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Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	FR	NM/LC									
				0.15	[Cross-hatched]	BITUMEN						
				0.40	[Diagonal lines]	FILL Clayey Sandy GRAVEL (GP) Dense, fine to medium size, brown and grey, fine to coarse grained sand, low to medium plasticity fines, moist.						
				0.90	[Horizontal lines]	NATURAL CLAY (CH) Very stiff, high plasticity, red grey, moist.						
				1.0	[Diagonal lines]	CLAY (CI) Hard, medium plasticity, red grey, trace of fine to coarse sized gravel, moist.						
				2.0	[Diagonal lines]							U50 PP>600
				3.0	[Diagonal lines]							
				4.0	[Diagonal lines]							
				4.30	[Diagonal lines]							SPT 17, 30/130mm N=R
				4.70	[Dotted]	SANDSTONE (XW) Weak, fine to medium grained						
				5.0	[Dotted]	SANDSTONE, fine grained, light grey mottled orange, granular, laminated, with closely spaced fractures, with thin clay bands.	XW - DW					
				5.20	[Dotted]	SANDSTONE, fine to medium grained, light brown mottled orange, granular, medium bedded with closely spaced fractures, trace of limonite veins, with grey siltstone band from 5.83m to 5.96m.	DW - SW			100	63	5.53 m; J, 40°, P, R, O, L 5.57 m; J, 30°, P, R, O, C
				6.0	[Dotted]							
				6.18	[Dotted]	SANDSTONE, fine to medium grained, light brown mottled orange, granular, medium bedded with very closely spaced fractures, trace of limonite veins.	SW					
				6.50	[Dotted]							
				6.75	[Dotted]	SANDSTONE, fine to medium grained, light brown mottled orange, granular, medium bedded with closely spaced fractures, trace of limonite veins.				100	65	6.79 m; J, 50°, P, R, O, L
				7.0	[Dotted]							
				7.80	[Dotted]	SANDSTONE, fine to medium grained, light brown mottled orange, granular, medium bedded with closely spaced fractures, trace of limonite veins, trace lenses of organics.						7.31 m; J, 20°, P, R, O, L 7.50 m; J, 10°, S, R, O, L
				8.0	[Dotted]							
				8.40	[Dotted]	CONGLOMERATE, coarse grained, yellow brown, granular, massively bedded, very closely spaced fractures, clasts are fine to medium gravel sized of siltstone and quartz. Coarse sandstone matrix.	FR					
				8.90	[Dotted]	CONGLOMERATE, coarse grained, yellow brown, granular, massively bedded, closely spaced fractures, clasts are fine to medium gravel sized of siltstone and quartz. Coarse sandstone matrix.				100	92	9.62 m; DI, 5°, S, R, O, Z 9.89 m; DI, 5°, S, R, O, Z
				10.0	[Dotted]							

Comments:
1) Groundwater not observed, 2) ATV survey carried out.
3) Monitoring well installed to 17.5m on completion.

Defects - 1.54m : F, 60°, P, R, O, C

Depth (m)	Type	Dip (deg)	Planarity	Roughness	Aperture	Width
	B - Bedding		C - Curvilinear	L - Slickensides	C - Closed	C - Clay
	C - Clay seam		D - Discontinuous	P - Polished	F - Filled	P - Iron Oxide
	F - Foliation		P - Planar	R - Rough	N - Clean	K - Calcite
	H - Schistosity		S - Subplanar	S - Smooth	O - Open	L - Limonite
	J - Joint		T - Stepped	V - Very rough	S - Stain	Q - Quartz
	L - Cleavage					S - Secondary mineral
	R - Fracture					U - Unidentified mineral
	S - Shear zone					W - Weathered rock
	T - Contact					X - Carbonaceous
	V - Vein					Z - Clean
	Z - Decomposed Zone					
	DI - Drilling induced break					

Weathering Grades

RS - Residual Soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh

Rock Strength

VW - Very weak
W - Weak
MS - Medium strong
S - Strong
VS - Very strong
ES - Extremely strong

Samples

U50
SPT
Disturbed Sample

Approved: _____
Date: _____

SOIL SURVEYS 00:LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:34 8.30.002 Developed by Dafgei



Easting: 503008 Northing: 6959041 RL: 23.86 m
Logger: SO/CB Operator: SO Machine: Scout 2

Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks		
TC	WB	FR	Casing											
				11.0		CONGLOMERATE, coarse grained, grey with dark grey and light grey, black and pale grey clasts, granular, massively bedded, moderately widely to widely spaced fractures, clasts are fine to medium, with trace coarse gravel size of siltstone, mudstone, sandstone and quartz. Clast supported. With fine to medium sandstone bands from 12.0m to 12.3m, 17.58m to 17.83m and 18.0m to 18.25m. (continued)	SW - FR							
				12.0			FR				100	92	10.52 m; DI, 10°, S, R, O, Z	
				13.0										
				14.0										
				15.0										
				16.0										
				16.48										16.48 m; J, 20°, U, R, O, Z
				16.67										16.67 m; J, 50°, S, R, O, Z
				17.0										
				17.15										17.15 m; J, 40°, U, R, O, Z
				17.23										17.23 m; DI, 10°, T, S, O, Z
				18.0										
				18.32										18.32 m; DI, 5°, S, R, O, W
				18.43										18.43 m; DI, 5°, S, R, O, W
				19.0										
				19.25										19.25 m; DI, 10°, S, R, O, W
				20.0										

Comments:
1) Groundwater not observed, 2) ATV survey carried out.
3) Monitoring well installed to 17.5m on completion.

Defects - 1.54m : F, 60°, P, R, O, C

Depth (m)	Type	Dip (Deg)	Planarity	Roughness	Aperture	Width
	B - Bedding		C - Curvilinear	L - Slickensides	C - Closed	C - Clay
	C - Clay seam		D - Discontinuous	P - Polished	F - Filled	F - Iron Oxide
	F - Foliation		P - Planar	R - Rough	N - Clean	K - Calcite
	H - Schistosity		S - Subplanar	S - Smooth	O - Open	L - Limonite
	J - Joint		T - Stepped	V - Very rough	S - Stain	Q - Quartz
	L - Cleavage		U - Undulating			S - Secondary mineral
	R - Fracture					U - Unidentified mineral
	S - Shear zone					W - Weathered rock
	T - Contact					X - Carbonaceous
	V - Vein					Z - Clean
	Z - Decomposed Zone					
	DI - Drilling induced break					

Weathering Grades

RS - Residual Soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh

Rock Strength

VW - Very weak
W - Weak
MS - Medium strong
S - Strong
VS - Very strong
ES - Extremely strong

Samples

U50

SPT

Disturbed Sample

Approved: _____
Date: _____

SOIL SURVEYS 00:LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:34 8.30.002 Developed by Dajgei



Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	RR	NM/LC									
				20.41	o o o o	CONGLOMERATE, coarse grained, grey with dark grey and light grey, black and pale grey clasts, granular, massively bedded, moderately widely to widely spaced fractures, clasts are fine to medium, with trace coarse gravel size of siltstone, mudstone, sandstone and quartz. Clast supported. With fine to medium sandstone bands from 12.0m to 12.3m, 17.58m to 17.83m and 18.0m to 18.25m. (continued)	FR			100	89	20.18 m; J, 31°, S, R, O, Z 20.23 m; DI, 50°, P, R, O, Z 20.47 m; J, 70°, S, V, O, Z
				21.0	.							
				22.0	.	SANDSTONE, fine to coarse grained, light grey with dark grey, green and light brown grains, granular, massively bedded with moderately widely spaced fractures. Fine to medium grained, from 21.40m to 21.48m.				103	84	21.60 m; J, 75°, S, R, O, Z
				22.16	x x x	TUFF, fine to medium grained, light green, porphyritic, massively bedded, closely spaced to moderately widely spaced fractures.	DW					
				23.0	x x x		DW - SW					22.47 m; J, 35°, P, R, O, W 22.66 m; J, 60°, P, R, O, Z 22.70 m; J, 15°, P, R, O, Z 22.73 m; J, 20°, P, R, O, Z
				24.0	x x x		FR					23.60 m; J, 20°, P, R, O, Z
				25.0	x x x					97	89	
				26.0	x x x							25.67 m; J, 30°, P, R, O, Z 25.78 m; J, 35°, S, R, O, Z
				27.0	x x x							27.44 m; J, 30°, S, R, O, Z 27.55 m; J, 32°, S, R, O, Z
				28.0	x x x					100	89	27.86 m; J, 50°, S, V, O, Z 28.20 m; J, 60°, S, R, O, Z 28.43 m; J, 45°, U, R, O, Z
				29.0	x x x							29.28 m; J, 50°, P, R, O, W 29.40 m; J, 60°, P, R, O, Z
				30.0	x x x					100	100	29.71 m; J, 30°, P, R, O, Z

Comments:
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Defects - 1.54m : F, 60°, P, R, O, C

Depth (m)	Type	Dip (deg)	Planarity	Roughness	Aperture	Width
	B - Bedding		C - Curvilinear	L - Slickensides	C - Closed	C - Clay
	C - Clay seam		D - Discontinuous	P - Polished	F - Filled	P - Iron Oxide
	F - Foliation		P - Planar	R - Rough	N - Clean	K - Kaolinite
	H - Schistosity		S - Subplanar	S - Smooth	O - Open	L - Limonite
	J - Joint		T - Stepped	V - Very rough	S - Stain	Q - Quartz
	L - Cleavage		U - Undulating			S - Secondary mineral
	R - Fracture					U - Unidentified mineral
	S - Shear zone					W - Weathered rock
	T - Contact					X - Carbonaceous
	V - Vein					Z - Clean
	Z - Decomposed Zone					
	DI - Drilling induced break					

Weathering Grades

RS - Residual Soil
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Rock Strength

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Samples

U50
SPT
Disturbed Sample

Approved: _____
Date: _____

SOIL SURVEYS 00: LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:35 8.30.002 Developed by Dargel



Easting: 503008 Northing: 6959041 RL: 23.86 m
Logger: SO/CB Operator: SO Machine: Scout 2

Drilling Method				Depth	Graphic	Description	Weathering	Strength Estimated	Defect Spacing	Rec (%)	RQD	Samples and Remarks
TC	WB	RR	NM/LC									
				30.36	XXXX	TUFF, fine to medium grained, light green mottled light red, porphyritic massively bedded, closely spaced to moderately widely spaced fractures.	FR	[Pattern]	[Pattern]	100	100	30.18 m; J, 40°, U, R, O, Z 30.27 m; J, 20°, P, R, O, W 30.43 m; J, 30°, P, R, O, Z
				31.0	XXXX		SW					31.42 m; J, 30°, S, R, O, W
				32.0	XXXX	TUFF, fine to medium grained, pale light grey, porphyritic, massively bedded, with widely spaced fractures.	FR	[Pattern]	[Pattern]	100	100	34.85 m; J, 42°, U, V, O, Z
				32.54	XXXX							
				33.0	XXXX							
				34.0	XXXX							
				35.0	XXXX							
				35.00		BOREHOLE BH 331 TERMINATED AT 35.00 m						
				36.0								
				37.0								
				38.0								
				39.0								
				40.0								

SOIL SURVEYS 00:LIBRARY 2012:05:G.LB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFiles>> 21/05/2012 14:35 8.30.002 Developed by Dajgeel

Comments:
1) Groundwater not observed, 2) ATV survey carried out.
3) Monitoring well installed to 17.5m on completion.

Defects - 1.54m : F,60°,P,R,O,C

Type	Dip (Deg)	Planarity	Roughness	Aperture	Wt%
B - Bedding	C - Curvilinear	L - Slickensides	C - Closed	C - Clay	
D - Discontinuous	P - Polished	F - Filled	F - Iron Oxide		
H - Schistosity	P - Planar	R - Rough	N - Clean	K - Calcite	
J - Joint	S - Subplanar	S - Smooth	O - Open	L - Limonite	
L - Cleavage	T - Stepped	V - Very rough	S - Stain	Q - Quartz	
R - Fracture	U - Undulating			S - Secondary mineral	
S - Shear zone				U - Unidentified mineral	
T - Contact				W - Weathered rock	
V - Vein				X - Carbonaceous	
Z - Decomposed zone				Z - Clean	
DI - Drilling induced break					

Weathering Grades
RS - Residual Soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh

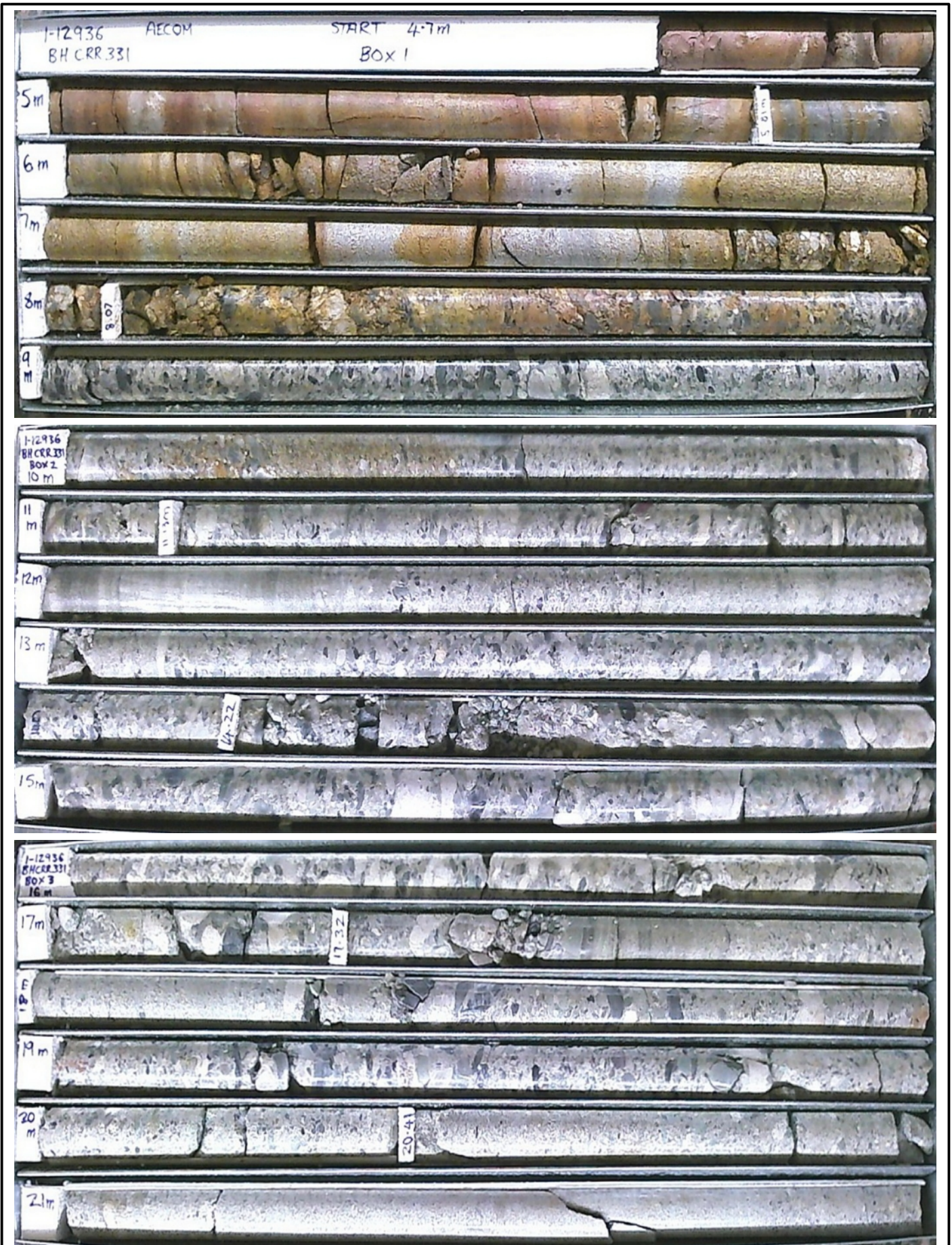
Rock Strength
VW - Very weak
W - Weak
MS - Medium strong
S - Strong
VS - Very strong
ES - Extremely strong

Samples
U50 [Bar] [Sample]
SPT [Bar] [Sample]
Disturbed Sample [Bar] [Sample]

Approved: [Signature]
Date: [Date]

Water First Noted [Symbol] Water Steady Level [Symbol]

SOIL_SURVEYS.00.LIBRARY.GLB.Grctbl.DG.PHOTO.CORE.PHOTO.4.PER.PAGE.111-12936.NEW.GPJ <<DrawingFile>> 26/04/2012 14:48 8.2.856 Developed by Datgel



TITLE

AECOM
Brisbane
Cross River Rail
Core Photo - BH 331

DRAWN	DT	DATE	26/04/2012
CHECKED	CB	DATE	26/04/2012
SCALE	Not To Scale		A4
PROJECT No	110-12936	FIGURE No	1/2

SOIL_SURVEYS_00.LIBRARY.GLB Grictbl DG PHOTO CORE PHOTO 4 PER PAGE 111-12936 NEW.GPJ <<DrawingFile>> 26/04/2012 14:48 8.2.856 Developed by Datgel



TITLE

AECOM
Brisbane
Cross River Rail
Core Photo - BH 331

DRAWN	DT	DATE	26/04/2012
CHECKED	CB	DATE	26/04/2012
SCALE	Not To Scale		A4
PROJECT No	110-12936	FIGURE No	2/2



COMPOSITE LOG

BOREHOLE TELEVIEWER LOGS AND STRUCTURES



Hole Name CRR331
Field Brisbane City
Log Date 8th Mar,2012
Location QLD

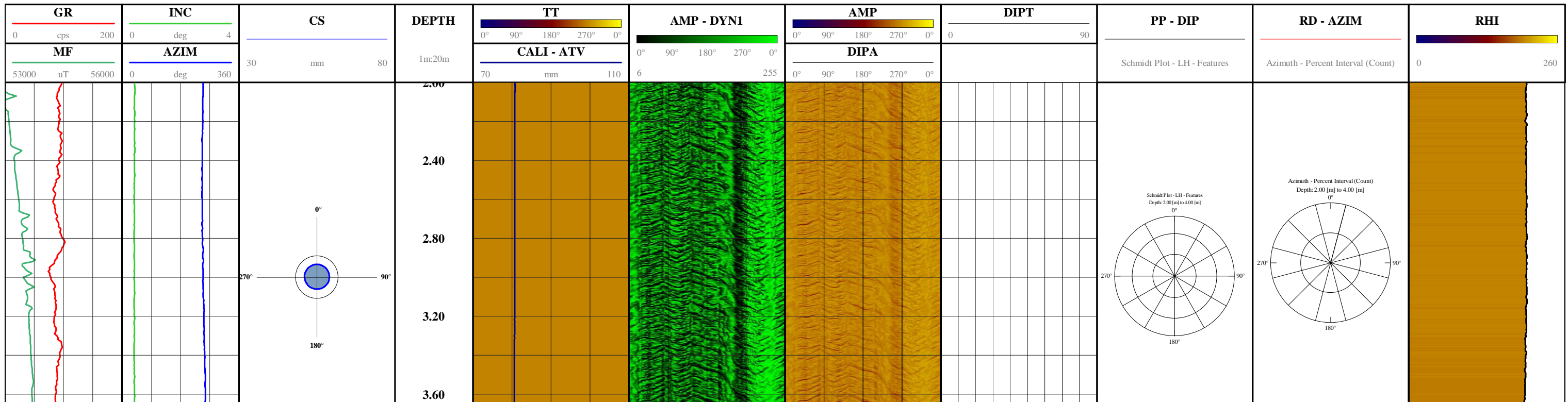
Drill Depth 35m
Bit Size 76mm
Casing Type PVC
Casing Depth N/A

Grid Name N/A
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Collar Northing N/A
Reduced Level N/A

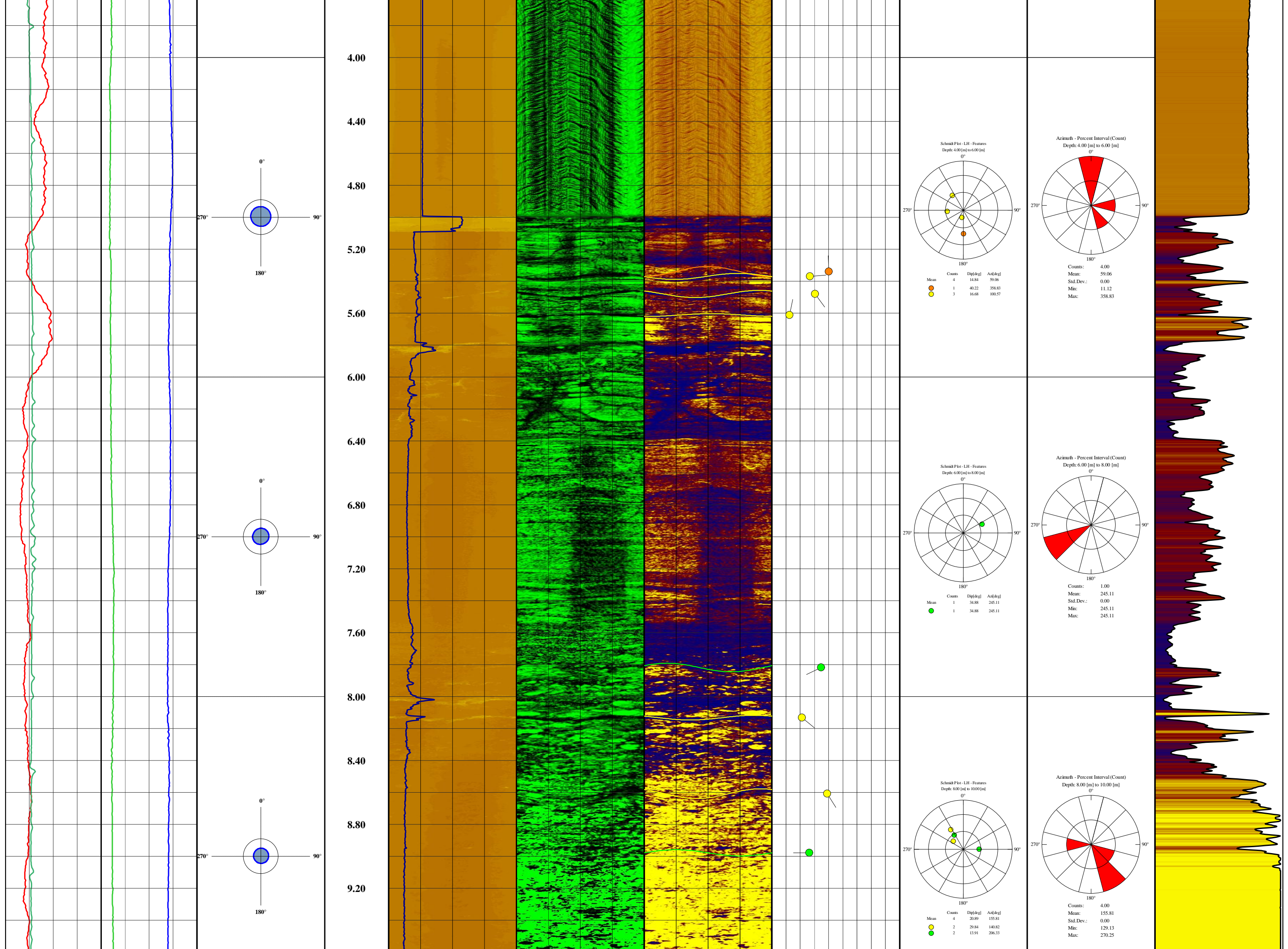
Logging Unit SV031
Engineer J.Mackay
Client Represent Julian Irons
Service Type Televiewer

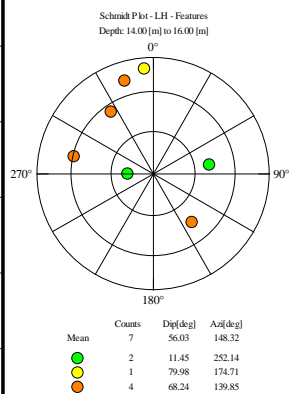
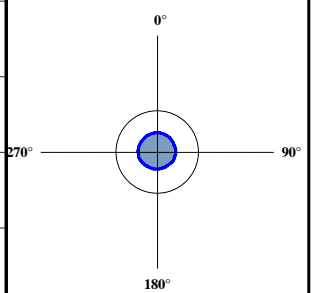
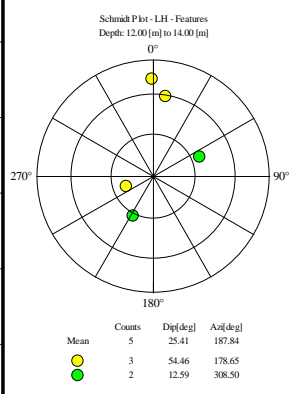
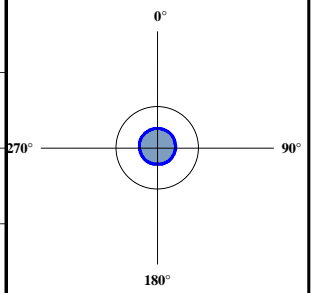
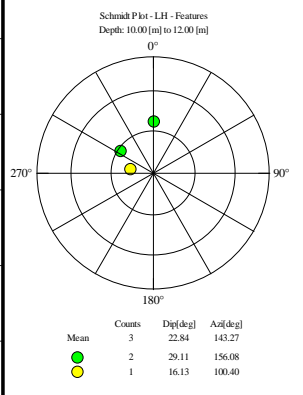
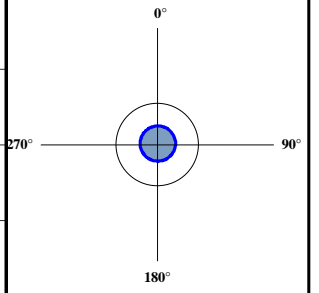
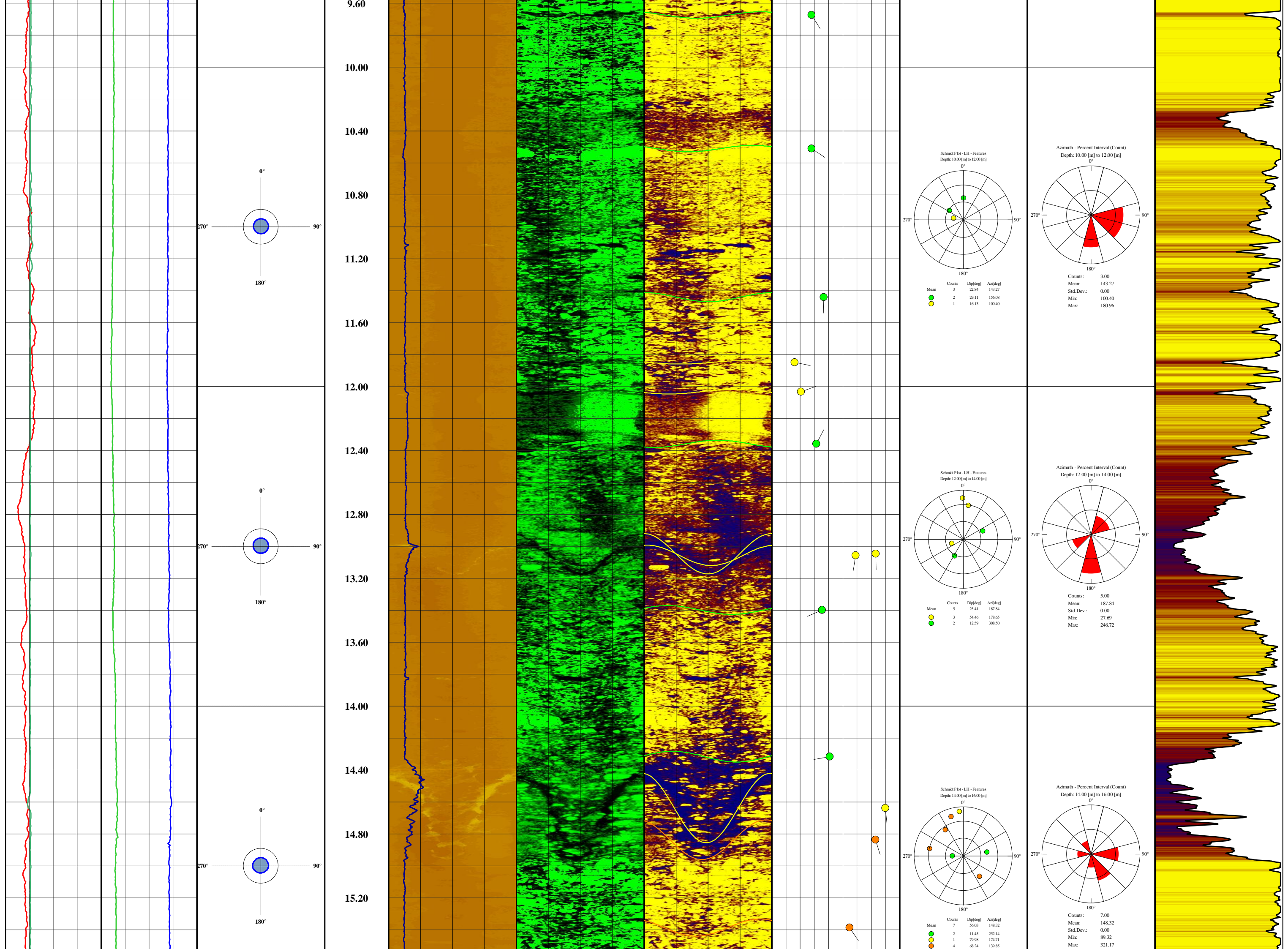
TELEVIEWER LOGS	STRUCTURAL LOGS	TADPOLES	COMMENTS
<p>MF Mag Field GR Gamma INC Tool Inclination (0 = Vertical Down) AZIM Tool Azimuth TT Travel Time Image AMP Amplitude Image AMP - DYN1 Amplitude Image Dynamic 1</p>	<p>DIPA Structures Apparent (Sinusoid Presentation) DIPT Structures True (Tadpole Presentation) PP - DIP Polar Projection Dip (Schmidt) RD - AZIM Rose Diagram - Azimuth CS Cross Section</p>	<p>● Partially Open Fracture ● Closed Fracture ● Foliation/Banding/Bedding</p>	<p>Image data is presented oriented to True North. Magnetic Declination = 10.97 deg Cross Sections are plotted at 2m intervals: White : Tool Position, Light Blue : Nominal Hole Size and Blue : Actual Hole Size</p>
PROCESSED LOGS			
CALI - ATV Calliper Average from ATV	RHI Rock Hardness Index		

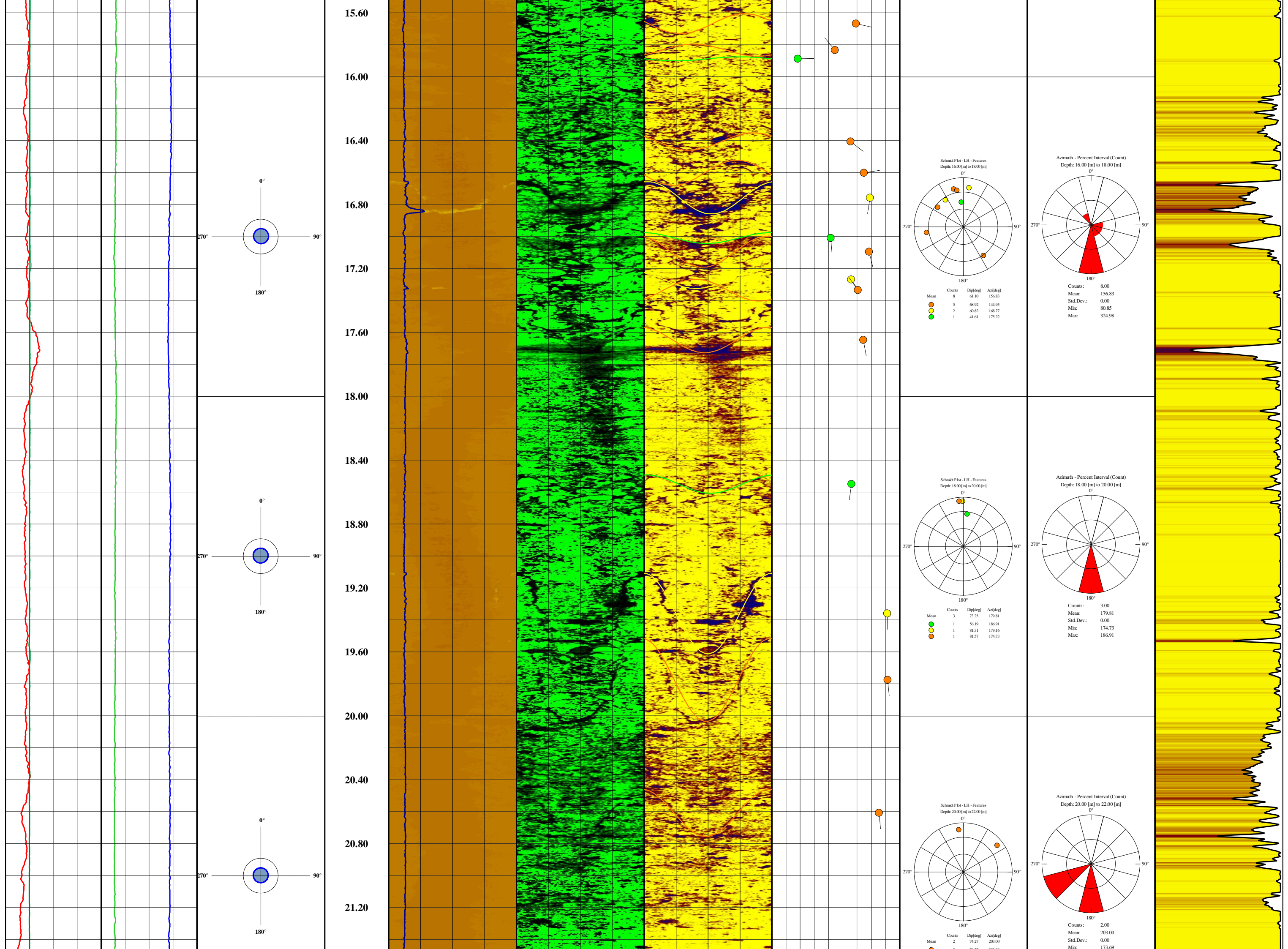
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 Therefore Surtron Technologies (Australia) Pty Ltd shall not be liable or responsible for any loss, damage, cost or expense incurred or sustained by anyone resulting from any interpretations.

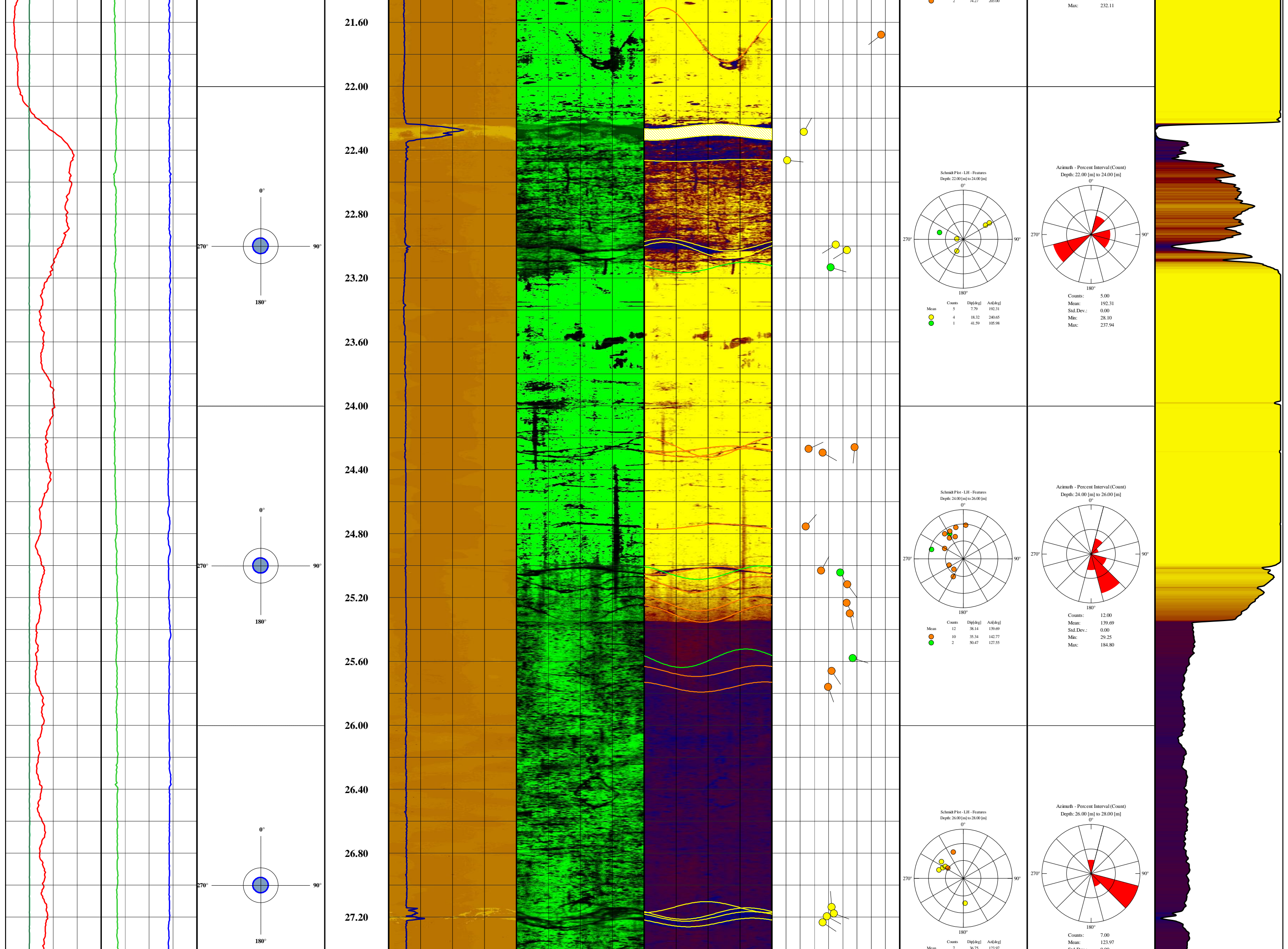


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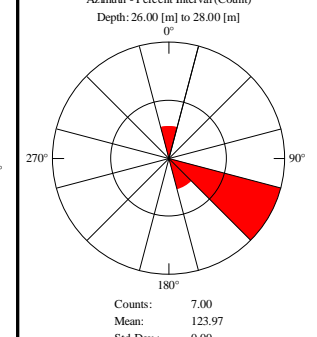
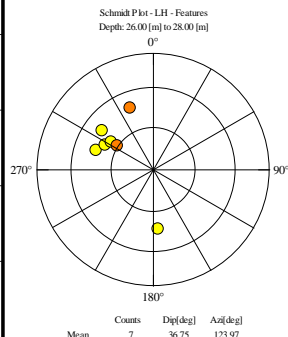
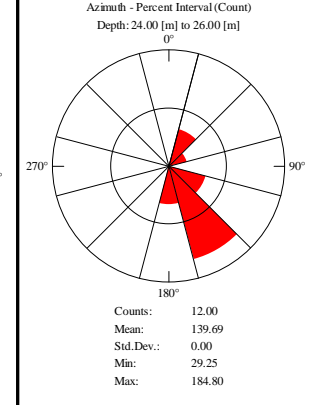
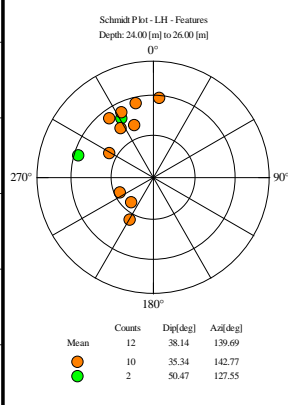
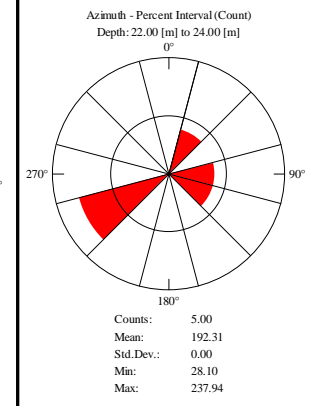
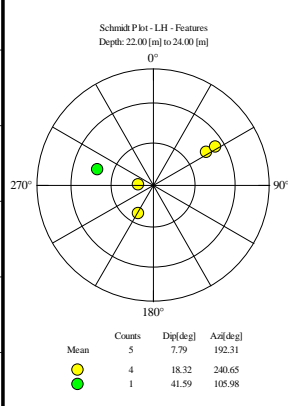
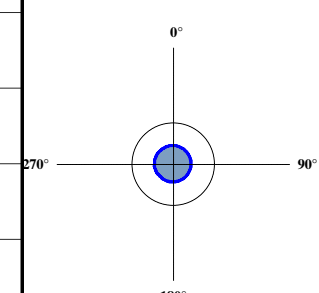
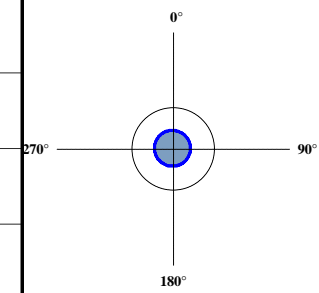
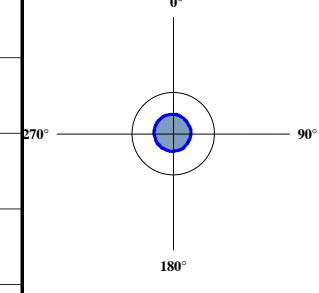


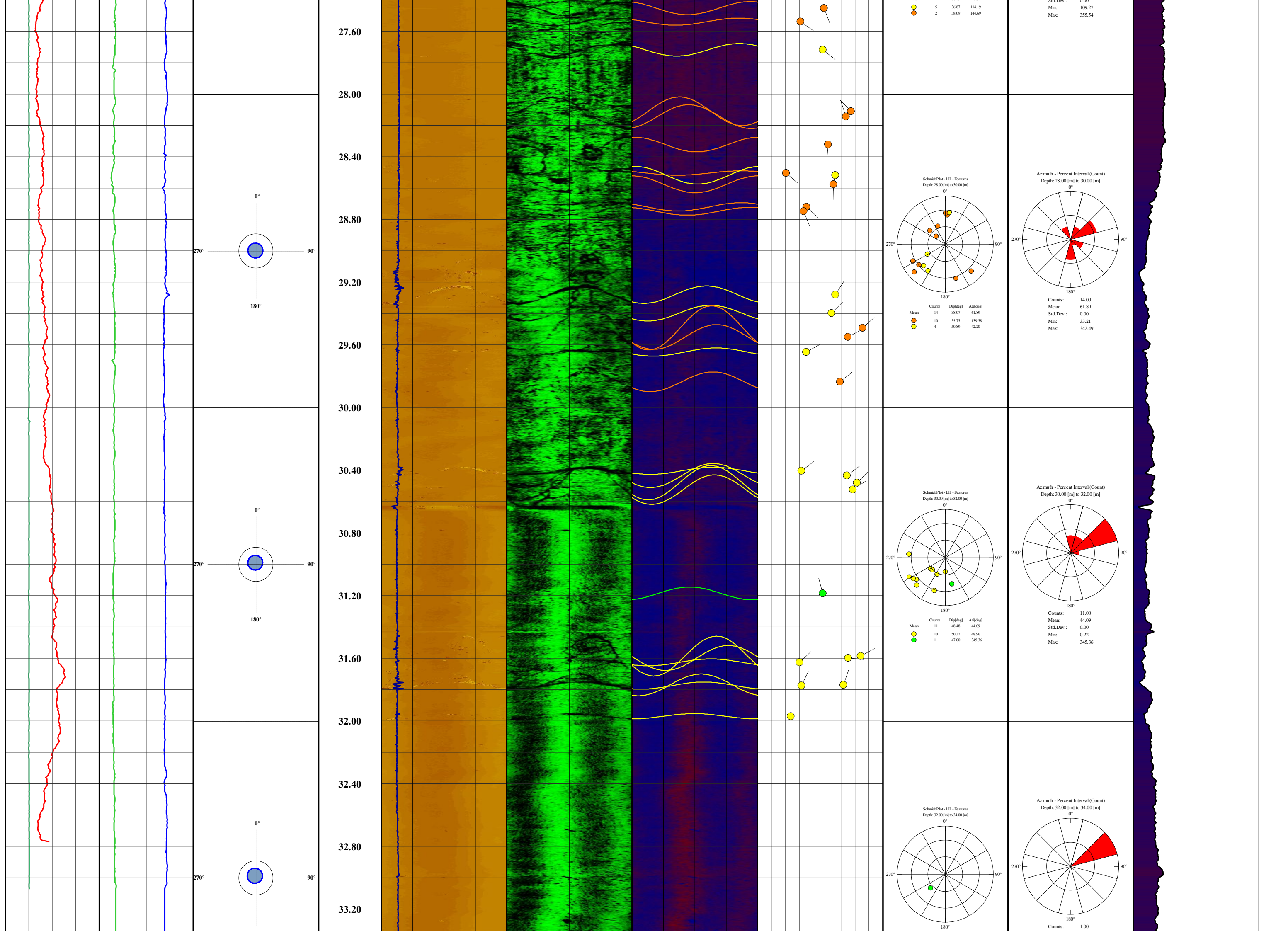




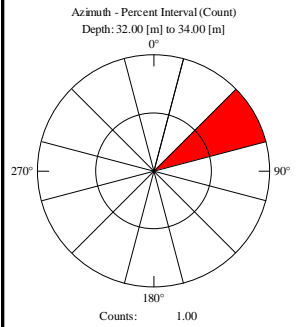
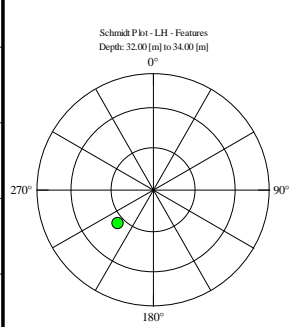
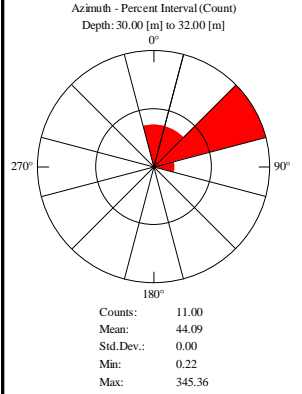
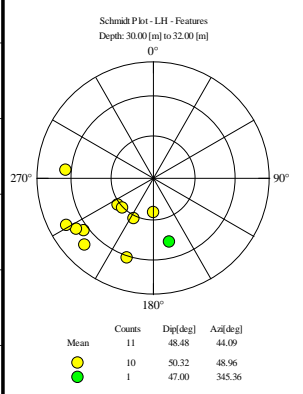
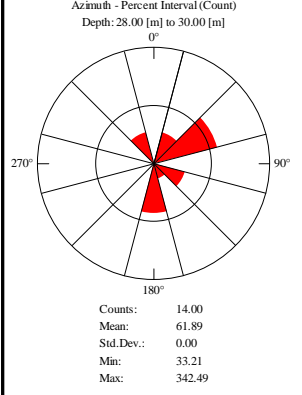
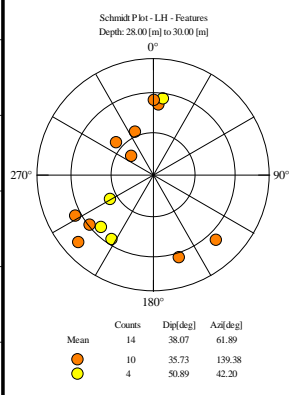
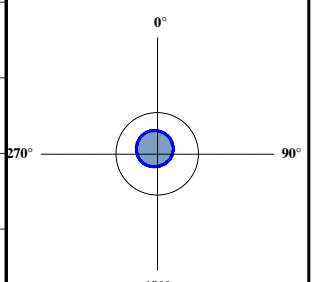
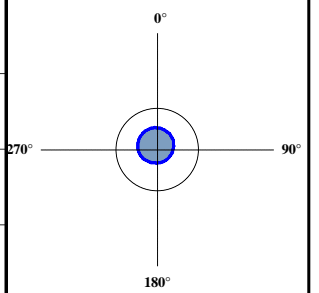
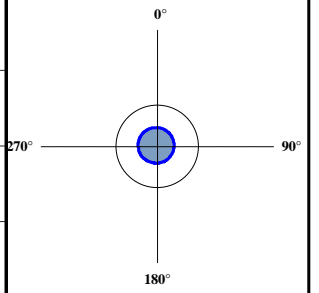


21.60
22.00
22.40
22.80
23.20
23.60
24.00
24.40
24.80
25.20
25.60
26.00
26.40
26.80
27.20

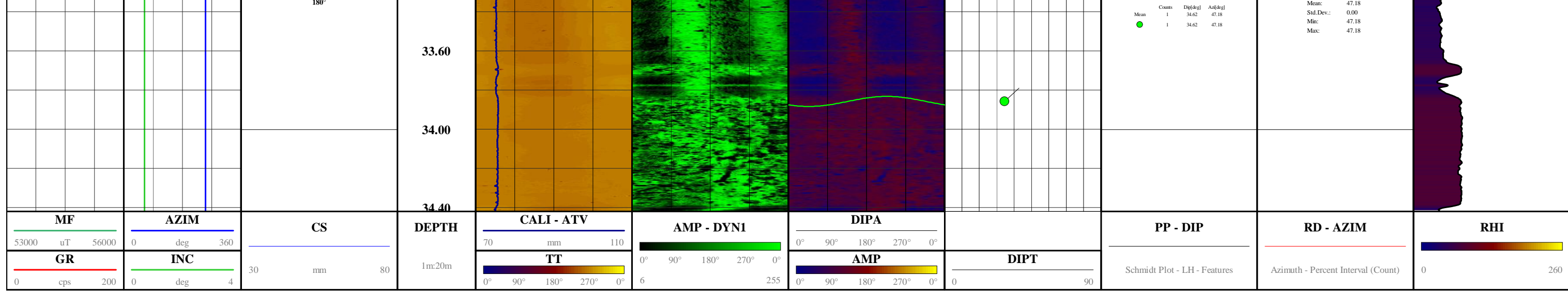




27.60
28.00
28.40
28.80
29.20
29.60
30.00
30.40
30.80
31.20
31.60
32.00
32.40
32.80
33.20



Std.Dev.: 109.27
Min: 36.87
Max: 144.69



IN-SITU PACKER PERMEABILITY TEST RESULT

PROJECT:	CRR	BH No.:	331	Packer type:	Double
PROJECT No.:	110-12936	Test No.:	1	Packer pressure:	2000kPa
		Date:	2/03/2012	Gauge pressures measured in:	kPa
				Tested by:	CS

Vertical depth to:

Top of test section (m):	21.50
Base of test section (m):	23.00
Centre of test section(m):	22.25
Base of casing (m):	20.00
Ground water (m)	NR

Depth of centre of test section (m)	22.25
Length of test section (m):	1.50

Gauge Height above ground level	0.00
Hole Diameter in test section (mm)	75

1st period	Time (mins)	0	5	10	15	Average
Gauge Pressure 200	Flow reading	4038.5	4038.7	4038.8	4038.9	Flow (l/min)
	Water Take	0.00	0.20	0.10	0.10	0.027
2nd period	Time (mins)	0	5	10	15	Average
Gauge Pressure 300	Flow reading	4039.0	4039.2	4039.6	4040.0	Flow (l/min)
	Water Take	0.00	0.20	0.40	0.40	0.067
3rd period	Time (mins)	0	5	10	15	Average
Gauge Pressure 500	Flow reading	4041.0	4043.2	4044.0	4044.8	Flow (l/min)
	Water Take	0.00	2.20	0.80	0.80	0.253
4th period	Time (mins)	0	5	10	15	Average
Gauge Pressure 300	Flow reading	4043.1	4044.0	4044.0	4044.3	Flow (l/min)
	Water Take	0.00	0.90	0.00	0.30	0.080
5th period	Time (mins)	0	5	10	15	Average
Gauge Pressure 200	Flow reading	4043.8	4043.4	4043.4	4043.2	Flow (l/min)
	Water Take	0.00	-0.40	0.00	-0.20	-0.040

Period	Flow (q) (l/min)	Gauge Press (kPa)	Gauge Press (m of water)	Friction Loss (m)*		Total Head (m)	Lugeon Value	Perm. (m/s)
				Basic	In extra rods			
1st	0.027	200.00	20.440	0.000	0.000	42.690	0.043	4.07E-09
2nd	0.067	300.00	30.660	0.000	0.000	52.910	0.086	8.21E-09
3rd	0.253	500.00	51.100	0.000	0.000	73.350	0.235	2.25E-08
4th	0.080	300.00	30.660	0.000	0.000	52.910	0.103	9.85E-09
5th	-0.040	200.00	20.440	0.000	0.000	42.690	-0.064	-6.10E-09

*Where friction loss is assumed to be negligible.

N.B. Pressure Conversion: 1 bar = 100 kPa = 14.503 psi

Note - backflow in 5th period

IN-SITU PACKER PERMEABILITY TEST RESULT

PROJECT:	CRR	BH No.:	331	Packer type:	Double
PROJECT No.:	110-12936	Test No.:	2	Packer pressure:	2000kPa
		Date:	2/03/2012	Gauge pressures measured in:	kPa
				Tested by:	CS

Vertical depth to:	Top of test section (m): 11.00	Depth of centre of test section (m) 11.75
	Base of test section (m): 12.50	Length of test section (m): 1.50
	Centre of test section(m): 11.75	
	Base of casing (m): 10.00	Gauge Height above ground level 0.00
	Ground water (m) NR	Hole Diameter in test section (mm) 75

1st period	Time (mins)	0	5	10	15	Average
Gauge Pressure 150	Flow reading	4074.5	4076.8	4080.5	4083.0	Flow (l/min)
	Water Take	0.00	2.30	3.70	2.50	0.567
2nd period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 300	Flow reading	4084.0	4089.0	4094.5	4097.0
	Water Take	0.00	5.00	5.50	2.50	0.867
3rd period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 500	Flow reading	4097.1	4101.5	4104.2	4106.3
	Water Take	0.00	4.40	2.70	2.10	0.613
4th period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 300	Flow reading	4106.0	4107.1	4107.4	4107.6
	Water Take	0.00	1.10	0.30	0.20	0.107
5th period	Time (mins)	0	5	10	15	Average
	Gauge Pressure 150	Flow reading	4107.3	4107.3	4107.4	4107.6
	Water Take	0.00	0.00	0.10	0.20	0.020

Period	Flow (q) (l/min)	Gauge Press (kPa)	Gauge Press (m of water)	Friction Loss (m)*		Total Head (m)	Lugeon Value	Perm. (m/s)
				Basic	In extra rods			
1st	0.567	150.00	15.330	0.000	0.000	27.080	1.425	1.36E-07
2nd	0.867	300.00	30.660	0.000	0.000	42.410	1.392	1.33E-07
3rd	0.613	500.00	51.100	0.000	0.000	62.850	0.665	6.36E-08
4th	0.107	300.00	30.660	0.000	0.000	42.410	0.171	1.64E-08
5th	0.020	150.00	15.330	0.000	0.000	27.080	0.050	4.81E-09

*Where friction loss is assumed to be negligible.

N.B. Pressure Conversion: 1 bar = 100 kPa = 14.503 psi