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BOREHOLE: BQUA-02

Project:	Pioneer-Burdekin PHES	Position:	Lower Reservoir	Sheet	1 of 6
Location:	Netherdale/Dalrymple Heights	Coords:	658262.4 m E 7666924.2 m N MGA2020-55		
Client:	Queensland Hydro	Surface RL:	881.22 m AHD	Date Started:	4/7/2024
Job No.:	PS138693	Contractor:	Twin Hills Engineering & Drilling Drill Rig: TH24	Date Completed:	13/7/2024
		Inclination:	~~-85°~~ -84° Direction: 219°	Logged:	HF/PT

Drilling					Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/V	E	Groundwater Not Encountered	0	881.22				CH	TOPSOIL Silty CLAY: high plasticity, dark brown, trace fine grained sand.		S	TOPSOIL
				0.50								
	F-H		1, 2	881.72				CI-CH	Silty CLAY: medium to high plasticity, red-brown pale brown, trace fine grained sand.		F	RESIDUAL SOIL
			3	3.00 884.21				CL-CI	Silty CLAY: low to medium plasticity, red-brown pale brown, trace fine grained sand.	w<PL		
	H		4, 5	4.00 885.20				MH	Clayey SILT: medium to high plasticity, red-brown pale brown, clay is high plasticity; trace fine grained sand.		F - St	
			6	6.00					Continued as Cored Borehole			
			7, 8, 9, 10									

Comments

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Date 3/12/2024

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BOREHOLE: BQUA-02

Project:	Pioneer-Burdekin PHES	Position:	Lower Reservoir	Sheet	2 OF 6
Location:	Netherdale/Dalrymple Heights	Coords:	658262.4 m E 7666924.2 m N MGA2020-55		
Client:	Queensland Hydro	Surface RL:	881.22 m AHD	Date Started:	4/7/2024
Job No.:	PS138693	Contractor:	Twin Hills Engineering & Drilling Drill Rig: TH24	Date Completed:	13/7/2024
		Inclination:	-85° Direction: 219°	Logged:	HF/PT

Drilling						Field Material Description					Defect Information	
METHOD	WATER	TCR	RQD	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH (MPa) ■ - UCS VL -2 L -5 M -20 H -60 VH -200 EH	DEFECT DESCRIPTION & Additional Observations (Core partings shown - refer to Detailed Defect Descriptions table for all logged features)	AVERAGE DEFECT SPACING (mm) 10 30 100 300 1000 3000
				0							
				1							
				2							
				3							
				4							
				5							
				6	6.00		Continuation from non-cored borehole				
HQ3	Groundwater Not Observed			7	887.20		MH Clayey SILT: medium to high plasticity, red-brown pale brown, clay is high plasticity; trace fine grained sand. stiff to very stiff.	RS			
				8							
				9	9.00 890.19		Red-brown dark brown.				
				10							

Comments

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BOREHOLE: BQUA-02

Project:	Pioneer-Burdekin PHES	Position:	Lower Reservoir	Sheet	3 OF 6
Location:	Netherdale/Dalrymple Heights	Coords:	658262.4 m E 7666924.2 m N MGA2020-55		
Client:	Queensland Hydro	Surface RL:	881.22 m AHD	Date Started:	4/7/2024
Job No.:	PS138693	Contractor:	Twin Hills Engineering & Drilling Drill Rig: TH24	Date Completed:	13/7/2024
		Inclination:	-85° Direction: 219°	Logged:	HF/PT

Drilling

METHOD	WATER	TCR	RQD
HQ3	Groundwater Not Observed	100	93
		100	100
		100	96
		100	99

Field Material Description

DEPTH (metres)	DEPTH RL	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING
10		MH Clayey SILT: medium to high plasticity, red-brown pale brown, clay is high plasticity; trace fine grained sand. stiff to very stiff.	RS
	10.50 / 891.68	SM Silty SAND: fine to medium grained, brown red-brown. dense - very dense.	
11			
12	12.30 / 893.47	CI-CH Silty CLAY: medium to high plasticity, red-brown pale orange, trace fine grained sand. very stiff.	
13			
14	14.65 / 895.81	GRANODIORITE: fine to medium grained, pale grey to dark grey, crystalline, massive, yellow alteration staining around healed defects, rounded inclusions of mafic rock up to 60 mm diameter.	SW
15			
16			
17			
18			
19			
20			

INFERRED STRENGTH (MPa) ■ - UCS: VL <2, L 2-5, M 5-20, H 20-60, VH 60-200, EH >200

Defect Information

DEFECT DESCRIPTION & Additional Observations (Core partings shown - refer to Detailed Defect Descriptions table for all logged features)

- 6.00-14.65: J., Cored with no recovery, SPT carried out at 12 and 14 metres bgl
- 12.00-12.45: JSPT, SPT: 4, 6, 10 N = 16
- 14.00-14.45: JSPT, SPT: 6, 7, 9 N = 16
- 14.70-15.12: DBs x5, drilling break
- 14.92: J, 5°, SN, PR, RF
- 15.15: J, 60°, gy SN, PR, RF
- 15.29: J, 5°, SN, PR, RF
- 15.54: J, 25°, RF
- 16.13: J, 20°, SN, UN, RF
- 16.31: J, 20°, wh VN, PR, RF
- 16.50: J, 40°, gy VN, PR, RF
- 16.73: J, 45°, br SN, UN, RF
- 17.27-17.32: DBs x3, drilling induced breaks
- 17.62: J, 5°, SN, PR, RF
- 18.05: J, 45°, VN, PR, RF
- 18.06: J, 60°, gy, gr SN, PR, RF
- 18.10: J, 60°, gy, gr SN, PR, RF
- 19.12: J, 30°, gy VN, PR, RF
- 19.50: J, 20°, br VN, UN, RF

AVERAGE DEFECT SPACING (mm): 10, 30, 100, 300, 1000, 3000

Comments

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BOREHOLE: BQUA-02

		Position:	Lower Reservoir	Sheet	4 OF 6
Project:	Pioneer-Burdekin PHES	Coords:	658262.4 m E 7666924.2 m N MGA2020-55		
Location:	Netherdale/Dalrymple Heights	Surface RL:	881.22 m AHD	Date Started:	4/7/2024
Client:	Queensland Hydro	Contractor:	Twin Hills Engineering & Drilling Drill Rig: TH24	Date Completed:	13/7/2024
Job No.:	PS138693	Inclination:	-85° Direction: 219°	Logged:	HF/PT

Drilling

METHOD	WATER	TCR	RQD	DEPTH (metres)	DEPTH RL
HQ3	Groundwater Not Observed	100	99	20	
		100	100	21	
		100	99	22	
		100	80	23	
		100	93	24	
		100	99	25	
		100	100	26	
		100	93	27	
				28	
				29	
				30	30.00

Field Material Description

GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH (MPa) ■ - UCS (VL -2, L -5, M -20, H -60, VH -200, EH -200)
	GRANODIORITE: fine to medium grained, pale grey to dark grey, crystalline, massive, yellow alteration staining around healed defects, rounded inclusions of mafic rock up to 60 mm diameter.	SW	

Defect Information

DEFECT DESCRIPTION & Additional Observations (Core partings shown - refer to Detailed Defect Descriptions table for all logged features)	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
20.13: J, 60°, br SN, PR, RF	
20.12-20.30: Jsx2, 40 - 45°, VN, PR, RF	
20.34: J, 40°, VN, UN, RF	
20.74: J, 25°, wh, gy VN, CU, RF	
20.91: J, 25°, wh VN, PR, RF	
22.26-22.28: VN, 10°, pale gy, Qz, CU	
22.60: J, 25°, VN, CU, RF	
22.91: J, 20°, br VN, PR-CU, RF	
23.31: J, 25°, VN, PR-CU, RF	
23.33: J, 45°, SN, UN	
23.50-23.55: J, 20 - 30°, gy SN, PR	
23.72: J, 10°, wh SN, PR	
23.55-23.95: J, 85°, gy SN, PR	
24.04-24.09: VN, 85°, UN	
24.12: J, 15°, VN, UN, RF	
24.20: J, 15°, SN, PR	
24.33-24.50: VN, 80 - 85°, wh, gy VN, UN	
24.51: Js x4, 15°, wh VN, PR-CU	
24.91: J, 15°, wh VN, UN, RF	
25.34: J, 20°, wh VN, UN, RF	
26.42: J, 10°, SN, PR, RF	
26.77: J, CN, PR, RF	
27.17: J, 20°, gy VN, PR, RF	
27.51: J, 15°, VN, CU, RF	
27.63: J, 25°, VN, PR, RF	
27.65: J, 15°, VN, UN, RF	
28.15: J, 15°, VN, UN, RF	
28.30-28.35: Jsx3, 5 - 15°, CN, PR, RF	
29.10: J, 15°, VN, CU, RF	
29.67-29.83: Js x2, 5 - 10°, gy CN, PR, RF	

Comments

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BOREHOLE: BQUA-02

Project:	Pioneer-Burdekin PHES	Position:	Lower Reservoir	Sheet	5 OF 6
Location:	Netherdale/Dalrymple Heights	Coords:	658262.4 m E 7666924.2 m N MGA2020-55		
Client:	Queensland Hydro	Surface RL:	881.22 m AHD	Date Started:	4/7/2024
Job No.:	PS138693	Contractor:	Twin Hills Engineering & Drilling Drill Rig: TH24	Date Completed:	13/7/2024
		Inclination:	-85° Direction: 219°	Logged:	HF/PT

Drilling

METHOD	WATER	TCR	RQD	DEPTH (metres)	DEPTH RL
HQ3	Groundwater Not Observed	100	100	30	911.11
		100	100	31	
		100	100	32	32.60
		100	59	33	913.70
		100	93	34	
		100	73	35	
		100	77	36	
		100	100	37	
		100	59	38	
				39	39.25
				40	920.32
					39.50
					920.57

Field Material Description

GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH (MPa) ■ - UCS
	GRANODIORITE: fine to medium grained, pale grey to dark grey, crystalline, massive, yellow alteration staining around healed defects, rounded inclusions of mafic rock up to 60 mm diameter. With pale grey, white, pink, brown silicious alteration.	SW	
	Pink, brown, siliceous granite.		
	Strongly brecciated and recemented with siliceous pink, brown,,and white matrix. Sub-vertival healed joints, dark grey and white.		

Defect Information

DEFECT DESCRIPTION & Additional Observations (Core partings shown - refer to Detailed Defect Descriptions table for all logged features)

- 30.39: J, 25°, VN, CU, RF
- 32.60: J, 10°, VN, PR, RF
- 32.88-33.00: Jsx2, 50 - 60°, gy, wh CN, PR, RF
- 33.02-33.06: Js x2, 5 - 10°, SN, PR, RF
- 33.08: J, 30°, VN, PR-CU-UN, RF
- 33.15-33.25: FZ, br, iron oxide, recovered as gravel
- 33.13-33.34: Jsx4, 70 - 80°, br SN, CU, RF
- 33.35: J, 45°, VN, PR-CU-UN, RF
- 33.49-33.71: FZ, 70°, VN, PR-CU-IR, RF, significant, multiple joint set with infilled quartz vein and fractured zone visible
- 33.67: J, 20°, br, iron oxide VN, PR, RF
- 34.12: J, 80°, br SN, UN, RF
- 34.29: J, 40°, br VN, CU, RF
- 34.62: J, 55°, br SN, PR, RF
- 34.81: J, 80°, br, iron oxide SN, PR, RF
- 34.86: J, 5°, gy SN, UN, RF
- 35.33: J, 45°, br VN, PR, RF
- 35.48: J, 60°, br SN, PR, RF, multiple joint inthis zone
- 35.66: J, VN, PR-CU, RF, quartz vein with a joint
- 35.70: J, 35°, SN, PR, RF
- 35.71: J, 50°, br VN, PR, RF
- 36.14: J, 45°, VN, PR-CU, RF
- 36.15: J, 70°, br VN, PR, RF
- 36.47: J, 30°, br VN, PR, RF
- 36.51: J, 20°, VN, PR-CU, RF
- 36.57: J, 60 - 80°, br VN, CU, RF
- 36.58-36.80: FZ, VN, UN-IR, RF, multiple joint set
- 36.72-36.81: Js x4, 5 - 10°, br VN, UN, RF
- 37.01-37.15: FZ, br, significant, recovered as gravel
- 37.17: J, 60°, br VN, CU, RF
- 37.38: J, 45°, br VN, PR, RF
- 37.45: J, 50°, br VN, PR, RF
- 37.92: J, 45°, br VN, CU, RF
- 38.22: J, 25°, br VN, PR, RF
- 38.35: J, 65°, gy SN, PR, RF
- 38.43: J, 30°, gy VN, CU, RF
- 38.75: J, 10°, br CN, PR, RF
- 39.12: J, 40°, br VN, CU, RF
- 39.22: J, 30°, br SN, CU, RF
- 39.58: J, 50°, br VN, UN, RF
- 39.63: J, 35°, br VN, CU, RF
- 39.81: J, 25°, gy, pk VN, CU, RF

AVERAGE DEFECT SPACING (mm) — 10, 30, 100, 300, 1000, 3000

Comments

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BOREHOLE: BQUA-02

		Position:	Lower Reservoir	Sheet	6 OF 6
Project:	Pioneer-Burdekin PHES	Coords:	658262.4 m E 7666924.2 m N MGA2020-55		
Location:	Netherdale/Dalrymple Heights	Surface RL:	881.22 m AHD	Date Started:	4/7/2024
Client:	Queensland Hydro	Contractor:	Twin Hills Engineering & Drilling Drill Rig: TH24	Date Completed:	13/7/2024
Job No.:	PS138693	Inclination:	-85° Direction: 219°	Logged:	HF/PT

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH (MPa) ■ - UCS VL -2 L -5 M -20 H -60 VH -200 EH	DEFECT DESCRIPTION & Additional Observations (Core partings shown - refer to Detailed Defect Descriptions table for all logged features)	AVERAGE DEFECT SPACING (mm) 10 30 100 300 1000 3000
HQ3		100	59	40	40.28 921.35		Hole Terminated at 40.28 m Target depth. Standpipe Piezometer Installed.	SW		40.05: J, 40°, pk, wh VN, UN, RF 40.05-40.28: FZ, SN, recovered as fine to coarse gravel	
				41							
				42							
				43							
				44							
				45							
				46							
				47							
				48							
				49							
				50							

Comments

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Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BQUA-02
Defects List

PointID	Depth	Bottom	Fracture Set	Defect Number	Type	Type Suffix	Dip Minimum (degrees)	Dip Maximum (degrees)	Infilling Material	Aperture Observation	Planarity	Roughness	Aperture Measurement Sign	Aperture Measurement	Aperture	Spacing	Remark
BQUA-02	6.00	14.65			J	.											Cored with no recovery, SPT carried out at 12 and 14 metres bgl
BQUA-02	12.00	12.45			J	SPT											SPT: 4, 6, 10 N = 16
BQUA-02	14.00	14.45			J	SPT											SPT: 6, 7, 9 N = 16
BQUA-02	14.70	14.80			hJ		75		wh, mi		UN						
BQUA-02	14.70	15.12			DBs	x5											drilling break
BQUA-02	14.77				hJ		20		wh, mi		UN						
BQUA-02	14.82				hJ		30		wh, mi		UN						
BQUA-02	14.88				V												
BQUA-02	14.92				J		5			SN	PR	RF					
BQUA-02	14.95				hJ												
BQUA-02	15.07				hJ		50		gy		UN						
BQUA-02	15.15				J		60		gy	SN	PR	RF					
BQUA-02	15.29				J		5			SN	PR	RF					
BQUA-02	15.32	15.40			hJ		55		gy		UN						
BQUA-02	15.42	15.44			hJs	x2	20		wh, gy		UN						
BQUA-02	15.54				J		25					RF					
BQUA-02	15.71				HB												
BQUA-02	15.74				hJ		50		wh, gy		UN						
BQUA-02	15.87				hJ		30		wh	VN	UN						
BQUA-02	15.89				HB												
BQUA-02	15.90				hJ		60		wh		UN						
BQUA-02	15.96				hJ		80		wh		UN						
BQUA-02	16.00	16.10			hJ		80		gy		PR						
BQUA-02	16.11				hJ		20		wh, gy		UN						
BQUA-02	16.13				J		20			SN	UN	RF					
BQUA-02	16.13	16.30			hJ		75		gy		UN						
BQUA-02	16.20				hJ		75		wh		PR						
BQUA-02	16.26				hJ		55		wh, pl gy mi		PR-UN						
BQUA-02	16.31				J		20		wh	VN	PR	RF					
BQUA-02	16.41				hJ		20				PR						
BQUA-02	16.50				J		40		gy	VN	PR	RF					
BQUA-02	16.53				hJ		45		wh		UN						
BQUA-02	16.58				hJ		40		wh		UN						
BQUA-02	16.65				hJ		30		wh		UN						
BQUA-02	16.70				hJ		80	85	wh		UN						
BQUA-02	16.73				J		45		br	SN	UN	RF					
BQUA-02	16.80	16.87			hJs	x2	20	30	gy, wh		UN						
BQUA-02	16.83				hJ		75				UN						
BQUA-02	16.94				hJ		60				PR						
BQUA-02	16.96				hJ		40				UN						
BQUA-02	17.06				hJ		15		wh		PR						
BQUA-02	17.08				hJ		25		pl gy		PR						
BQUA-02	17.13				hJ		50		wh		PR						
BQUA-02	17.22				hJ		45				UN						
BQUA-02	17.25				hJ		50				UN						
BQUA-02	17.27	17.32			DBs	x3											drilling induced breaks
BQUA-02	17.50	17.60			hJ		55		wh		UN						
BQUA-02	17.54				hJ		20		wh		UN						
BQUA-02	17.62				J		5			SN	PR	RF					
BQUA-02	17.72				V		30				PR-CU						
BQUA-02	17.73				hJ		45		wh, gy		PR						
BQUA-02	17.75	17.90			hJ		85	90	wh, gy		PR						
BQUA-02	17.94				hJ		25				PR-CU						
BQUA-02	17.96	18.00			hJs	x3	60	70	wh, gy		PR						
BQUA-02	18.05				J		45			VN	PR	RF					
BQUA-02	18.06				J		60		gy, gr	SN	PR	RF					
BQUA-02	18.06	18.12			hJ		85		gy		PR						
BQUA-02	18.10				J		60		gy, gr	SN	PR	RF					
BQUA-02	18.14	18.18			hJs	x2	30	35	gy, wh		PR						
BQUA-02	18.27	18.33			hJs	x4	40	50	gy, wh		PR						
BQUA-02	18.39				hJ		40				PR						
BQUA-02	18.45				hJ		50		gy, wh		PR						
BQUA-02	18.55	18.58			hJs	x2	60		gy, wh		PR						
BQUA-02	18.60				V		45		wh qz mi		UN						
BQUA-02	18.71	18.77			hJs	x2	50	60	wh qz		UN						
BQUA-02	18.71	18.92			hJ		55		wh, gy		UN						
BQUA-02	19.07				hJ		35		gy		UN						
BQUA-02	19.12				J		30		gy	VN	PR	RF					
BQUA-02	19.21				V		20		br		PR						
BQUA-02	19.28	19.80			hJs	x7	30	40	gy		PR						
BQUA-02	19.29				V		15				CU						
BQUA-02	19.36				hJ		10		wh		UN						
BQUA-02	19.38				hJ		15		gy		UN						
BQUA-02	19.40				V		50		wh, Qz		UN						
BQUA-02	19.50				J		20		br	VN	UN	RF					
BQUA-02	19.55				hJ		80		wh, gy		UN						
BQUA-02	19.59				hJ		15				UN						
BQUA-02	19.64	19.65			hJ		10				vu						
BQUA-02	19.73				hJ		50		wh		UN						

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Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BQUA-02
Defects List

PointID	Depth	Bottom	Fracture Set	Defect Number	Type	Type Suffix	Dip Minimum (degrees)	Dip Maximum (degrees)	Infilling Material	Aperture Observation	Planarity	Roughness	Aperture Measurement Sign	Aperture Measurement	Aperture	Spacing	Remark
BQUA-02	19.77				hJ		30				UN						
BQUA-02	19.85				hJ		25				PR						
BQUA-02	19.91				hJ		35				UN						
BQUA-02	20.00	20.22			hJ		45				UN						
BQUA-02	20.12	20.30			Js	x2	40	45		VN	PR	RF					
BQUA-02	20.13				J		60		br	SN	PR	RF					
BQUA-02	20.34				J		40			VN	UN	RF					
BQUA-02	20.40				hJ		40		pale gy		UN						
BQUA-02	20.57				V		20		gy		UN						
BQUA-02	20.68				hJ		50		gy		UN						
BQUA-02	20.74				J		25		wh, gy	VN	CU	RF					
BQUA-02	20.85				hJ		45		wh		PR						
BQUA-02	20.88				hJ		50		wh		PR						
BQUA-02	20.91				J		25		wh	VN	PR	RF					
BQUA-02	21.09				hJ		10		wh		UN						
BQUA-02	21.24				hJ		15		wh		PR						
BQUA-02	21.27				hJ		30		wh		PR						
BQUA-02	21.32	21.40			hJs	x3	45	55	wh		UN						
BQUA-02	21.41				hJ		50		wh		UN						
BQUA-02	21.66				V		50		wh, gy		CU						
BQUA-02	21.70				hJ		30		wh		PR						
BQUA-02	21.76				hJ		25		wh		PR						
BQUA-02	21.80				V		25		wh		PR						
BQUA-02	21.85				V		35		gy		PR						
BQUA-02	21.86				hJ		35		pale br		PR						
BQUA-02	21.88				hJ		45		gy		PR						
BQUA-02	21.91				hJ		40		gy		PR						
BQUA-02	22.08				hJ		45		gy		PR						
BQUA-02	22.10				hJ		75		gy		PR						
BQUA-02	22.23	22.24			hJs	x2	10		gy		PR						
BQUA-02	22.26	22.28			VN		10		pale gy, Qz		CU						
BQUA-02	22.33				hJ		55		br, gy		UN						
BQUA-02	22.35				hJ		20				PR						
BQUA-02	22.37				hJ		50		wh		UN						
BQUA-02	22.46				hJ		40				CU						
BQUA-02	22.51				hJ		55				CU						
BQUA-02	22.60				J		25			VN	CU	RF					
BQUA-02	22.64				hJ						UN						
BQUA-02	22.70				hJ		50		gy, wh		CU						
BQUA-02	22.75				hJ		60		gy, wh		UN						
BQUA-02	22.83				hJ		50		gy, wh		UN						
BQUA-02	22.91				J		20		br	VN	PR-CU	RF					
BQUA-02	23.03				hJ		55		wh, gy		PR						
BQUA-02	23.08				hJ		60		wh, gy		PR						
BQUA-02	23.15				HB												
BQUA-02	23.22				hJ		25		wh, gy		PR						
BQUA-02	23.26				hJ		20		gy		CU						
BQUA-02	23.31				J		25			VN	PR-CU	RF					
BQUA-02	23.33				J		45			SN	UN						
BQUA-02	23.40				hJ		45		wh, gy		PR						
BQUA-02	23.41				hJ		20				PR-CU						
BQUA-02	23.46				hJ		25				PR-CU						
BQUA-02	23.47				hJ		45		wh, gy		PR						
BQUA-02	23.50	23.55			J		20	30	gy	SN	PR						
BQUA-02	23.55	23.95			J		85		gy	SN	PR						
BQUA-02	23.72				J		10		wh	SN	PR						
BQUA-02	23.81				hJ		50		gy		CU						
BQUA-02	24.04	24.09			VN		85				UN						
BQUA-02	24.12				J		15			VN	UN	RF					
BQUA-02	24.20				J		15			SN	PR						
BQUA-02	24.32				hJ		30		gy		UN						
BQUA-02	24.33	24.50			VN		80	85	wh, gy	VN	UN						
BQUA-02	24.51				Js	x4	15		wh	VN	PR-CU						
BQUA-02	24.65	25.96			AZ					VN	UN						
BQUA-02	24.91				J		15		wh	VN	UN	RF					
BQUA-02	25.34				J		20		wh	VN	UN	RF					
BQUA-02	25.42				hJ		85		wh		CU						
BQUA-02	25.68				hJ		25		wh		UN						
BQUA-02	25.80	26.00			hJ		60		wh		PR						
BQUA-02	26.12				hJ		60		wh, gy		UN						
BQUA-02	26.25				hJ		15		gy		PR-CU						
BQUA-02	26.42				J		10			SN	PR	RF					
BQUA-02	26.65	26.73			hJs	x2	20	30	pl yl mi alt halo <3 mm		PR						
BQUA-02	26.74	26.76			V		25		wh, pl br, Qz		UN						
BQUA-02	26.75				DB												
BQUA-02	26.77				J					CN	PR	RF					
BQUA-02	26.82	26.84			hJs	x2	20	30	gy		PR						
BQUA-02	26.87				hJ		20				UN						
BQUA-02	27.00	27.10			hJs	x2	20	30	gy		PR						

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Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BQUA-02
Defects List

PointID	Depth	Bottom	Fracture Set	Defect Number	Type	Type Suffix	Dip Minimum (degrees)	Dip Maximum (degrees)	Infilling Material	Aperture Observation	Planarity	Roughness	Aperture Measurement Sign	Aperture Measurement	Aperture	Spacing	Remark
BQUA-02	27.07				hJ		30				PR						
BQUA-02	27.17				J		20		gy	VN	PR	RF					
BQUA-02	27.20				hJ		70		gy		PR						
BQUA-02	27.27	27.33			hJs	x3	10	15	gy		PR						
BQUA-02	27.32				hJ						UN						
BQUA-02	27.45				hJ		50		gy		UN						
BQUA-02	27.51				J		15			VN	CU	RF					
BQUA-02	27.63				J		25			VN	PR	RF					
BQUA-02	27.65				J		15			VN	UN	RF					
BQUA-02	27.65	27.68			hJs	x2	20		gy		PR						
BQUA-02	27.75				hJ		10		gy		PR						
BQUA-02	27.80				hJ		60		gy		PR						
BQUA-02	27.93				hJ		20				UN						
BQUA-02	28.04	28.13			hJs	x2	50	60	gy		CU						
BQUA-02	28.15				J		15			VN	UN	RF					
BQUA-02	28.20	28.40			hJs	x2	70	85	gy		PR						
BQUA-02	28.30	28.35			Js	x3	5	15		CN	PR	RF					
BQUA-02	28.35	28.45			hJs	x2	70	80	gy		PR						
BQUA-02	28.45	28.63			hJ		85		gy		PR						
BQUA-02	28.60	28.70			hJs	x3	40	50	gy		UN						
BQUA-02	28.70	28.80			V		70		gy		CU						
BQUA-02	28.90				hJ		20		gy		PR						
BQUA-02	28.90	29.00			hJ		75		gy		PR						
BQUA-02	29.01	29.09			V						CU						
BQUA-02	29.05	29.20			hJ		75	85	gy		PR						
BQUA-02	29.10				J		15			VN	CU	RF					
BQUA-02	29.11	29.31			hJ		85		gy		IR						
BQUA-02	29.30	30.00			hJs	x14	15	25	gy		PR						
BQUA-02	29.35	30.60			hJ		80	85	pale gy, wh		UN						
BQUA-02	29.67	29.83			Js	x2	5	10	gy	CN	PR	RF					
BQUA-02	29.90	30.00			hJ		70		gy		UN						
BQUA-02	30.00	30.40			hJ		80	85	pale gy, wh		UN						
BQUA-02	30.06				hJ		20		gy		PR						
BQUA-02	30.10	30.40			V				gy mi		IR						
BQUA-02	30.20	33.00			hJs	x20	20	30	gy		PR						
BQUA-02	30.21				hJ		25		wh, gy mi		CU						
BQUA-02	30.39				J		25			VN	CU	RF					
BQUA-02	30.47				hJ						UN						
BQUA-02	30.83	30.95			V						CU						
BQUA-02	30.85	30.87			V		25		pl gy, wh, qz		PR						
BQUA-02	31.03				hJ		60		gy, wh, qz		PR						
BQUA-02	31.05	31.18			hJ		70		pl gy, wh, qz		PR						
BQUA-02	31.08	32.10			hJ		30		gy, wh		PR						
BQUA-02	31.09				hJ						UN						
BQUA-02	31.15	31.25			hJs	x3	50	60	pale gy, wh, Qz		PR						
BQUA-02	31.40				DB												
BQUA-02	31.40	31.50			hJs	x3	65	70	gy, wh, Qz		PR						
BQUA-02	31.54	32.00			hJs	x5	20	30	gy, wh, Qz		PR						
BQUA-02	31.71				hJ		75		gy, wh		CU						
BQUA-02	31.73				hJ		60		gy, wh		PR						
BQUA-02	31.80				hJ		70		gy, wh		PR						
BQUA-02	31.98				hJ		5		gy, wh		PR						
BQUA-02	32.03				hJ		15		gy, wh		UN						
BQUA-02	32.12				hJ		45		gy, wh		PR						
BQUA-02	32.14				hJ		30		gy, wh		PR						
BQUA-02	32.20	32.23			V		10		wh, Qz		PR						
BQUA-02	32.21				V		15				CU						
BQUA-02	32.32				V						UN						Quartz vein dark redbrownish
BQUA-02	32.34				V		40	50	wh, pk, Qz		PR						
BQUA-02	32.58				DB												
BQUA-02	32.60				J		10			VN	PR	RF					
BQUA-02	32.65				V		75		pk, wh, Qz		PR						
BQUA-02	32.87				hJ		20		gy, wh		PR						
BQUA-02	32.88	33.00			Js	x2	50	60	gy, wh	CN	PR	RF					
BQUA-02	33.00				HB												
BQUA-02	33.02	33.06			Js	x2	5	10		SN	PR	RF					
BQUA-02	33.08				J		30			VN	PR-CU-UN	RF					
BQUA-02	33.13	33.34			Js	x4	70	80	br	SN	CU	RF					
BQUA-02	33.15				hJ		35		br, iron oxide		PR						
BQUA-02	33.15	33.25			FZ				br, iron oxide								recovered as gravel
BQUA-02	33.25	33.32			hJ		10	20	br, iron oxide		PR						
BQUA-02	33.32	33.48			hJ		70		br, iron oxide		PR						
BQUA-02	33.35				J		45			VN	PR-CU-UN	RF					
BQUA-02	33.42	33.44			V		30		wh, br, qz		IR						
BQUA-02	33.49	33.71			FZ		70			VN	PR-CU-IR	RF					significant, multiple joint set with infilled quartz vein and fractured zone visible
BQUA-02	33.65				hJ		65		wh, gy		PR						
BQUA-02	33.67				J		20		br, iron oxide	VN	PR	RF					
BQUA-02	34.02				hJ		50		gy		UN						
BQUA-02	34.06				hJ		30		gy		PR-CU						

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Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BQUA-02
Defects List

PointID	Depth	Bottom	Fracture Set	Defect Number	Type	Type Suffix	Dip Minimum (degrees)	Dip Maximum (degrees)	Infilling Material	Aperture Observation	Planarity	Roughness	Aperture Measurement Sign	Aperture Measurement	Aperture	Spacing	Remark
BQUA-02	34.11				HB												
BQUA-02	34.12				J		80		br	SN	UN	RF					
BQUA-02	34.14	34.25			V		70	80	gy		CU						
BQUA-02	34.29				J		40		br	VN	CU	RF					
BQUA-02	34.34				hJ		25		br, iron oxide		PR-CU						
BQUA-02	34.36				hJ		35		gy		PR						
BQUA-02	34.62				J		55		br	SN	PR	RF					
BQUA-02	34.73				hJ		40		br		UN						
BQUA-02	34.80				hJ		50		gy		PR						
BQUA-02	34.81				J		80		br, iron oxide	SN	PR	RF					
BQUA-02	34.86				J		5		gy	SN	UN	RF					
BQUA-02	34.93	34.96			hJs	x2	20	30	gy		PR						
BQUA-02	35.33				J		45		br	VN	PR	RF					
BQUA-02	35.48				J		60		br	SN	PR	RF					multiple joint inthis zone
BQUA-02	35.66				J					VN	PR-CU	RF					quartz vein with a joint
BQUA-02	35.70				J		35			SN	PR	RF					
BQUA-02	35.71				J		50		br	VN	PR	RF					
BQUA-02	35.80				HB												
BQUA-02	35.80	39.00			hJ		60	70	gy		UN	RF					
BQUA-02	35.85				hJ		40				PR						
BQUA-02	36.00	36.10			hJ		80	85	gy		UN						
BQUA-02	36.06				hJ						UN						
BQUA-02	36.14				J		45			VN	PR-CU	RF					
BQUA-02	36.15				J		70		br	VN	PR	RF					
BQUA-02	36.20				V		70		pk,wh, Qz		PR						
BQUA-02	36.35				hJ		80		gy		PR						
BQUA-02	36.42	36.42			hJs	x3	10	20	gy, wh		PR						
BQUA-02	36.47				J		30		br	VN	PR	RF					
BQUA-02	36.48				hJ						PR-UN						
BQUA-02	36.51				J		20			VN	PR-CU	RF					
BQUA-02	36.56				hJ		30				PR-CU						
BQUA-02	36.57				J		60	80	br	VN	CU	RF					
BQUA-02	36.58	36.80			FZ					VN	UN-IR	RF					multiple joint set
BQUA-02	36.72	36.81			Js	x4	5	10	br	VN	UN	RF					
BQUA-02	36.80	36.90			hJs	x7	50		pk, wh, pale brown		UN						
BQUA-02	36.85				hJ		50		gy		PR						
BQUA-02	36.94				hJ		10		br		IR						
BQUA-02	37.01	37.15			FZ				br								significant, recovered as gravel
BQUA-02	37.17				J		60		br	VN	CU	RF					
BQUA-02	37.20	37.40			AZ				pl pk, br	VN	IR						numerous healed joints
BQUA-02	37.36	37.41			hJ												
BQUA-02	37.38				J		45		br	VN	PR	RF					
BQUA-02	37.45				J		50		br	VN	PR	RF					
BQUA-02	37.50	37.90			hJs	x7	50	60	gy		PR						
BQUA-02	37.55				hJ		40				PR						
BQUA-02	37.64				hJ		45				PR						
BQUA-02	37.69				hJ		50				CU						
BQUA-02	37.86				HB												
BQUA-02	37.92				J		45		br	VN	CU	RF					
BQUA-02	38.05	38.22			hJ		75		gy		PR						
BQUA-02	38.09				hJ		45		gy		PR						
BQUA-02	38.22				J		25		br	VN	PR	RF					
BQUA-02	38.23				hJ		30		gy, pk		PR						
BQUA-02	38.29				hJ		45				CU						
BQUA-02	38.35				J		65		gy	SN	PR	RF					
BQUA-02	38.36				hJ		45		gy		PR						
BQUA-02	38.43				J		30		gy	VN	CU	RF					
BQUA-02	38.53				hJ		45		gy		PR						
BQUA-02	38.55				V		30		gy		CU						
BQUA-02	38.58	38.62			hJs	x2	45	50	gy		PR						
BQUA-02	38.67				hJ		60		gy		CU						
BQUA-02	38.73				hJ		60		gy		CU						
BQUA-02	38.75				J		10		br	CN	PR	RF					
BQUA-02	38.82				hJ		50		gy		CU						
BQUA-02	38.84				hJ		25		gy		CU						
BQUA-02	38.91				hJ		45		gy		UN						
BQUA-02	39.05				hJ		20		gy		PR						
BQUA-02	39.10				hJ		45		br		CU						
BQUA-02	39.12				J		40		br	VN	CU	RF					
BQUA-02	39.17	39.22			hJ		45	50	br		UN						
BQUA-02	39.22				J		30		br	SN	CU	RF					
BQUA-02	39.49				hJ		50		gy		UN						
BQUA-02	39.55				hJ		80	85	gy		UN						
BQUA-02	39.58				J		50		br	VN	UN	RF					
BQUA-02	39.63				J		35		br	VN	CU	RF					
BQUA-02	39.64	40.00			V		75	85	wh, pk		UN						
BQUA-02	39.70				hJ		65		gy, wh, pk		UN						
BQUA-02	39.78				hJ		35		pk, wh		UN						
BQUA-02	39.81				J		25		gy, pk	VN	CU	RF					

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Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BQUA-02
Defects List

PointID	Depth	Bottom	Fracture Set	Defect Number	Type	Type Suffix	Dip Minimum (degrees)	Dip Maximum (degrees)	Infilling Material	Aperture Observation	Planarity	Roughness	Aperture Measurement Sign	Aperture Measurement	Aperture	Spacing	Remark
BQUA-02	39.85	39.94			hJ		65		pk, wh		PR						
BQUA-02	40.05				J		40		pk, wh	VN	UN	RF					
BQUA-02	40.05	40.28			FZ					SN							recovered as fine to coarse gravel

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PointID : BQUA-02 Depth Range: 14.70 - 18.00 m

PointID : BQUA-02 Depth Range: 18.00 - 22.00 m

wsp	TITLE Queensland Hydro Netherdale/Dalrymple Heights Pioneer-Burdekin PHES Core photo - BQUA-02	DRAWN RC	DATE 12/11/2024
		CHECKED GEM	DATE 4/12/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 1/4

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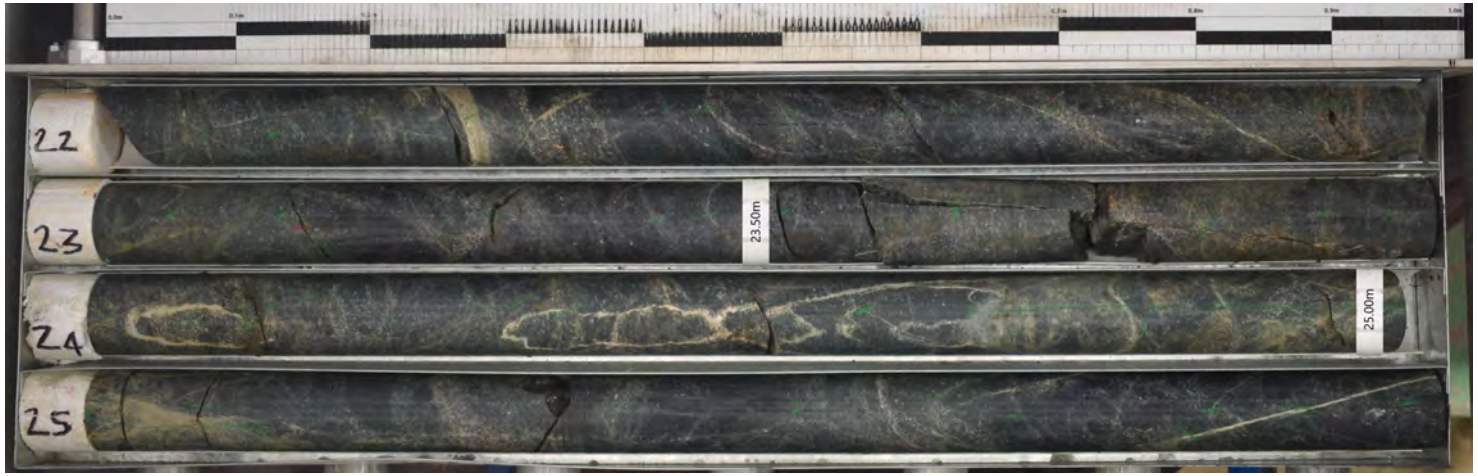
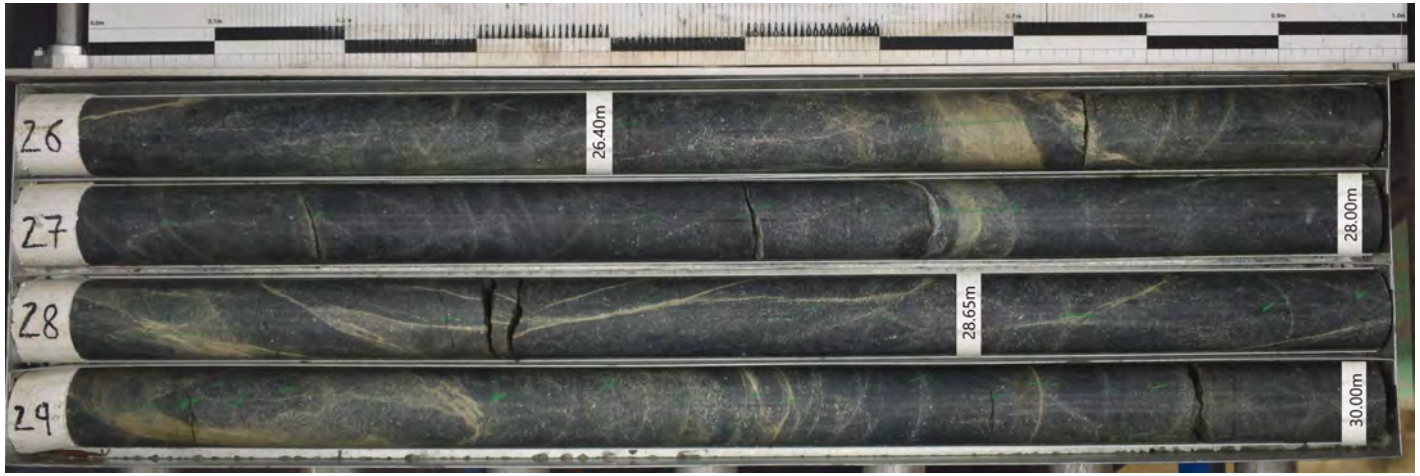


PointID : BQUA-02 Depth Range: 22.00 - 26.00 m



PointID : BQUA-02 Depth Range: 26.00 - 30.00 m

wsp	TITLE Queensland Hydro Netherdale/Dalrymple Heights Pioneer-Burdekin PHES Core photo - BQUA-02	DRAWN RC	DATE 12/11/2024
		CHECKED GEM	DATE 4/12/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 2/4

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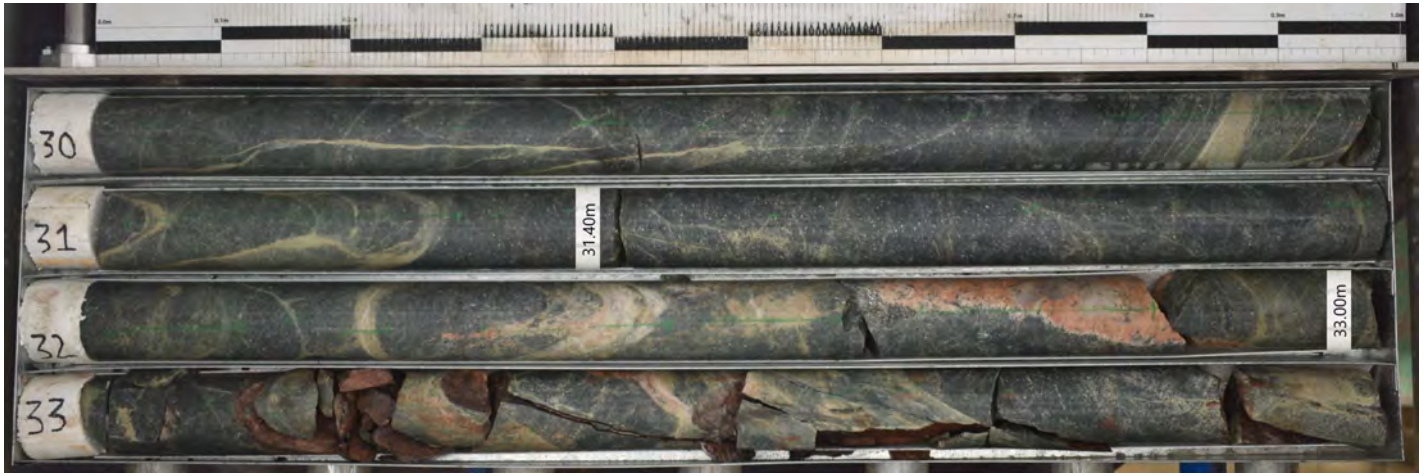

PointID : BQUA-02 Depth Range: 30.00 - 34.00 m

PointID : BQUA-02 Depth Range: 34.00 - 38.00 m

wsp	TITLE Queensland Hydro Netherdale/Dalrymple Heights Pioneer-Burdekin PHES Core photo - BQUA-02	DRAWN RC	DATE 12/11/2024
		CHECKED GEM	DATE 4/12/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 3/4

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PointID : BQUA-02 Depth Range: 38.00 - 40.28 m

wsp	TITLE Queensland Hydro Netherdale/Dalrymple Heights Pioneer-Burdekin PHES Core photo - BQUA-02	DRAWN RC	DATE 12/11/2024
		CHECKED GEM	DATE 4/12/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 4/4

BQUA-02 Structural Logs

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WSP Australia Pty Limited
Level 12, 900 Ann Street
Fortitude Valley
QLD 4006
Australia

GEOPHYSICAL RECORD OF BOREHOLE: BQUA-02

PROJECT:	Pioneer-Burdekin PHES	JOB #	PS138693
CLIENT:	Queensland Hydro	DATE:	20/11/2024

BOREHOLE DETAILS

LOCATION:	Upper Reservoir A	BH DEPTH:	40 m
EASTING:	659817.794 m E	BH DIAMETER:	HQ
NORTHING:	7660877.827 m N	BH AZIMUTH:	219° TN
ELEVATION:	881.222 m	BH PLUNGE:	-84° TN
COORD SYSTEM:	MGA2020	CASING DEPTH:	14.47 m
LOGGING DATUM:	Ground Level	CASING TYPE:	HWT Steel

DOCUMENT DETAILS

LOGGED BY:	JH
LOGGED DATE:	22/7/2024
DRAWN BY:	JH
REVIEWED BY:	GH
FILE:	BQUA-02_Struct_RevB
LOGGED DEPTH:	40 m

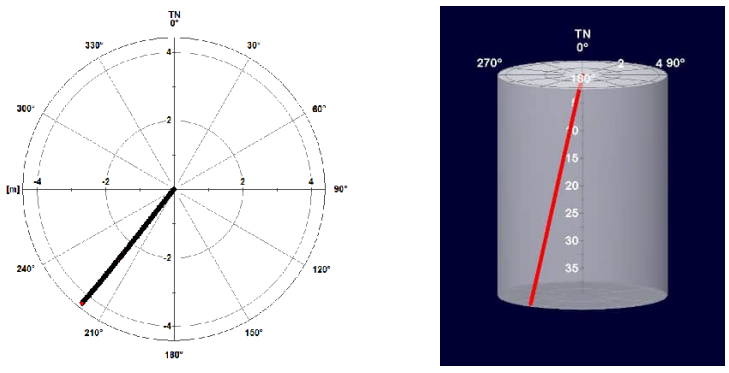
NOTES

Image logs are oriented relative to borehole high side. Final structure log is oriented relative to true north using magnetic declination of 8.17° East.

Mechanical calliper log used for structure dip corrections.

All logs zerored to ground level. Cased section assumed straight for deviation calculations.

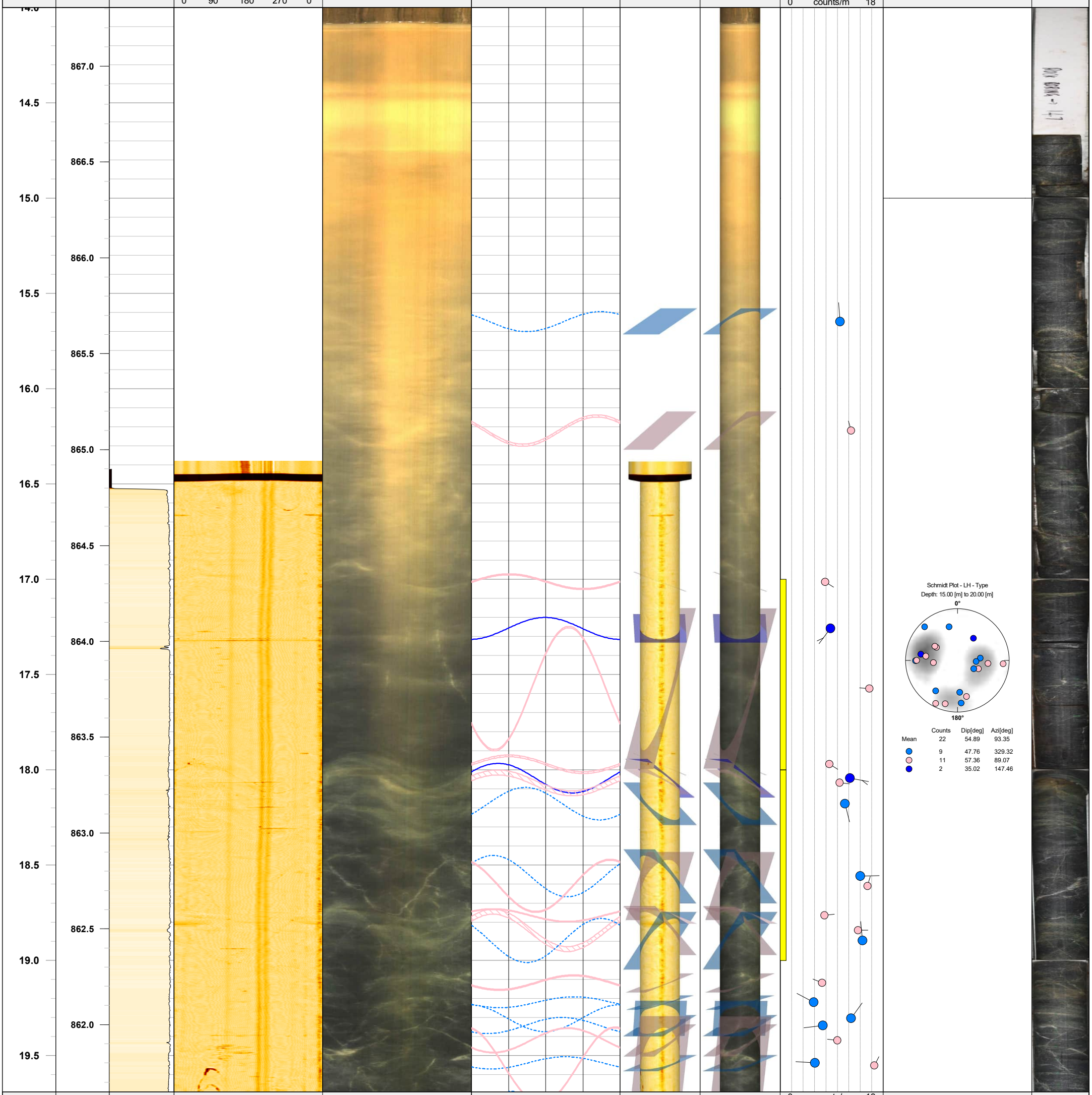
BOREHOLE DEVIATION



INTERPRETED STRUCTURES

Contact | Crushed Seam | Joint | Shear Zone | Vein | Healed Joint

BQUA-02



BQUA-02

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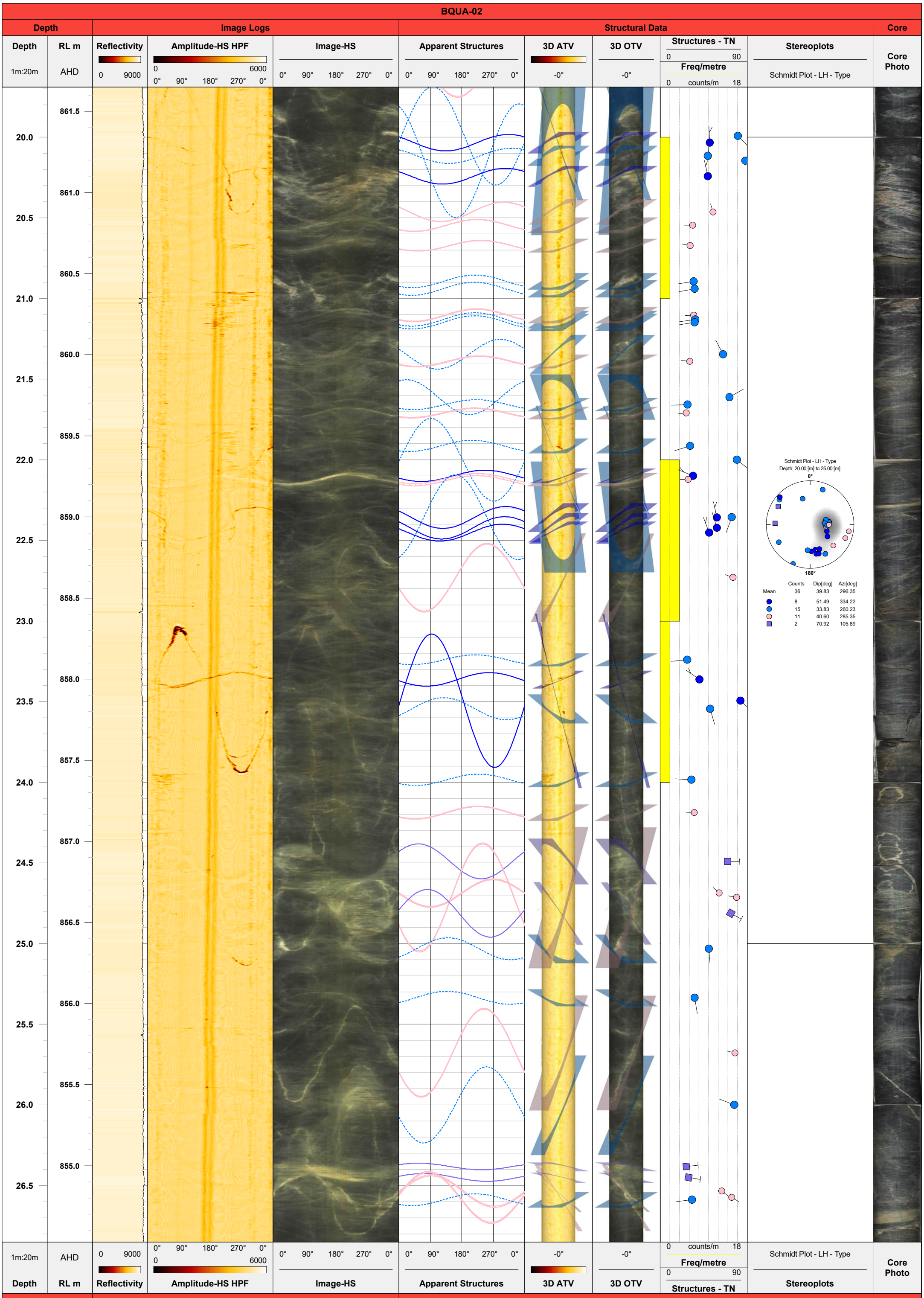

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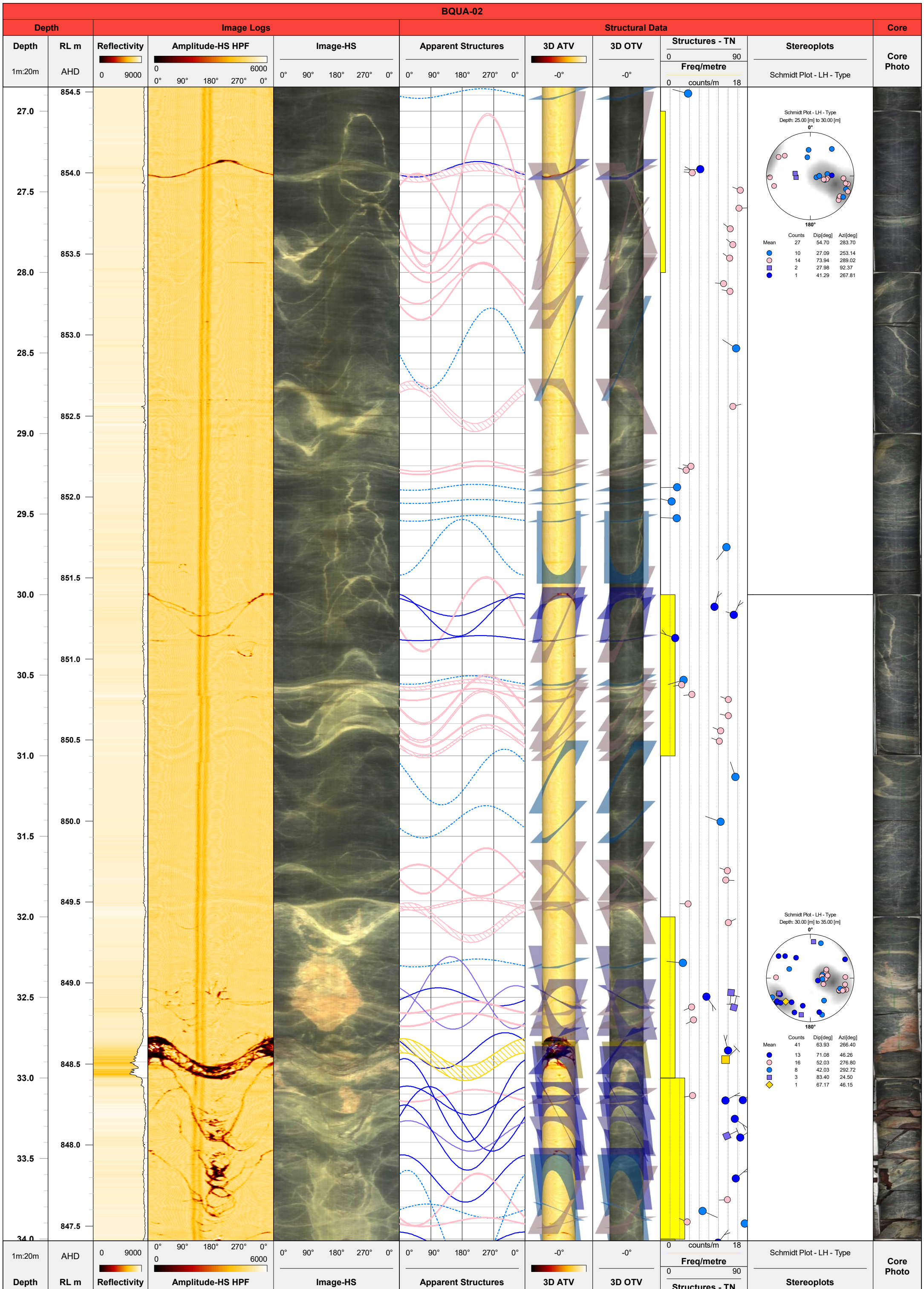

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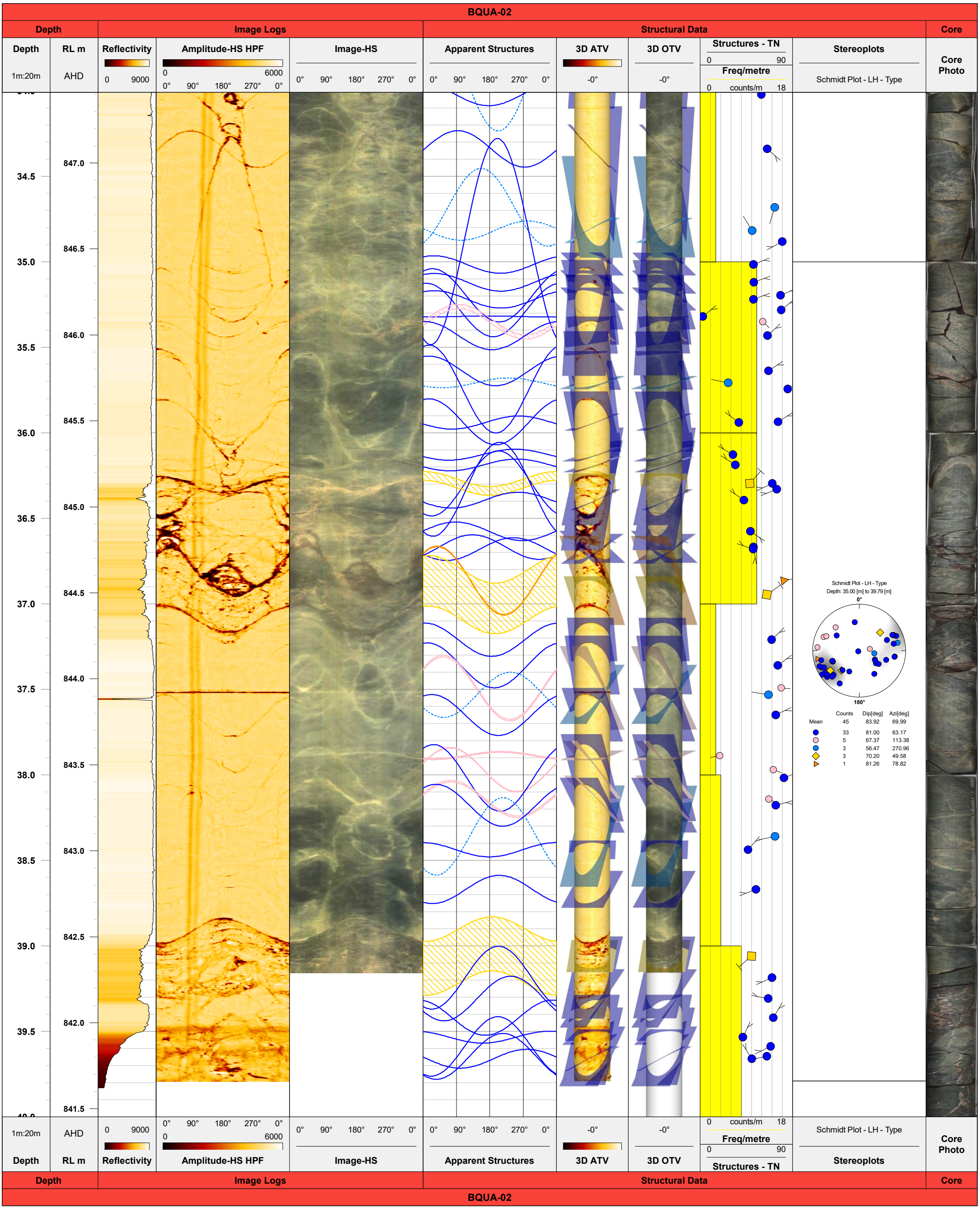

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BQUA-02 Composite Logs

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GEOPHYSICAL RECORD OF BOREHOLE: BQUA-02

PROJECT:	Pioneer-Burdekin PHES	JOB #	PS138693
CLIENT:	Queensland Hydro	DATE:	21/11/2024

BOREHOLE DETAILS

LOCATION:	Upper Reservoir A	BH DEPTH:	40 m
EASTING:	659817.794 m E	BH DIAMETER:	HQ
NORTHING:	7660877.827 m N	BH AZIMUTH:	219° TN
ELEVATION:	881.222 m	BH PLUNGE:	-84° TN
COORD SYSTEM:	MGA2020	CASING DEPTH:	14.47 m
LOGGING DATUM:	Ground Level	CASING TYPE:	HWT Steel

DOCUMENT DETAILS

LOGGED BY:	JH
LOGGED DATE:	22/7/2024
DRAWN BY:	JH
REVIEWED BY:	GH
FILE:	BQUA-02_Comp_RevB
LOGGED DEPTH:	39.81 m

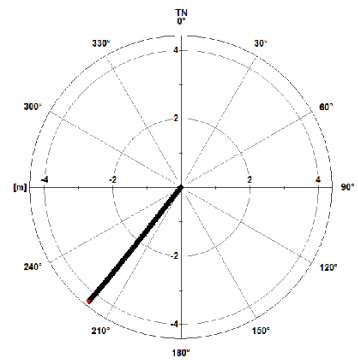
NOTES

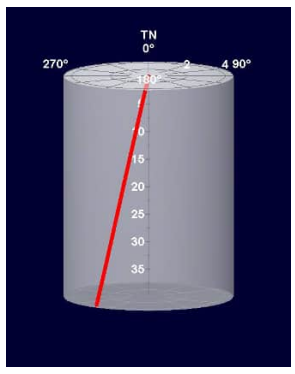
Image logs are oriented relative to borehole high side. Final structure log is oriented relative to true north using magnetic declination of 8.17° East.

Mechanical calliper log used for structure dip corrections.

All logs zerored to ground level. Cased section assumed straight for deviation calculations.

BOREHOLE DEVIATION

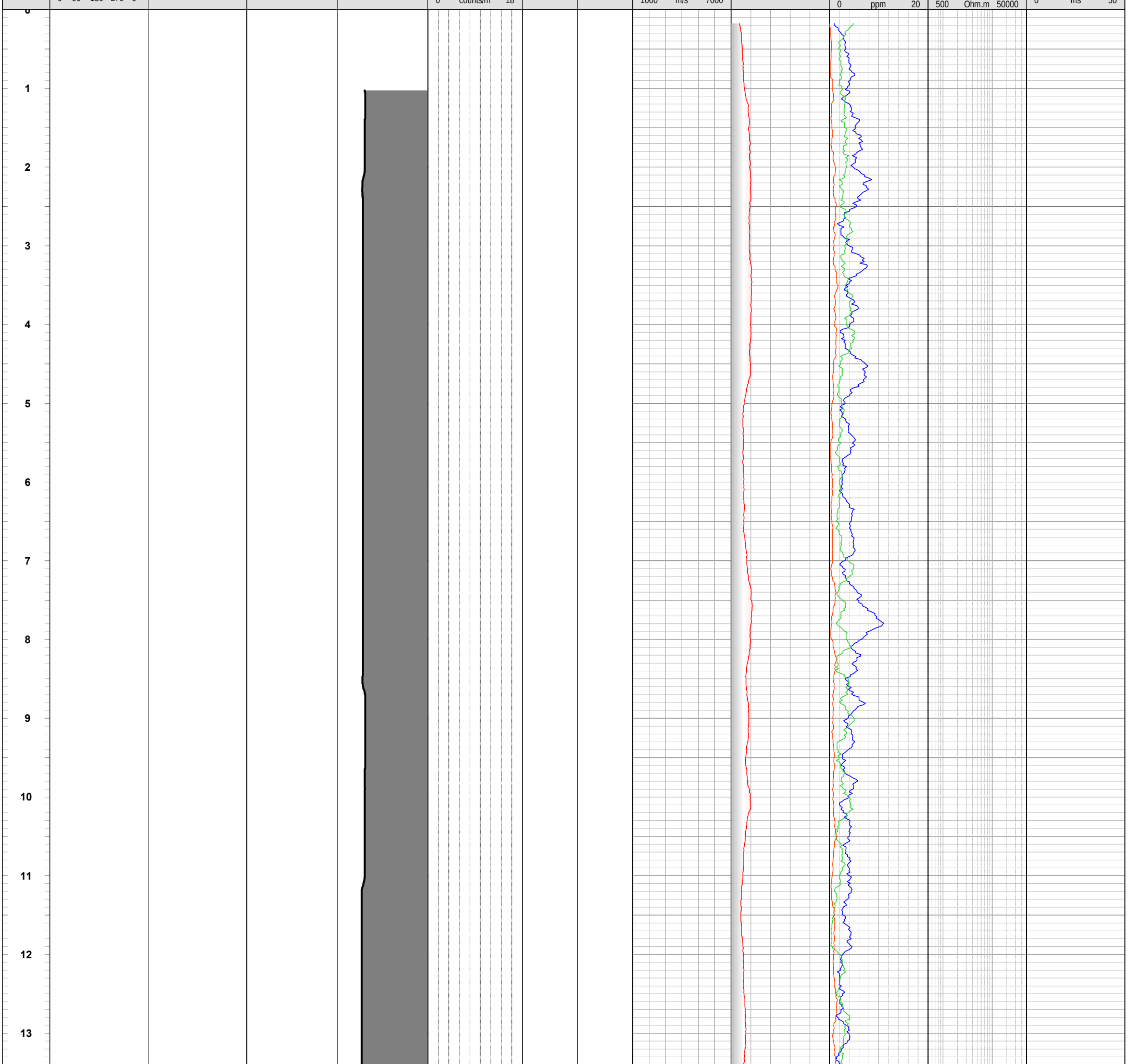




INTERPRETED STRUCTURES

Contact · Crushed Seam · Joint · Shear Zone · Vein · Healed Joint

BQUA-02



BQUA-02

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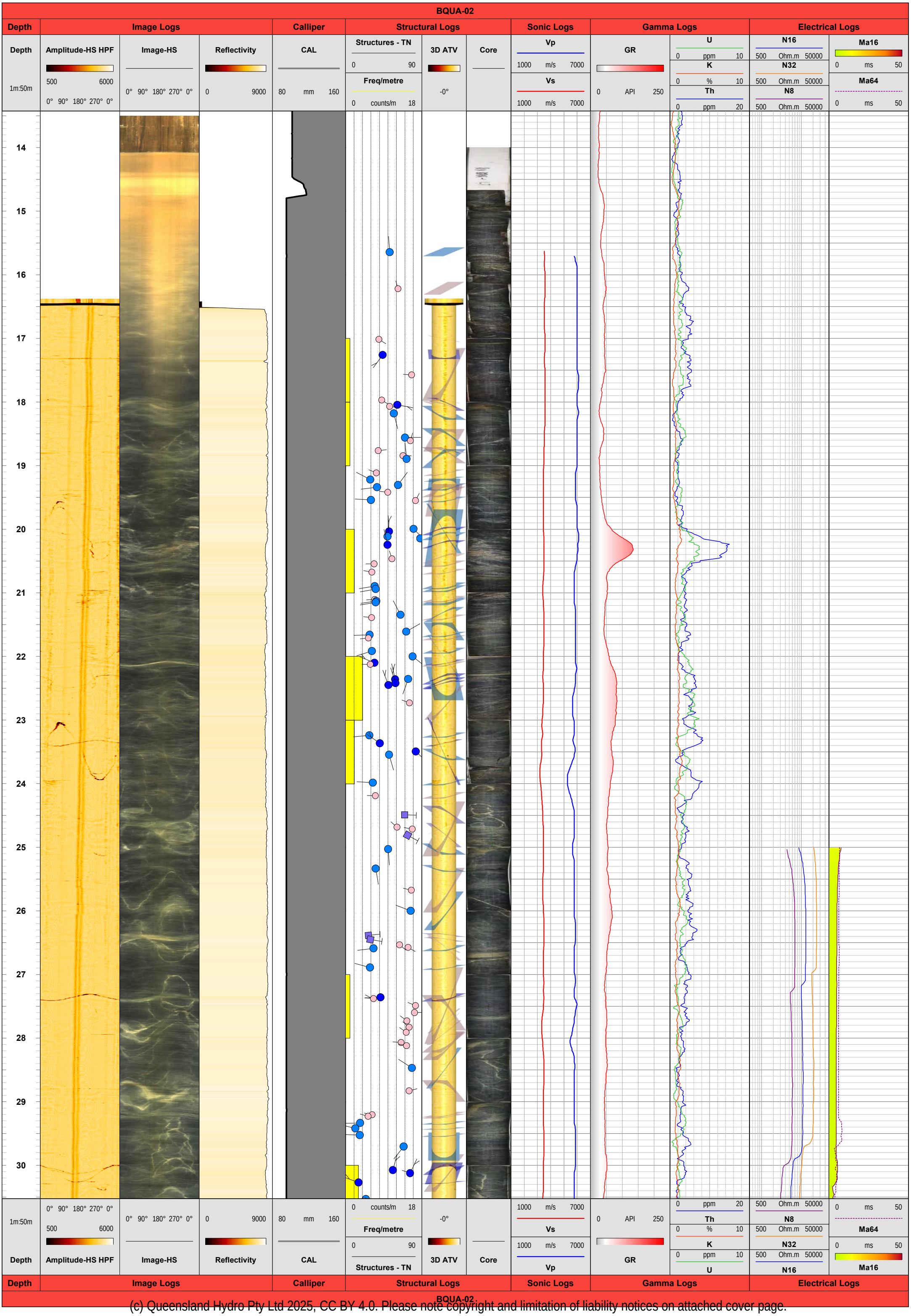

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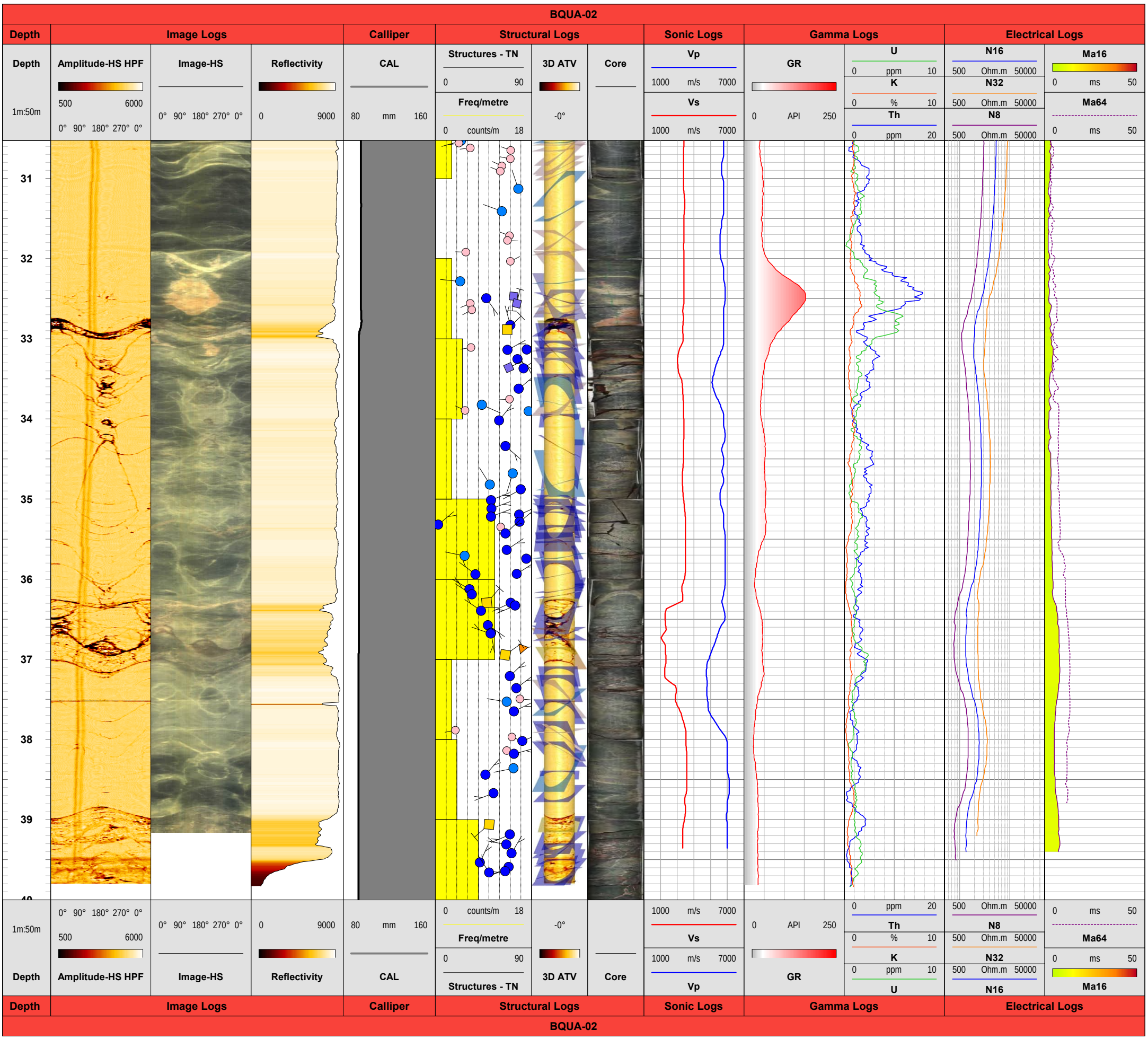

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