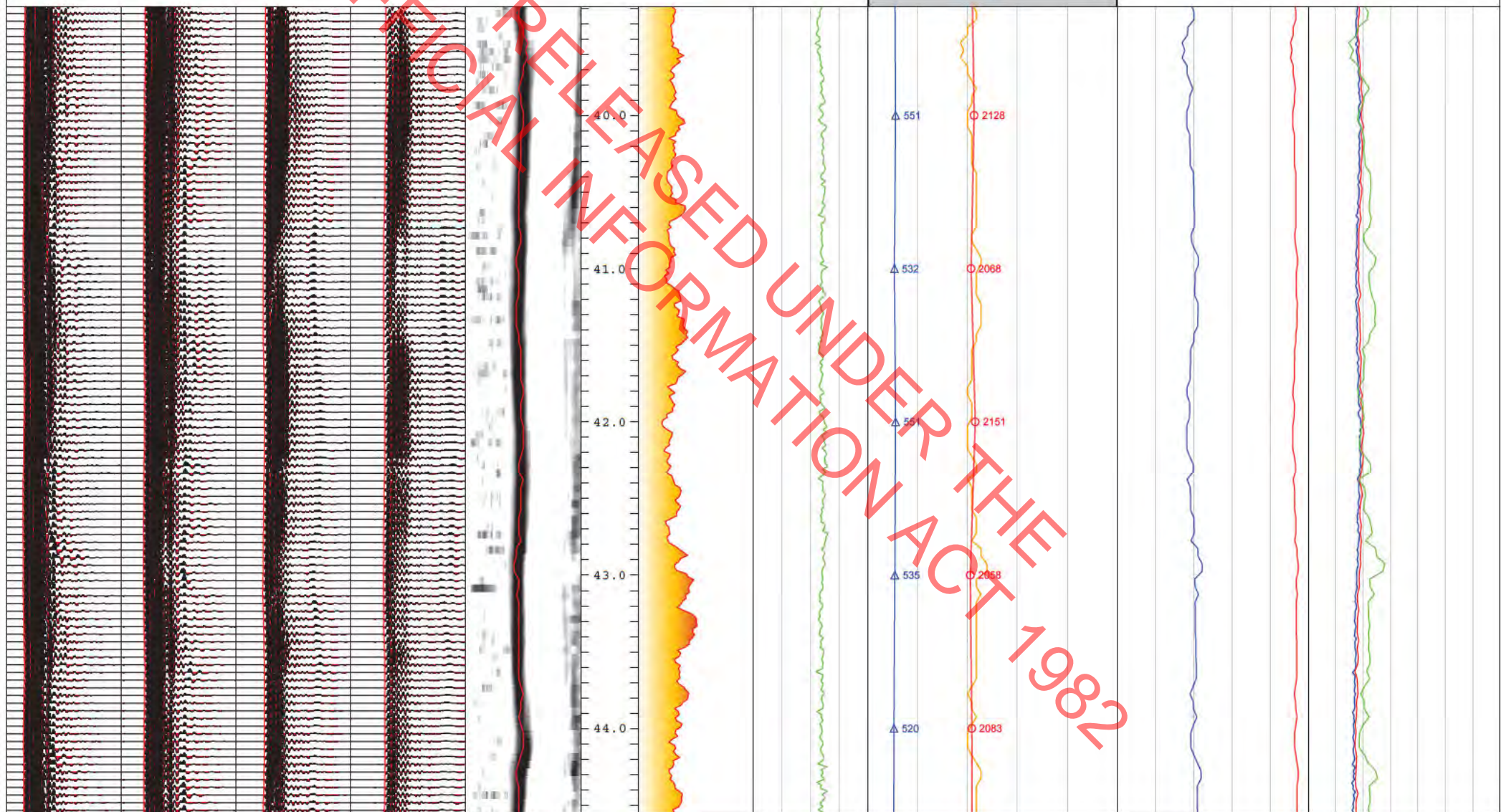
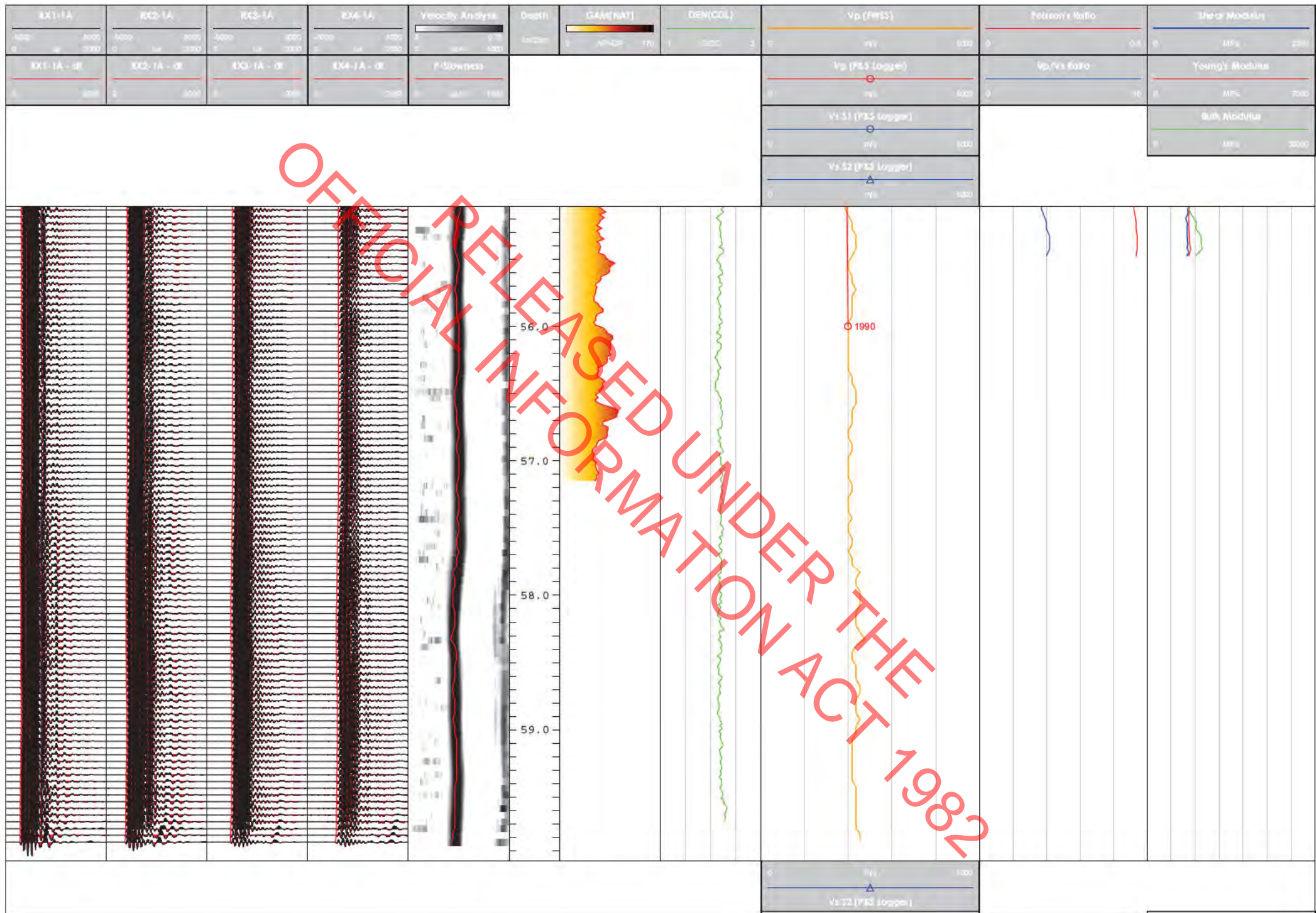


KX1-1A	KC2-1A	KC3-1A	KX4-1A	Velocity Analysis	Depth	GAM(NAT)	DEN(COL)	Vp (FMS)	Poisson's Ratio	Shear Modulus
0 8000 16000	0 8000 16000	0 8000 16000	0 8000 16000	0 10 20	0 10000 20000	0 1700 1900	0 3000 3	0 1000 5000	0 0.4 0.6	0 1000 2000
KX1-1A - SE	KC2-1A - OE	KC3-1A - OE	KX4-1A - OE	P-Slopes				Vp (FMS Logger)	Vp/Vs Ratio	Young's Modulus
0 8000 16000	0 8000 16000	0 8000 16000	0 8000 16000	0 1000 1500				0 1000 5000	0 10 16	0 1000 7000
								Vs 51 (FMS Logger)		Bulk Modulus
								0 1000 5000		0 1000 30000
								Vs 52 (FMS Logger)		
								0 1000 5000		







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Structural Legend:

- BP - Bedding Plane
- BF - Bedding Fracture
- JT - Joint
- FR - Fracture
- FZ - Fractured Zone
- SH - Shear
- CZ - Crushed Zone
- IF - Infilled Zone
- DZ - Decomposed Zone
- UF - Unidentified Feature

Log Nomenclature:

Azimuth = Tool azimuth from magnetic north
Tilt = Inclination from vertical
Acoustic Calliper = 360° average from travel time
Calliper from Cent = Calliper derived from travel time
Image-NM = Optical image oriented to magnetic north
Amplitude-NM = Acoustic amplitude (magnetic north)
Structures = Apparent Structures oriented to hole
Structures - True = Structures Oriented to true north
3D Optical = 3D representation of optical log
3D Acoustic = 3D representation of acoustic log
DEN(CDL) = Compensated Density in g/ccm
GAM(NAT) = Natural Gamma

Comments:

1. Structures - True are reported in dip direction and dip relative to grid north.
2. Water quality turbid below 23.0 m

Basic Information:

Drill hole ID: BH1107
Client: McMillans Drilling (NI) Ltd
Run Number(s): 01, 03 & 04
Tool Type(s): ABI40-2G-VLB Acoustic Televiwer
OB40-2G Optical Televiwer
QL40-CAL Mechanical Calliper

Service Company: RDCL
Operator: H Soma
Date Logged: 27/03/2023
Field: Auckland Light Rail
State / Province: Auckland
Country: New Zealand

Drillhole Information:

Log interval from (m): 2.50 Log interval to (m): 59.88
Depth Driller (m): 60.00 Depth Logger (m): 60.03 (Acoustic)
Fluid Type: Water Fluid Level (m): 19.57 (Acoustic)
Easting: 5919868.890 Northing: 1757424.435
Elevation: N/A Coord Ref System: NZTM
Hole Azimuth: Vertical Hole Inclination: >88.5°
Magnetic Declination: +20° 8' East Magnetic Indination: 62° 49'

Drill Company: McMillans Drilling (NI) Ltd

Printing Information:

Depth Unit: Metres Log Scale: 1:10 Log Version: Final
Processed: J Connors Log Reviewer: K Koria

Bit Size Record:

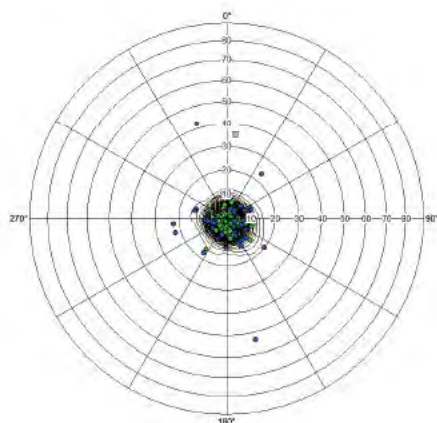
Size (mm):	From (m):	To (m):	Type:	Size:	From (m):	To (m):
HQ	0.00	60.00	HWT	101.6	-0.55	2.84
###	###	###	XX	###	###	###
###	###	###	XX	###	###	###
###	###	###	XX	###	###	###

Casing Record:

Location Description:

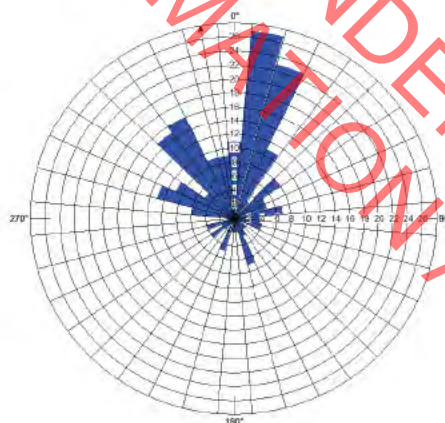
87 Wakefield Street

Stereoplot - Polar Projection Dip



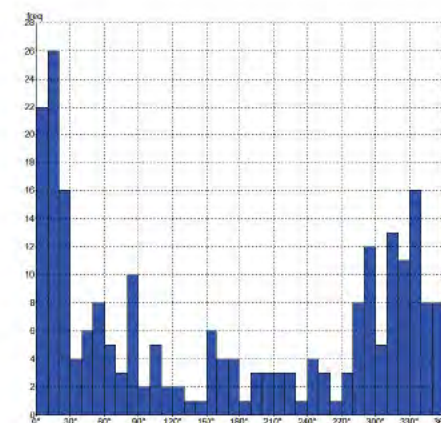
Schmidt Plot - Lower (Southern) Hemisphere - Structures - True
Depth: 2.50 m to 59.88 m

Rose Diagram - Azimuth

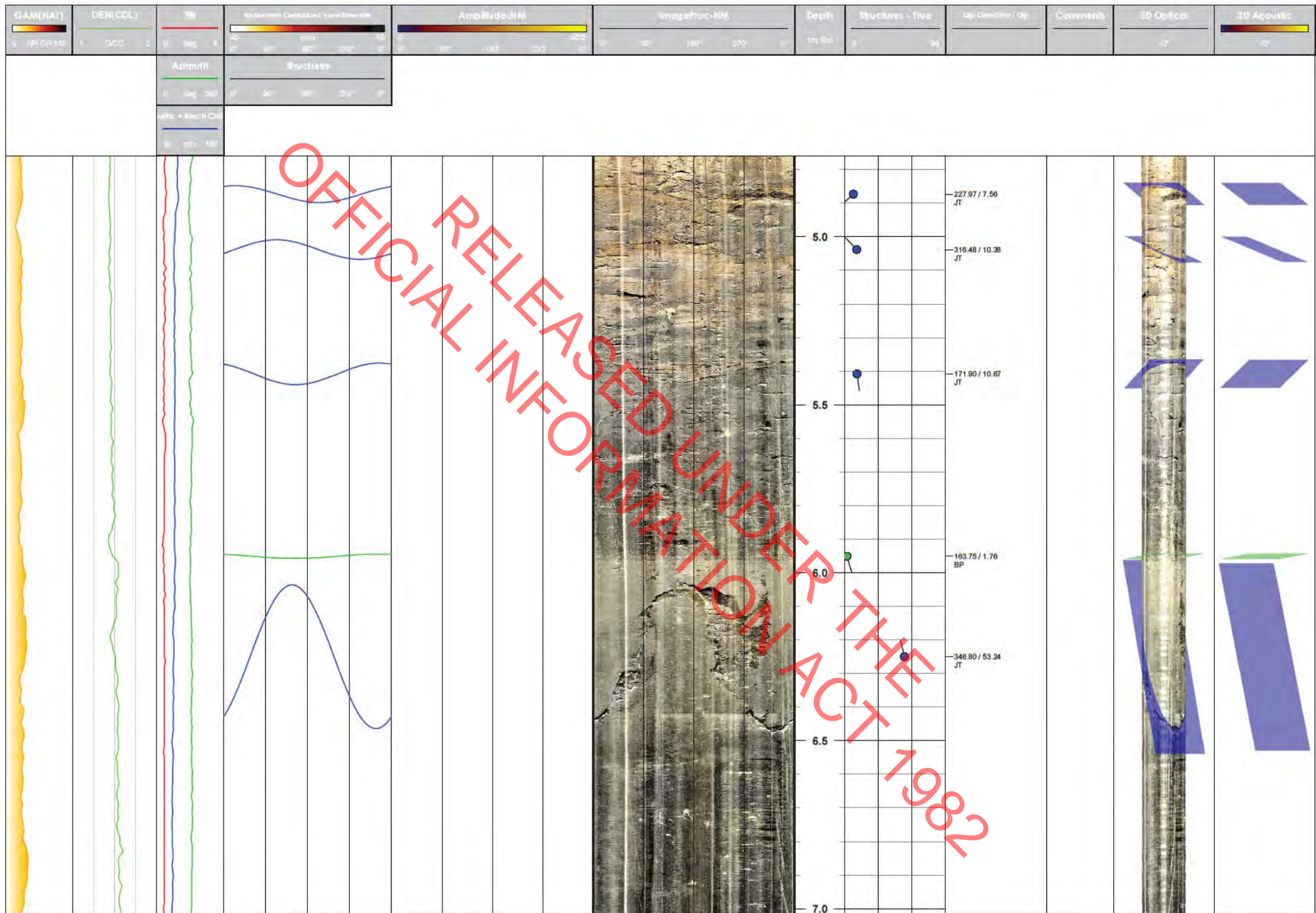


Depth: 2.50 m to 59.88 m

Histogram - Azimuth

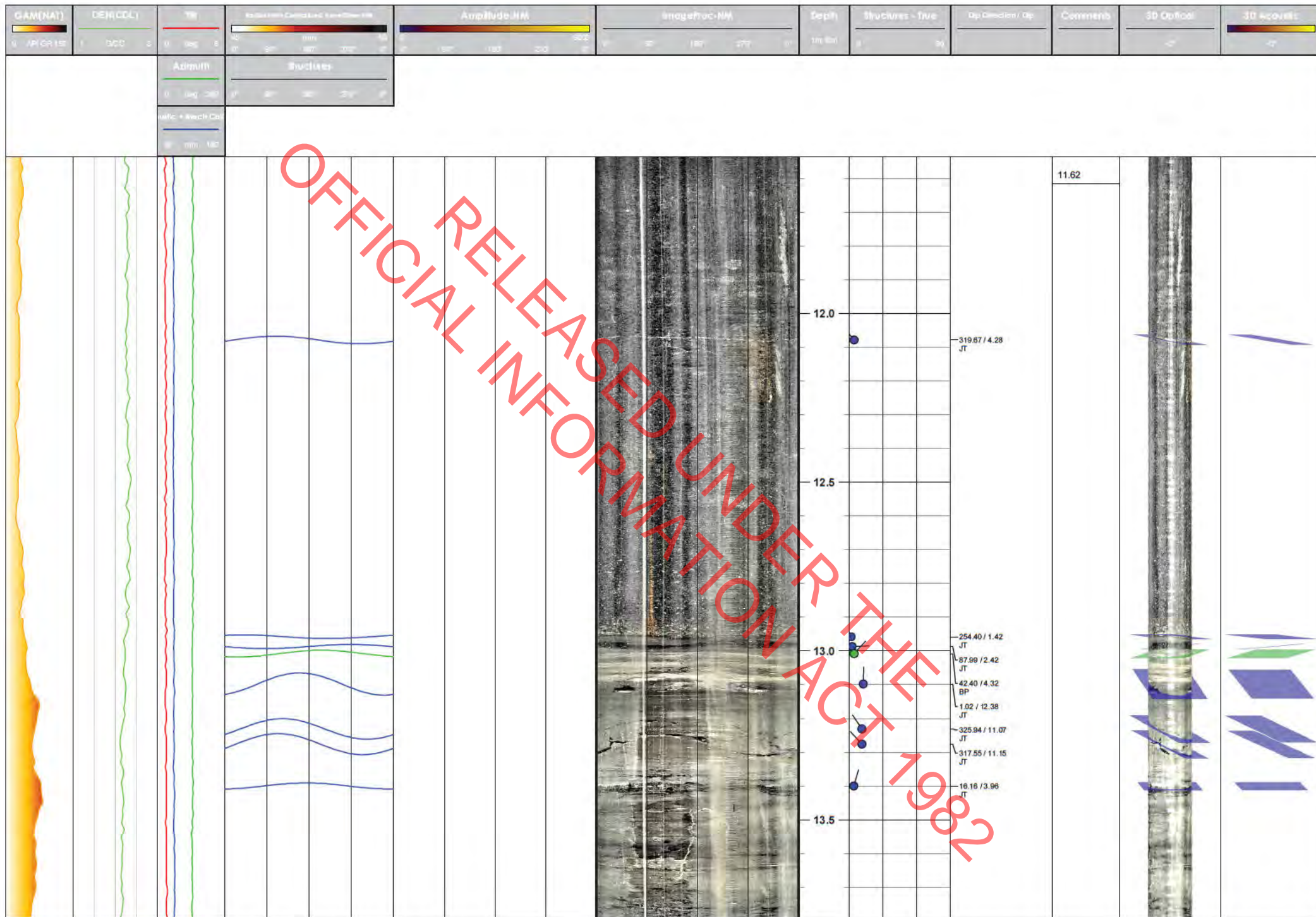


Depth: 2.50 m to 59.88 m

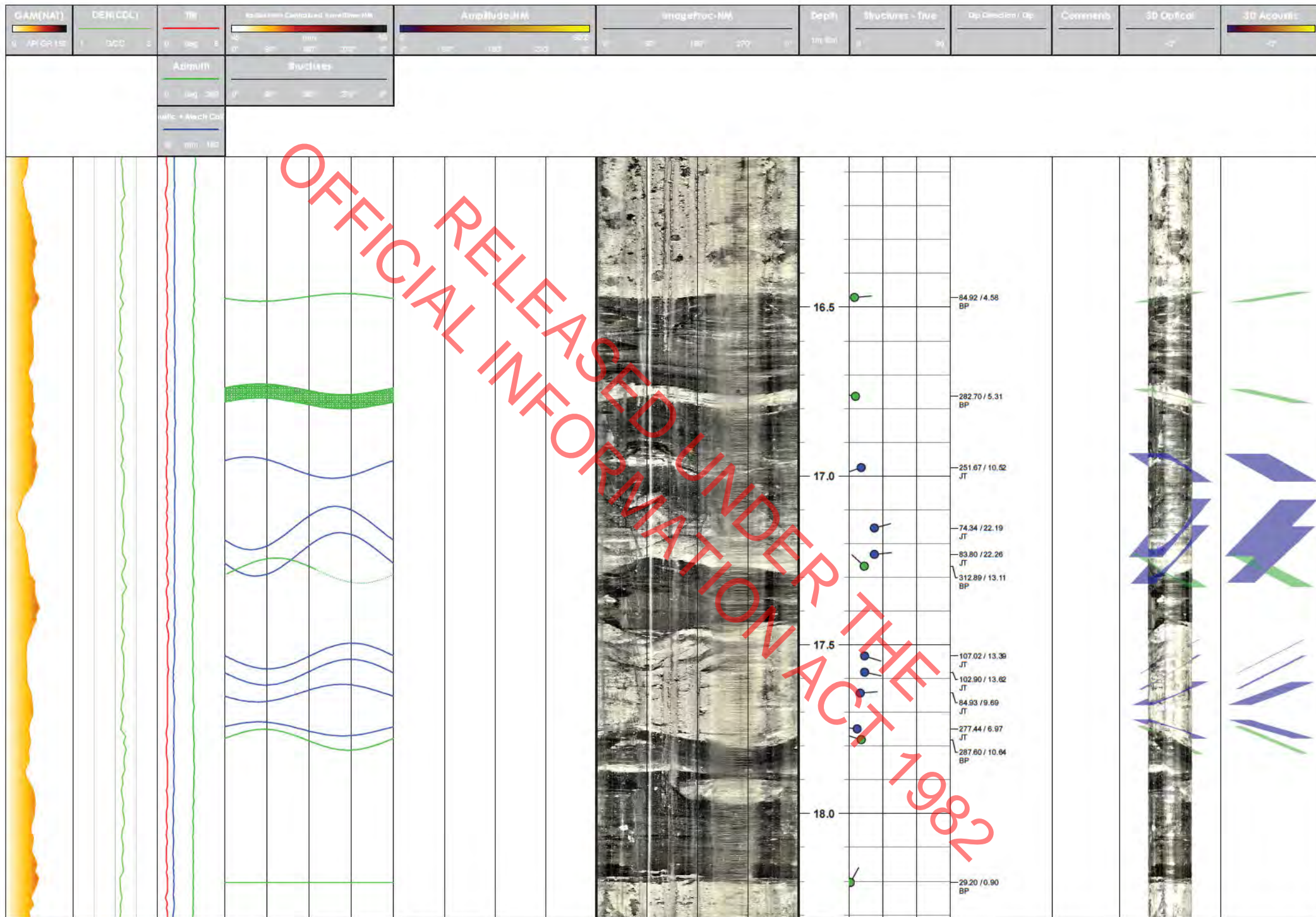


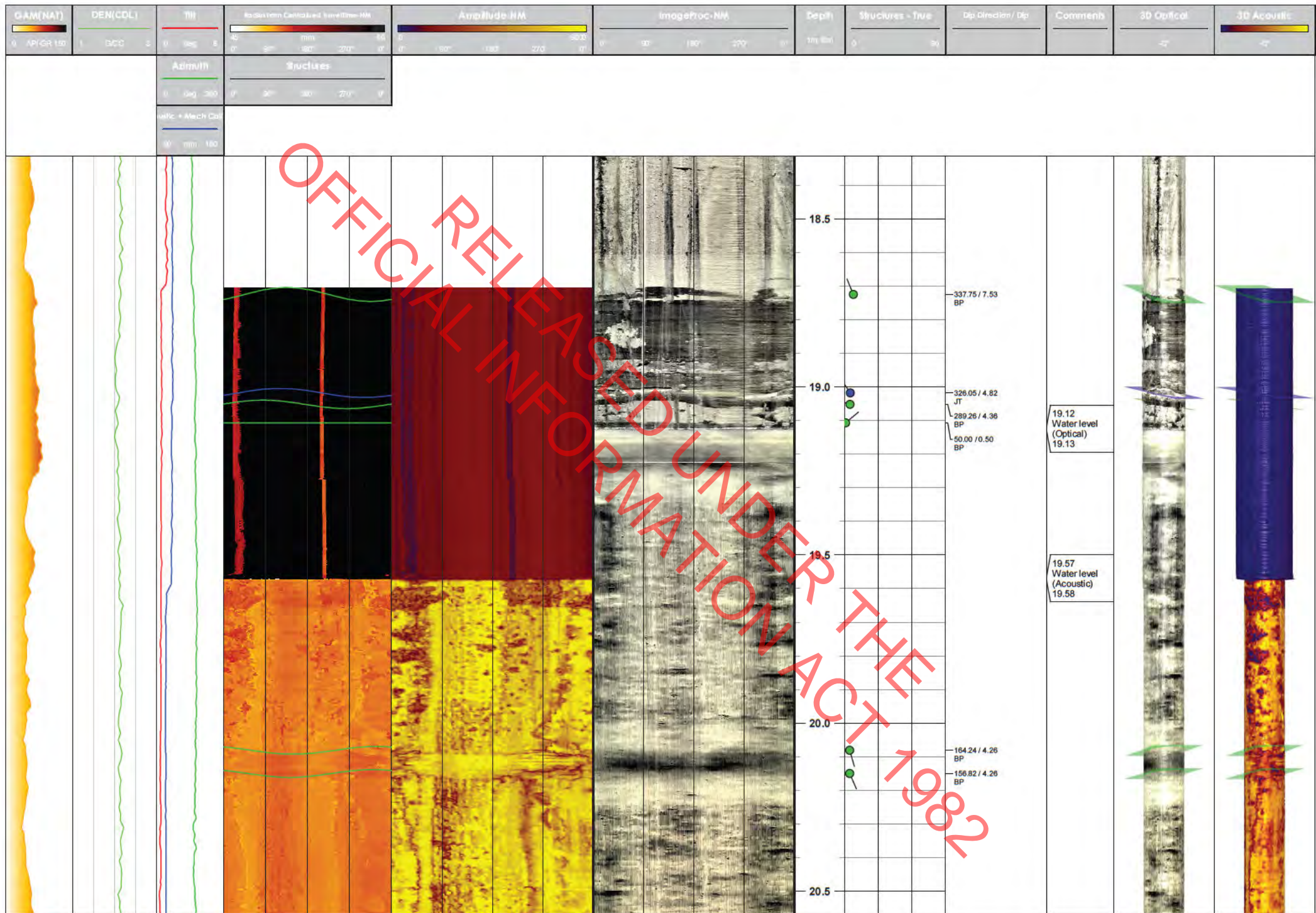


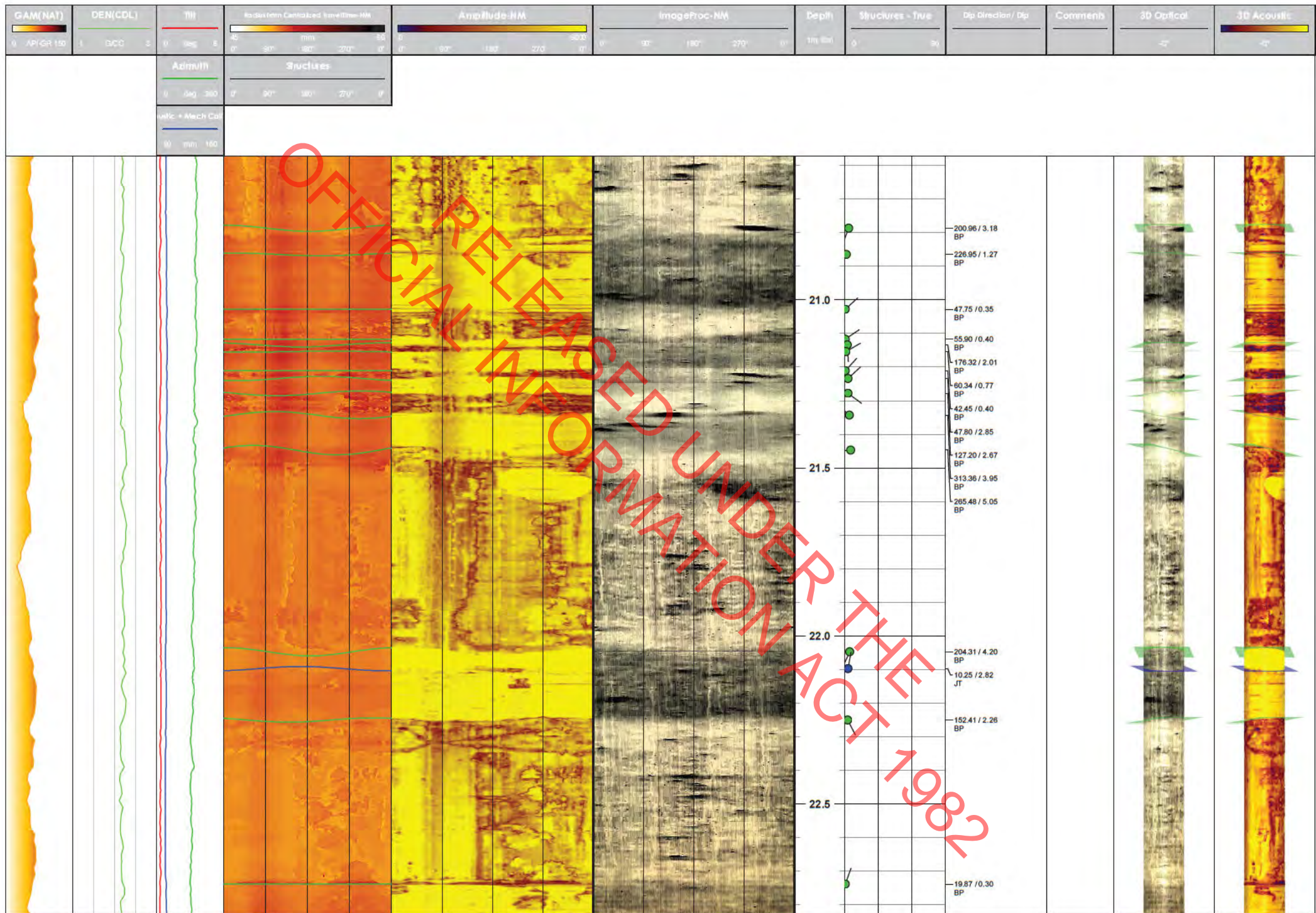


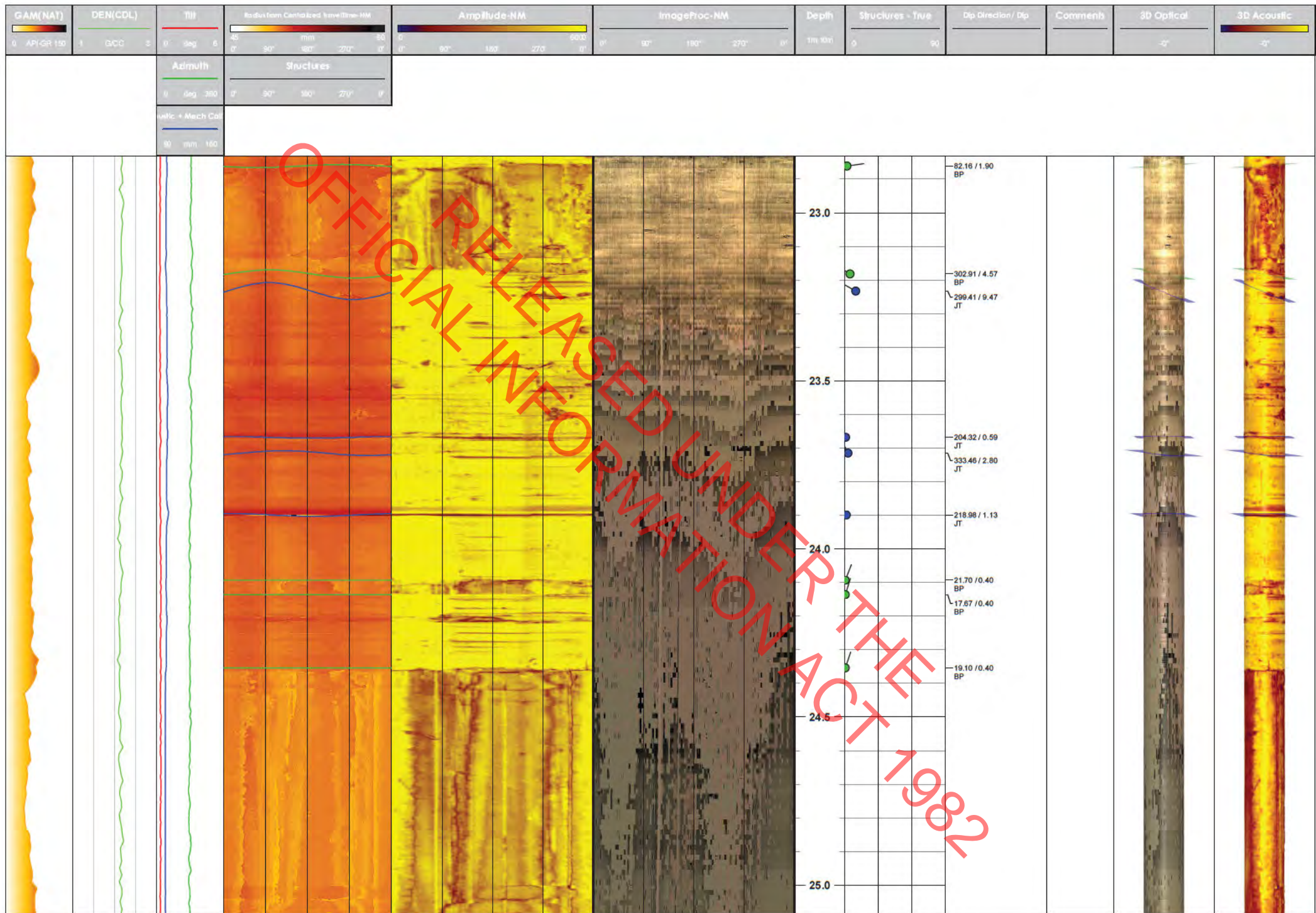


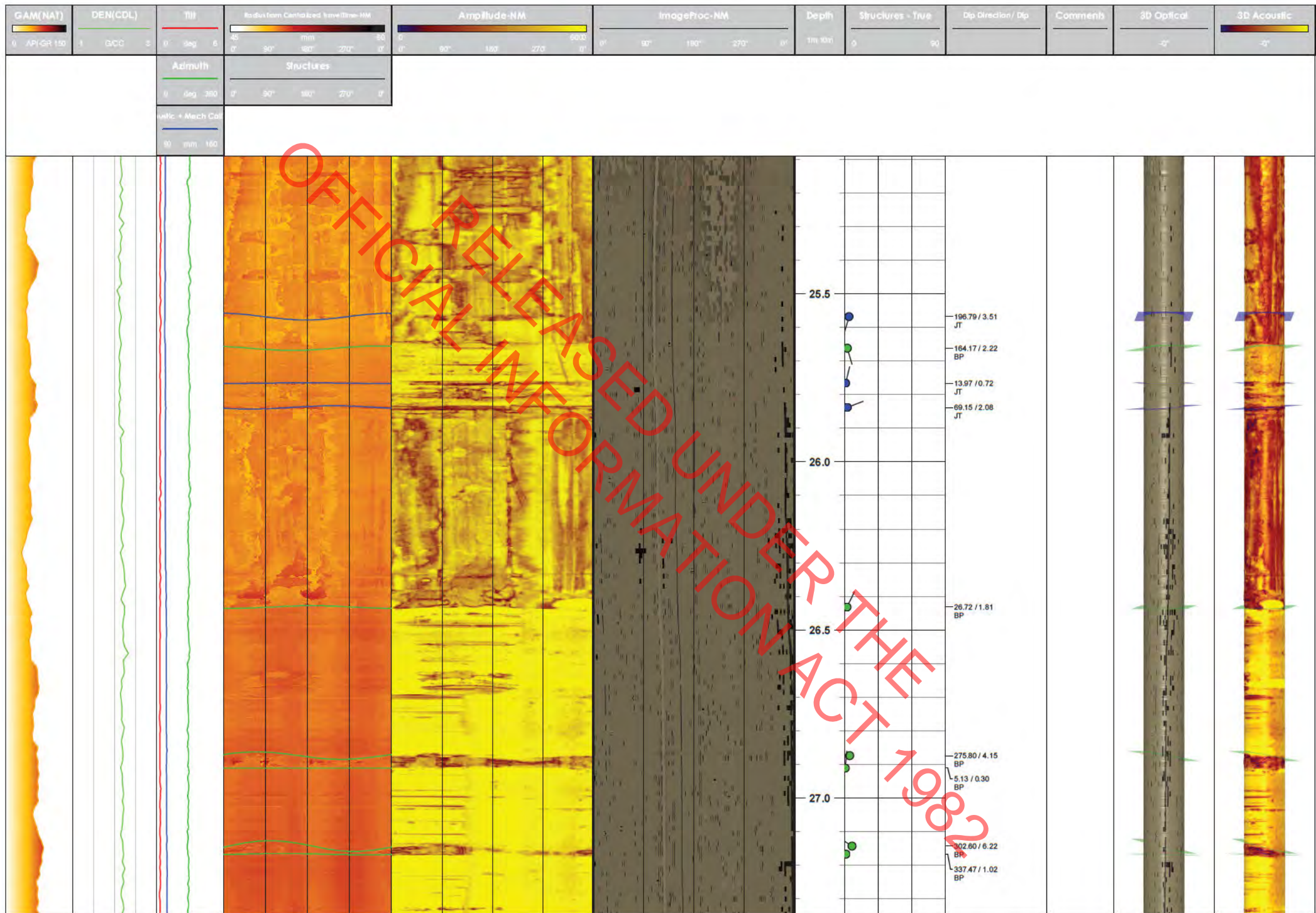


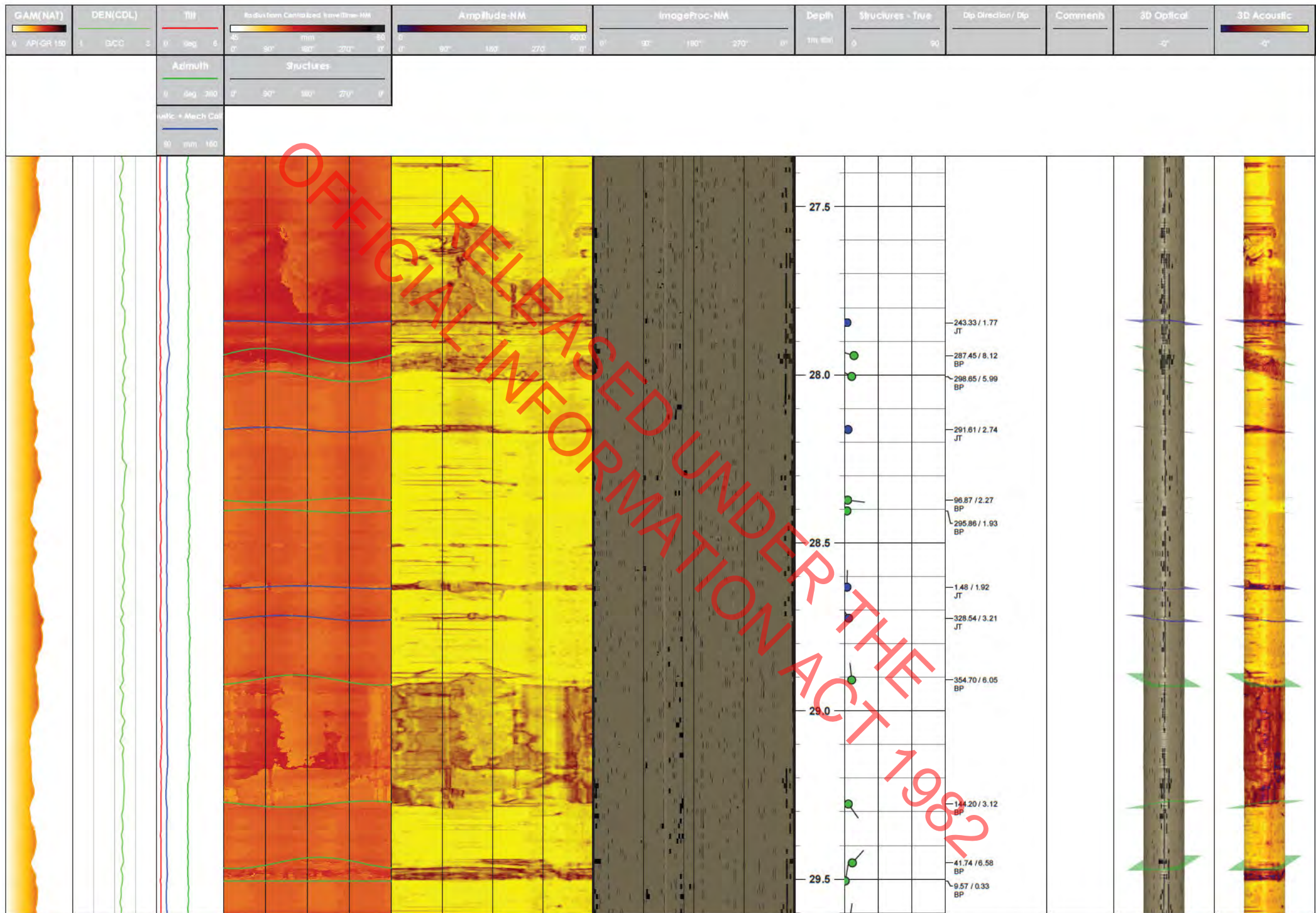


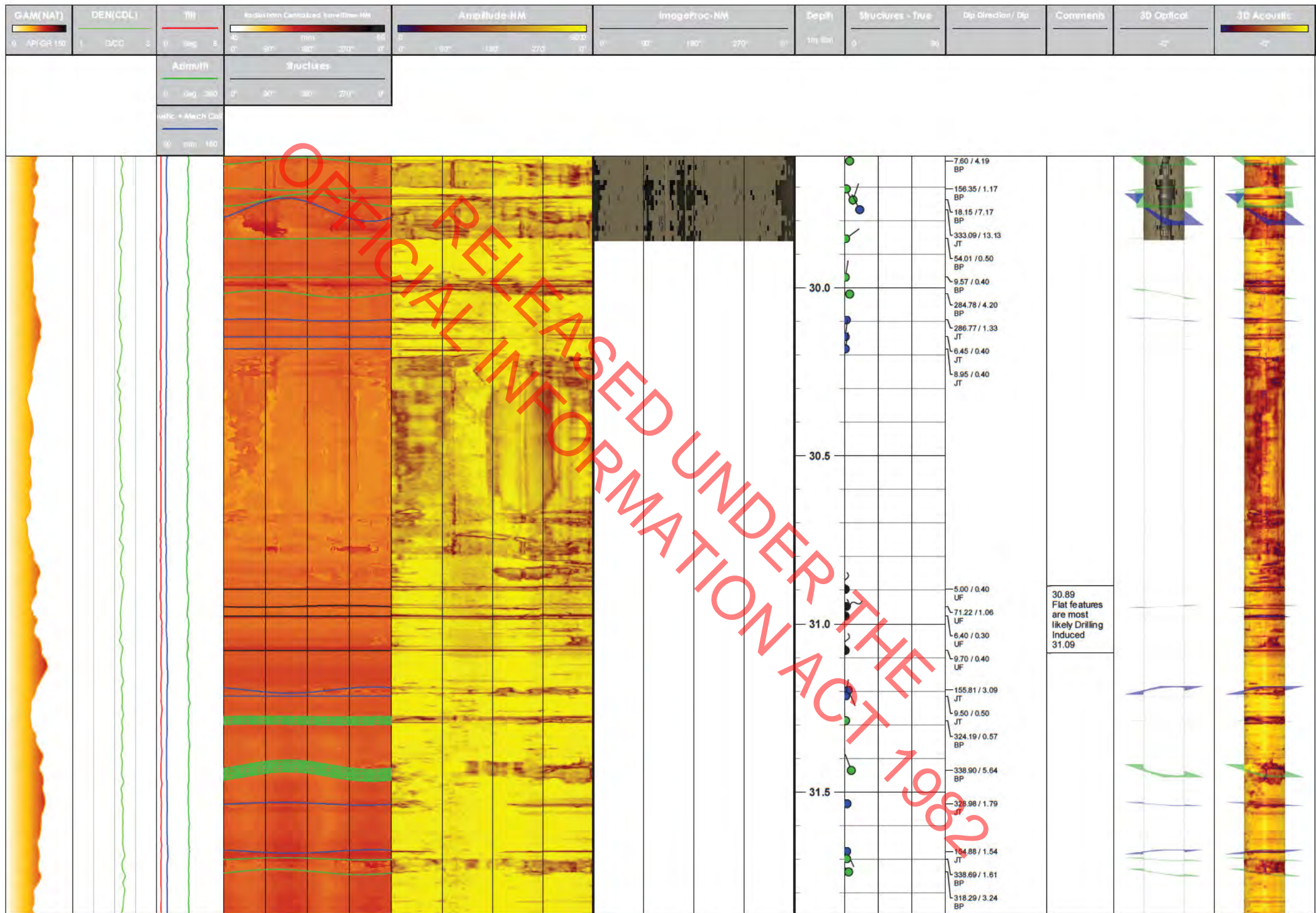


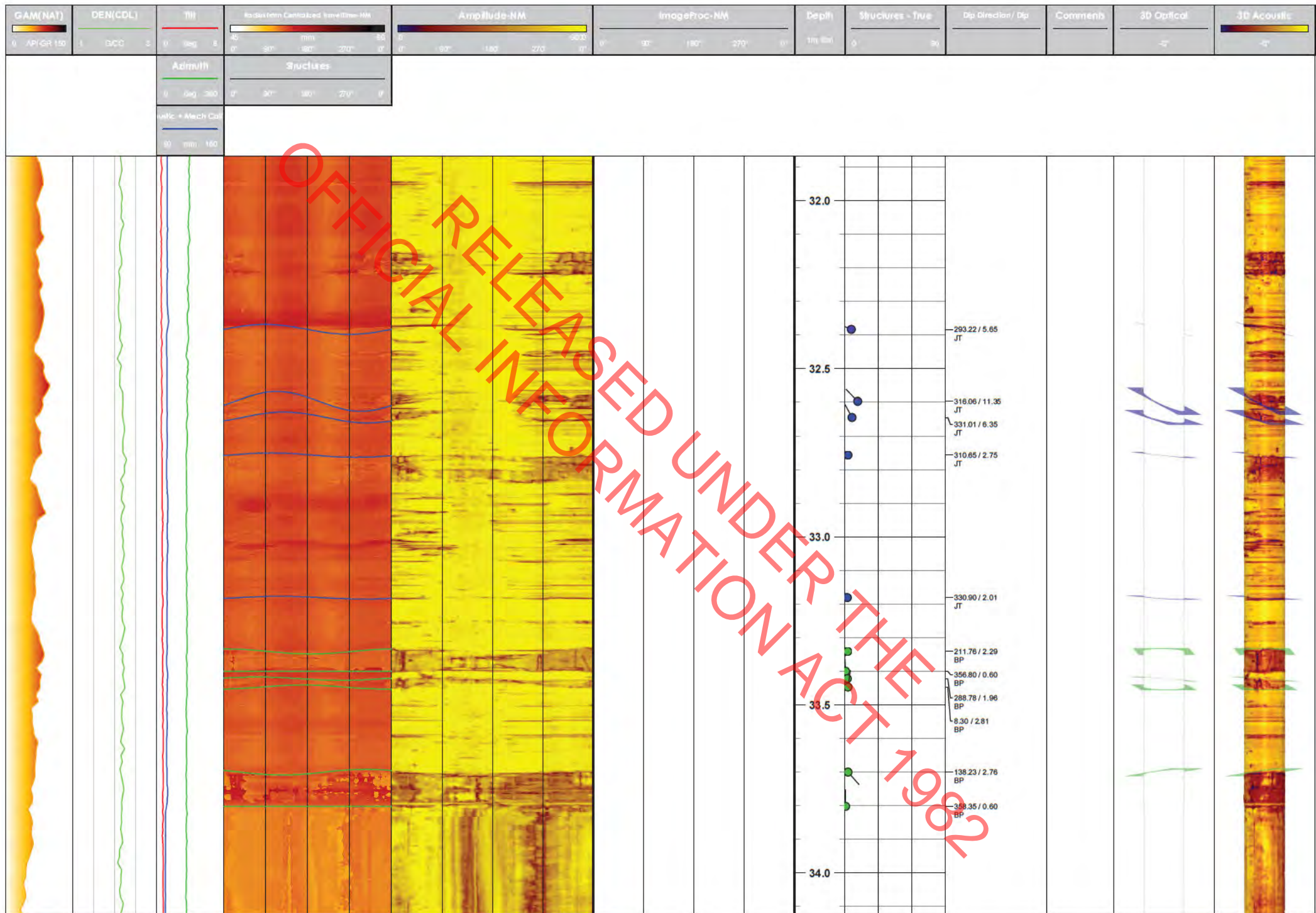


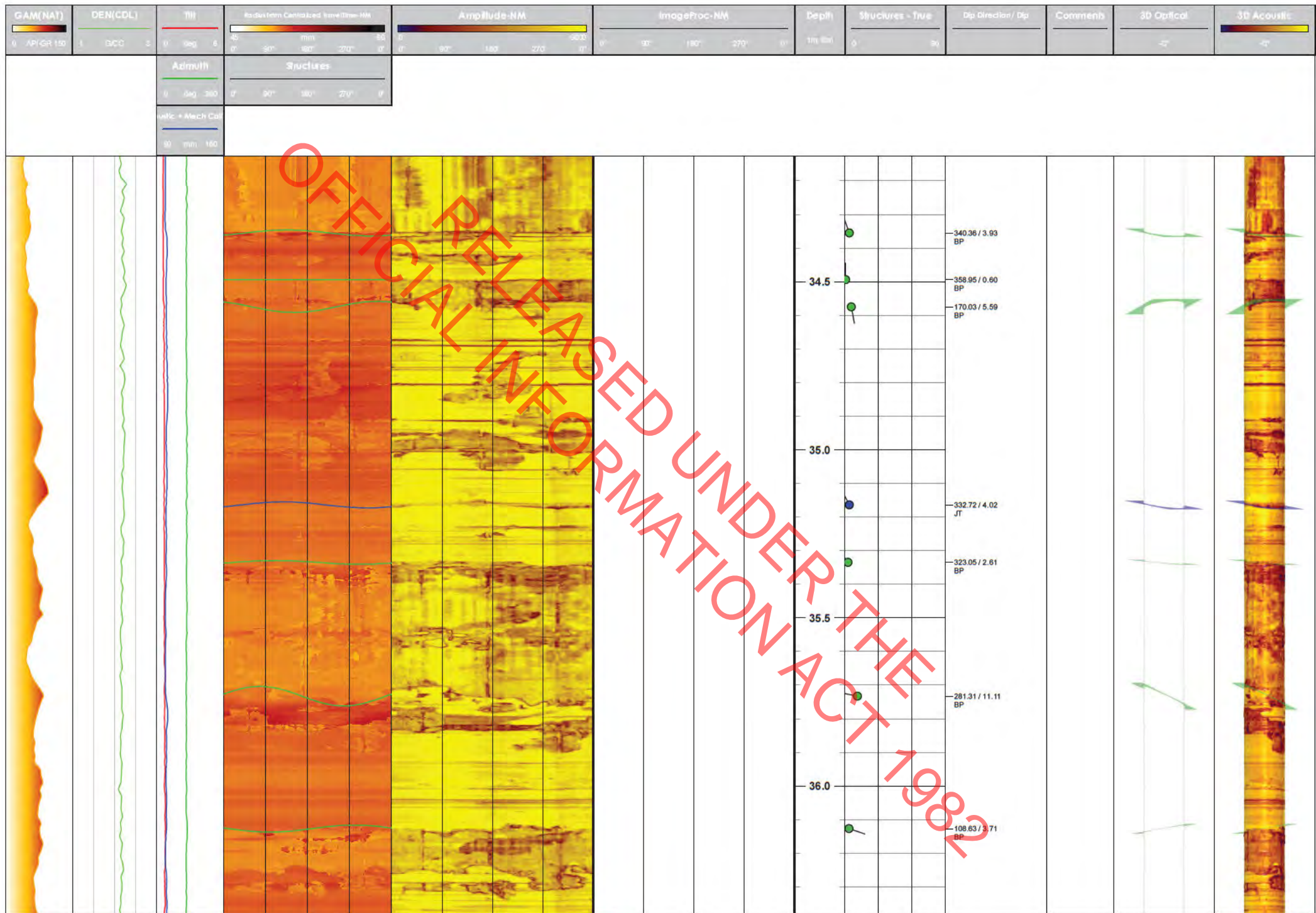


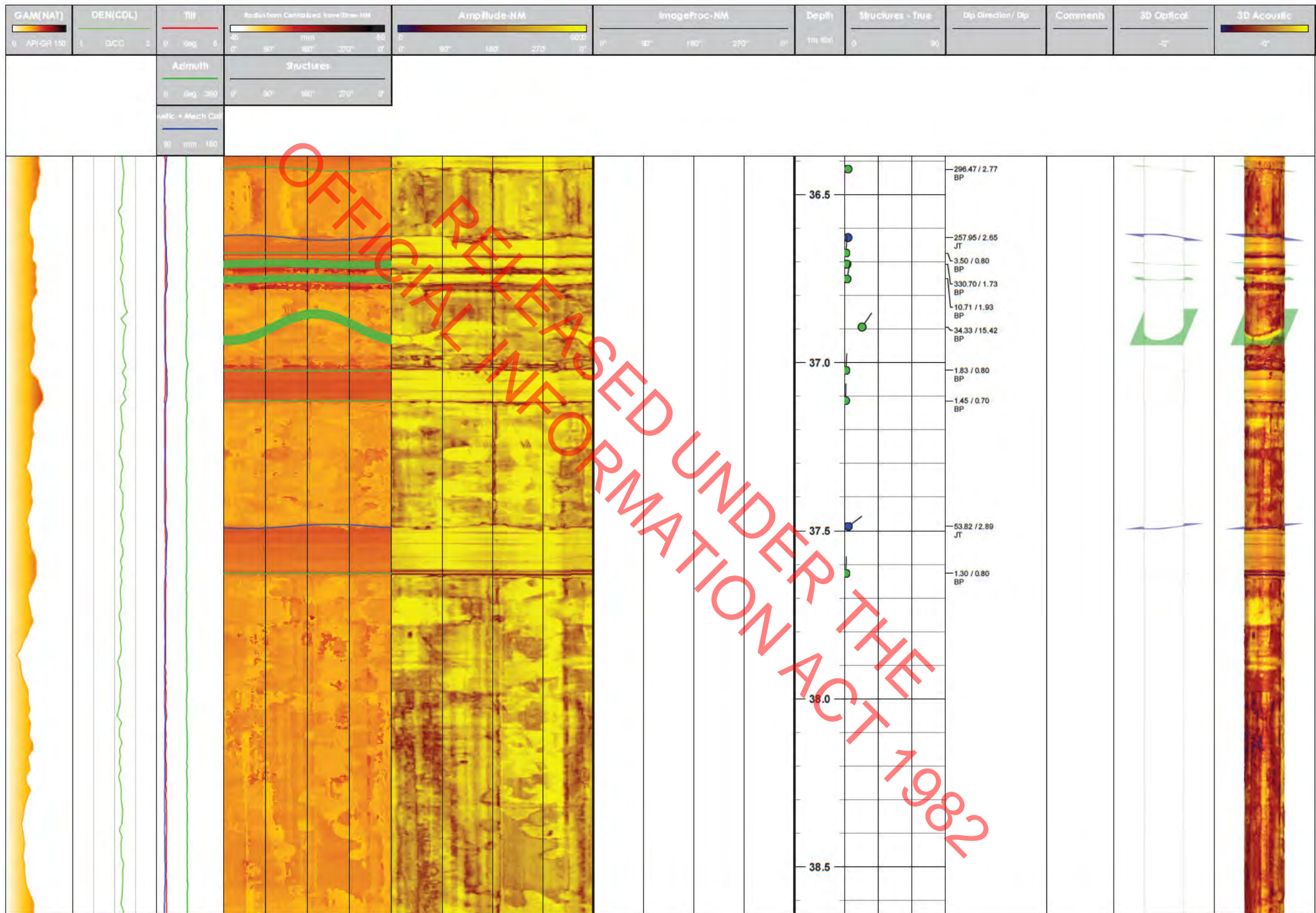


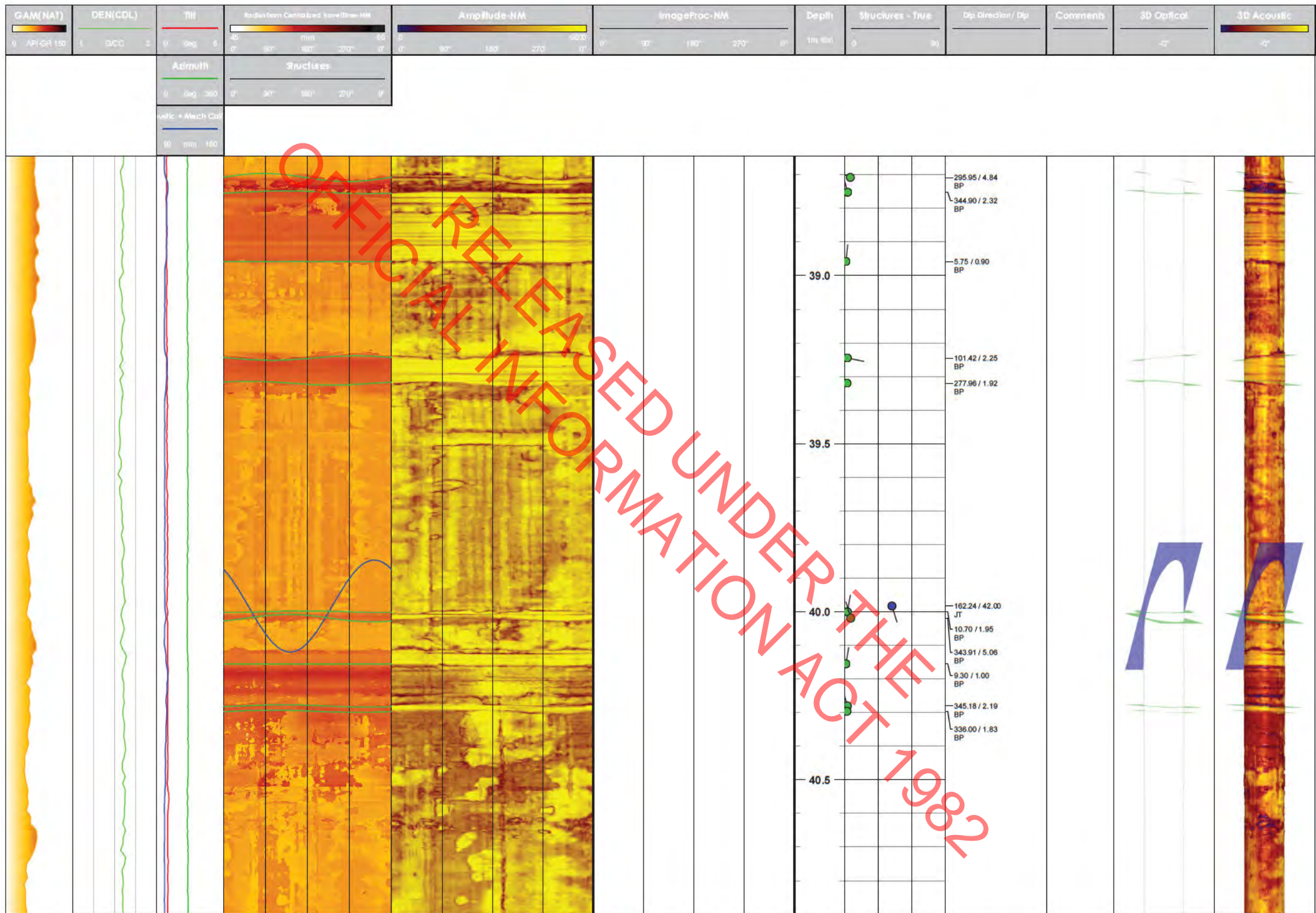


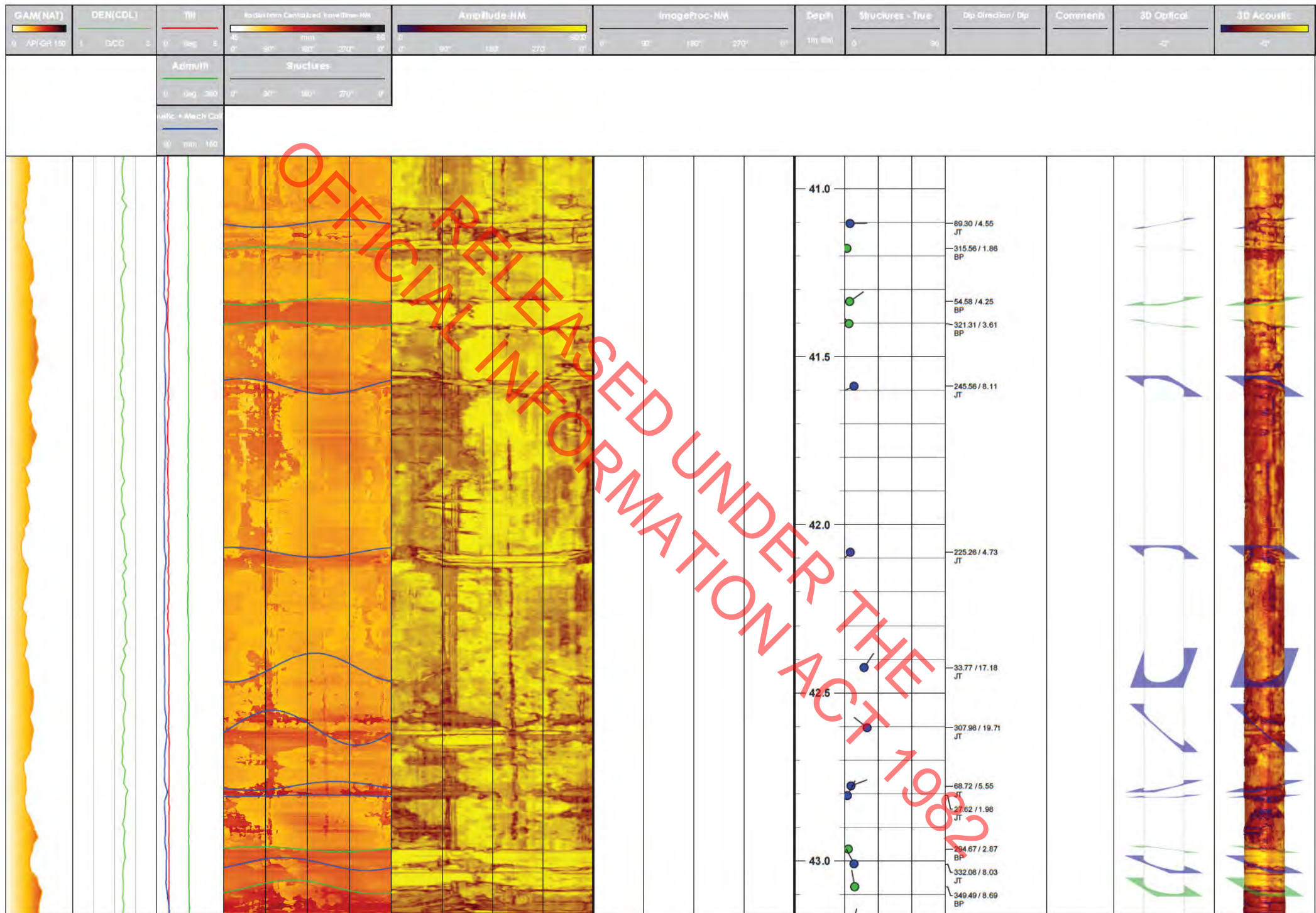


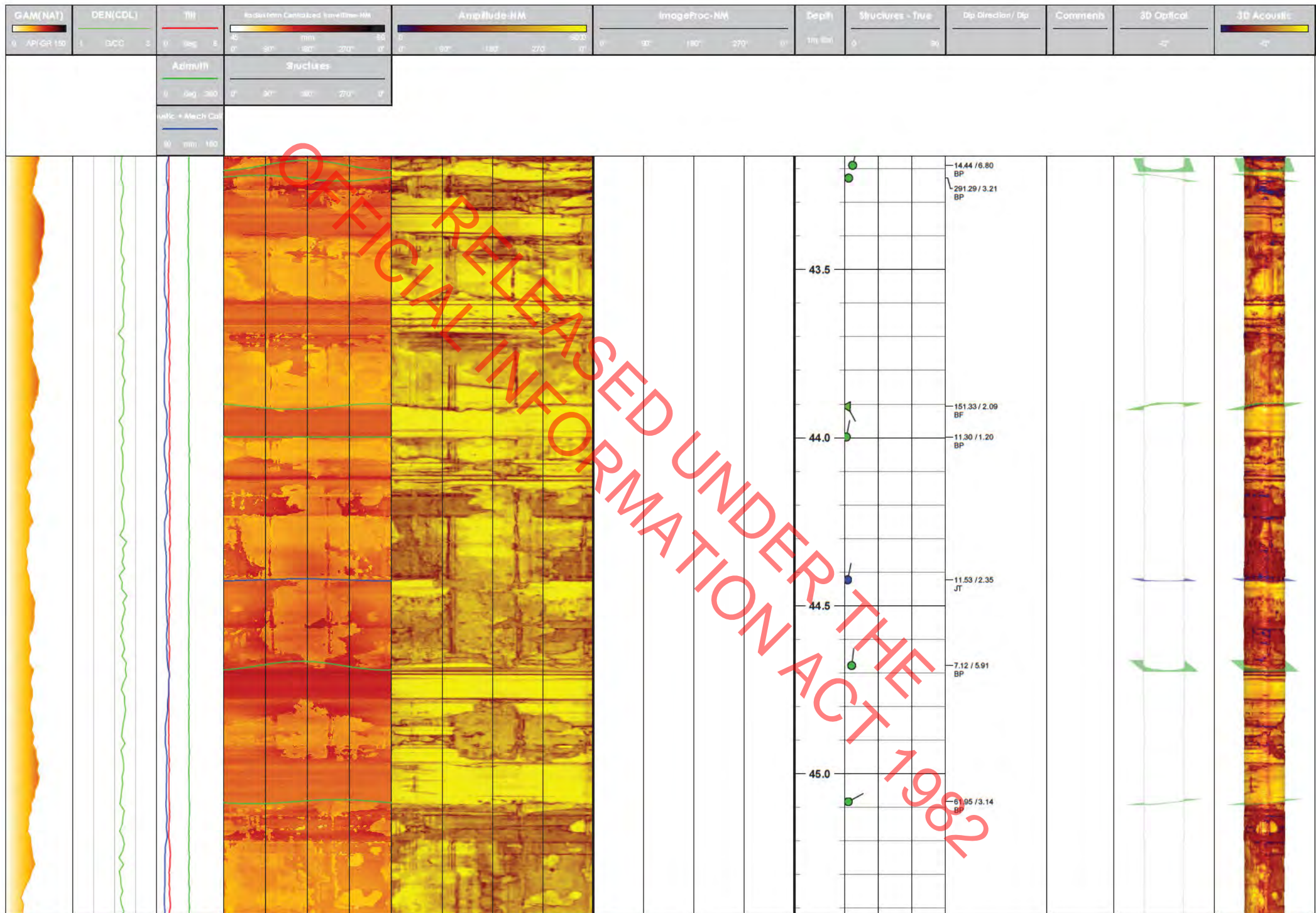


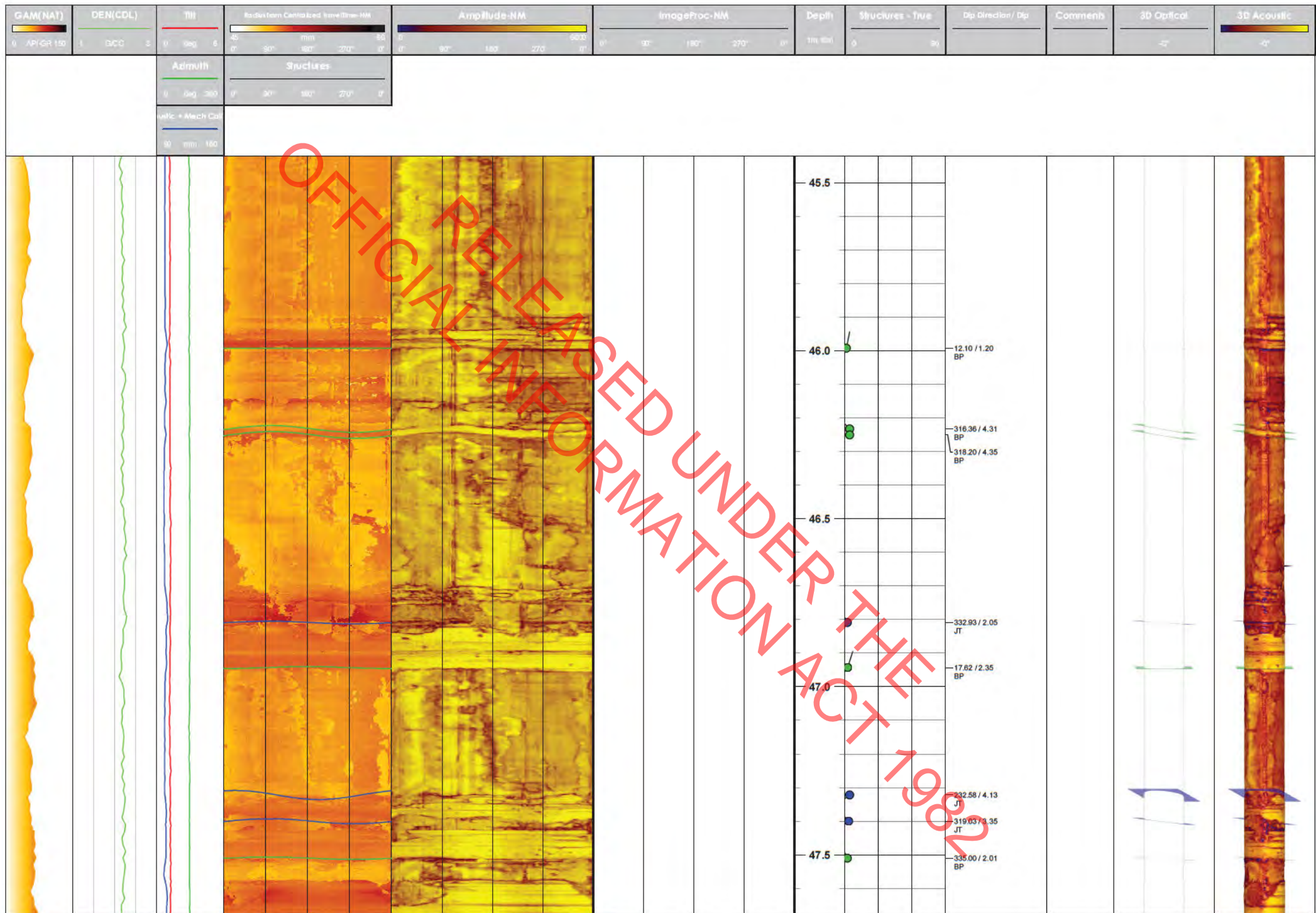


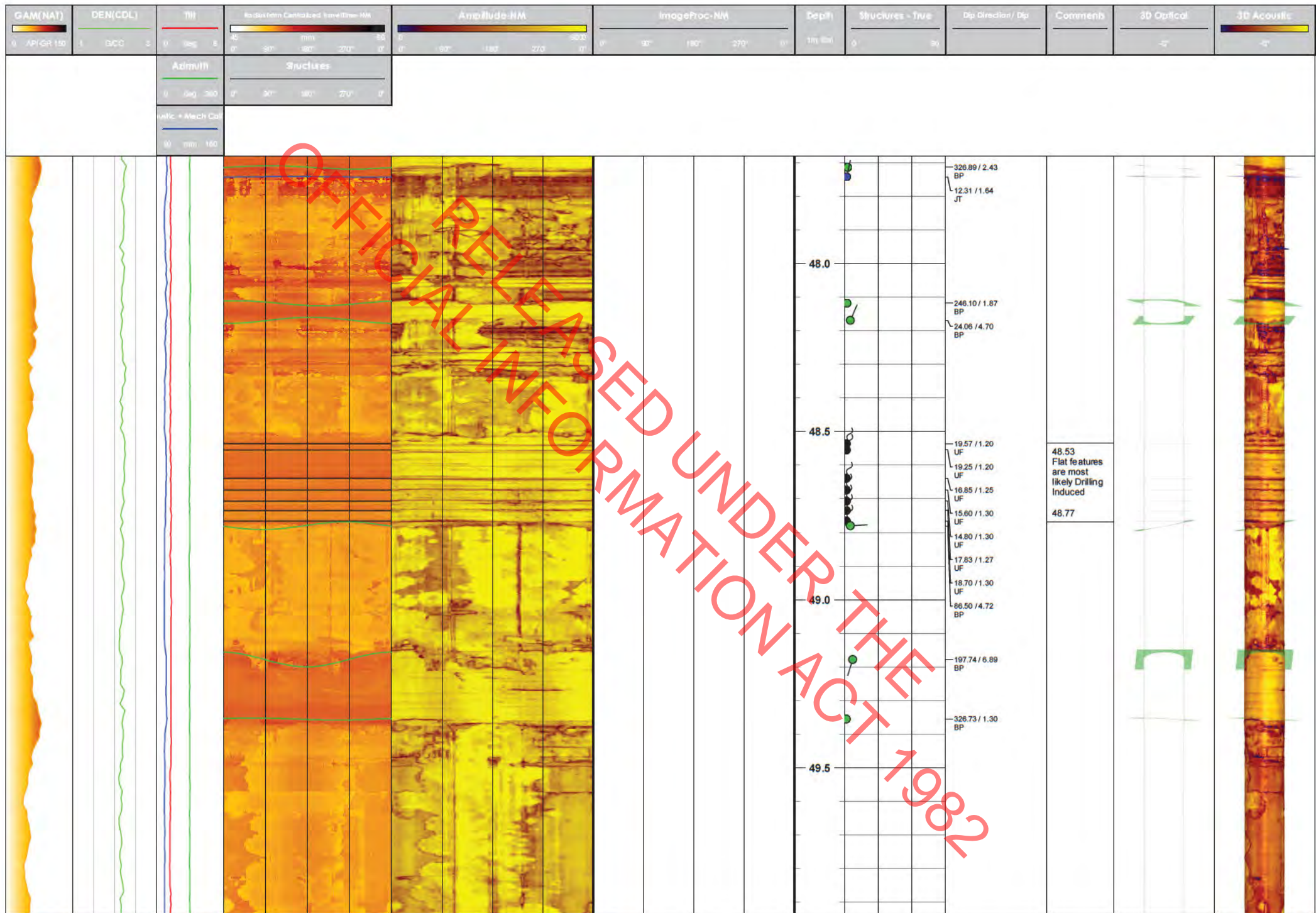


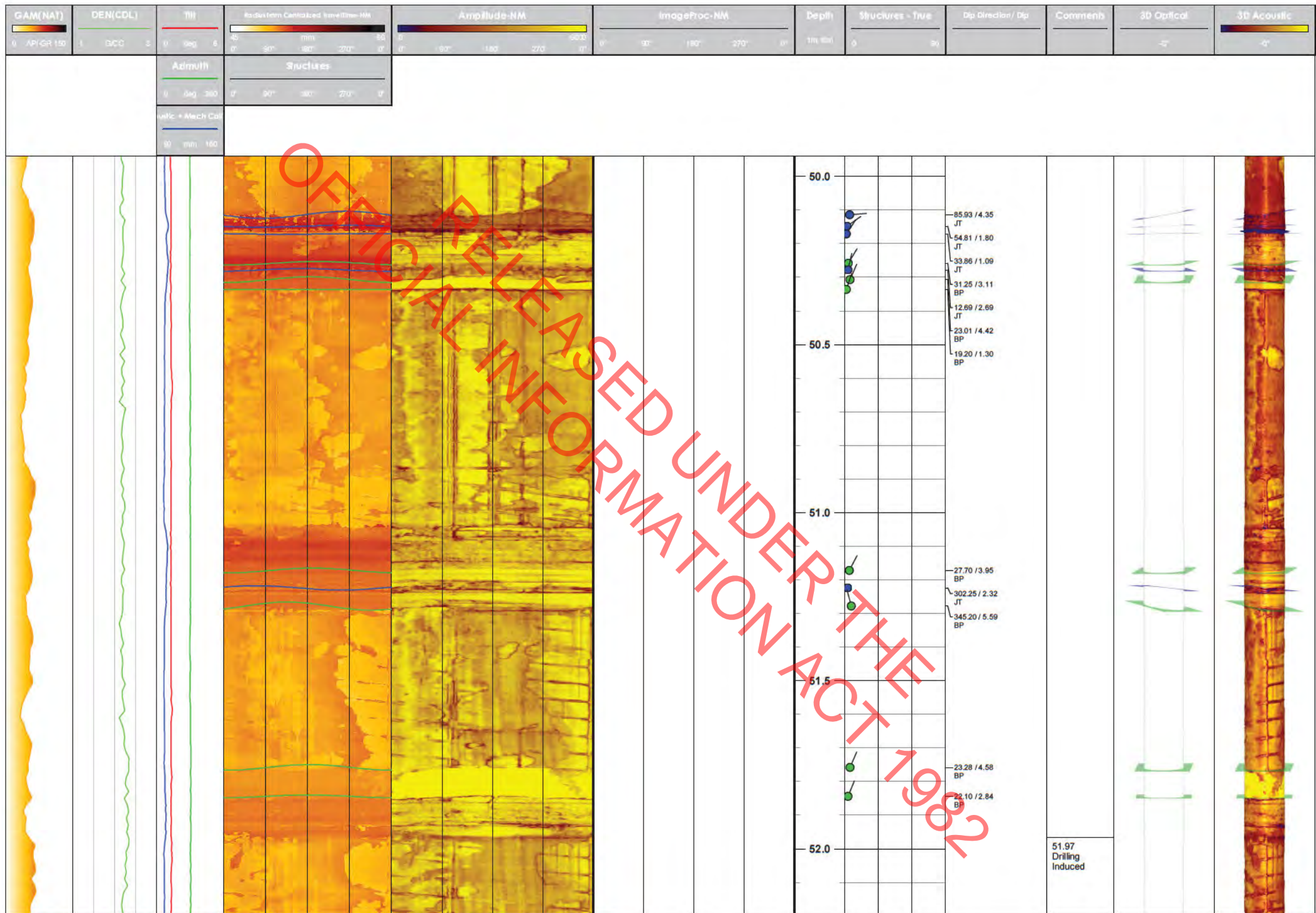


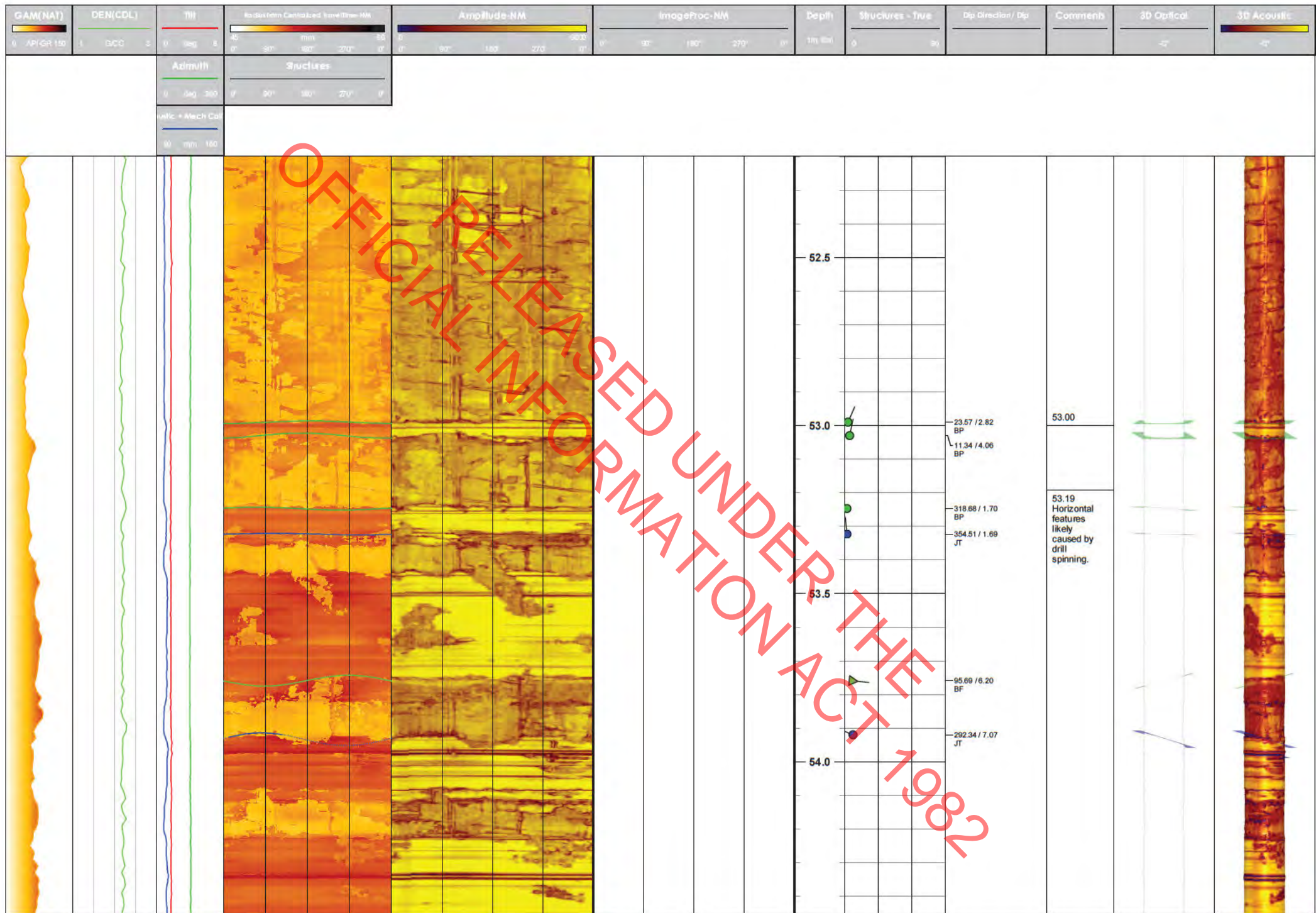


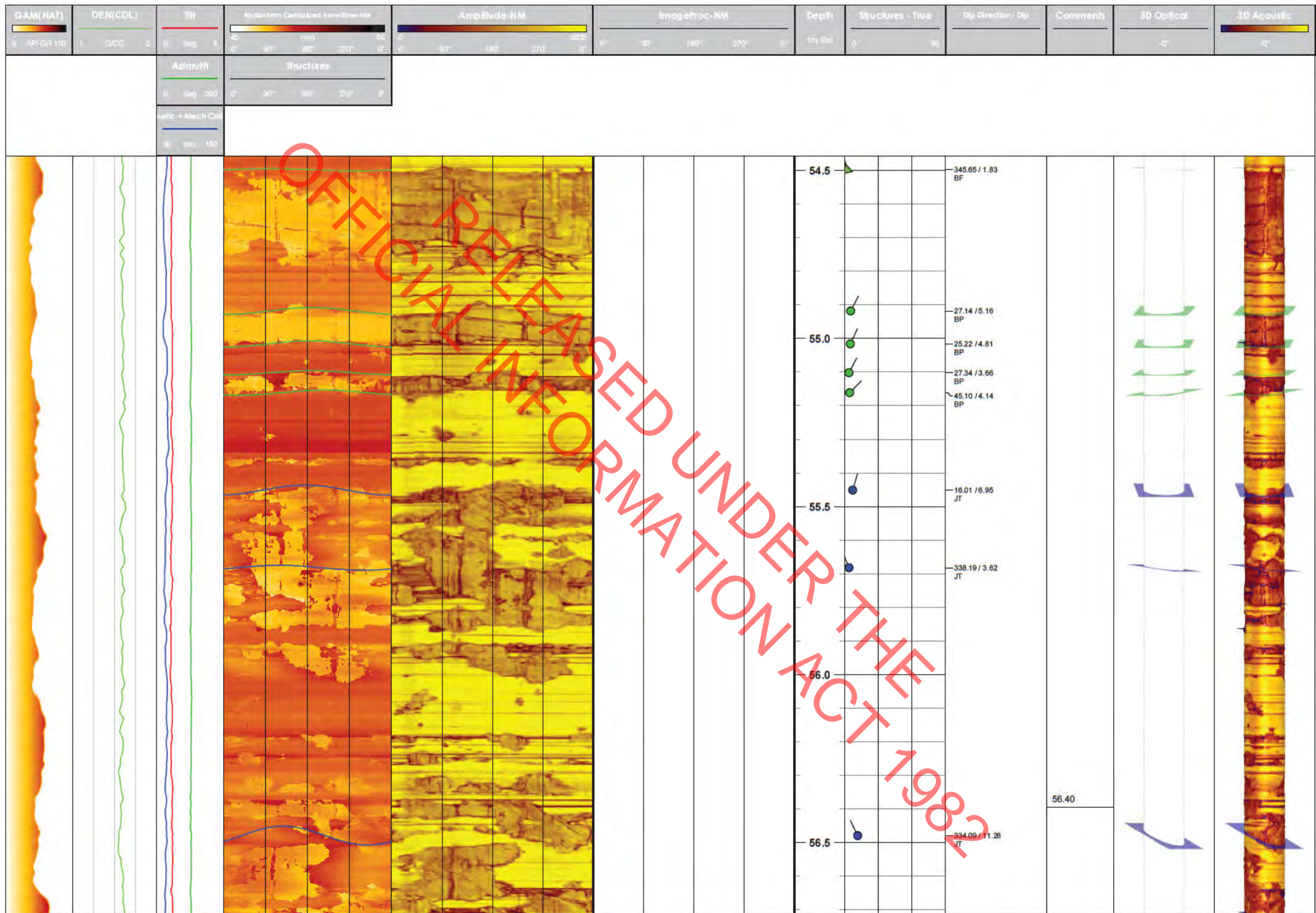


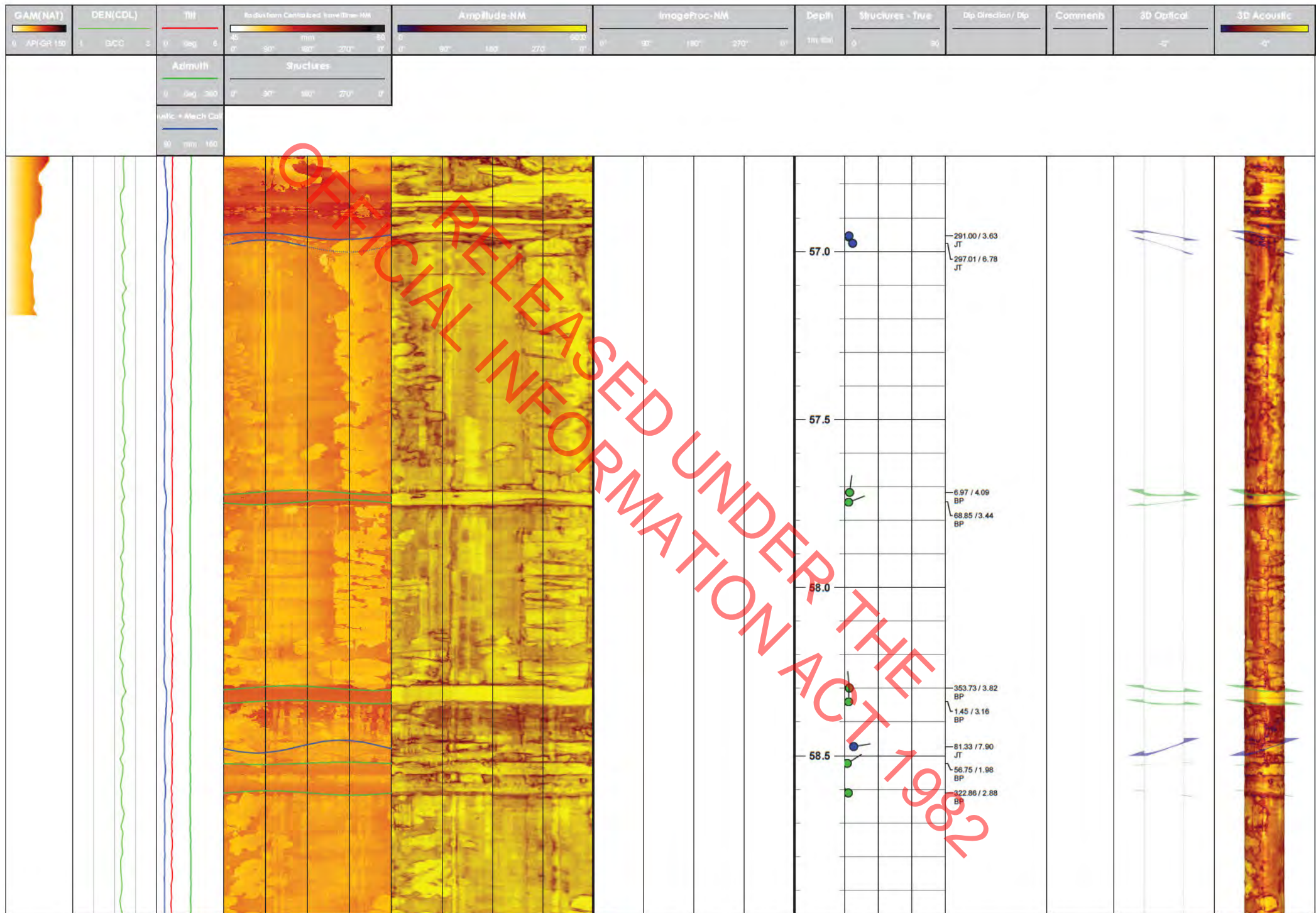


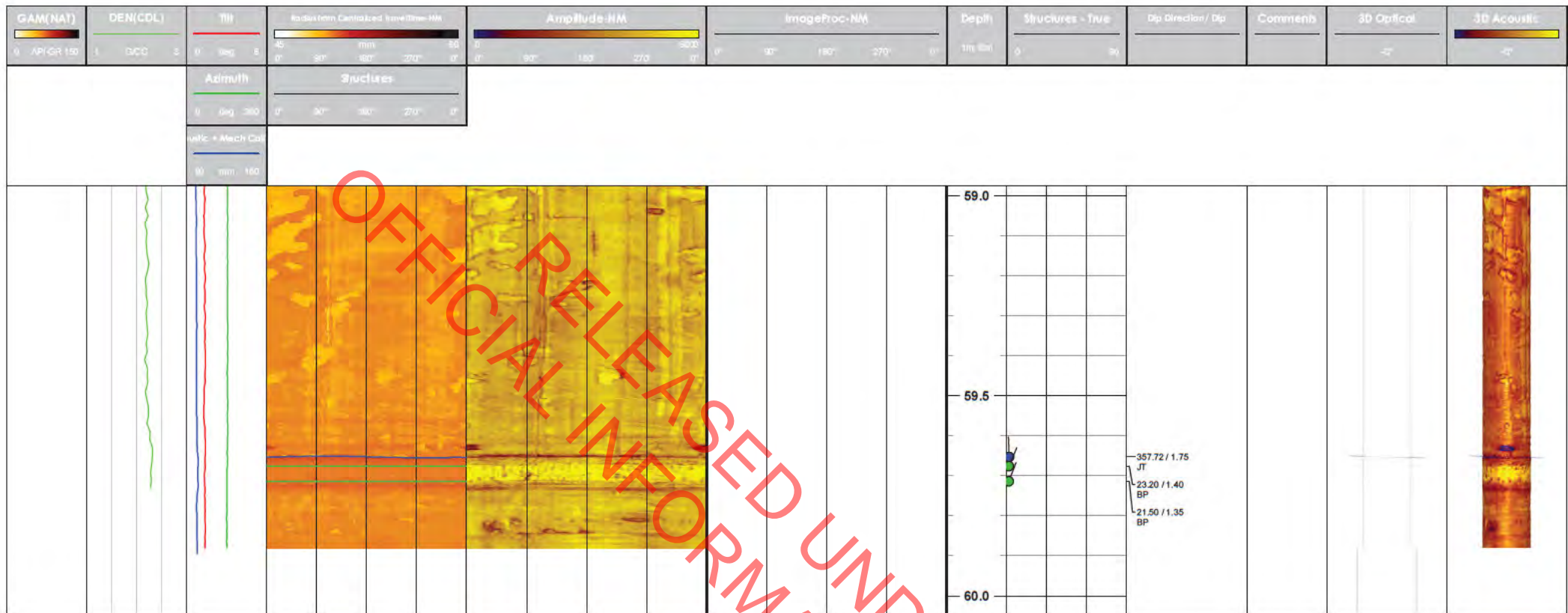














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Log Notes:

The elastic moduli and engineering parameters were calculated from Full Wave Form Sonic Tool Vp and Vs measurements and assumed densities. As such the logs should be considered in-situ, small strain and bulk measurements. These measurements may differ from laboratory testing for these reasons.

Log Calculations:

SI unit calculations:
Shear Modulus (G) = dVs^2
Bulk Modulus (K) = $1/3*(E/(1-2*PR))$
Young's Modulus (E) = $2G(1+PR)$
Poisson's Ratio (PR) = $2-(Vp/Vs)^2/2-(Vp/Vs)^2$

Where:
Vp = P-wave seismic velocity
Vs = S-wave seismic velocity
d = Density

Log Nomenclature:

Velocity Analysis = Output of semblance processing
S_Slowness = Shear wave slowness from semblance
Vp = P-wave velocity
Vs = Shear wave velocity from S-Slowness
DEN(CDL) = Compensated Density
Shear Modulus = Shear Modulus (G0)
Bulk Modulus = Bulk Modulus (K)
Young's Modulus = Young's Modulus (E)
Poisson's Ratio = Poisson's Ratio (PR)
Vp/Vs = P-wave S-wave ratio
RX#-1A = Wiggle window of sensor #
RX#-1A - dt = Picked first arrival time for sensor #

Basic Information:

Well Name: BH1109
Company: McMillans Drilling (NI) Ltd
Run No: 05 & 07
Tool Type(s): QL40-FWSS Full Wave Form Sonic
Geovista P&S Logger
Service Company: RDCL
Operator: H Soma
Witness: Nil
Date Logged: 20/03/2023
Field: Auckland Light Rail
State / Province: Auckland
Country: New Zealand

Drillhole Information:

Bit Size: HQ
Log interval from: 12.00 m Log interval to: 65.63
Depth Driller: 66.00 m Depth Logger: 65.8 (Calliper)
Fluid Type: Water Fluid Level: 12.82 (Acoustic)
Northing: 1757311.161 Easting: 5919646.682
Elevation: TBC Projection: NZTM
Hole Azimuth: Vertical Hole Inclination: <88.6°
Magnetic Declination: +20° 8' East Magnetic Inclination: 62° 49'
Casing Size: HWT Casing Depth: 2.86 m

Printing Information:

Print Type: Paginated Log Version: Final
Depth Unit: Metres Scale Ratio: 1:25

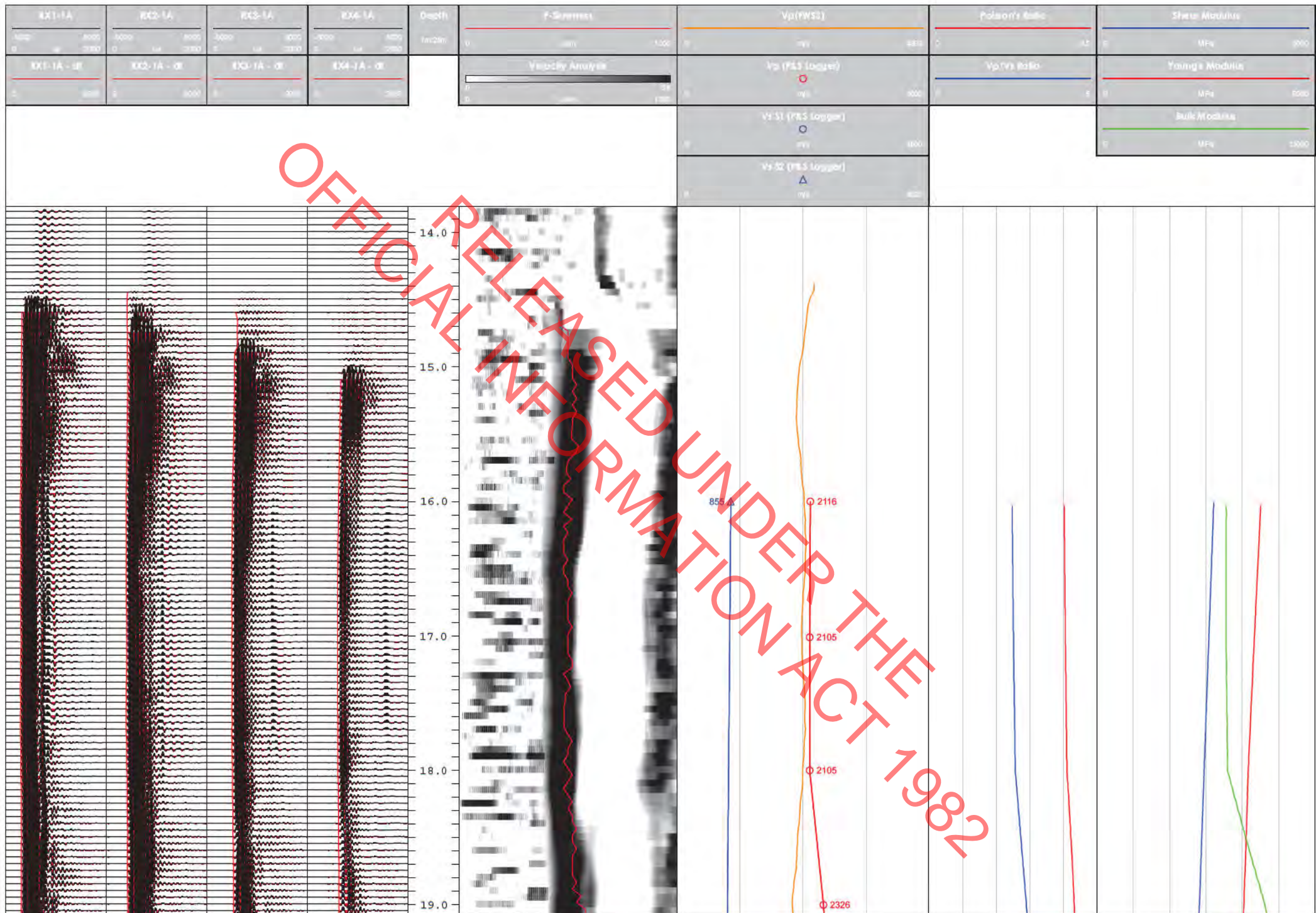
Location Description:

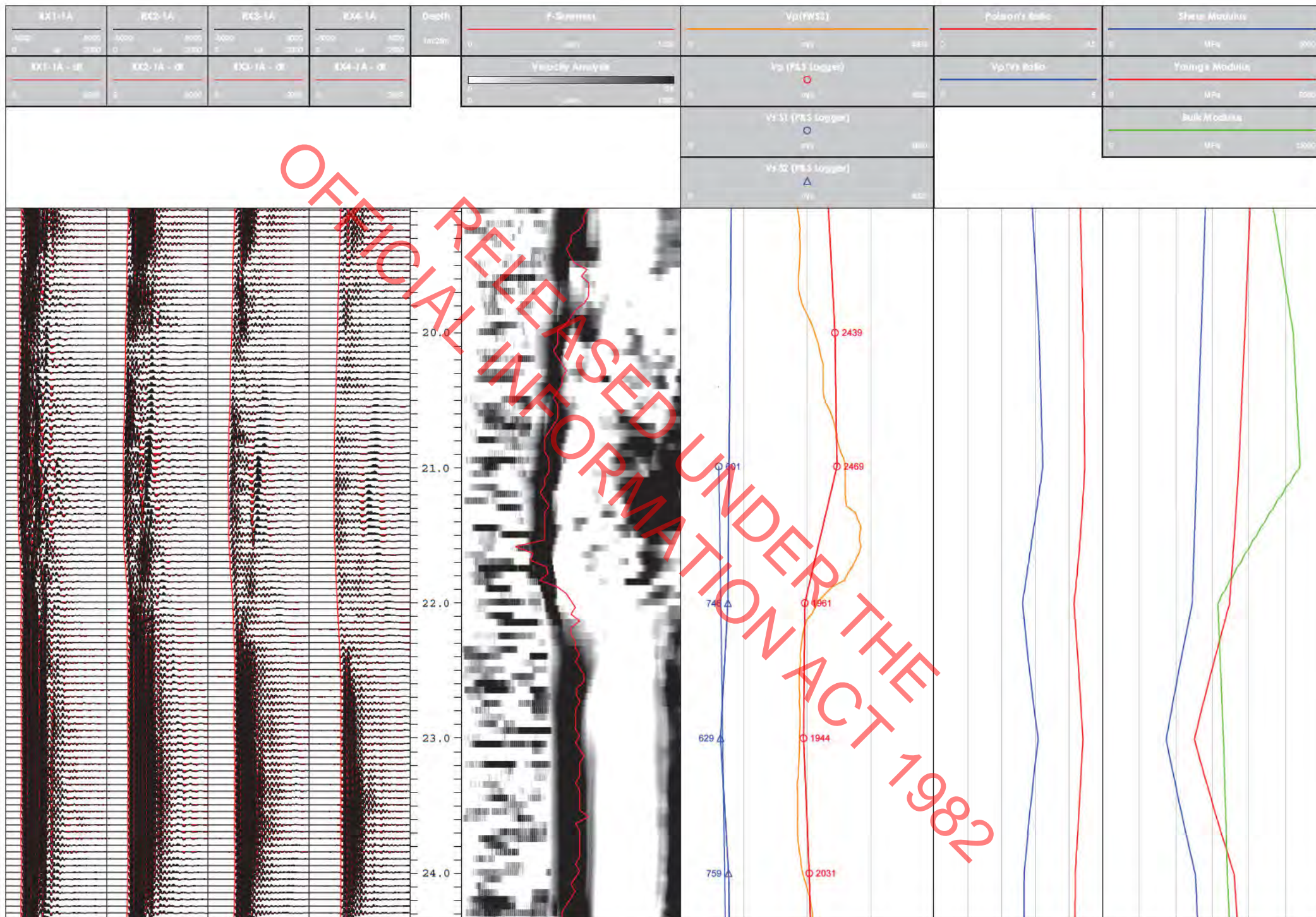
Opposite the Cordis Hotel.

Comments:

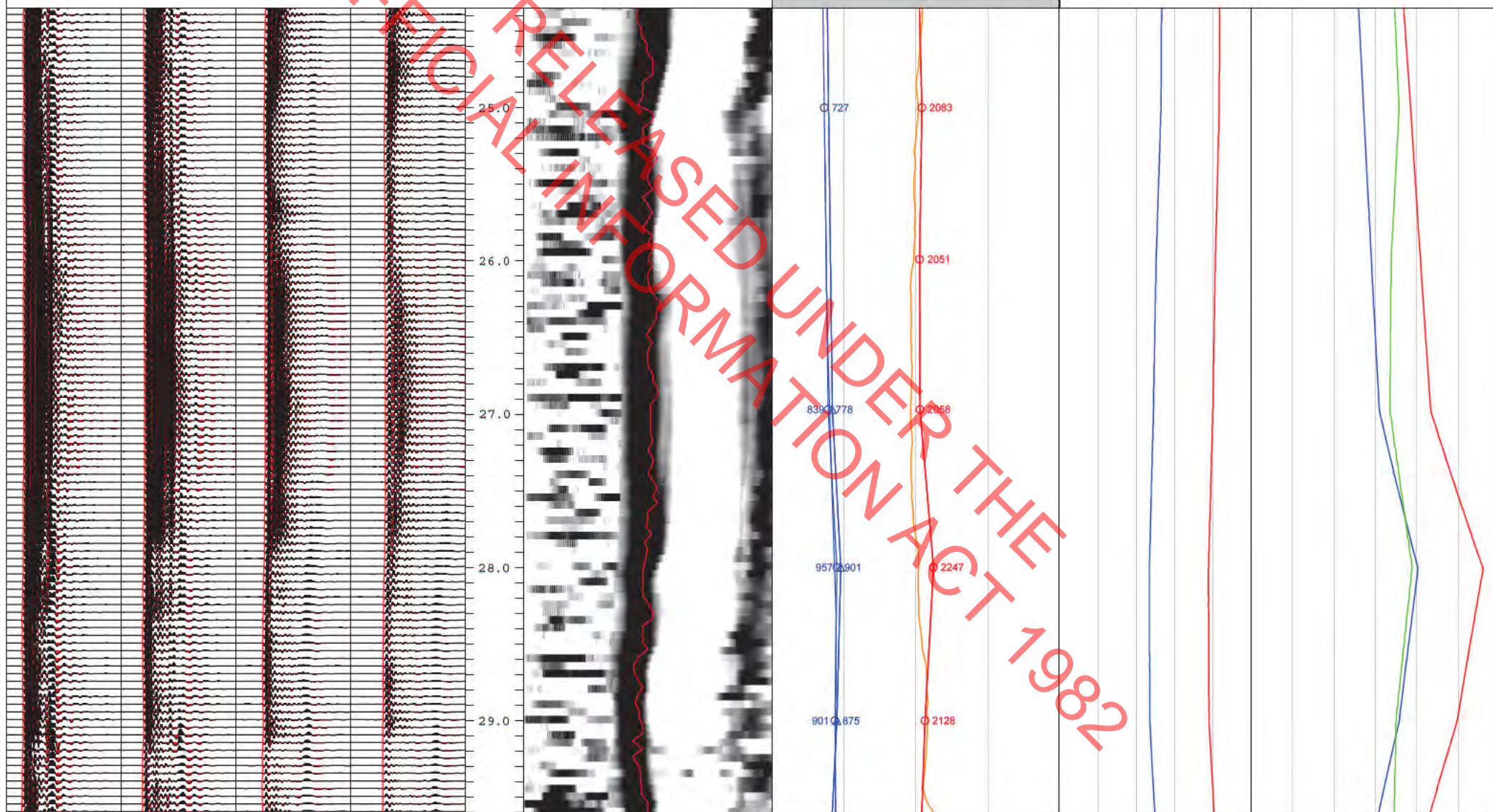
1. No density run on this hole. Assumed density of 2.2 g/cm is used for elastic moduli calculations.
2. Gaps left in P&S Logger Vs picks where data is noisy.
3. Hole coordinates taken from Google Earth and are approximate.

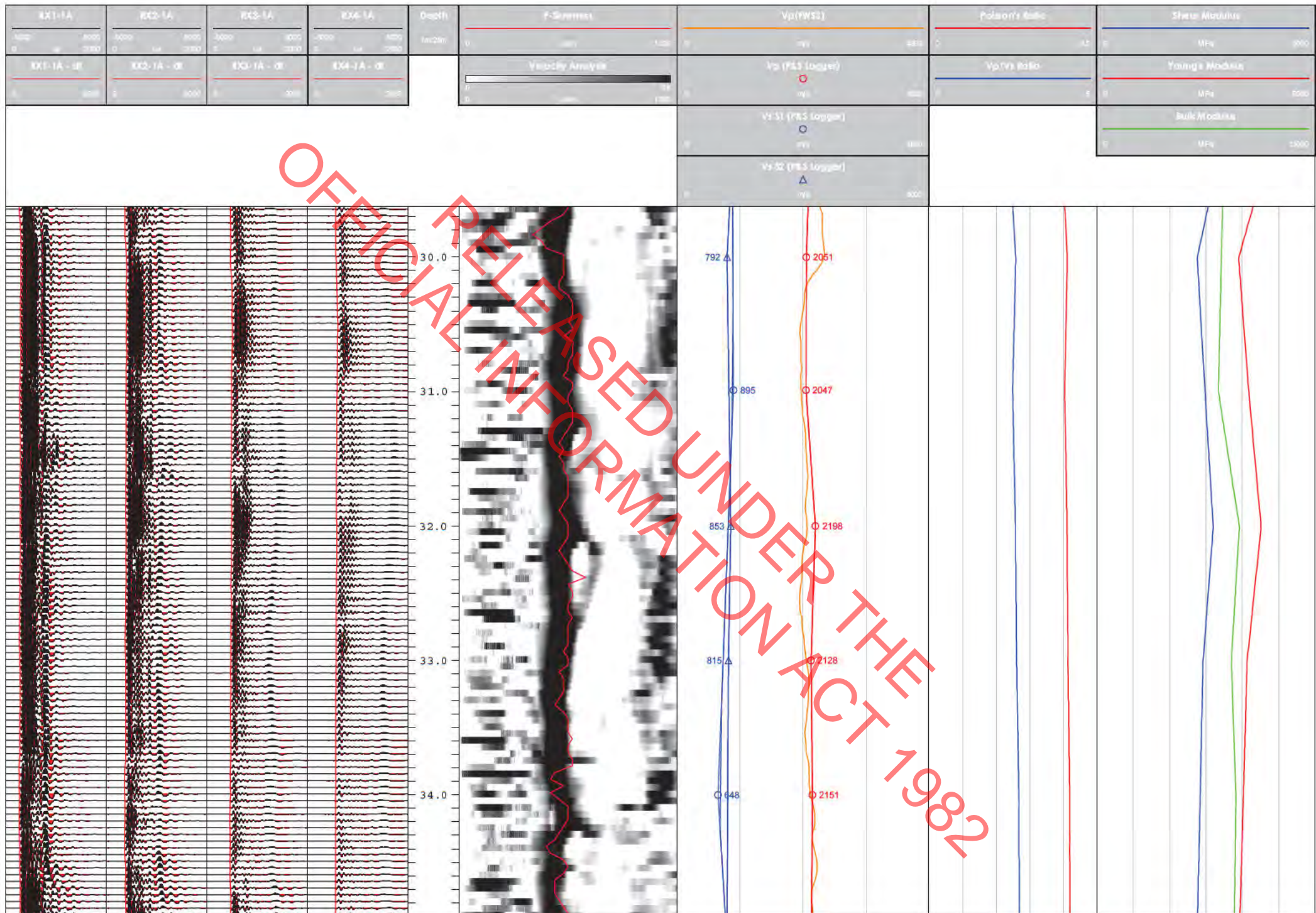


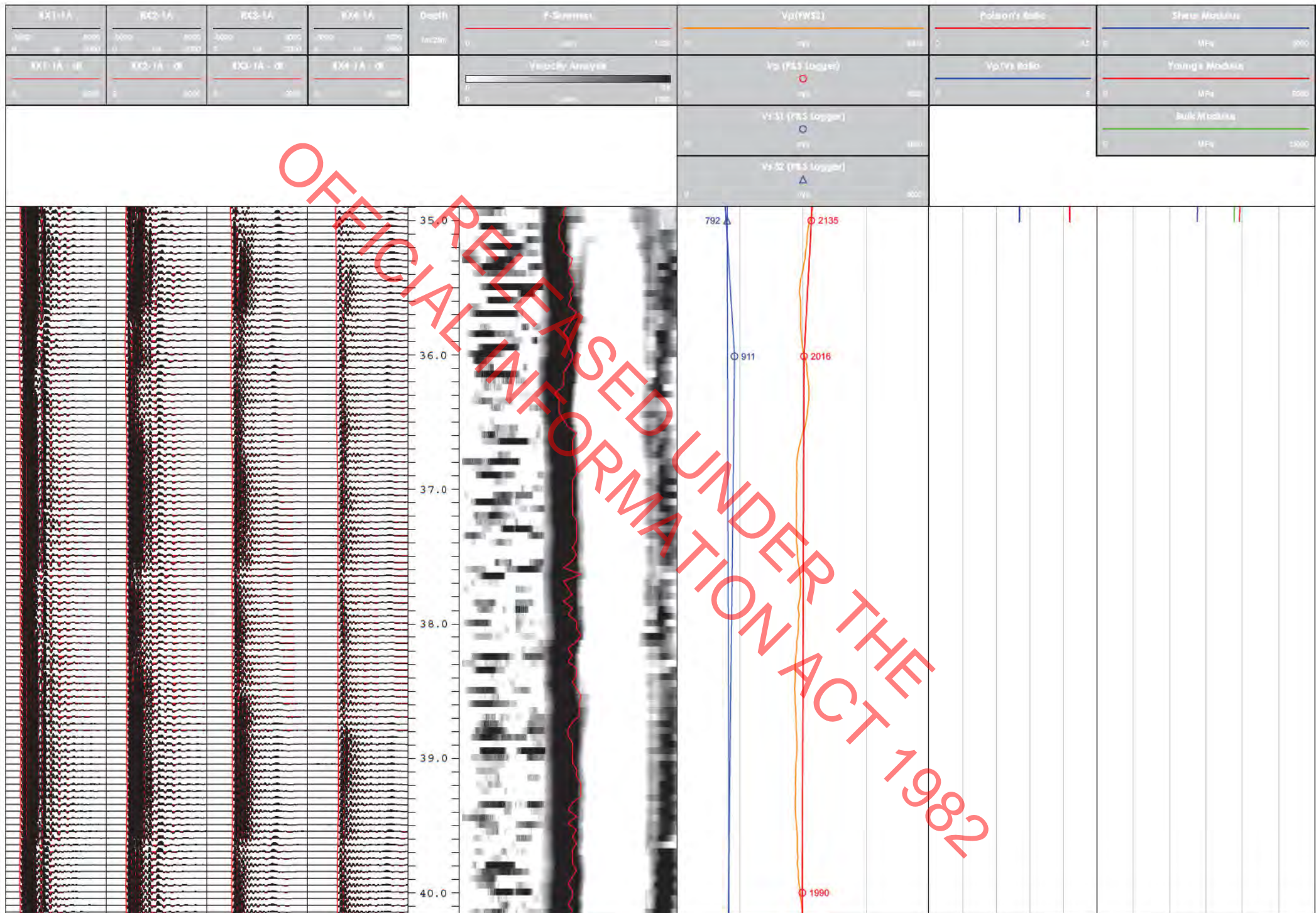


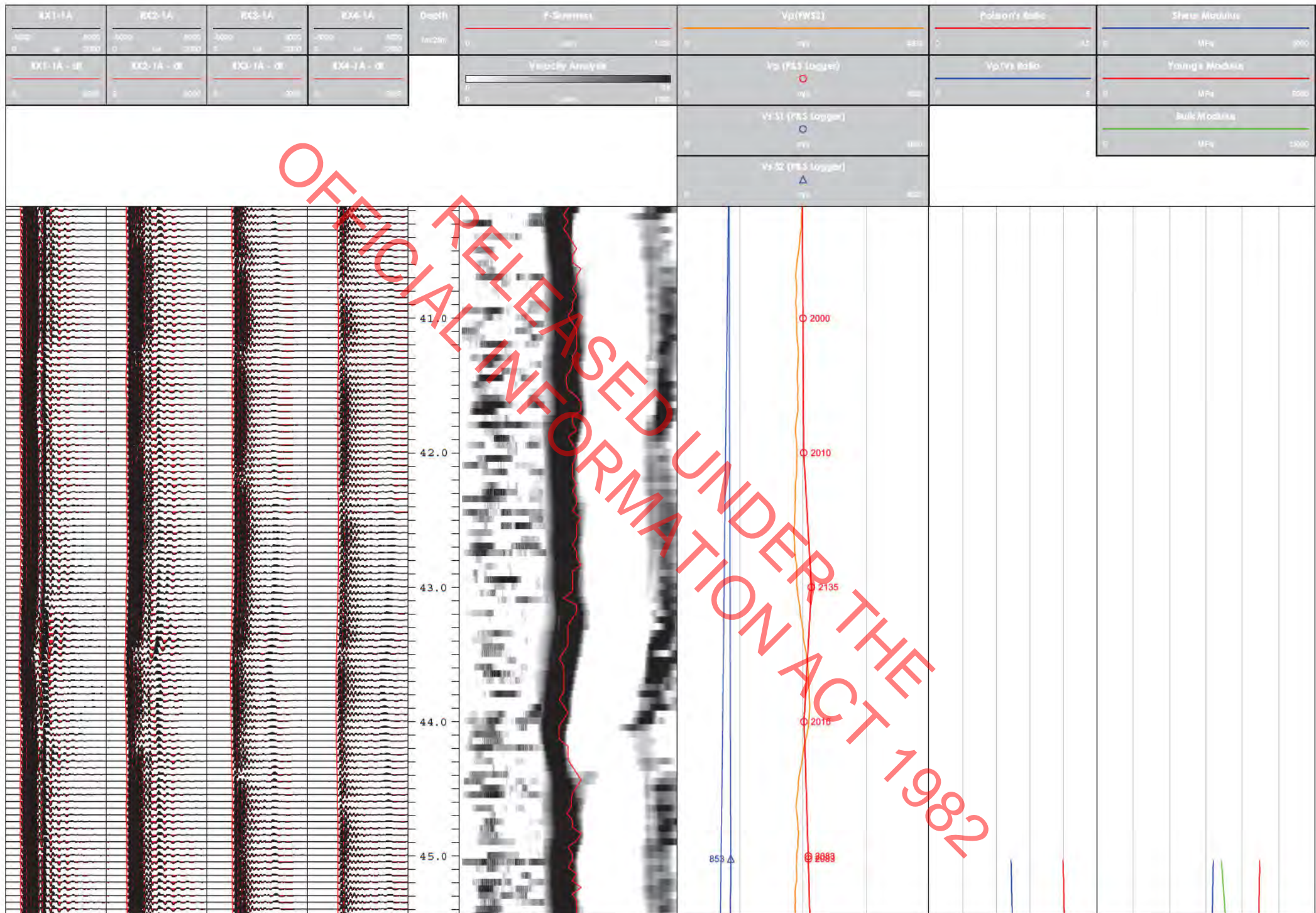


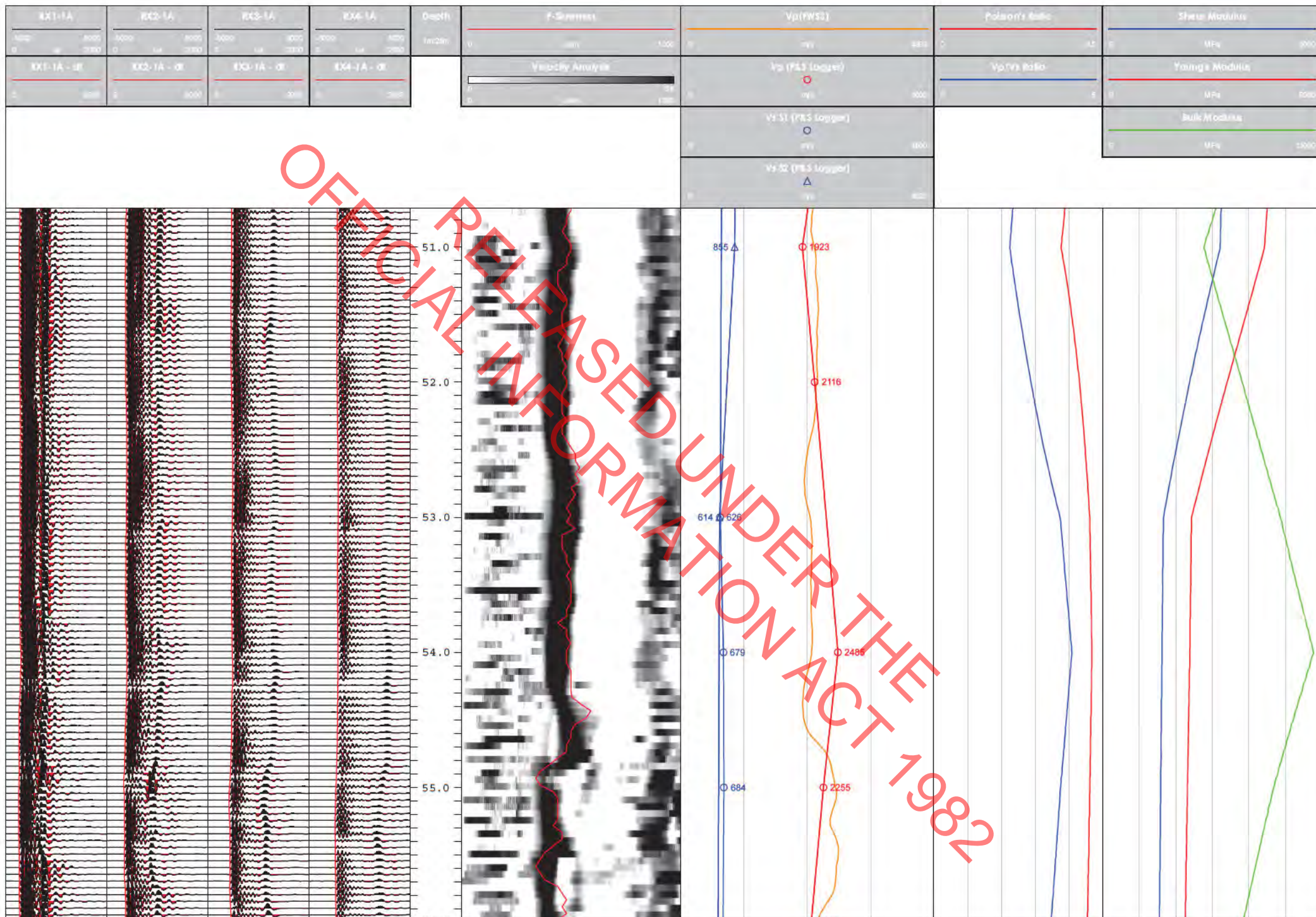
KX1-1A	KC2-1A	KC3-1A	KX4-1A	Depth	F-Screens	Vp (FWS2)	Poisson's Ratio	Shear Modulus
0 8000 10000	0 8000 10000	0 8000 10000	0 8000 10000	1000m	0 1000 1000	0 8000 10000	0 0.5 1.0	0 0 1000
KX1-1A - SE	KC2-1A - SE	KC3-1A - SE	KX4-1A - SE		Velocity Analysis	Vp (FWS2)	Vp/Vs Ratio	Young's Modulus
0 8000 10000	0 8000 10000	0 8000 10000	0 8000 10000		0 1000 1000	0 8000 10000	0 0.5 1.0	0 0 1000
						Vs S1 (PSS Logger)		Bulk Modulus
						0 8000 10000		0 0 1000
						Vs S2 (PSS Logger)		
						0 8000 10000		

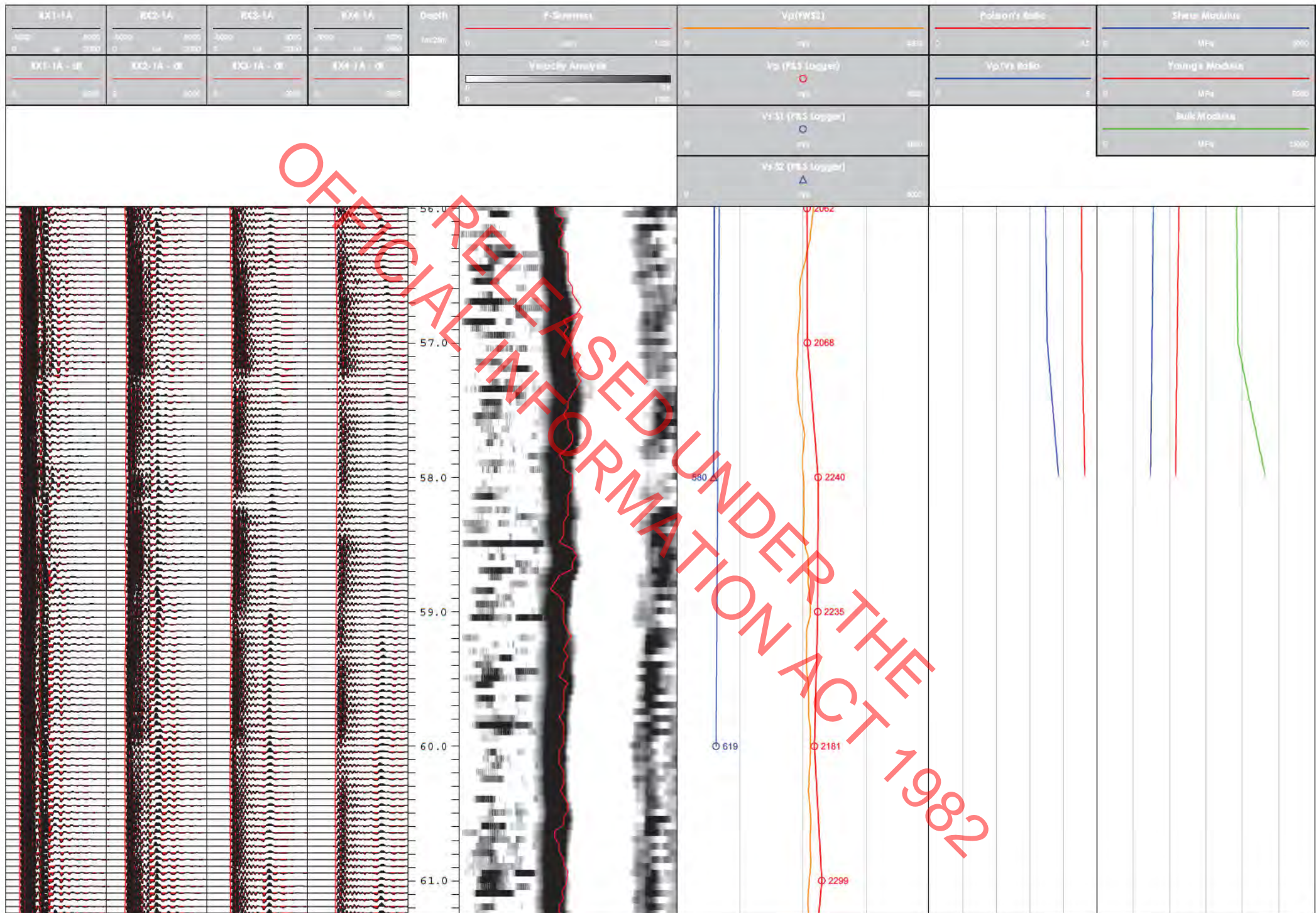


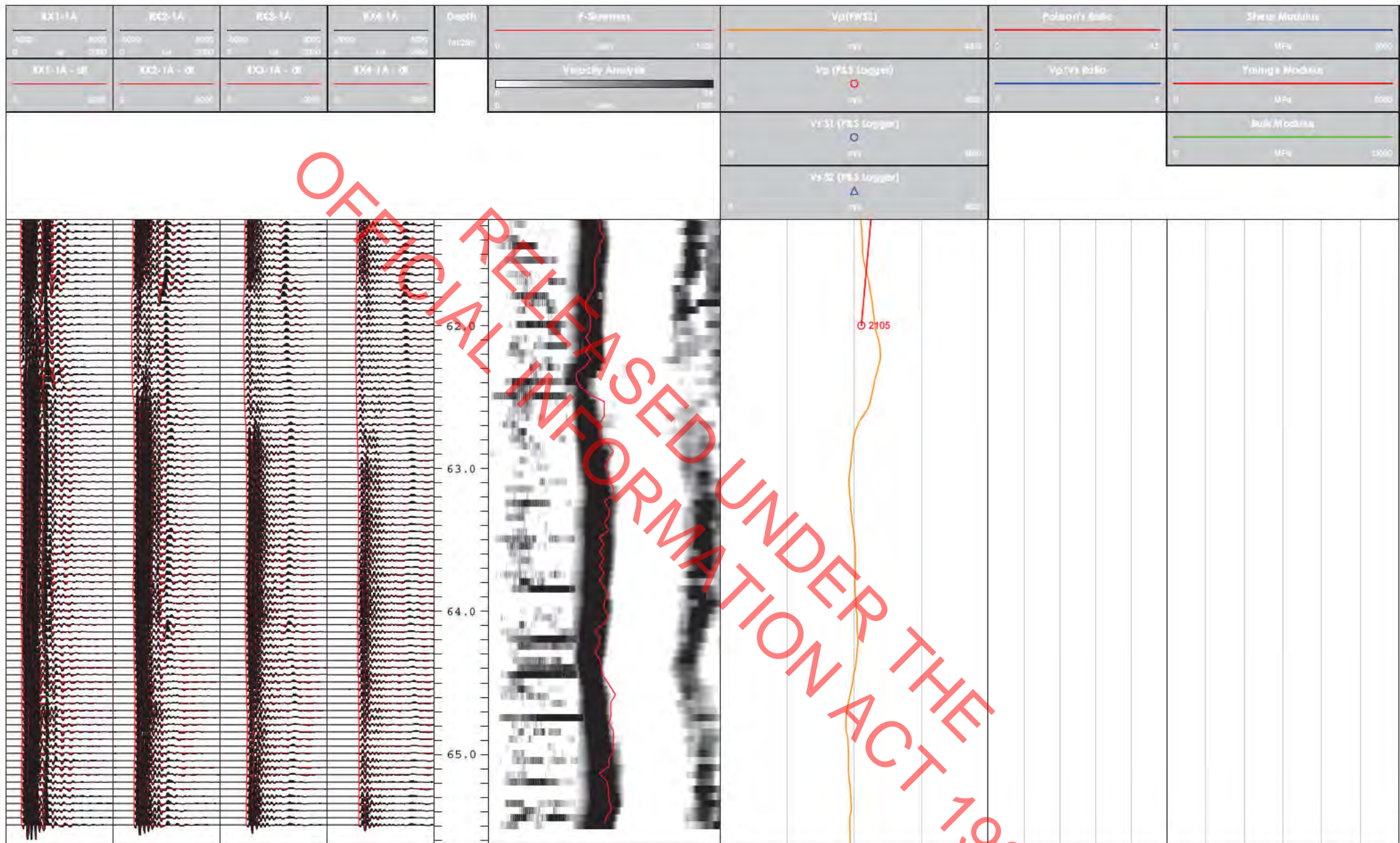














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Basic Information:

Drill hole ID: BH1109
Client: McMillans Drilling (NI) Ltd
Run Number(s): 01, 02 & 03
Tool Type(s): ABI40-2G Acoustic Televiwer
OBI40-2G Optical Televiwer
QL40-CAL Mechanical Calliper

Service Company: RDCL
Operator: H Soma
Date Logged: 20/03/2023
Field: Auckland Light Rail
State / Province: Auckland
Country: New Zealand

Location Description:

Opposite the Cordis Hotel.

Drillhole Information:

Log interval from (m): 0.84 Log interval to (m): 65.68
Depth Driller (m): 66.00 Depth Logger (m): 65.8 (Calliper)
Fluid Type: Water Fluid Level (m): 12.82 (Acoustic)
Easting: 5919646.682 Northing: 1757311.161
Elevation: N/A Coord Ref System: NZTM
Hole Azimuth: Vertical Hole Inclination: <88.6°
Magnetic Declination: +20° 8' East Magnetic Inclination: 62° 49'

Drill Company: McMillans Drilling (NI) Ltd

Printing Information:

Depth Unit: Metres Log Scale: 1:10 Log Version: Final
Processed: J Connors Log Reviewer: O Gibson

Bit Size Record:

Size (mm):	From (m):	To (m):	Type:	Size:	From (m):	To (m):
96 mm (HQ)	2.76	65.68	HWT	101.6	0.00	2.76
###.#	###.#	###.#	XX	###.#	###.#	###.#
###.#	###.#	###.#	XX	###.#	###.#	###.#
###.#	###.#	###.#	XX	###.#	###.#	###.#

Casing Record:

Structural Legend:

- BP - Bedding Plane
- BF - Bedding Fracture
- JT - Joint
- FR - Fracture
- FZ - Fractured Zone
- SH - Shear
- CZ - Crushed Zone
- IF - Infilled Zone
- DZ - Decomposed Zone
- UF - Unidentified Feature

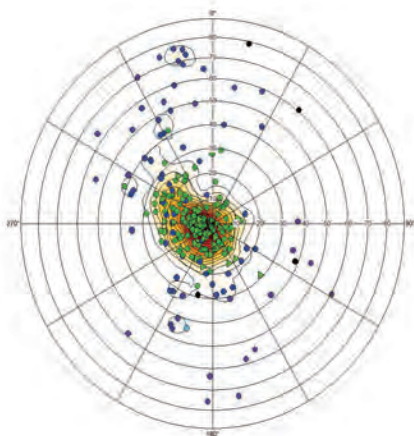
Log Nomenclature:

Azimuth = Tool azimuth from magnetic north
Tilt = Inclination from vertical
Acoustic Calliper = 360° average from travel time
Calliper from Cent = Calliper derived from travel time
Image-NM = Optical image oriented to magnetic north
Amplitude-NM = Acoustic amplitude (magnetic north)
Structures = Apparent Structures oriented to hole
Structures - True = Structures Oriented to true north
3D Optical = 3D representation of optical log
3D Acoustic = 3D representation of acoustic log

Comments:

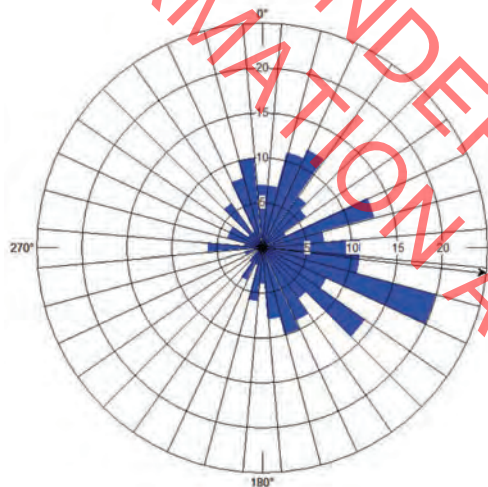
- Structures - True are reported in dip direction and dip relative to grid north.
- Optical data obscured below water line due to Turbid water conditions.
- Coordinates are taken from Google Earth and are approximate.

Stereoplot - Polar Projection Dip



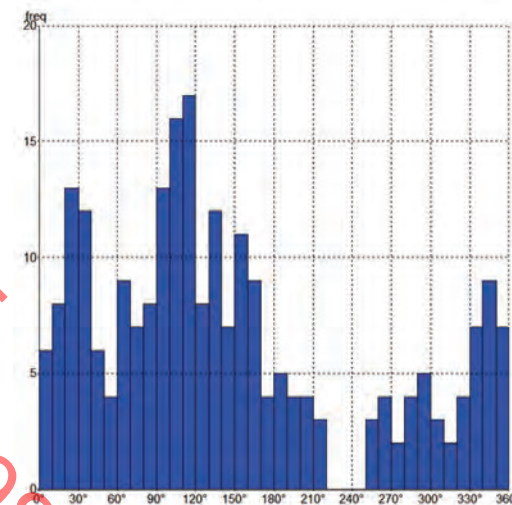
Schmidt Plot - Lower (Southern) Hemisphere - Structures - True
Depth: 0.84 m to 65.68 m

Rose Diagram - Azimuth

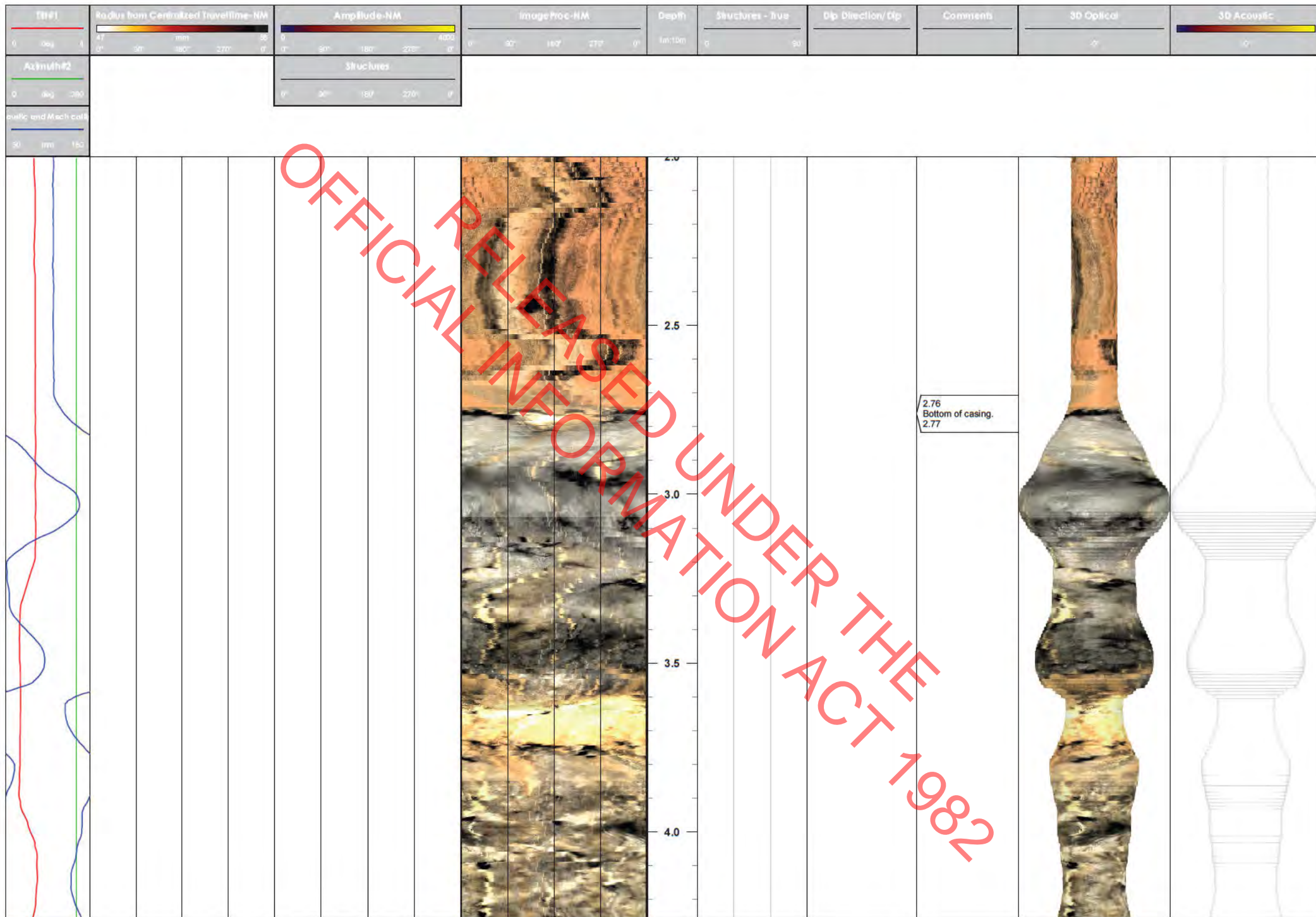


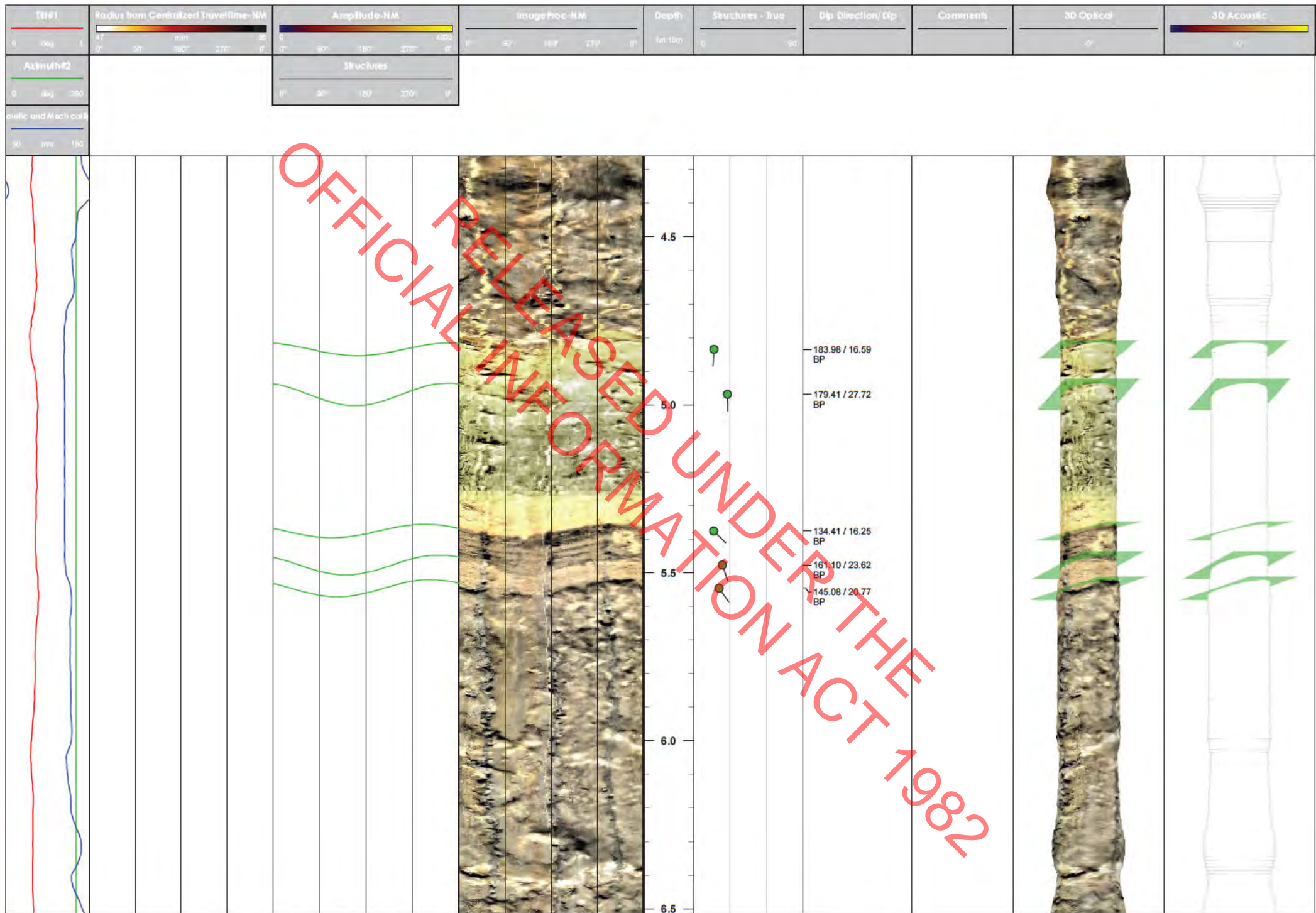
Depth: 0.84 m to 65.68 m

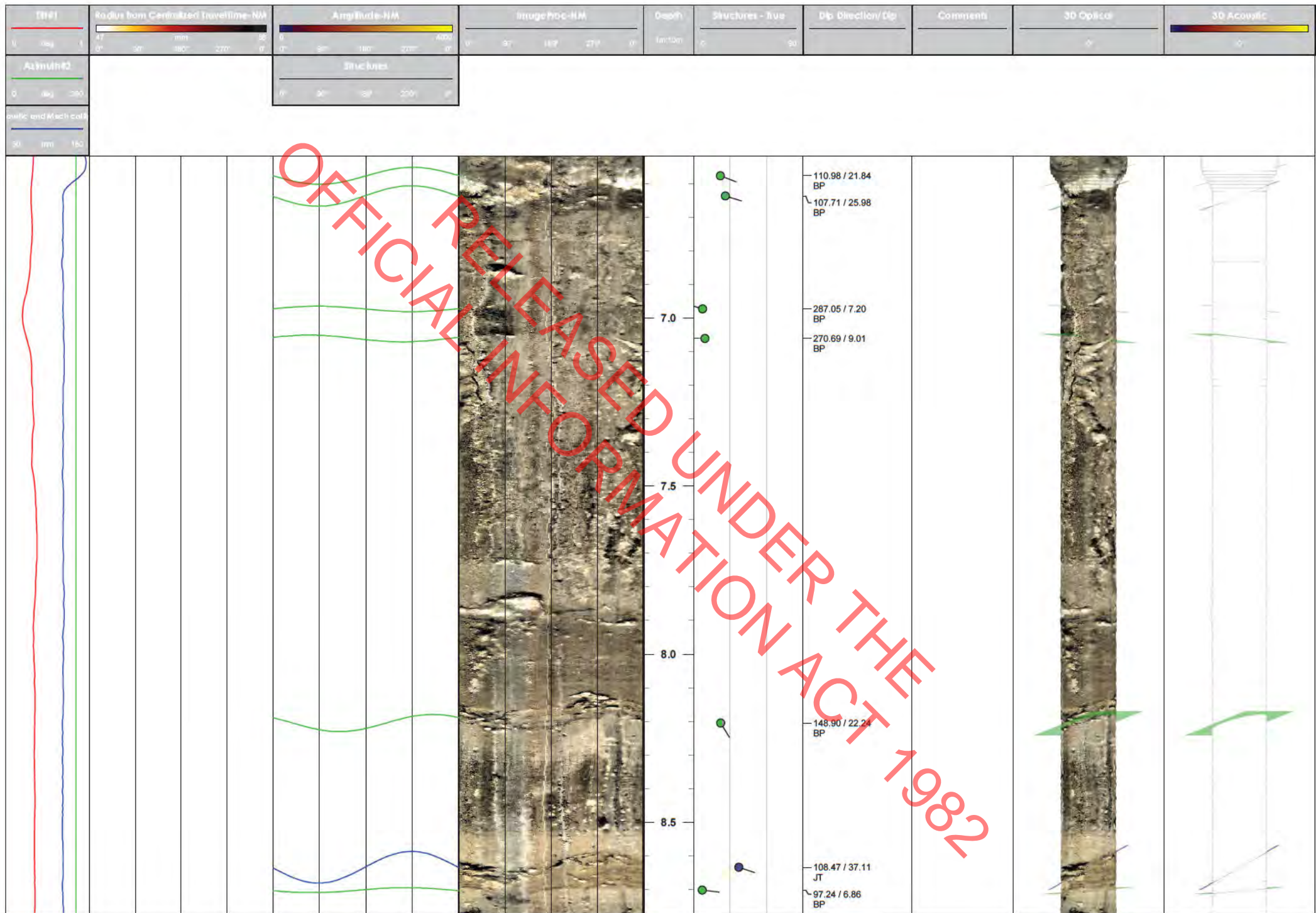
Histogram - Azimuth

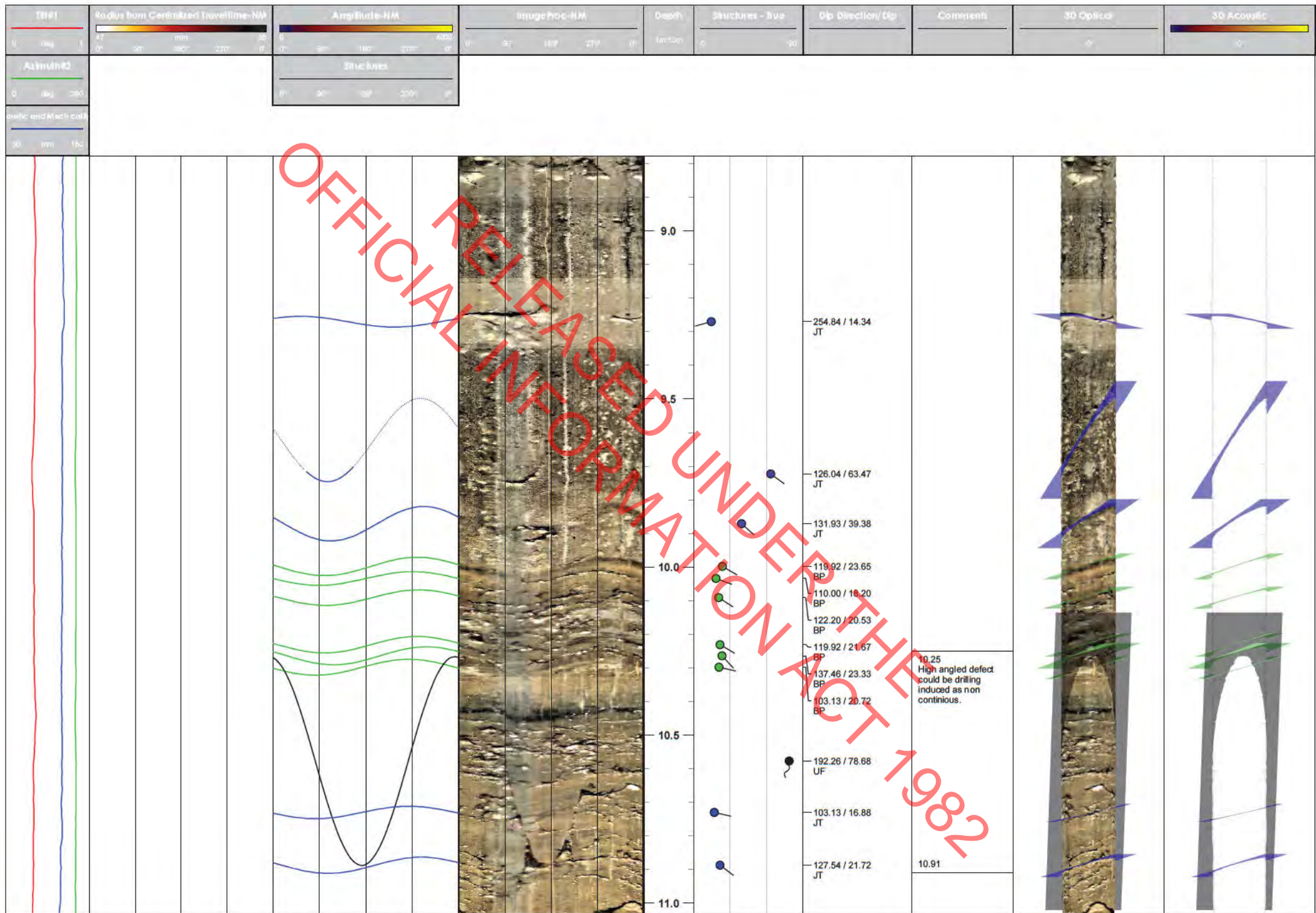


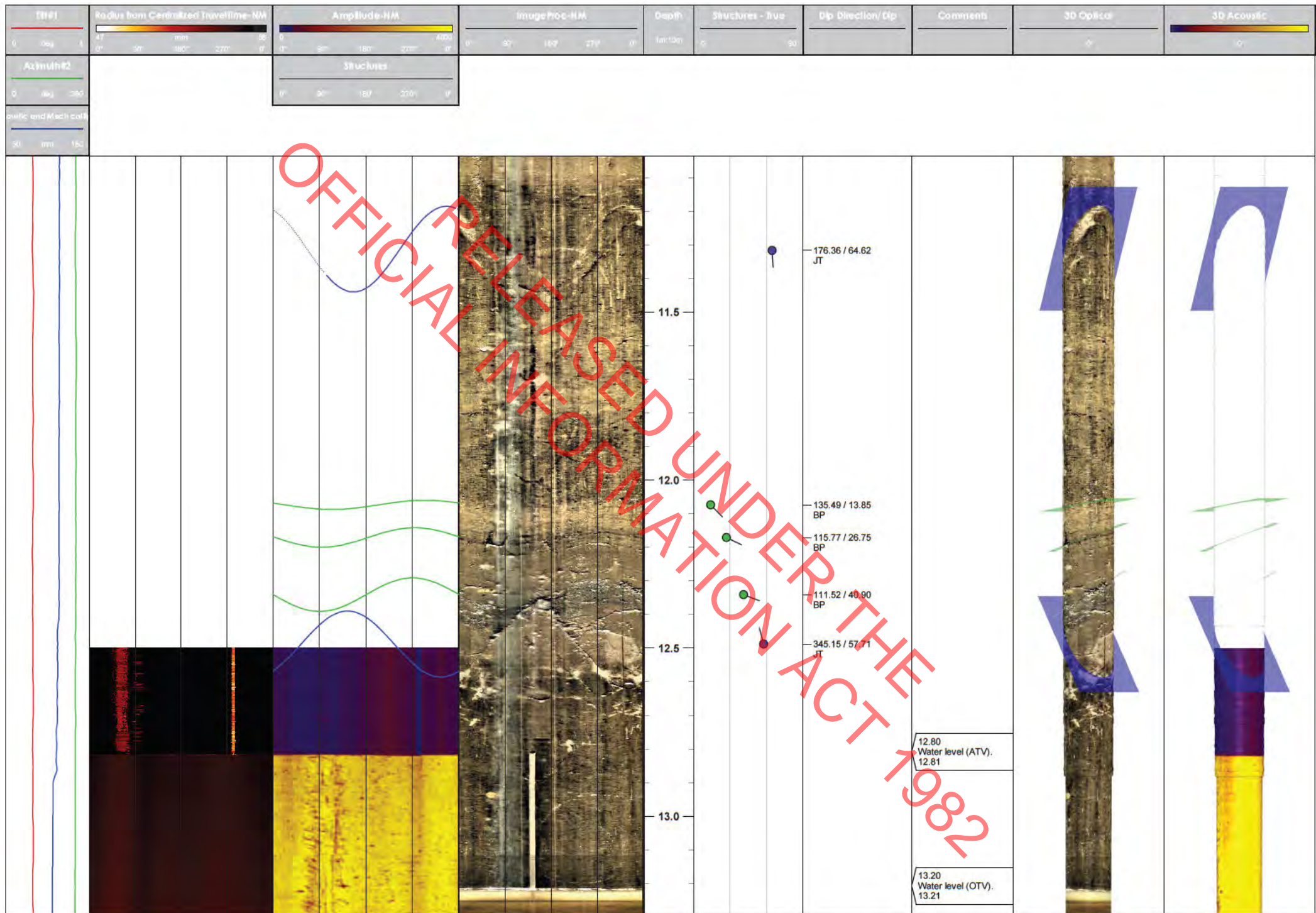
Depth: 0.84 m to 65.68 m

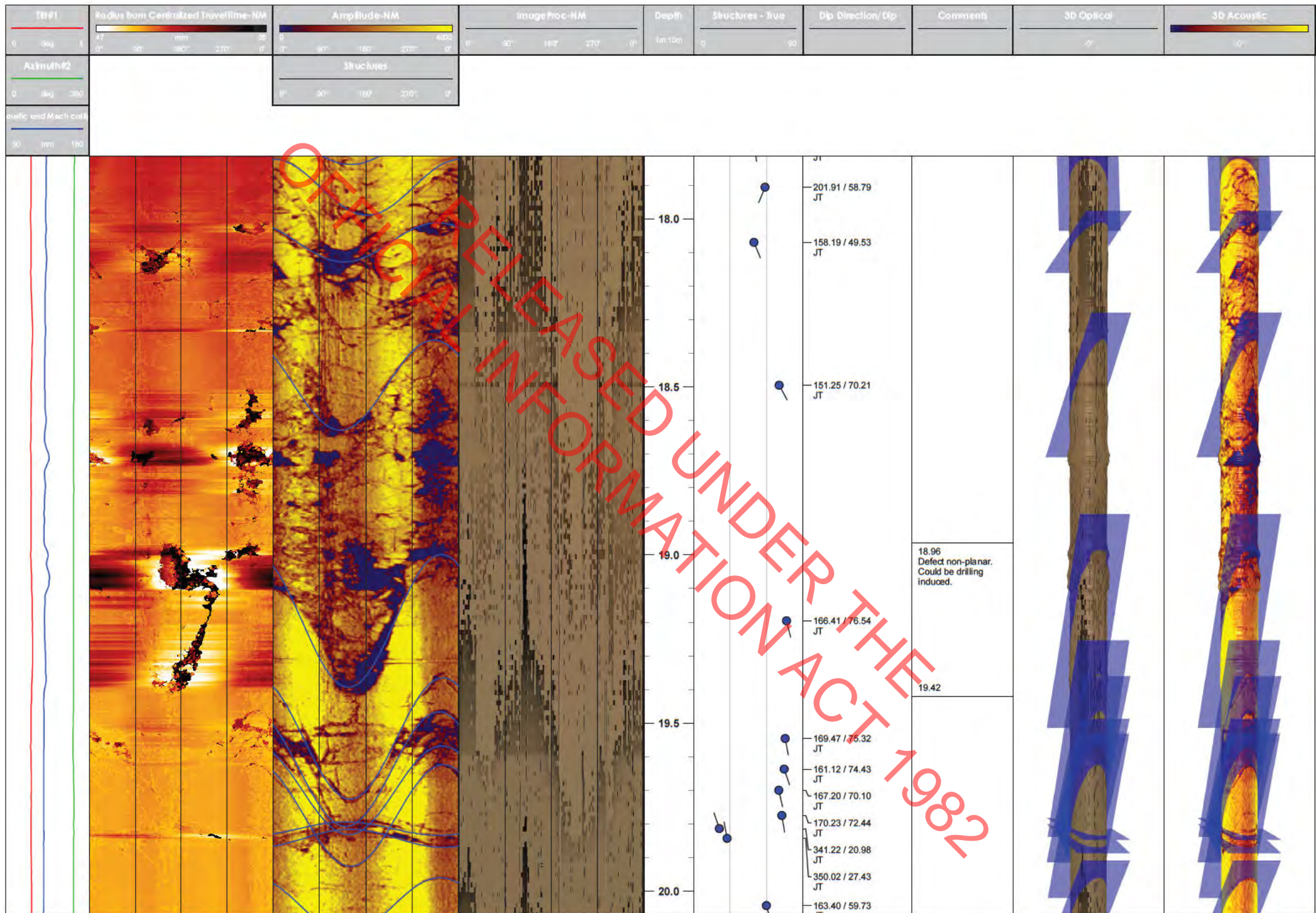


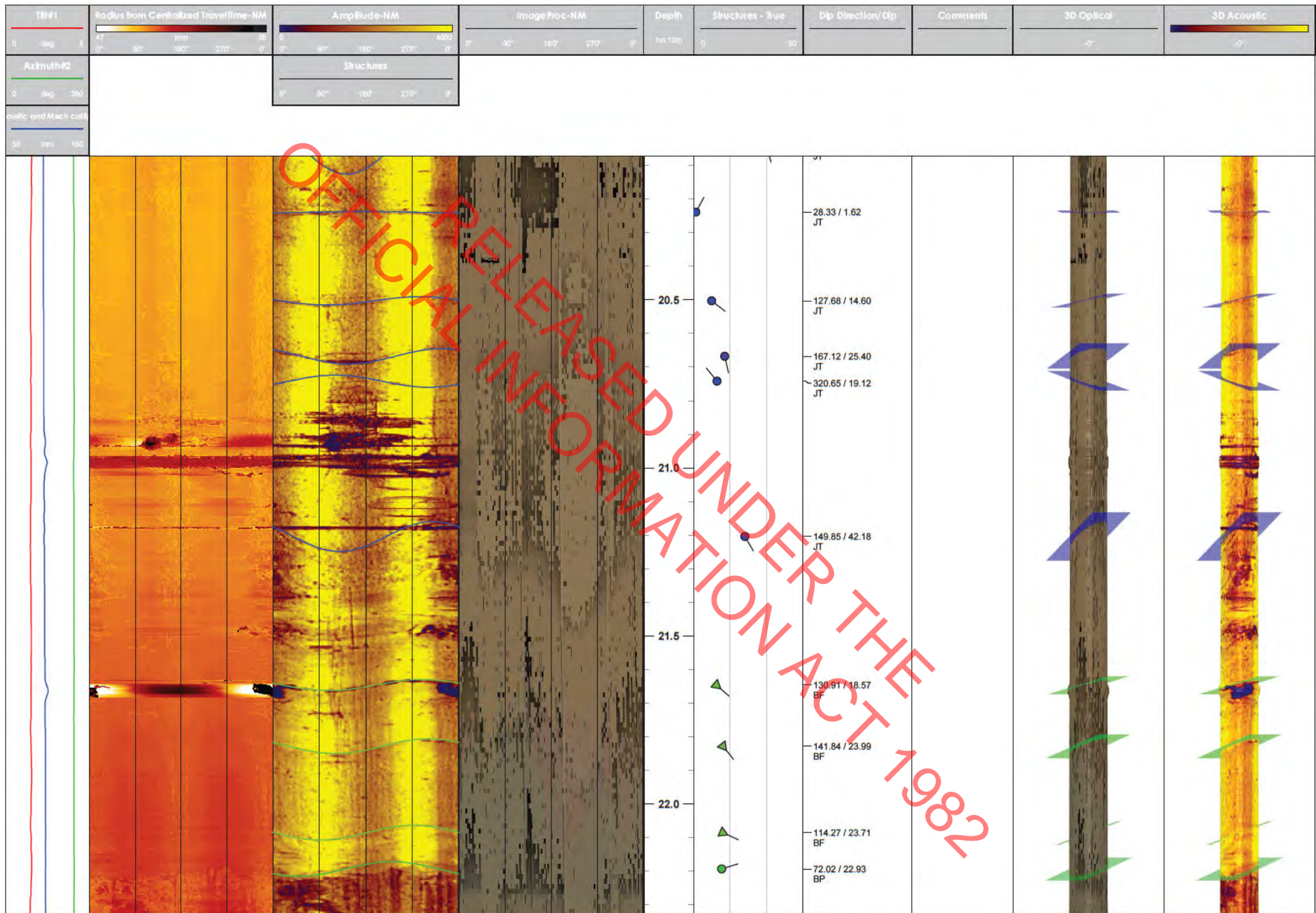


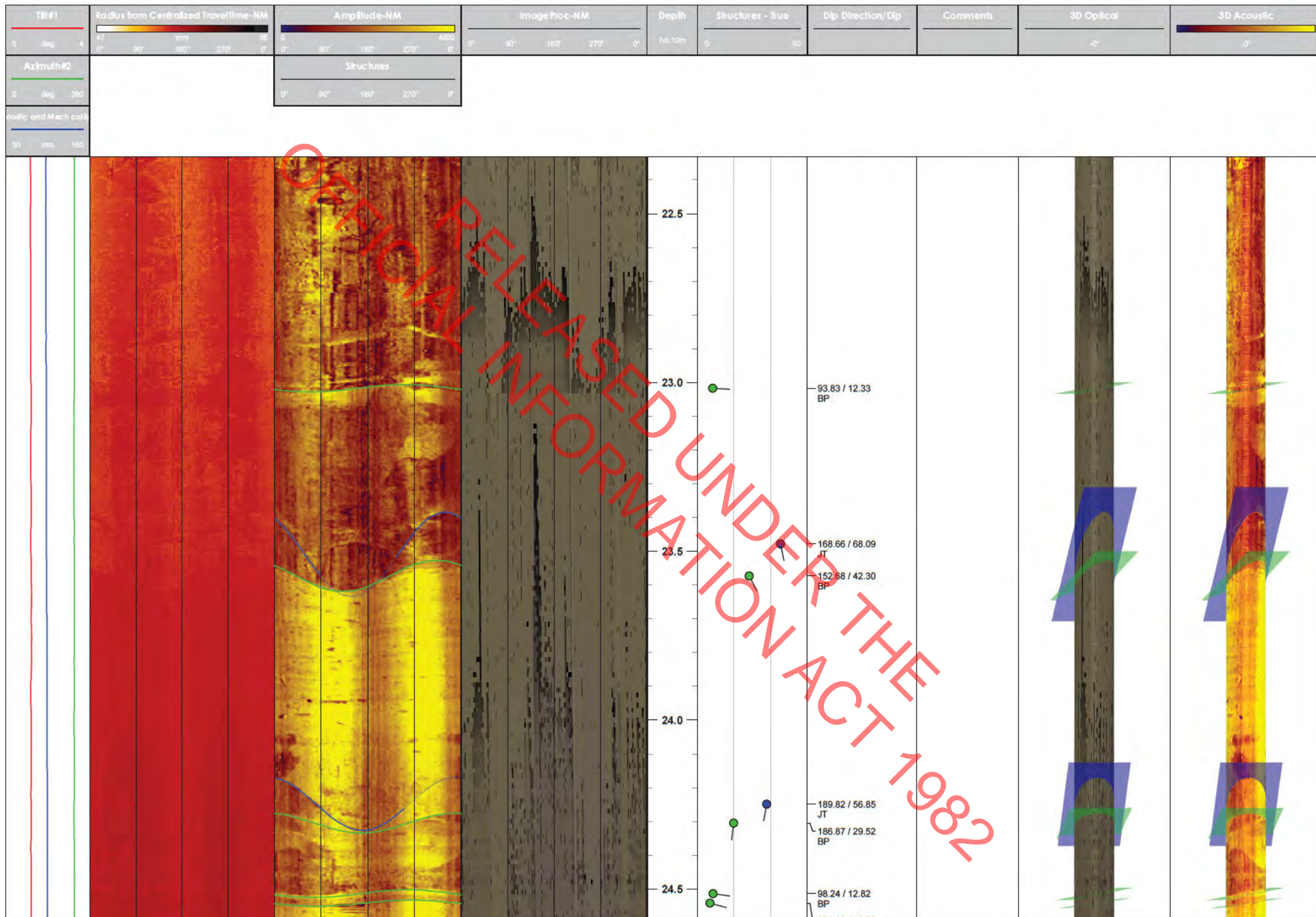


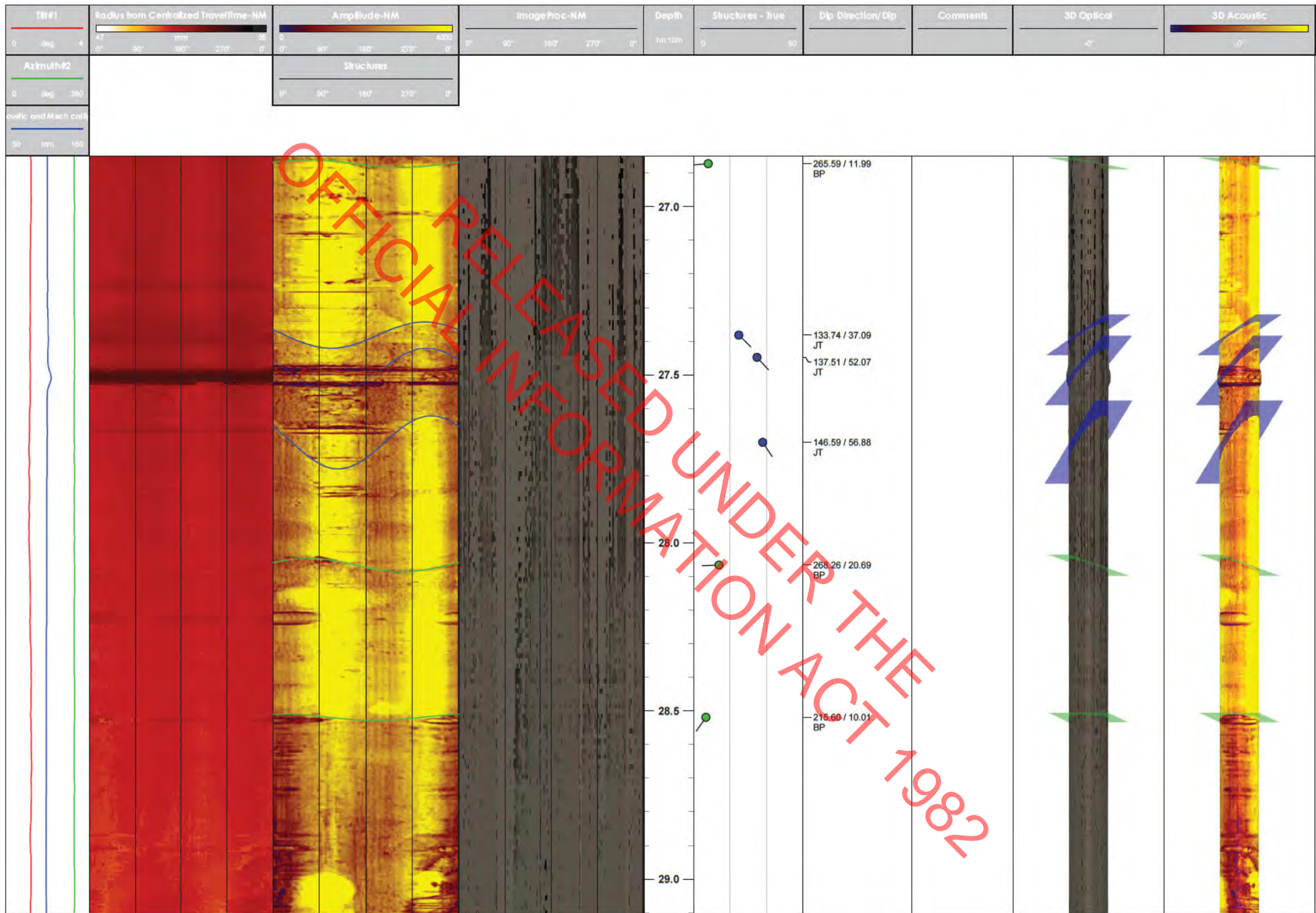


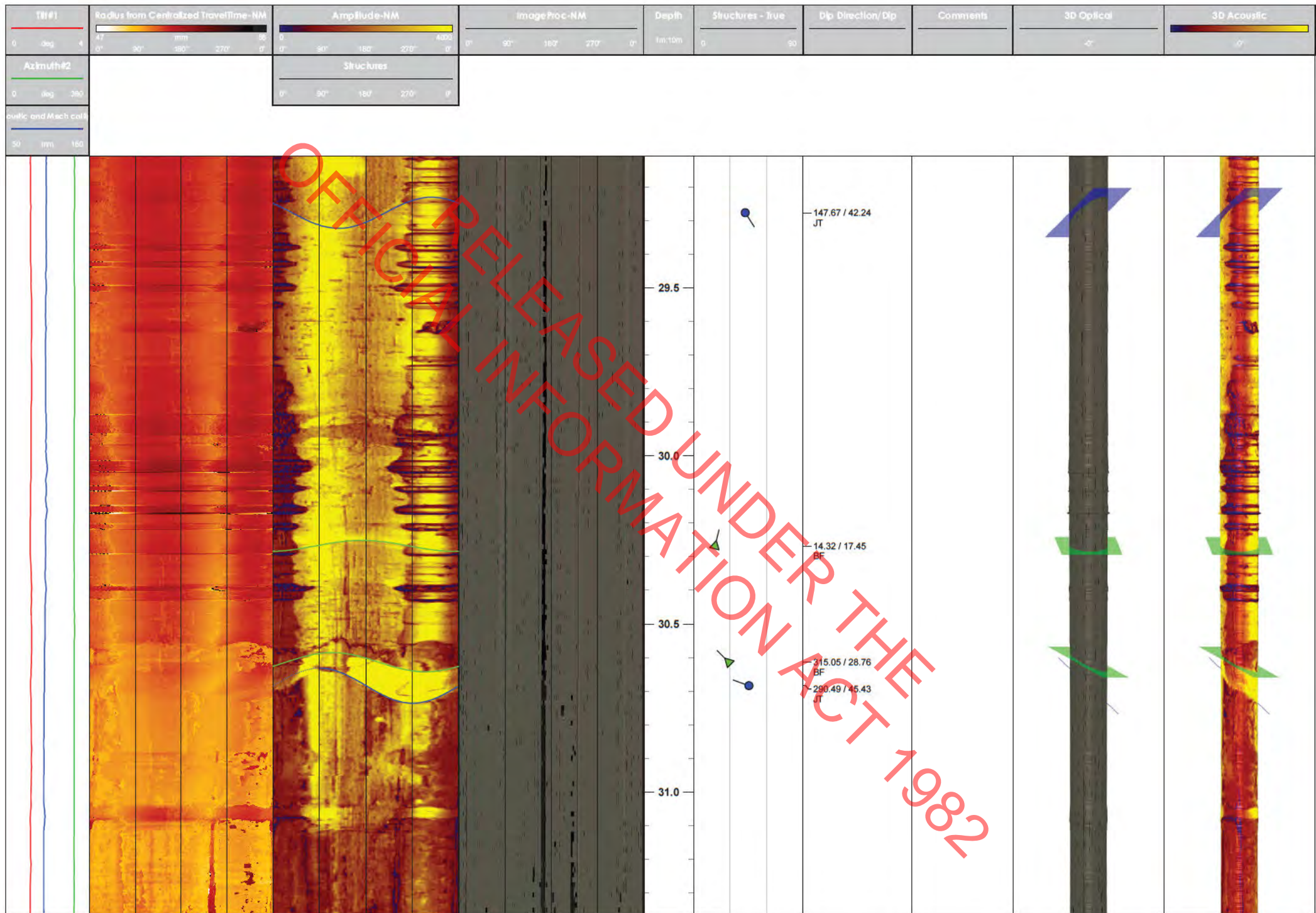


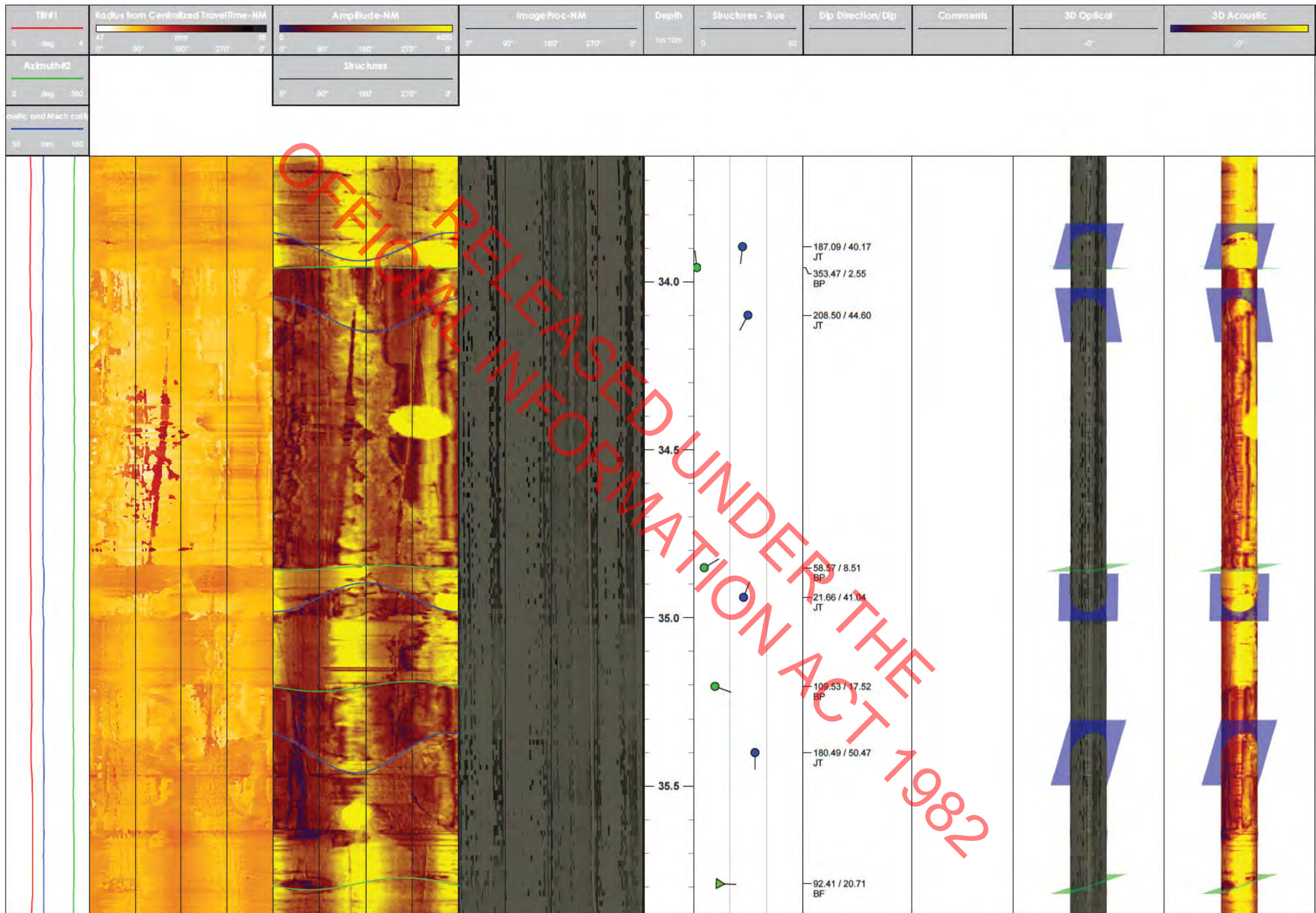


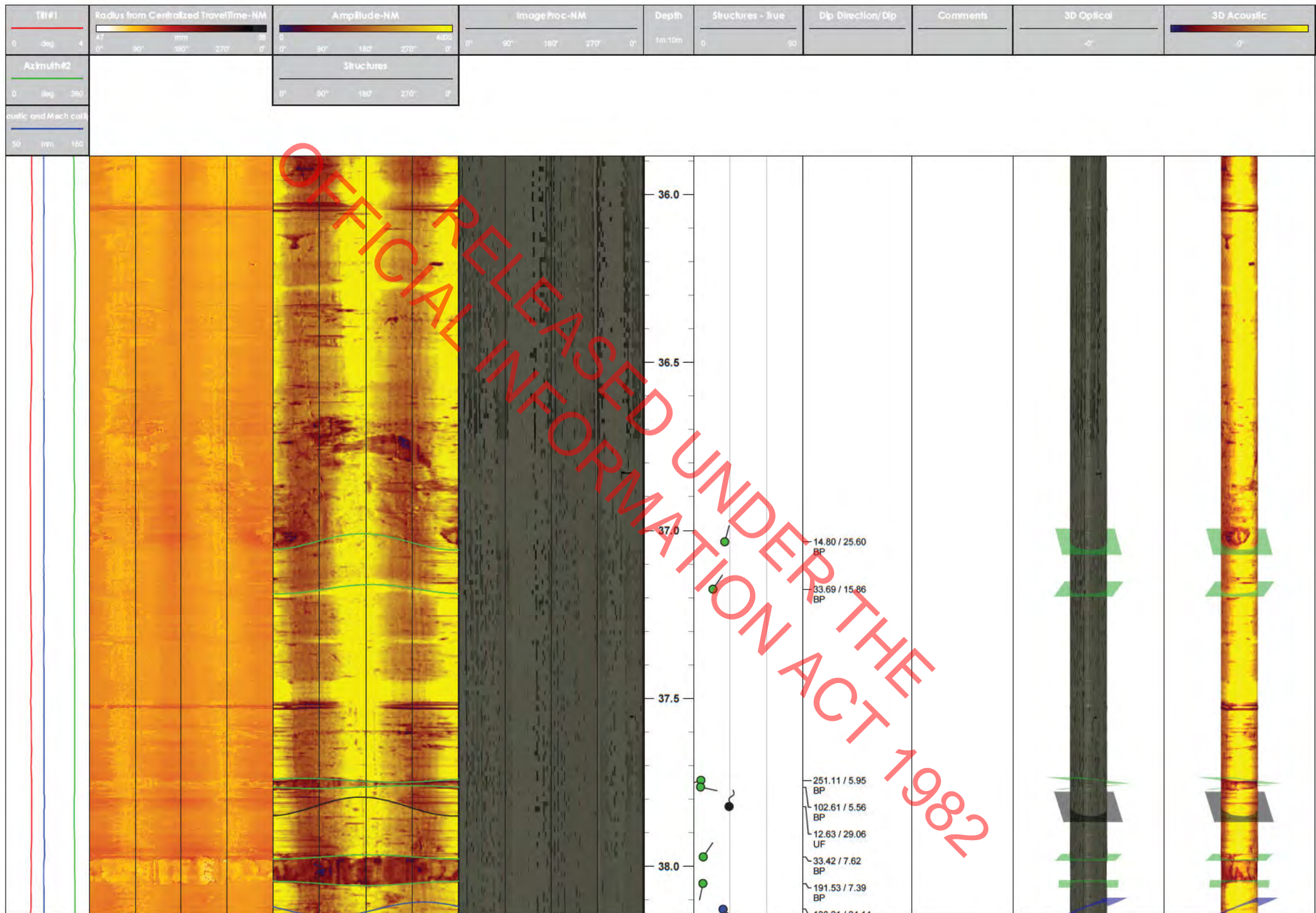


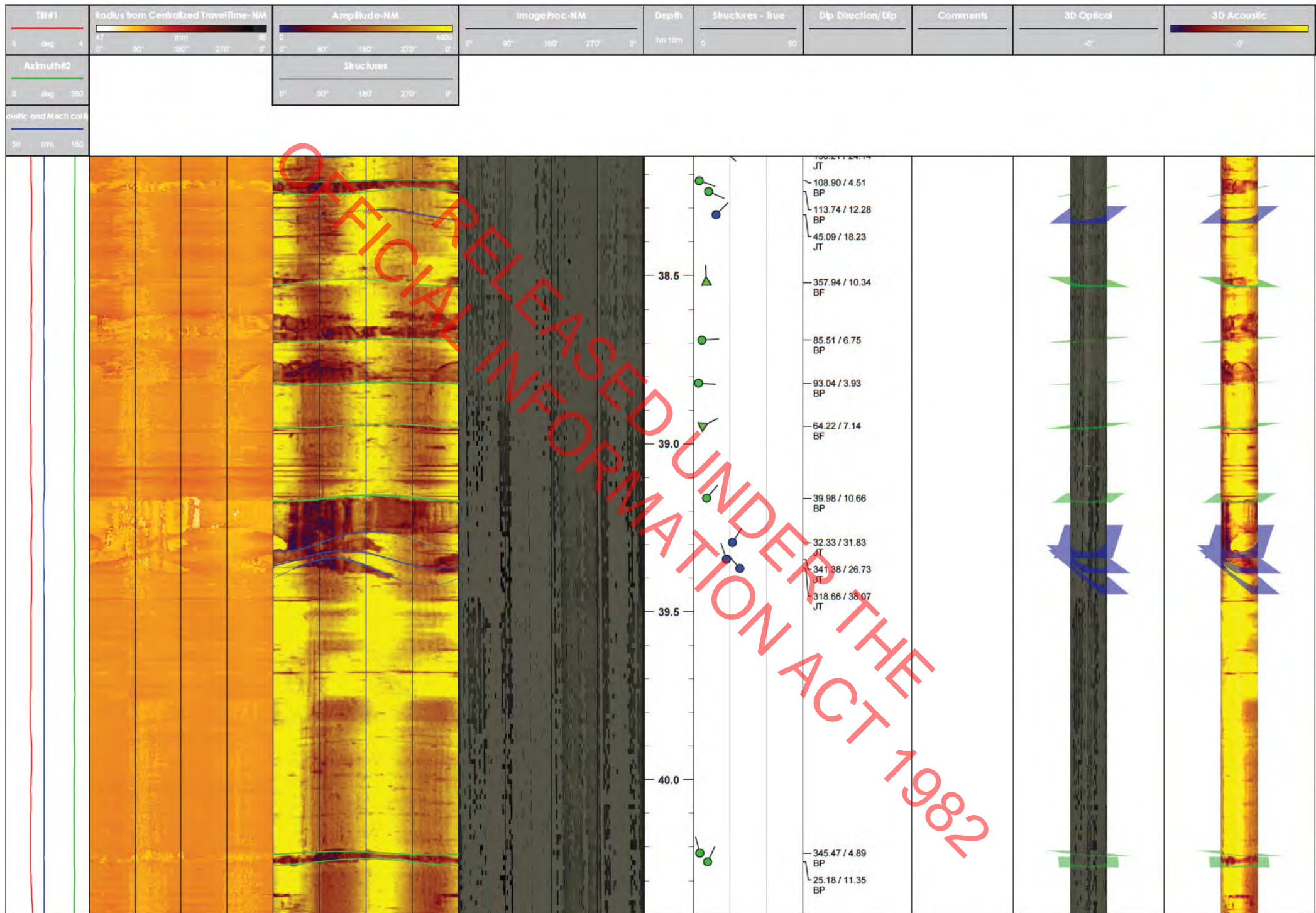


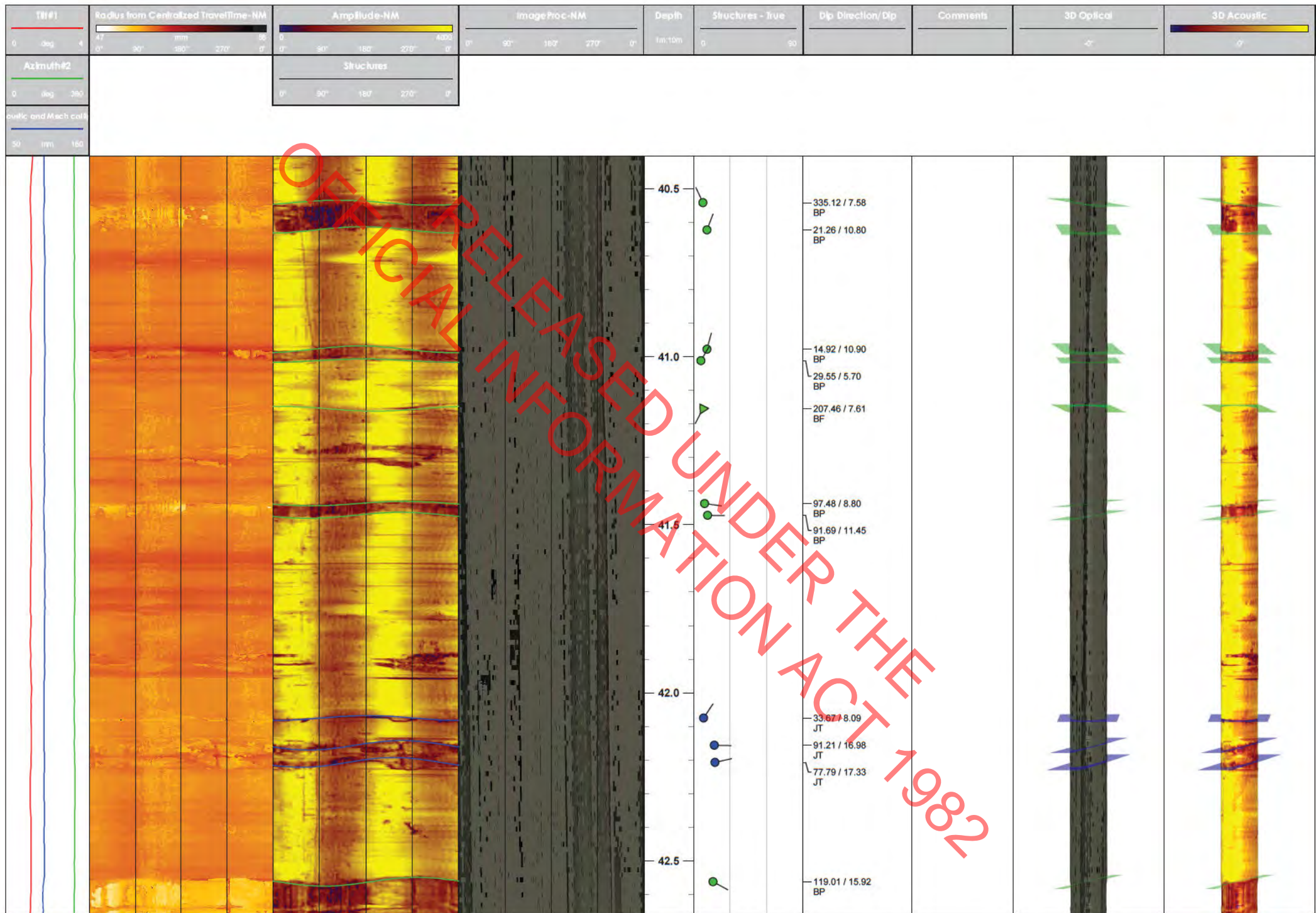


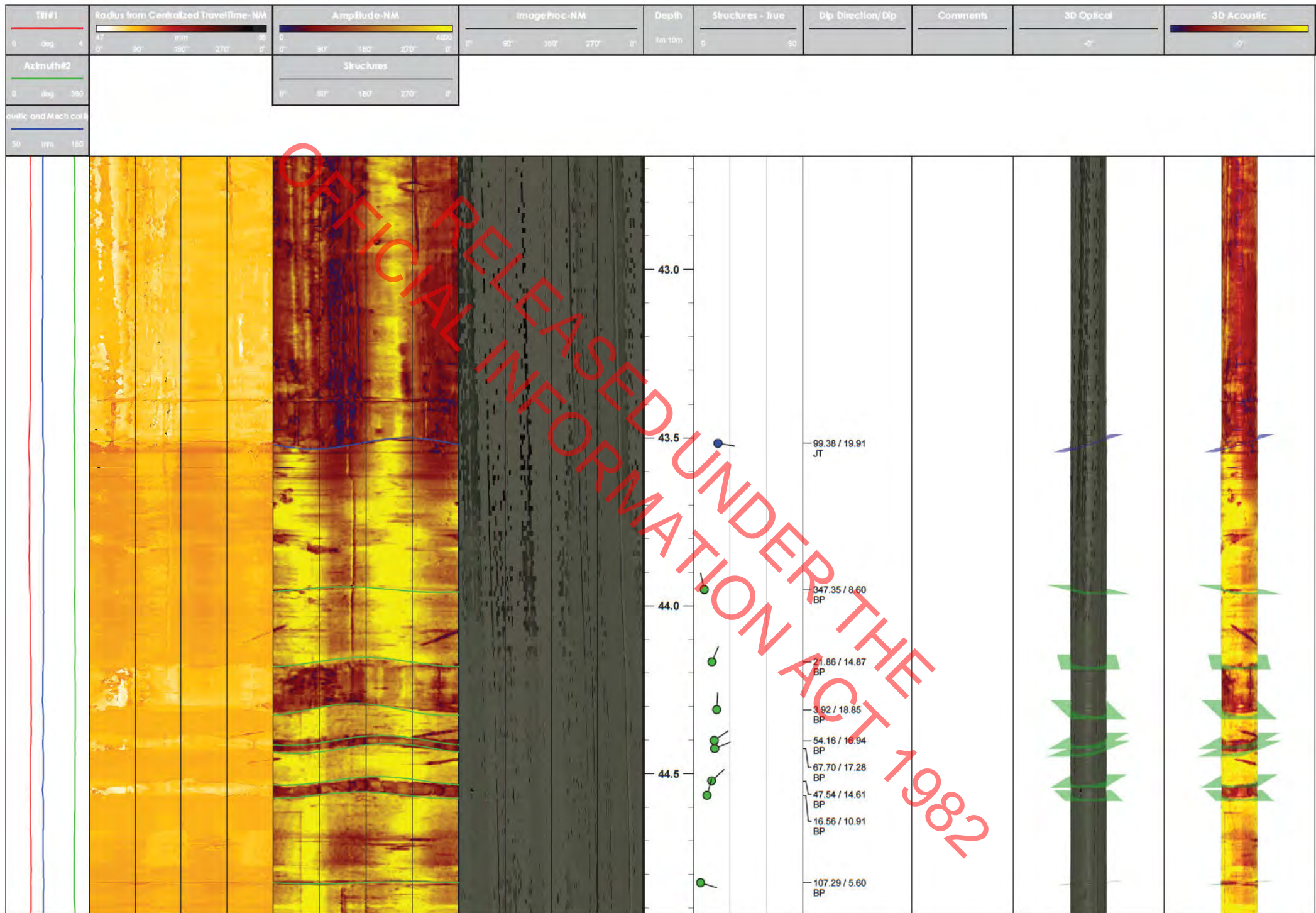


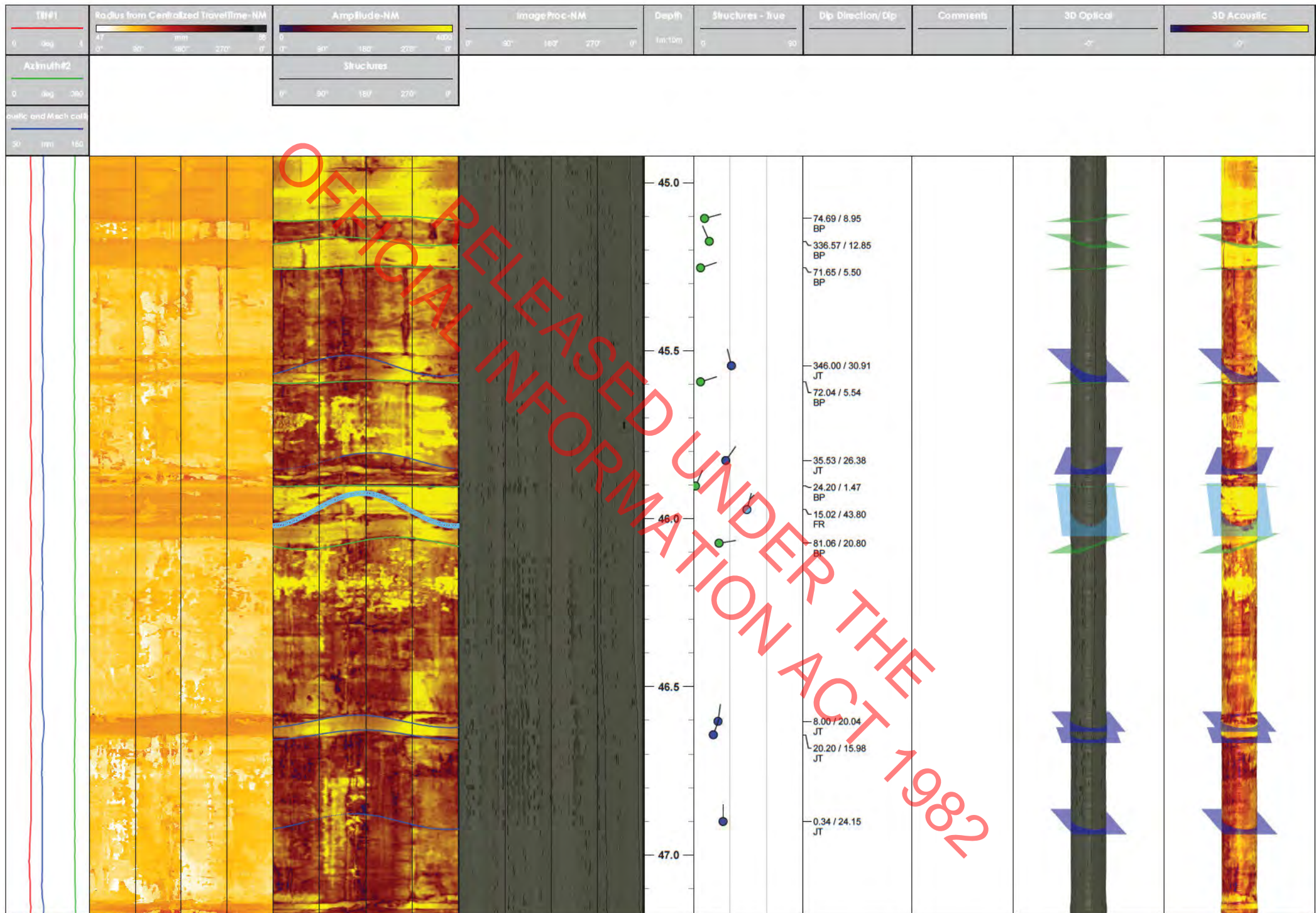


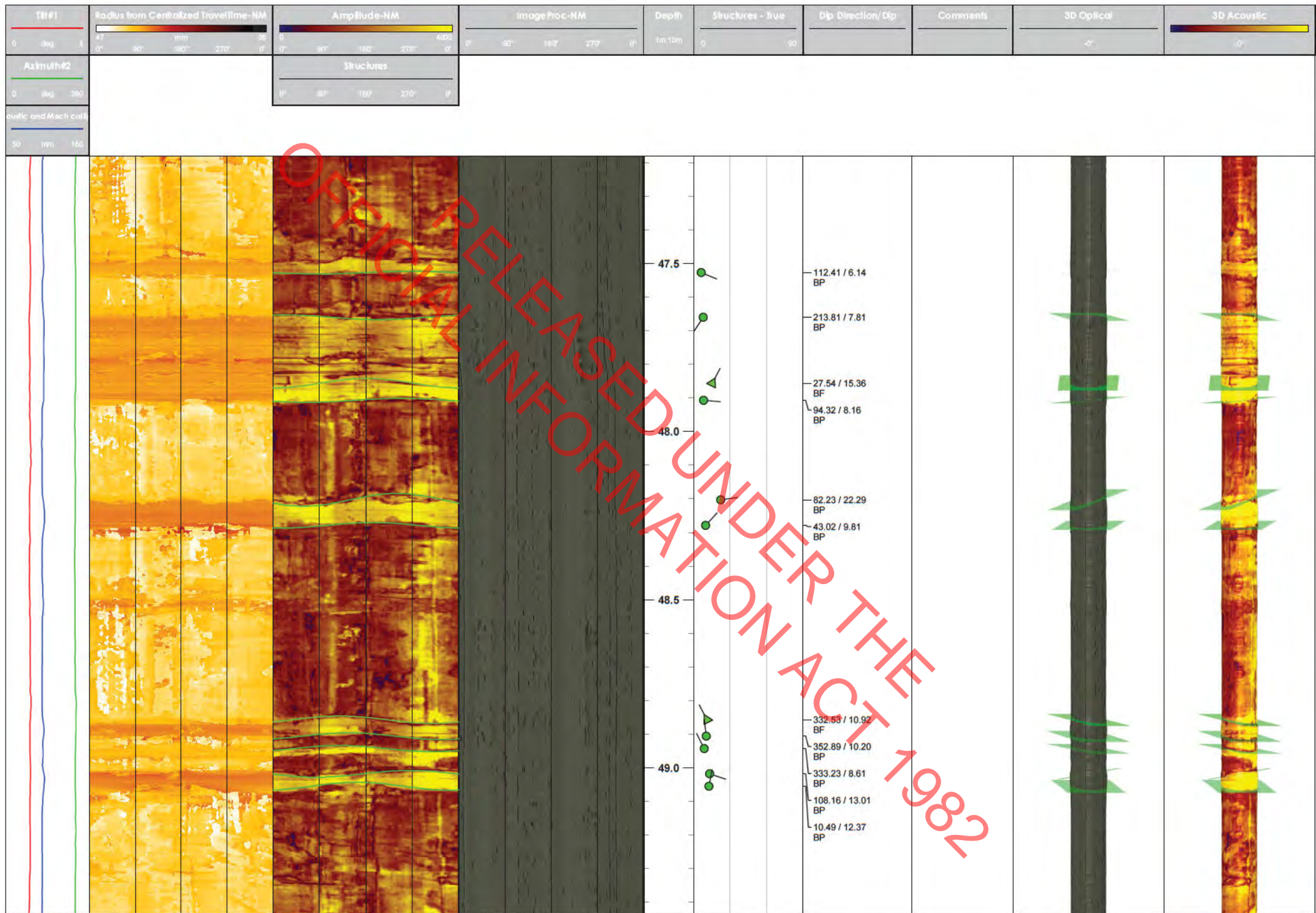


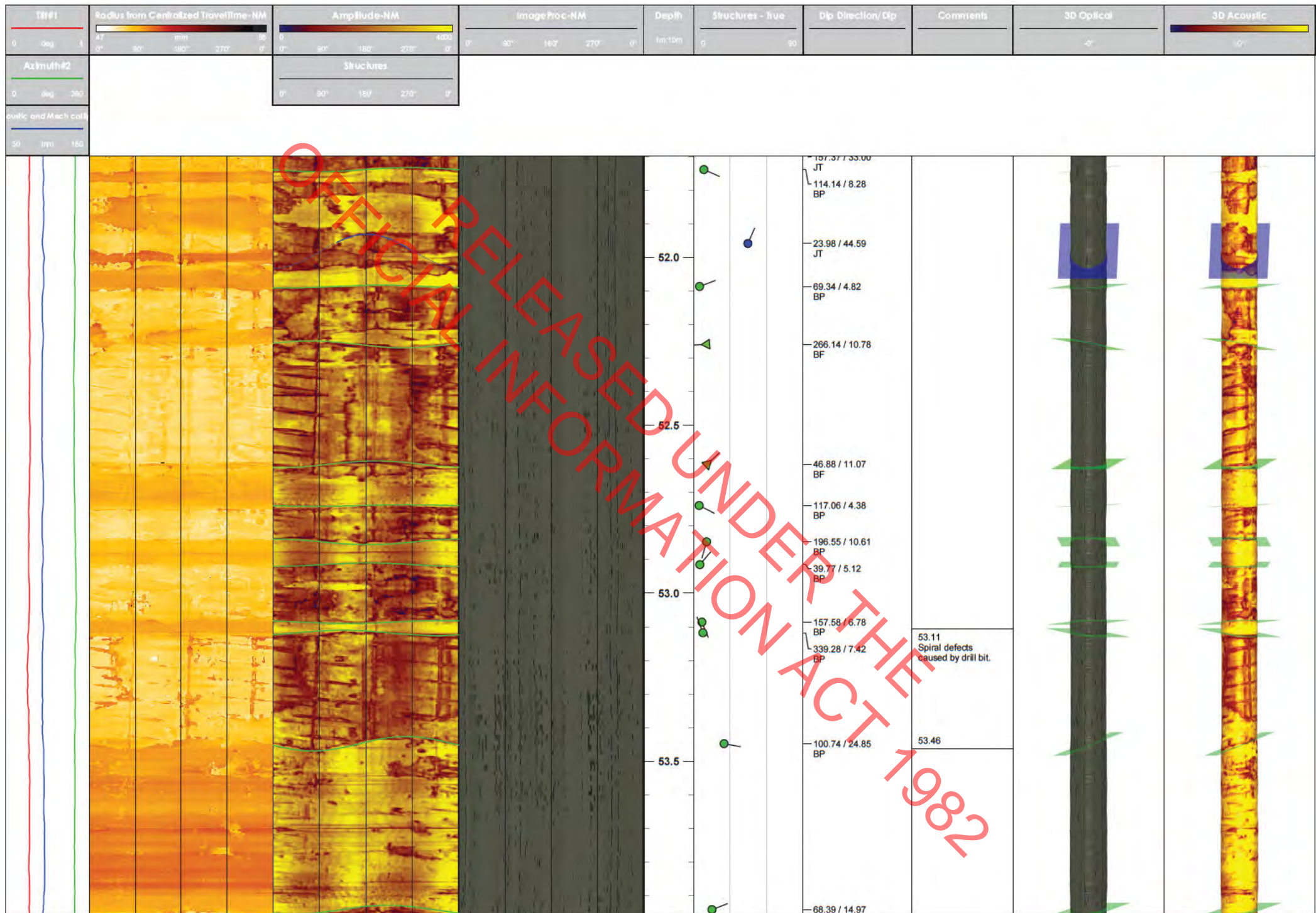


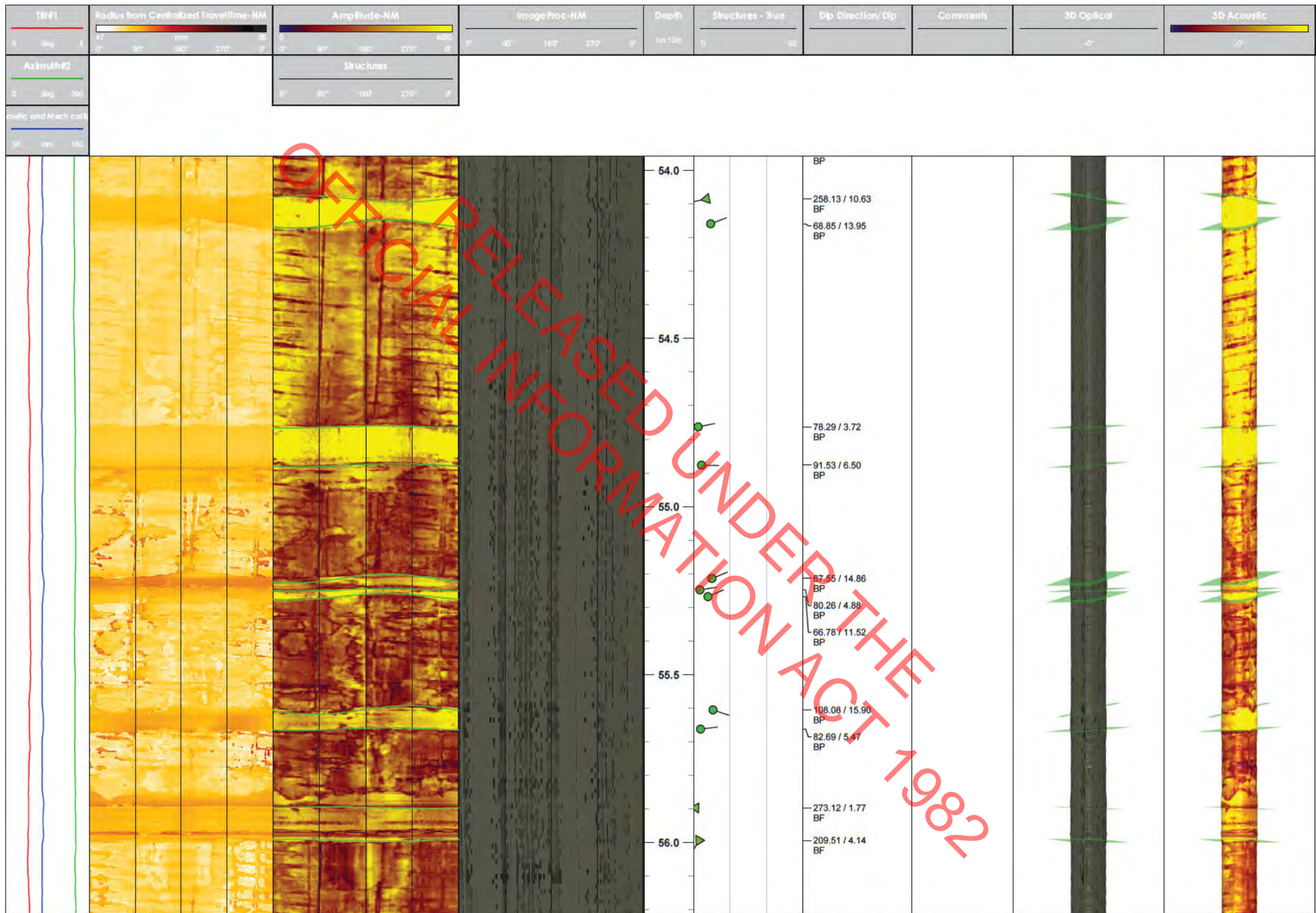


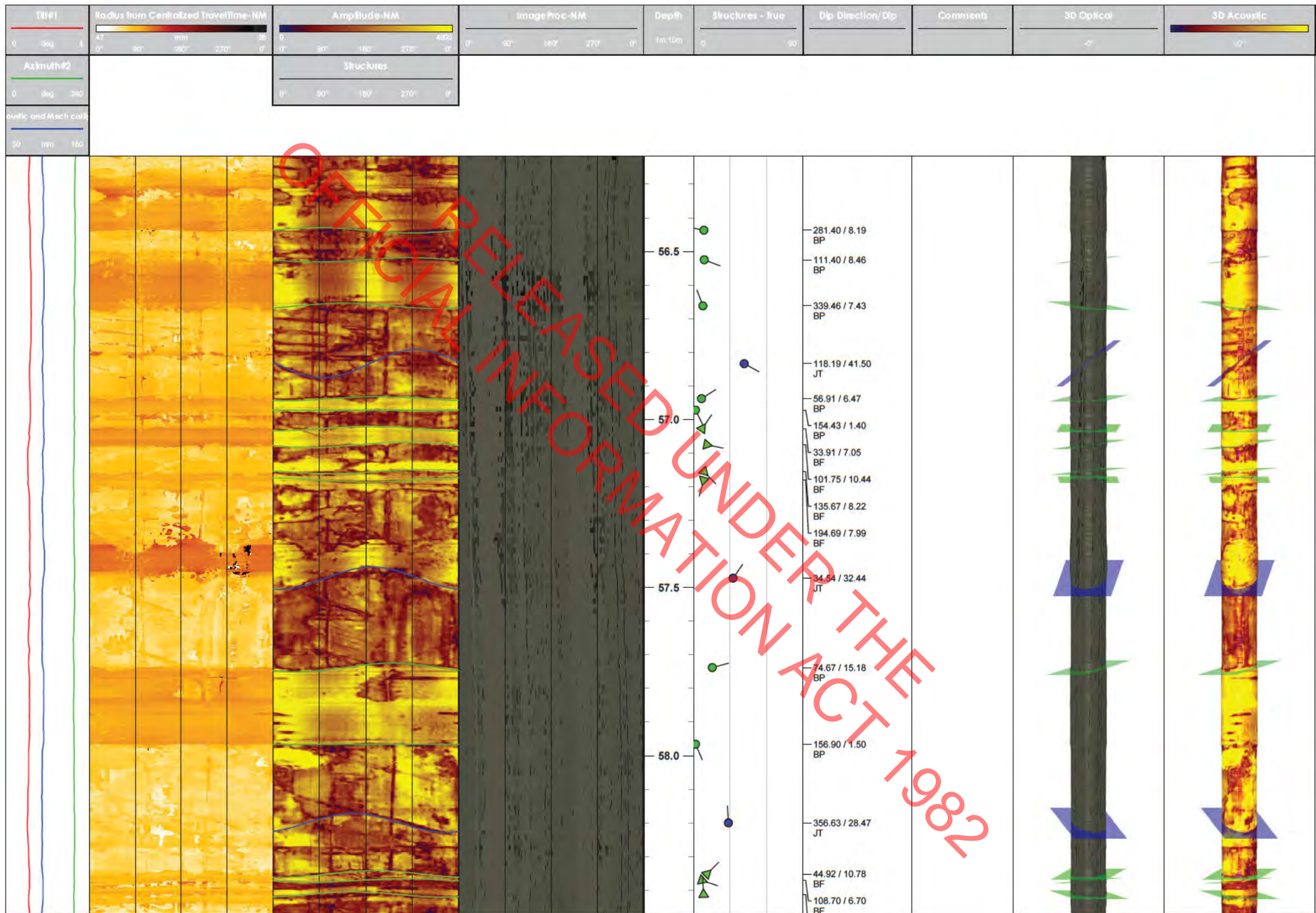


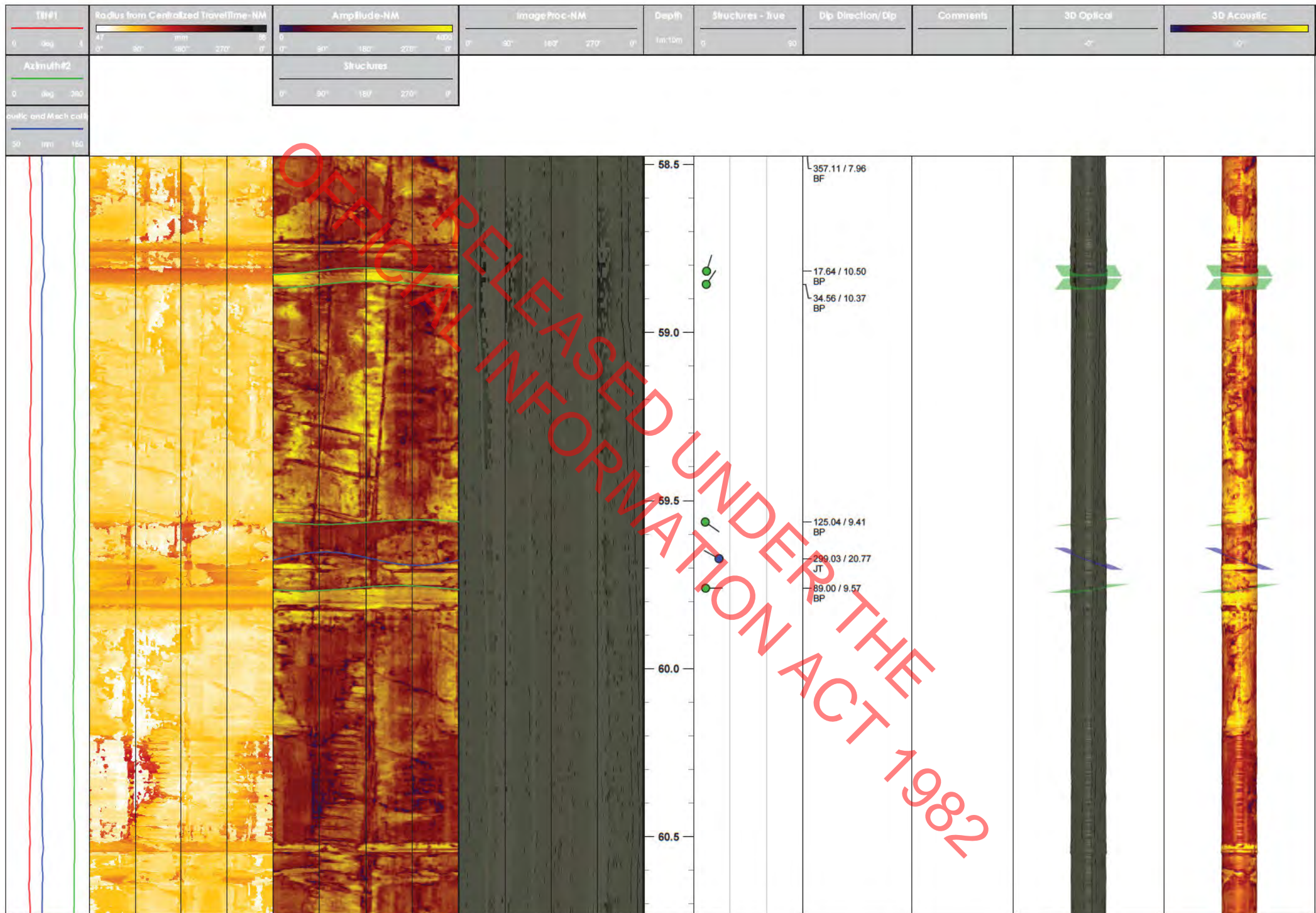


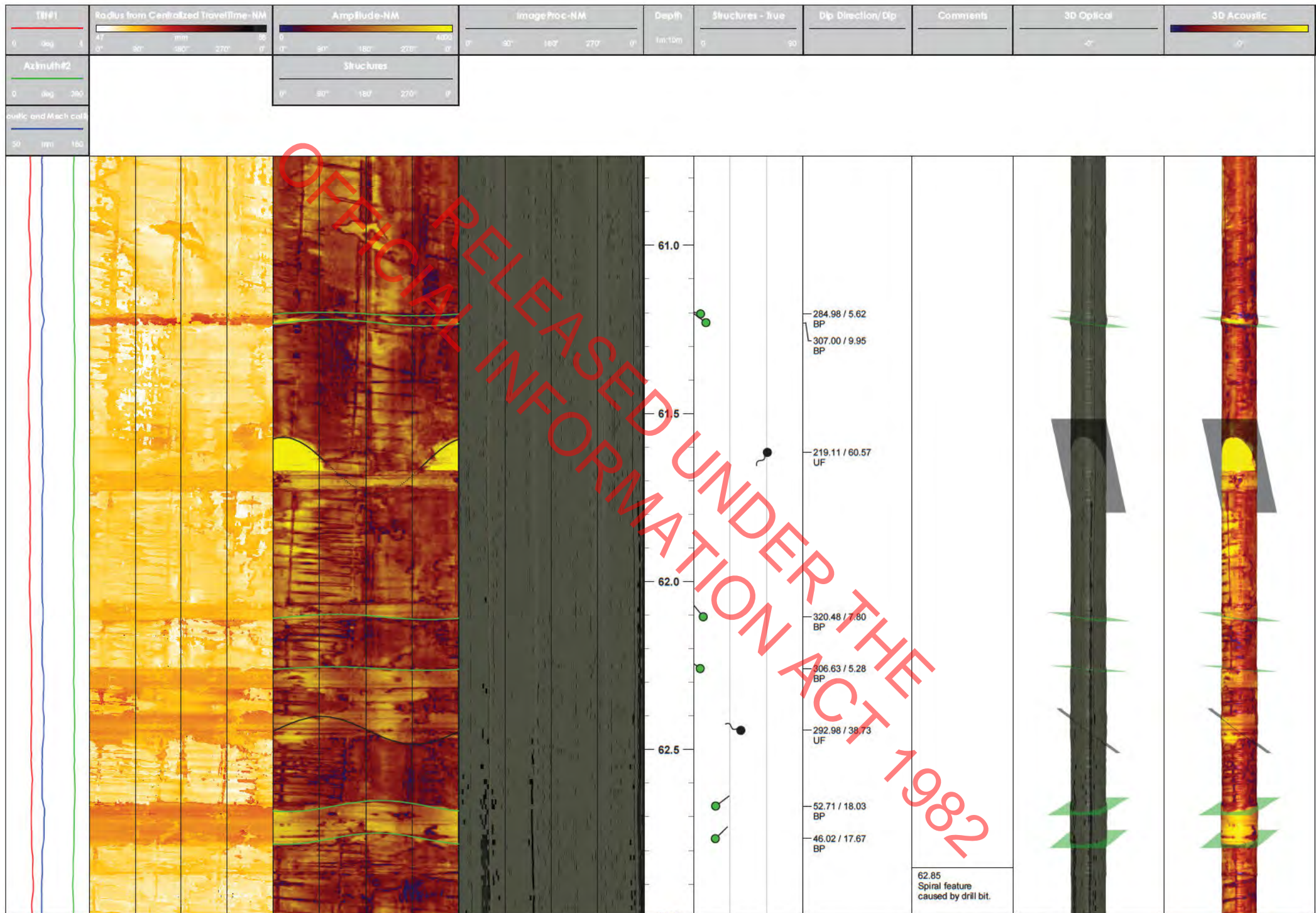


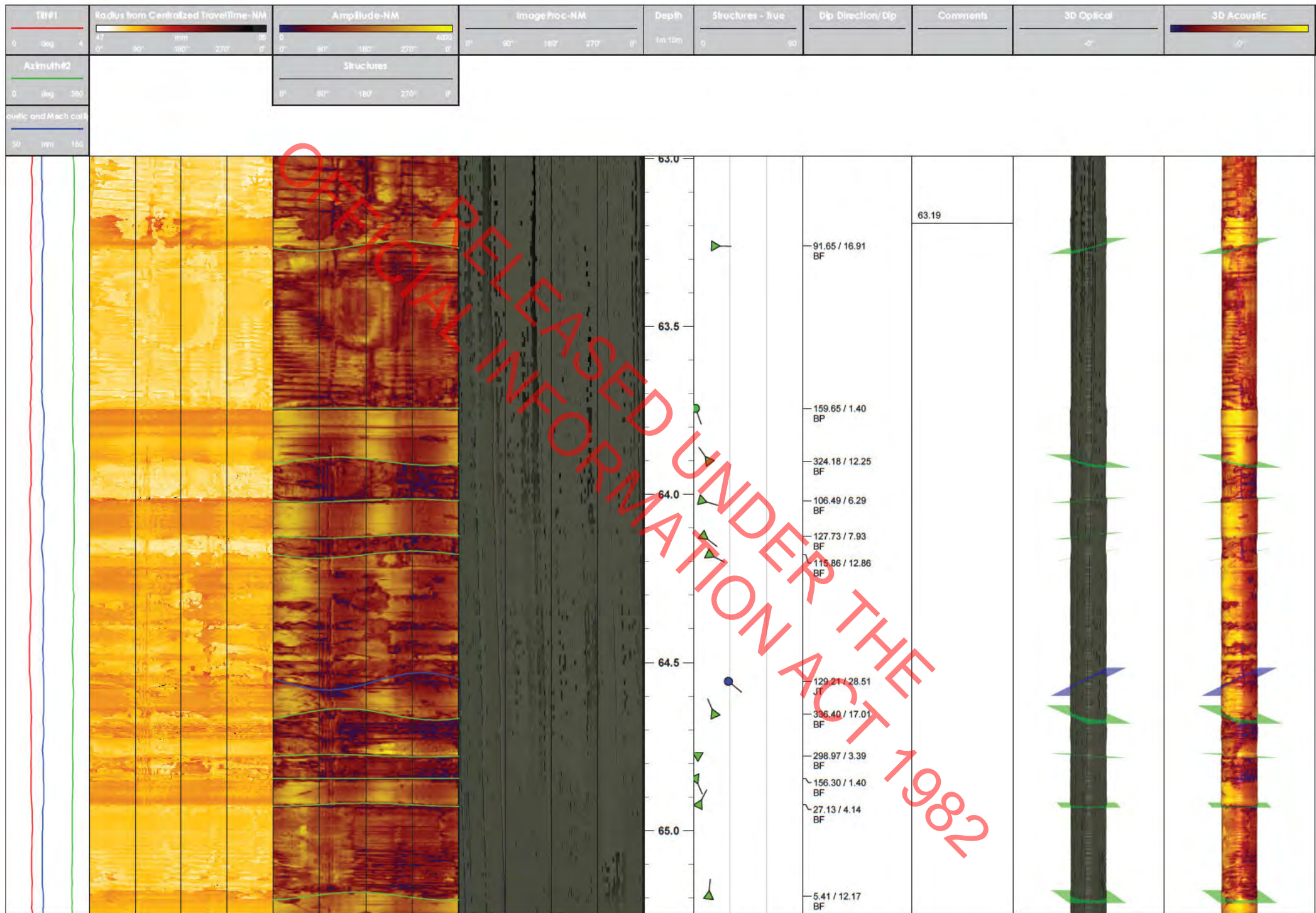


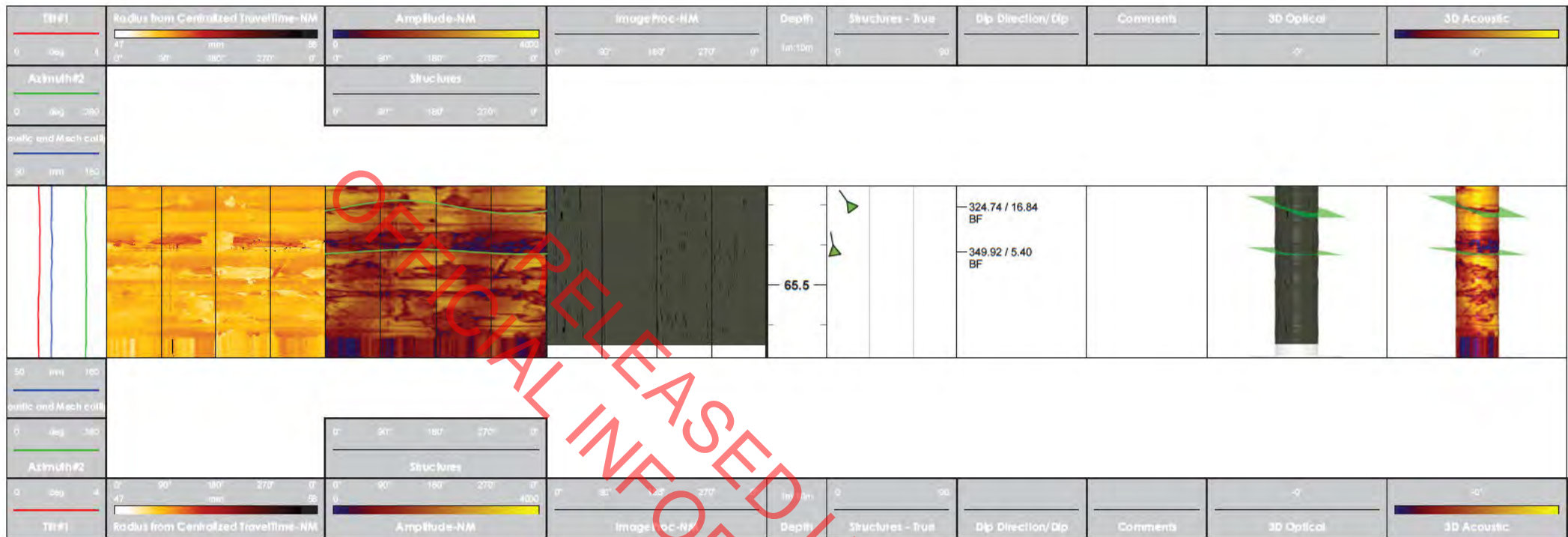














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Log Notes:

The elastic moduli and engineering parameters were calculated from Full Wave Form Sonic Tool Vp and Vs measurements and CCS tool density measurements. As such the logs should be considered in-situ, small strain and bulk measurements. These measurements may differ from laboratory testing for these reasons.

Log Calculations:

SI unit calculations:
Shear Modulus (G) = dVs^2
Bulk Modulus (K) = $1/3*(E/(1-2*PR))$
Young's Modulus (E) = $2G(1+PR)$
Poisson's Ratio (PR) = $2-(Vp/Vs)^2/2-(Vp/Vs)^2$

Where:
Vp = P-wave seismic velocity
Vs = S-wave seismic velocity
d = Density

Log Nomenclature:

Velocity Analysis = Output of semblance processing
S_Slowness = Shear wave slowness from semblance
Vp = P-wave velocity
Vs = Shear wave velocity from S-Slowness
DEN(CDL) = Compensated Density
Shear Modulus = Shear Modulus (G0)
Bulk Modulus = Bulk Modulus (K)
Young's Modulus = Young's Modulus (E)
Poisson's Ratio = Poisson's Ratio (PR)
Vp/Vs = P-wave S-wave ratio
RX#-1A = Wiggle window of sensor #
RX#-1A - dt = Picked first arrival time for sensor #

Basic Information:

Well Name: BH1111
Company: McMillans Drilling (NI) Ltd
Run No: 08, 09 & 10
Tool Type(s): QL40-FWSS Full Wave Form Sonic
Geovista P&S Logger
Service Company: RDCL
Operator: K Koria
Witness: R Hamlin
Date Logged: 05/04/2023
Field: Auckland Light Rail
State / Province: Auckland
Country: New Zealand

Drillhole Information:

Bit Size: PQ
Log interval from: 1.25 m Log interval to: 44.29 m
Depth Driller: 45 m Depth Logger: 45.20 m (Calliper)
Fluid Type: Water Fluid Level: 4.13 m (Acoustic)
Northing: 1756180.390 Easting: 5918428.243
Elevation: TBC Projection: NZTM
Hole Azimuth: Vertical Hole Inclination: -89.06° (Mean)
Magnetic Declination: +20° 9' Magnetic Inclination: 62° 50'
Casing Size: PWT Casing Depth: 4.29 m

Printing Information:

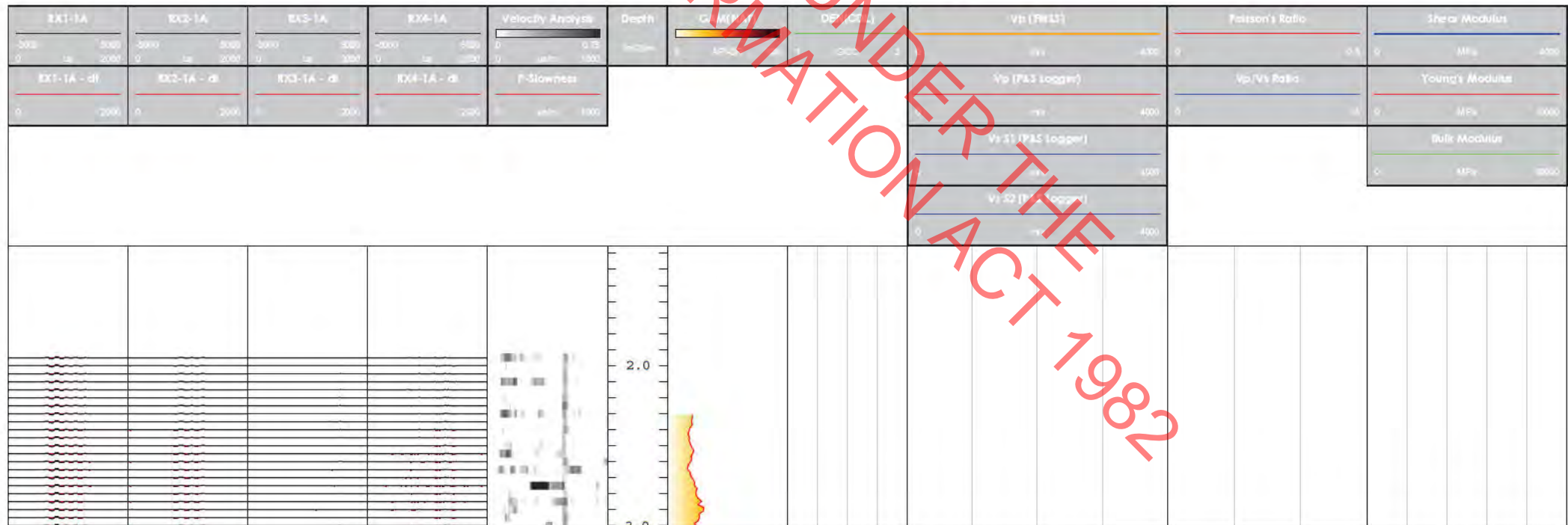
Print Type: Paginated Log Version: Final
Depth Unit: Metres Scale Ratio: 1:25

Location Description:

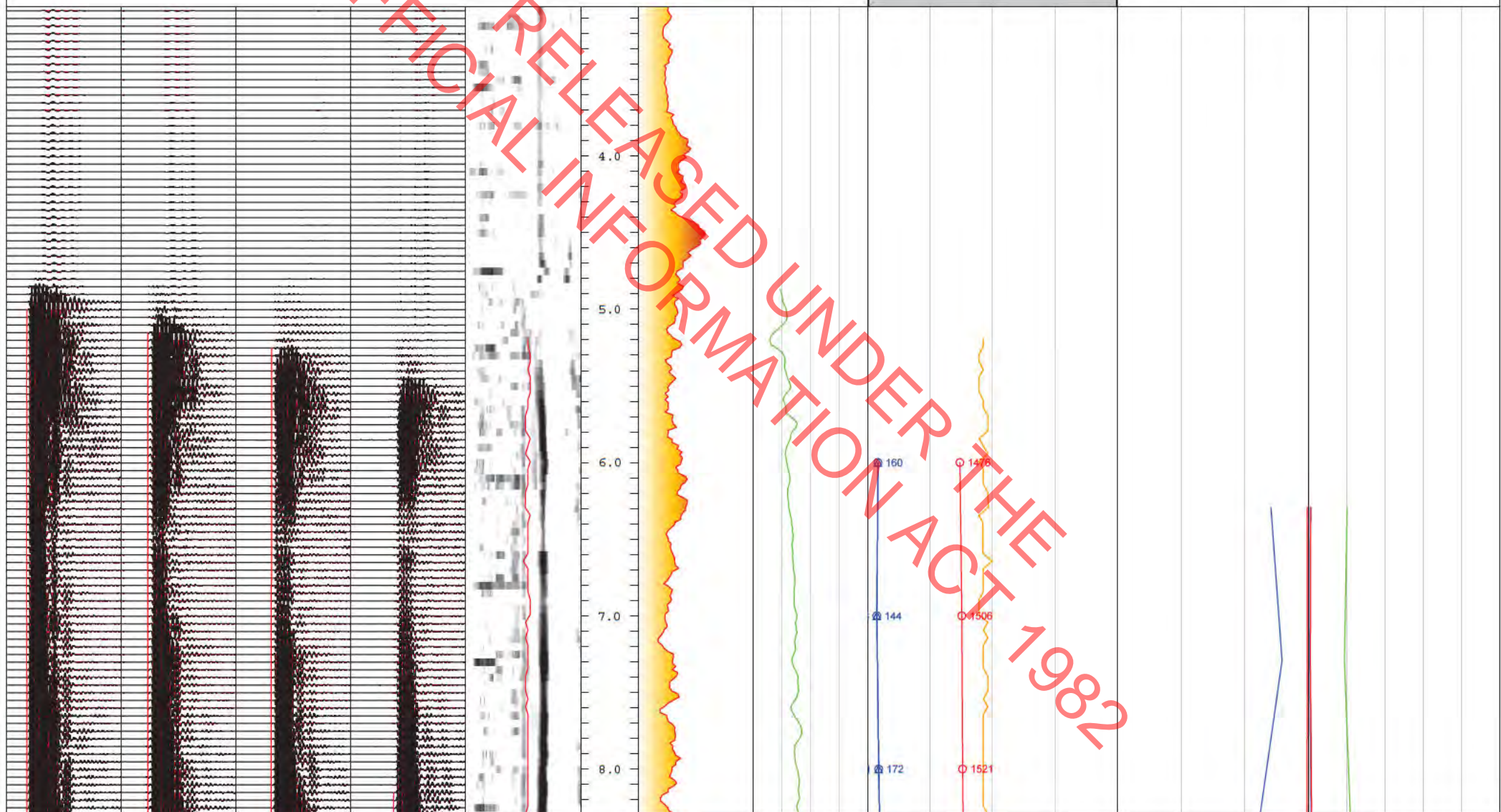
332 New North Road, Kingsland, Auckland, 1021

Comments:

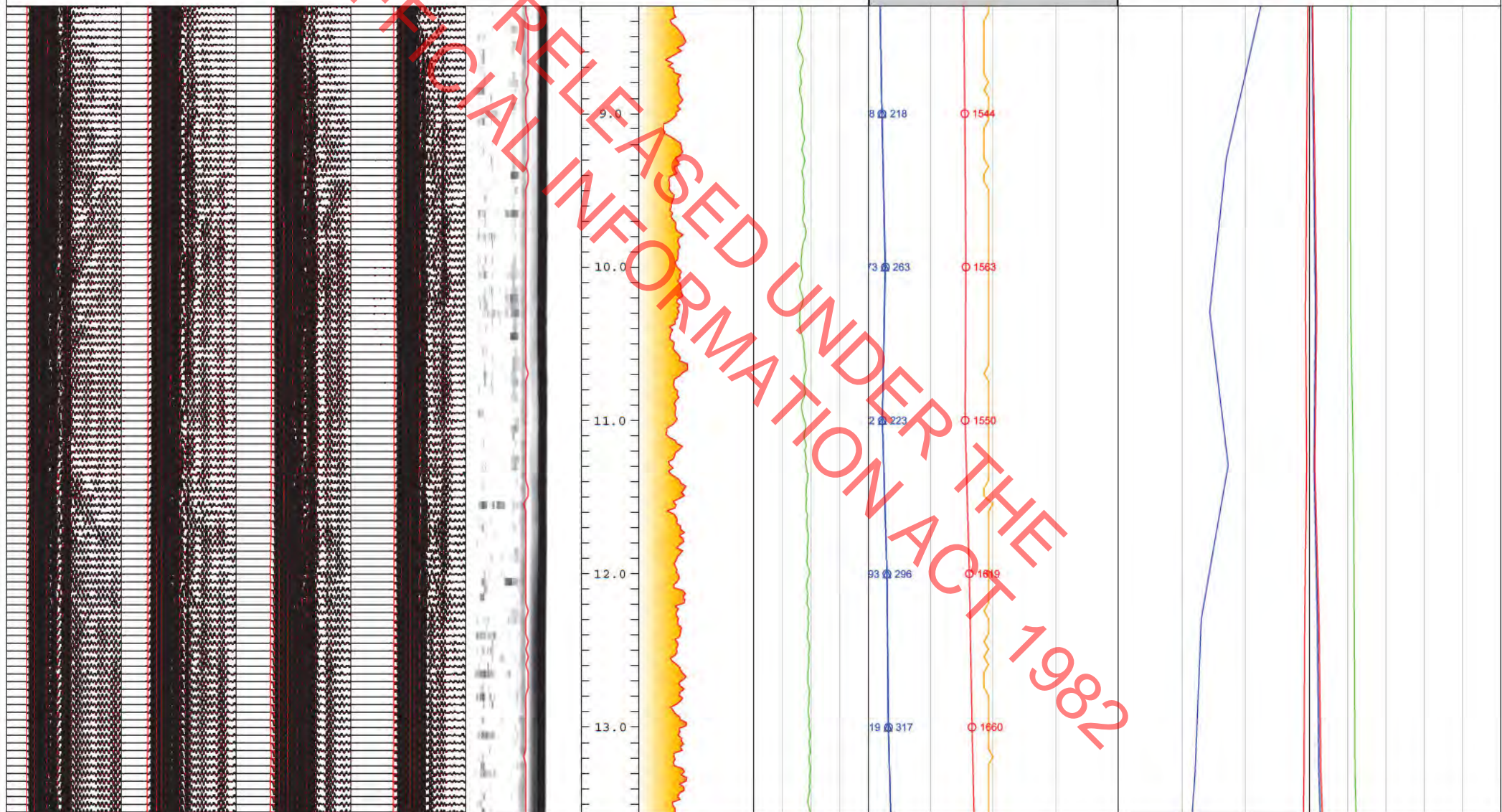
1. Gaps left in P&S Logger Vs picks where data is noisy.
2. Coordinates are taken from Google Earth and are approximate.



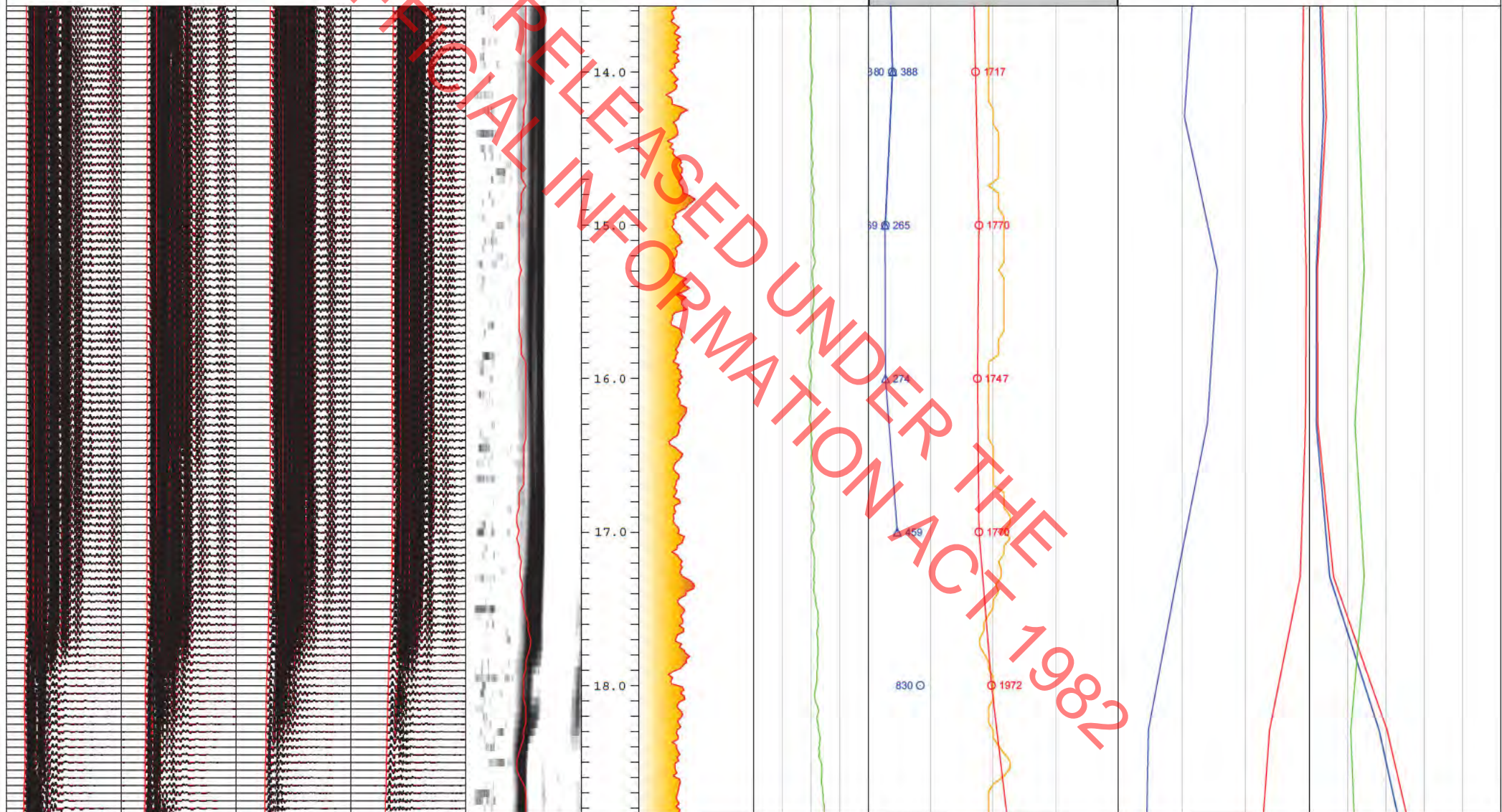
KX1-1A	KC2-1A	KC3-1A	KX4-1A	Velocity Analysis	Depth	GAA(NAT)	DEN(COL)	Vp (FPS)	Poisson's Ratio	Shear Modulus
0 8000 1000	0 8000 1000	0 8000 1000	0 8000 1000	0 10 1000	0 1000 1000	0 1000 1000	0 1000 1000	0 4000 4000	0 0.4 0.4	0 1000 1000
KX1-1A - 01	KC2-1A - 01	KC3-1A - 01	KX4-1A - 01	P-Slopes						Young's Modulus
0 8000 1000	0 8000 1000	0 8000 1000	0 8000 1000	0 1000 1000						0 1000 1000
								Vs 11 (FPS Logger)		
								0 1000 1000		
								Vs 12 (FPS Logger)		
								0 1000 1000		



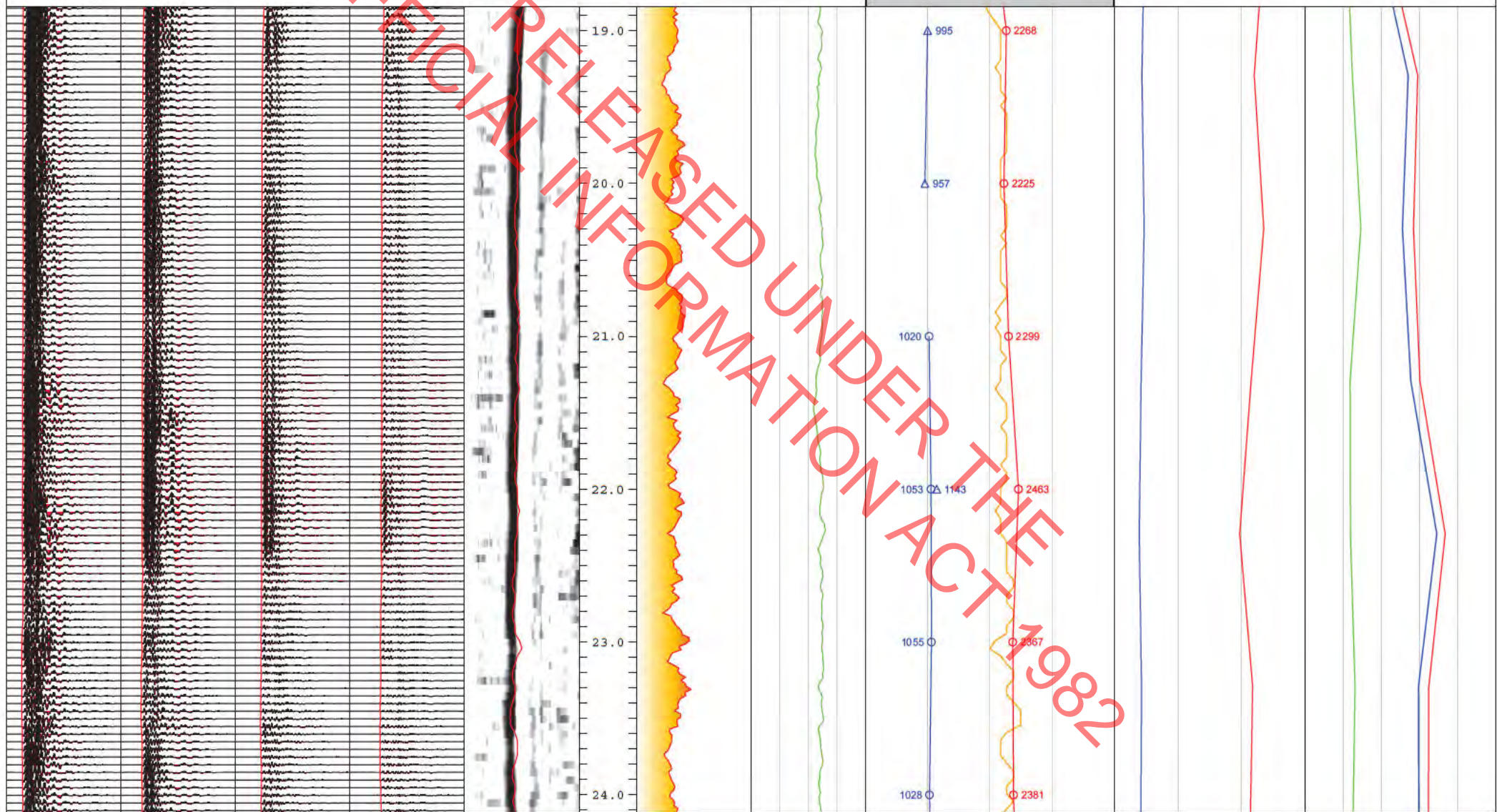
KX1-1A	KC2-1A	KC3-1A	KX4-1A	Velocity Analysis	Depth	GAA(NAT)	DEN(COL)	Vp (FPS)	Poisson's Ratio	Shear Modulus
0 8000 10000	0 8000 10000	0 8000 10000	0 8000 10000	0 100 1000	0 10000 10000	0 10000 10000	0 10000 10000	0 10000 10000	0 10000 10000	0 10000 10000
KX1-1A - 01	KC2-1A - 01	KC3-1A - 01	KX4-1A - 01	P-Wave				Vp (FPS log)	Vp/Vs Ratio	Young's Modulus
0 8000 10000	0 8000 10000	0 8000 10000	0 8000 10000	0 100 1000				0 10000 10000	0 10000 10000	0 10000 10000
								Vs 11 (FPS log)		Bulk Modulus
								0 10000 10000		0 10000 10000
								Vs 12 (FPS log)		
								0 10000 10000		

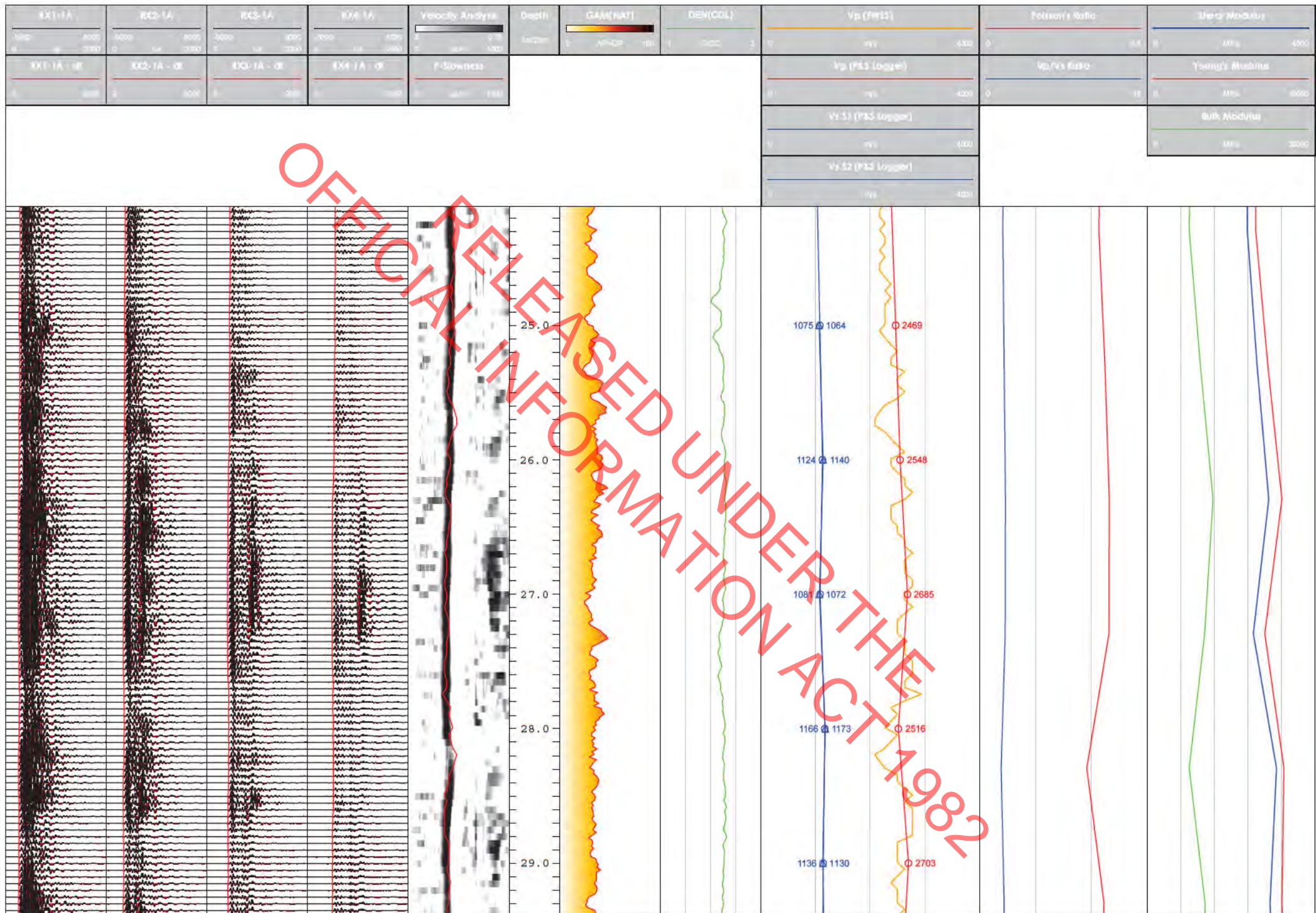


KX1-1A	KC2-1A	KC3-1A	KC4-1A	Velocity Analysis	Depth	GAA(NAT)	DEN(COL)	Vp (FPS)	Poisson's Ratio	Shear Modulus
0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000
KX1-1A - SE	KC2-1A - SE	KC3-1A - SE	KC4-1A - SE	P-Slopes				Vp (FPS log)	Vp/Vs Ratio	Young's Modulus
0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000				0 1000 2000	0 1000 2000	0 1000 2000
								Vs 1.1 (FPS log)		Bulk Modulus
								0 1000 2000		0 1000 2000
								Vs 1.2 (FPS log)		
								0 1000 2000		

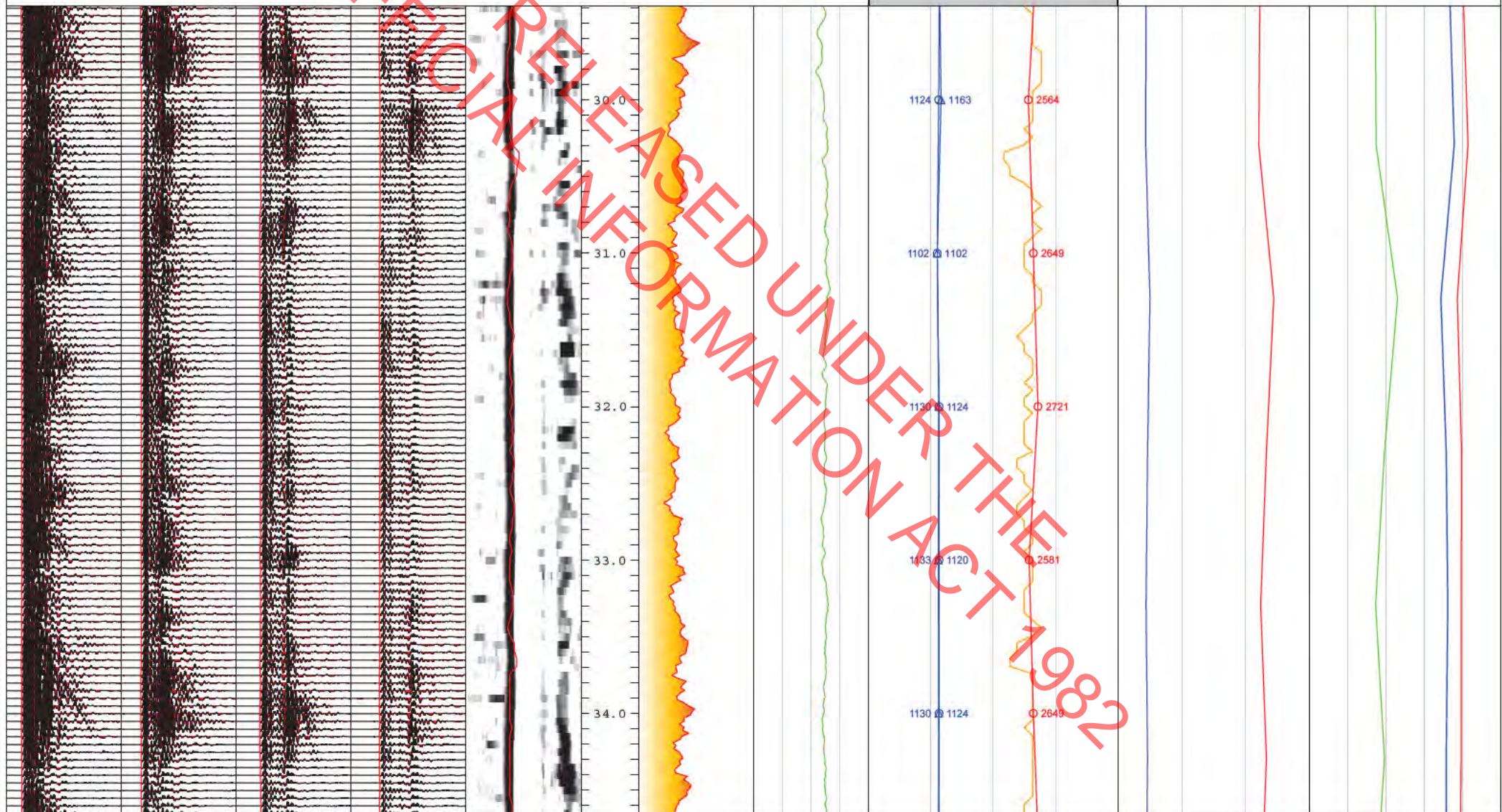


KX1-1A	KX2-1A	KX3-1A	KX4-1A	Velocity Analysis	Depth	GAM(NAT)	DEN(COL)	Vp (FPS)	Poisson's Ratio	Shear Modulus
0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000
KX1-1A - GR	KX2-1A - GR	KX3-1A - GR	KX4-1A - GR	P-Slopes				Vp (FPS logg)	Vp/Vs Ratio	Young's Modulus
0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000				0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000	0 1000 2000 3000 4000 5000
								Vs 1.1 (FPS logg)		Bulk Modulus
								0 1000 2000 3000 4000 5000		0 1000 2000 3000 4000 5000
								Vs 1.2 (FPS logg)		
								0 1000 2000 3000 4000 5000		

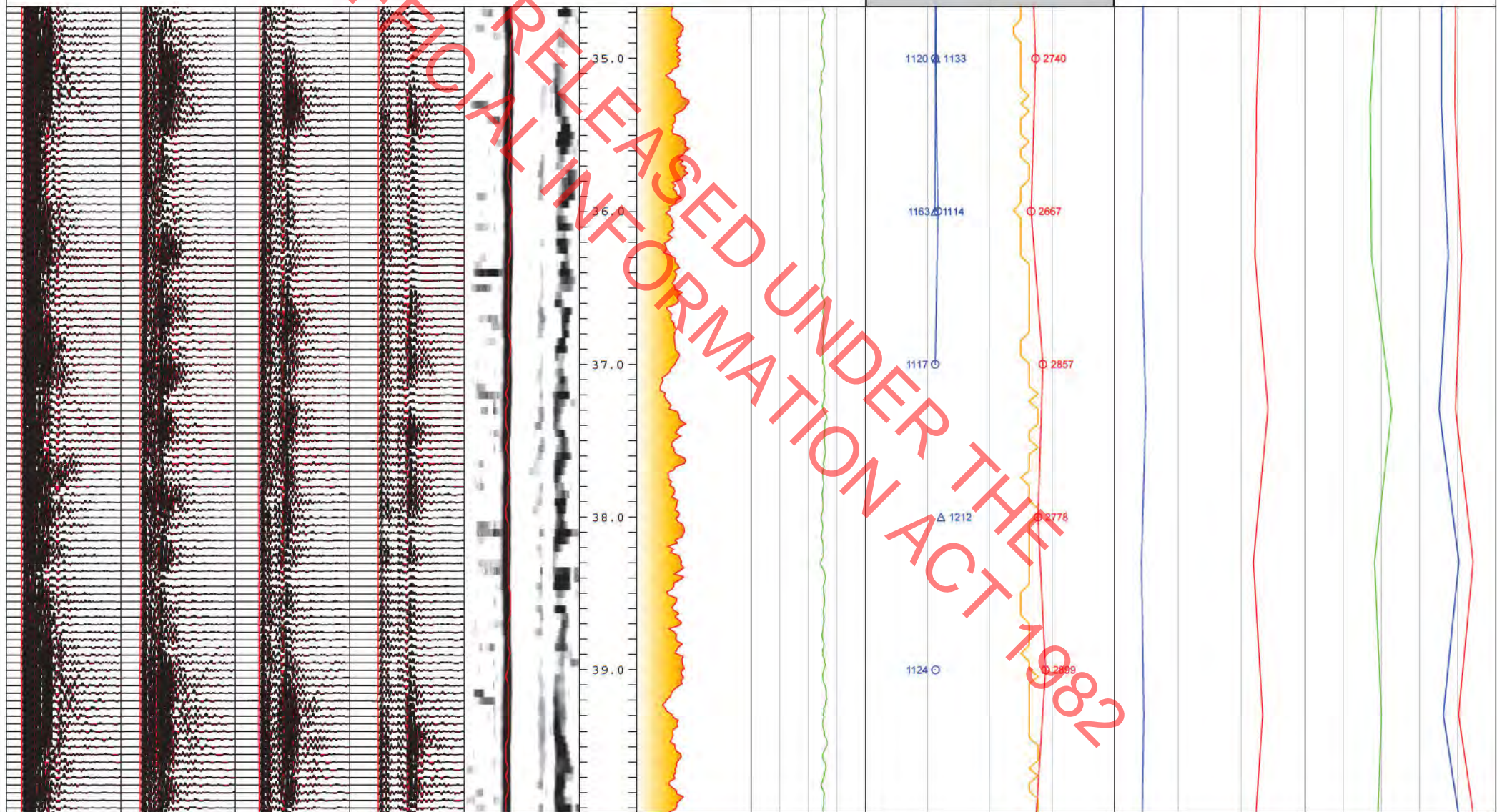




KX1-1A	KC2-1A	KC3-1A	KX4-1A	Velocity Analysis	Depth	GAAR(NAT)	DEN(COL)	Vp (FPS)	Poisson's Ratio	Shear Modulus
0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000
KX1-1A - 01	KC2-1A - 01	KC3-1A - 01	KX4-1A - 01	P-Wave				Vp (FPS Log)	Vp/Vs Ratio	Young's Modulus
0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000				0 1000 2000	0 1000 2000	0 1000 2000
								Vs 11 (FPS Log)		Bulk Modulus
								0 1000 2000		0 1000 2000
								Vs 12 (FPS Log)		
								0 1000 2000		



KX1-1A	KC2-1A	KC3-1A	KX4-1A	Velocity Analysis	Depth	GAM(NAT)	DEN(COL)	Vp (FPS)	Poisson's Ratio	Shear Modulus
0 8000 16000	0 8000 16000	0 8000 16000	0 8000 16000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000	0 1000 2000
KX1-1A - 01	KC2-1A - 01	KC3-1A - 01	KX4-1A - 01	P-Spectrum				Vp (FPS Log)	Vp/Vs Ratio	Young's Modulus
0 8000 16000	0 8000 16000	0 8000 16000	0 8000 16000	0 1000 2000				0 1000 2000	0 1000 2000	0 1000 2000
								Vs 51 (FPS Log)		Bulk Modulus
								0 1000 2000		0 1000 2000
								Vs 52 (FPS Log)		
								0 1000 2000		



RX1-1A - dt		RX2-1A - dt		RX3-1A - dt		RX4-1A - dt		P-Slowness				Vp (P&S Logger)		Vp/Vs Ratio		Young's Modulus	
0	1000	0	1000	0	1000	0	1000	0	1000	1000	0.75	0	1000	0	0.5	0	1000
4000	6000	4000	6000	4000	6000	4000	6000	4	0.75	1000	0.75	0	1000	0	0.5	0	1000
RX1-1A		RX2-1A		RX3-1A		RX4-1A		Velocity Analysis		Depth	GAM(NAT)	Vp (FWSS)		Poisson's Ratio		Shear Modulus	

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Structural Legend:

- BP - Bedding Plane
- BF - Bedding Fracture
- JT - Joint
- FR - Fracture
- FZ - Fractured Zone
- SH - Shear
- CZ - Crushed Zone
- IF - Infilled Zone
- DZ - Decomposed Zone
- UF - Unidentified Feature

Log Nomenclature:

Azimuth = Tool azimuth from magnetic north
Tilt = Inclination from vertical
Acoustic Calliper = 360° average from travel time
Calliper from Cent = Calliper derived from travel time
Image-NM = Optical image oriented to magnetic north
Amplitude-NM = Acoustic amplitude (magnetic north)
Structures = Apparent Structures oriented to hole
Structures - True = Structures Oriented to true north
3D Optical = 3D representation of optical log
3D Acoustic = 3D representation of acoustic log
DEN(CDL) = Compensated Density in g/ccm
GAM(NAT) = Natural Gamma

Comments:

1. Structures - True are reported in dip direction and dip relative to grid north.
2. Hole oblate and blown out to 17.5 m bgl.
3. Coordinates are taken from Google Earth and are approximate.

Basic Information:

Drill hole ID: BH1111
Client: McMillans Drilling (NI) Ltd
Run Number(s): 06 & 07
Tool Type(s): ABI40-2G Acoustic Televiwer
OB40-2G Optical Televiwer
QL40-CAL Mechanical Calliper

Service Company: RDCL
Operator: H Soma
Date Logged: 05/04/2023
Field: Auckland Light Rail
State / Province: Auckland
Country: New Zealand

Drillhole Information:

Log interval from (m): 3.50 Log interval to (m): 44.88
Depth Driller (m): 45 Depth Logger (m): 45.20 (Calliper)
Fluid Type: Water Fluid Level (m): 4.14 (ATV)
Easting: 5918428.243 Northing: 1756180.390
Elevation: N/A Coord Ref System: NZTM
Hole Azimuth: Vertical Hole Inclination: -89.06° (Mean)
Magnetic Declination: +20° 9' East Magnetic Indination: 62° 50'

Drill Company: McMillans Drilling (NI) Ltd

Printing Information:

Depth Unit: Metres Log Scale: 1:10 Log Version: Final
Processed: O Gibson Log Reviewer: K Koria

Bit Size Record:

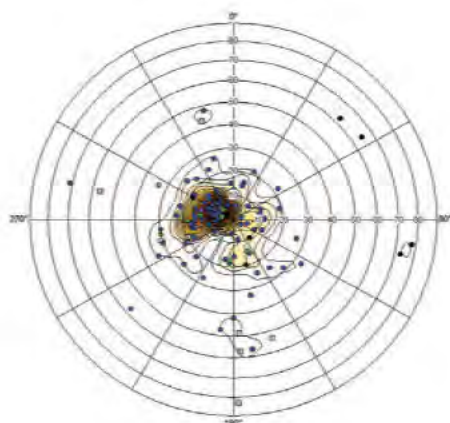
Size (mm):	From (m):	To (m):	Type:	Size:	From (m):	To (m):
PQ (122.6)	0.00	45.2	PWT	127.0	0.00	4.31
###	###	###	XX	###	###	###
###	###	###	XX	###	###	###
###	###	###	XX	###	###	###

Casing Record:

Location Description:

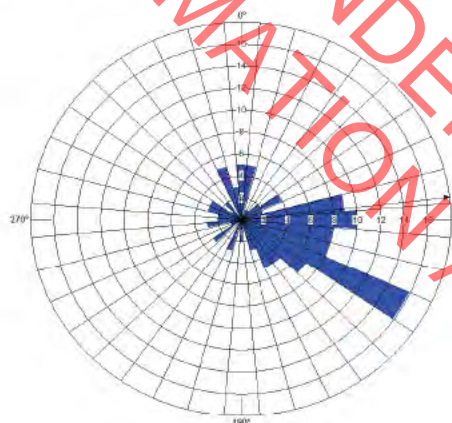
332 New North Road, Kingsland, Auckland 1021.

Stereoplot - Polar Projection Dip



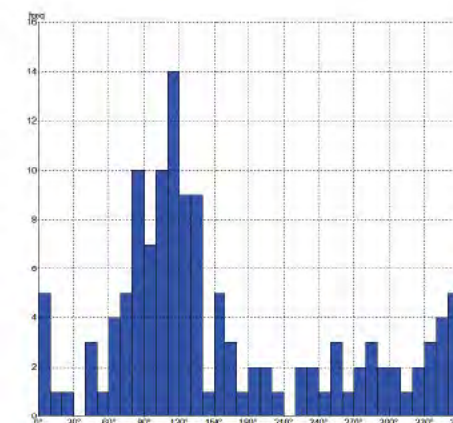
Schmidt Plot - Lower (Southern) Hemisphere - Structures - True
Depth: 3.50 m to 44.88 m

Rose Diagram - Azimuth

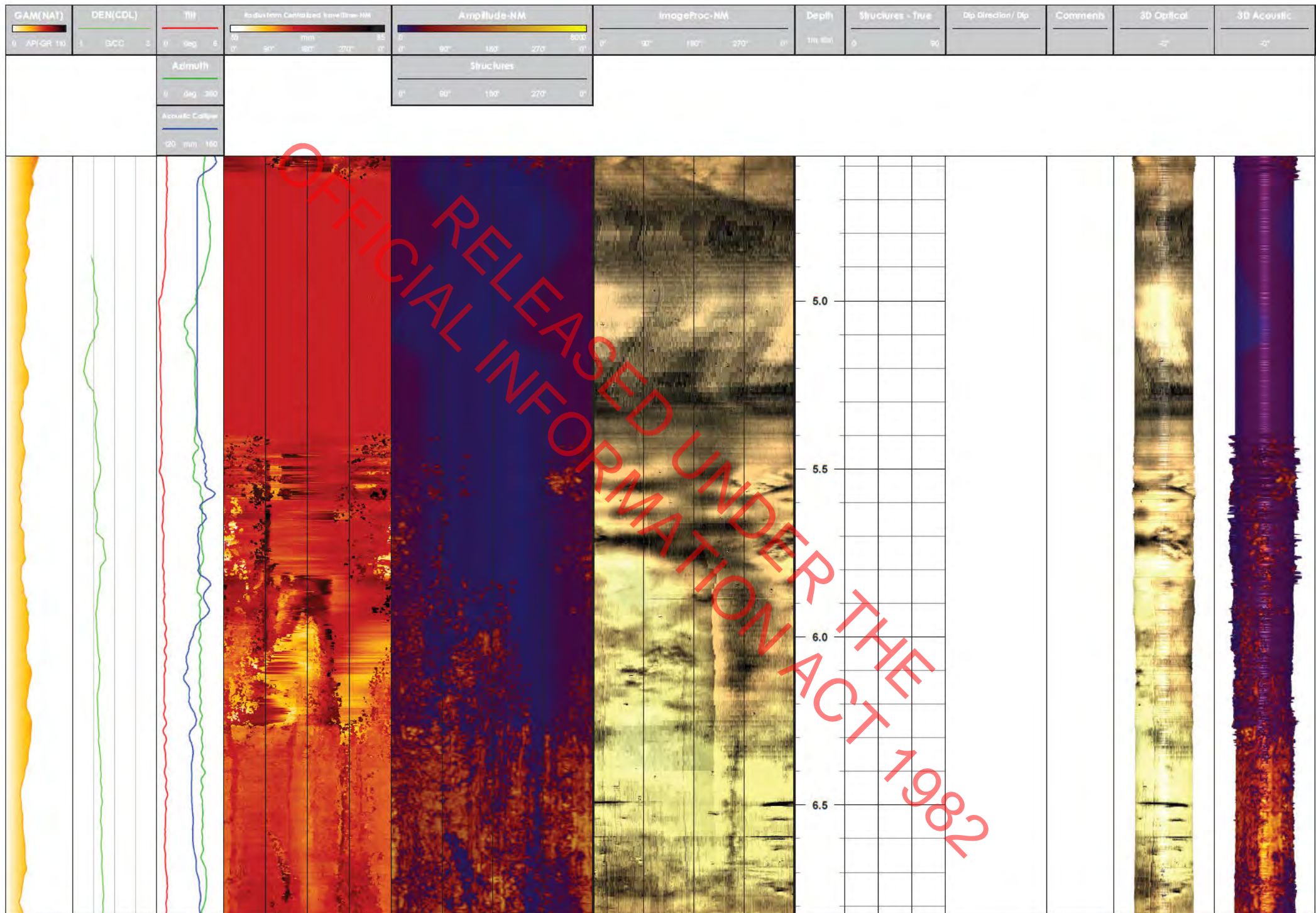


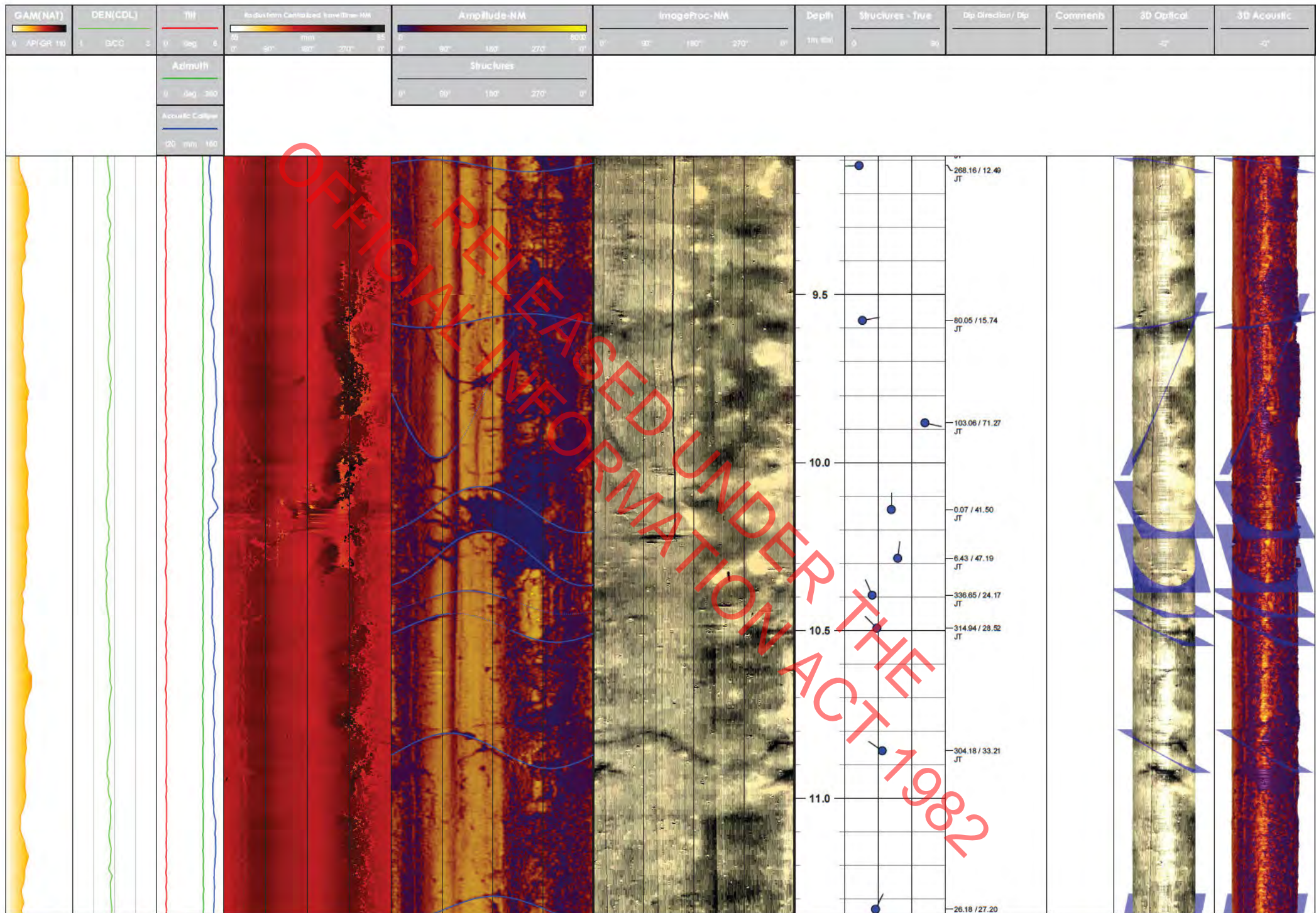
Depth: 3.50 m to 44.88 m

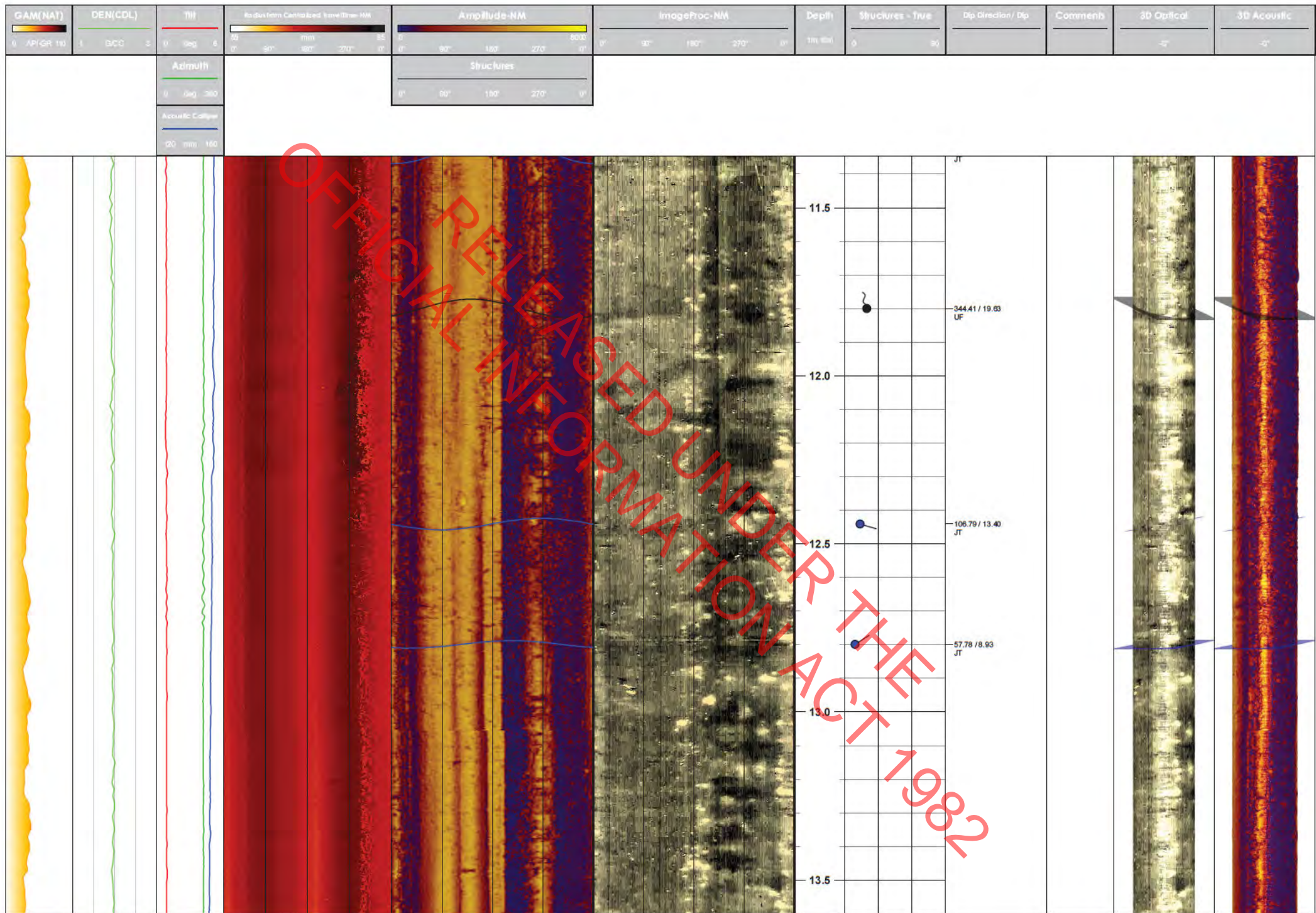
Histogram - Azimuth

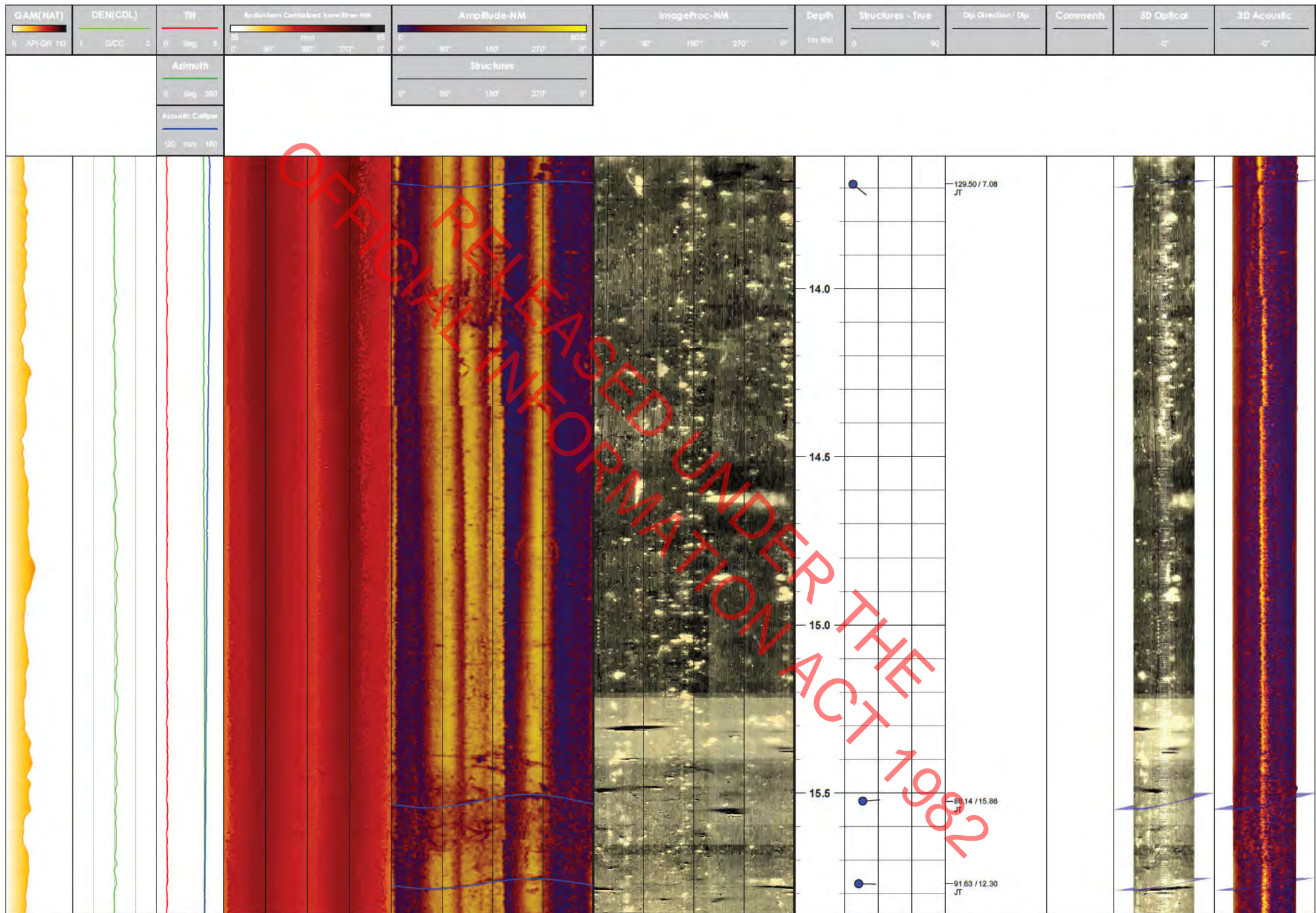


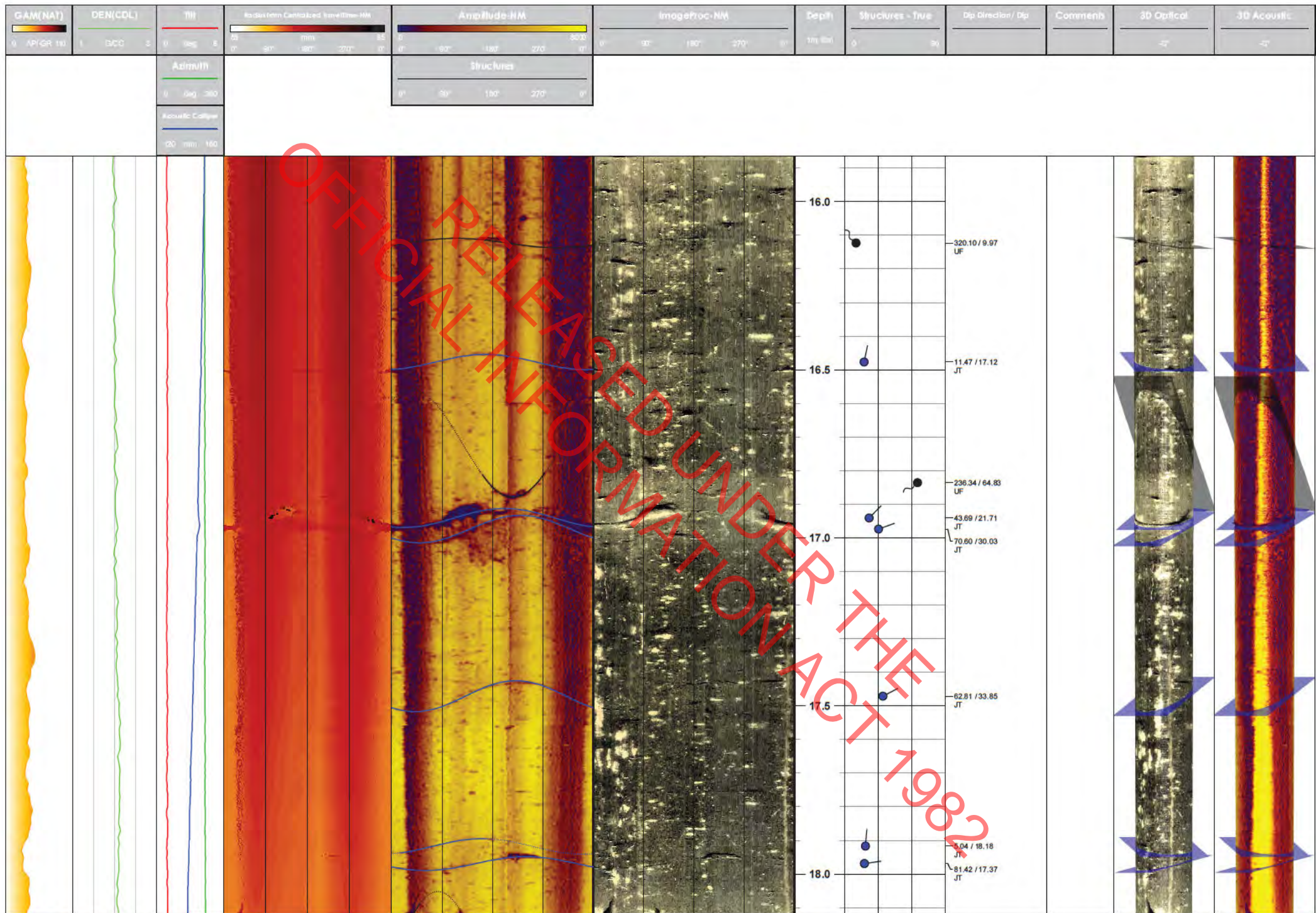
Depth: 3.50 m to 44.88 m

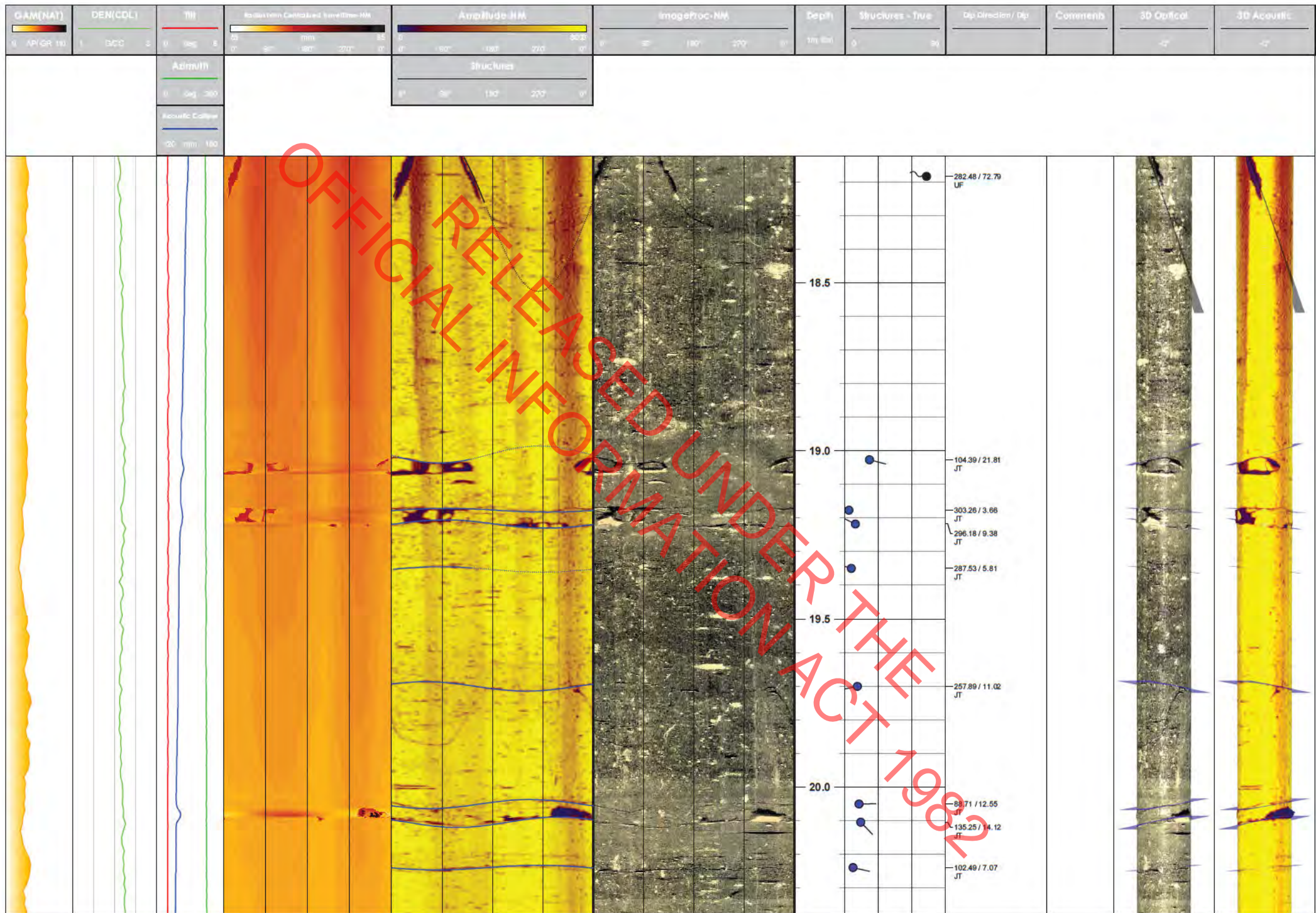


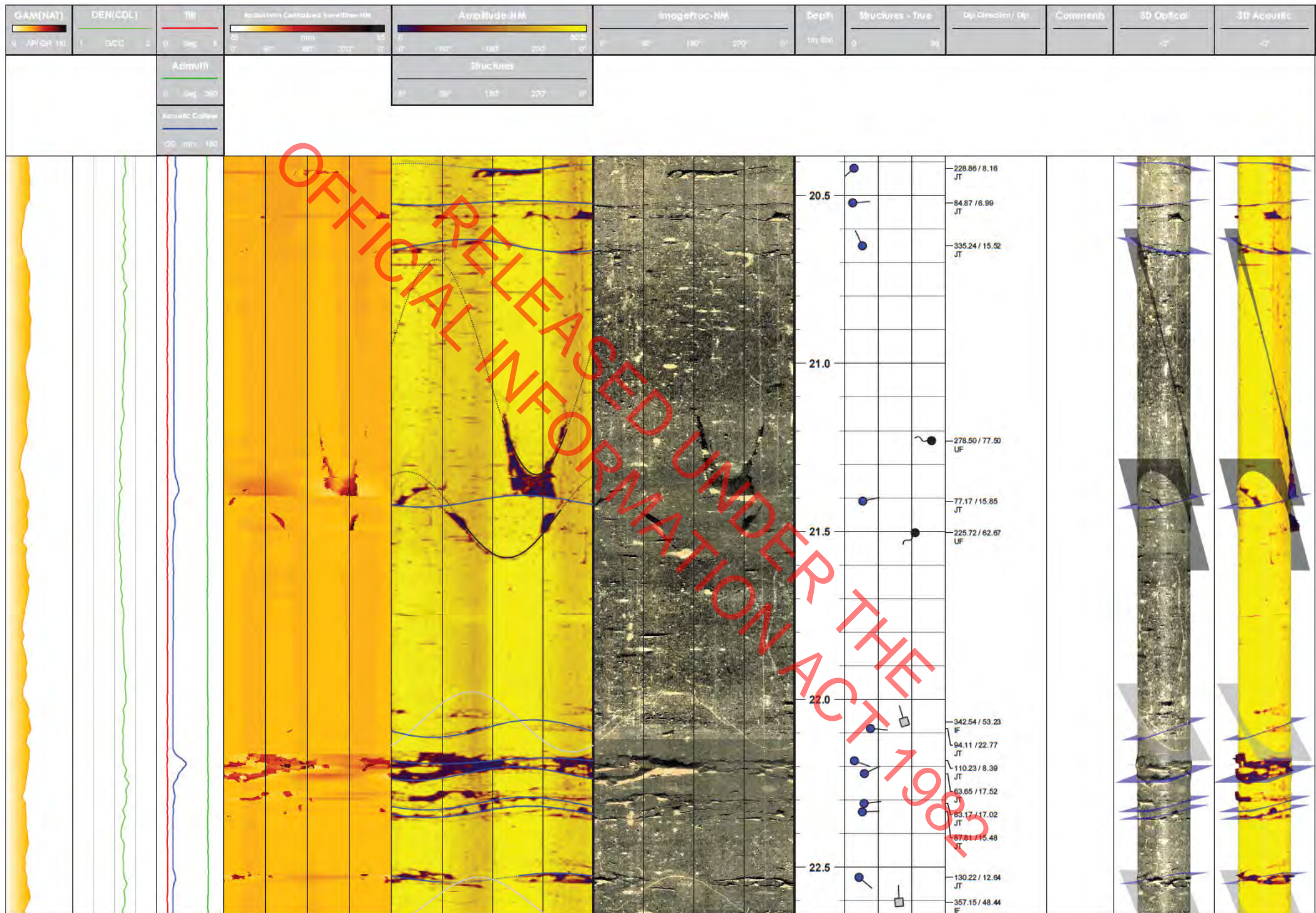


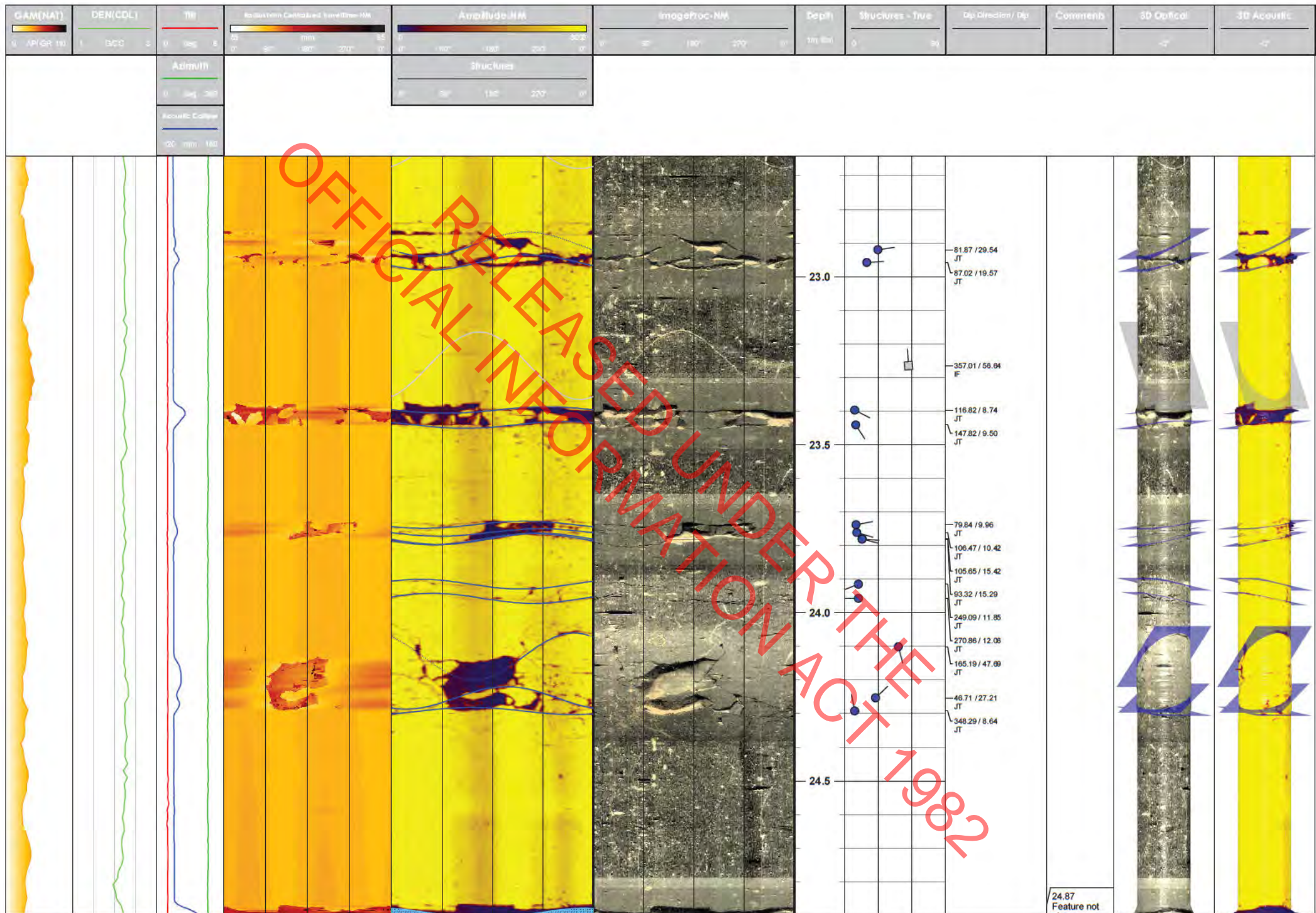


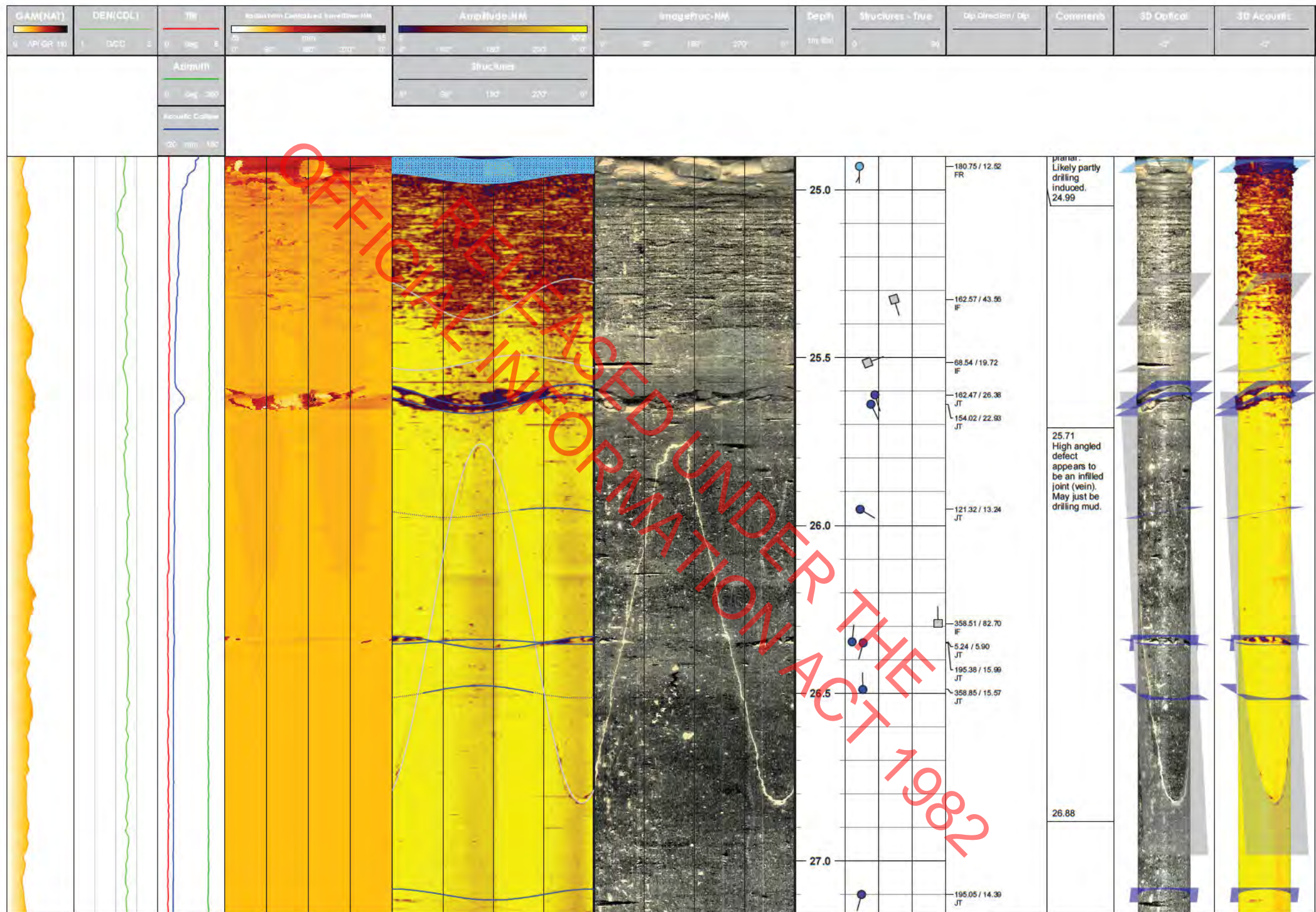


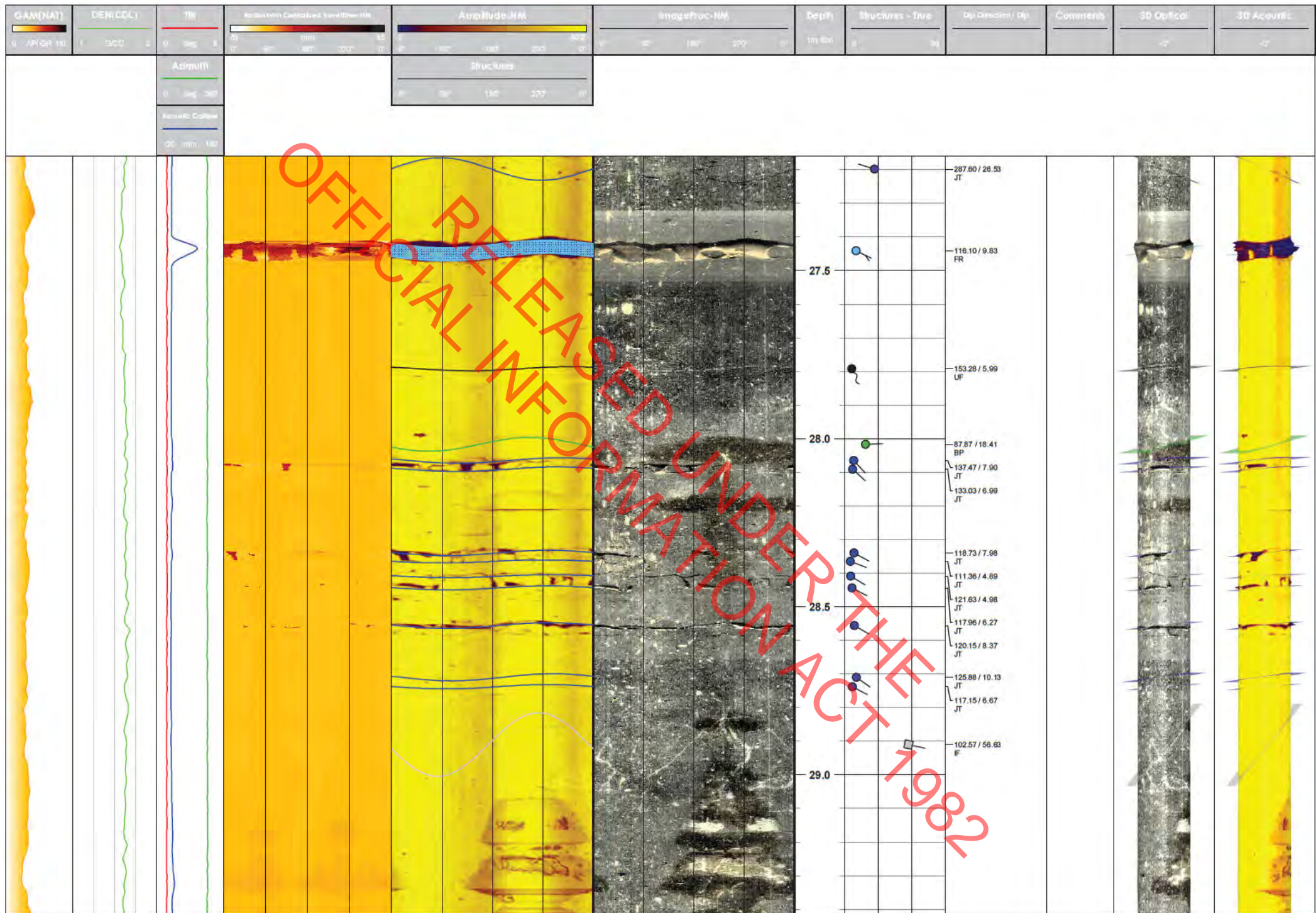


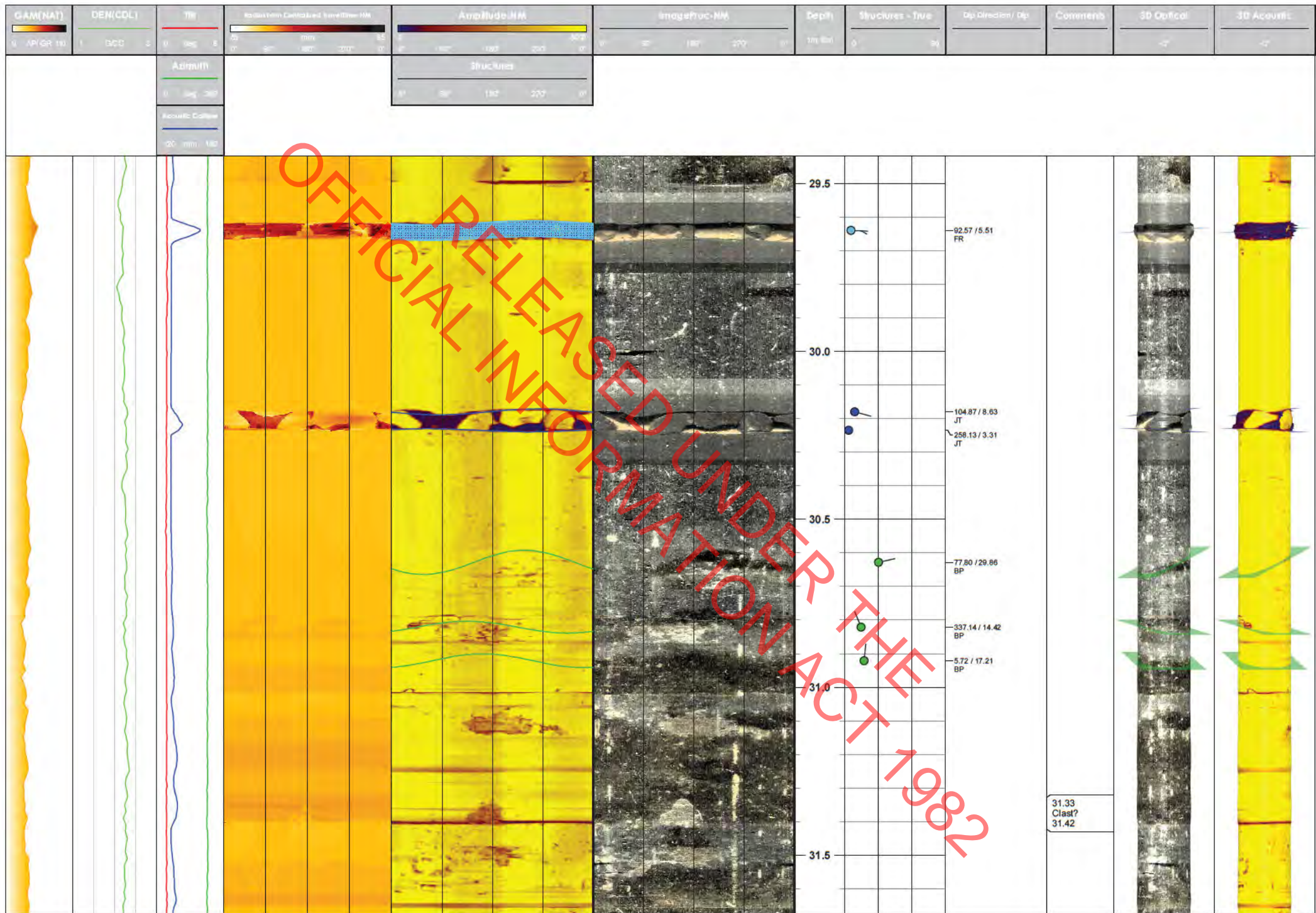


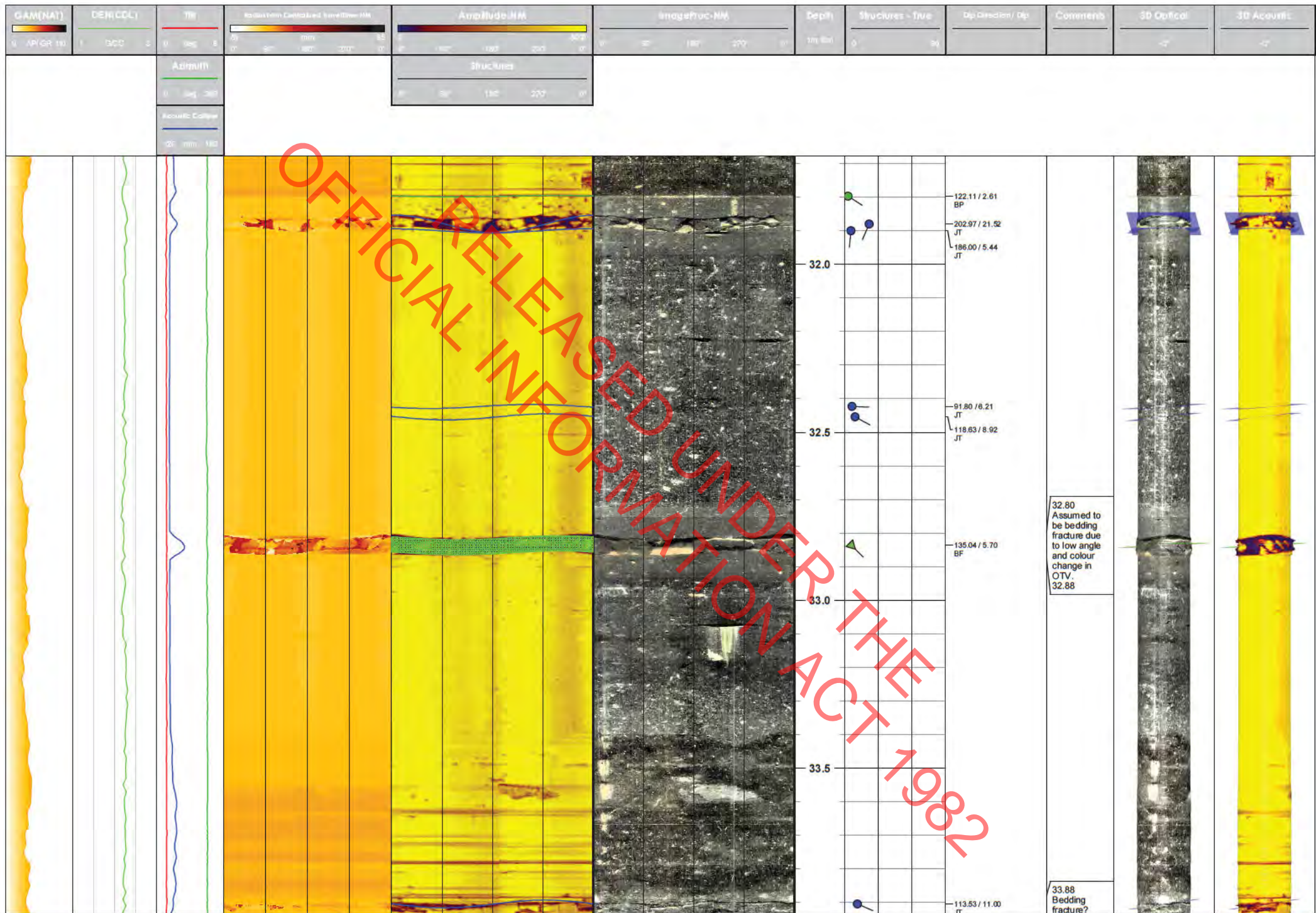


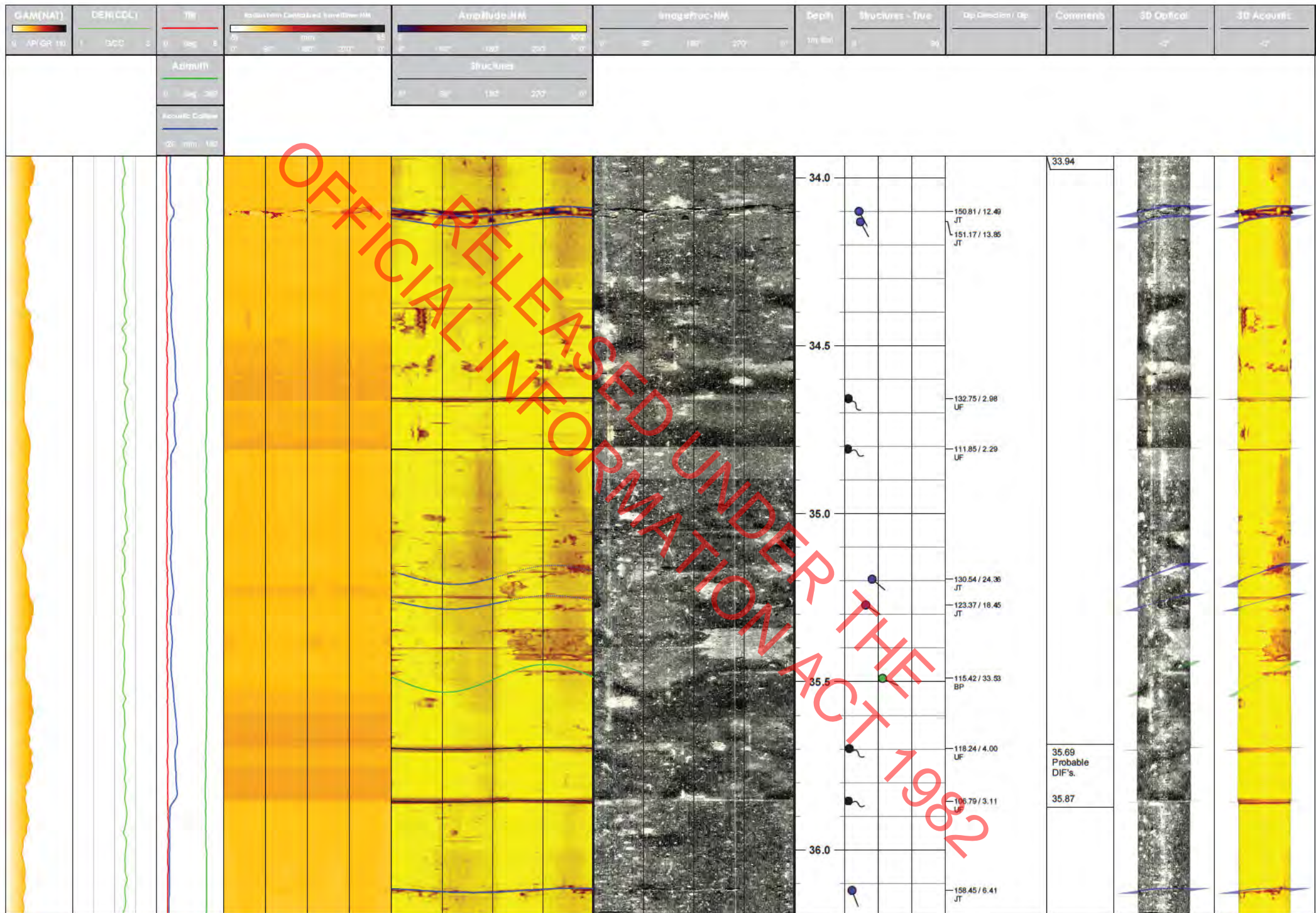


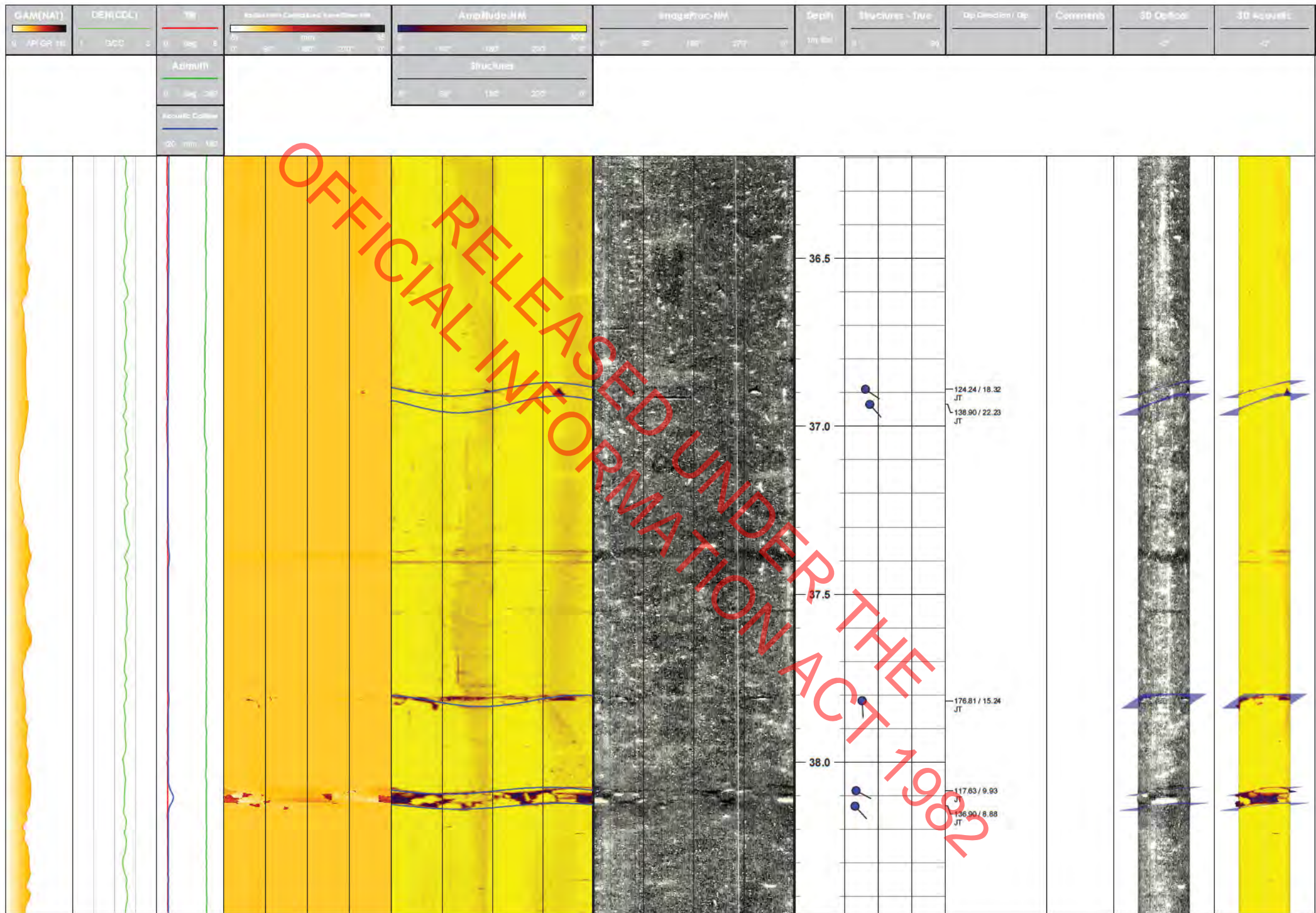


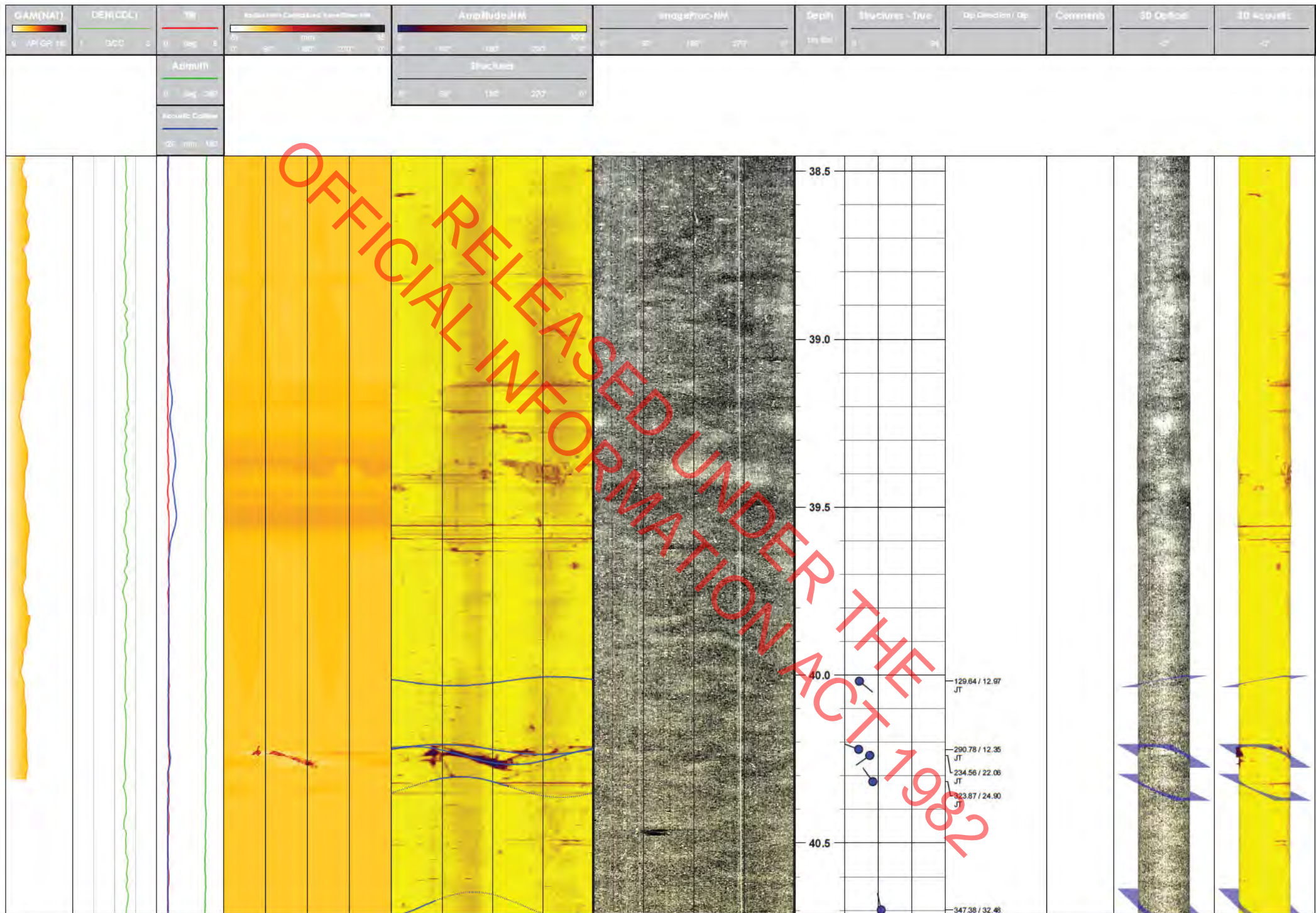


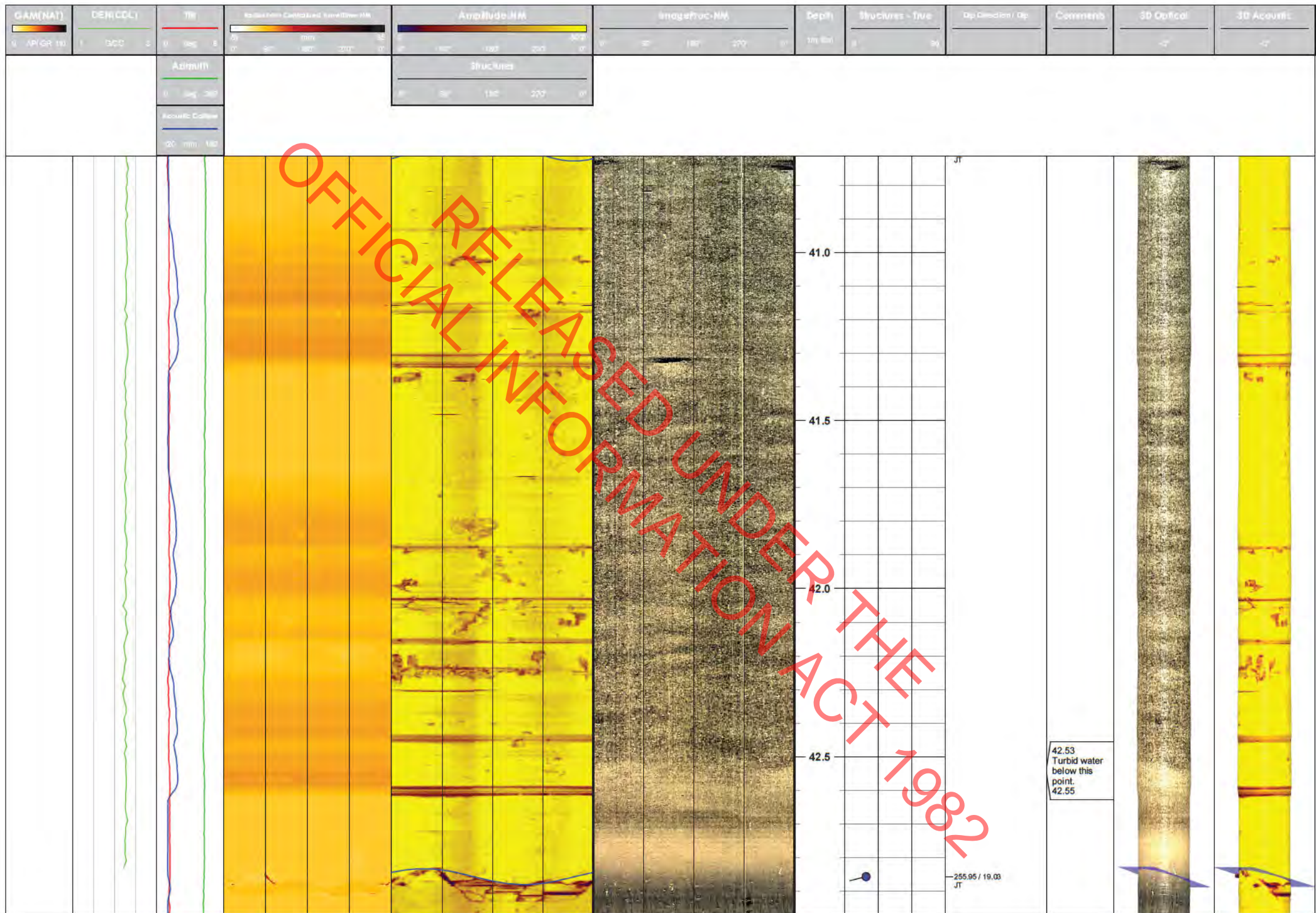


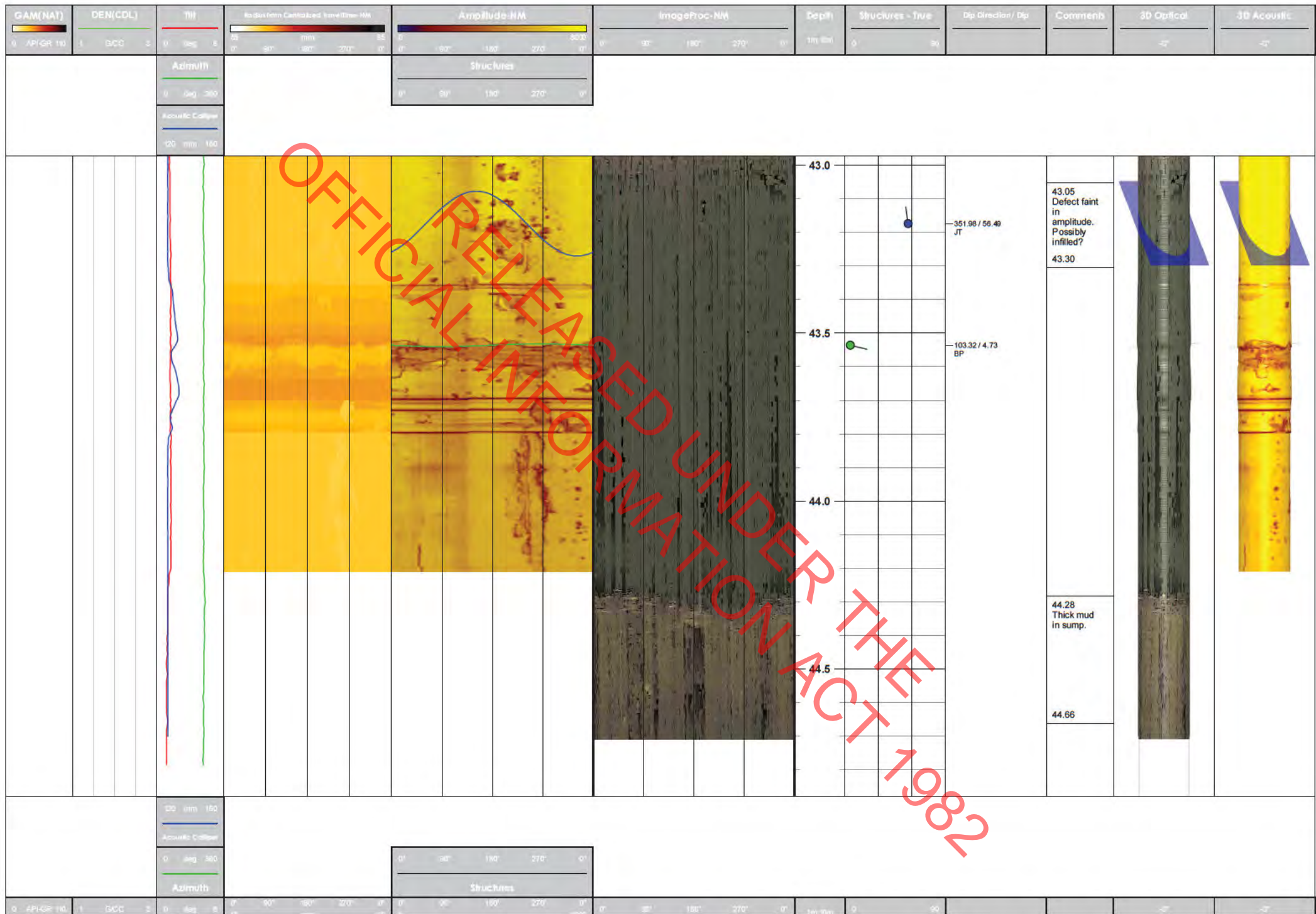












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Log Notes:

Log Nomenclature:

Velocity Analysis = Output of semblance processing
S_Slowness = Shear wave slowness from semblance
Vp = P-wave velocity
Vs = Shear wave velocity from S-Slowness
DEN(CDL) = Compensated Density
Shear Modulus = Shear Modulus (G0)
Bulk Modulus = Bulk Modulus (K)
Young's Modulus = Young's Modulus (E)
Poisson's Ratio = Poisson's Ratio (PR)
Vp/Vs = P-wave S-wave ratio
RX#-1A = Wiggle window of sensor #
RX#-1A - dt = Picked first arrival time for sensor #

Basic Information:

Well Name: BH1206
Company: McMillans Drilling (NI) Ltd
Run No: 05, 06 & 07
Tool Type(s): QL40-FWSS Full Wave Form Sonic
9239 Compensated Density
Geovista PS Suspension Logger
Service Company: RDCL
Operator: K Koria
Witness: H Soma
Date Logged: 01/03/2023
Field: Auckland Light Rail
State / Province: Auckland
Country: New Zealand

Drillhole Information:

Bit Size: PQ
Log interval from: 1.26 Log interval to: 47.12
Depth Driller: 50.00 Depth Logger: 49.81 (Calliper)
Fluid Type: Water Fluid Level: 3.03 (Acoustic)
Northing: 1755023.476 Easting: 5917026.950
Elevation: N/A Projection: NZTM
Hole Azimuth: Vertical Hole Inclination: >=89.2°
Magnetic Declination: +20° 8' East Magnetic Inclination: -62°
Casing Size: No Casing Casing Depth: No Casing

Printing Information:

Print Type: Paginated Log Version: Final for review
Depth Unit: Metres Scale Ratio: 1:25

Location Description:

Gribblehirst Park

Comments:

- Coordinates taken from Google Earth and are approximate.
- No Vs picks from suspension logger between 8.0 - 15.0 m due to noisy data.
- Density run stopped at 15.42 m due to tool hang up. Assumed density values used above this depth.
- PS Suspension Logger started from 43.00 m due to length of tool.

The elastic moduli and engineering parameters were calculated from Full Wave Form Sonic and PS Suspension Logger Tools Vp and Vs measurements and CCS tool density measurements. As such the logs should be considered in-situ, small strain and bulk measurements. These measurements may differ from laboratory testing for these reasons.

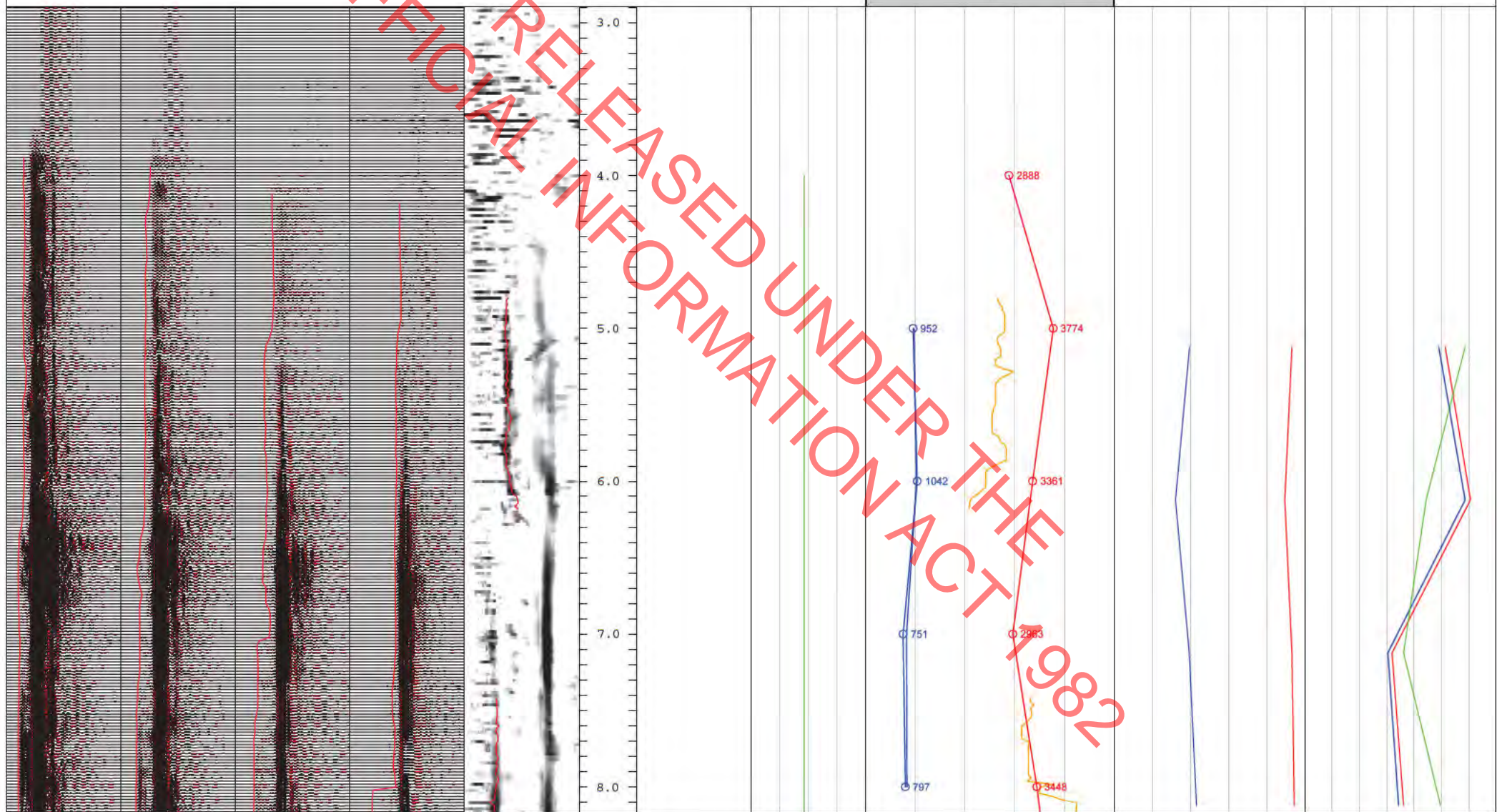
Log Calculations:

SI unit calculations:
Shear Modulus (G) = dVs^2
Bulk Modulus (K) = $1/3 \cdot (E/(1-2 \cdot PR))$
Young's Modulus (E) = $2G(1+PR)$
Poisson's Ratio (PR) = $2 \cdot (Vp/Vs)^2 / (2 \cdot (Vp/Vs)^2 - 1)$

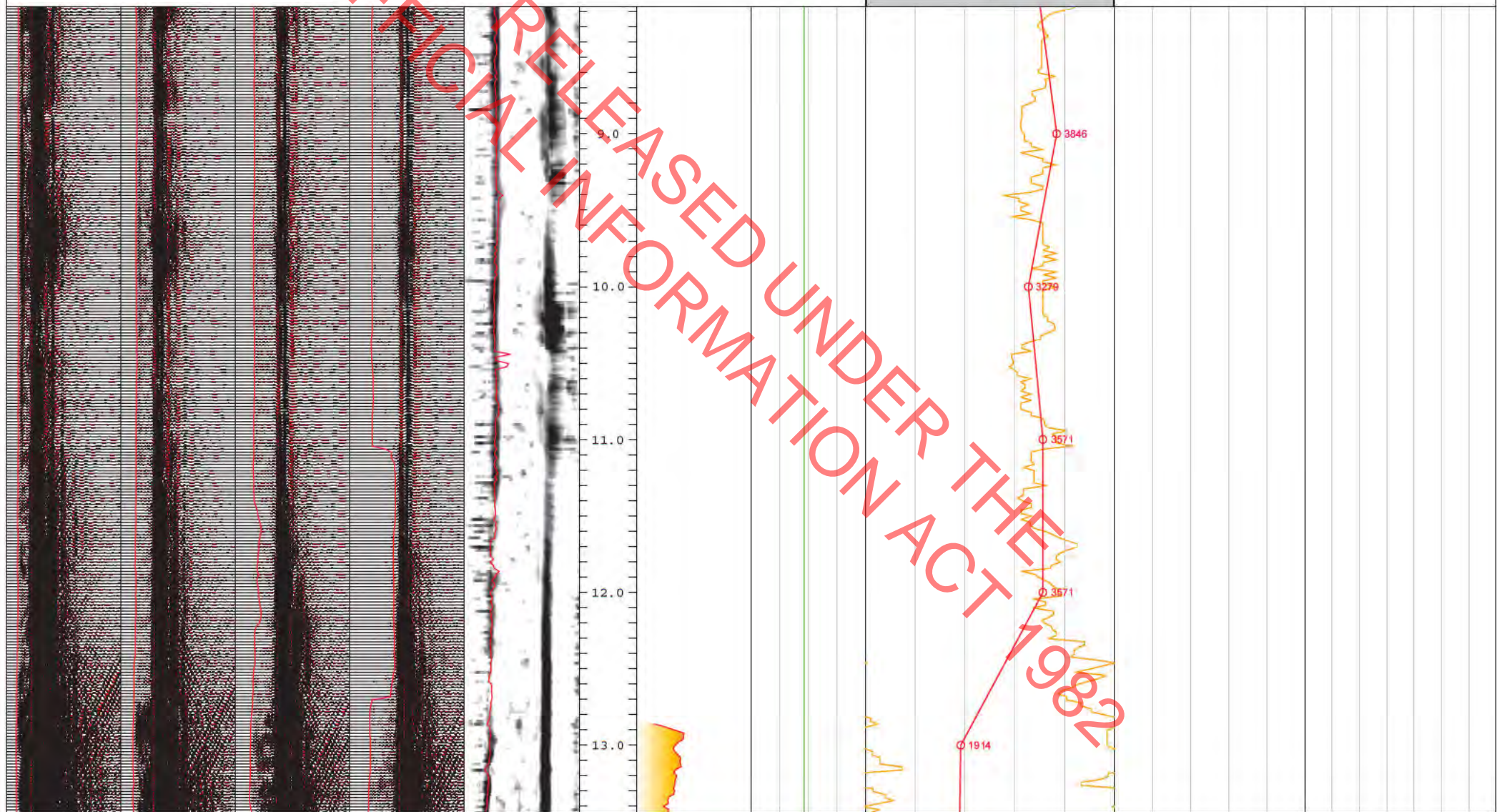
Where:
Vp = P-wave seismic velocity
Vs = S-wave seismic velocity
d = Density



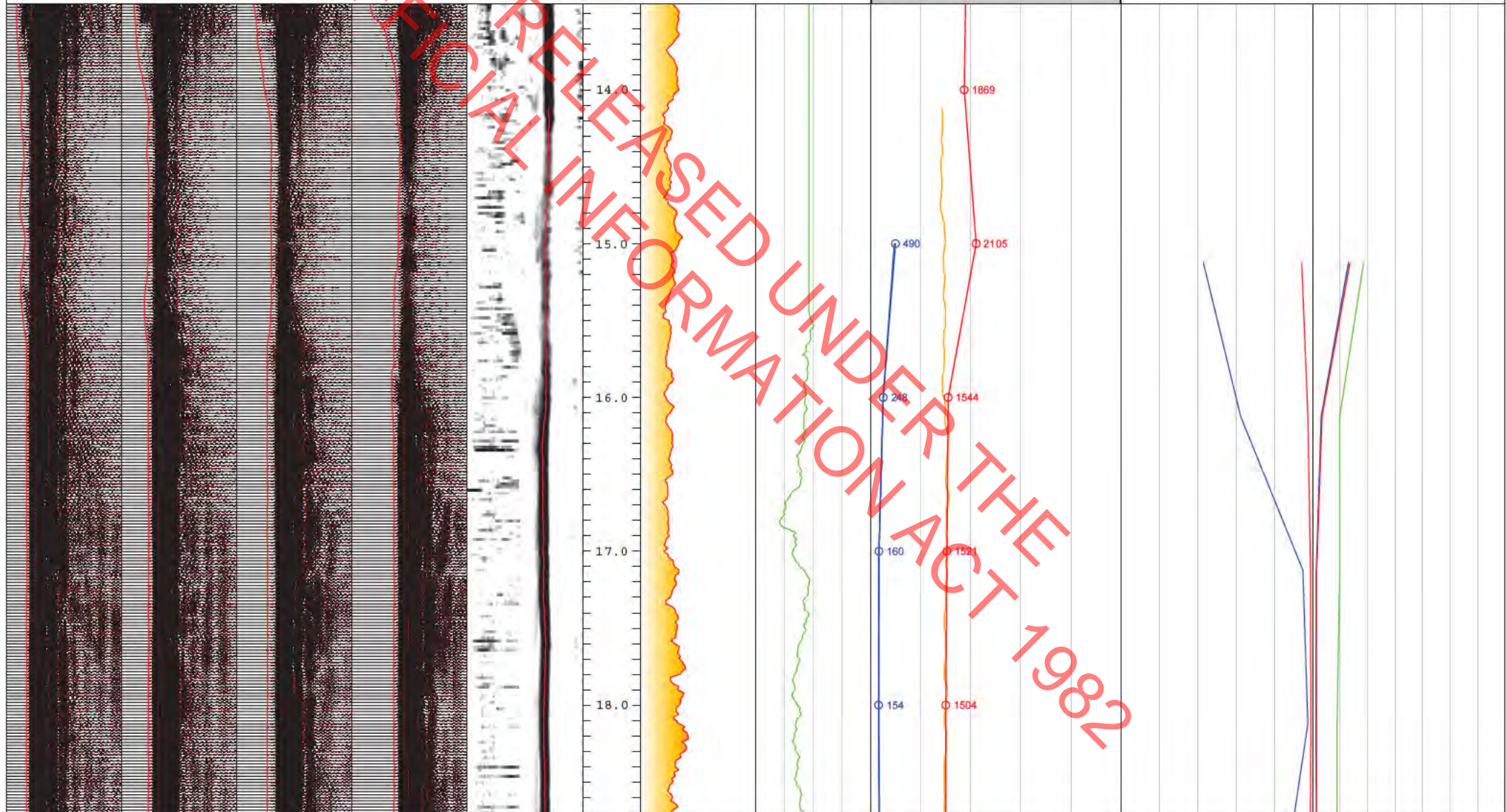
KX1-1A - 01	KX2-1A - 01	KX3-1A - 01	KX4-1A - 01	Velocity Analysis	Depth	GAA(NAT)	DEN(COL)	Vp (FMS)	Shear Modulus	Thermal Modulus
0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000
KX1-1A	KX2-1A	KX3-1A	KX4-1A	F. Time (ms)				Vp (FMS)	Shear Modulus	Thermal Modulus
0 1000	0 1000	0 1000	0 1000	0 1000				0 1000	0 1000	0 1000
								Vp 31 (FMS)		Shear Modulus
								0 1000		0 1000
								Vp 32 (FMS)		Shear Modulus
								0 1000		0 1000



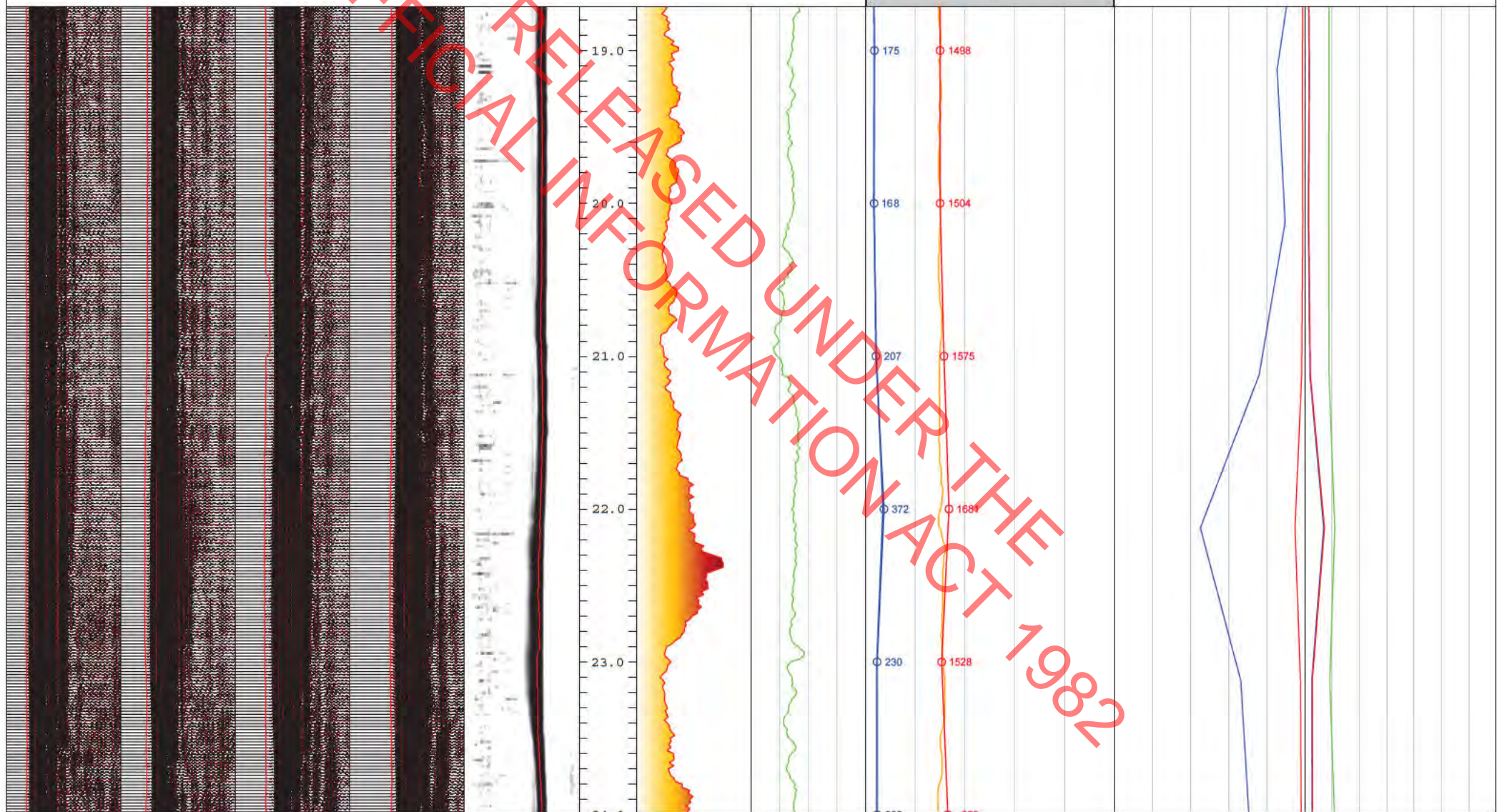
K11-1A - 01	K12-1A - 01	K13-1A - 01	K14-1A - 01	Velocity Analysis	Depth	GAIN(NAT)	DEN(COL)	Vp (FMS)	Shear's Modulus	Shear Modulus
0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000
K11-1A	K12-1A	K13-1A	K14-1A	F.11000000 - 0000				Vp (F5 Logge)	Shear's Modulus	Young's Modulus
0 1000	0 1000	0 1000	0 1000	0 1000				0 1000	0 1000	0 1000
								Vs 11 (F5 Logge)		Shear Modulus
								0 1000		0 1000
								Vs 12 (F5 Logge)		
								0 1000		



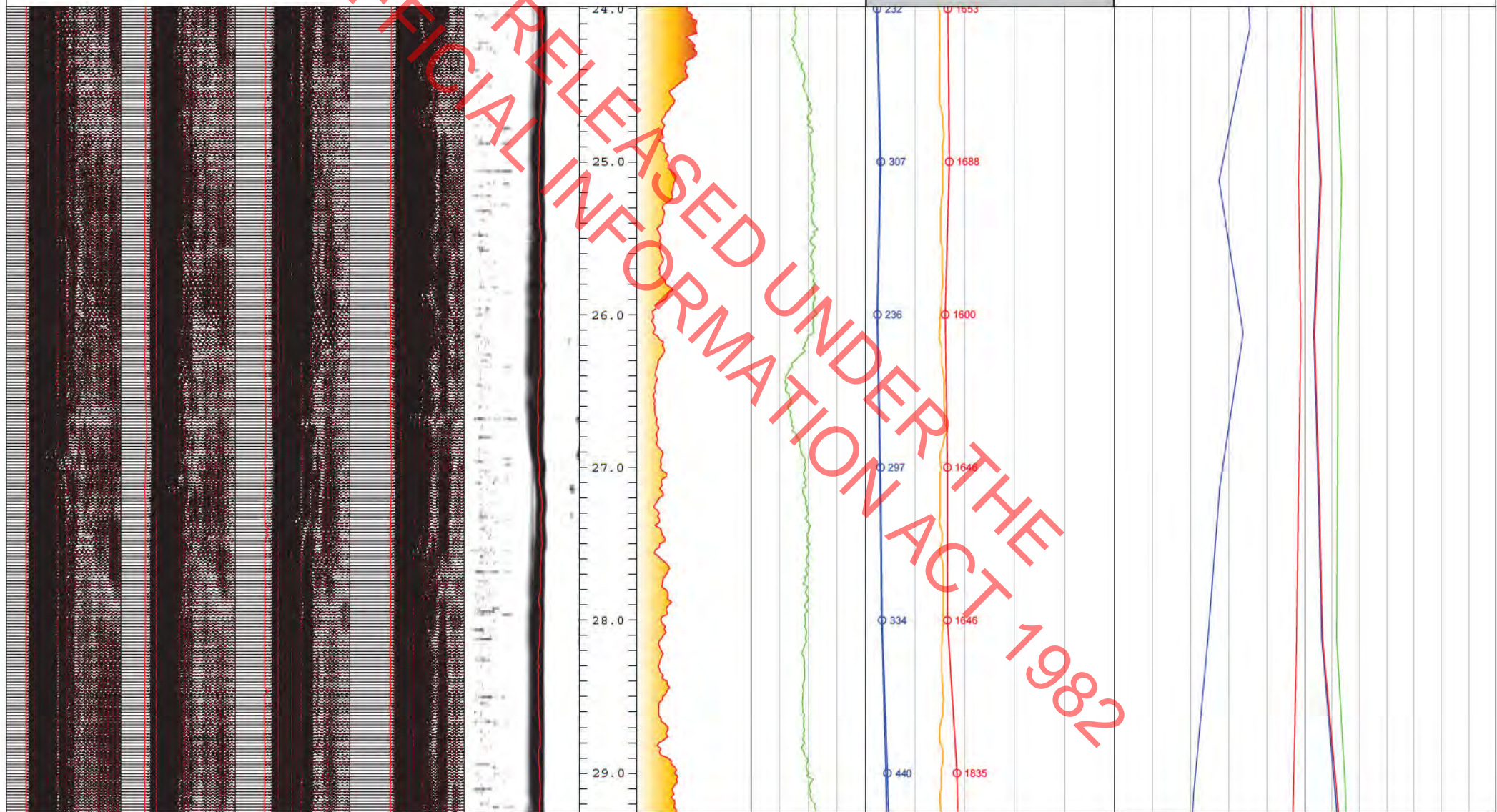
KX1-1A - 98	KX2-1A - 0	KX3-1A - 0	KX4-1A - 0	Velocity Analysis	Depth	GAA(NAT)	DEN(COL)	Vp (FMS)	Shear Modulus	Young's Modulus
0	0	0	0	0	0	0	0	0	0	0
KX1-1A	KX2-1A	KX3-1A	KX4-1A	F. Time (ms)				Vp (FMS)	Shear Modulus	Young's Modulus
0	0	0	0	0				0	0	0
								Vp 31 (FMS)		Shear Modulus
								0		0
								Vp 32 (FMS)		Shear Modulus
								0		0



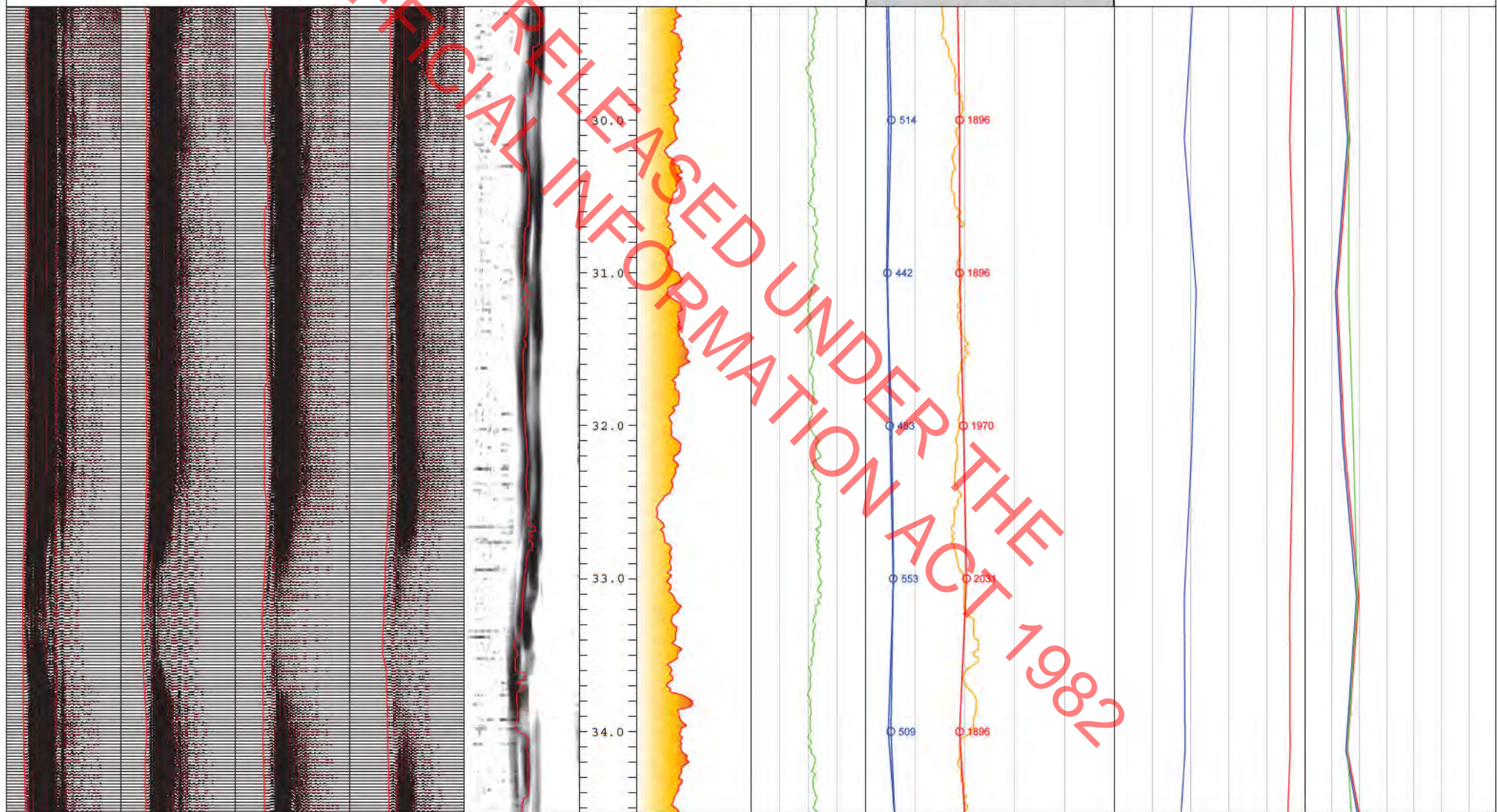
KX1-TA - 01	KX2-TA - 01	KX3-TA - 01	KX4-TA - 01	Velocity Analysis	Depth	GAA(NAT)	DEN(COL)	Vp (FMS)	Shear's Modulus	Shear Modulus
0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000
KX1-TA	KX2-TA	KX3-TA	KX4-TA	F. 1.000000				Vp (FMS)	Shear's Modulus	Shear Modulus
0 1000	0 1000	0 1000	0 1000	0 1000				0 1000	0 1000	0 1000
								Vs 11 (FMS)		Shear Modulus
								0 1000		0 1000
								Vs 12 (FMS)		Shear Modulus
								0 1000		0 1000



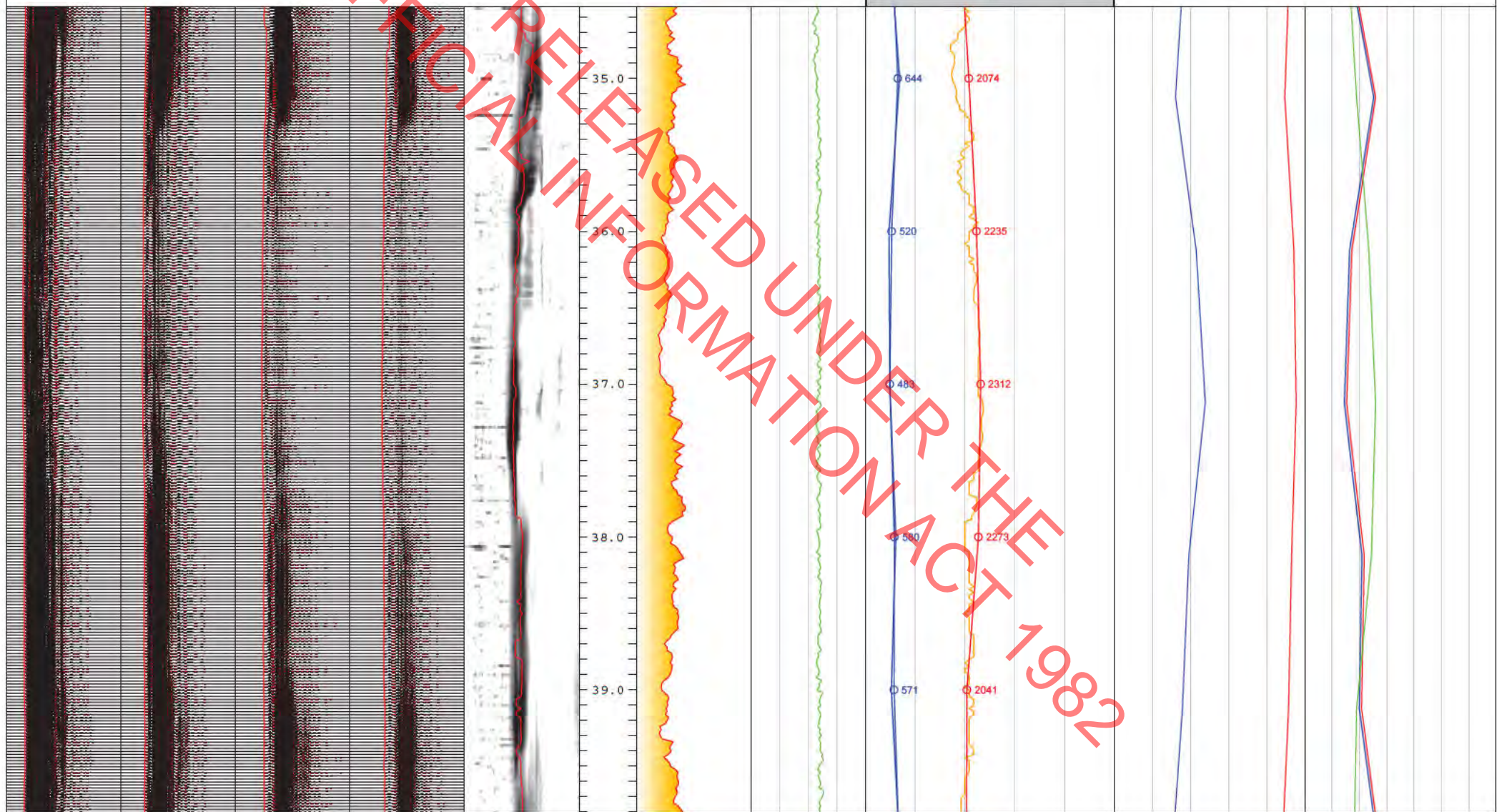
KX1-1A - 98	KX2-1A - 01	KX3-1A - 01	KX4-1A - 01	Velocity Analysis	Depth	GAM(NAT)	DEN(COL)	Vp (FMS)	Poisson's Ratio	Shear Modulus
0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000
KX1-1A	KX2-1A	KX3-1A	KX4-1A	F. 11/11/11				Vp (FS Logger)	Vp/Vs Ratio	Young's Modulus
0 1000	0 1000	0 1000	0 1000	0 1000				0 1000	0 1000	0 1000
								Vs 51 (FS Logger)		Shear Modulus
								0 1000		0 1000
								Vs 52 (FS Logger)		
								0 1000		



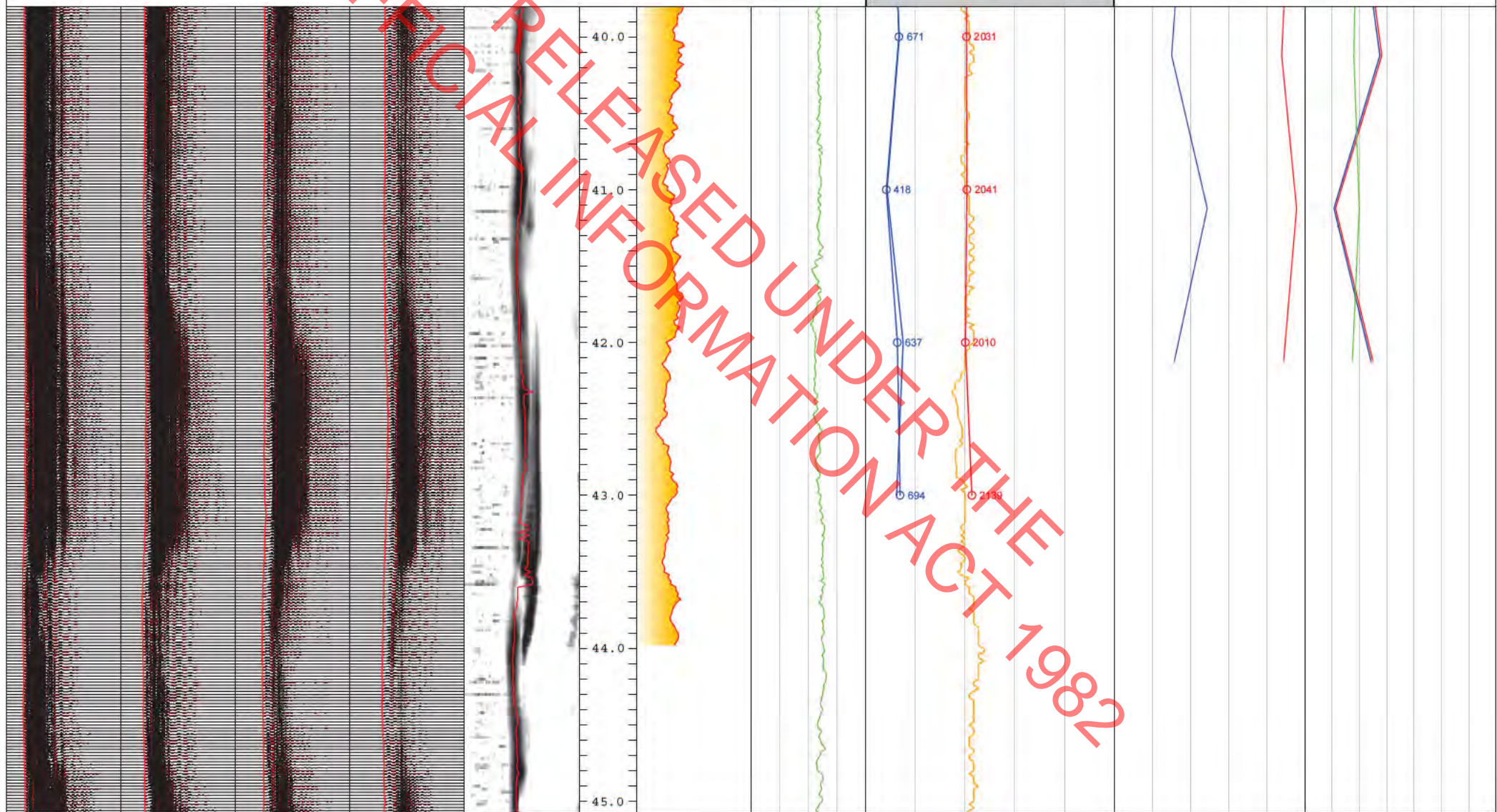
KX1-1A - 98	KX2-1A - 01	KX3-1A - 01	KX4-1A - 01	Velocity Analysis	Depth	GAM(NAT)	DEN(COL)	Vp (FMS)	Poisson's Ratio	Shear Modulus
0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000
KX1-1A	KX2-1A	KX3-1A	KX4-1A	F. 11/11/11				Vp (FS Logger)	Vp/Vs Ratio	Young's Modulus
0 1000	0 1000	0 1000	0 1000	0 1000				0 1000	0 1000	0 1000
								Vs 51 (FS Logger)		Shear Modulus
								0 1000		0 1000
								Vs 52 (FS Logger)		
								0 1000		

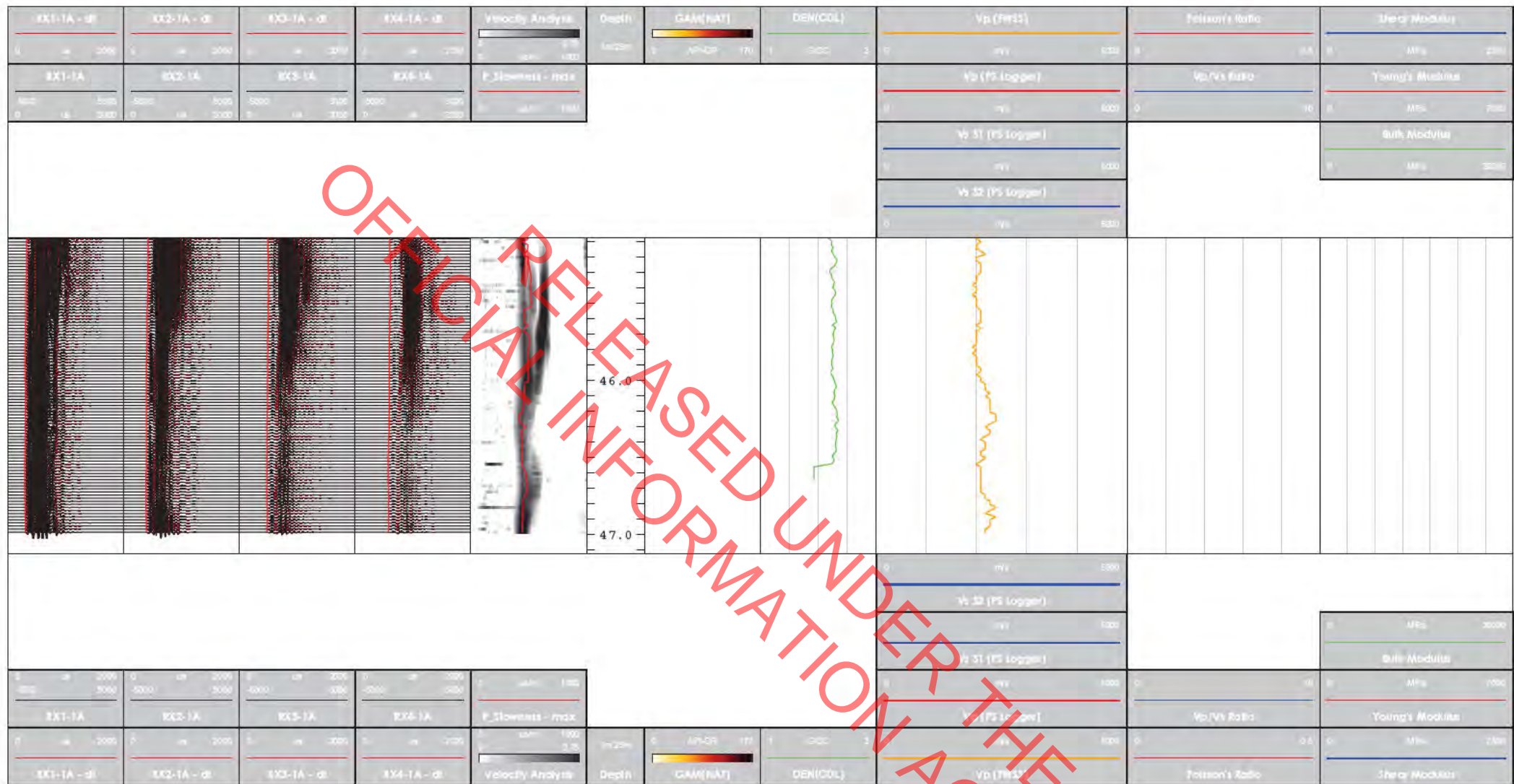


KX1-1A - 95	KX2-1A - 01	KX3-1A - 01	KX4-1A - 01	Velocity Analysis	Depth	GAM(NAT)	DEN(COL)	Vp (FMS)	Poisson's ratio	Shear Modulus
0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000	0 1000
KX1-1A	KX2-1A	KX3-1A	KX4-1A	F. 11/11/11				Vp (FS Logger)	Vp/Vs ratio	Young's Modulus
0 1000	0 1000	0 1000	0 1000	0 1000				0 1000	0 1000	0 1000
								Vs 51 (FS Logger)		Shear Modulus
								0 1000		0 1000
								Vs 52 (FS Logger)		
								0 1000		













KX1-1A - 95'	KX2-1A - 0'	KX3-1A - 0'	KX4-1A - 0'	Velocity Analysis	Depth	GAA(NAT)	DEN(COL)	Vp (FMS)	Shear's Modulus	Shear Modulus
0	0	0	0	0	0	0	0	0	0	0
KX1-1A	KX2-1A	KX3-1A	KX4-1A	F. 11/11/11				Vp (F5 Logge)	Shear's Modulus	Young's Modulus
0	0	0	0	0				0	0	0
								Vp 11 (F5 Logge)		Shear Modulus
								0		0
								Vp 12 (F5 Logge)		
								0		0





Structural Legend:

-  BP - Bedding Plane
-  BF - Bedding Fracture
-  JT - Joint
-  FR - Fracture
-  FZ - Fractured Zone
-  SH - Shear
-  CZ - Crushed Zone
-  IF - Infilled Zone
-  DZ - Decomposed Zone
-  UF - Unidentified Feature

Log Nomenclature:

Azimuth = Tool azimuth from magnetic north
 Tilt = Inclination from vertical
 Acoustic Calliper = 360° average from travel time
 Calliper from Cent = Calliper derived from travel time
 Image-NM = Optical image oriented to magnetic north
 Amplitude-NM = Acoustic amplitude (magnetic north)
 Structures = Apparent Structures oriented to hole
 Structures - True = Structures Oriented to true north
 3D Optical = 3D representation of optical log
 3D Acoustic = 3D representation of acoustic log
 DEN(CDL) = Compensated Density in g/ccm
 GAM(NAT) = Natural Gamma

Comments:

1. Water quality turbid, obscuring optical data below water level.
2. Hole was logged without casing.
3. Coordinates taken from Google Earth and are approximate.

Basic Information:

Drill hole ID: BH1206
 Client: McMillans Drilling (NI) Ltd
 Run Number(s): 1, 3 & 6
 Tool Type(s): ABI40-2G-VLB Acoustic Televiwer
 OBI40-2G Optical Televiwer
 QL40-CAL Mechanical Calliper
 9239 Compensated Density Sonde

Service Company: RDCL
 Operator: H Soma
 Date Logged: 01-02/03/2023
 Field: Auckland Light Rail
 State / Province: Auckland
 Country: New Zealand

Drillhole Information:

Log interval from (m): 0.40 Log interval to (m): 49.34
 Depth Driller (m): 50.00 Depth Logger (m): 49.81 (Calliper)
 Fluid Type: Water Fluid Level (m): 3.03 (Acoustic)
 Easting: 5917026.950 Northing: 1755023.476
 Elevation: N/A Coord Ref System: TBC
 Hole Azimuth: Vertical Hole Inclination: >89.2°
 Magnetic Declination: +20° 8' East Magnetic Indination: 62° 49'

Drill Company: McMillans Drilling (NI) Ltd

Printing Information:

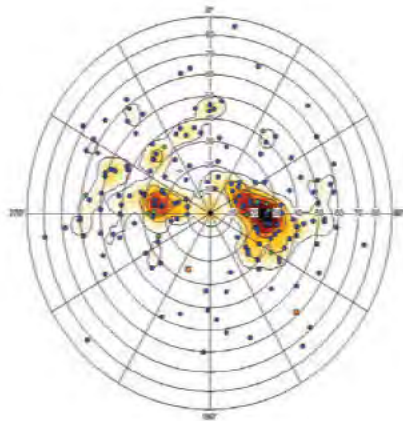
Depth Unit: Metres Log Scale: 1:10 Log Version: Final
 Processed: H Soma Log Reviewer: K Koria

Bit Size Record:

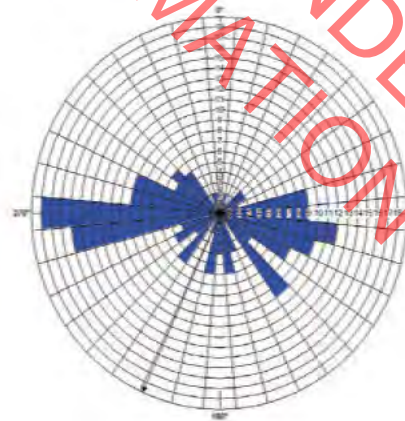
Size (mm):	From (m):	To (m):	Type:	Size:	From (m):	To (m):
###.#	###.#	###.#	XX	###.#	###.#	###.#
###.#	###.#	###.#	XX	###.#	###.#	###.#
###.#	###.#	###.#	XX	###.#	###.#	###.#
###.#	###.#	###.#	XX	###.#	###.#	###.#

Casing Record:
Location Description:

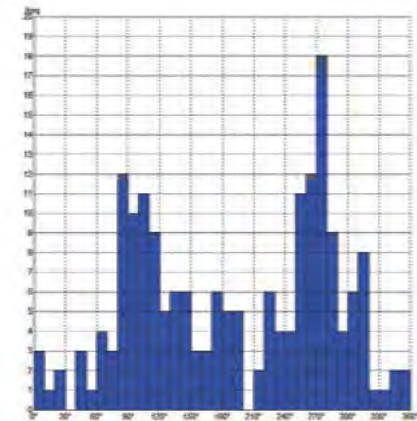
Gribblehirst Park

Stereoplot - Polar Projection Dip


Schmidt Plot - Lower (Southern) Hemisphere - Structures - True
 Depth: 0.40 m to 49.34 m

Rose Diagram - Azimuth


Depth: 0.40 m to 49.34 m

Histogram - Azimuth


Depth: 0.40 m to 49.34 m

