TGT

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

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

MAXIM ver 7.6.1.11940
Log Interpretation Report

		Elevations
Permanent Datum:	MSL Elevation	TBF 29.99 m
Log Meas. From:	TBF	DFE/RKB 45.5 m
Northing:	485,062.59 m	GLE 30.73 m
Easting	260,609.13 m	MSL N/A

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/cm3)	N/A
Tool	Pulse-3E
Engineer	512e
Witnessed	N/A
Prepared by	512e
Reviewed by	512e

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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	13⅜	72.00	N-80	0.00	870.00
Casing	9⅝	53.50	C-75	0.00	1891.92
Casing	7	32.0	C-75	1735.18	2241.92
Tubing	3½	10.20	L-80	-1.30	1214.00
Tubing	3½	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

Summary

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 ⅝" 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)

			November 2021					October 2023						
JT	Top, m	Length, m	Nominal thickness, in	Minimum thickness, in	Metal loss		Depth for max metal loss m	Minimum thickness, in	Metal loss		Depth for max metal loss m	Metal loss Progresion		Comment
					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

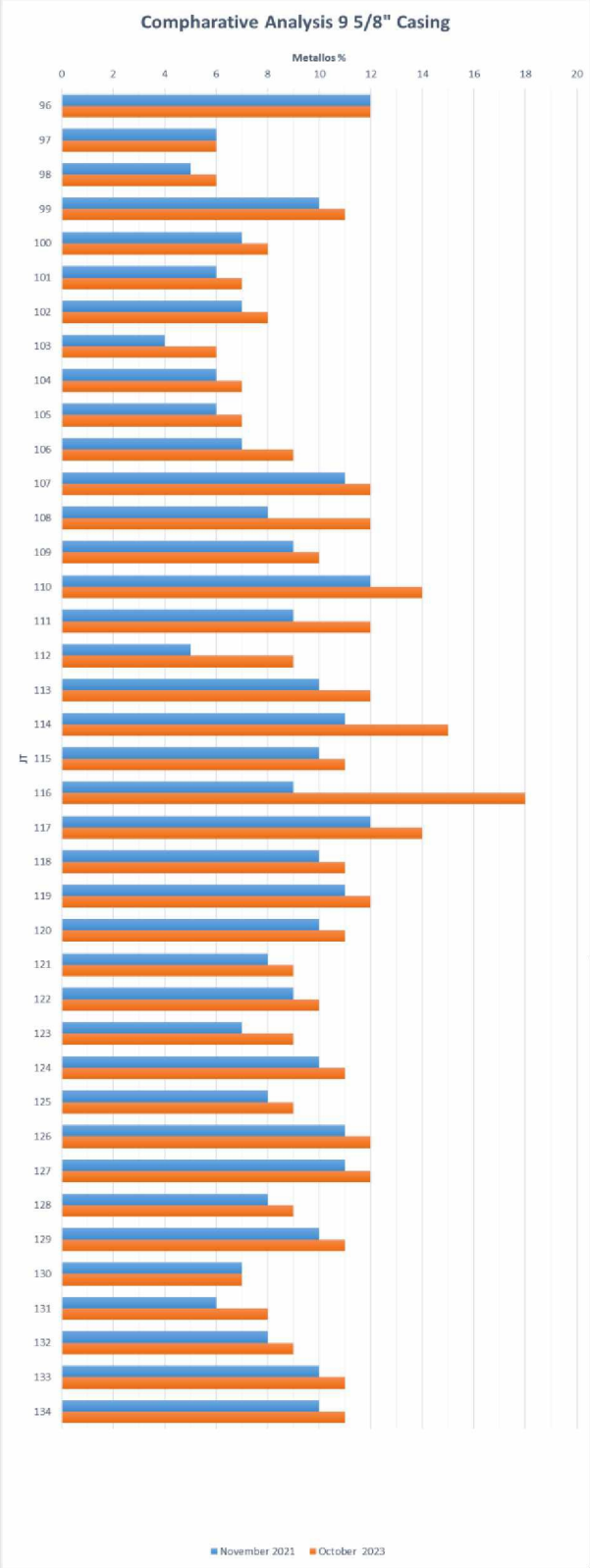
Perfs 1283-1323 & 1359-1402 mDFE

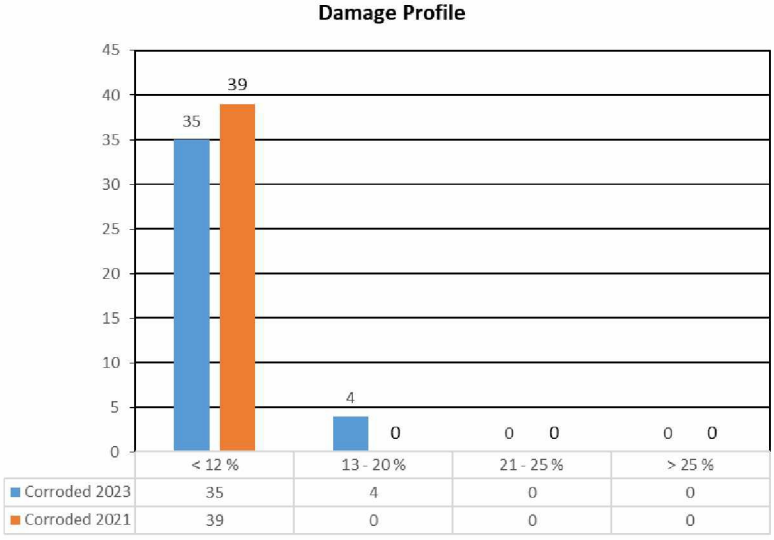
Joint by Joint Analysis

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



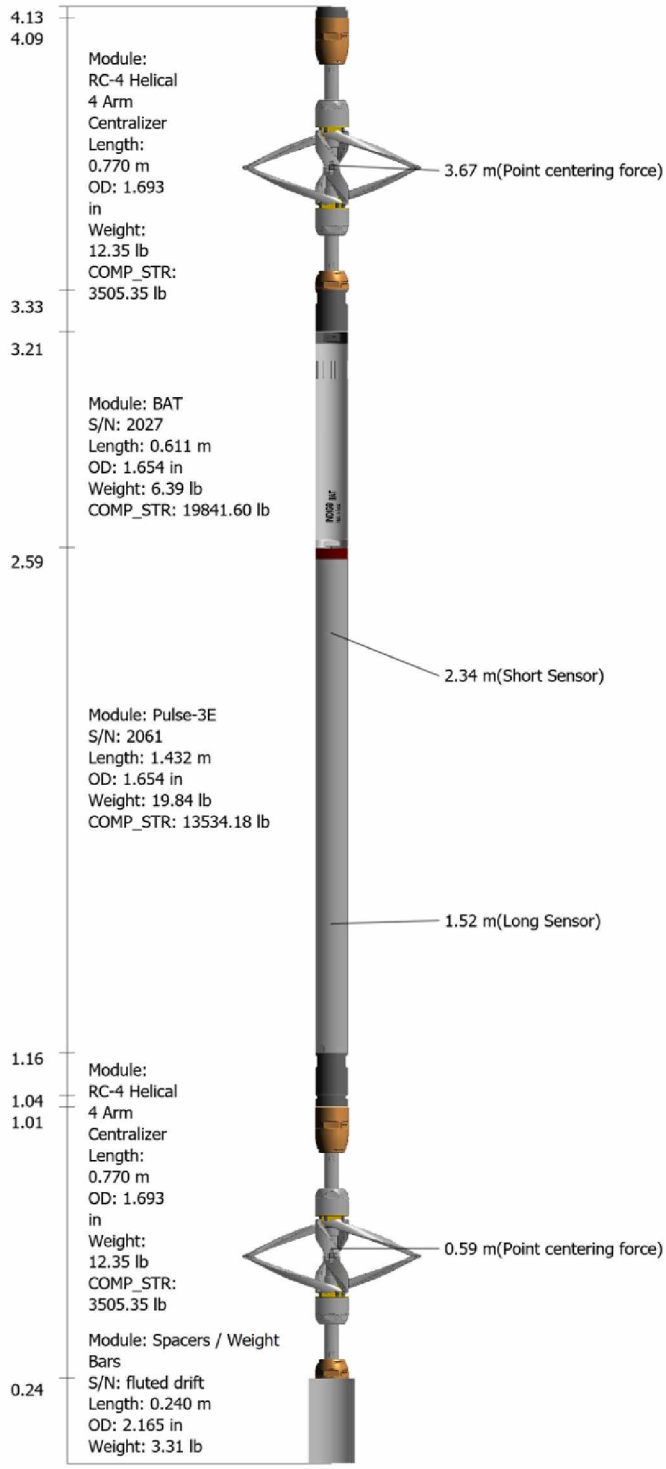


Sequence of Events

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			
9-Oct-23	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	**RIH**	RIH @ 50m/min
	09:59	1599	1599			5-minute station
	10:05	1599	1500	4	**S5U1 repeat**	Begin logging the repeat interval
	10:33	1500	1599	30		Run back down to bottom of logging interval
	10:40	1599	1150	4	**S5U2**	Start logging the main interval
	12:37	1150	Surface	50	**POOH**	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

Logging Tool Diagram

RC-4 Helical 4 Arm Centralizer Indigo-BAT Pulse-3E Spacers / Weight Bars



Total Length (m)	Max OD (in)	Total Weight (lb)
4.127	2.165	58.64

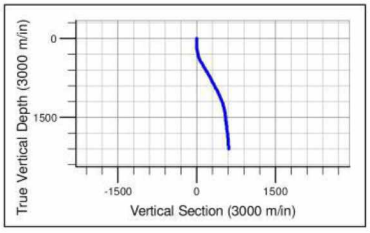
TGT

Well Sketch

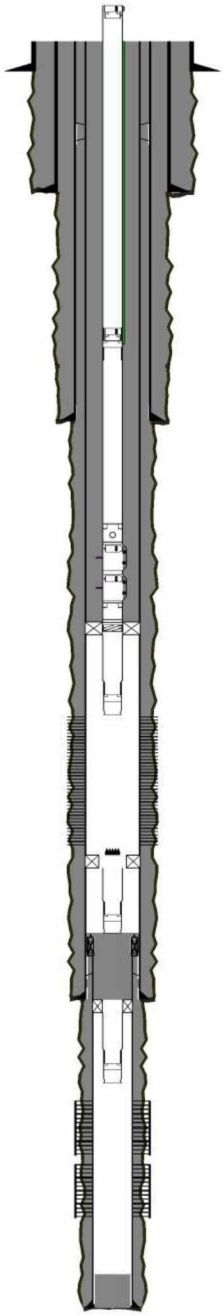
Site: ROSSUM-WEERSELO-2
Well Name: ROSSUM-WEERSELO- 7
Wellbore Name: ROW- 7A
Wellbore No: 02
Legal Wellbore Name: ROSSUM-WEERSELO- 7-2
Original Spud Date: 27/10/1976
Spud/Kick-off date: 24/11/1976
Tree Cap Connection: 6.875" 4G ACME
H2S Present: Y
LSA Present: N
Well Comments:
NOTE: For further detail: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

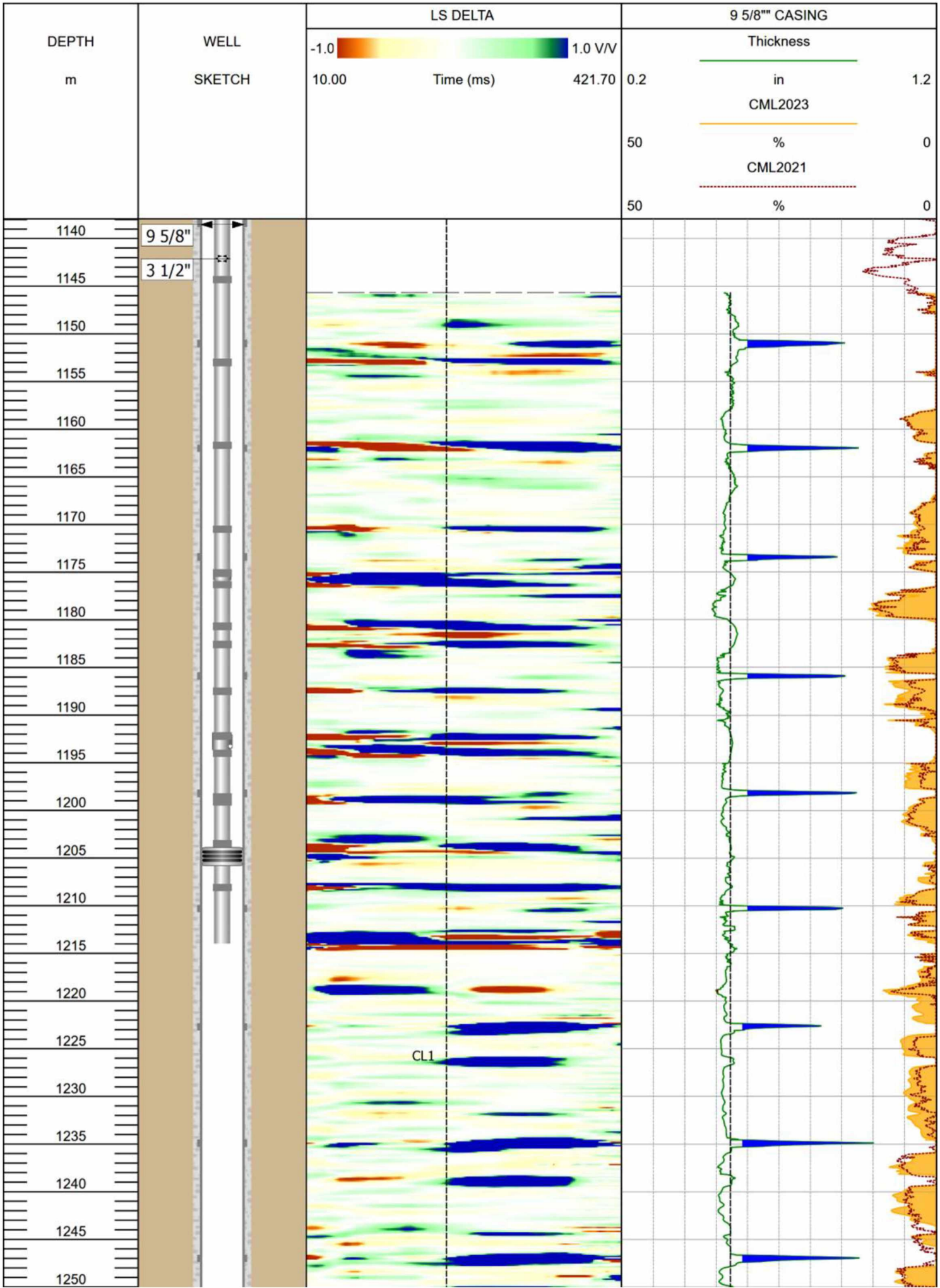


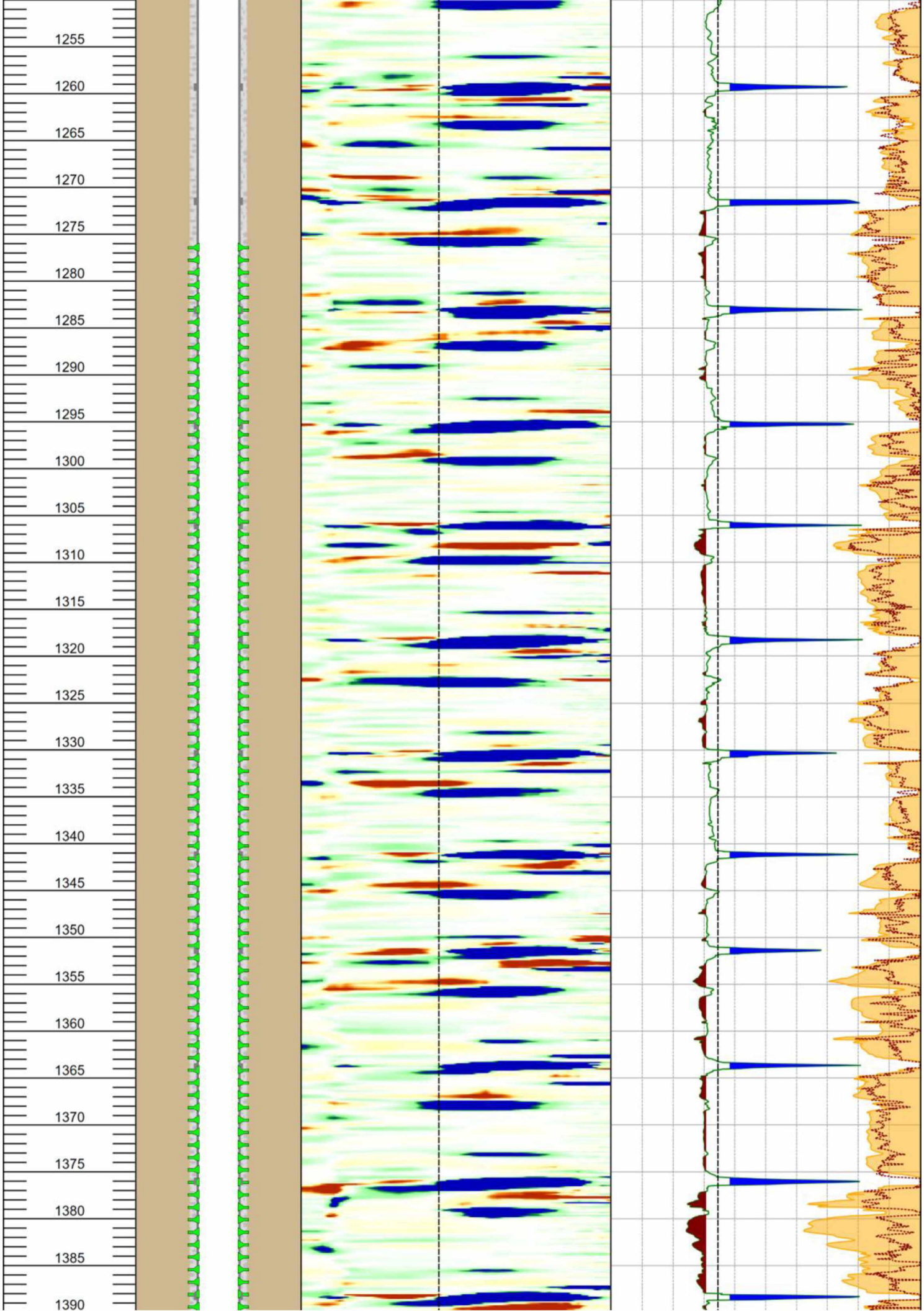
Wellbore Comments: Hole 2 : KO 768m/ORT:Compass 2000 Rig Name: NAM 4
Compass 2000 Description: Started 24/11/1976 [Original Compass Actual Design Datum: ROW- 7 ORT @ 36.07 metres above System Datum]

Top Perfo`s	Casing Details	Schematic last update (30/07/2020)	Completion Details	Body ID / Min ID	HUD ORDERED AT DEPTH NOT AT DATE !!!!
			-1.29m, WLLM,2.87,KAMPEN,SX,5000/5000,STD, , LM3886	1.750in / 1.750in	
			-1.28m, WLSF,2.750,17-BPV-0068-ISLB,BPV,3600,H2S,N; EQ, holes 2.31 / 6x2mm, , FV2210	0.000in / 0.000in	
	28.000", 35.92m		-1.30m, SRT TENTION TBG HGR, 2.87" SX-PROFILE, 3.1/2" - 10.2# VAM, 6.1/ 4" RAMS, CL, H1/U, ,	2.875in / 2.875in	
			-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, ,	2.922in / 2.922in	
			5.84m, TBNG 3.1/2" - 10.2# VAM, L80, ,		
	20.000", 299.92m			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	
			701.80m, FLCP, 3.1/2" - 10.2# VAM, 9Cr1Mo, ,	2.812in / 2.812in	
			703.65m, WLSF,2.75,22-FXE-27502,FXE,10K,2300FT,STD,E; + O rings - OPD115/CL54/FULL130, , FV1025	1.500in / 1.500in	
	13.375", 870.00m		703.63m, LNSV, 2.750" XXO-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	
1,275.90m			1,198.87m, 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	
1,352.90m			1,203.88m, TGCO 3.1/2" - 10.2# VAM x 4.1/2" - 12.6# VAM, ,	2.921in / 2.921in	
1,358.90m			1,204.08m, ANCHOR SEAL, TYPE LOCATOR, 190DA60, KBH-22, 4.1/2" - 12.6# VAM, 4140, ,	3.958in / 3.958in	
1,377.90m			1,204.09m, PACKER 9.5/8", 194DAB60, 7.0" - 32.0# VAM, BD, 4140, ,	4.750in / 4.750in	
1,388.90m			1,205.61m, TGPJ 7.0" - 32.0# VAM, 8 ft, PxP, ,	6.094in / 6.094in	
			1,208.06m, TGCO 7.0" - 32.0# VAM x 3.1/2" - 10.2# VAM, C75, ,	2.922in / 2.922in	
			1,208.17m, TGPJ 3.1/2" - 10.2# VAM, L80, 16 ft, ,	/	H.1,597.00m.24/02/2014 00:00
			1,212.94m, FLCP, 3.1/2" - 10.2# VAM, 9Cr1Mo, ,	2.812in / 2.812in	H.1,597.00m.15/12/2015 00:00
			1,213.78m, LN, 2.750" X-PROFILE, 3.1/2" - 10.2# VAM, 9Cr1Mo, ,	2.750in / 2.750in	H.1,599.00m.22/11/2011 00:00
			1,214.10m, ENTRY GUIDE 2.750", 3.1/2" - 10.2# VAM, 9Cr1Mo, ,	6.094in / 6.094in	H.1,599.00m.29/02/2012 00:00
			1,599.00m, FISH: WIRELINE ITEM; Camco sheardisc., ,	2.921in / 2.921in	H.1,599.00m.21/01/2013 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.17/07/2014 00:00
			1,600.50m, TGPJ 7.0" - 32.0# VAM, 8 ft, PxP, ,	2.812in / 2.812in	H.1,599.00m.28/09/2000 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.22/05/1997 00:00
			1,603.10m, TGPJ 3.1/2" - 10.2# VAM, L80, 16 ft, ,	2.750in / 2.750in	H.1,599.00m.01/12/1995 00:00
			1,607.90m, FLCP, 3.1/2" - 10.2# VAM, 9Cr1Mo, ,	2.750in / 2.750in	H.1,599.00m.01/11/1994 00:00
	9.625", 1,891.92m		1,608.70m, LN, 2.750" X-PROFILE, 3.1/2" - 10.2# VAM, 9Cr1Mo, ,		H.1,599.00m.05/06/1991 00:00
			1,609.00m, ENTRY GUIDE 2.750", 3.1/2" - 10.2# VAM, 9Cr1Mo, ,	3.250in / 3.250in	
			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	
2,000.62m			1,969.55m, LN, 2.750" X-PROFILE, 3.1/2" - 10.2# VAM, 9Cr1Mo, ,	2.750in / 2.750in	
2,005.72m			1,969.82m, ENTRY GUIDE 2.750", 3.1/2" - 10.2# VAM, 9Cr1Mo, ,		
2,025.22m					
2,027.52m					
	7.000", 2,241.92m				

Prepared By: EUROPE 5.1.2.e Date: 30/07/2020
Data QA/QC'd by: Date QA/QC'd:

Template Version: EP General v 1202


DEPTH
m
WELL
SKETCH
LS DELTA
-1.0
1.0 V/V
10.00
Time (ms)
421.70
9 5/8"" CASING
Thickness
0.2
in
1.2
CML2023
50
%
0
CML2021
50
%
0
1140
1145
1150
1155
1160
1165
1170
1175
1180
1185
1190
1195
1200
1205
1210
1215
1220
1225
1230
1235
1240
1245
1250
9 5/8"
3 1/2"
CL1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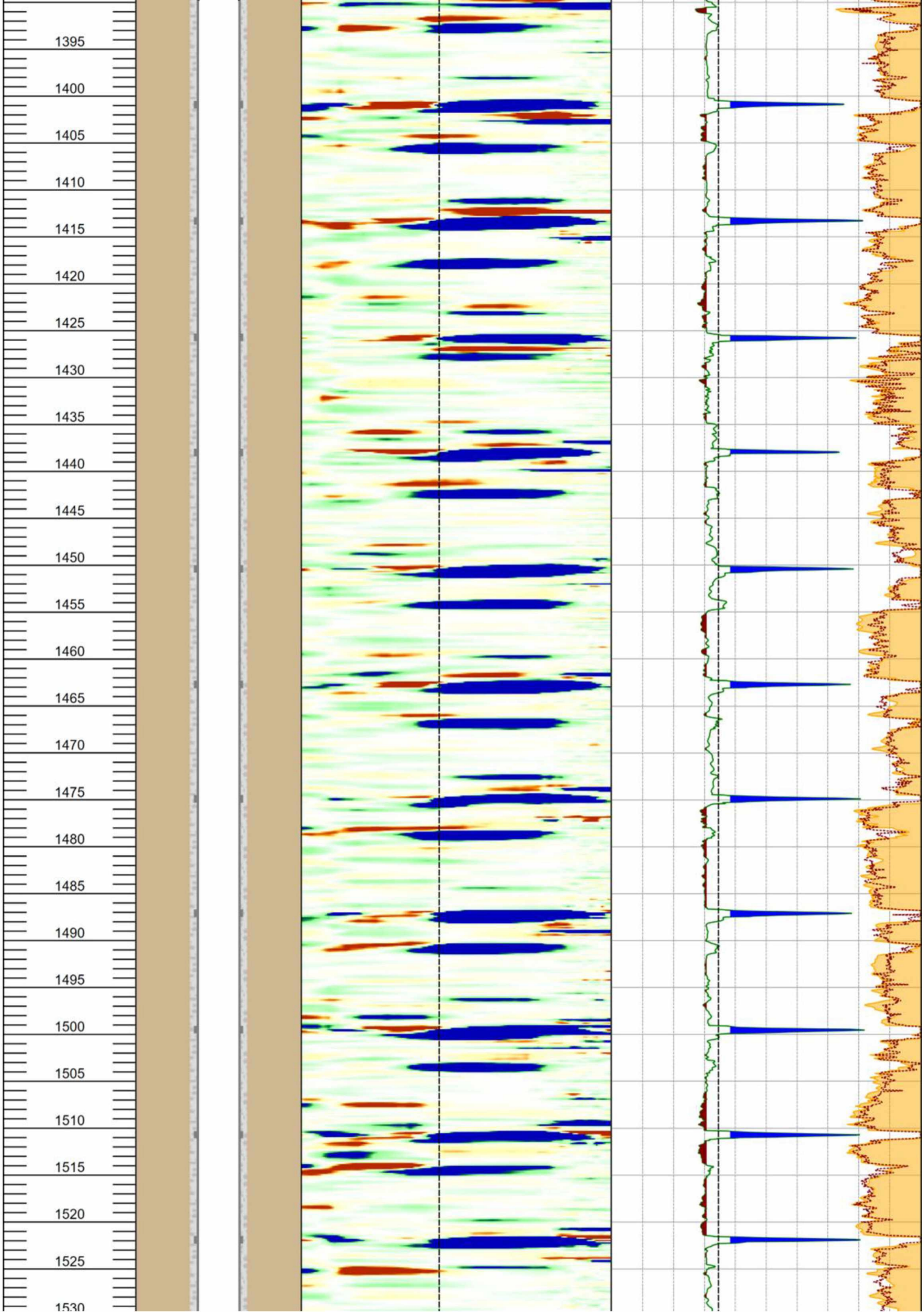
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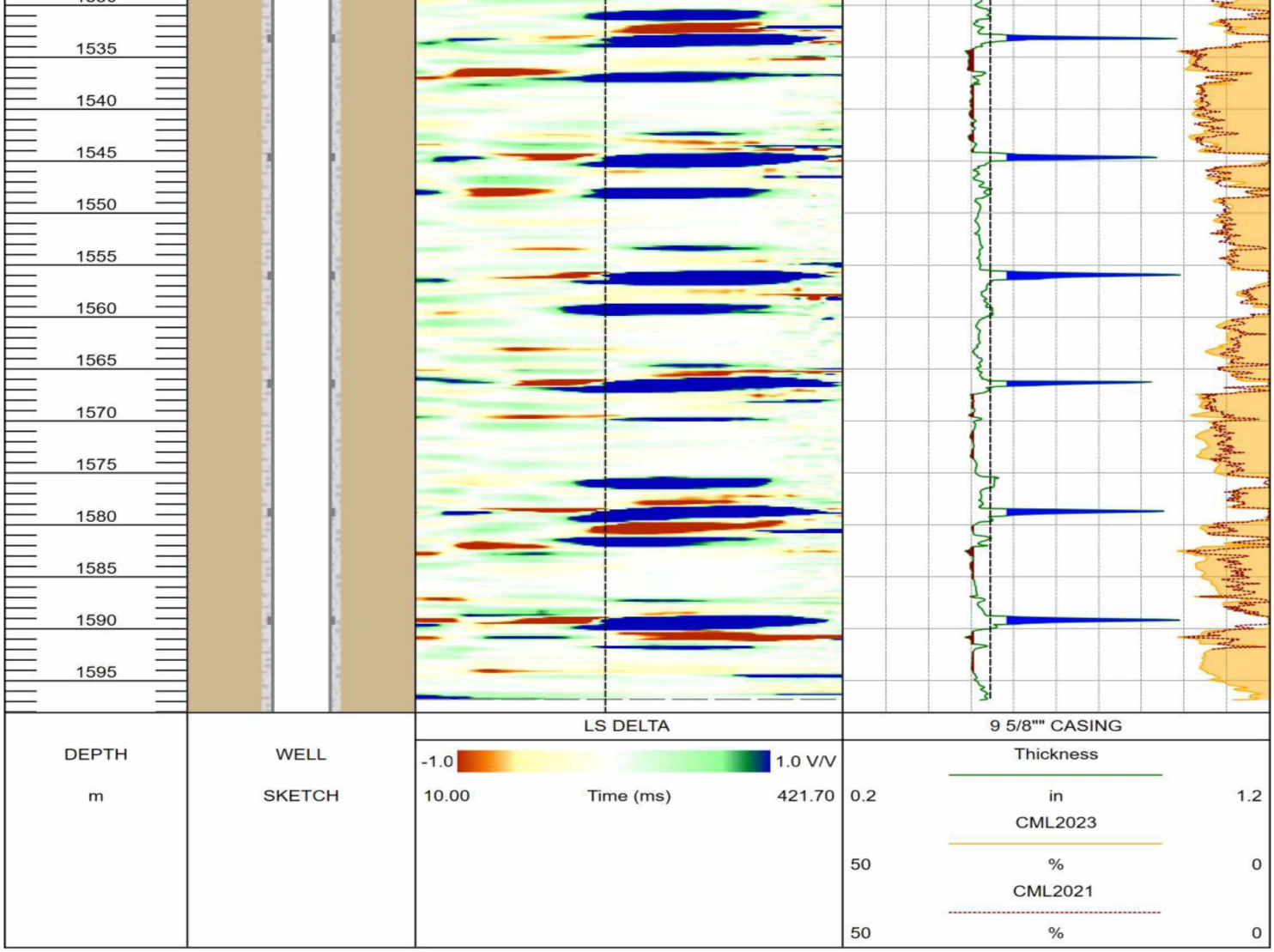

List of Logs

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