

# TGT

Multi Tube Integrity  
Pulse (Electromagnetic) Logs  
(1:500)

MAXIM ver 7.6.1.11940  
Log Interpretation Report

Country:	Brunei Darussalam
Company:	ROSSUM-WEERSELO
Location:	N/A
Field:	ROSSUM-WEERSELO
Well:	ROW-7A
Well No. abbr:	ROW-7A
Rig:	Rigless
Unit Number:	N/A
Permanent Datum:	MSL Elevation
Log Meas. From:	TBF
Northing:	485,062.59 m
Easting:	260,609.13 m
Date:	09.10.2023
Run:	1
HUD G/C (m)	N/A
Top Logged Interval (m)	Surface
Bottom Logged Interval (m)	1596.9
Type of Fluid	N/A
Dens (g/cm <sup>3</sup> )	N/A
Tool	Pulse-3E
Engineer	
Witnessed	N/A
Prepared by	
Reviewed by	

Elevations

TBF 29.99 m

DFE/RKB 45.5 m

GLE 30.73 m

MSL N/A

This report was prepared by the Geoscience department of TGT at the request of the customer. The report is TGT's interpretation based on measurements, empirical relationships and assumptions, and on information provided by the customer, in respect of which there may be a number of possible interpretations and conclusions. All representations and warranties expressed or implied, in respect of this report are hereby excluded. TGT accepts no liability for any use which the customer may make of the information, recommendations or conclusions contained in this document or for any decisions which the customer may take as a result of this report.

#### Casing/Tubing Record

Key	Size, in	Weight, lb/ft	Grade	From, m	To, m
Casing	28	N/A	N/A	0.80	25.92
Casing	20	94.00	K-55	0.71	299.92
Casing	13 <sup>3</sup> / <sub>8</sub>	72.00	N-80	0.00	870.00
Casing	9 <sup>5</sup> / <sub>8</sub>	53.50	C-75	0.00	1891.92
Casing	7	32.0	C-75	1735.18	2241.92
Tubing	3 <sup>1</sup> / <sub>2</sub>	10.20	L-80	-1.30	1214.00
Tubing	3 <sup>1</sup> / <sub>2</sub>	10.20	L-80	1599.00	1609.00

#### Comments

- Job was done rigless.
- Depth was correlated to the previous Pulse survey (NAM\_ROSSUM-WEERSELO\_ROW-7A\_MTI\_Log Interpretation Report\_TGT\_12 nov 2021 .pdf).
- Pulse data quality is good. Cable speed is satisfactory

### Objectives

- To evaluate thickness profile and metal loss in the first/second barrier (9 5/8" Casing).

### Well History

Row-7A-02 is a deviated well completed with 3 1/2" tubing.

### Classification of metal loss

Level of Corrosion	Minor (A)	Moderate (B)	Intense (C)	Severe (D)
Ranges	0 - 12	13 - 20	21 - 30	31 - 100

Table below specifies Pulse thicknesses evaluation sensitivity for each respective barrier.

### Pulse thickness accuracy

Barrier	From, m	To, m	Thickness Accuracy, %
9.5/8" Casing	1145.7	1596.9	7.0

### Results

Tube thicknesses and total metal losses were assessed based on Pulse data using Real Time Fitting technique.

The survey results is given below.

#### 9 5/8" Casing (1145.7 – 1596.9 m)

Total of 39 joints were scanned.

9 5/8" Casing was found to be in moderate condition with maximum metal loss of 18 % at 1381.3 m (across perforation zone) and 15 % at 1354.7 m (across perforation zone).

Maximum metal loss in non-perforated zone is 12 % at 1145.7 m, 1422.1 m, 1509.6 m, 1512.6 m.

#### Time lapse analysis

##### 9 5/8" Casing

Maximum metal loss progression in first barrier in non-perforated zone since November 2021 is 2%.

Maximum metal loss progression in first barrier since November 2021 is 9% (across perforation zone).

Maximum average metal loss progression in first barrier since November 2021 is 6% (across perforation zone).

Metal loss progression with 3% or more percent is given in the table below (2023 comparing to 2021 survey):

JT	Top, m	Length, m	2021	2023	Depth for max metal loss, m
			Max, %	Max, %	
108	1283.1	12.3	8	12	1289.4
111	1318.3	12.1	9	12	1326.9
112	1330.4	10.8	5	9	1331.5
114	1351.4	12.4	11	15	1354.7
116	1376	12.3	9	18	1381.3



# Joint by Joint Analysis

9 5/8 in Casing (1145.7 – 1596.9 m)

JT	Top, m	Length, m	November 2021					October 2023					Comment	
			Nominal thickness, in	Minimum thickness, in	Metal loss		Depth for max metal loss m	Minimum thickness, in	Metal loss		Metal loss Progression			
					Avg, %	Max, %			Avg, %	Max, %	Avg, %	Max, %		
96	1138.4	12.6	0.545	0.482	5	12	1143.5	0.526	6	12	1145.7	1	0	No Change
97	1151	11	0.545	0.513	3	6	1159	0.515	3	6	1159	0	0	No Change
98	1162	11.4	0.545	0.516	2	5	1171.2	0.511	3	6	1172.5	1	1	Metal Loss progression
99	1173.4	12.5	0.545	0.49	5	10	1178.9	0.486	6	11	1178.9	1	1	Metal Loss progression
100	1185.9	12.3	0.545	0.509	3	7	1188.9	0.5	4	8	1188.9	1	1	Metal Loss progression
101	1198.2	12.1	0.545	0.514	3	6	1209.6	0.509	3	7	1209.9	0	1	Metal Loss progression
102	1210.3	12.4	0.545	0.506	2	7	1219	0.499	3	8	1218.9	1	1	Metal Loss progression
103	1222.7	12.2	0.545	0.521	2	4	1225.1	0.514	4	6	1224.2	2	2	Metal Loss progression
104	1234.9	12.1	0.545	0.511	3	6	1236.8	0.504	4	7	1237.5	1	1	Metal Loss progression
105	1247	12.3	0.545	0.511	4	6	1248.1	0.506	4	7	1252.3	0	1	Metal Loss progression
106	1259.3	12.2	0.545	0.509	4	7	1262.1	0.497	5	9	1262	1	2	Metal Loss progression
107*	1271.5	11.6	0.545	0.488	6	11	1275.1	0.481	8	12	1277	2	1	Metal Loss progression
108*	1283.1	12.3	0.545	0.499	3	8	1289.4	0.482	6	12	1289.4	3	4	Metal Loss progression
109*	1295.4	10.7	0.545	0.442	3	9	1301.8	0.491	6	10	1301.8	3	1	Metal Loss progression
110*	1306.1	12.2	0.545	0.434	6	12	1308.5	0.469	9	14	1308.2	3	2	Metal Loss progression
111*	1318.3	12.1	0.545	0.495	6	9	1326.8	0.482	7	12	1326.9	1	3	Metal Loss progression
112*	1330.4	10.8	0.545	0.508	3	5	1332.7	0.495	4	9	1331.5	1	4	Metal Loss progression
113*	1341.2	10.2	0.545	0.492	4	10	1347.5	0.482	6	12	1347.5	2	2	Metal Loss progression
114*	1351.4	12.4	0.545	0.487	4	11	1353.2	0.464	8	15	1354.7	4	4	Metal Loss progression
115*	1363.8	12.2	0.545	0.481	6	10	1364.9	0.486	8	11	1366.9	2	1	Metal Loss progression
116*	1376	12.3	0.545	0.474	5	9	1378.2	0.443	11	18	1381.3	6	9	Metal Loss progression
117*	1388.3	12.6	0.545	0.478	5	12	1390.7	0.47	6	14	1390.8	1	2	Metal Loss progression
118*	1400.9	12.4	0.545	0.489	7	10	1402.1	0.486	7	11	1402.1	0	1	Metal Loss progression
119	1413.3	12.4	0.545	0.483	7	11	1422.2	0.477	7	12	1422.1	0	1	Metal Loss progression
120	1425.7	12.3	0.545	0.489	5	10	1430.4	0.483	6	11	1430.3	1	1	Metal Loss progression
121	1438	12.4	0.545	0.502	4	8	1439.2	0.498	5	9	1444.5	1	1	Metal Loss progression
122	1450.4	12.3	0.545	0.495	6	9	1461.8	0.488	7	10	1456.3	1	1	Metal Loss progression
123	1462.7	12.2	0.545	0.506	4	7	1465.1	0.498	4	9	1466	0	2	Metal Loss progression
124	1474.9	12.2	0.545	0.491	7	10	1477.1	0.486	8	11	1476.2	1	1	Metal Loss progression
125	1487.1	12.4	0.545	0.502	5	8	1488.9	0.496	6	9	1496.9	1	1	Metal Loss progression

Perfs 1283-1323 & 1359-1402 mDFE



## Joint by Joint Analysis

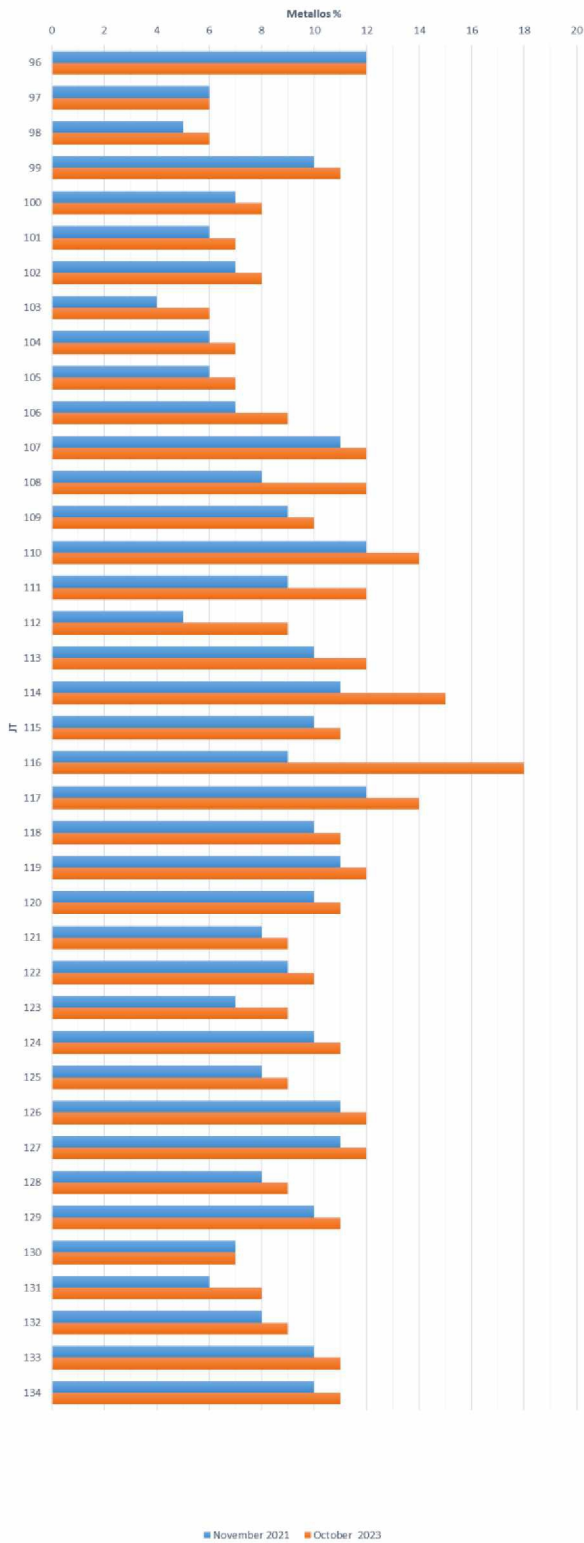
126	1499.5	11.2	0.545	0.487	6	11	1509.6	0.48	7	12	1509.6	1	1	Metal Loss progression
127	1510.7	11.2	0.545	0.484	8	11	1511.9	0.48	8	12	1512.6	0	1	Metal Loss progression
128	1521.9	11.3	0.545	0.502	5	8	1524.2	0.498	5	9	1525.5	0	1	Metal Loss progression
129	1533.2	11.4	0.545	0.488	7	10	1534.5	0.486	7	11	1534.4	0	1	Metal Loss progression
130	1544.6	11.4	0.545	0.504	5	7	1545.9	0.505	5	7	1545.9	0	0	No Change
131	1556	10.4	0.545	0.512	3	6	1565.1	0.504	4	8	1563.3	1	2	Metal Loss progression
132	1566.4	12.4	0.545	0.502	5	8	1567.5	0.495	6	9	1569.5	1	1	Metal Loss progression
133	1578.8	10.4	0.545	0.492	4	10	1582.5	0.486	6	11	1582.5	2	1	Metal Loss progression
134	1589.2	2.8	0.545	0.491	5	10	1590.8	0.486	6	11	1590.8	1	1	Metal Loss progression

\*These joints are across the perforated interval.

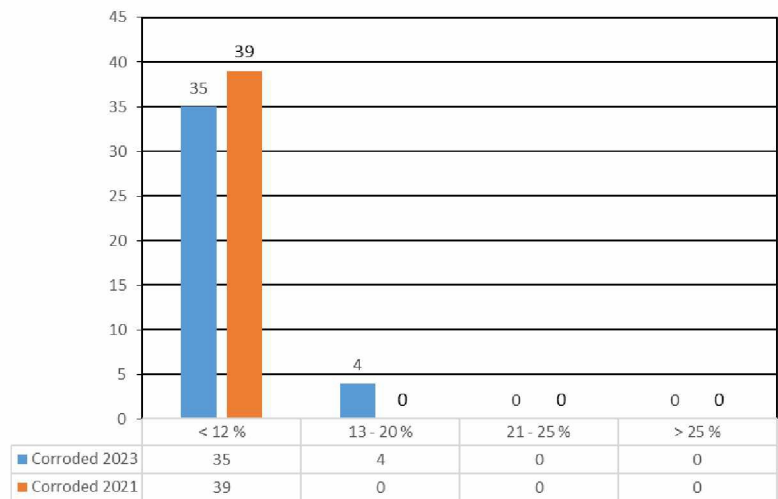


# Joint by Joint Analysis

Compharative Analysis 9 5/8" Casing



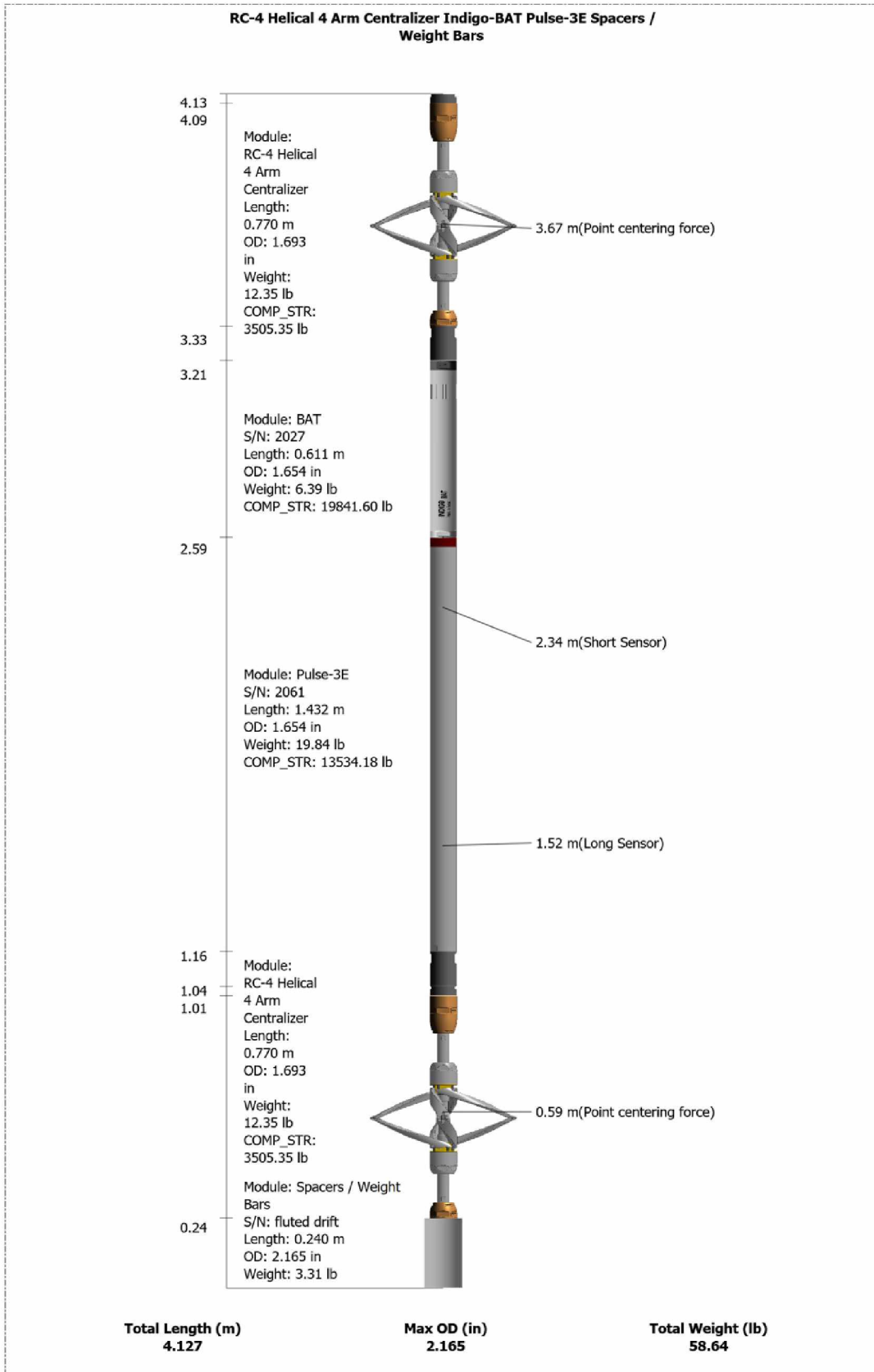
Damage Profile





# Sequence of Events

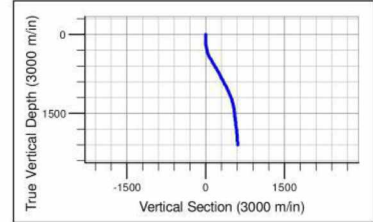
DATE	TIME	Start of interval(m)	End of Interval (m)	Speed m/min	Las Name	EVENTS
3-8 October waiting for tool equipment delivering on the wellsite. Client made decision start on Monday 9 October						
	07:00					Drive to wellsite location
	07:30					Sign into NAM register and meet with all crew involved in the operation.
	08:25					Begin testing tools and programming (1 Day:10 hours:10 mins) Synchronised time with winchmans display
	08:47					Start recording data,
	08:38					Tools made up in the lubricator prior to picking up
	09:05					Stab on lubricator and test the QTS
	09:15					Open the well and start RIH
	09:16	Surface	1599	50	<b>RIH</b>	RIH @ 50m/min
9-Oct-23	09:59	1599	1599			5-minute station
	10:05	1599	1500	4	<b>S5U1 repeat</b>	Begin logging the repeat interval
	10:33	1500	1599	30		Run back down to bottom of logging interval
	10:40	1599	1150	4	<b>S5U2</b>	Start logging the main interval
	12:37	1150	Surface	50	<b>POOH</b>	Pull out of hole at 50m/min
	13:05	Surface	Surface			Shut in the well and bleed off
	13:10					Break out toolstring
	13:20					Start to download data from Pulse 3E tool
						Upload data to WLA server
						Waiting for QC



Site: ROSSUM-WEERSELO-2  
 Well Name: ROSSUM-WEERSELO- 7  
 Wellbore Name: ROW- 7A  
 Wellbore No: 02  
 Legal Wellbore Name: ROSSUM-WEERSELO- 7-2  
 Original Spud Date: 27/10/1976  
 Spud/Kick-off date: 24/11/1976  
 Tree Cap Connection: 6.875" 4G ACME  
 H2S Present: Y  
 LSA Present: N  
 Well Comments:

NOTE: For further detail: consult OpenWells/iWellfile

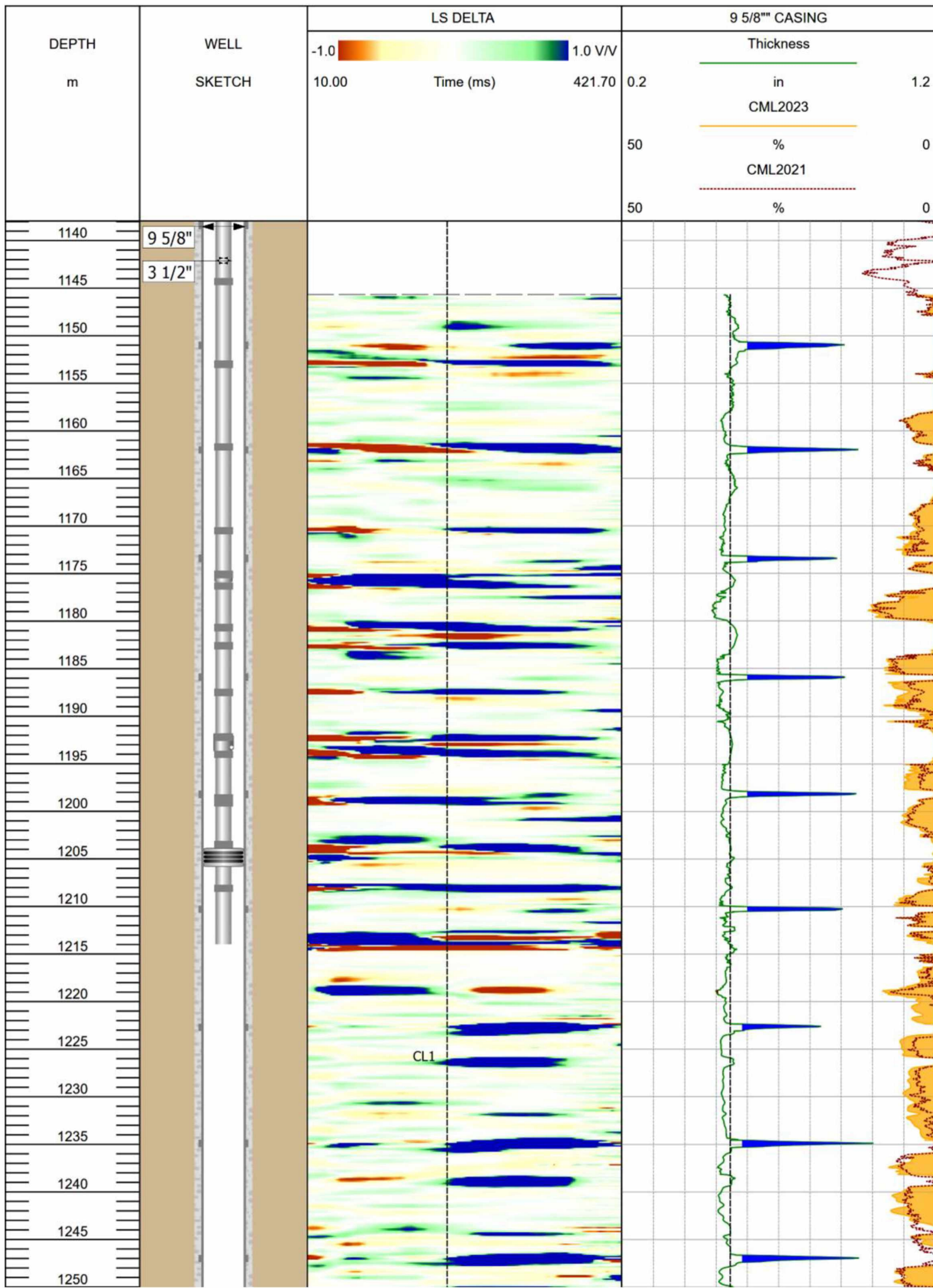
Casing Assemblies			
Name	Top MD(m)	Base MD(m)	Size(in)
Conductor - driven	0.80	35.92	28.000
Surface Casing	0.71	299.92	20.000
Intermediate Casing	-0.00	870.00	13.375
Production Casing	-0.00	1,891.92	9.625
Production Liner	1,735.18	2,241.92	7.000

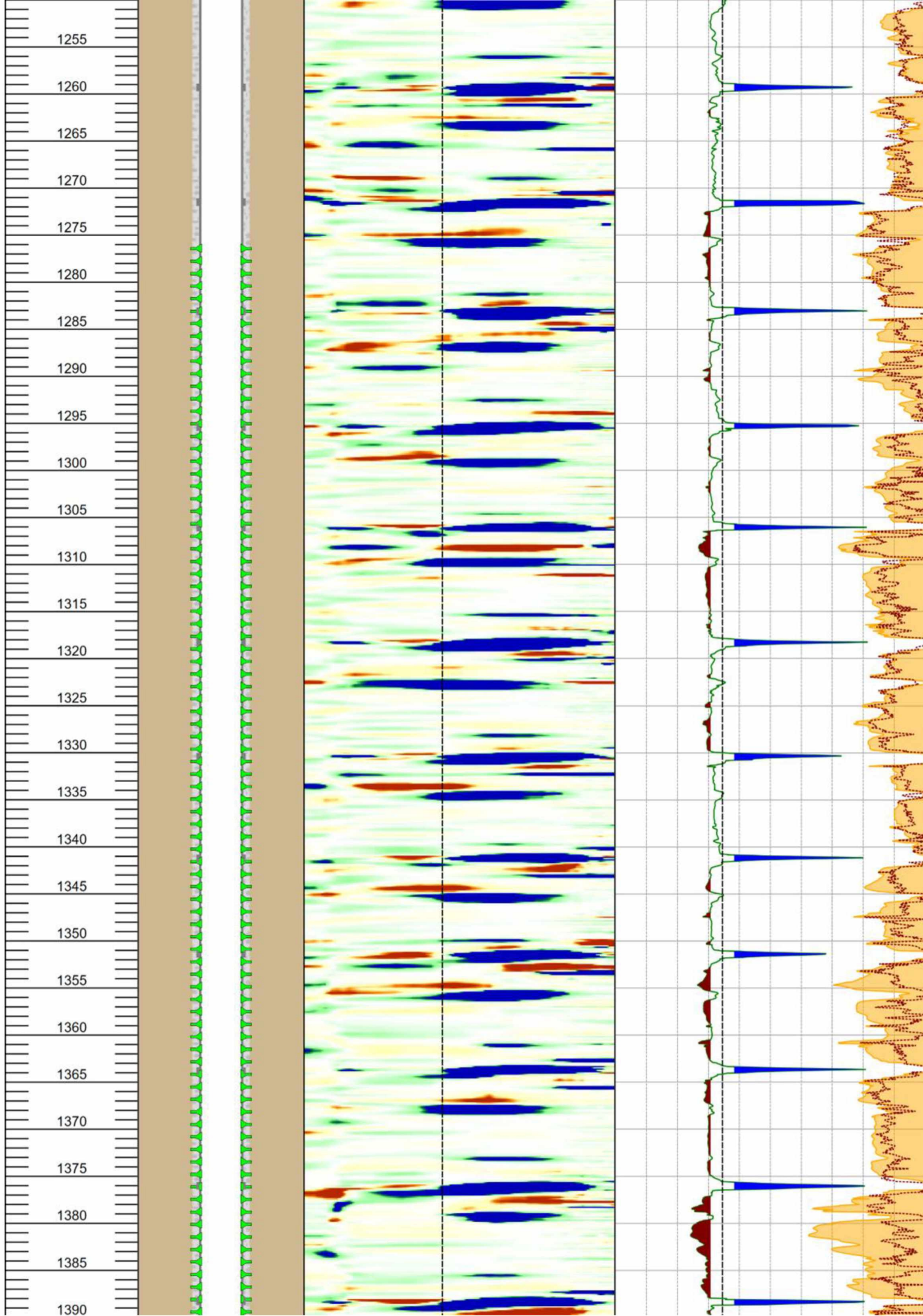


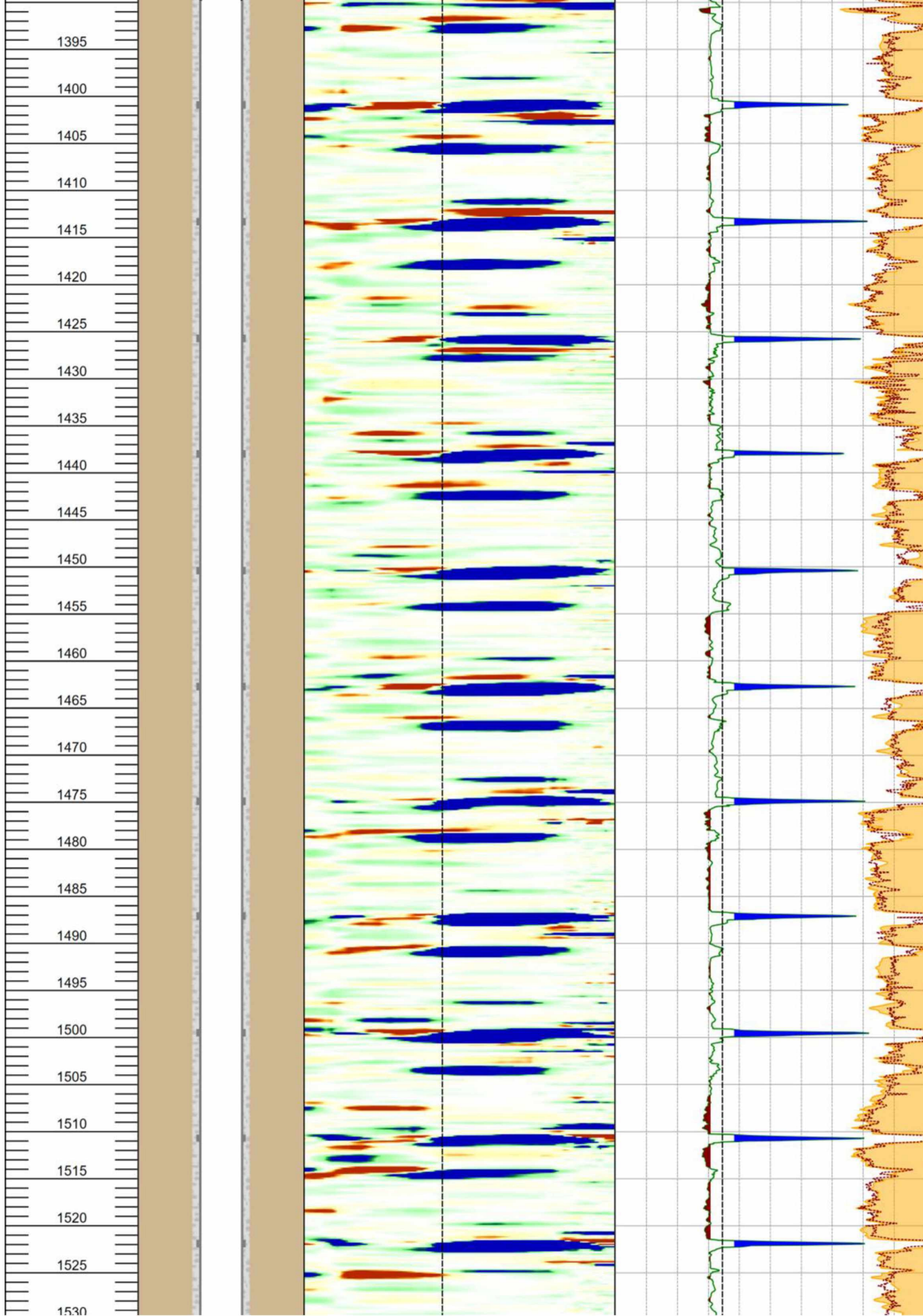
Wellbore Comments: Hole 2 - KO 765m/ORT,Compass 2000 Rtg Name: NAM 4  
Compass 2000 Description: Started 24/11/1976 (Original Compass Actual Design Datum: ROW- 7 - ORT @ 36.07 metres above System Datum)

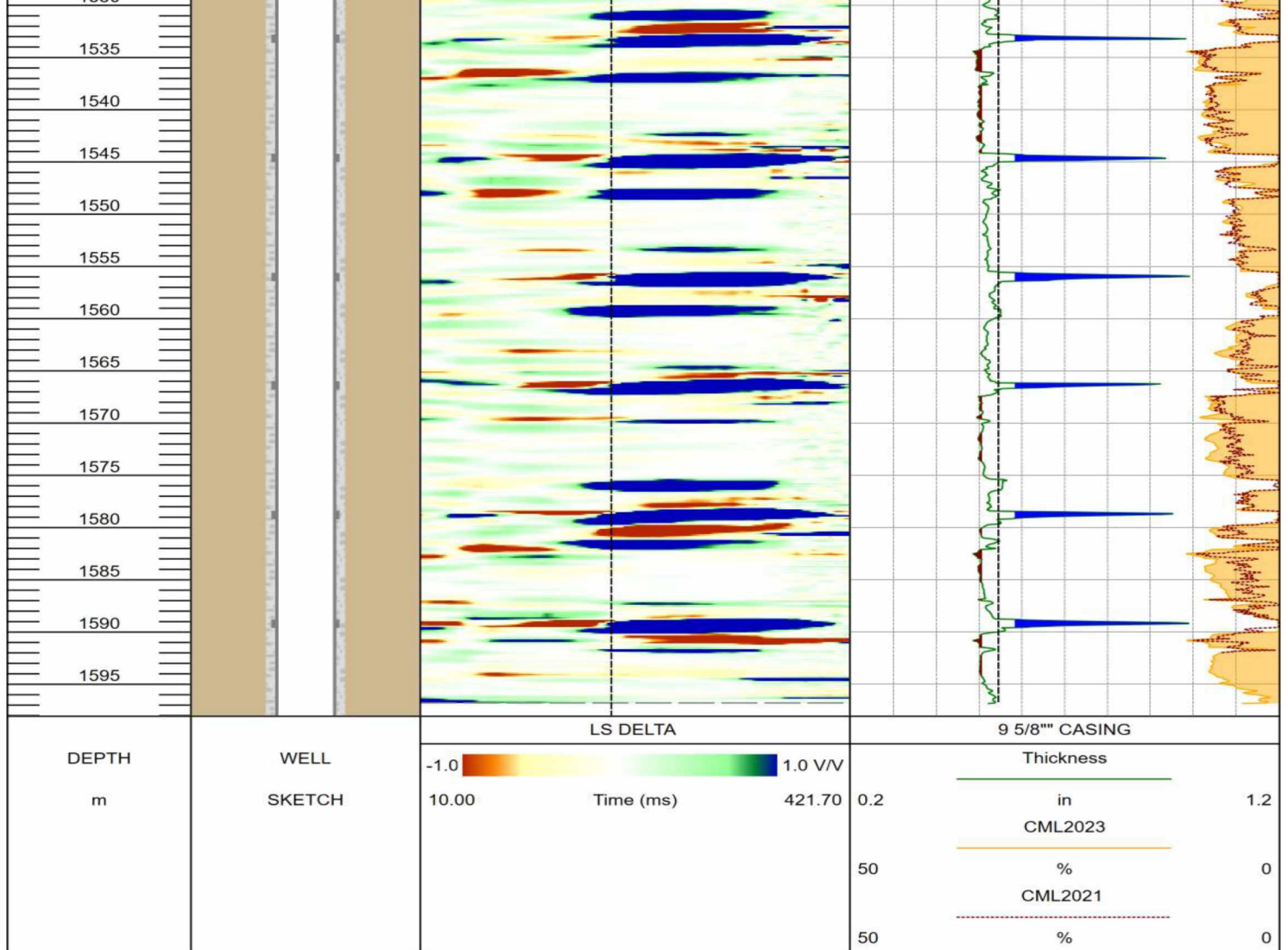
Top Perfo's	Casing Details	Schematic last update (30/07/2020)	Completion Details	Body ID / Mn ID	HUD ORDERED AT DEPTH NOT AT DATE !!!	
28.000', 35.92m			-1.29m, WLLM2.87,KAMPEN,SX.5000/5000,STD., LM3886	1.750in / 1.750in		
			-1.28m, WLSF,2.750,17-BPV-0068-ISLB,BPV,3600,H2S,N, EQ, eqs. 2.31 / 6x2mm., FV2210	0.000in / 0.000in 2.875in / 2.875in		
			-1.30m, SRT TENTION TBSR HGR, 2.87" SX-PROFILE, 3.1/2" - 10.2# VAM, 6.1 / 4" RAMS, CL, HI/II, .	2.922in / 2.922in		
			-0.70m, TGPJ 3.1/2" - 10.2# VAM, L80, 16 ft., .	2.922in / 2.922in		
			4.08m, TGPJ 3.1/2" - 10.2# VAM, L80, 6 ft., .			
				5.84m, TBNG 3.1/2" - 10.2# VAM, L80, .	2.922in / 2.922in	
				700.42m, TGPJ 3.1/2" - 10.2# VAM, L80, 5 ft., .	2.922in / 2.922in	
				703.64m, WLLM,2.75,910XO27503,X.4300/9900,H2S., LM2887	1.750in / 1.750in 2.812in / 2.812in	
				701.80m, FLCP, 3.1/2" - 10.2# VAM, 9Cr1Mo, .		
				703.65m, WLSF,2.75,22-FXE-27502,FXE,10K,2300FT,STD,E: + O rings - OPD115/CL54/FULL130., FV1025	1.500in / 1.500in	
				703.63m, LNSV, 2.750" XPO-PROFILE, 3.1/2" - 10.2# VAM, 9Cr1Mo, .	2.750in / 2.750in	
				704.36m, FLCP, 3.1/2" - 10.2# VAM, 9Cr1Mo, .	2.812in / 2.812in	
				706.19m, TGPJ 3.1/2" - 10.2# VAM, L80, 2 ft., .	2.922in / 2.922in	
				706.66m, TBNG 3.1/2" - 10.2# VAM, L80, .	2.922in / 2.922in	
				1,170.41m, TGPJ 3.1/2" - 10.2# VAM, L80, 16 ft., .	2.922in / 2.922in	
				1,175.19m, SLSD 2.750" OTIS XA, 3.1/2" - 10.2# VAM, 9Cr1Mo, SHIFT UP TO OPEN, .	2.750in / 2.750in	
				1,176.25m, TGPJ 3.1/2" - 10.2# VAM, L80, 15 ft., .	2.922in / 2.922in	
				1,180.90m, Camco Dummy Valve E, 1 inch., .		
			1,180.80m, SPMA 3.1/2" - 10.2# VAM, MHO, SOUR, 4130, BxB, .	2.875in / 2.875in		
			1,182.85m, TGPJ 3.1/2" - 10.2# VAM, L80, 16 ft, PxP, .	2.922in / 2.922in		
			1,187.48m, TGPJ 3.1/2" - 10.2# VAM, L80, 16 ft., .	2.922in / 2.922in		
			1,192.42m, Camco Dummy Valve E, 1 inch., .			
			1,192.32m, SPMA 3.1/2" - 10.2# VAM, MHO, SOUR, 4130, BxB, .	2.875in / 2.875in		
			1,194.37m, TGPJ 3.1/2" - 10.2# VAM, L80, 16 ft, PxP, .	2.922in / 2.922in		
			1,196.87m, LN, 2.750" X-PROFILE, 3.1/2" - 10.2# VAM, 9Cr1Mo, .	2.750in / 2.750in		
			1,199.19m, TGPJ 3.1/2" - 10.2# VAM, L80, 16 ft., .	2.922in / 2.922in		
			1,203.88m, TGCO 3.1/2" - 10.2# VAM x 4.1/2" - 12.6# VAM, .	2.921in / 2.921in		
			1,204.06m, ANCHOR SEAL, TYPE LOCATOR, 190DA60, KBH-22, 4.1/2" - 12.6# VAM, 4140, .	3.958in / 3.958in 4.750in / 4.750in		
			1,204.09m, PACKER 9.5/8", 194DAB60, 7.0" - 32.0# VAM, BD, 4140, .			
			1,205.61m, TGPJ 7.0" - 32.0# VAM, 8 ft, PxP, .	6.894in / 6.894in		
			1,208.06m, TGCO 7.0" - 32.0# VAM x 3.1/2" - 10.2# VAM, C75, .			
			1,208.17m, TGPJ 3.1/2" - 10.2# VAM, L80, 16 ft., .	2.922in / 2.922in		
			1,212.94m, FLCP, 3.1/2" - 10.2# VAM, 9Cr1Mo, .	2.812in / 2.812in	H.1.597.00m.24/02/2014 00:00	
			1,213.78m, LN, 2.750" X-PROFILE, 3.1/2" - 10.2# VAM, 9Cr1Mo, .	2.750in / 2.750in	H.1.597.00m.15/12/2015 00:00	
			1,214.10m, ENTRY GUIDE 2.750", 3.1/2" - 10.2# VAM, 9Cr1Mo, .	2.750in / 2.750in	H.1.599.00m.22/11/2011 00:00	
			1,599.00m, FISH: WIRELINE ITEM: Camco sheardisc, .	2.921in / 2.921in	H.1.599.00m.29/02/2012 00:00	
			1,599.00m, PACKER 9.5/8", 194DAB60, 7.0" - 32.0# VAM, BD, 4140, .	2.922in / 2.922in	H.1.599.00m.21/01/2013 00:00	
			1,600.50m, TGPJ 7.0" - 32.0# VAM, 8 ft, PxP, .	2.812in / 2.812in	H.1.599.00m.17/07/2014 00:00	
			1,603.00m, TGCO 7.0" - 32.0# VAM x 3.1/2" - 10.2# VAM, C75, .	2.750in / 2.750in	H.1.599.00m.28/09/2000 00:00	
			1,603.10m, TGPJ 3.1/2" - 10.2# VAM, L80, 16 ft., .	2.750in / 2.750in	H.1.599.00m.22/05/1997 00:00	
			1,607.90m, FLCP, 3.1/2" - 10.2# VAM, 9Cr1Mo, .	2.750in / 2.750in	H.1.599.00m.01/12/1995 00:00	
			1,608.70m, LN, 2.750" X-PROFILE, 3.1/2" - 10.2# VAM, 9Cr1Mo, .	3.250in / 3.250in	H.1.599.00m.01/11/1994 00:00	
			1,609.00m, ENTRY GUIDE 2.750", 3.1/2" - 10.2# VAM, 9Cr1Mo, .	2.921in / 2.921in	H.1.599.00m.05/06/1991 00:00	
			1,960.11m, PACKER 7.0", 82DAB40, 5.0" - 15.0# VAM, BD, 4140, .	4.276in / 4.276in		
			1,961.55m, TGPJ 5.0" - 18.0# VAM, C75, 8 ft, PxP, .	2.921in / 2.921in		
			1,963.73m, TGCO 5.0" - 15.0# VAM x 3.1/2" - 10.2# VAM, .	2.922in / 2.922in		
			1,963.96m, TGPJ 3.1/2" - 10.2# VAM, C75, 16 ft., .	2.812in / 2.812in		
			1,968.71m, FLCP, 3.1/2" - 10.2# VAM, 9Cr1Mo, .	2.750in / 2.750in		
			1,969.55m, LN, 2.750" X-PROFILE, 3.1/2" - 10.2# VAM, 9Cr1Mo, .	2.750in / 2.750in		
			1,969.82m, ENTRY GUIDE 2.750", 3.1/2" - 10.2# VAM, 9Cr1Mo, .			











## List of Logs

Name	Value	Description
SS 3E DELTA	V/V	Short Sensor Model Deviation
LS 3E DELTA	V/V	Long Sensor Model Deviation
Thickness 1	in	1st Metal Barrier Thickness
LSPD	m/min	Linear Cable Speed
CL1		First Barrier Corrosion Line
CML2023	%	Metal loss calculated Thickness 1
CML2021	%	Metal loss calculated Thickness 1 based on 2021 Survey results

# TGT

## Multi Tube Integrity

### Log Interpretation Report

Company	NAM
Well	ROW-7A
Field	ROSSUM-WEERSELO

