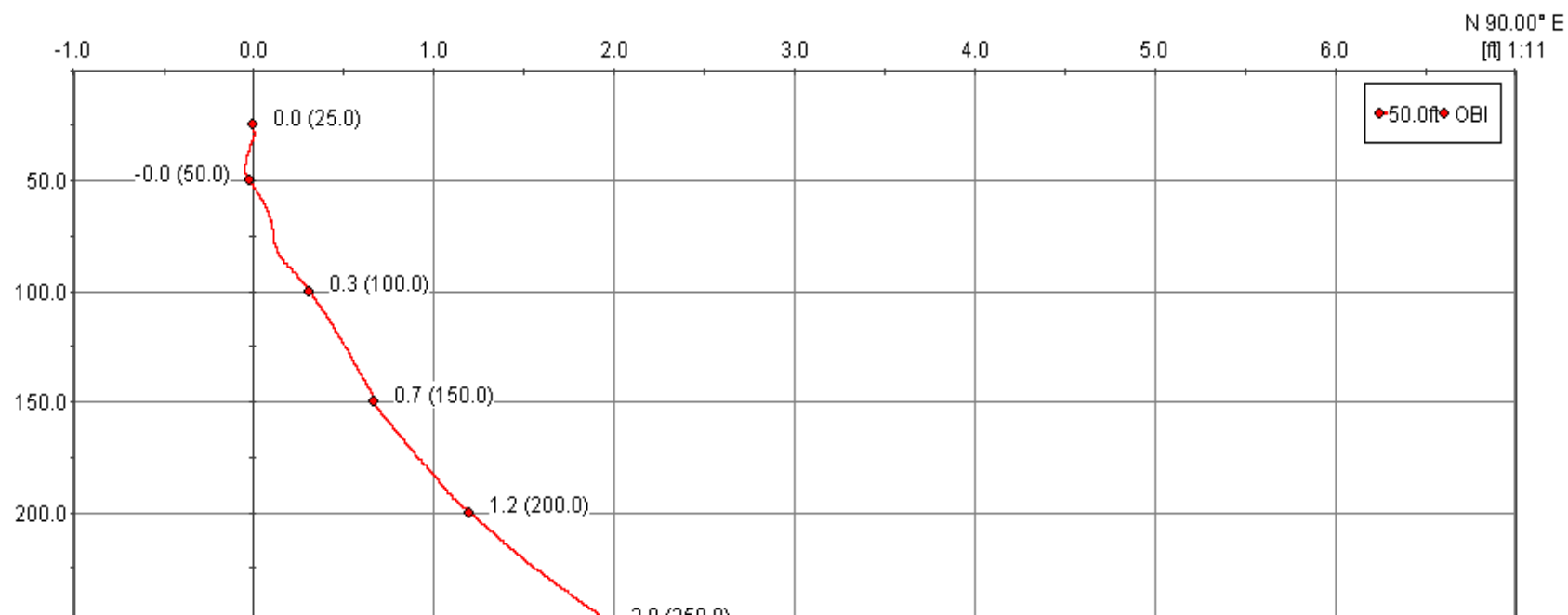
MW-18 OBI Bull's Eye Deviation Plot

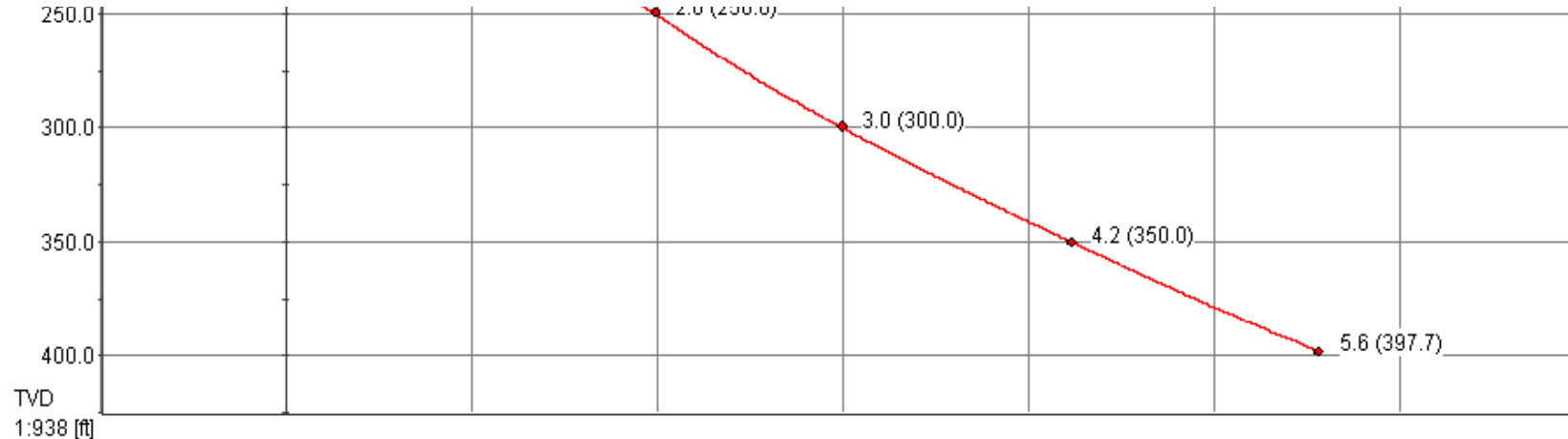




Note: Calculated values (Closure Distance, Closure Angle and True Vertical Depth) are in context of measured interval only

MW-18 OBI E-W Vertical Section Deviation Plot



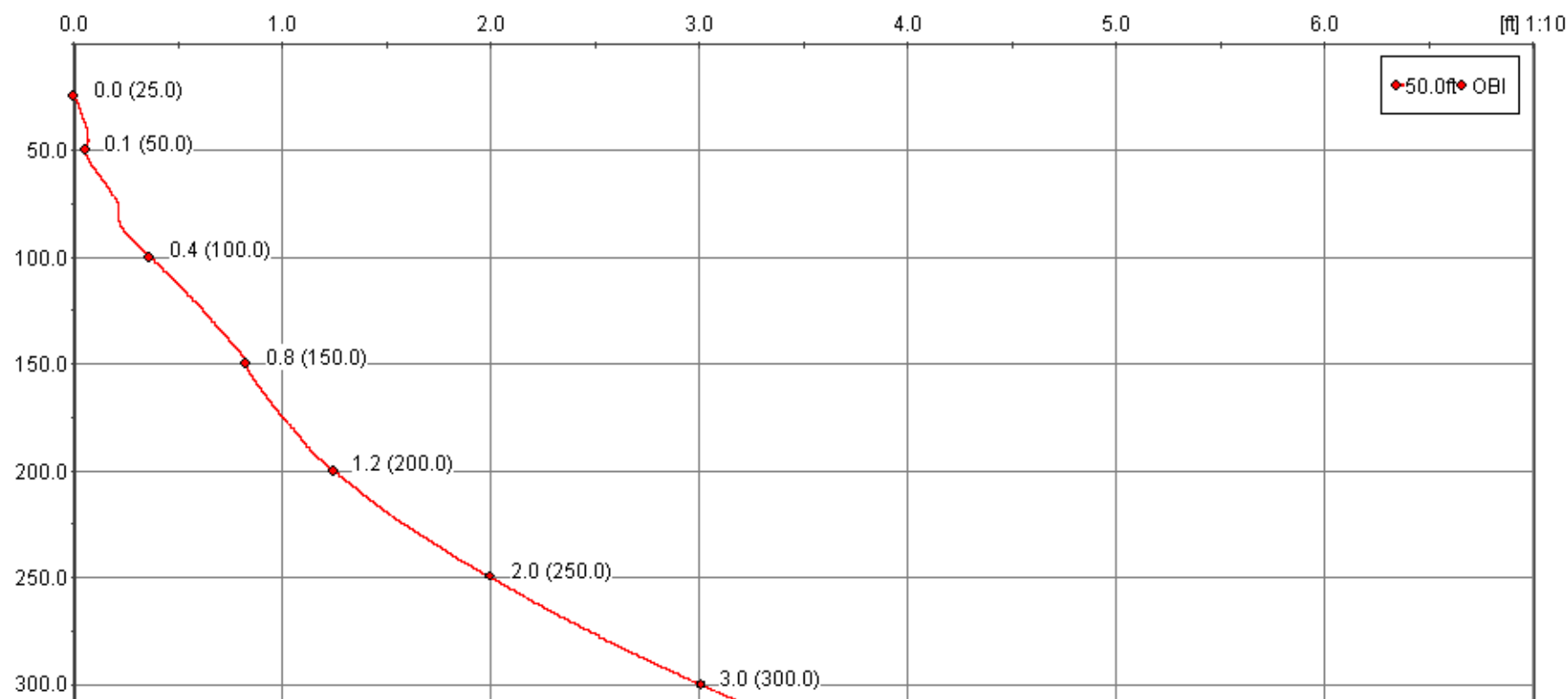


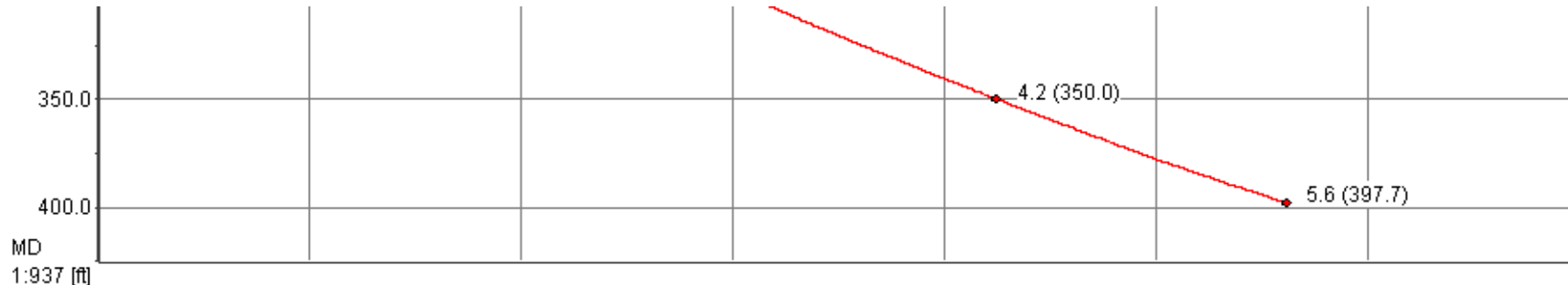
Measured Interval = 25.0 to 397.7 ft.
 Closure Distance = 5.61 ft.
 Closure Angle = 83.12 deg
 True Vertical Depth = 397.66 ft.
 Radius of Curvature Deviation Algorithm
 Corrected for 11.5 deg E Magnetic Declination to True North

9-29-09, RECC

Note: Calculated values (Closure Distance, Closure Angle and True Vertical Depth) are in context of measured interval only

MW-18-OBI Closure Section Deviation Plot





Measured Interval = 25.0 to 397.7 ft.

Closure Distance = 5.61 ft.

Closure Angle = 83.12 deg

True Vertical Depth = 397.66 ft.

Radius of Curvature Deviation Algorithm

Corrected for 11.5 deg E Magnetic Declination to True

North

9-29-09, RECC

Note: Calculated values (Closure Distance, Closure Angle and True Vertical Depth) are in context of measured interval only

Optical Image Summary Legend

Mnemonics and Comments

ARI = Acoustic Reflectance Index or relative rock hardness was not provided since ABI was not run due to low fluid level in well.

VFxs = Near Vertical Fractures, highly fractured zones and Fanglomerate or Breccia zones

Picks = planar features picked on optical borehole image shown as colored sinusoid (color designation shown on header) DIPA = dip apparent hole axis

OBI Image-NM = 2D plot of optical image oriented to magnetic north. Plotted from left to Right N-E-S-W-N

3-Arm = 3-arm mechanical caliper of hole diameter plotted from 5-15 inches (blue line)

Centralized TT = 2D plot of acoustic image travel time was not provided since the ABI probe was not run due to low fluid level in well.

Amplitude = 2D plot of unfiltered acoustic image amplitude was not provided since ABI was not run due to low fluid level in well.

3D-North = 3D cylindrical projection of OBI image looking from the North.

3D-East = 3D cylindrical projection of OBI image looking from the East.

Tadpole = tadpole plot of the image feature picks (fractures and bedding planes); plotted from 0 to 90 dip - see legend above. DIPT = True orientation; features corrected for hole deviation

Magn. Field = Total magnetic field strength as measured by fluxgate magnetometer in OBI deviation sensor - plotted 0-90 uT. (green line)

Azimuth	= direction of tool tilt plotted 0 to 360 deg; represents borehole deviation direction (red line)
Tilt	= tool tilt (vertical = 0 and horizontal = 90) plotted 0 to 8 deg ; represents borehole deviation tilt from vertical. (blue line)
CA	= Closure angle.= horizontal angle from hole to vertical projected collar location; plotted from 0 to 360 deg (dashed green line)
CD	= Closure Distance.= distance in feet in a horizontal plane from the borehole to vertical projected collar location; plotted from 0 to 8 ft. (dotted black line)

Prepared by Robert E. Crowder

Rev 9-29-2009

IMAGE FEATURE SUMMARY 2

Hole: 18 E. Yearling

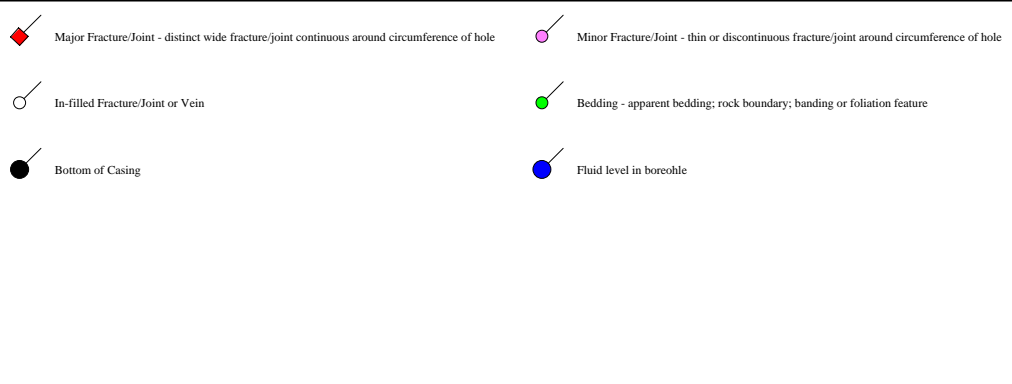
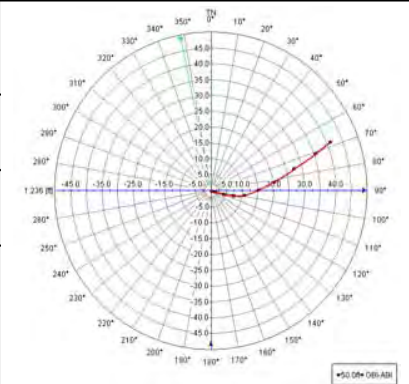
Malcolm Pirnie

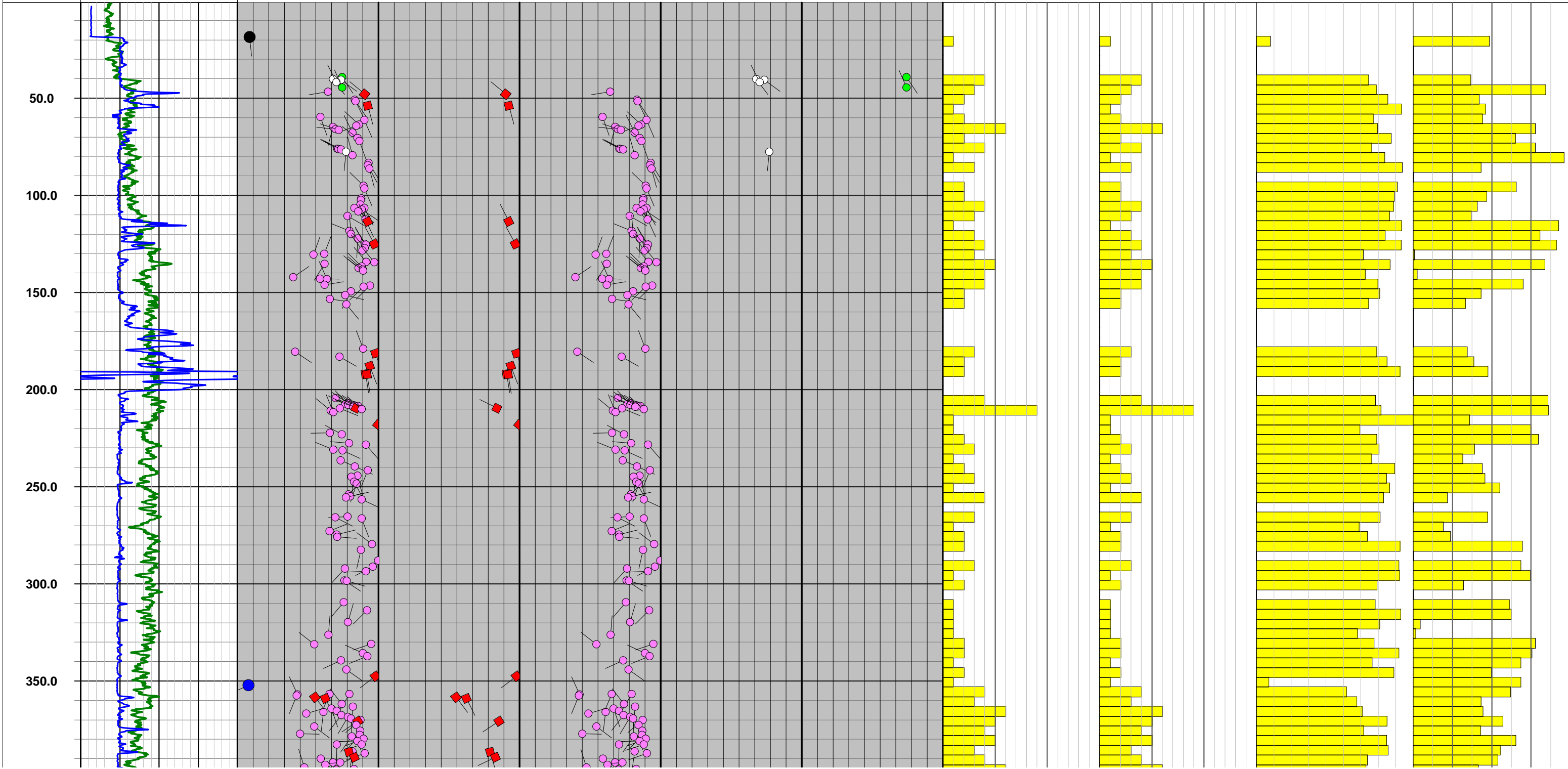
18 E. Yearling, Maricopa County, Az

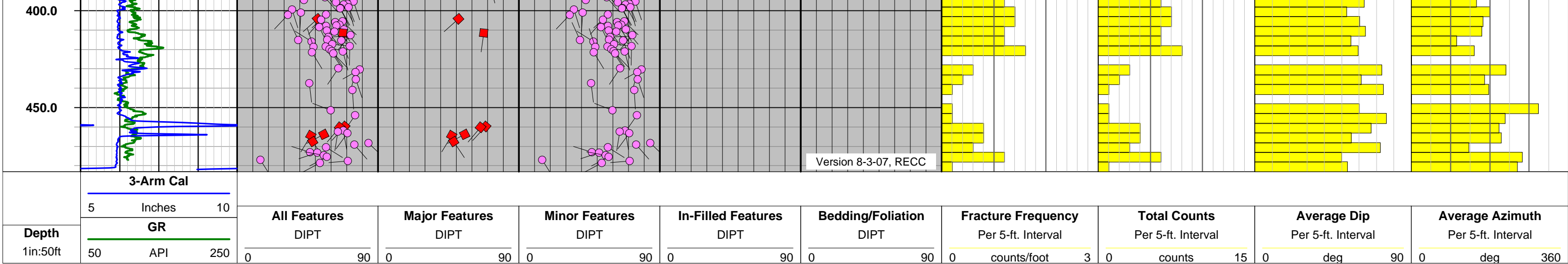
Driller: Property Owner

Drill Method: Hammer 6" hole diameter

Logged: July 27, 2007



Depth 1in:50ft	GR		All Features DIPT	Major Features DIPT	Minor Features DIPT	In-Filled Features DIPT	Bedding/Foliation DIPT	Fracture Frequency Per 5-ft. Interval	Total Counts Per 5-ft. Interval	Average Dip Per 5-ft. Interval	Average Azimuth Per 5-ft. Interval								
	50	API	250	0	90	0	90	0	counts/foot	3	0	counts	15	0	deg	90	0	deg	360
	3-Arm Cal																		
	5	Inches	10																
																			



Version 8-3-07, RECC

IMAGE FEATURE SUMMARY

Hole: 18 E. Yearling


Malcolm Pirnie

18 E. Yearling, Maricopa County, Az

Driller: Property Owner

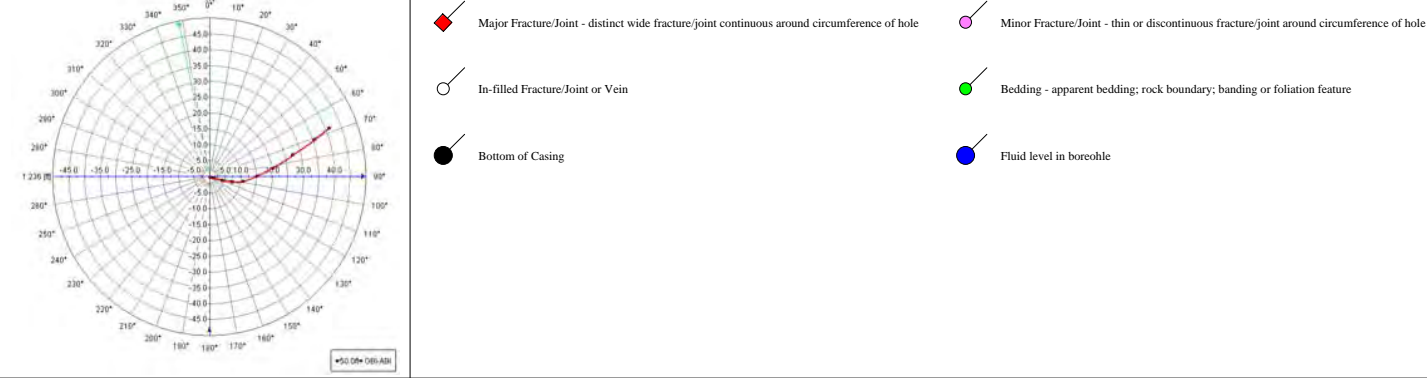
Drill Method: Hammer 6" hole diameter

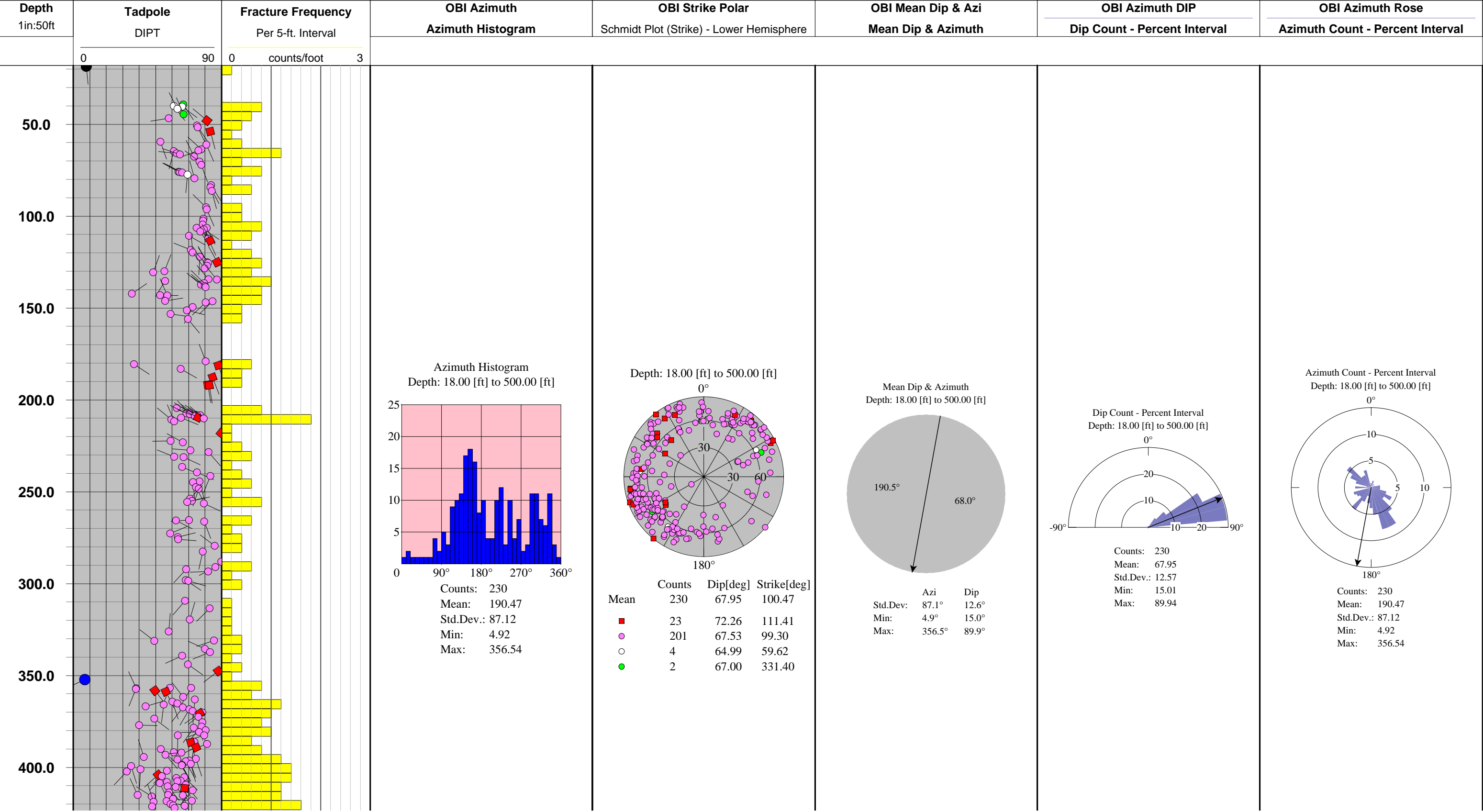
Logged: July 27, 2007











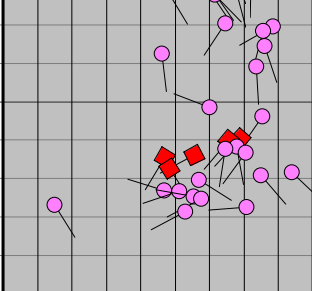
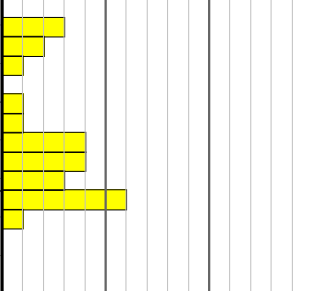








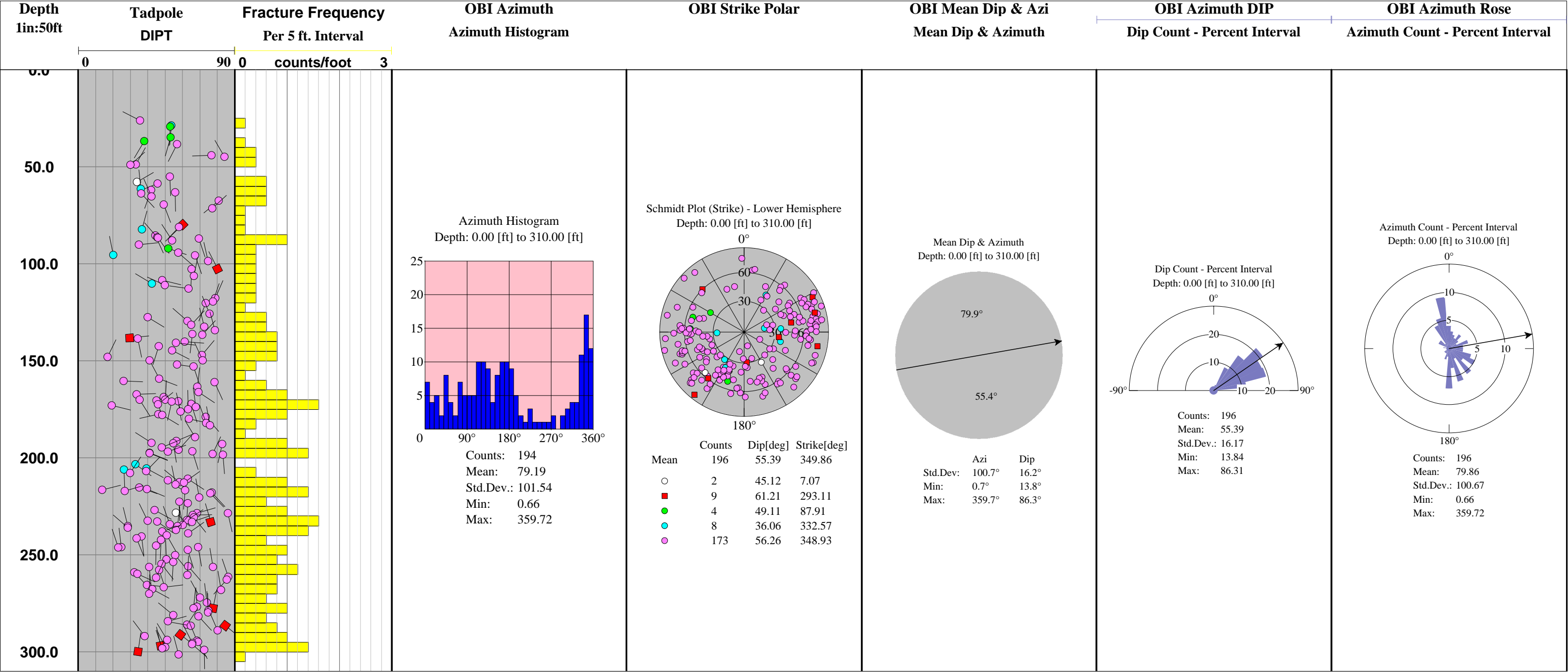
450.0								
500.0			Version 8-3-07, RECC					
	Tadpole	Fracture Frequency						
Depth	DIPT	Per 5-ft. Interval	OBI Azimuth	OBI Strike Polar	OBI Mean Dip & Azi	OBI Azimuth DIP	OBI Azimuth Rose	
1in:50ft	0 90	0 counts/foot 3	Azimuth Histogram	Schmidt Plot (Strike) - Lower Hemisphere	Mean Dip & Azimuth	Dip Count - Percent Interval	Azimuth Count - Percent Interval	

IMAGE FEATURE SUMMARY LOG Hole: MW-4				<div><div> In-filled fracture/joint with white or light colored material</div><div> Major fracture - distinct wide fracture/joint continuous around circumference of hole</div><div> Bedding - apparent bedding; rock boundary; banding or foliation feature</div><div> Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature</div><div> Minor fracture - thin or discontinuous fracture/joint around circumference of hole</div></div>
Malcolm Pirnie		UPCO Project, Maricopa County, Az		
Driller: Boart Longyear	Drill Method: NX Core - 3.87" hole diameter		Logged: August 06, 2004	
				



<h1>IMAGE FEATURE ANALYSIS LOG Hole: MW-4</h1>			
Malcolm Pirnie		UPCO Project, Maricopa County, Az	
Driller: Boart Longyear	Drill Method: NX Core - 3.87" hole diameter	Logged: August 06, 2004	

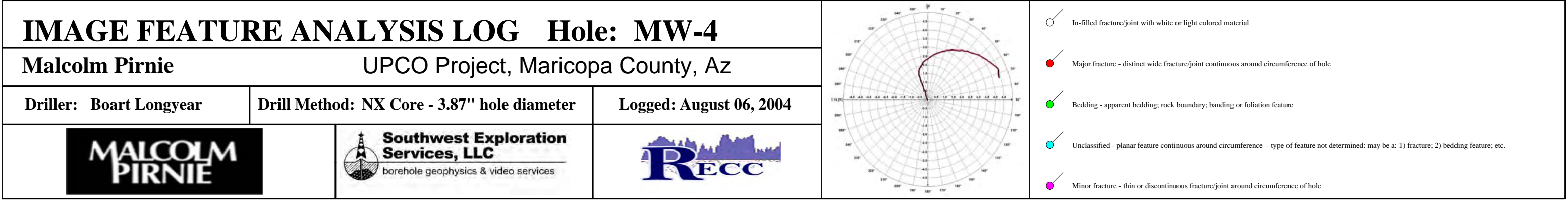
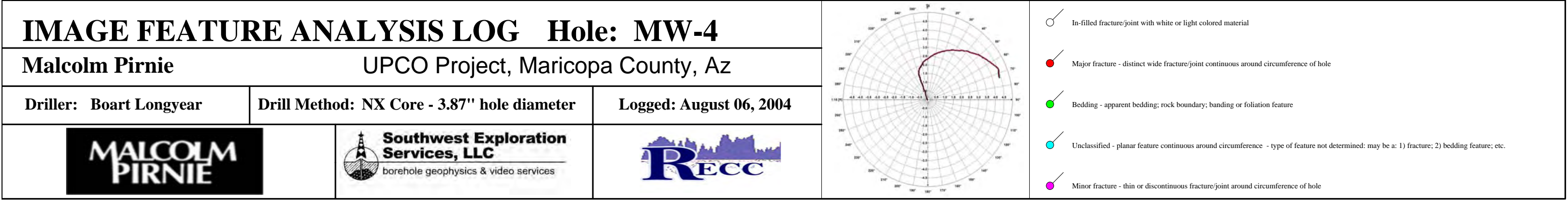
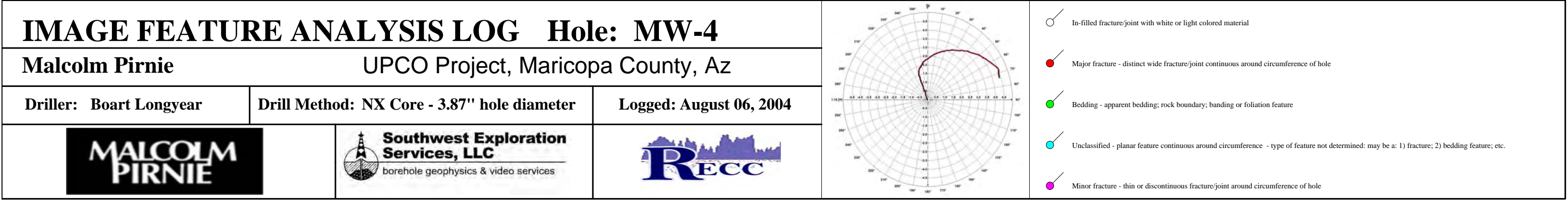
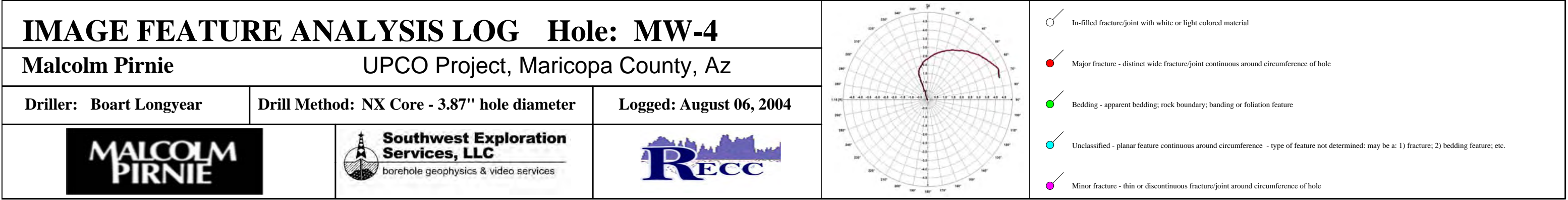
<h1>IMAGE FEATURE ANALYSIS LOG Hole: MW-4</h1>			
Malcolm Pirnie		UPCO Project, Maricopa County, Az	
Driller: Boart Longyear	Drill Method: NX Core - 3.87" hole diameter	Logged: August 06, 2004	




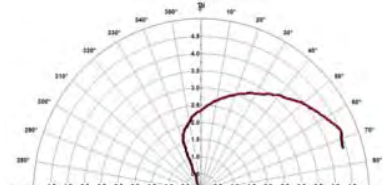





IMAGE FEATURE ANALYSIS LOG Hole: MW-4					
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear		Drill Method: NX Core - 3.87" hole diameter		Logged: August 06, 2004	
				<ul style="list-style-type: none"> In-filled fracture/joint with white or light colored material Major fracture - distinct wide fracture/joint continuous around circumference of hole Bedding - apparent bedding; rock boundary; banding or foliation feature Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc. Minor fracture - thin or discontinuous fracture/joint around circumference of hole 	

IMAGE FEATURE ANALYSIS LOG Hole: MW-4					
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear		Drill Method: NX Core - 3.87" hole diameter		Logged: August 06, 2004	
				<ul style="list-style-type: none"> In-filled fracture/joint with white or light colored material Major fracture - distinct wide fracture/joint continuous around circumference of hole Bedding - apparent bedding; rock boundary; banding or foliation feature Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc. Minor fracture - thin or discontinuous fracture/joint around circumference of hole 	

IMAGE FEATURE ANALYSIS LOG Hole: MW-4					
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear		Drill Method: NX Core - 3.87" hole diameter		Logged: August 06, 2004	
				<ul style="list-style-type: none"> In-filled fracture/joint with white or light colored material Major fracture - distinct wide fracture/joint continuous around circumference of hole Bedding - apparent bedding; rock boundary; banding or foliation feature Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc. Minor fracture - thin or discontinuous fracture/joint around circumference of hole 	

IMAGE FEATURE ANALYSIS LOG Hole: MW-4					
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear		Drill Method: NX Core - 3.87" hole diameter		Logged: August 06, 2004	
				<ul style="list-style-type: none"> In-filled fracture/joint with white or light colored material Major fracture - distinct wide fracture/joint continuous around circumference of hole Bedding - apparent bedding; rock boundary; banding or foliation feature Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc. Minor fracture - thin or discontinuous fracture/joint around circumference of hole 	



- | | | | | | | | |
|---|--|--|--|---|--|---|--|
| IMAGE FEATURE ANALYSIS LOG Hole: MW-4 | | | | | | | |
| Malcolm Pirnie | | | UPCO Project, Maricopa County, Az | | | | |
| Driller: Boart Longyear | | Drill Method: NX Core - 3.87" hole diameter | | Logged: August 06, 2004 | | | |
|  | |  | |  | | | |
| | | |  | | | <div style="display: flex; flex-direction: column;"> <div> In-filled fracture/joint with white or light colored material</div> <div> Major fracture - distinct wide fracture/joint continuous around circumference of hole</div> <div> Bedding - apparent bedding; rock boundary; banding or foliation feature</div> <div> Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.</div> <div> Minor fracture - thin or discontinuous fracture/joint around circumference of hole</div> </div> | |

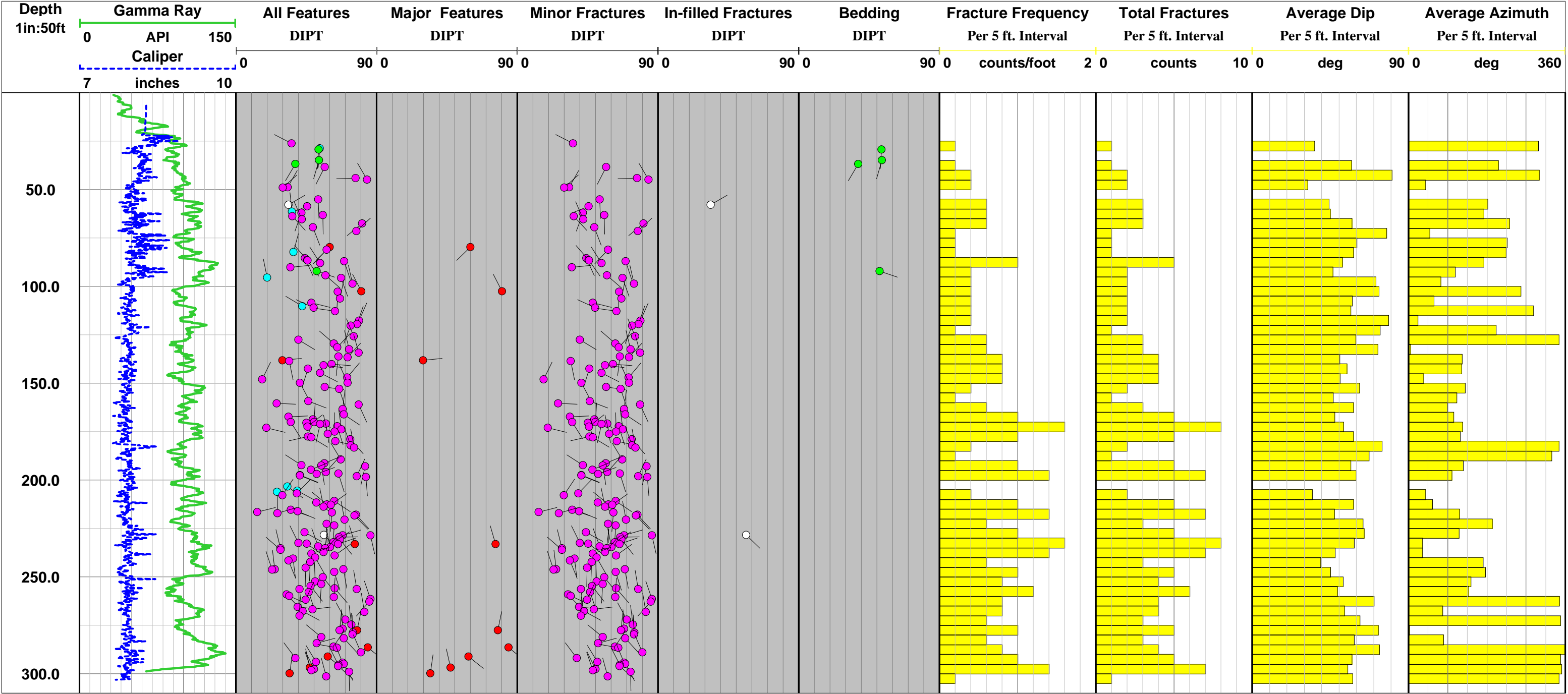





IMAGE FEATURE SUMMARY LOG Hole: MW-5				<div><div><div></div></div><div>In-filled fracture/joint with white or light colored material</div></div> <div><div><div></div></div><div>Major fracture - distinct wide fracture/joint continuous around circumference of hole</div></div> <div><div><div></div></div><div>Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature;</div></div> <div><div><div></div></div><div>Minor fracture - thin or discontinuous fracture/joint around circumference of hole</div></div>
Malcolm Pirnie		UPCO Project, Maricopa County, Az		
Driller: Boart Longyear	Drill Method: Rotary 7-7/8" hole diameter		Logged: August 13, 2004	
				

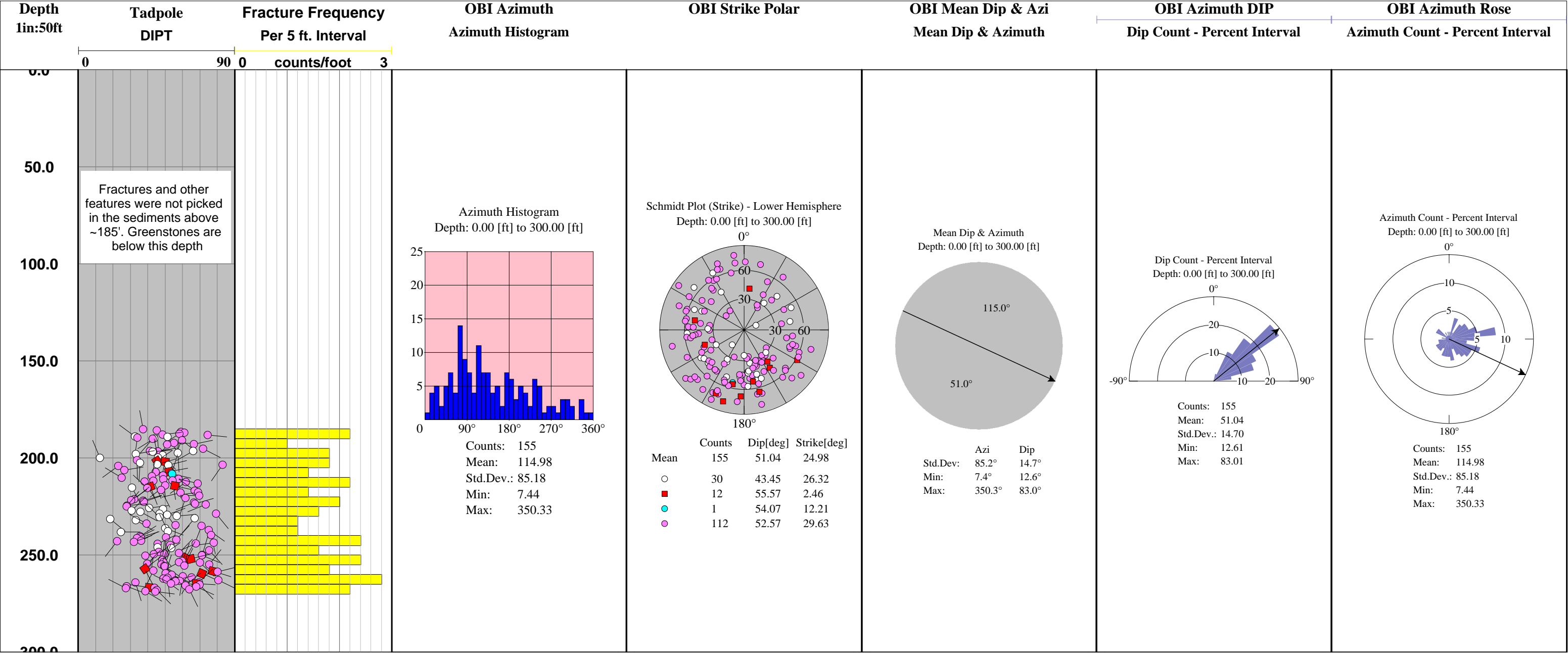



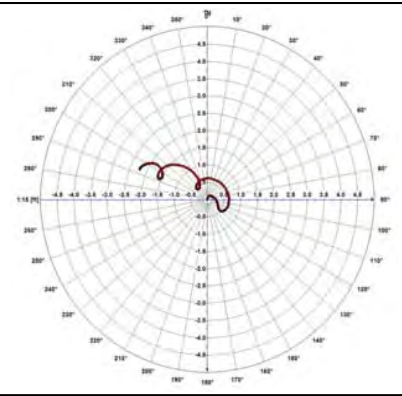





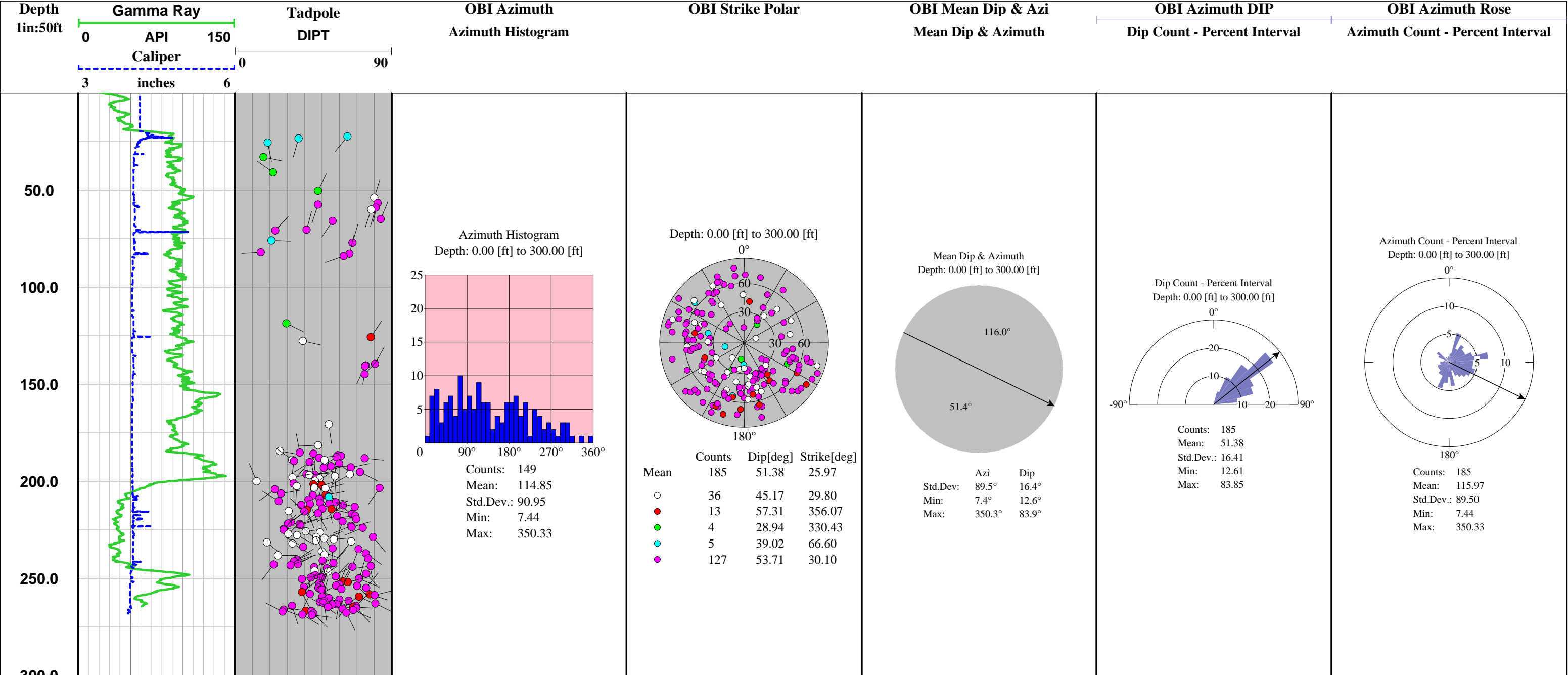


IMAGE FEATURE SUMMARY LOG Hole: MW-5			
Malcolm Pirnie		UPCO Project, Maricopa County, Az	
Driller: Boart Longyear	Drill Method: Rotary 7-7/8" hole diameter		Logged: August 13, 2004
		 borehole geophysics & video services	

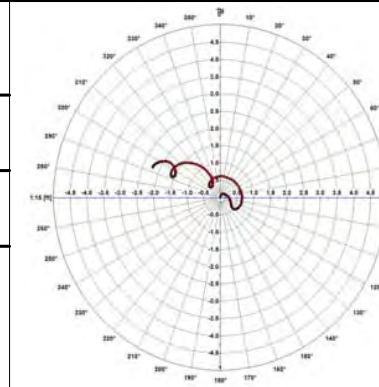







-  In-filled fracture/joint with white or light colored material
-  Major fracture - distinct wide fracture/joint continuous around circumference of hole
-  Bedding - apparent bedding; rock boundary; banding or foliation feature
-  Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.
-  Minor fracture - thin or discontinuous fracture/joint around circumference of hole



UPCO Project, Maricopa County, Az

Logged: August 13, 2004



-  In-filled fracture/joint with white or light colored material
-  Major fracture - distinct wide fracture/joint continuous around circumference of hole
-  Bedding - apparent bedding; rock boundary; banding or foliation feature
-  Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.
-  Minor fracture - thin or discontinuous fracture/joint around circumference of hole

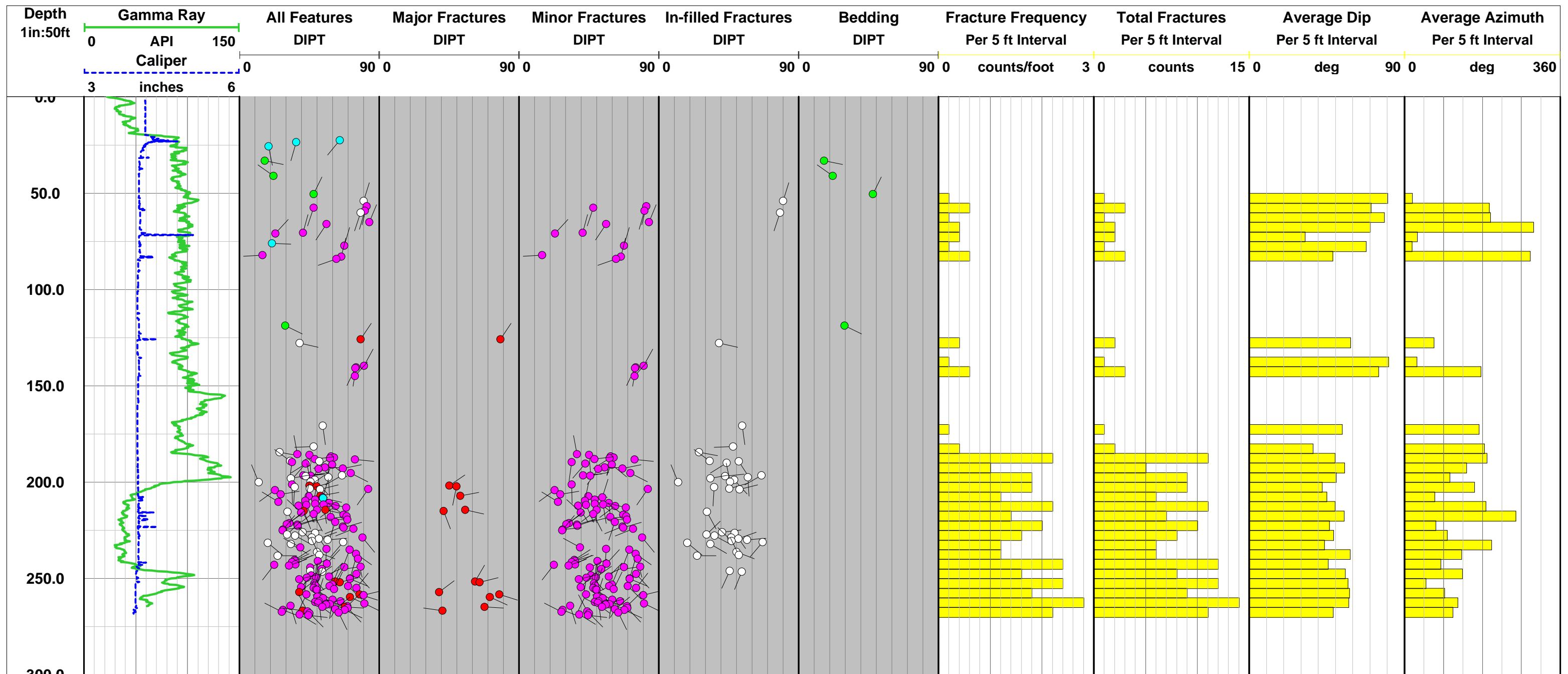


IMAGE FEATURE SUMMARY LOG Hole: MW-8				<div><div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div><div>In-filled fracture/joint with white or light colored material</div><div>Major fracture - distinct wide fracture/joint continuous around circumference of hole</div><div>Fluid level in boreohle</div><div>Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature</div><div>Minor fracture - thin or discontinuous fracture/joint around circumference of hole</div></div>
Malcolm Pirnie		UPCO Project, Maricopa County, Az		
Driller: Boart Longyear	Drill Method: Rotary 7 7/8" hole diameter		Logged: September 13, 2004	
<div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div> <div>MALCOLM PIRNIE</div>	<div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div> <div>Southwest Exploration Services, LLC</div> <div>borehole geophysics & video services</div>	<div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div> <div>RECC</div>		

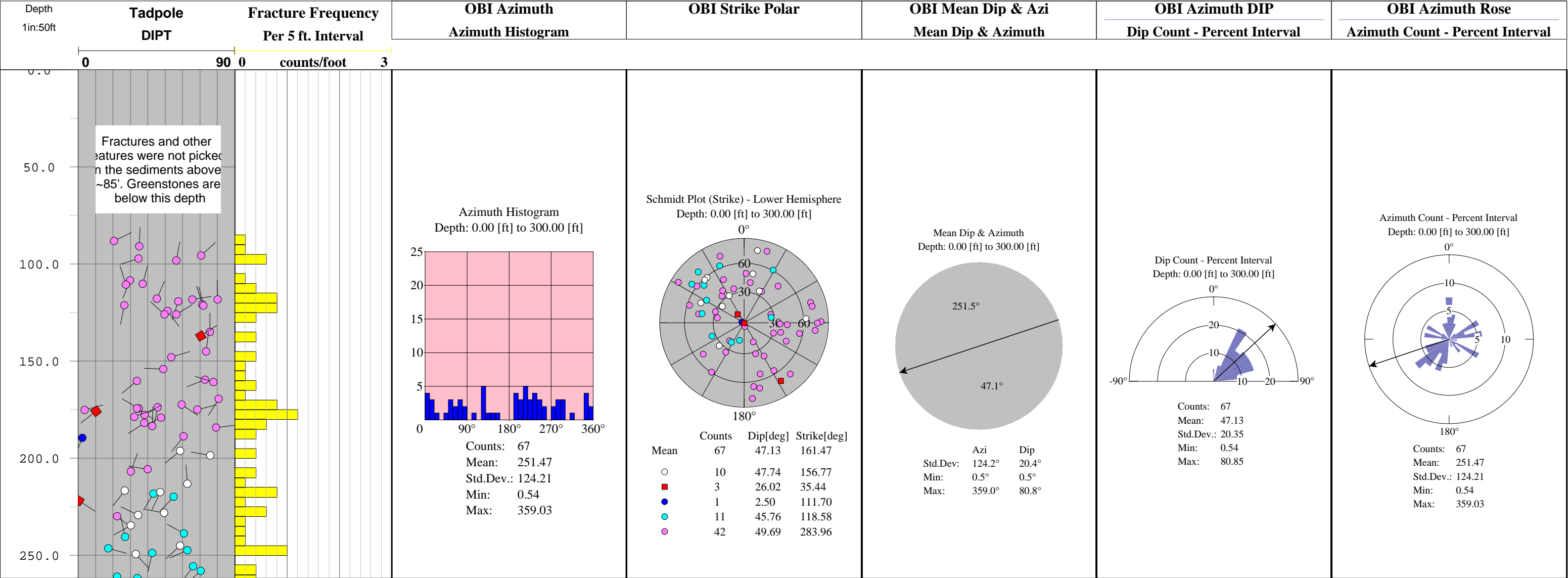
Schmidt Plot (Strike) - Lower Hemisphere
Depth: 0.00 [ft] to 300.00 [ft]Counts Dip[deg] Strike[deg]
Mean 67 47.13 161.47
○ 10 47.74 156.77
■ 3 26.02 35.44
● 1 2.50 111.70
● 11 45.76 118.58
● 42 49.69 283.96Mean Dip & Azimuth
Depth: 0.00 [ft] to 300.00 [ft]Azi Dip
Std.Dev: 124.2° 20.4°
Min: 0.5° 0.5°
Max: 359.0° 80.8°Dip Count - Percent Interval
Depth: 0.00 [ft] to 300.00 [ft]Counts: 67
Mean: 47.13
Std.Dev.: 20.35
Min: 0.54
Max: 80.85Azimuth Count - Percent Interval
Depth: 0.00 [ft] to 300.00 [ft]Counts: 67
Mean: 251.47
Std.Dev.: 124.21
Min: 0.54
Max: 359.03

IMAGE FEATURE ANALYSIS LOG

Hole: MW-8


Malcolm Pirnie


UPCO Project, Maricopa County, Az


Driller: Boart Longyear

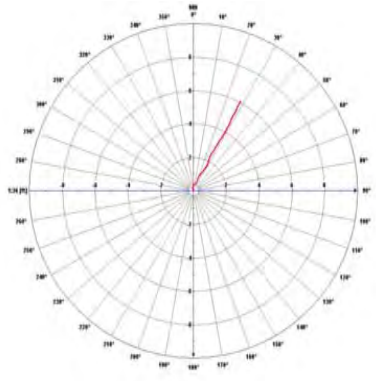
Drill Method: Rotary 7 7/8" hole diameter


Logged: September 13, 2004













 In-filled fracture/joint with white or light colored material

 Major fracture - distinct wide fracture/joint continuous around circumference of hole

 Fluid level in boreohle

 Unclassified - planar feature continuous around circumference - type of feature not determined:

 Minor fracture - thin or discontinuous fracture/joint around circumference of hole

Depth
1in:50ft

Caliper
7 inches 10

Nat. Gamma Ray
0 API 150

All Features
DIPT

Major Fractures
DIPT

Minor Fractures
DIPT

In-filled Fractures
DIPT

Unclassified
DIPT

Fracture Frequency
Per 5 ft. Interval

Total Fractures
Per 5 ft Interval

Average Dip
Per 5 ft Interval

Average Azimuth
Per 5 ft Interval

50.0

100.0

150.0

200.0

250.0

Note the borehole was broken and enlarged below ~213' & many unclassified features

IMAGE FEATURE SUMMARY LOG Hole: MW-9

Malcolm Pirnie

UPCO Project, Maricopa County, Az

Driller: Boart Longyear

Drill Method: NX Core - 3.87" hole diameter

Logged: January 25, 2005



○ In-filled fracture/joint with white or light colored material

Major fracture - distinct wide fracture/joint continuous around circumference of hole

- Bedding - apparent bedding; rock boundary; banding or foliation feature

- Fluid level in borehole

- Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature

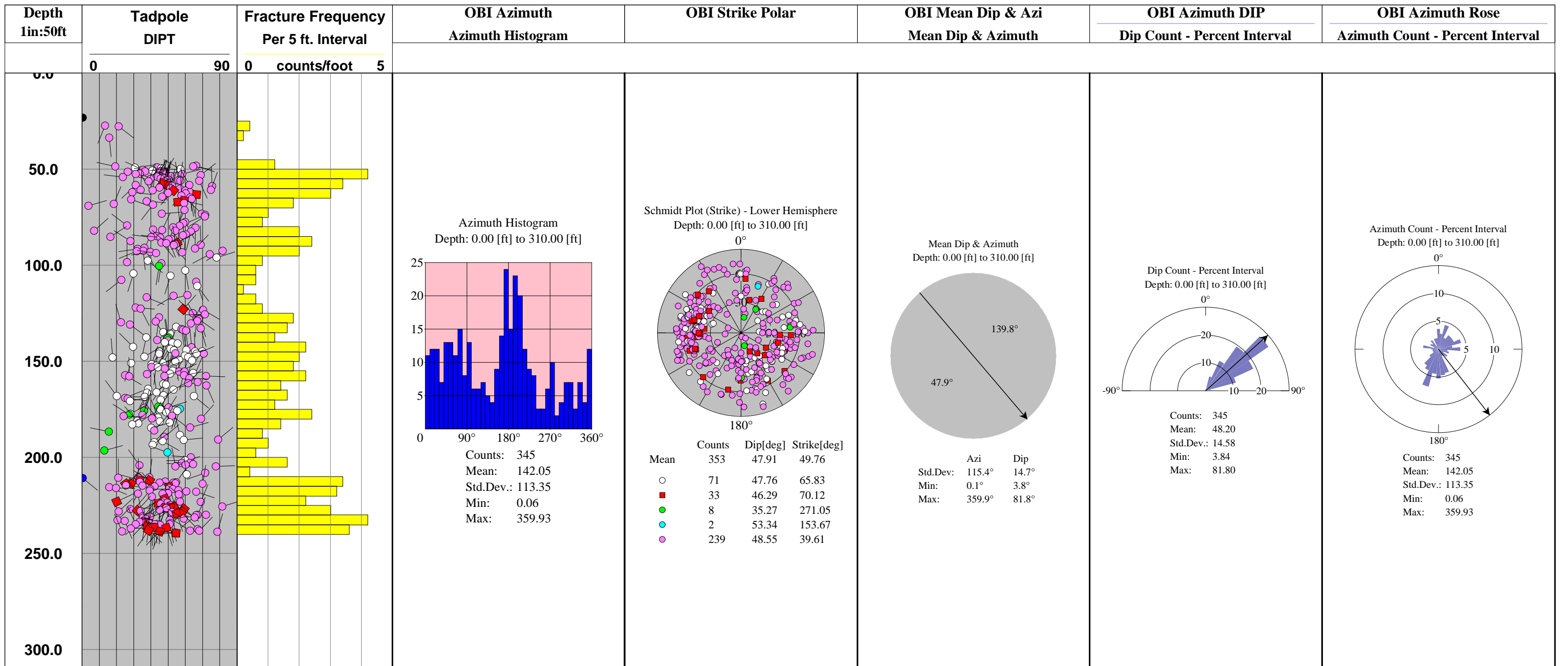


IMAGE FEATURE ANALYSIS LOG Hole: MW-9					
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear	Drill Method: NX Core - 3.87" hole diameter		Logged: January 25, 2005		
		 borehole geophysics & video services			
			<ul style="list-style-type: none"> In-filled fracture/joint with white or light colored material Major fracture - distinct wide fracture/joint continuous around circumference of hole Bedding - apparent bedding; rock boundary; banding or foliation feature Fluid level in borehole Unclassified - planar feature continuous around circumference - type of feature not determined; may be a: 1) fracture; 2) bedding feature; etc. 		

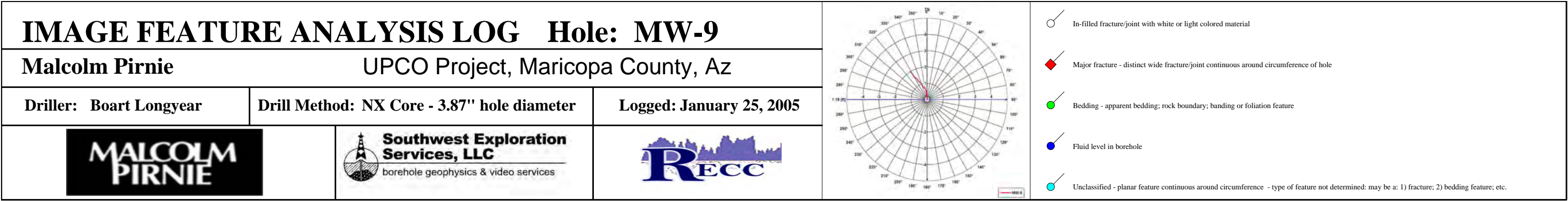
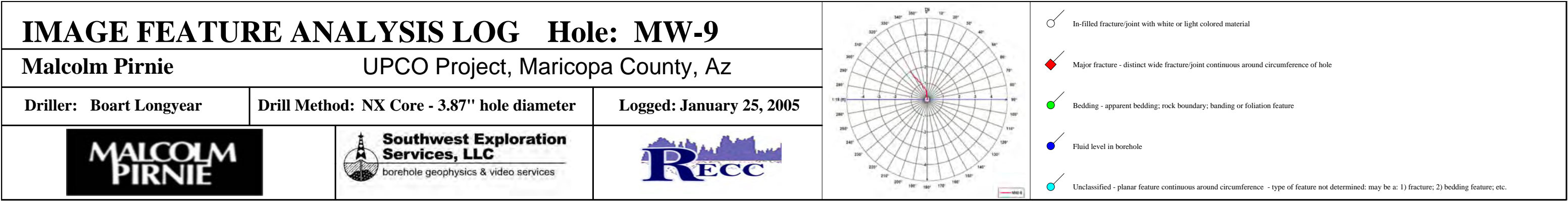
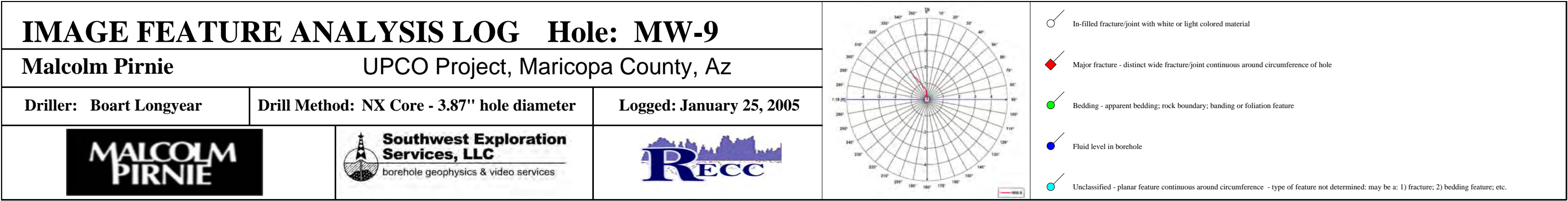
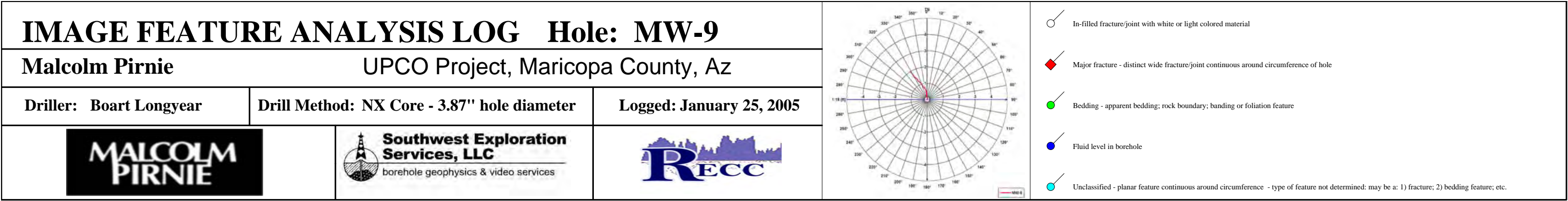
IMAGE FEATURE ANALYSIS LOG Hole: MW-9					
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear	Drill Method: NX Core - 3.87" hole diameter		Logged: January 25, 2005		
		 Southwest Exploration Services, LLC borehole geophysics & video services			
			<p>○ In-filled fracture/joint with white or light colored material</p> <p>◆ Major fracture - distinct wide fracture/joint continuous around circumference of hole</p> <p>● Bedding - apparent bedding; rock boundary; banding or foliation feature</p> <p>● Fluid level in borehole</p> <p>● Unclassified - planar feature continuous around circumference - type of feature not determined; may be a: 1) fracture; 2) bedding feature; etc.</p>		

IMAGE FEATURE ANALYSIS LOG Hole: MW-9					
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear	Drill Method: NX Core - 3.87" hole diameter		Logged: January 25, 2005		
		 borehole geophysics & video services			

IMAGE FEATURE ANALYSIS LOG Hole: MW-9					
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear	Drill Method: NX Core - 3.87" hole diameter		Logged: January 25, 2005		
		 borehole geophysics & video services			
			<p>○ In-filled fracture/joint with white or light colored material</p> <p>◆ Major fracture - distinct wide fracture/joint continuous around circumference of hole</p> <p>● Bedding - apparent bedding; rock boundary; banding or foliation feature</p> <p>● Fluid level in borehole</p> <p>● Unclassified - planar feature continuous around circumference - type of feature not determined; may be a: 1) fracture; 2) bedding feature; etc.</p>		

IMAGE FEATURE ANALYSIS LOG Hole: MW-9					
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear	Drill Method: NX Core - 3.87" hole diameter		Logged: January 25, 2005		
		 Southwest Exploration Services, LLC borehole geophysics & video services			
			<div style="display: flex; justify-content: space-between;"> <div> <p> In-filled fracture/joint with white or light colored material</p> <p> Major fracture - distinct wide fracture/joint continuous around circumference of hole</p> <p> Bedding - apparent bedding; rock boundary; banding or foliation feature</p> <p> Fluid level in borehole</p> <p> Unclassified - planar feature continuous around circumference - type of feature not determined; may be a: 1) fracture; 2) bedding feature; etc.</p> </div> <div> <p>Scale: 0 to 4000 g</p> </div> </div>		

IMAGE FEATURE ANALYSIS LOG Hole: MW-9					
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear	Drill Method: NX Core - 3.87" hole diameter		Logged: January 25, 2005		
		 borehole geophysics & video services			
			<div style="display: flex; justify-content: space-between;"> <div> <p> In-filled fracture/joint with white or light colored material</p> <p> Major fracture - distinct wide fracture/joint continuous around circumference of hole</p> <p> Bedding - apparent bedding; rock boundary; banding or foliation feature</p> <p> Fluid level in borehole</p> <p> Unclassified - planar feature continuous around circumference - type of feature not determined; may be a: 1) fracture; 2) bedding feature; etc.</p> </div> <div> <p>Scale: 0 to 4000 g</p> </div> </div>		



- | | | | | | |
|---|--|---|--|--|--|
| IMAGE FEATURE ANALYSIS LOG Hole: MW-9 | | | | | |
| Malcolm Pirnie | | | UPCO Project, Maricopa County, Az | | |
| Driller: Boart Longyear | Drill Method: NX Core - 3.87" hole diameter | | Logged: January 25, 2005 | | |
| | |
Southwest Exploration
Services, LLC
borehole geophysics & video services | | | |
| | | | | | |
| | | | | | |
| | | | <p>○ In-filled fracture/joint with white or light colored material</p> <p>◆ Major fracture - distinct wide fracture/joint continuous around circumference of hole</p> <p>● Bedding - apparent bedding; rock boundary; banding or foliation feature</p> <p>● Fluid level in borehole</p> <p>● Unclassified - planar feature continuous around circumference - type of feature not determined; may be a: 1) fracture; 2) bedding feature; etc.</p> | | |

Depth 1in:50ft	Caliper	All Features	Major Fractures	Minor Fractures	In-filled Fractures	Bedding/Foliation	Fracture Frequency	Total Counts	Average Dip	Average Azimuth
	2 inches 7	DIPT	DIPT	DIPT	DIPT	DIPT	Per 5 ft. Interval	Per 5 ft. Interval	Per 5 ft. Interval	Per 5 ft. Interval
	Gamma Ray 0 API 150	0 90	0 90	0 90	0 90	0 90	0 counts/foot 5	0 counts 25	0 deg 90	0 deg 360
50.0										
100.0										
150.0										
200.0										
250.0										
300.0										

IMAGE FEATURE ANALYSIS LOG

Hole: MW-11


Malcolm Pirnie


UPCO Project, Maricopa County, Az


Driller: Boart Longyear

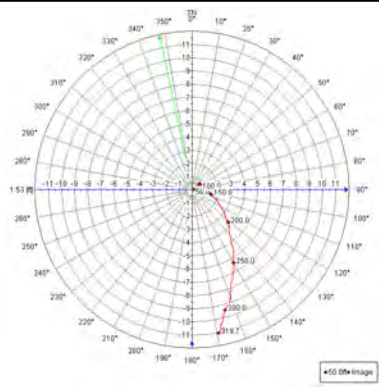
Drill Method: Rotary 8" hole diameter


Logged: December 11, 2005













 In-filled fracture/joint with white or light colored material

 Major fracture - distinct wide fracture/joint continuous around circumference of hole

 Bedding - apparent bedding; rock boundary; banding or foliation feature

 Fluid level in borehole

 Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.

Depth 1in:50ft	Nat. Gamma Ray			All Features DIPT		Major Fractures DIPT		Minor Fractures DIPT		In-filled Fractures DIPT		Bedding DIPT		Fracture Frequency Per 5 ft. Interval			Total Counts Per 5 ft Interval			Average Dip Per 5 ft Interval			Average Azimuth Per 5 ft Interval		
	0	API	150	0 90		0 90		0 90		0 90		0 90		0 counts/foot 3			0 counts 15			0 deg 90			0 deg 360		
	Caliper																								
	6	inches	12																						
<div>50.0</div> <div>100.0</div> <div>150.0</div> <div>200.0</div> <div>250.0</div> <div>300.0</div>																									
	<div>Version 2-07-06, RECC</div>																								

IMAGE FEATURE SUMMARY LOG

Hole: MW-12


Malcolm Pirnie


UPCO Project, Maricopa County, Az


Driller: Boart Longyear


Drill Method: Rotary 10" hole diameter


Logged: December 11, 2005













In-filled fracture/joint with white or light colored material

Major fracture - distinct wide fracture/joint continuous around circumference of hole

Bedding - apparent bedding; rock boundary; banding or foliation feature

Fluid level in borehole

Minor fracture - thin or discontinuous fracture/joint around circumference of hole

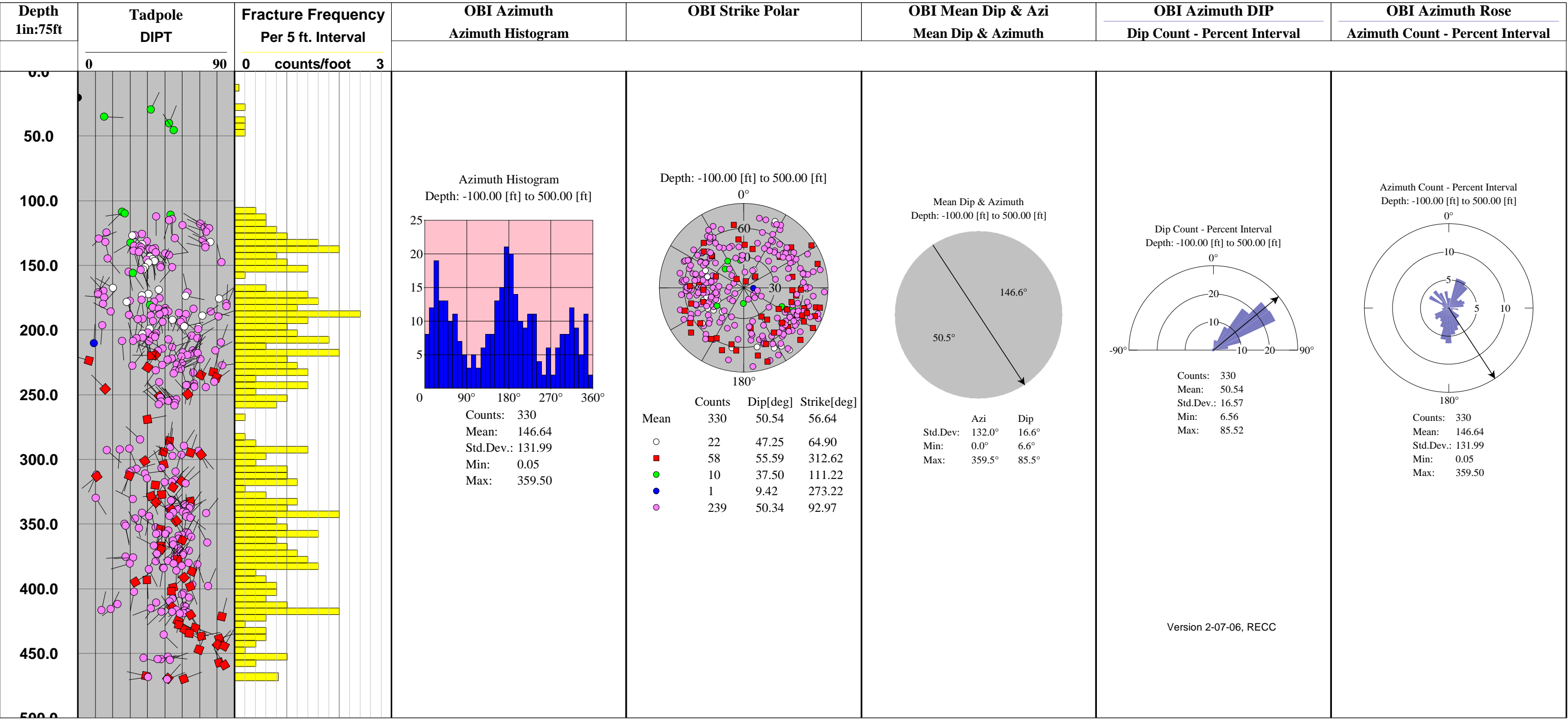
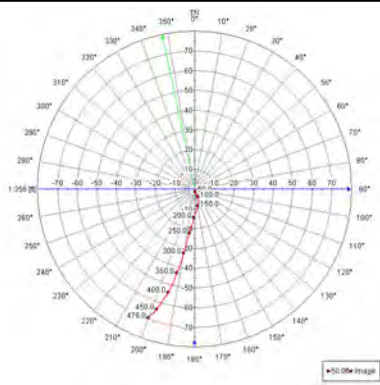


IMAGE FEATURE ANALYSIS LOG Hole: MW-12

Malcolm PirnieUPCO Project, Maricopa County, Az

Driller: Boart LongyearDrill Method: Rotary 10" hole diameterLogged: December 11, 2005



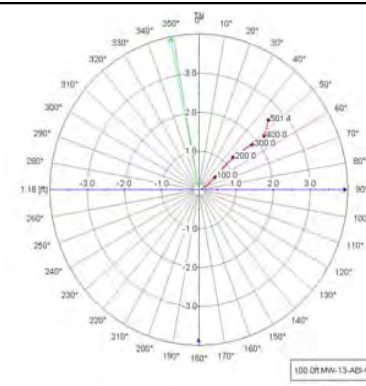
- In-filled fracture/joint with white or light colored material
- Major fracture - distinct wide fracture/joint continuous around circumference of hole
- Bedding - apparent bedding; rock boundary; banding or foliation feature
- Fluid level in borehole
- Minor fracture - thin or discontinuous fracture/joint around circumference of hole







Depth 1in:85ft	Gamma Ray		All Features	Major Fractures	Minor Fractures	In-filled Fractures	Bedding	Fracture Frequency	Total Fractures	Average Dip	Average Azimuth										
	0	API	DIPT	DIPT	DIPT	DIPT	DIPT	Per 5 ft. Interval	Per 5 ft. Interval	Per 5 ft. Interval	Per 5 ft. Interval										
	Caliper		0	90	0	90	0	90	0	counts/foot	3	0	counts	15	0	deg	90	0	deg	360	
	7	inches	13																		
50.0																					
100.0																					
150.0																					
200.0																					
250.0																					
300.0																					
350.0																					
400.0																					
450.0																					
500.0																					
Version 2-07-06, RECC																					

Hole: MW-13

Phoenix, Maricopa County, Az

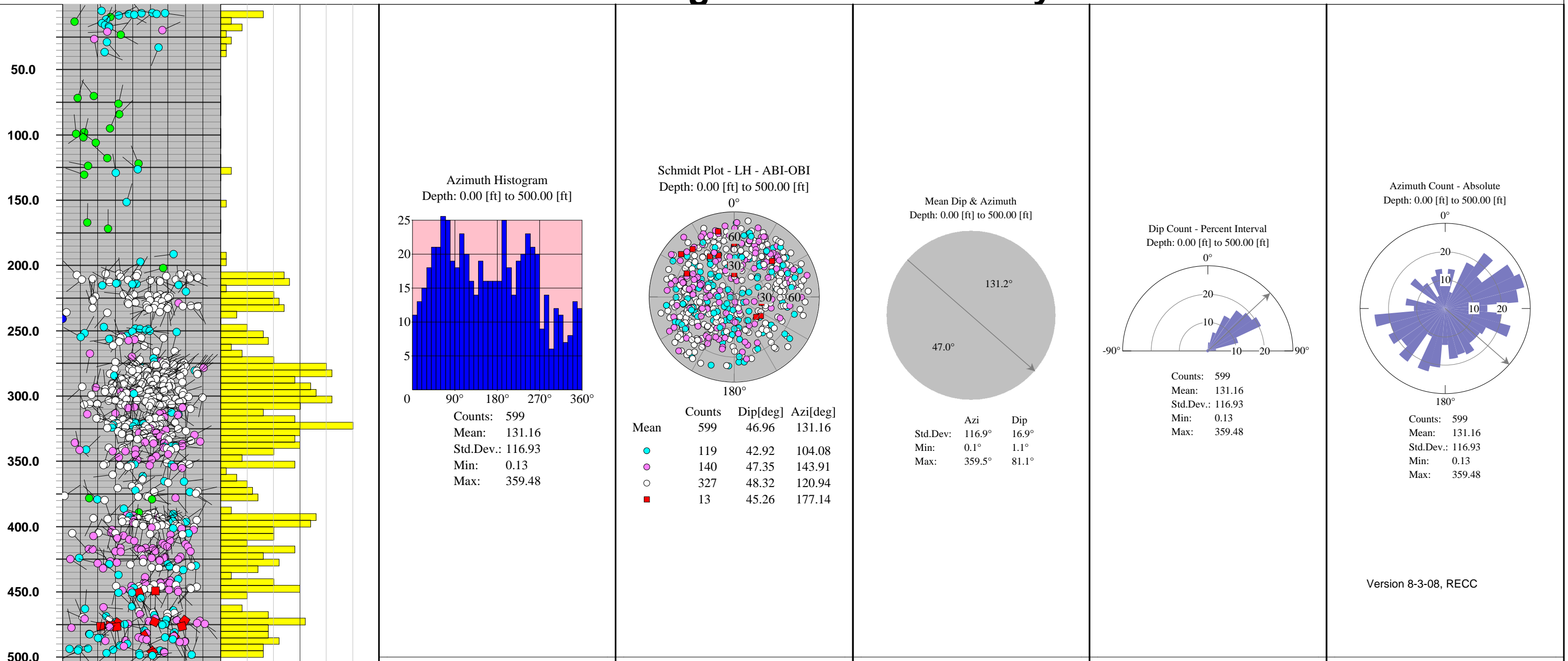
Logged: June 13, 2008



-  In-filled Fracture/joint or vein
-  Major fracture - distinct wide fracture/joint continuous around circumference of hole
-  Bedding - apparent bedding; rock boundary; banding or foliation feature
-  Fluid level in borehole
-  Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.
-  Minor fracture - thin or discontinuous fracture/joint around circumference of hole

Depth 1in:75ft	Features	Fracture Freq.	Image Azimuth	Image Polar	Image Mean Dip & Azi	Image Azimuth DIP	Image Azimuth Rose
	DIPT	Per 5 ft. Interval	Azimuth Histogram	Schmidt Plot - LH - ABI-OBI	Mean Dip & Azimuth	Dip Count - Percent Interval	Azimuth Count - Absolute
	0 90	0 counts/foot 6					

MW-13 Image Feature Summary



Version 8-3-08, RECC

IMAGE FEATURE SUMMARY 2

Hole: MW-13


Malcolm Pirnie


Phoenix, Maricopa County, Az


Driller: Yellow Jacket


Drill Method: Continuous HQ Core

Logged: June 13, 2008









In-filled Fracture/joint or vein

Major fracture - distinct wide fracture/joint continuous around circumference of hole

Bedding - apparent bedding; rock boundary; banding or foliation feature

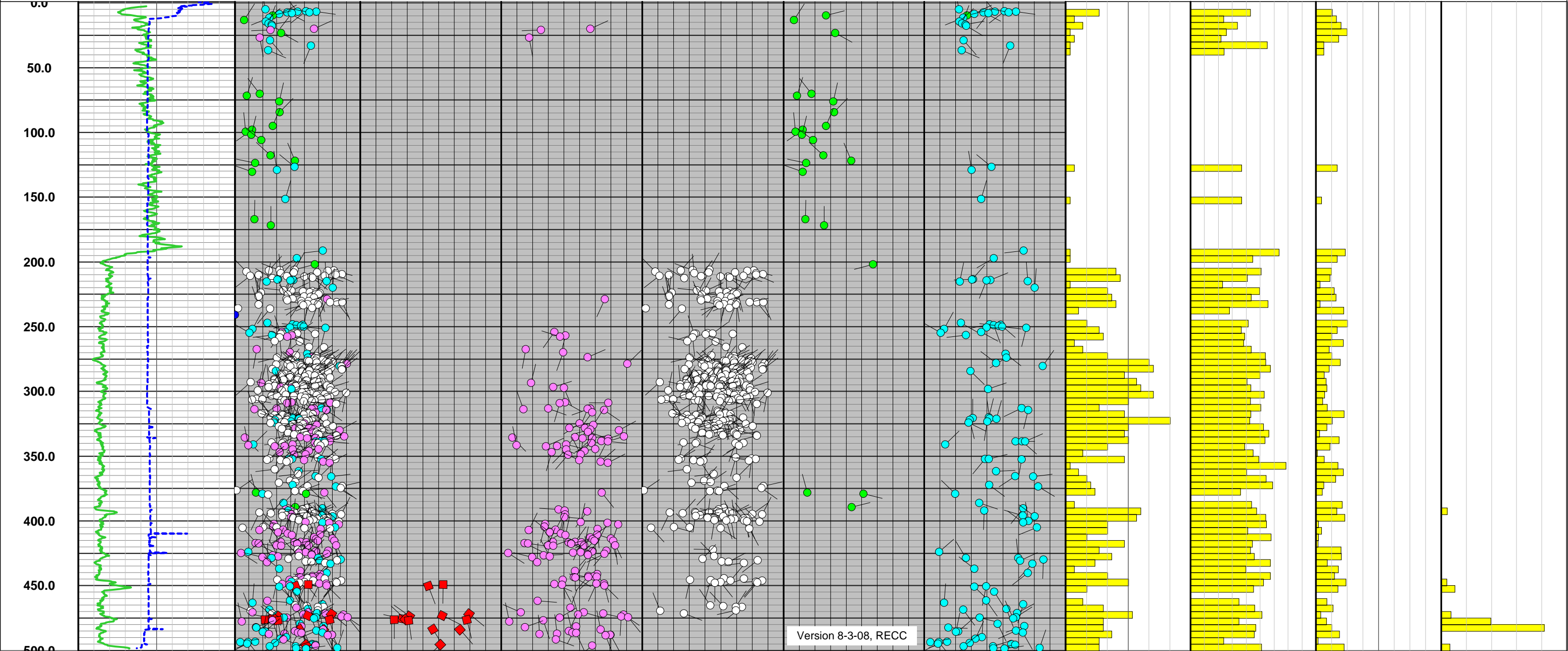
Fluid level in borehole

Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.




Minor fracture - thin or discontinuous fracture/joint around circumference of hole

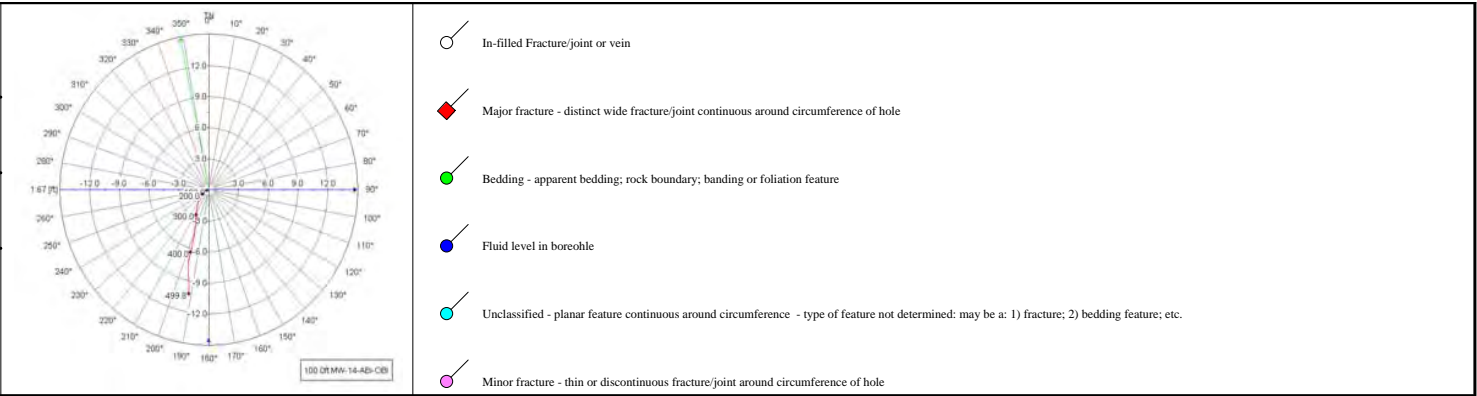
Depth 1in:75ft	GR		All Features DIPT	Major DIPT	Minor DIPT	In-Filled DIPT	Bedding/Band DIPT	Unclassified DIPT	Total Counts		Ave Dip		Ave Azimuth		Ave Aperture	
	0	200							Per 5-ft. Interval		Per 5-ft. Interval		Per 5-ft. Interval		Per 5-ft. Interval	
	Caliper								counts	30	deg	90	deg	360	0.1 In	0.025
	2	6														

MW-13 Interval Statistics



Version 8-3-08, RECC

IMAGE FEATURE SUMMARY		Hole: MW-14	
Malcolm Pirnie		Phoenix, Maricopa County, Az	
Driller: Yellow Jacket	Drill Method: 5 1/4" Air Rotary		Logged: June 10, 2008
			



Depth 1in:75ft	Features DIPT	Fracture Freq. Per 5 ft. Interval	Image Azimuth Azimuth Histogram	Image Polar Schmidt Plot - LH - ABI-OBI	Image Mean Dip & Azi Mean Dip & Azimuth	Image Azimuth DIP Dip Count - Percent Interval	Image Azimuth Rose Azimuth Count - Absolute
	090	06					

MW-14 Image Feature Summary

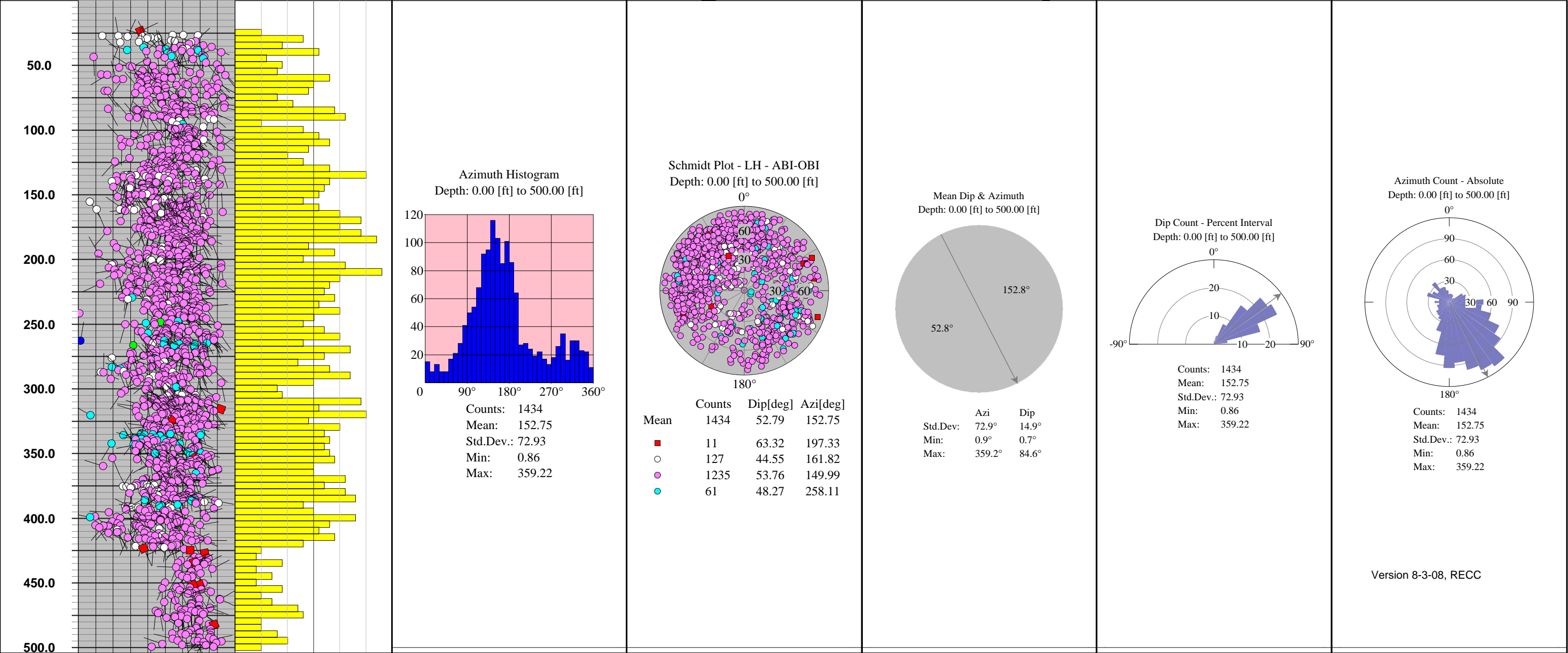


IMAGE FEATURE SUMMARY 2

Hole: MW-14

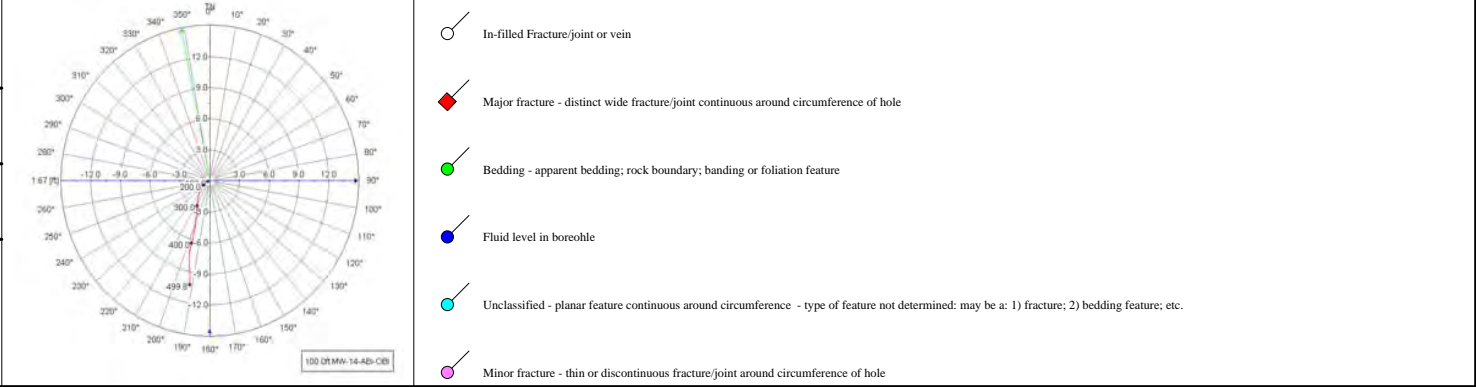
Malcolm Pirnie

Phoenix, Maricopa County, Az

Driller: Yellow Jacket

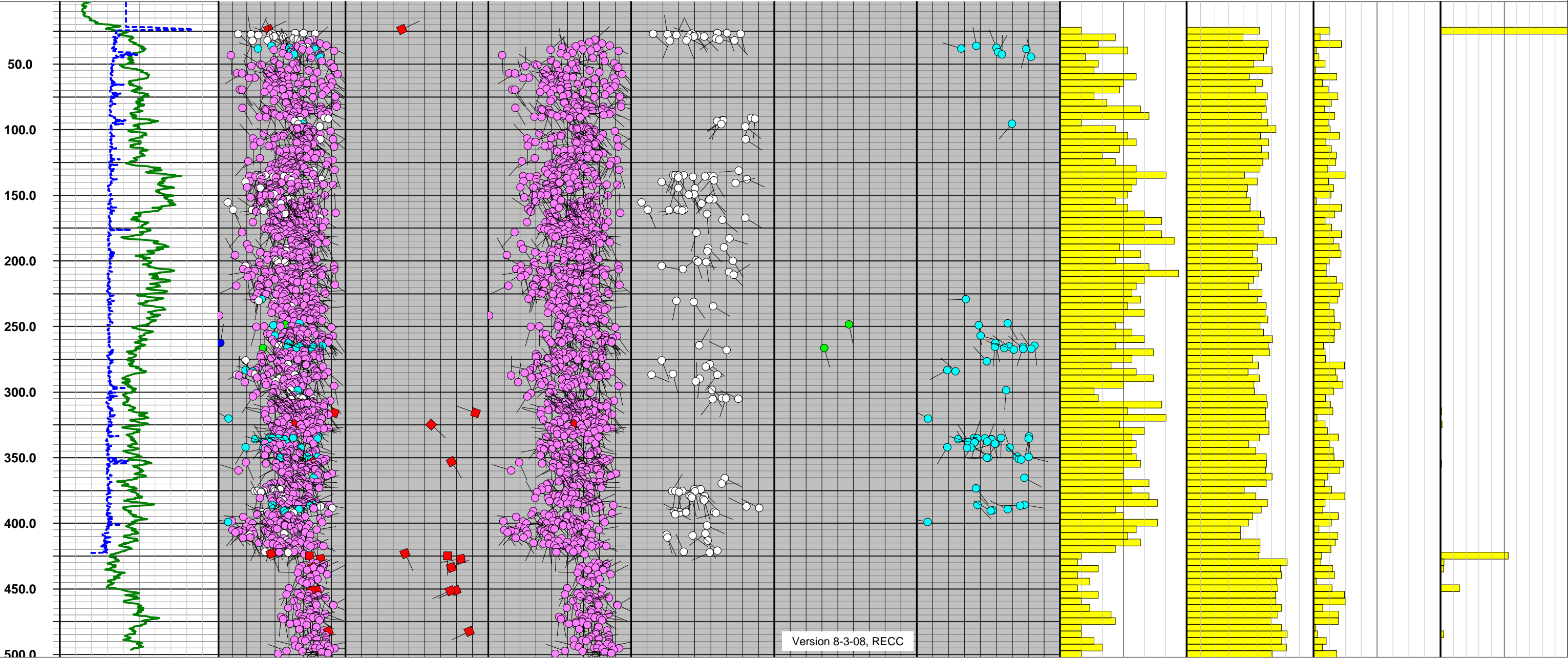
Drill Method: 5 1/4" Air Rotary

Logged: June 10, 2008



Depth 1in:75ft	GR		All Features	Major	Minor	In-Filled	Bedding/Band	Unclassified	Total Counts	Ave Dip	Ave Azimuth	Ave Aperture
			DIPT	DIPT	DIPT	DIPT	DIPT	DIPT	Per 5-ft. Int.	Per 5-ft. Int.	Per 5-ft. Int.	Per 5-ft. Int.
	0	API 200										
	Caliper		90	90	90	90	90	90	counts 30	deg 90	deg 360	mm 0.05
	2	inches 12										




MW-14 ABI-OBI
















COMPANY MALCOLM PERNNIE		WELL ID MW-16	
FIELD UPCO		COUNTY MARICOPA	
STATE ARIZONA		TYPE OF LOGS: ABI TELEVIEWER MORE: 3-ARM CALIPER	
LOCATION		OTHER SERVICES OBI NAT. GAMMA DUAL INDUCTION 3 RX SONIC	
SEC	TWP	RGE	K.B. D.F. G.L.
PERMANENT DATUM		ELEVATION	
LOG MEAS. FROM		GROUND LEVEL	
ABOVE PERM. DATUM		D.F.	
DRILLING MEAS. FROM		G.L.	
DATE	03-30-11	TYPE FLUID IN HOLE	FORMATION WATER
RUN No	1	SALINITY	N/A
TYPE LOG	ABI	DENSITY	N/A
DEPTH-DRILLER	510 FT	LEVEL	250 FT
DEPTH-LOGGER	507.5 FT	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	507.5 FT	IMAGE ORIENTED TO:	MAG NORTH
TOP LOGGED INTERVAL	250	SAMPLE INTERVAL	0.0096 FT
DRILLER / RIG#	YELLOW JACKET	LOGGING TRUCK	TRUCK # 689
RECORDED BY / Logging Eng.	K. MITCHELL/ED TURNER	TOOL STRING/SN	ALT-ABI-40 SN 917
WITNESSED BY	MALCOLM PERNNIE	LOG TIME:ON SITE/OFF SITE	08:30 AM
BOREHOLE RECORD		CASING RECORD	
NO.	BIT	FROM	TO
1	15"	20 FT	10"
2	10" HAM	20 FT	10"
3			
COMMENTS:			












Major Lithology

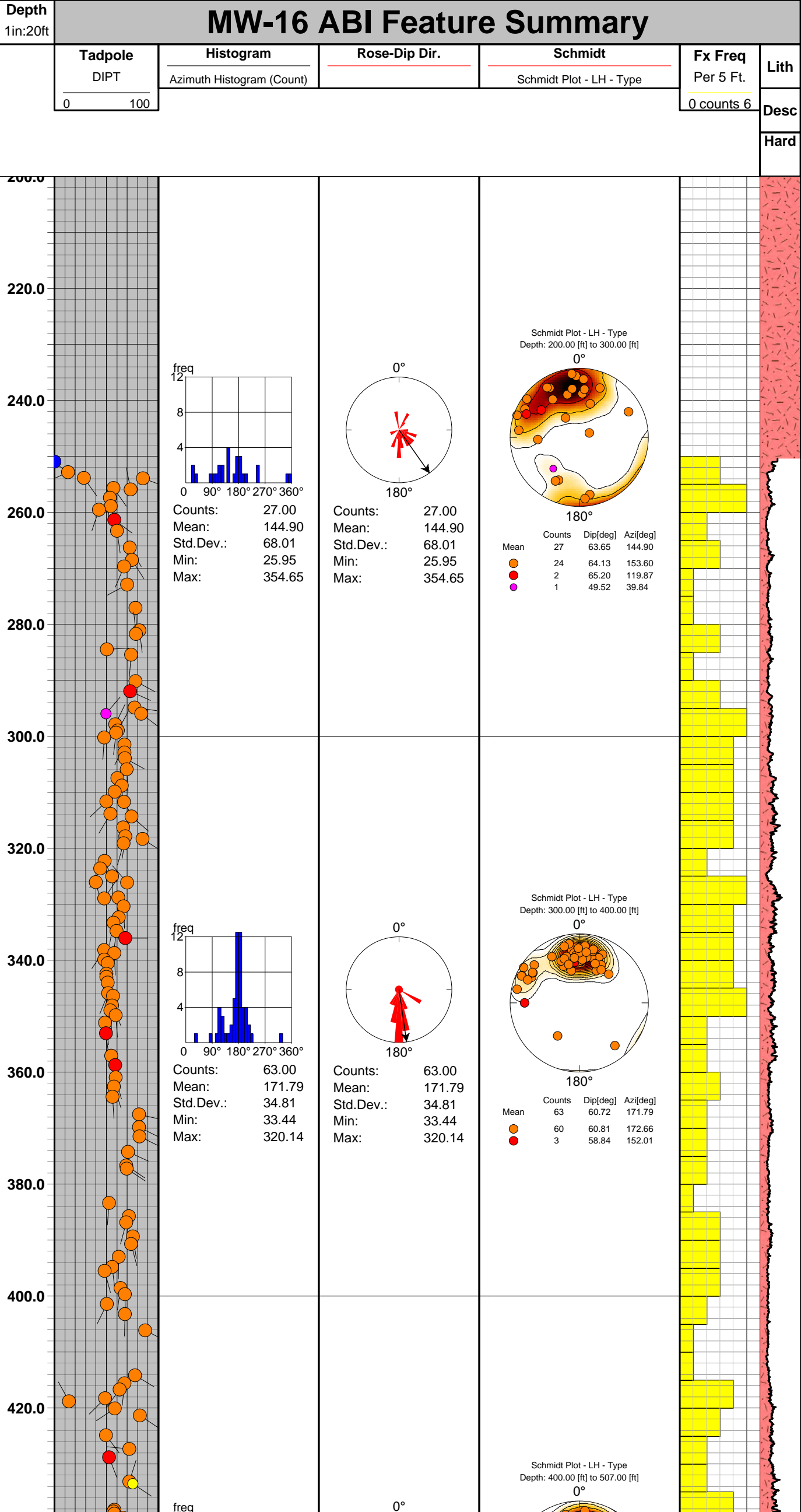
-  GM - Silty gravel w/ sand
-  GP - Sandy Gravel
-  BR - Granodiorite

Acoustic Image Features Legend

-  Btm of Casing
-  Filled Fracture / Joint
-  Bedding / Banding / Foliation / Veins
-  Partially Open Joint / Fracture
-  Minor Open Joint / Fracture
-  OJ/Fx terminates at Fx intersection
-  Unclassified
-  Sulfide Vein
-  Breakouts
-  Major Open Joint / Fracture
-  Fluid Level

VFx Lithology Legend

-  Breccia or Conglomerate
-  Large Vugs/Vesicles (> 6")
-  Medium Vugs/Vesicles (2-6")
-  Small Vugs/Vesicles (< 2")
-  >2 Near Vertical Fxs
-  2 Near Vertical Fxs
-  2 Wide Near Vertical Fxs
-  Filled Fxs
-  Conglomerate - sand matrix supported
-  Conglomerate - mud matrix supported
-  Conglomerate - clast supported






Hard = apparent rock hardness from ARI used to silhouette lithology.

Prepared by Robert E. Crowder
Ver 6/14/2011

OBI FEATURE SUMMARY

Malcolm Pirnie

Driller: Yellow Jacket





Hole: MW-18


Phoenix, Maricopa County, Az

Drill Method: 9 7/8" Air Rotary

Logged: Sept. 17, 2009


borehole geophysics & video services





In-filled Fracture/joint or vein

Major fracture - distinct wide fracture/joint continuous around circumference of hole

Bedding - apparent bedding; rock boundary; banding or foliation feature

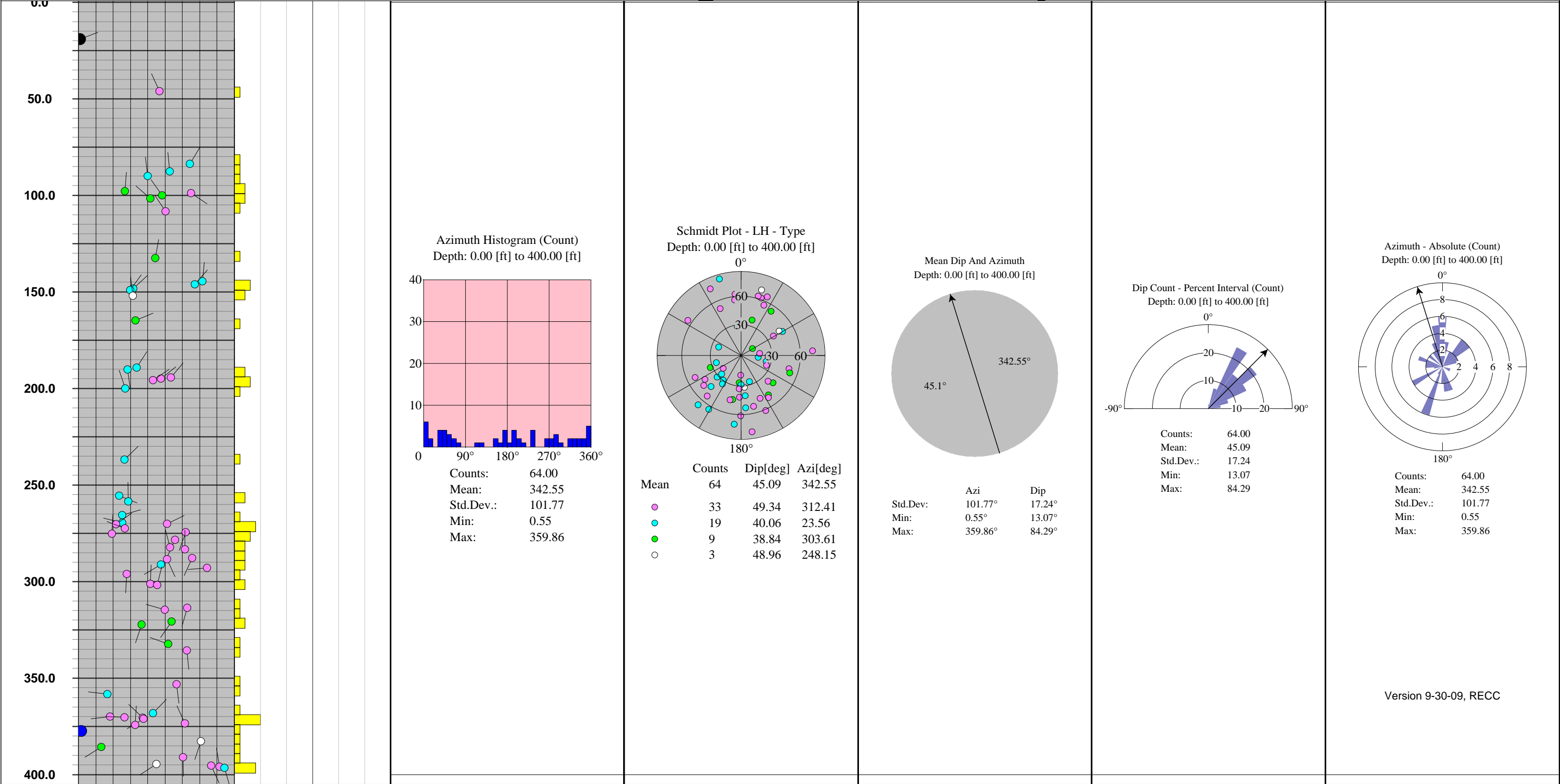
Fluid level in borehole

Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.

Minor fracture - thin or discontinuous fracture/joint around circumference of hole

Depth 1in:50ft	Tadpole DIPT	Freq/foot Per 5 ft. Interval	Image Azimuth Azimuth Histogram (Count)	Image Polar Schmidt Plot - LH - Type	Image Mean Dip & Azi Mean Dip And Azimuth	Image Azimuth DIP Dip Count - Percent Interval (Count)	Image Azimuth Rose Azimuth - Absolute (Count)
	090	0counts/foot6					

MW-18 Image Feature Summary



OBI FEATURE SUMMARY 2

Hole: MW-18

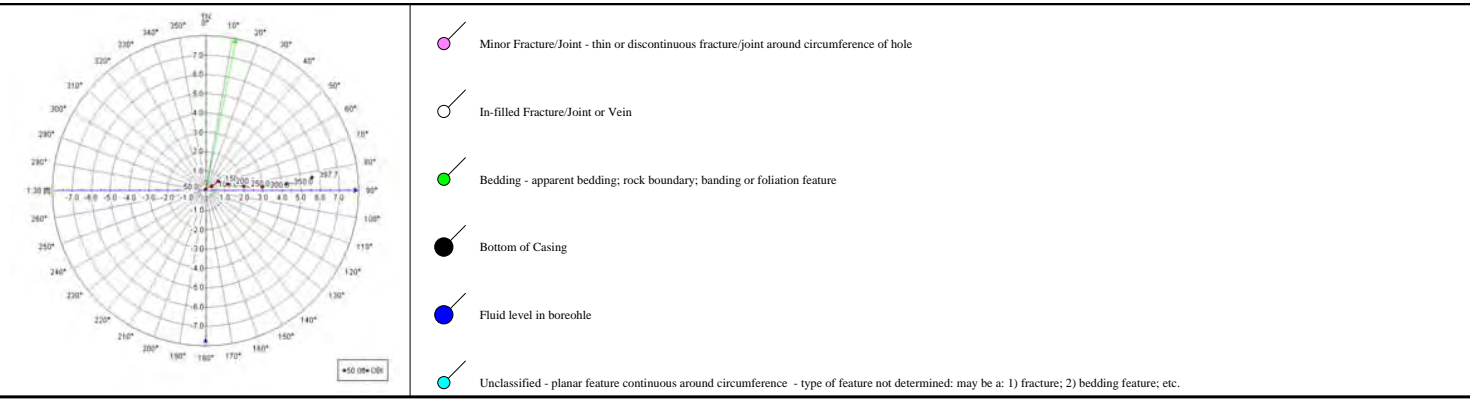
Malcolm Pirnie

Phoenix, Maricopa County, Az

Driller: Yellow Jacket

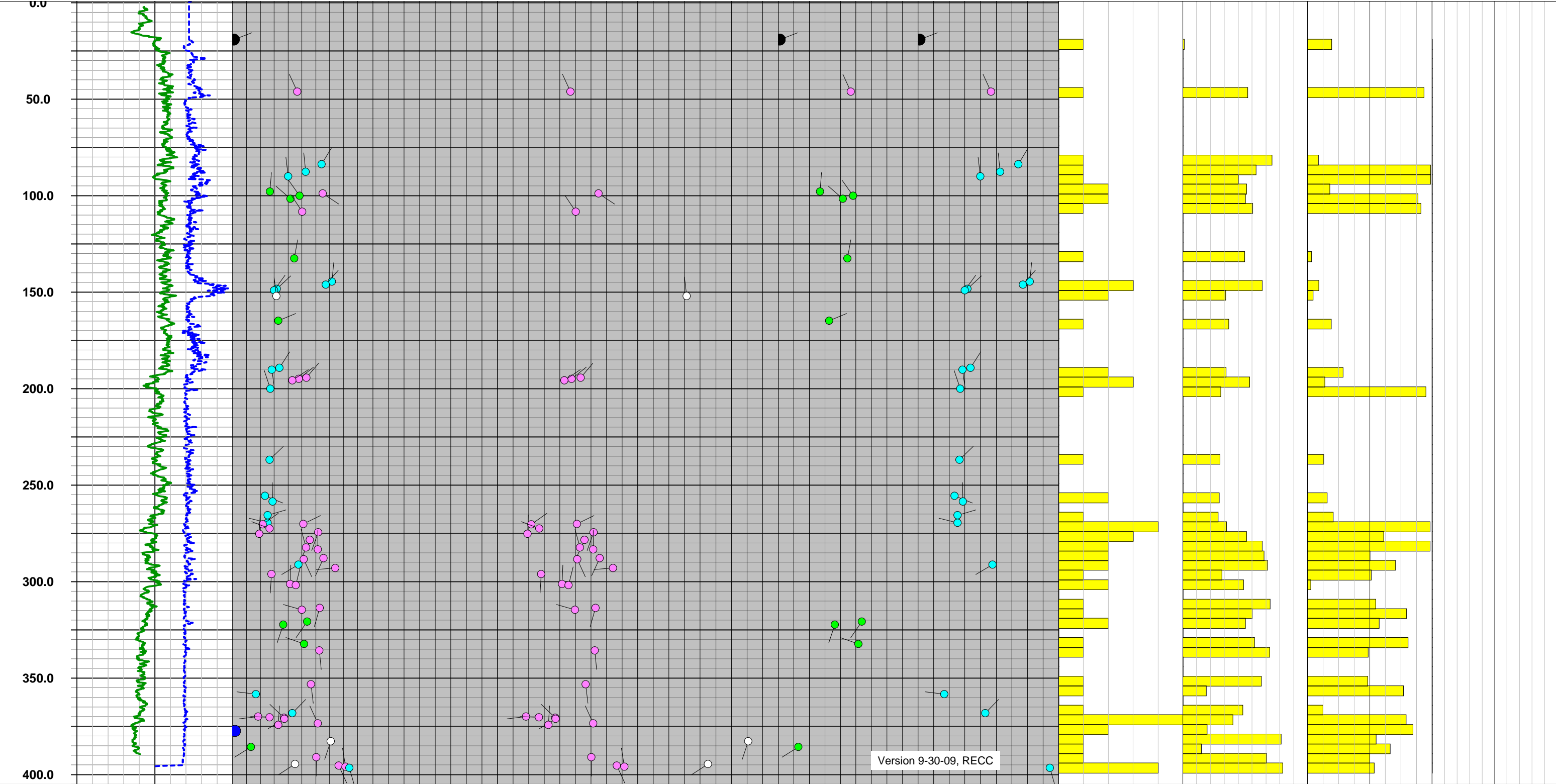
Drill Method: 9 7/8" Air Rotary

Logged: Sept. 17, 2009



Depth 1in:50ft	GR		All Features DIPT	Major DIPT	Minor DIPT	In-Filled DIPT	Bedding/Band DIPT	Unclassified DIPT	Total Counts Per 5-ft. Int.	Ave Dip Per 5-ft. Int.	Ave Azimuth Per 5-ft. Int.	Ave Aperture Per 5-ft. Int.
	0	200										
	3-Arm Caliper		0	0	0	0	0	0	0	0	0	0
	3	13							counts	deg	deg	inch/10 0.05

MW-18 OBI



Geophysical Log Summary Hole 18 E. Yearling

Malcolm Pirnie

18 E. Yearling, Maricopa County, Az



Image Features Rotated 11.5 deg E for Magnetic Declination to True North

Feature Dip is from 0 to 90 deg (0 = Horizontal, 90 = Vertical) Logged: July 27, 2007



Southwest Exploration Services, LLC
borehole geophysics & video services



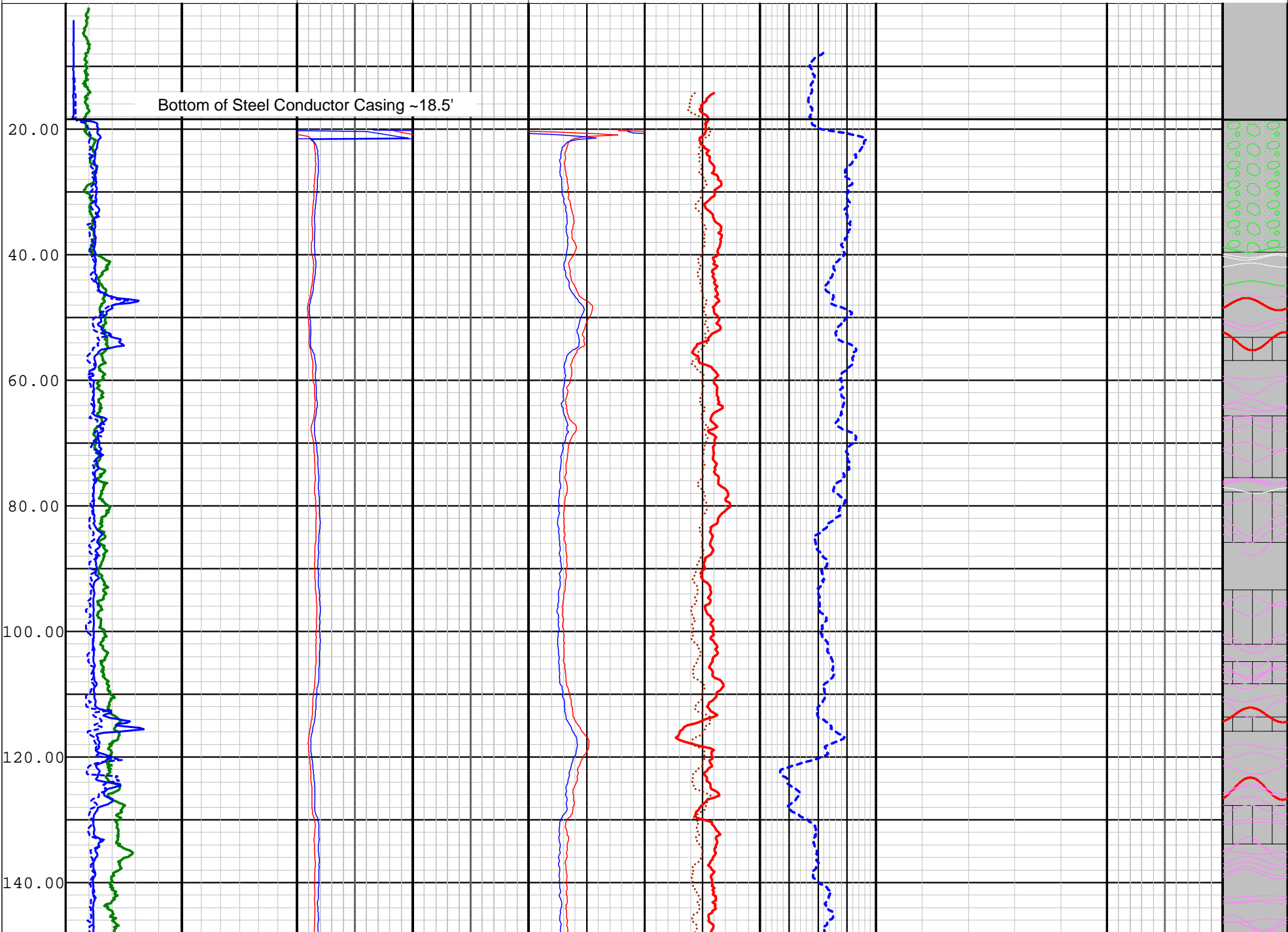
Optical and Acoustic Image Features Legend

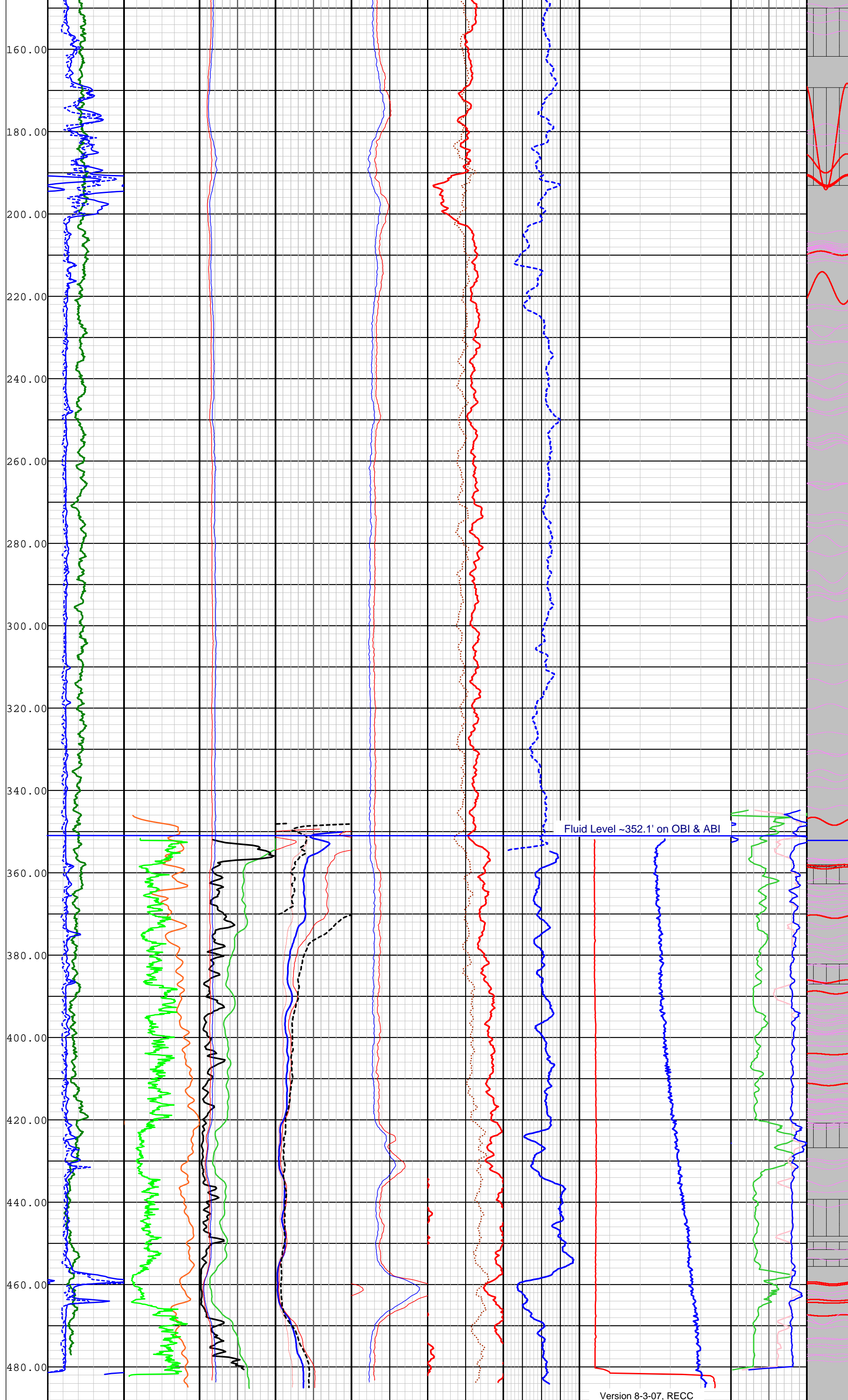
- Major Fracture/Joint - distinct wide fracture/joint continuous around circumference of hole
- Minor Fracture/Joint - thin or discontinuous fracture/joint around circumference of hole
- In-filled Fracture/Joint or Vein
- Bedding - apparent bedding; rock boundary; banding or foliation feature
- Bottom of Casing
- Fluid level in boreohle


VFx Lithology Legend

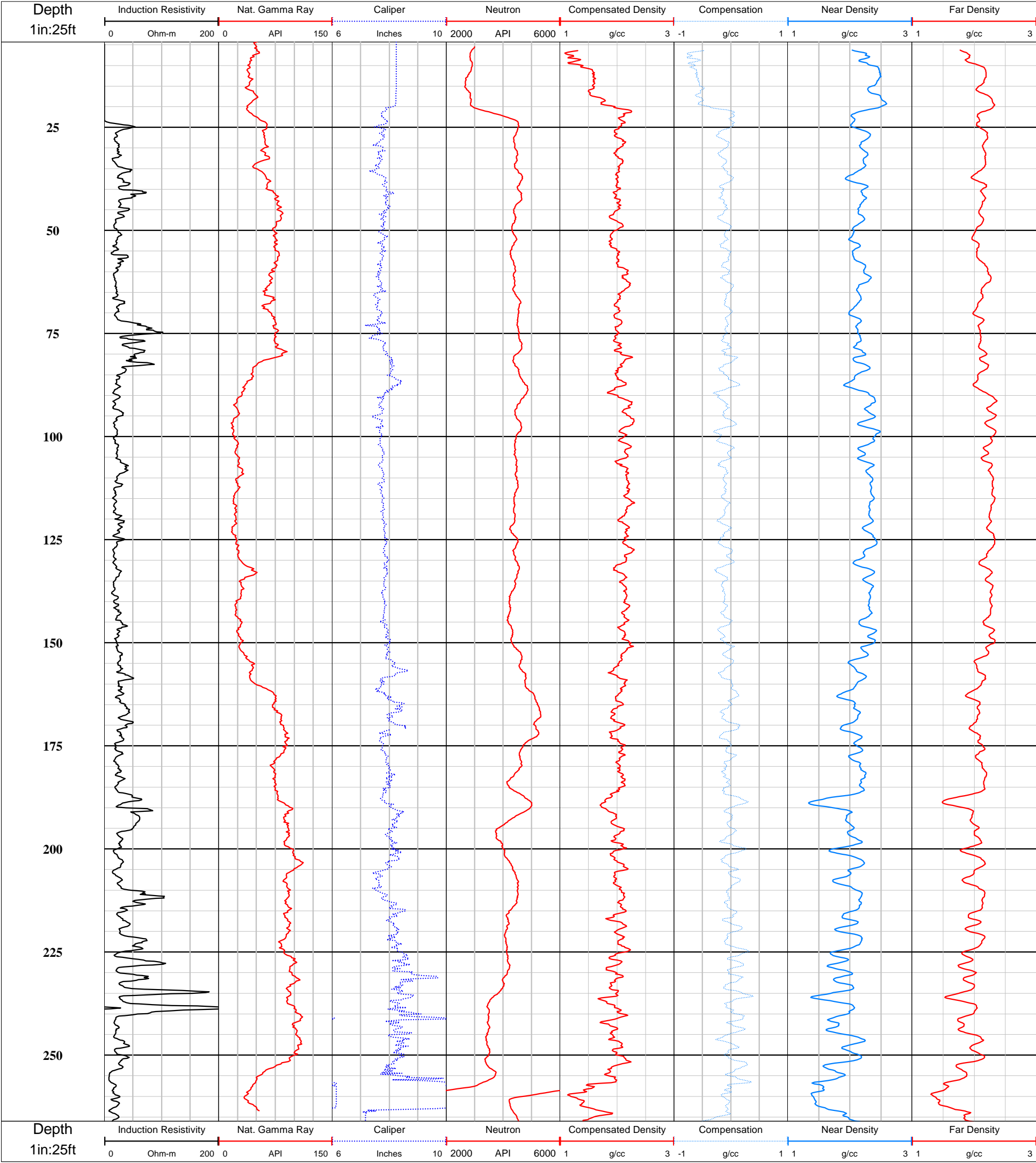
- Highly Fractured Zone
- Near Vertical Fractures
- Fanglomerate - cemented, rounded clasts
- Conglomerate - mud matrix supported, angular to sub-rounded
- Breccia - cemented, angular fragments

Depth 1in:20ft	18 E. Yearling Well - Geophysical Log Summary									
	GR	SP	SPR	8" NRes.	ILM	Density	Neutron (Dry)	Fluid Res	Sp (dtp)	VFx
	50 API 250	450 mV 750	0 Ohms 400	0 2000	0 mS/m 50	1 g/cc 3	1000API5000	4 Ohm-m 14	40 uS/ft. 240	
	1-Arm Cal	ARI	Guard Res	16" NRes	ILD	Comp.	Neutron (Wet)	Temperature	Ss (dts)	Picks
	5 inches 10	0 250	0 400	0 2000	0 mS/m 50	-1 g/cc 1	0 API2000	30 DegC 32	40 uS/ft. 240	DIPA
	3-Arm Cal		Res ILM	32" NRes					Sst (dtsst)	
5 Inches 10	0 400		0 2000	40 uS/ft. 240						
			Res ILD	64" NRes						
			0 400	0 2000						





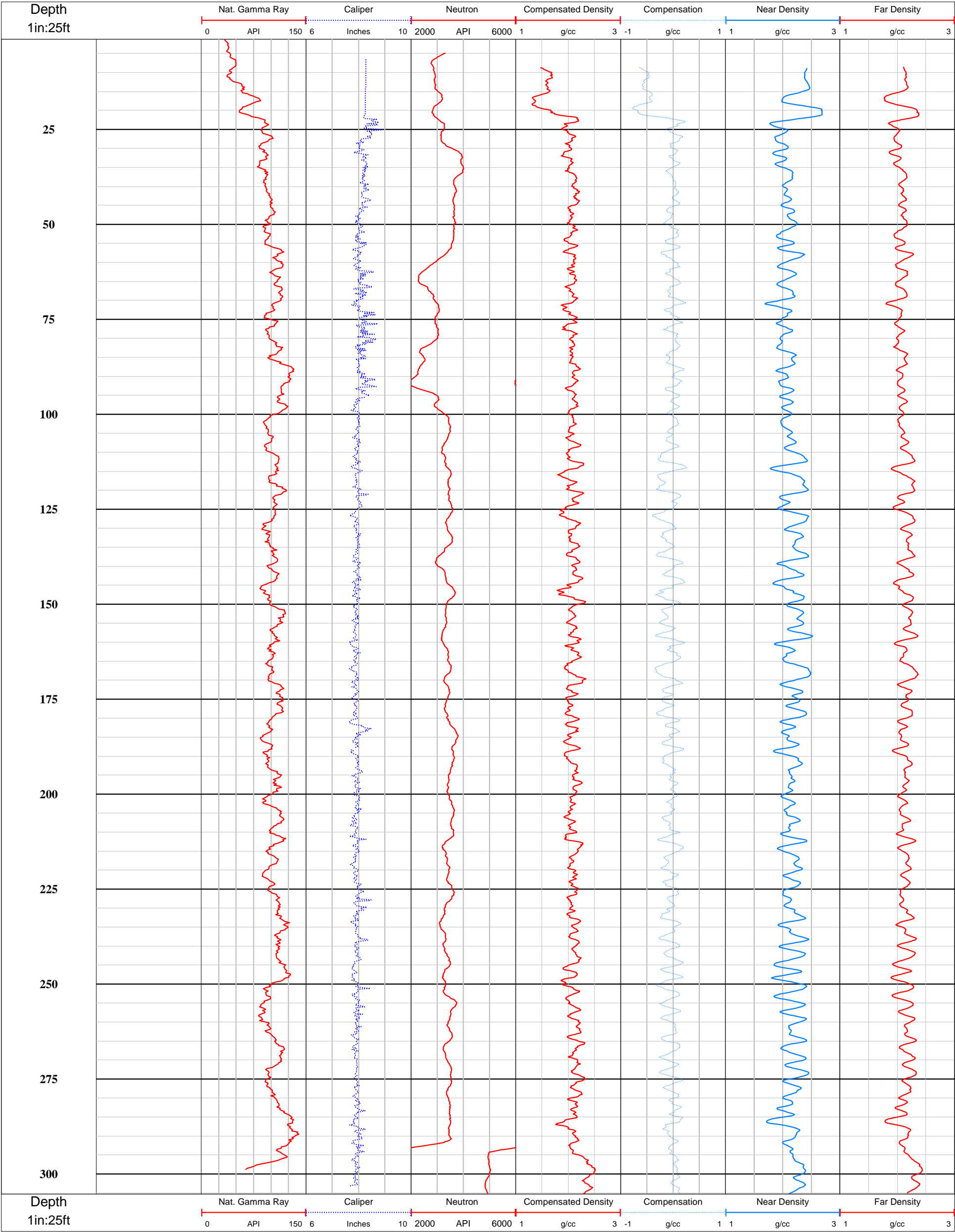
GEOPHYSICAL SUMMARY LOG			Hole: MW-3
Malcolm Pirnie		UPCO Project, Maricopa County, Az	
Driller: Boart Longyear	Drill Method: Rotary 7-7/8" hole diameter	Logged: August 12, 2004	
			



Hole: MW-4

UPCO Project, Maricopa County, Az

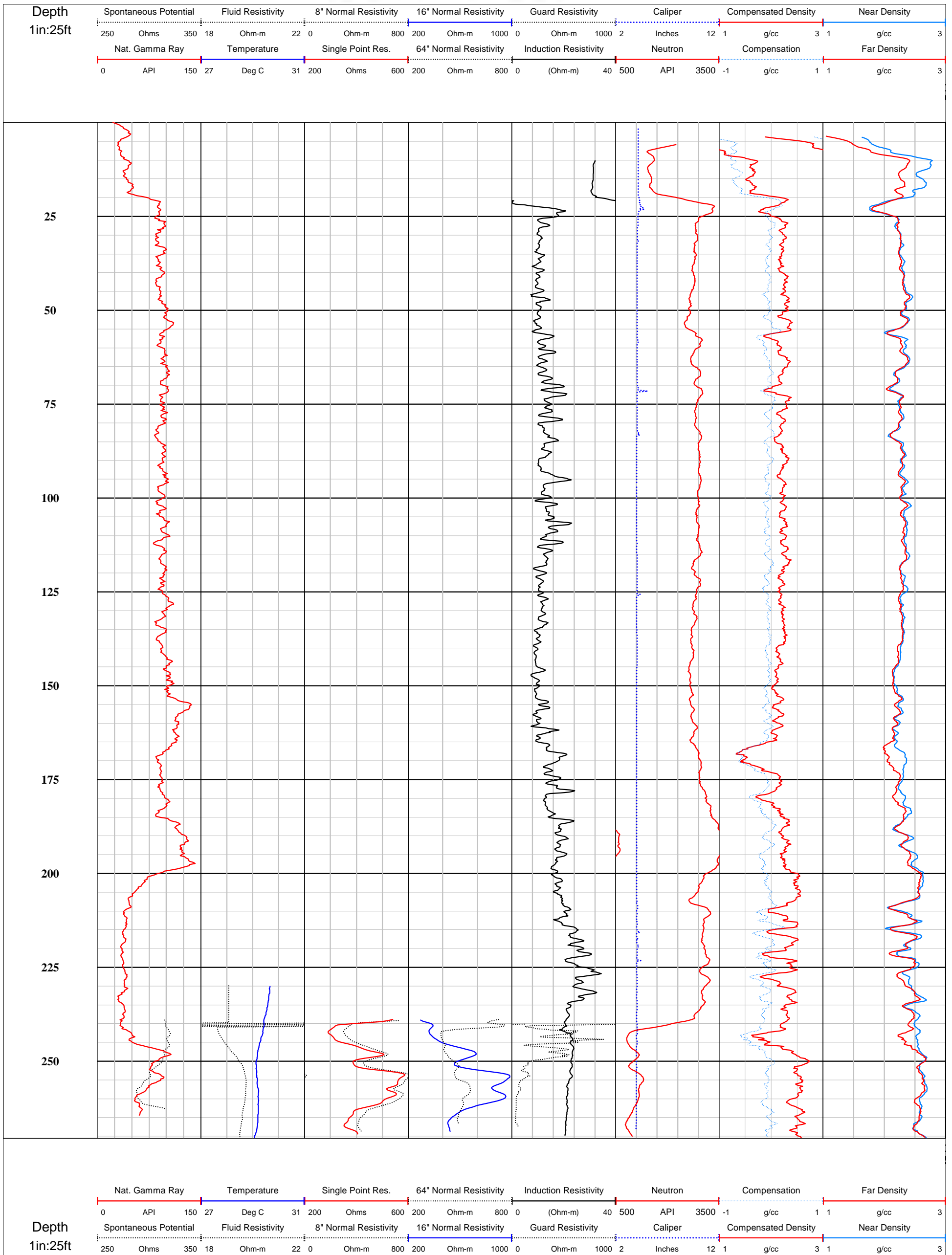
Logged: August 6, 2004



Hole: MW-5

UPCO Project, Maricopa County, Az

Logged: August 13, 2004



GEOPHYSICAL SUMMARY LOG


Malcolm Pirnie


UPCO Project, Maricopa County, Az

Driller: Boart Longyear

Drill Method: NX Core - 3.87" Diameter


Logged: August 5, 2004





Southwest Exploration Services, LLC

borehole geophysics & video services



Depth
1in:25ft

Nat. Gamma Ray

API

0150

Fluid Resistivity

Ohm-m

1220

8" Normal Resistivity

Ohm-m

020

16" Normal Resistivity

Ohm-m

0150

Guard Resistivity

Ohm-m

040

Neutron

API

01200

Compensated Density

g/cc

13

Near Density

g/cc

13

Spontaneous Potential

Ohms

350500

Temperature

DegC

3032

Single Point Res.

Ohms

50200

64" Normal Resistivity

Ohm-m

0200

Caliper

Inches

3.55.5

Compensation

g/cc

-11

Far Density

g/cc

13

Depth
1in:25ft

Spontaneous Potential

Ohms

350500

Temperature

DegC

3032

Single Point Res.

Ohms

50200

64" Normal Resistivity

Ohm-m

0200

Caliper

Inches

3.55.5

Compensation

g/cc

-11

Far Density

g/cc

13

Nat. Gamma Ray

API

0150

Fluid Resistivity

Ohm-m

1220

8" Normal Resistivity

Ohm-m

020

16" Normal Resistivity

Ohm-m

0150

Guard Resistivity

Ohm-m

040

Neutron

API

01200

Compensated Density




g/cc

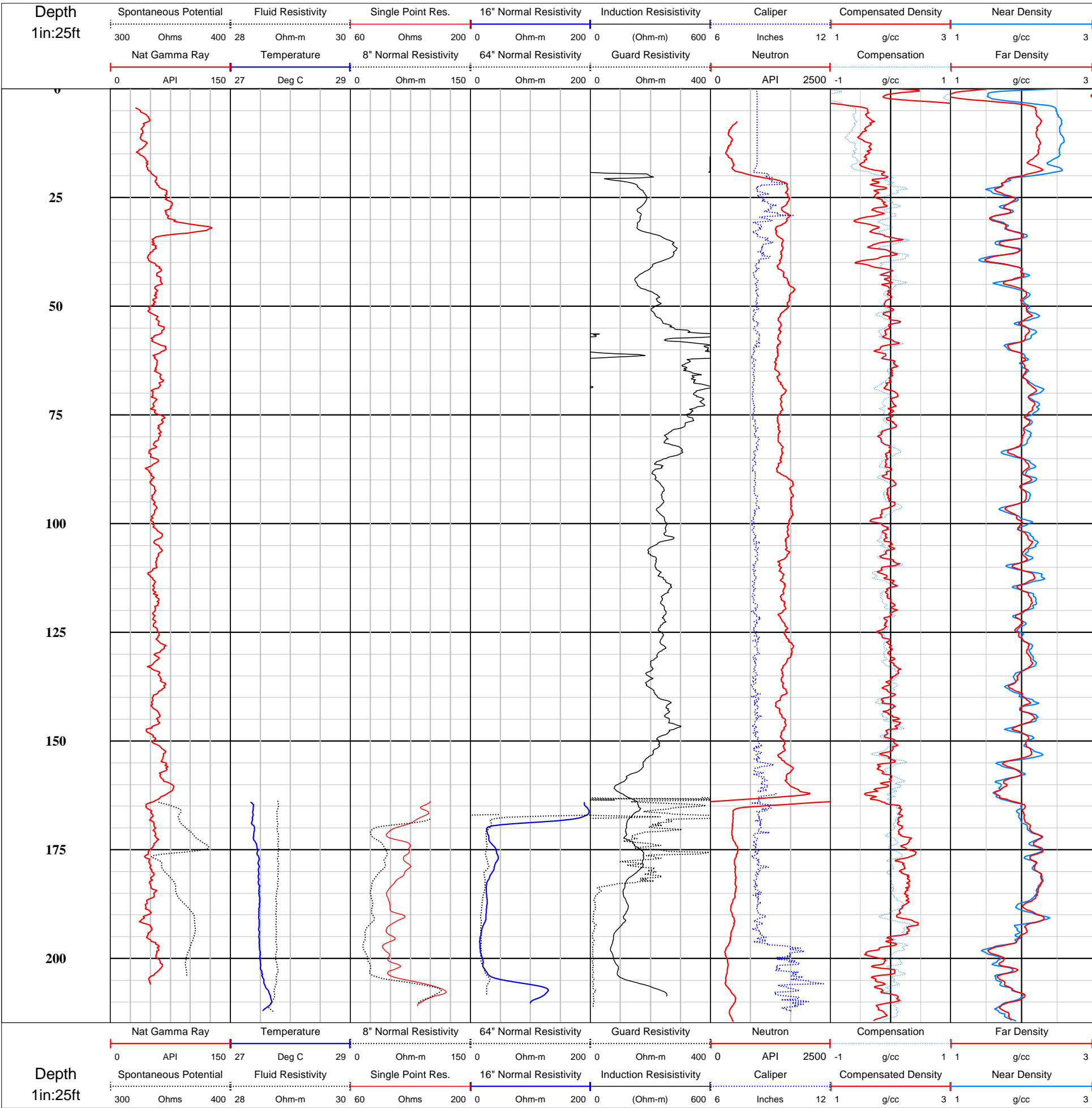
13

Near Density

g/cc

13

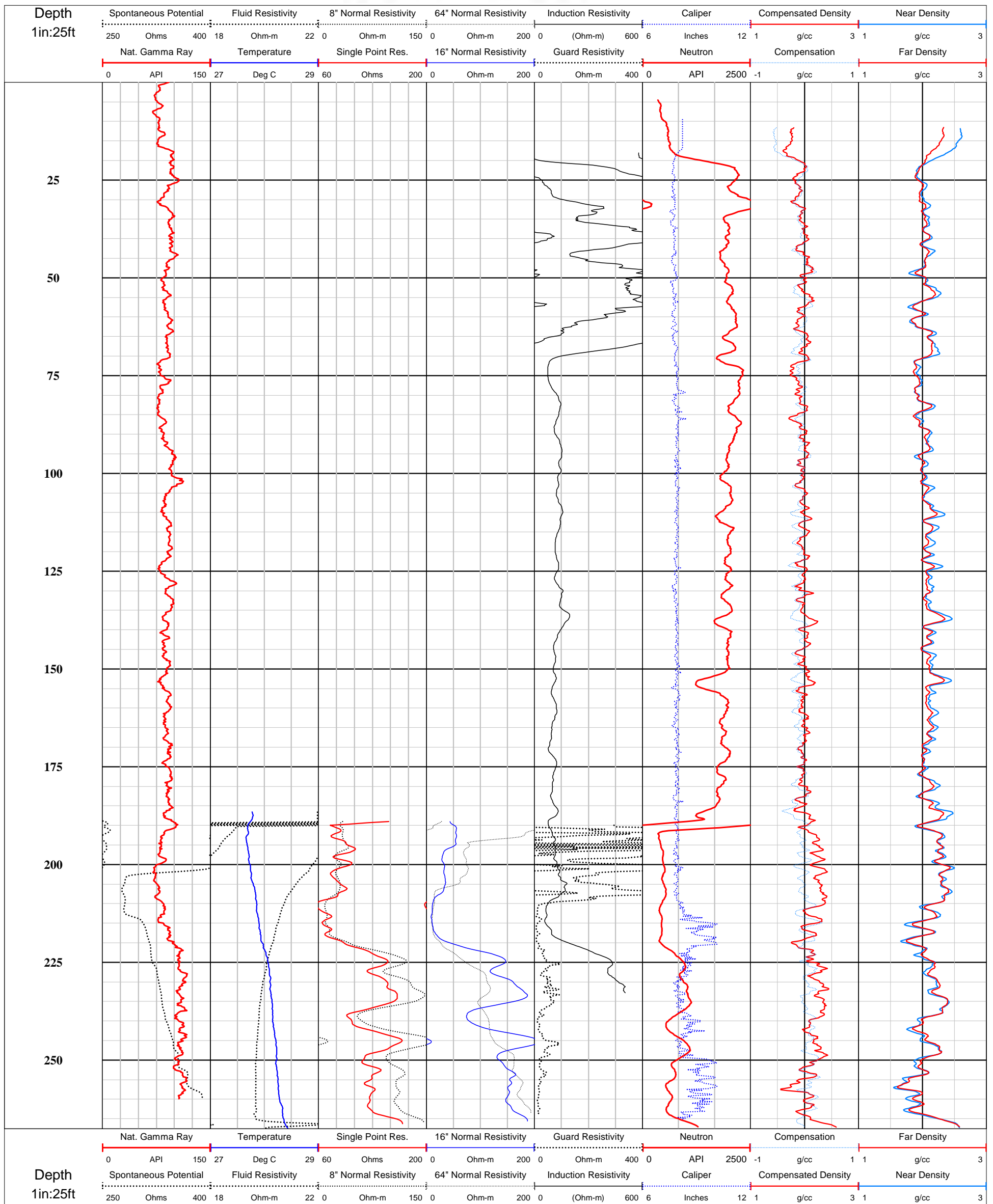
GEOPHYSICAL SUMMARY LOG			Hole: MW-7		
Malcolm Pirnie			UPCO Project, Maricopa County, Az		
Driller: Boart Longyear		Drill Method: Rotary 7-7/8" hole diameter		Logged: October 15, 2004	
					



Hole: MW-8

UPCO Project, Maricopa County, Az

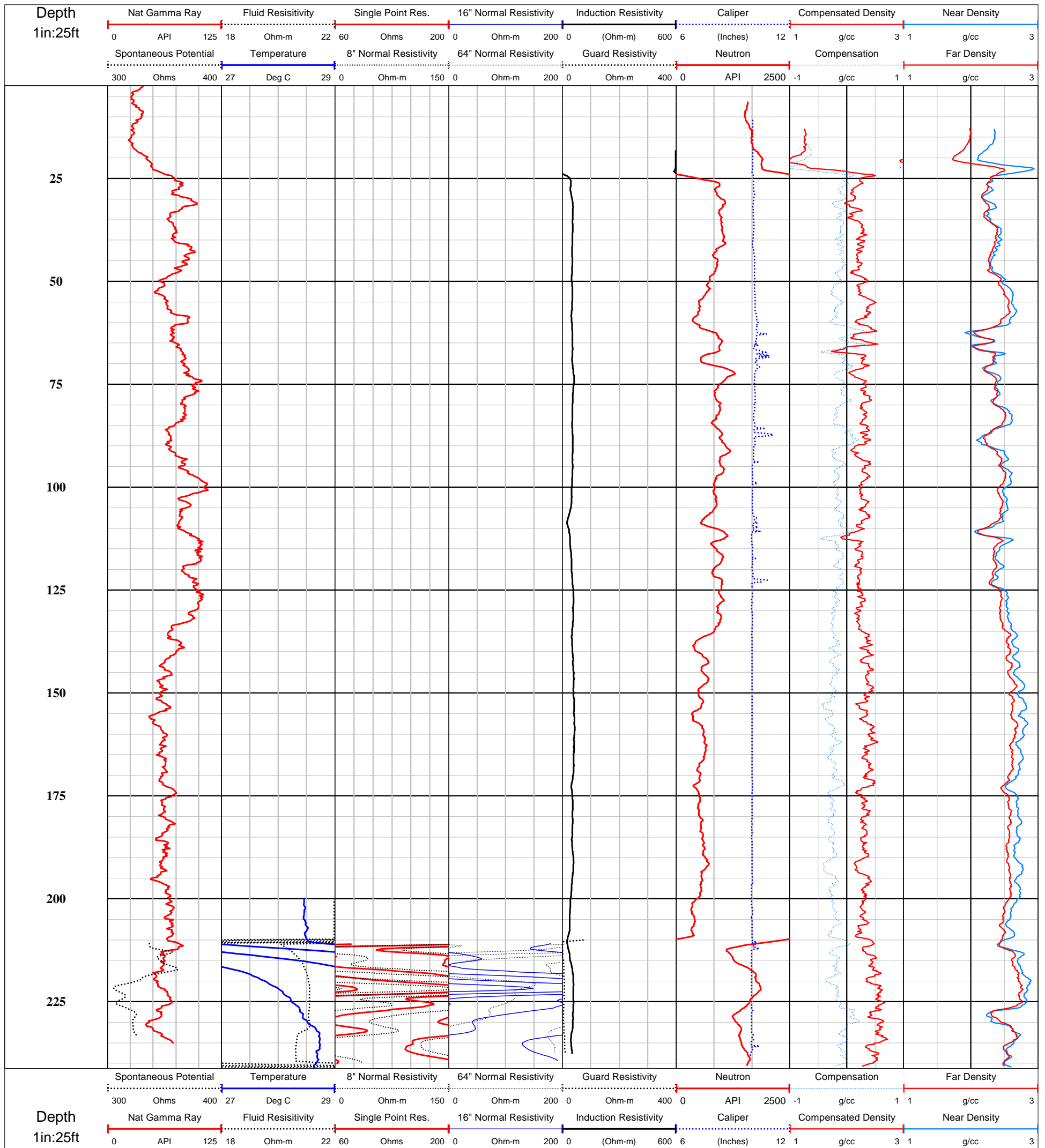
Logged: October 13, 2004



Hole: MW-9

UPCO Project, Maricopa County, Az

Logged: January 25, 2005



GEOPHYSICAL SUMMARY LOG

Hole: MW-10


Malcolm Pirnie


UPCO Project, Maricopa County, Az


Driller: Boart Longyear

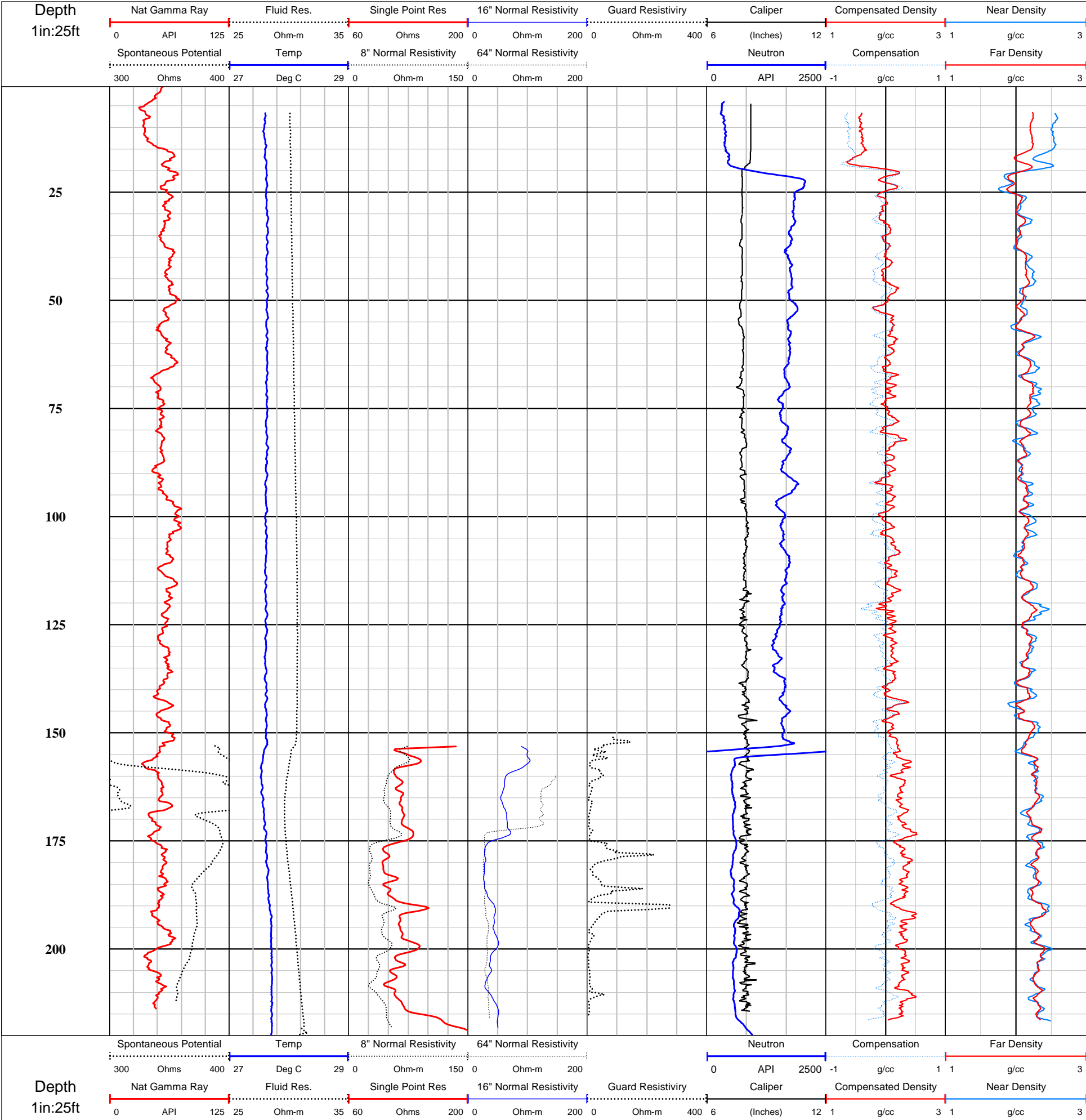
Drill Method: Rotary 7-7/8" hole diameter

Logged: January 19-20, 2005





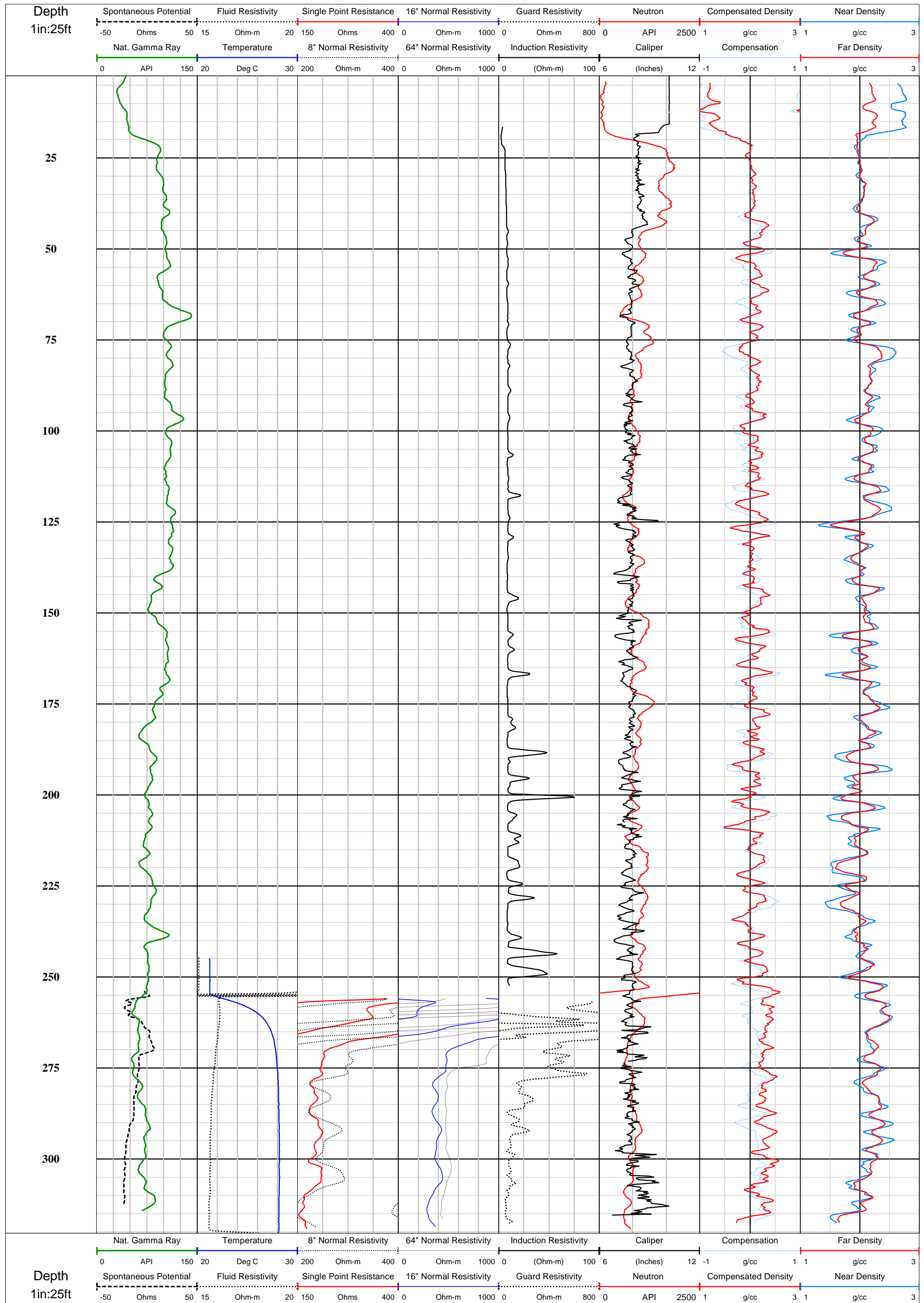







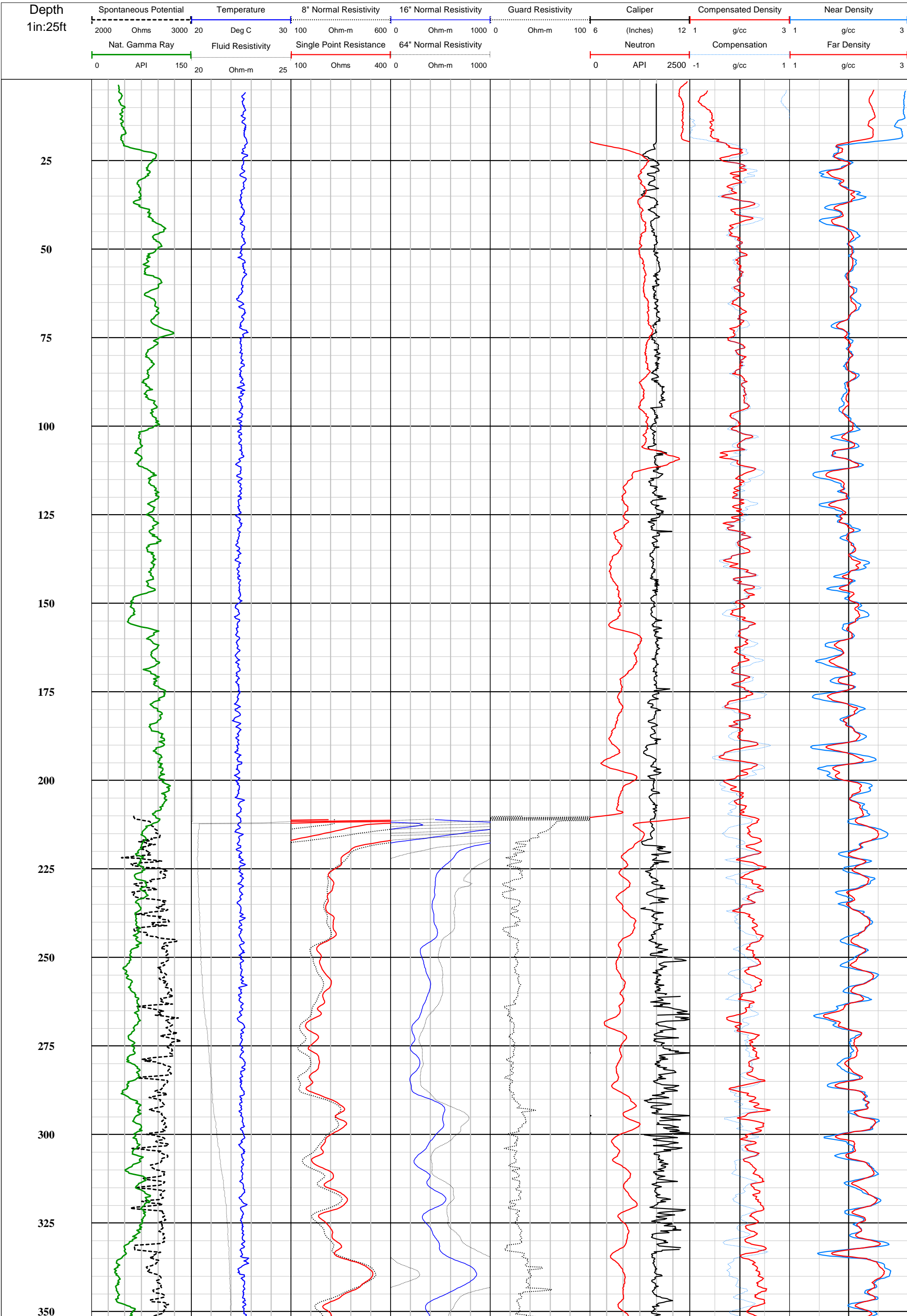
Hole: MW-11

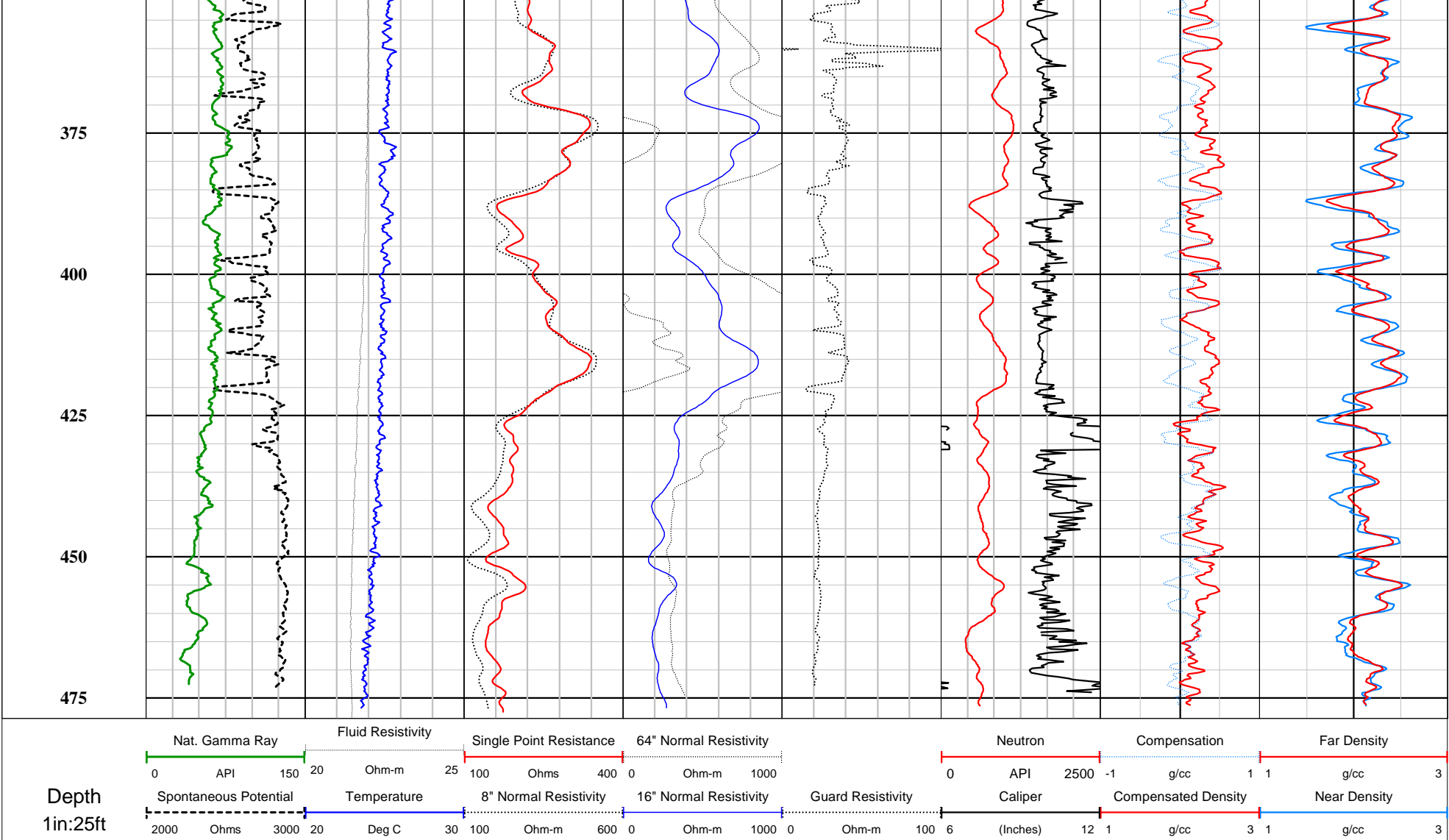
UPCO Project, Maricopa County, Az

Logged: Dec 11, 2005



GEOPHYSICAL SUMMARY LOG		Hole: MW-12	
Malcolm Pirnie		UPCO Project, Maricopa County, Az	
Driller: Boart Longyear	Drill Method: Rotary 10" hole diameter	Logged: December 11, 2005	
		 	





Geophysical Log Summary Hole MW-13

Malcolm Pirnie

Phoenix, Maricopa County, Az



Image Features Rotated 11.5 deg E for Magnetic Declination to True North

Feature Dip is from 0 to 90 deg (0 = Horizontal, 90 = Vertical) Logged: June 13, 2008





Southwest Exploration
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
borehole geophysics & video services





Optical and Acoustic Image Features Legend


- 


In-filled Fracture/joint or vein
- 


Major fracture - distinct wide fracture/joint continuous around circumference of hole
- 

Bedding - apparent bedding; rock boundary; banding or foliation feature
- 

Fluid level in boreohle
- 


Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.
- 

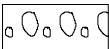
Distinct probable fracture/joint continuous over a portion of the circumference of hole - usually terminated at another fracture interesection
- 

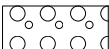
Minor fracture - thin or discontinuous fracture/joint around circumference of hole
- 

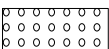
Bottom of Casing


VFx Lithology Legend


- 


Breccia or Conglomerate
- 


Large Vugs/Vesicles (> 6")
- 

Medium Vugs/Vesicles (2-6")
- 

Small Vugs/Vesicles (< 2")
- 

>2 Near Vertical Fxs
- 

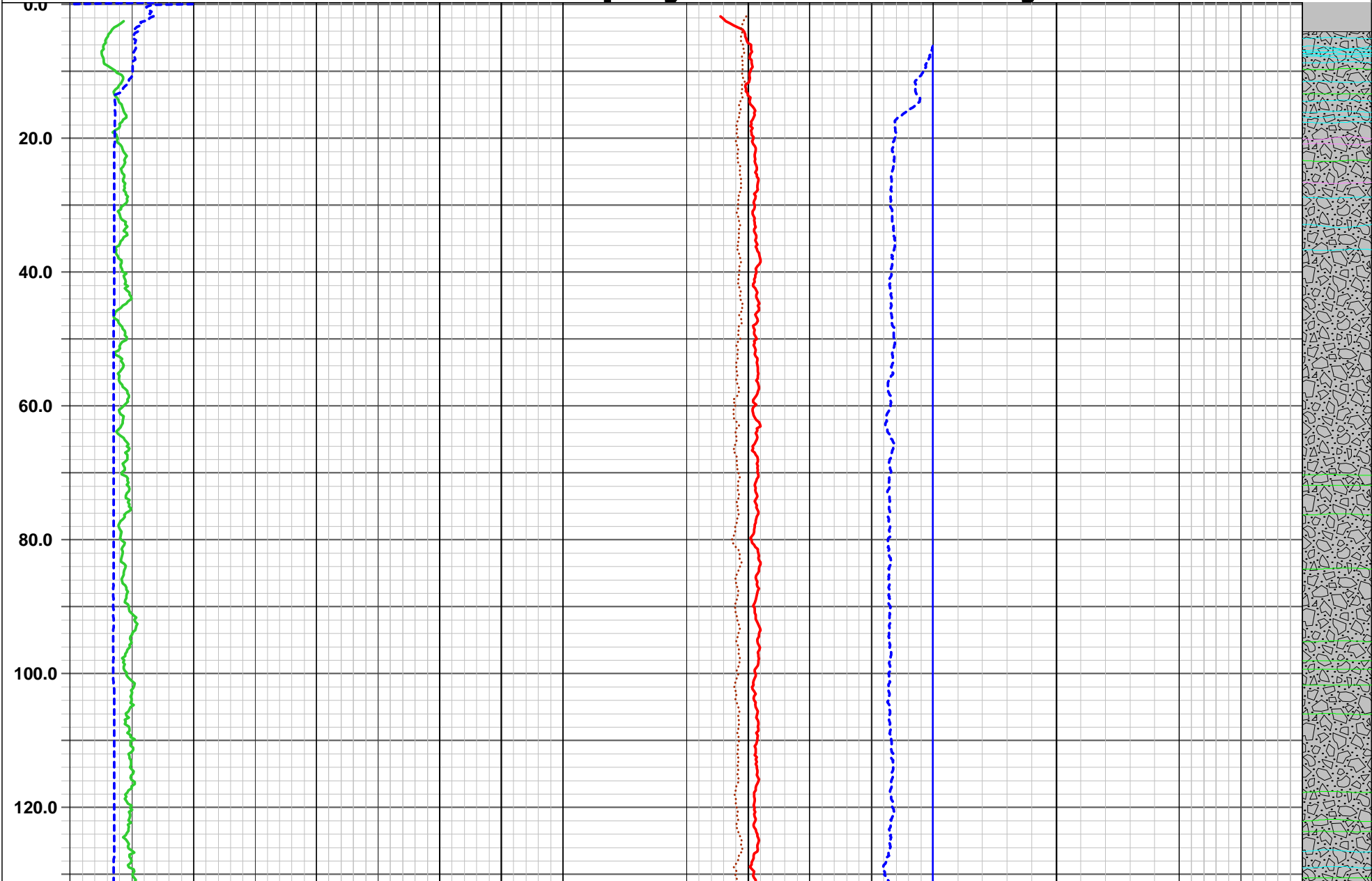
2 Near Vertical Fxs
- 

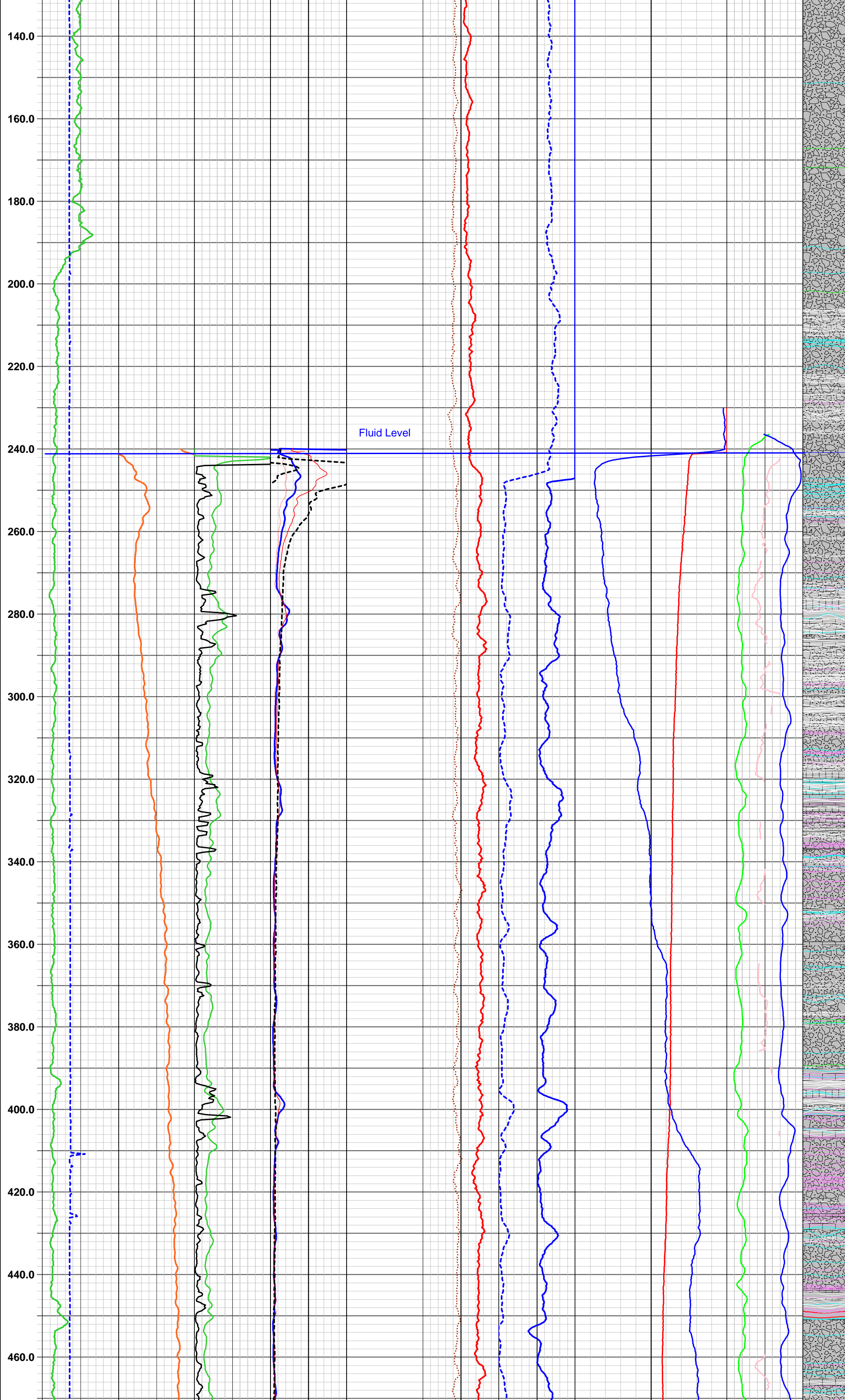
2 Wide Near Vertical Fxs
- 

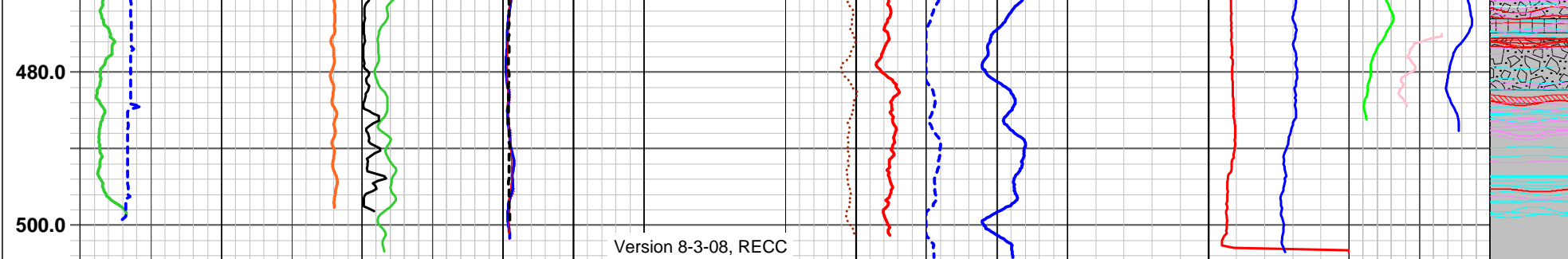
Drilling Induced Fxs

Depth 1in:20ft	GR			SP			SPR		8" NRes		Density			Neutron-Dry		Fluid Resistivity			Sp (dtp)			Picks	
	0	API	200	100	mV	500	0	1000	0	2000	1	g/cc	3	1000	API	5000	10	Ohm-m	20	40	us/ft		240
	1-Arm Cal			ARI			Guard Res		16" NRes		Comp.			Neutron-Wet		Temperature			Ss (dts)			VFx	
	2	inches	7	0		1500	0	1000	0	2000	-1	g/cc	1	0	API	2000	30.5	Deg C	32.5	40	us/ft		240
																			Sst (dtst)				
																			80			us/ft	280

MW-13 Geophysical Summary







MW-13 Geophysical Summary

					<div>64" NRes</div> <div>-----</div> <div>02000</div>																		
					<div>32" NRes</div> <div>-----</div> <div>02000</div>																		
		<div>1-Arm Cal</div> <div>-----</div> <div>2 inches 7</div>		<div>ARI</div> <div>-----</div> <div>01500</div>		<div>Guard Res</div> <div>-----</div> <div>01000</div>		<div>16" NRes</div> <div>-----</div> <div>02000</div>						<div>Sst (dtst)</div> <div>-----</div> <div>80 us/ft 280</div>		VFX							
		<div>GR</div> <div>-----</div> <div>0 API 200</div>		<div>SP</div> <div>-----</div> <div>100 mV 500</div>		<div>SPR</div> <div>-----</div> <div>01000</div>		<div>8" NRes</div> <div>-----</div> <div>02000</div>		<div>Comp.</div> <div>-----</div> <div>-1 g/cc 1</div>		<div>Neutron-Wet</div> <div>-----</div> <div>0 API2000</div>		<div>Temperature</div> <div>-----</div> <div>30.5 Deg C 32.5</div>			<div>Ss (dts)</div> <div>-----</div> <div>40 us/ft 240</div>						
Depth			<div>GR</div> <div>-----</div> <div>0 API 200</div>		<div>SP</div> <div>-----</div> <div>100 mV 500</div>		<div>SPR</div> <div>-----</div> <div>01000</div>		<div>8" NRes</div> <div>-----</div> <div>02000</div>						<div>Density</div> <div>-----</div> <div>1 g/cc 3</div>		<div>Neutron-Dry</div> <div>-----</div> <div>1000API5000</div>		<div>Fluid Resistivity</div> <div>-----</div> <div>10 Ohm-m 20</div>		<div>Sp (dtp)</div> <div>-----</div> <div>40 us/ft 240</div>		Picks DIPA
1in:20ft																							

Geophysical Summary Legend

Mnemonics and Comments

- GR

= natural gamma ray log plotted from 0 to 200 API uints (green line)
- 1-Arm Cal

= 1-arm mechanical caliper of hole diameter plotted from 2-7 inches (dotted blue line)
- SP

= spontaneous potential log plotted 100 to 500 mV (orange line)
- ARI

= Acoustic Reflectance Index or relative rock hardness from ABI Amplitude log. Plotted 0 (soft) to 1500 (harder) as green line.
- SPR

= single point resistance log plotted 0 to 1000 ohms (green line)
- Guard Res

= micro-guard or LL3 resistivity log plotted 0 to 1000 ohm-meters (black line)
- 8" NRes

= 8" normal resistivity log plotted 0 to 2000 ohm-meters (dotted red line)
- 16" NRes

= 16" normal resistivity log plotted 0 to 2000 ohm-meters (blue line)
- 32" NRes

= 32" normal resistivity log plotted 0 to 2000 ohm-meters (red line)
- 64" NRes

= 64" normal resistivity log plotted 0 to 2000 ohm-meters (dotted black line)
- Density

= gamma-gamma density log plotted 1 to 3 g/cc (red line)
- Comp.

= density compensation log plotted -1 to 1 g/cc (dotted brown line)
- Neutron (Dry)

= neutron log above fluid level plotted 1000 to 5000 API units (dotted blue line)
- Neutron (Wet)

= neutron log below fluid level plotted 0 to 2000 API units (blue line)
- Fluid Res

= fluid resistivity log plotted 10 to 20 ohm-meters (red line)
- Temperatue

= fluid temperature log plotted 30.5 to 32.5 deg Celcius (blue line)
- Sp (dtp)

= P-wave slowness or transit time log plotted 40 to 240 uSec/ft (green line)
- Ss (dts)

= S-wave slowness or transit time log plotted 40 to 240 uSec/ft (pink line). Values greater than ~200 uS/ft are invalid.
- Sst (dtst)

= Stoneley-wave slowness or transit time log plotted 80 to 280 uSec/ft (blue line).
- VFXs

= Near Vertical Fractures, highly fractured zones and Fanglomerate or Breccia zones
- Picks

= planar feaues picked on optical or acoustic borehole image shown as colored sinusoid (color designation shown on header) DIPA = dip apparent hole axis

Geophysical Log Summary Hole MW-14

Malcolm Pirnie

Phoenix, Maricopa County, Az



Image Features Rotated 11.5 deg E for Magnetic Declination to True North

Feature Dip is from 0 to 90 deg (0 = Horizontal, 90 = Vertical)

Logged: June 10, 2008



Southwest Exploration
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borehole geophysics & video services



Optical and Acoustic Image Features Legend

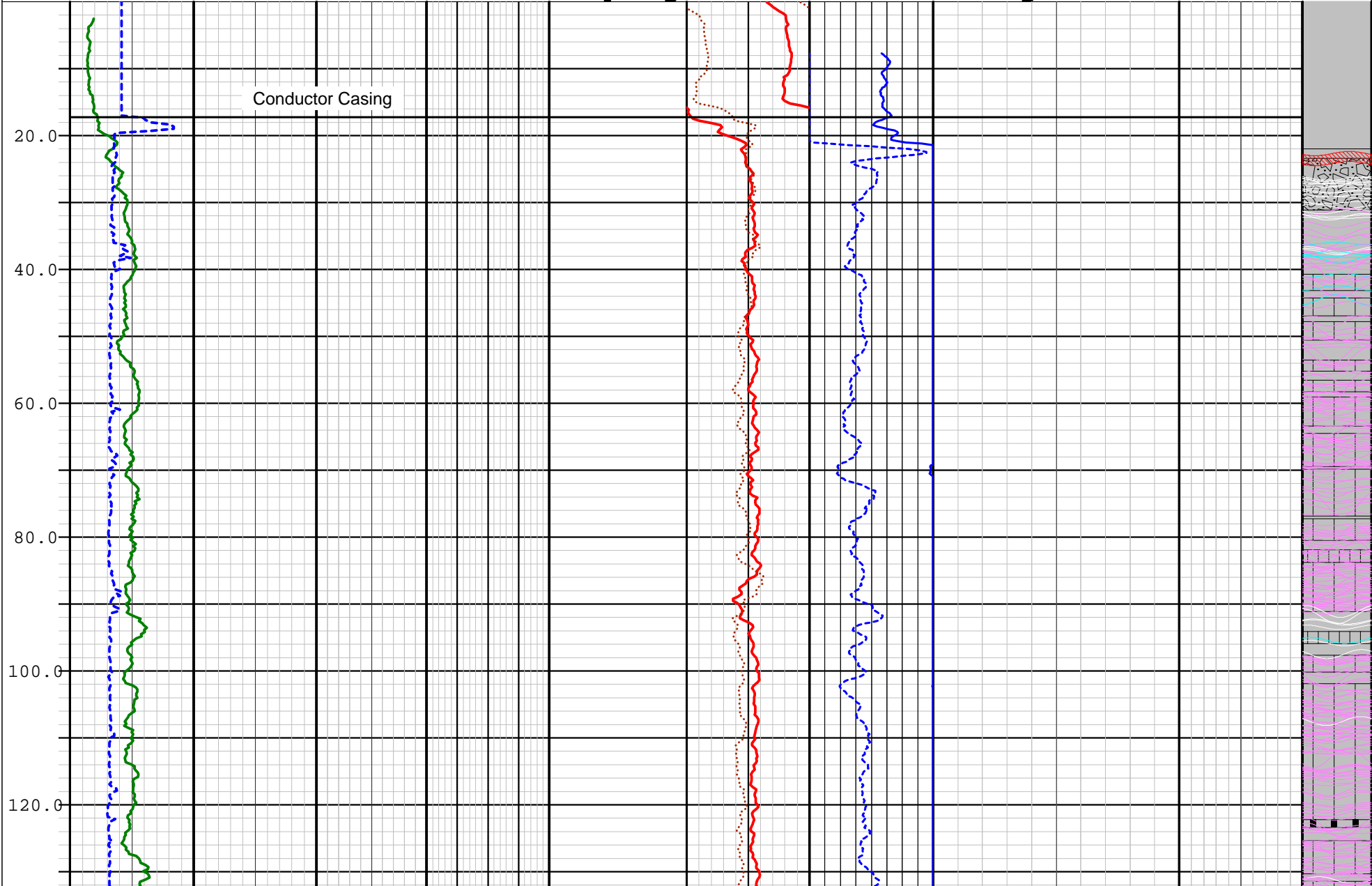
- In-filled Fracture/joint or vein
- Major fracture - distinct wide fracture/joint continuous around circumference of hole
- Bedding - apparent bedding; rock boundary; banding or foliation feature
- Fluid level in boreohle
- Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.
- Distinct probable fracture/joint continuous over a portion of the circumference of hole - usually terminated at another fracture interesection
- Minor fracture - thin or discontinuous fracture/joint around circumference of hole
- Bottom of Casing

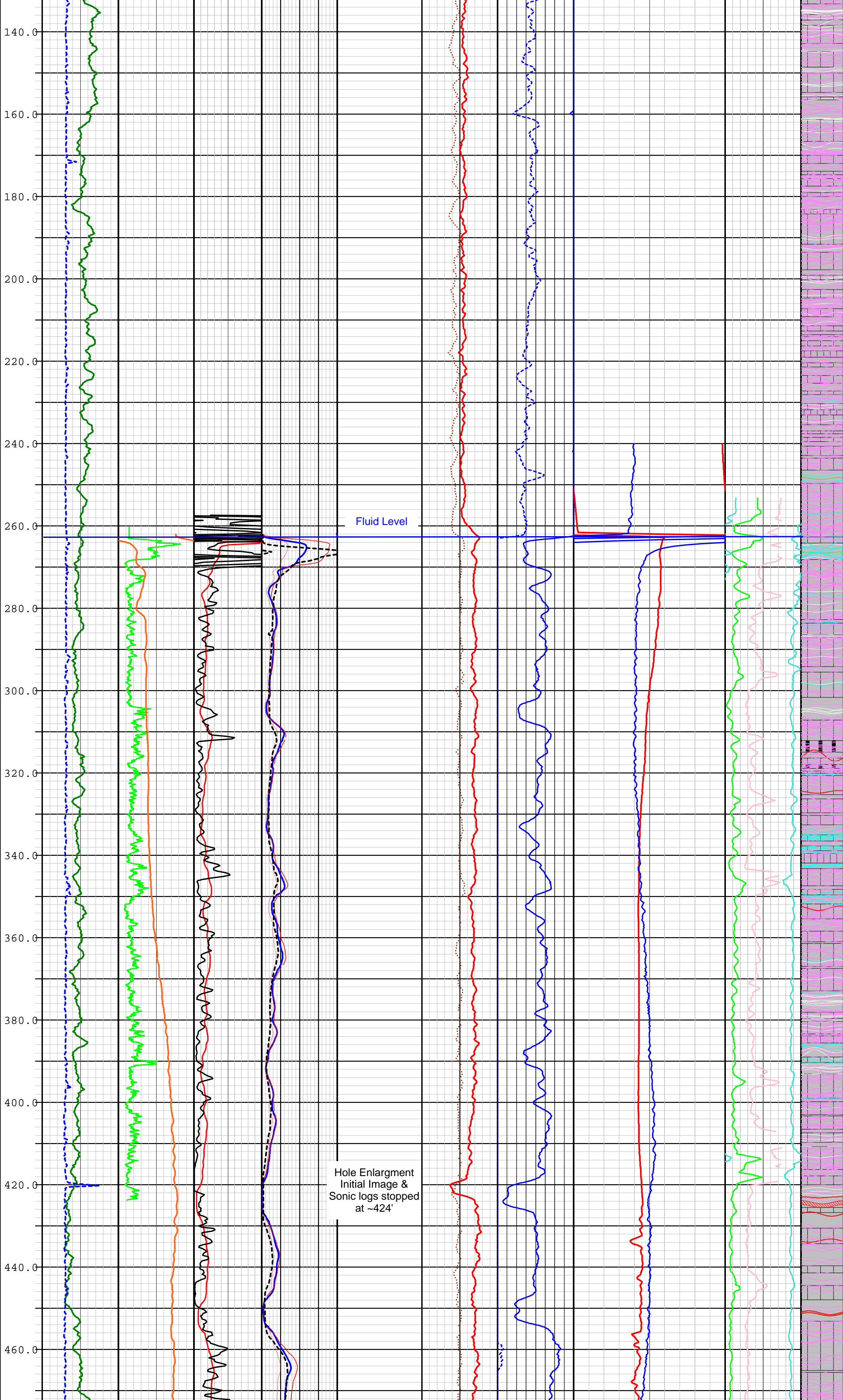
VFx Lithology Legend

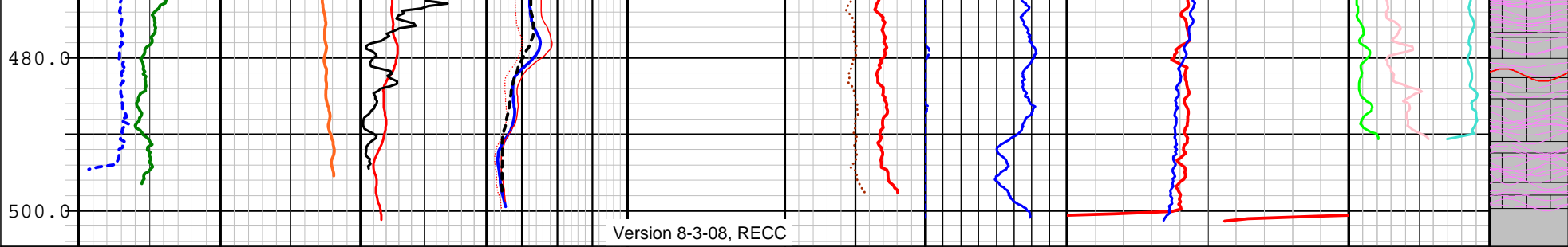
- Breccia or Conglomerate
- Large Vugs/Vesicles (> 6")
- Medium Vugs/Vesicles (2-6")
- Small Vugs/Vesicles (< 2")
- >2 Near Vertical Fxs
- 2 Near Vertical Fxs
- 2 Wide Near Vertical Fxs
- Drilling Induced Fxs

Depth	GR	ARI	SPR	8" NRes	Density	Neutron-Dry	Fluid Resistivity	Sp (dtp)	Picks
1in:20ft	0 API 200	0 1500	0 2000	0 4000	1 g/cc 3	3000API7000	10 Ohm-m 20	40 us/ft 240	DIPA
	1-Arm Cal	SP	Guard Res	16" NRes	Comp.	Neutron-Wet	Temperature	Ss (dts)	VFx
	2 inches 12	100 mV 500	0 2000	0 4000	-1 g/cc 1	0 API4000	30 DegC 32	40 uS/ft 240	
				32" NRes				Sst (dtst)	
				0 4000				40 us/ft 240	
				64" NRes					
				0 4000					

MW-14 Geophysical Summary







MW-14 Geophysical Summary

				<div>64" NRes</div> <div>04000</div>								<div>Sst (dtst)</div> <div>40us/ft240</div>		VFX	
				<div>32" NRes</div> <div>04000</div>											Picks DIPA
		<div>1-Arm Cal</div> <div>2inches12</div>	<div>SP</div> <div>100mV500</div>	<div>Guard Res</div> <div>02000</div>	<div>16" NRes</div> <div>04000</div>					<div>Comp.</div> <div>-1g/cc1</div>	<div>Neutron-Wet</div> <div>0API4000</div>	<div>Temperature</div> <div>30DegC32</div>	<div>Ss (dts)</div> <div>40uS/ft240</div>		
<div>Depth</div> <div>1in:20ft</div>	<div>GR</div> <div>0API200</div>	<div>ARI</div> <div>01500</div>	<div>SPR</div> <div>02000</div>	<div>8" NRes</div> <div>04000</div>					<div>Density</div> <div>1g/cc3</div>	<div>Neutron-Dry</div> <div>3000API7000</div>	<div>Fluid Resistivity</div> <div>10Ohm-m20</div>	<div>Sp (dtp)</div> <div>40us/ft240</div>			

Geophysical Summary Legend

Mnemonics and Comments

GR = natural gamma ray log plotted from 0 to 200 API uints (green line)
1-Arm Cal = 1-arm mechanical caliper of hole diameter plotted from 2-12 inches (dotted blue line)

SP = spontaneous potential log plotted 100 to 500 mV (orange line)
ARI = Acoustic Reflectance Index or relative rock hardness from ABI Amplitude log. Plotted 0 (soft) to 1500 (harder) as green line.

SPR = single point resistance log plotted 0 to 2000 ohms (green line)
Guard Res = micro-guard or LL3 resistivity log plotted 0 to 2000 ohm-meters (black line)

8" NRes = 8" normal resistivity log plotted 0 to 4000 ohm-meters (dotted red line)
16" NRes = 16" normal resistivity log plotted 0 to 4000 ohm-meters (blue line)
32" NRes = 32" normal resistivity log plotted 0 to 4000 ohm-meters (red line)
64" NRes = 64" normal resistivity log plotted 0 to 4000 ohm-meters (dotted black line)

Density = gamma-gamma density log plotted 1 to 3 g/cc (red line)
Comp. = density compensation log plotted -1 to 1 g/cc (dotted brown line)

Neutron (Dry) = neutron log above fluid level plotted 3000 to 7000 API units (dotted blue line)
Neutron (Wet) = neutron log below fluid level plotted 0 to 4000 API units (blue line)

Fluid Res = fluid resistivity log plotted 10 to 20 ohm-meters (red line)
Temperatue = fluid temperature log plotted 30 to 32 deg Celcius (blue line)

Sp (dtp) = P-wave slowness or transit time log plotted 40 to 240 uSec/ft (green line)
Ss (dts) = S-wave slowness or transit time log plotted 40 to 240 uSec/ft (pink line). Values greater than ~200 uS/ft are invalid.
Sst (dtst) = Stoneley-wave slowness or transit time log plotted 40 to 240 uSec/ft (blue line).

VFXs = Near Vertical Fractures, highly fractured zones and Fanglomerate or Breccia zones
Picks = planar featues picked on optical or acoustic borehole image shown as colored sinusoid (color designation shown on header) DIPA = dip apparent hole axis

Prepared by Robert E. Crowder
Rev 8-1-2008



Southwest Exploration Services, LLC

borehole geophysics & video services

COMPANY	MALCOLM PINNIE	STATE	ARIZONA
WELL ID	MW-16		
FIELD	PHOENIX		
COUNTY	MARICOPA		
TYPE OF LOGS	SUMMARY LOG		
MORE:			3-ARM CALIPER E-LOGS GAMMA-TEMP GUARD RESISTIVITY OBI-40 NEUTRON 3-AX SONIC
LOCATION			
SEC	TWP	RGE	
PERMANENT DATUM		ELEVATION	K.B.
LOG MEAS. FROM	GROUND LEVEL	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM			G.L.
DATE	04-02-11	TYPE FLUID IN HOLE	FRESH WATER
RUN No	1	SALINITY	N/A
TYPE LOG	SUMMARY	DENSITY	N/A
DEPTH-DRILLER	510 FT	LEVEL	251 FT
DEPTH-LOGGER	508 FT	MAX REC. TEMP.	266 Deg C
BTM LOGGED INTERVAL	508 FT	IMAGE ORIENTED TO:	N/A
TOP LOGGED INTERVAL	SURFACE	SAMPLE INTERVAL	0.25
DRILLER / RIG#	YELLOW JACKET	LOGGING-TRUCK	TRUCK #440
RECORDED BY / Logging Eng.	K. MITCHELL	TOOL STRING-SSN	MULTIPLE
WITNESSED BY	MALCOLM PINNIE, C. LEGG	LOG TIME-ON SITE/OFF SITE	
RUN	BOREHOLE RECORD	CASING RECORD	
NO.	BIT	SIZE	WGTL.
1	15"	SURFACE	12"
2	10"	20 FT	STEEL
		TOTAL DEPTH	21 FT
COMMENTS:			

Major Lithology

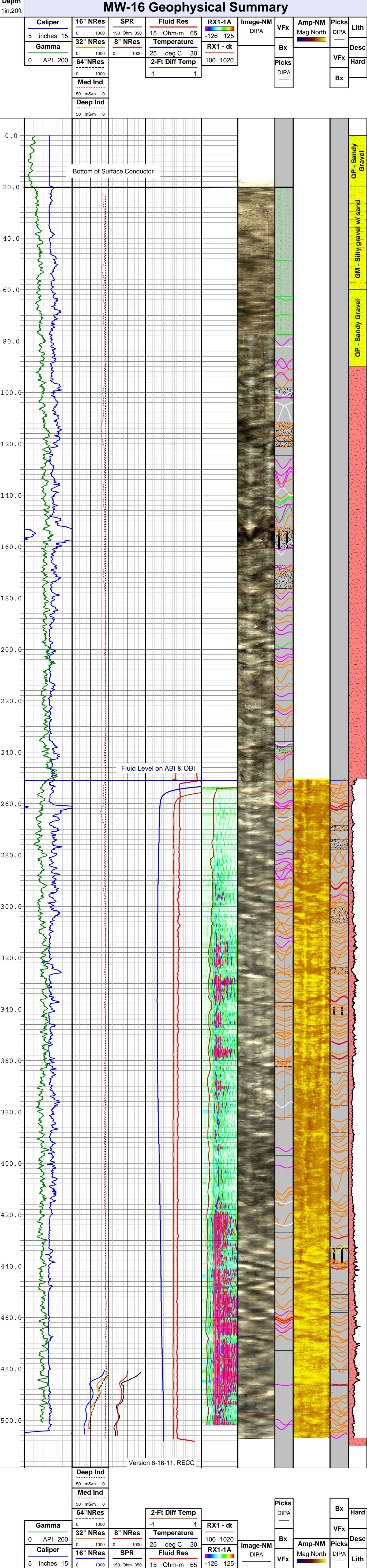
- GM - Silty gravel w/ sand
- GP - Sandy Gravel
- BR - Granodiorite

Optical Image Features Legend

- Btm of Casing
- Filled Fracture / Joint
- Bedding / Banding / Foliation / Veins
- Partially Open Joint / Fracture
- Minor Open Joint / Fracture
- OJ/Fx terminates at Fx intersection
- Unclassified
- Sulfide Vein
- Breakouts
- Major Open Joint / Fracture
- Fluid Level

VFx Lithology Legend




- Breccia or Conglomerate
- Large Vugs/Vesicles (> 6")
- Medium Vugs/Vesicles (2-6")
- Small Vugs/Vesicles (< 2")
- >2 Near Vertical Fxs
- 2 Near Vertical Fxs
- 2 Wide Near Vertical Fxs
- Filled Fxs
- Conglomerate - sand matrix supported
- Conglomerate - mud matrix supported
- Conglomerate - clast supported
















COMPANY MALCOLM PIRNIE WELL ID MW-17 FIELD PHOENIX COUNTY MARICOPA STATE ARIZONA TYPE OF LOGS: SUMMARY LOG MORE: LOCATION SFC TWP RGE ELEVATION K.B. D.F. G.L. PERMANENT DATUM LOG MEAS. FROM GROUND LEVEL ABOVE PERM. DATUM DRILLING MEAS. FROM DATE 04-02-11 RUN NO. 1 TYPE LOG SUMMARY DEPTH-DRILLER 280 FT DEPTH-LOGGER 272 FT BIT/LOGGED INTERVAL 272 FT TOP LOGGED INTERVAL N/A DRILLER / RIG# YELLOW JACKET RECORDED BY / Logging Eng K. MITCHELL WITNESSED BY MALCOLM PIRNIE, C. LIEGG BOREHOLE RECORD RUN NO. 1 BIT 15" FROM SURFACE TO 20 FT Casing Record WGT. 12" FROM STEEL TO SURFACE 21 FT COMMENTS: 2 10" TOTAL DEPTH 30 FT	OTHER SERVICES 3-ARM CALIPER E-LOGS-GAMMA-TEMP GUARD RESISTIVITY OBI-40, ABI-40 NEUTRON 3 RX SONIC












Major Lithology

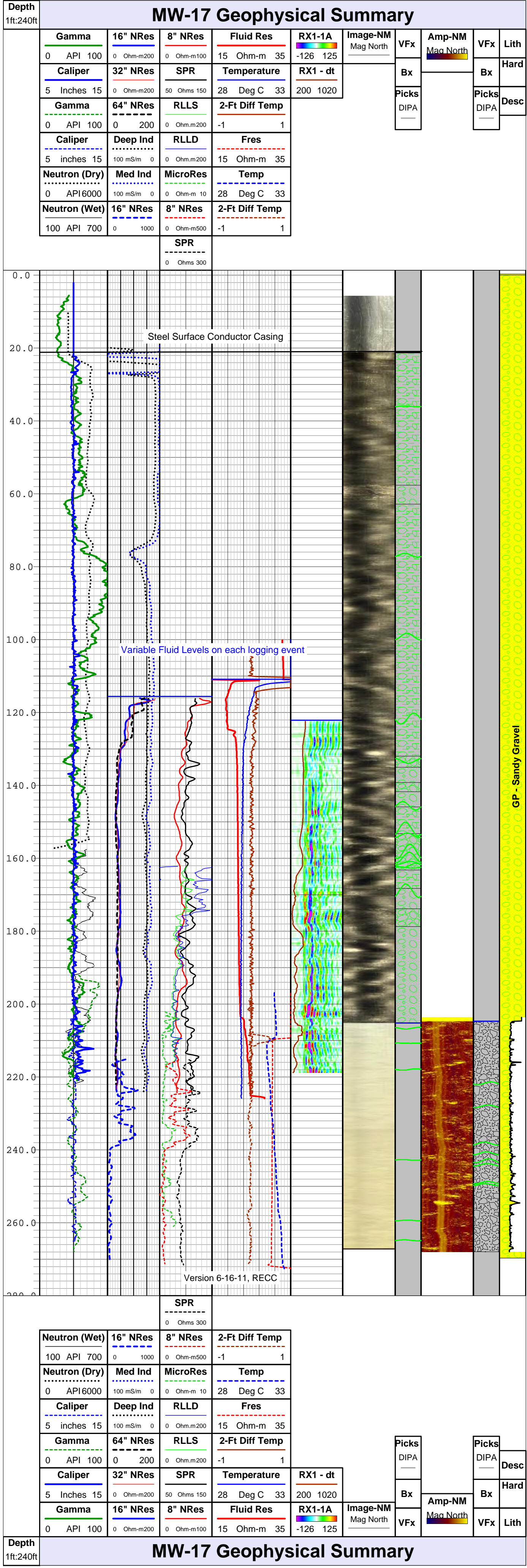
-  GM - Silty gravel w/ sand
-  GP - Sandy Gravel
-  BT - Granodiorite

Optical Image Features Legend

-  Btm of Casing
-  Filled Fracture / Joint
-  Bedding / Banding / Foliation / Veins
-  Partially Open Joint / Fracture
-  Minor Open Joint / Fracture
-  OJ/Fx terminates at Fx intersection
-  Unclassified
-  Sulfide Vein
-  Breakouts
-  Major Open Joint / Fracture
-  Fluid Level

VFx Lithology Legend

-  Breccia or Conglomerate
-  Large Vugs/Vesicles (> 6")
-  Medium Vugs/Vesicles (2-6")
-  Small Vugs/Vesicles (< 2")
-  >2 Near Vertical Fxs
-  2 Near Vertical Fxs
-  2 Wide Near Vertical Fxs
-  Filled Near Vert Fxs
-  Conglomerate - sand matrix supported
-  Conglomerate - mud matrix supported
-  Conglomerate - clast supported



GP - Sandy Gravel

Geophysical Log Summary Hole MW-18

Malcolm Pirnie Phoenix, Maricopa County, Az

Image Features Oriented to Magnetic North and not Corrected for Magnetic Declination
Feature Dip is from 0 to 90 deg (0 = Horizontal, 90 = Vertical) Logged: Sept. 17, 2009



Southwest Exploration Services, LLC
borehole geophysics & video services



Optical Image Features Legend

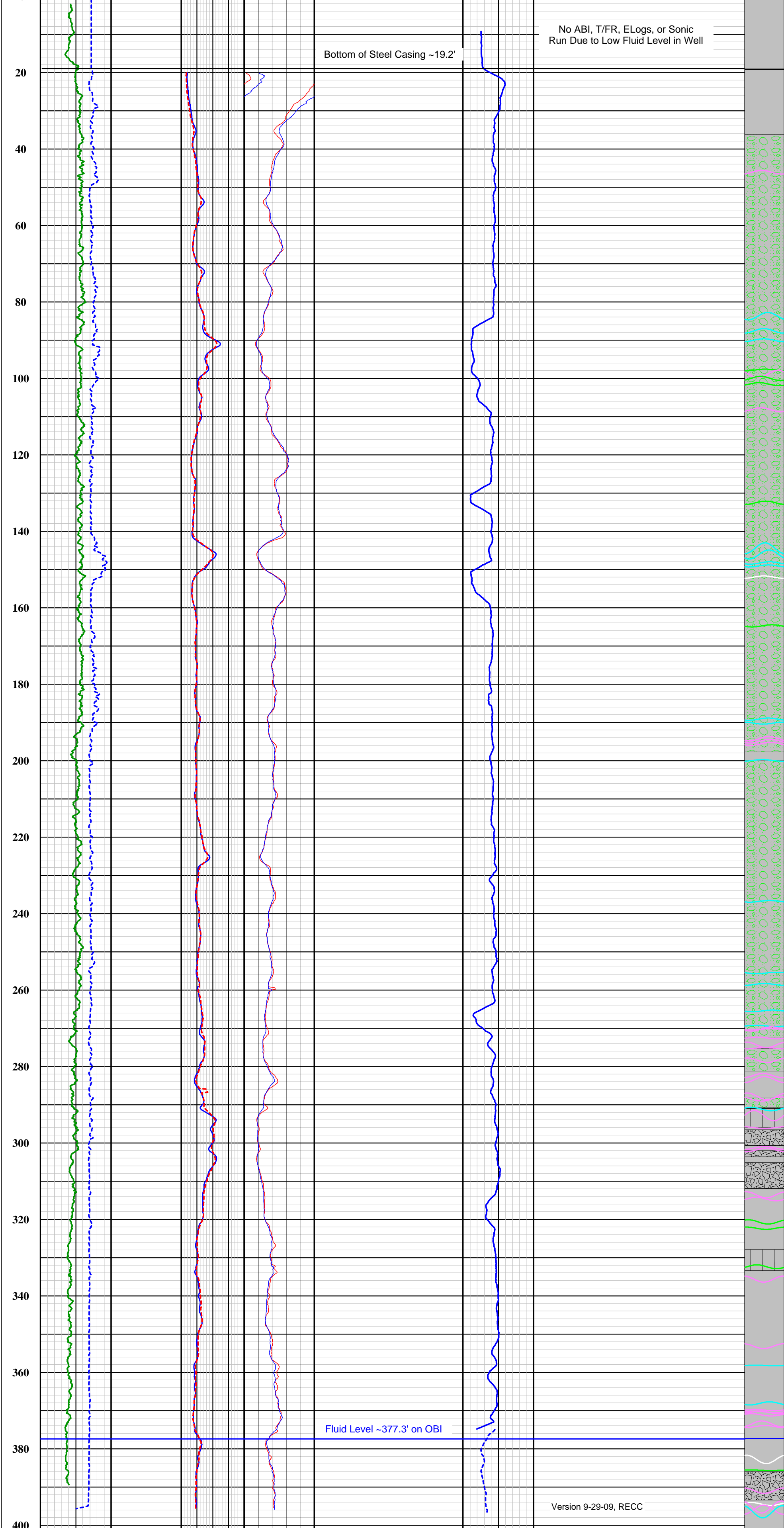
- Major Fracture/Joint - distinct wide fracture/joint continuous around circumference of hole
- Minor Fracture/Joint - thin or discontinuous fracture/joint around circumference of hole
- Partially Open Fracture/Joint
- In-filled Fracture/Joint or Vein
- Bedding - apparent bedding; rock boundary; banding or foliation feature
- Bottom of Casing
- Fluid level in borehole
- Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.
- Distinct probable Fracture/Joint continuous over a portion of the circumference of hole - usually terminated at another fracture intersection

VFx Lithology Legend

- Breccia or Conglomerate
- Large Vugs/Vesicles (> 6")
- Medium Vugs/Vesicles (2-6")
- Small Vugs/Vesicles (< 2")
- >2 Near Vertical Fxs
- 2 Near Vertical Fxs
- 2 Wide Near Vertical Fxs
- Breakouts
- Drilling Induced Fxs
- Conglomerate - mud matrix supported
- Conglomerate - clast supported
- Conglomerate - sand matrix supported

Depth 1in:20ft	3-Arm Caliper 3 inches 13	MIL 0 mS/m200	Res ILM 0 ohm-m 50	Neutron - Dry 2000 10000	Picks DIPA
	GR 0 API 200	DIL 0 mS/m200	Res ILD 0 ohm-m 50	Neutron - Wet 0 API2000	VFx

MW-18 Geophysical Summary



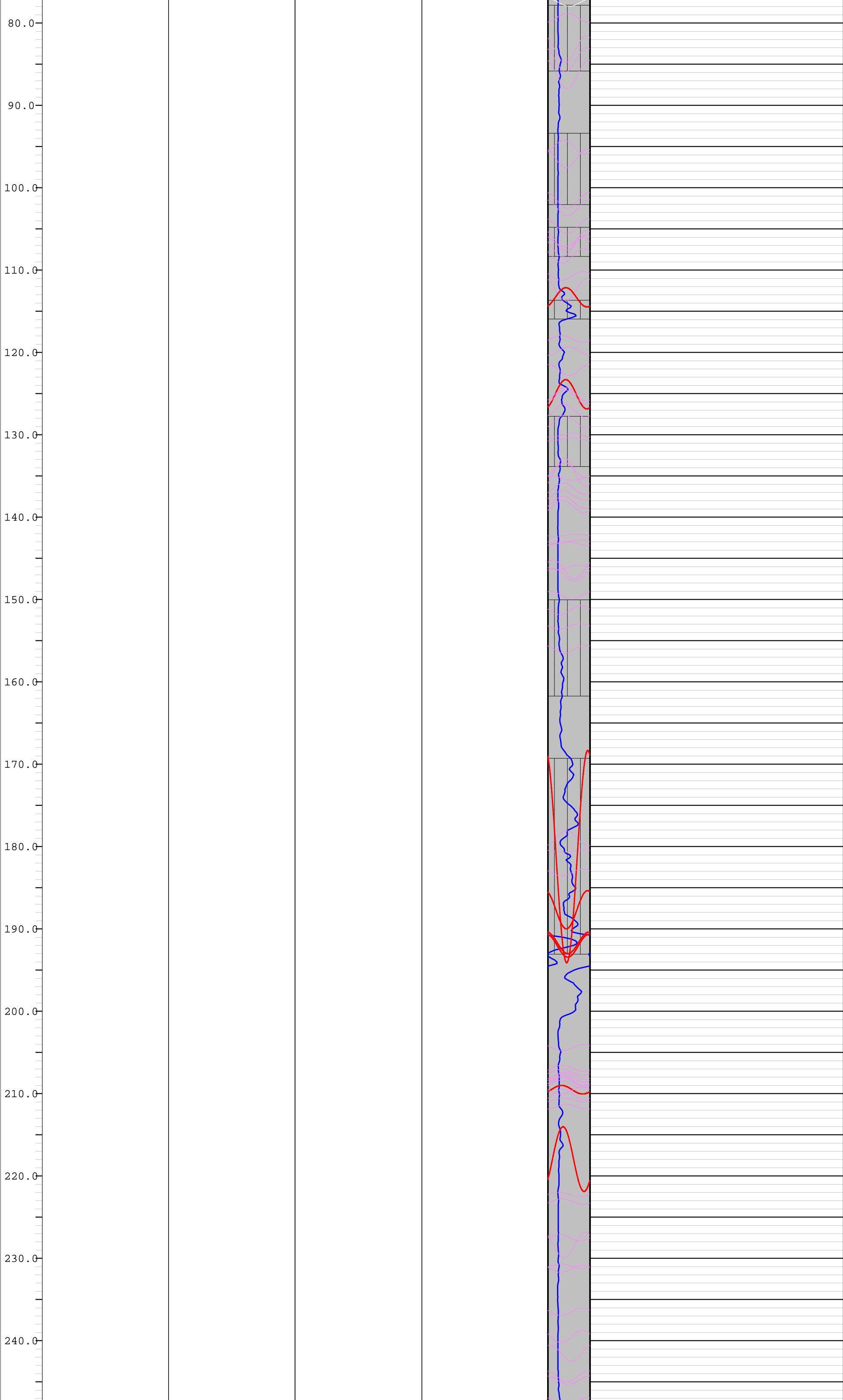
MW-18 Geophysical Summary

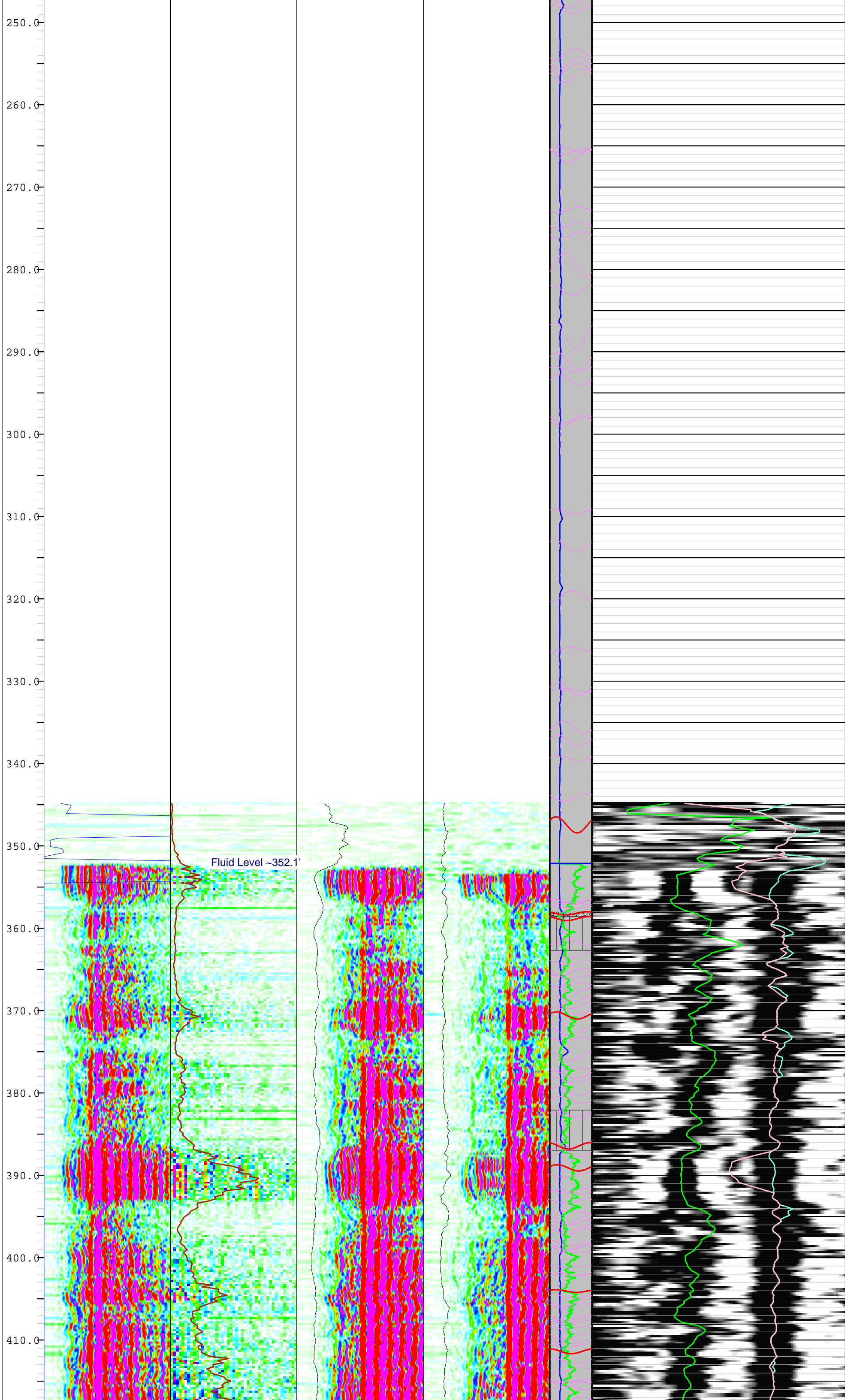
Depth 1in:20ft	GR 0 API 200	DIL 0 mS/m200	Res ILD 0 ohm-m 50	Neutron - Wet 0 API2000	VFx
	3-Arm Caliper 3 inches 13	MIL 0 mS/m200	Res ILM 0 ohm-m 50	Neutron - Dry 2000 10000	Picks DIPA

Geophysical Summary Legend


Mnemonics and Comments


- GR** = natural gamma ray log plotted from 0 to 200 API units (green line)
- 3-Arm Cal** = 3-arm mechanical caliper of hole diameter plotted from 3-13 inches (dotted blue line)
- SP** = spontaneous potential log was not run due to low fluid level in well.
- ARI** = Acoustic Reflectance Index or relative rock hardness from ABI log -- ABI was not run due to low fluid level in well.
- SPR** = single point resistance log was not run due to low fluid level in well.
- Guard Res** = micro-guard or LL3 resistivity log was not run due to low fluid level in well.
- 8" NRes** = 8" normal resistivity log was not run due to low fluid level in well.
- 16" NRes** = 16" normal resistivity log was not run due to low fluid level in well.
- 32" NRes** = 32" normal resistivity log was not run due to low fluid level in well.
- 64" NRes** = 64" normal resistivity log was not run due to low fluid level in well.
- MIL** = medium depth induction log plotted 0 to 200 mS/meter (dotted blue line)
- DIL** = deep depth induction log plotted 0 to 200 mS/meter (dotted dashed red line)
- Res ILM** = medium depth induction resistivity log (recipocal of conductivity) plotted 0 to 50 ohm-meter (red line)
- Res ILD** = deep depth induction resistivity log (recipocal of conductivity) plotted 0 to 50 ohm-meter (blue line)
- Density** = gamma-gamma density log was not run.
- Comp.** = density compensation log was not run.
- Neutron (Dry)** = neutron log above fluid level plotted 2000 to 10000 API units (blue line)
- Neutron (Wet)** = neutron log below fluid level plotted 0 to 2000 API units (dotted blue line)
- Fluid Res** = fluid resistivity log was not run due to low fluid level in well.
- Temperatue** = fluid temperature log was not run due to low fluid level in well.
- Sp (dtp)** = P-wave slowness or transit time log -- sonic log not run due to low fluid level in well.
- Ss (dts)** = S-wave slowness or transit time log -- sonic log not run due to low fluid level in well.
- Sst (dtst)** = Stoneley-wave slowness or transit time log -- sonic log was not run due to low fluid level in well.
- VFxs** = Near Vertical Fractures, highly fractured zones and Fanglomerate or Breccia zones
- Picks** = planar features picked on optical or acoustic borehole image shown as colored sinusoid (color designation shown on header) DIPA = dip apparent hole axis








Optical and Acoustic Image Features Legend


 In-filled Fracture/joint or vein


 Major fracture - distinct wide fracture/joint continuous around circumference of hole


 Bedding - apparent bedding; rock boundary; banding or foliation feature

 Fluid level in boreohle


 Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.

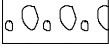
 Distinct probable fracture/joint continuous over a portion of the circumference of hole - usually terminated at another fracture interesection

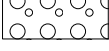
 Minor fracture - thin or discontinuous fracture/joint around circumference of hole

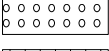
 Bottom of Casing


VFx Lithology Legend

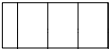
 Breccia or Conglomerate


 Large Vugs/Vesicles (> 6")


 Medium Vugs/Vesicles (2-6")

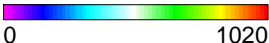
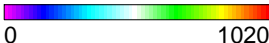
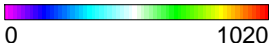

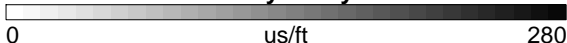
 Small Vugs/Vesicles (< 2")

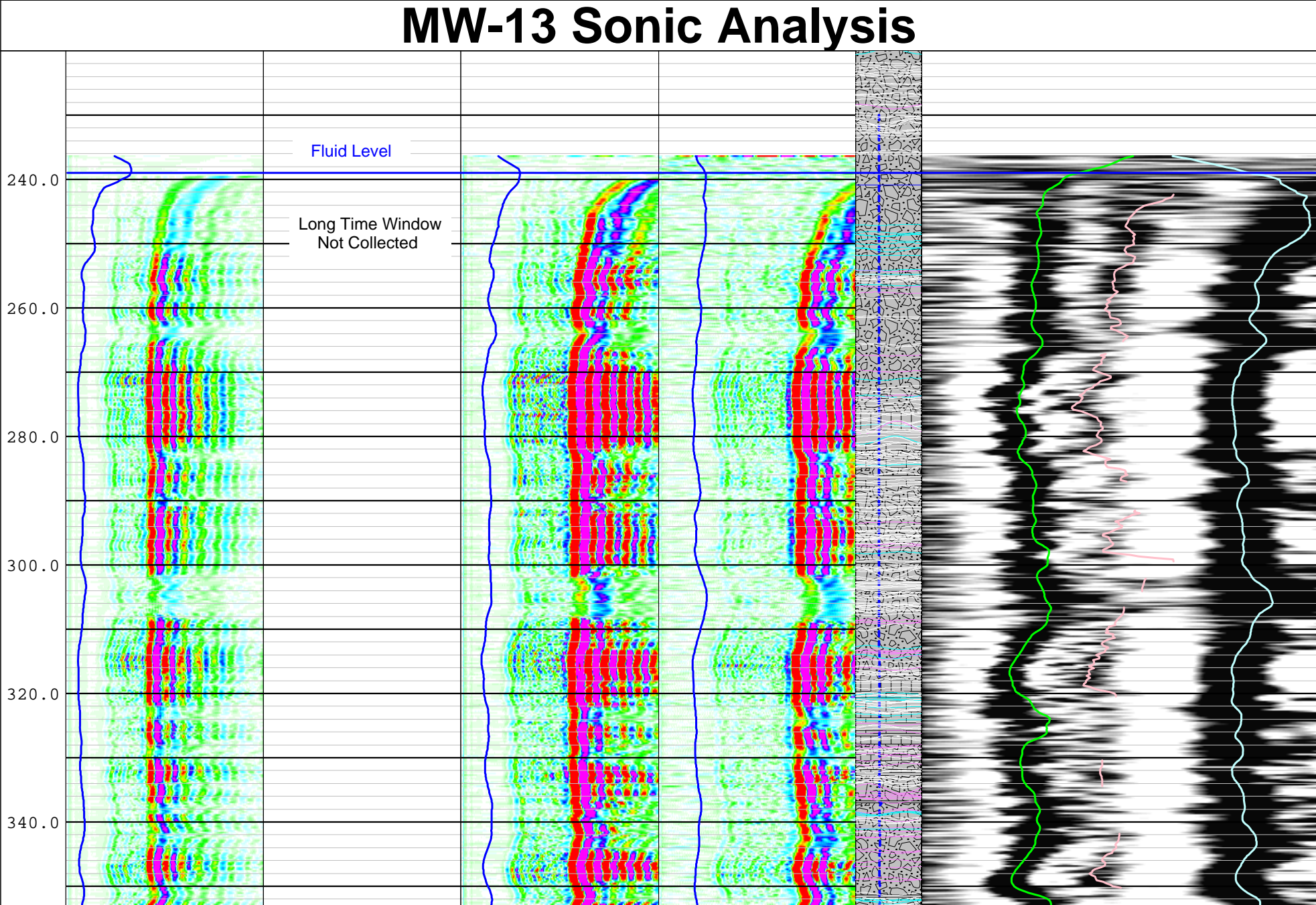
 >2 Near Vertical Fxs

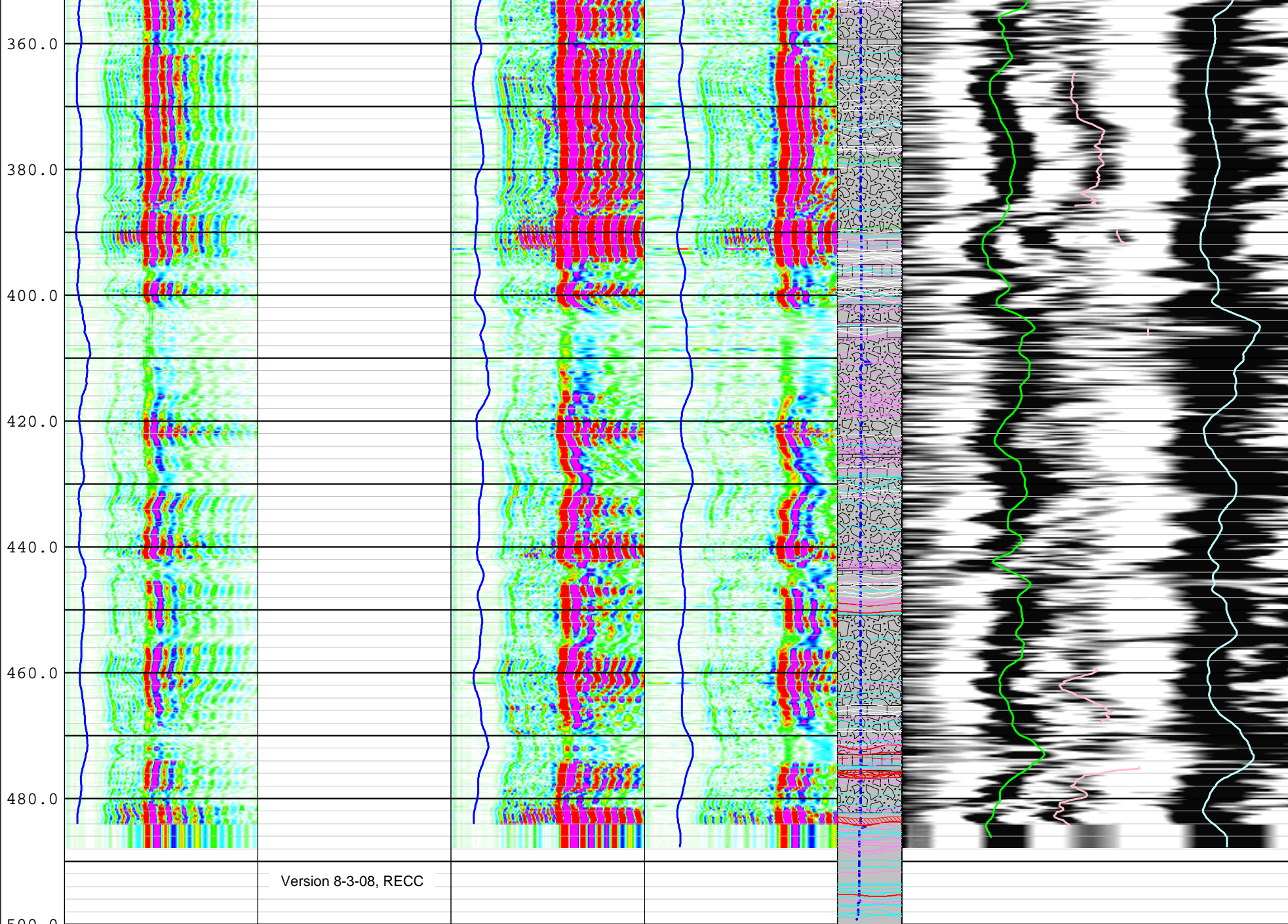
 2 Near Vertical Fxs

 2 Wide Near Vertical Fxs

 Drilling Induced Fxs

Depth 1in:20ft	RX1-1A			RX2-1A			RX3-1A			Caliper	Velocity Analysis		
										 2 7		0	280
	RX1-1A - dt			RX2-1A - dt			RX3-1A - dt					us/ft	
	100	1000	uSec	100	1000	uSec	100	1000	uSec	Picks		Sp	
										DIPA	0	us/ft	280
												Ss	
											0	us/ft	280
										VFx		Sst	
										ARI	0	us/ft	280





MW-13 Sonic Analysis									
					ARI				
							Sst		
					0		us/ft 280		
							Ss		
					0		us/ft 280		
					Picks				
					DIPA		Sp		
					0		us/ft 280		
							Velocity Analysis		
					0		us/ft 280		
					Caliper				
					2 7				

RX1-1A - dt		
100	uSec	1000
RX1-1A		
0		1020

RX2-1A - dt		
100	uSec	1000
RX2-1A		
0		1020

RX3-1A - dt		
100	uSec	1000
RX3-1A		
0		1020

Depth	
1in:20ft	

Sonic Analysis Summary Legend

Mnemonics and Comments

- RX1-1A

= 2D plot of sonic waveform VDL log from receiver 1 (0.6m Rx-Tx spacing) plotted from 100 to 1100 in uSecs
- RX1-1A-dt

= first arrival pick (P-wave) on receiver 1 (0.6m Rx-Tx spacing) plotted from 100 to 1100 in uSecs (thin blue line)
- RX2-1A

= 2D plot of sonic waveform VDL log from receiver 2 (0.8m Rx-Tx spacing) plotted from 100 to 1100 in uSecs
- RX2-1A-dt

= first arrival pick (P-wave) on receiver 2 (0.8m Rx-Tx spacing) plotted from 100 to 1100 in uSecs (thin black line)
- RX3-1A

= 2D plot of sonic waveform VDL log from receiver 3 (1.0m Rx-Tx spacing) plotted from 100 to 1100 in uSecs
- RX3-1A-dt

= first arrival pick (P-wave) on receiver 3 (1.0m Rx-Tx spacing) plotted from 100 to 1100 in uSecs (thin black line)
- 3-Arm

= 3-arm mechanical caliper of hole diameter plotted from 5-10 inches (blue line)
- ARI

= Acoustic Reflectance Index or relative rock hardness from ABI Amplitude log. Plotted 0 (soft) to 1500 (harder) as green line.
- VFXs

= Near Vertical Fractures, highly fractured zones and Fanglomerate or Breccia zones
- Picks

= planar features picked on optical or acoustic borehole image shown as colored sinusoid (color designation shown on header) DIPA = dip apparent hole axis
- Velocity Analysis


= gray scale variable density display of velocity semblance waveform; plotted from 0 to 280 uSec/ft.
- Sp

= apparent P-wave transit time or slowness from maximum energy peak on semblance velocity waveform in uSec/ft. (light blue line).
- Ss


= apparent S-wave transit time or slowness from maximum energy peak on semblance velocity waveform in uSec/ft. (light green line).
- Sst

= apparent Stonely-wave slowness from maximum energy peak on semblance velocity waveform in uSec/ft. (yellow line).


Optical and Acoustic Image Features Legend




In-filled Fracture/joint or vein




Major fracture - distinct wide fracture/joint continuous around circumference of hole




Bedding - apparent bedding; rock boundary; banding or foliation feature




Fluid level in boreohle




Unclassified - planar feature continuous around circumference - type of feature not determined: may be a: 1) fracture; 2) bedding feature; etc.



Distinct probable fracture/joint continuous over a portion of the circumference of hole - usually terminated at another fracture interesection




Minor fracture - thin or discontinuous fracture/joint around circumference of hole

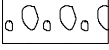


Bottom of Casing

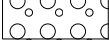
VFx Lithology Legend



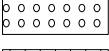
Breccia or Conglomerate



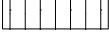
Large Vugs/Vesicles (> 6")




Medium Vugs/Vesicles (2-6")




Small Vugs/Vesicles (< 2")




>2 Near Vertical Fxs



2 Near Vertical Fxs

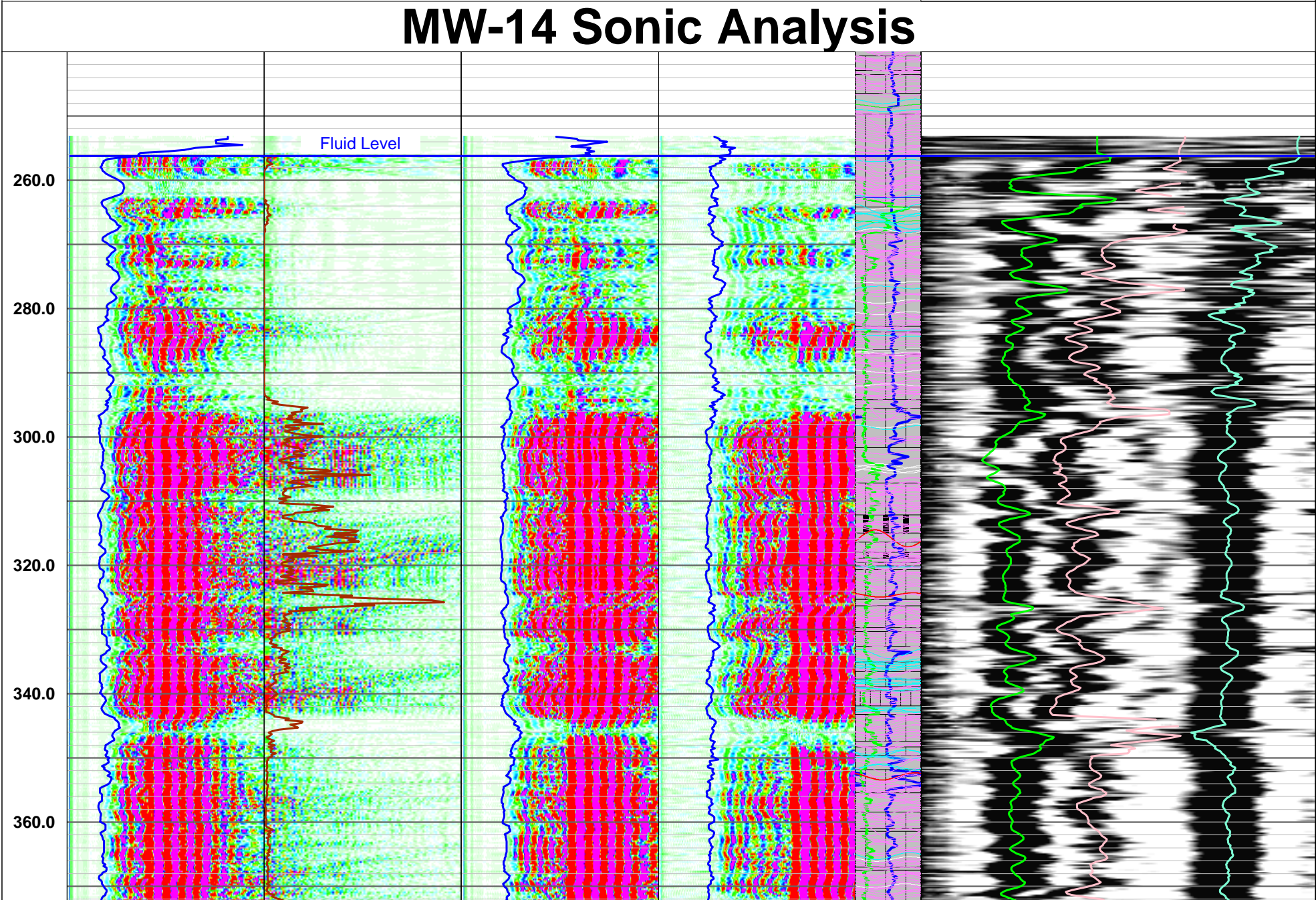


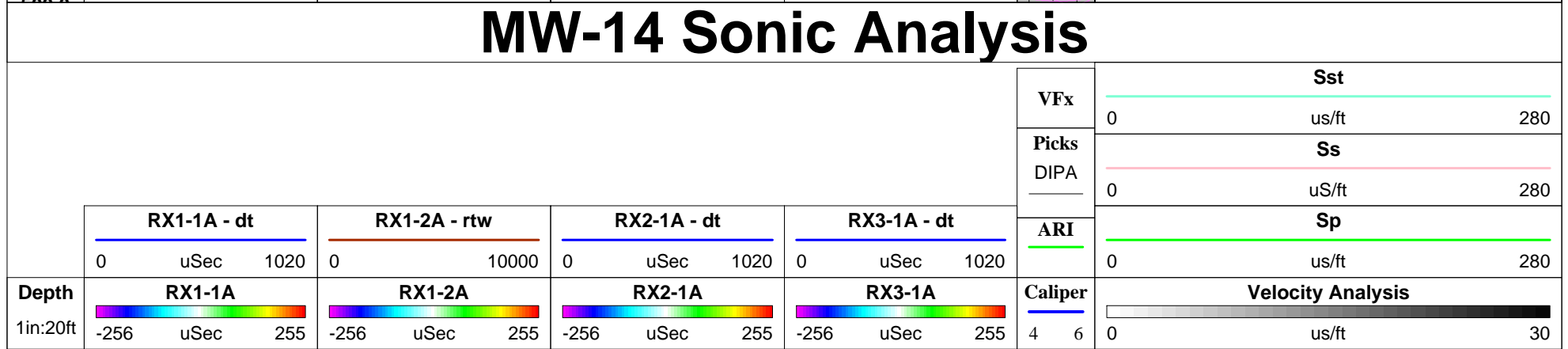
2 Wide Near Vertical Fxs



Drilling Induced Fxs

Depth 1in:20ft	RX1-1A	RX1-2A	RX2-1A	RX3-1A	Caliper	Velocity Analysis		
	<div><div></div><div>-256 uSec 255</div></div>	<div><div></div><div>-256 uSec 255</div></div>	<div><div></div><div>-256 uSec 255</div></div>	<div><div></div><div>-256 uSec 255</div></div>	<div><div></div><div>4 6</div></div>	<div><div></div><div>0 us/ft 30</div></div>		
	<div><div>RX1-1A - dt</div><div><div></div><div>0 uSec 1020</div></div></div>	<div><div>RX1-2A - rtw</div><div><div></div><div>0 10000</div></div></div>	<div><div>RX2-1A - dt</div><div><div></div><div>0 uSec 1020</div></div></div>	<div><div>RX3-1A - dt</div><div><div></div><div>0 uSec 1020</div></div></div>	ARI	<div><div></div><div>0 us/ft 280</div></div>	Sp	
					Picks DIPA	<div><div></div><div>0 uS/ft 280</div></div>	Ss	
					VFx	<div><div></div><div>0 us/ft 280</div></div>	Sst	



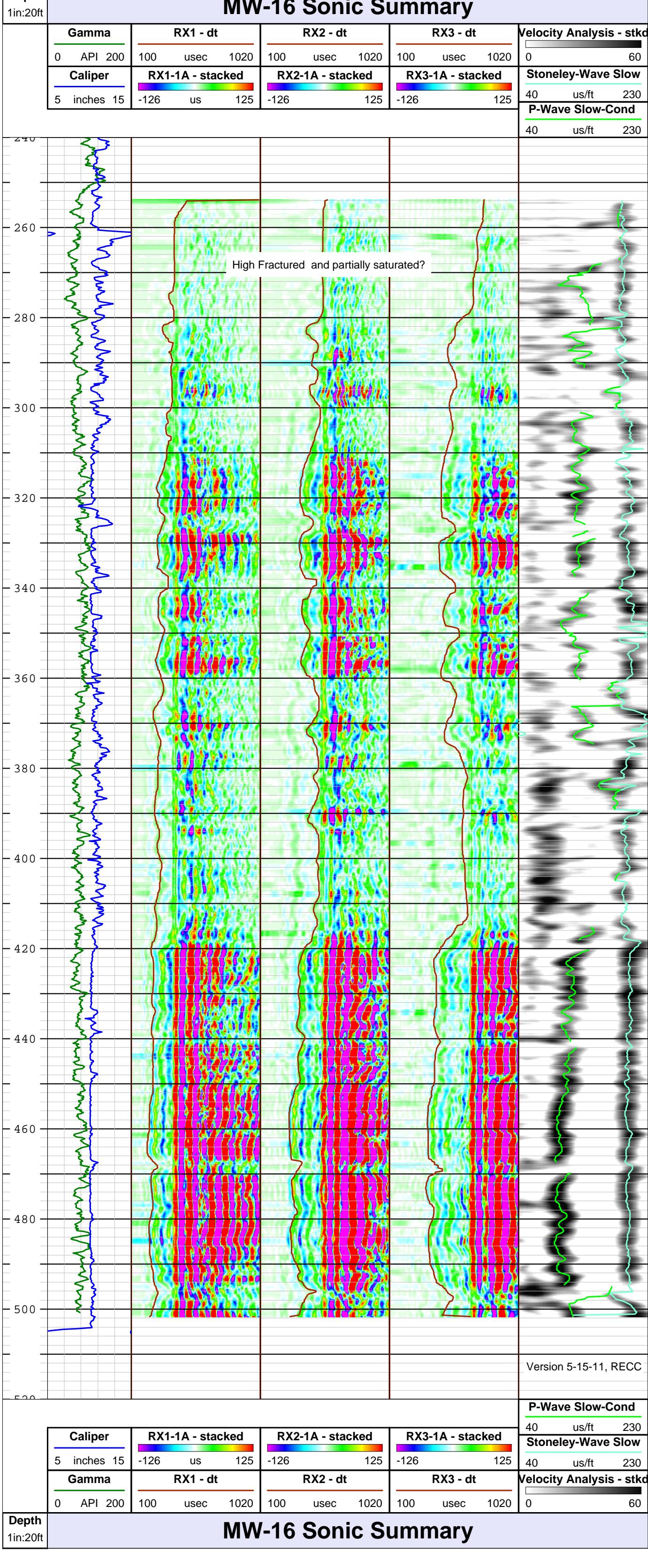


Mnemonics and Comments

Prepared by Robert E. Crowder
Rev 8-1-2008



COMPANY MALCOLM PRINNE					
WELL ID		MW-16			
FIELD		PHOENIX			
COUNTRY	MARICOPA	STATE		ARIZONA	
TYPE OF LOGS: 50 MM SONIC-3 RX MORE: CALIBER				OTHER SERVICES 3-ARM CALIPER E-LOGS/GAMMA-TEMP GUARD RESISTIVITY OH-40 AB-40 NEUTRON	
SEC.	TWP	RGE		K.B.	
PERMANENT DATUM		ELEVATION			
LOG MEAS. FROM		GROUND LEVEL	ABOVE PERM. DATUM	D.F.	
DRILLING MEAS. FROM				G.L.	
DATE	03-30-11	TYPE FLUID IN HOLE		FRESH WATER	
RUN No	1	SALINITY	N/A		
TYPE LOG	50 MM SONIC	DENSITY	N/A		
DEPTH-DRILLER	500 FT	LEVEL			
DEPTH-LOGGER	504 FT	MAX. REC. TEMP.	Deg C		
BTM LOGGED INTERVAL	504 FT	IMAGE ORIENTED TO	N/A		
TOP LOGGED INTERVAL	254 FT	SAMPLE INTERVAL	0.25		
DRILLER / RIG#	YELLOW JACKET	LOGGING TRUCK	TRUCK #400		
RECORDED BY / Logging Eng	K. MITCHELL	TOOL STRING-SSN	ALT 90 MM SONIC - 3RX		
WITNESSED BY	MALCOLM PRINNE C. LEGG	LOG TIME/ON SITE/OFF SITE		7:00 AM	
RUN	BOREHOLE RECORD		CASING RECORD		
BIT	FROM	TO	SIZE	WGT.	FROM
NO.	1	15"	SURFACE	20 FT	STEEEL
1	15"	SURFACE	20 FT	STEEEL	SURFACE
10"	20 FT	TOTAL DEPTH			21 FT
COMMENTS:					



Mnemonics and Comments

Gamma = natural gamma ray log plotted from 0 to 200 API units (green line)
Caliper = 3-arm mechanical caliper of hole diameter plotted from 5-15 inches (blue line)

RX1-1A-stacked = color variable density display of 0.6m Rx waveform; stacked over 5 waveforms and plotted from 100 to 1020 uSec.

RX1 - dt = Manual P-wave travel time pick. Plotted 100 to 1020 μ Sec (brown line)

RY2-1A stacked \rightarrow \rightarrow right to left distal of 22. Base of stacked distal 5 mm of

RXZ-1A-stacked = color variable density display of 0.8m Rx waveform; stacked over 5 plotted from 100 to 1020 uSec.

RX2 - dt = Manual P-wave travel time pick. Plotted 100 to 1020 uSec (brown line).

RY2 1A stacked color-variable density display of 1.0m Ry waveforms stacked over 5 s

RX5-1A-stacked = color variable density display of 1.0m Rx waveform; stacked over 5 waveforms and plotted from 100 to 1020 uSec.

RX3 - dt = Manual P-wave travel time pick. Plotted 100 to 1020 uSec (brown line).

Velocity Analysis-- stkd = gray scale variable density display of velocity semblance waveform of the stacked waveforms; plotted from 40 to 230 uSec/ft.

P-wave Slowness = apparent P-wave transit time or slowness from maximum energy peak on semblance velocity waveform in uSec/ft (green line).

semblance velocity waveform in $\mu\text{Sec}/\text{t}$. (light blue line).

Discussion



COMPANY MALCOLM PIRNIE				STATE ARIZONA			
WELL ID MW-17							
FIELD PHOENIX							
COUNTY MARICOPA							
TYPE OF LOGS: 50 MM SONIC-3 RX							
MORE: CALIPER							
LOCATION				OTHER SERVICES 3-ARM CALIPER E-LOGS GAMMA-TEMP GUARD RESISTIVITY OBI-40 NEUTRON			
SEC		TWP		RGE		K.B.	
PERMANENT DATUM				ELEVATION			
LOG MEAS. FROM		GROUND LEVEL		ABOVE PERM. DATUM		D.F.	
DRILLING MEAS. FROM				G.L.			
DATE		04-02-11		TYPE FLUID IN HOLE		FRESH WATER	
RUN No		1		SALINITY		N/A	
TYPE LOG		50 MM SONIC		DENSITY		N/A	
DEPTH-DRILLER		228 FT		LEVEL		150 FT	
DEPTH-LOGGER		223 FT		MAX. REC. TEMP.		Deg C	
BTM LOGGED INTERVAL		220 FT		IMAGE ORIENTED TO		N/A	
TOP LOGGED INTERVAL		150 FT		SAMPLE INTERVAL		0.25	
DRILLER / RIG#		YELLOW JACKET		LOGGING TRUCK		TRUCK # 400	
RECORDED BY / Logging Eng.		K. MITCHELL		TOOL STRING/SGN		ALT 50 MM SONIC - 3RX	
WITNESSED BY		MALCOLM PIRNIE, C. LEGG		LOG TIME/ON SITE/OFF SITE		7:00 AM	
BOREHOLE RECORD							
RUN NO.		FROM		TO		CASING RECORD	
NO.		BIT		SIZE		WGT.	
1		15"		20 FT		12"	
2		10"		20 FT		STEEL	
TOTAL DEPTH						SURFACE	
						21 FT	
COMMENTS:							

