ROGII

Geosteering Post-job Report
Well Shenandoah S-1H

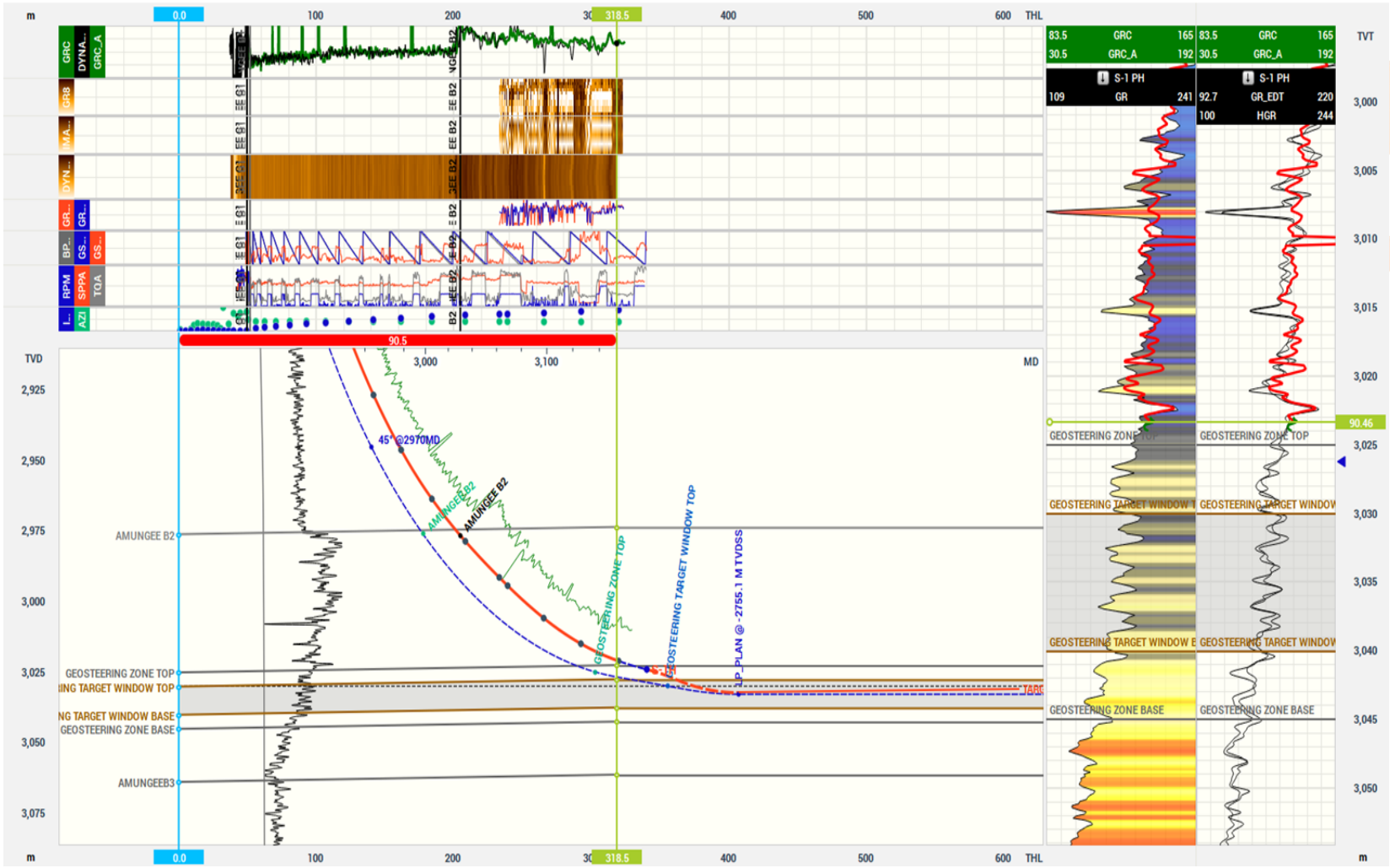
Geosteering team ROGII

September 2023

StarSteer

Landing Interpretation Shenandoah - 1H

Interpretation at 3174 m MD



- Interpreted a structural trend of 0.46° UpDip, estimated at last survey
- Estimated at bit projection ~3.90 m TVD above horizon Geosteering Target Window Top, ~13.90 m TVD above horizon Geosteering Target Window Base
- Recommendation: Continue drilling according to the plan Shenandoah S-1H Rev7 -28Aug23HL to reach the landing point at 3259 m MD / -2755.08 m TVDSS. Good correlation of the low and high GR signature just before the entry to the Geosteering Zone Top (20 m window). It is presumable that the bit is close to the entry to the target window. According to the current apparent dip (90.46°), and if the trajectory follows the plan, the planned landing will reach 4.9 m above geosteering target window base and 5.1 m below Geosteering target window top

Formation tops prognosis vs current tops

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Top Name	Prog Tops			Actual Tops			Difference	
	MD	TVD	TVDSS	MD	TVD	TVDSS	MD	TVD
WyworrieMember	2,357.5	2,356.8	-2,079.0					
Amungee C1	2,662.1	2,661.4	-2,383.6	2,662.1	2,661.4	-2,383.6	-0.0	0.0
Amungee B1	2,725.5	2,724.7	-2,446.9	2,725.1	2,724.3	-2,446.5	-0.4	-0.4
Amungee B2	3,018.6	2,976.1	-2,698.3	3,030.9	2,976.7	-2,698.9	12.3	0.6
Geosteering Zone TOP	3,154.3	3,025.0	-2,747.2	3,169.4	3,023.2	-2,745.4	15.0	-1.8
Geosteering Target Window Top	3,207.2	3,030.0	-2,752.2	3,522.6	3,034.5	-2,756.7	315.3	4.5

- Prognosed tops correspond to TVD of pilot hole S-1 PH, assuming flat horizontal structure

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Lateral Interpretation
Shenandoah - 1H

Interpretation at 4300 m MD (TD)

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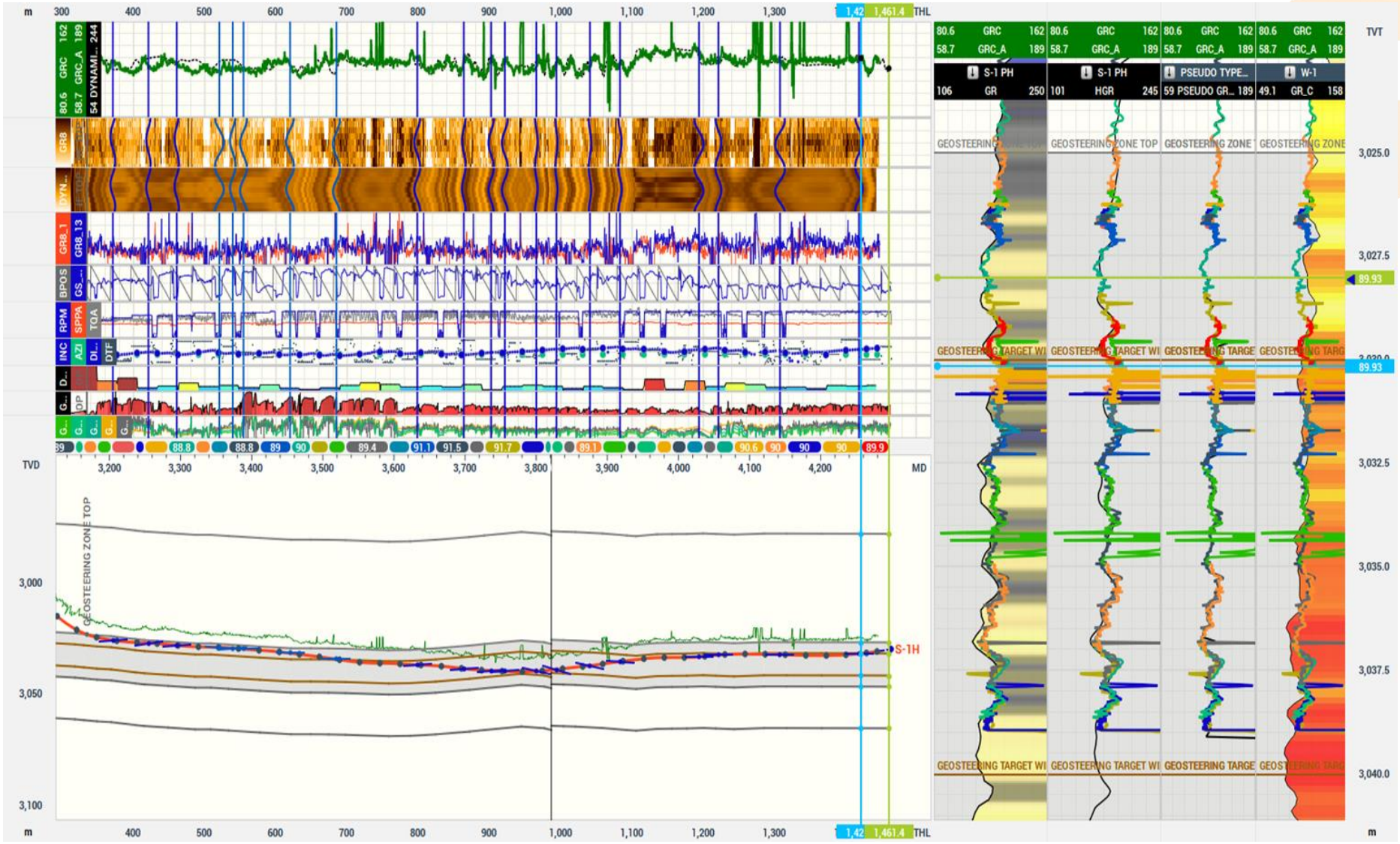
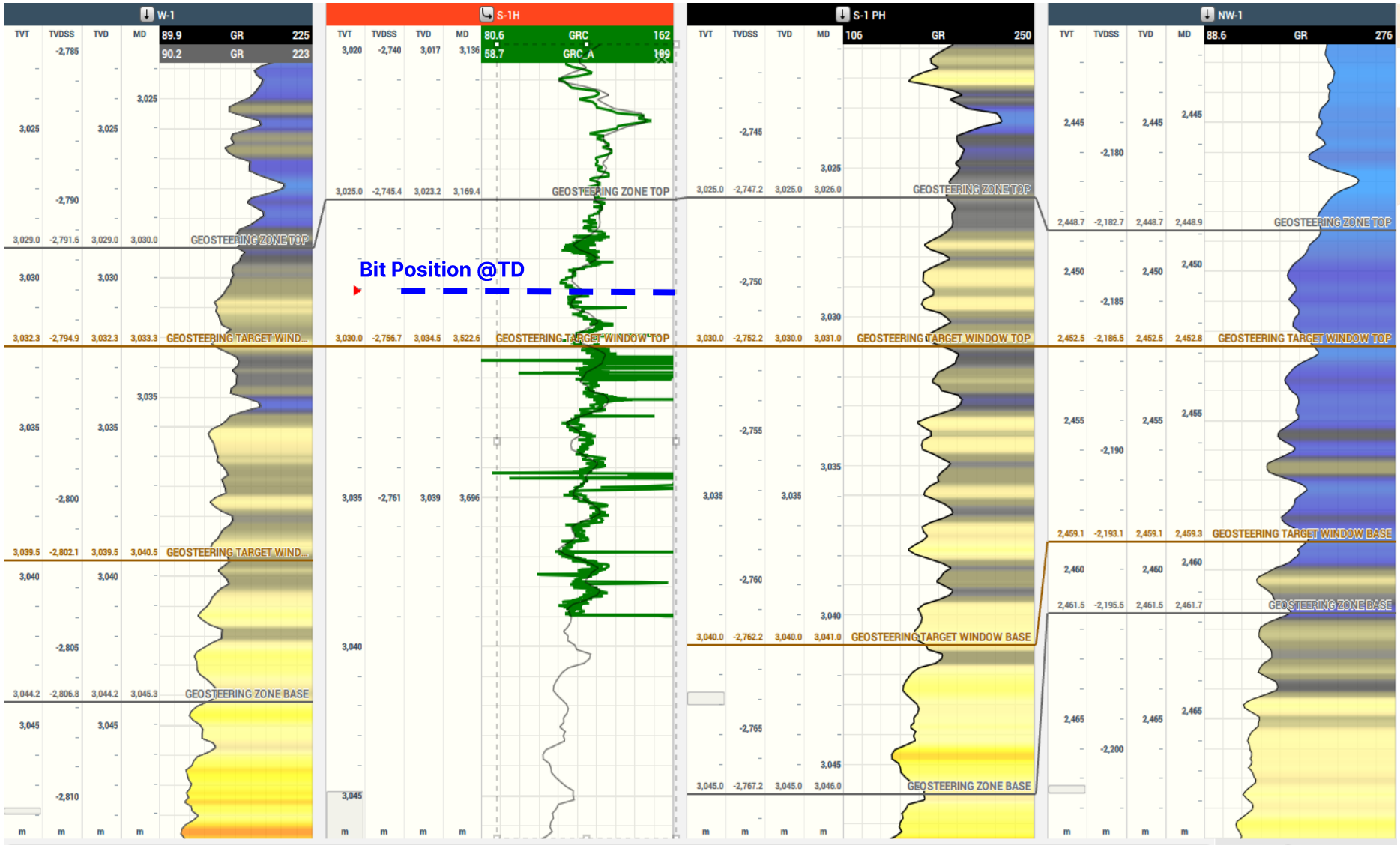


- Apparent dip interpretation at the last segment is 89.93°. Interpreted bit position ~1.94m TVD above Geosteering target window top.
- Good correlation related to Typewell S-1 PH. Included pseudo typewell for correlation based on previously drilled segments, down and up in section.
- Drilled Lateral Length from Reference Point (Geosteering Zone TOP): 1130.67 m MD
- TD called at @4300.07 m MD.

Correlation at TD



- Good correlation related to Typewell S-1 PH.
- Flattened at Geosteering Target Window Top
- TVT correlation panel, where logs are represented vertically for every interpreted segment, even if drilling is interpreted up or down in section along the well trajectory
- Thickness between typewell S-1PH and S-1PH is preserved

Interpretation Lateral Section

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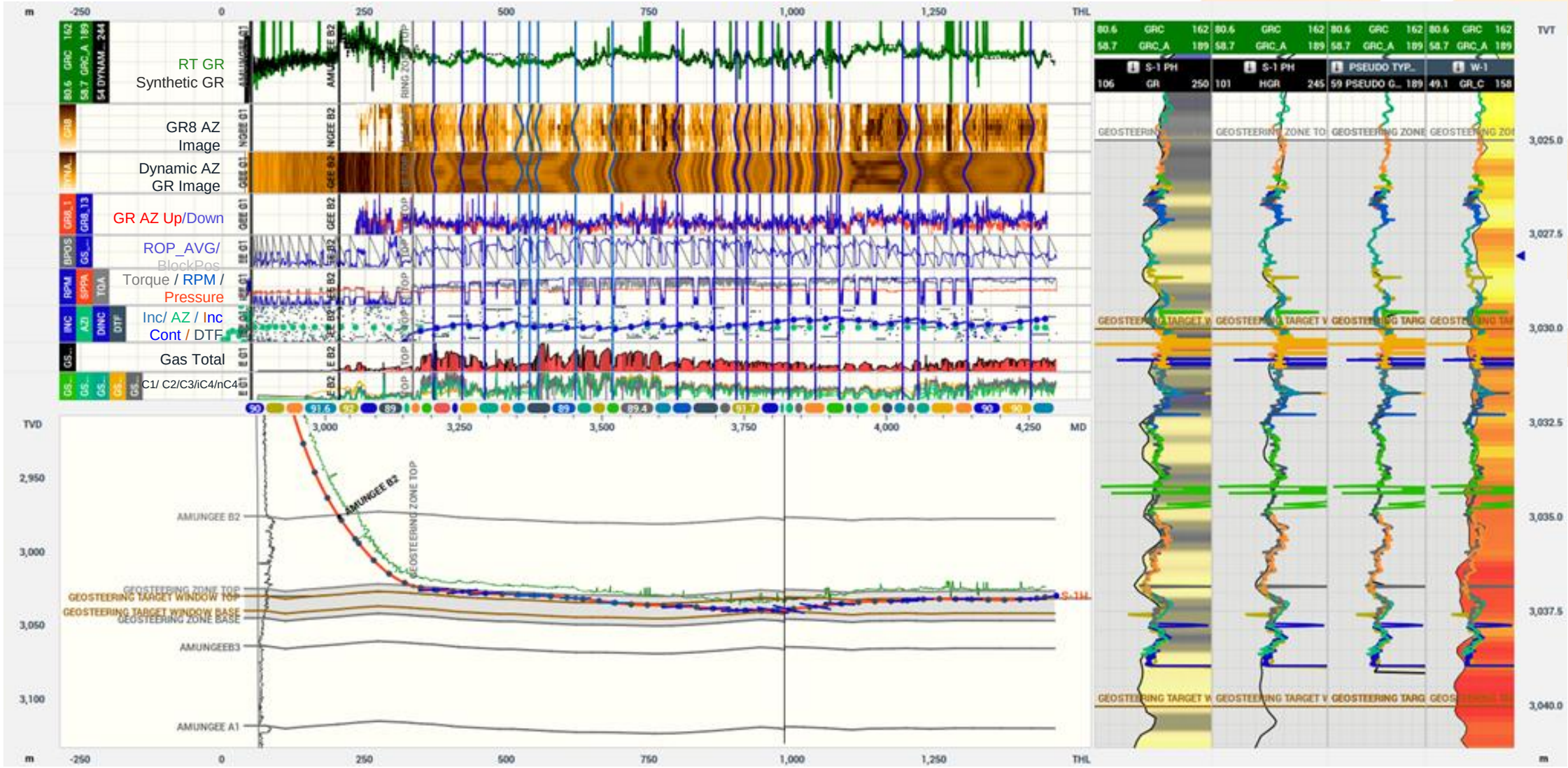

- TD called @4300m MD. Current interpreted bit position ~1.94m TVD above Geosteering target window horizon. Total Lateral length after Reference Point (Geosteering Zone Top @ 3169.4mMD) = 1130.67m MD.

Interpretation Zone Statistics, spreadsheet

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Top	Interval	S-1 PH MD	S-1 PH TVD	% in zone	In zone, m	TG_OUT_AV	RT_HRLT_modeled_av
Geosteering Zone Top	Interval_00.0	3026	3025.0	0.58	6.51	1.267873	158.915803
	Interval_00.5	3026.5	3025.5	0.85	9.66	2.426623	195.881479
	Interval_01.0	3027	3026.0	6.56	74.19	8.254721	149.452855
	Interval_01.5	3027.5	3026.5	16.13	182.4	10.304612	125.512285
	Interval_02.0	3028	3027.0	1.79	20.22	11.233483	189.322271
	Interval_02.5	3028.5	3027.5	1.12	12.67	14.050455	166.198028
	Interval_03.0	3029	3028.0	1.77	19.97	14.924267	146.947025
	Interval_03.5	3029.5	3028.5	1.91	21.54	11.993496	167.083688
	Interval_04.0	3030	3029.0	1.96	22.21	10.703877	144.945486
	Interval_04.5	3030.5	3029.5	3.33	37.67	14.280809	149.617651
Geosteering Target Window Top	Interval_05.0	3031	3030.0	7.72	87.29	6.953203	147.298172
	Interval_05.5	3031.5	3030.5	13.94	157.59	8.645241	153.038428
	Interval_06.0	3032	3031.0	5.41	61.17	10.403832	200.000673
	Interval_06.5	3032.5	3031.5	10.2	115.29	4.704127	150.748413
	Interval_07.0	3033	3032.0	2.13	24.07	6.320369	100.945078
	Interval_07.5	3033.5	3032.5	1.73	19.6	8.593725	110.427411
	Interval_08.0	3034	3033.0	1.47	16.64	4.436936	128.763153
	Interval_08.5	3034.5	3033.5	1.39	15.74	5.592894	130.126024
	Interval_09.0	3035	3034.0	1.32	14.98	6.88327	109.581331
	Interval_09.5	3035.5	3034.5	1.29	14.62	6.359349	114.322397
	Interval_10.0	3036	3035.0	1.42	16.03	4.68081	135.866082
	Interval_10.5	3036.5	3035.5	1.5	16.96	7.224515	134.548989
	Interval_11.0	3037	3036.0	1.64	18.57	7.656179	172.025662
	Interval_11.5	3037.5	3036.5	1.98	22.42	5.648855	152.909688
	Interval_12.0	3038	3037.0	2.32	26.19	7.384381	79.847361
	Interval_12.5	3038.5	3037.5	2.51	28.38	7.509263	136.916002
	Interval_13.0	3039	3038.0	3.08	34.8	6.72513	184.433979
	Interval_13.5	3039.5	3038.5	2.94	33.25	6.853825	168.987821
	Interval_14.0	3040	3039.0	0	0		
	Interval_14.5	3040.5	3039.5	0	0		
Geosteering Target Window Base	Interval_15.0	3041	3040.0	0	0		
	Interval_15.5	3041.5	3040.5	0	0		
	Interval_16.0	3042	3041.0	0	0		
	Interval_16.5	3042.5	3041.5	0	0		
	Interval_17.0	3043	3042.0	0	0		
	Interval_17.5	3043.5	3042.5	0	0		
	Interval_18.0	3044	3043.0	0	0		
	Interval_18.5	3044.5	3043.5	0	0		
	Interval_19.0	3045	3044.0	0	0		
	Inerval_19.5	3045.5	3044.5	0	0		
Geosteering Zone Base	Interval_20.0	3046	3045.0				

- 0.5 m TVD step zone intervals along the 20 m TVD Target window, Geosteering Zone Top to Geosteering Zone Base
- 34.86% of drilled horizontal section between Geosteering Zone top to Geosteering Target window top
- 65.15% of drilled horizontal section within the Geosteering Target window

Interpretation Zone Statistics, with dips

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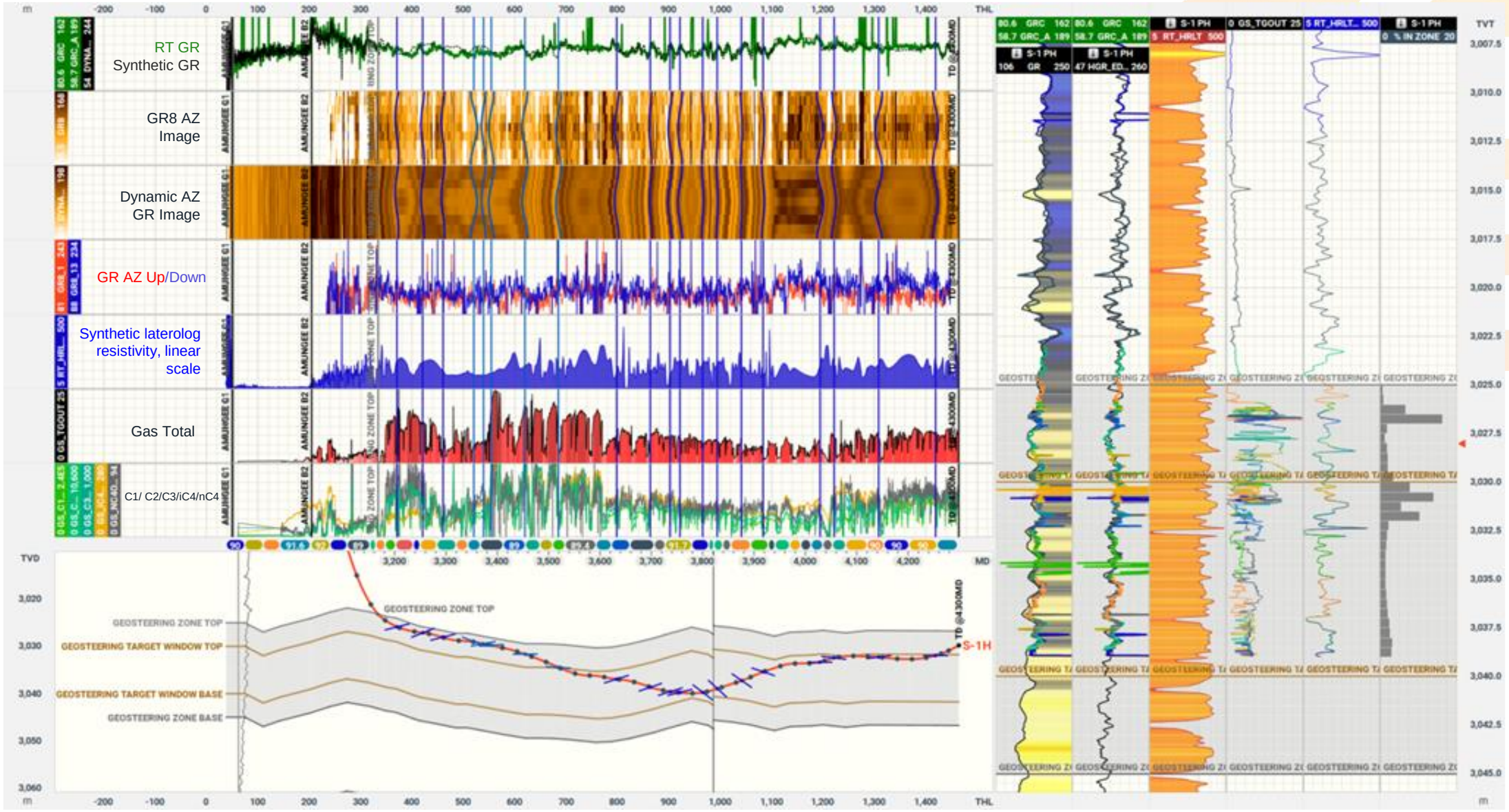

Interpretation Zone Statistics, without dips

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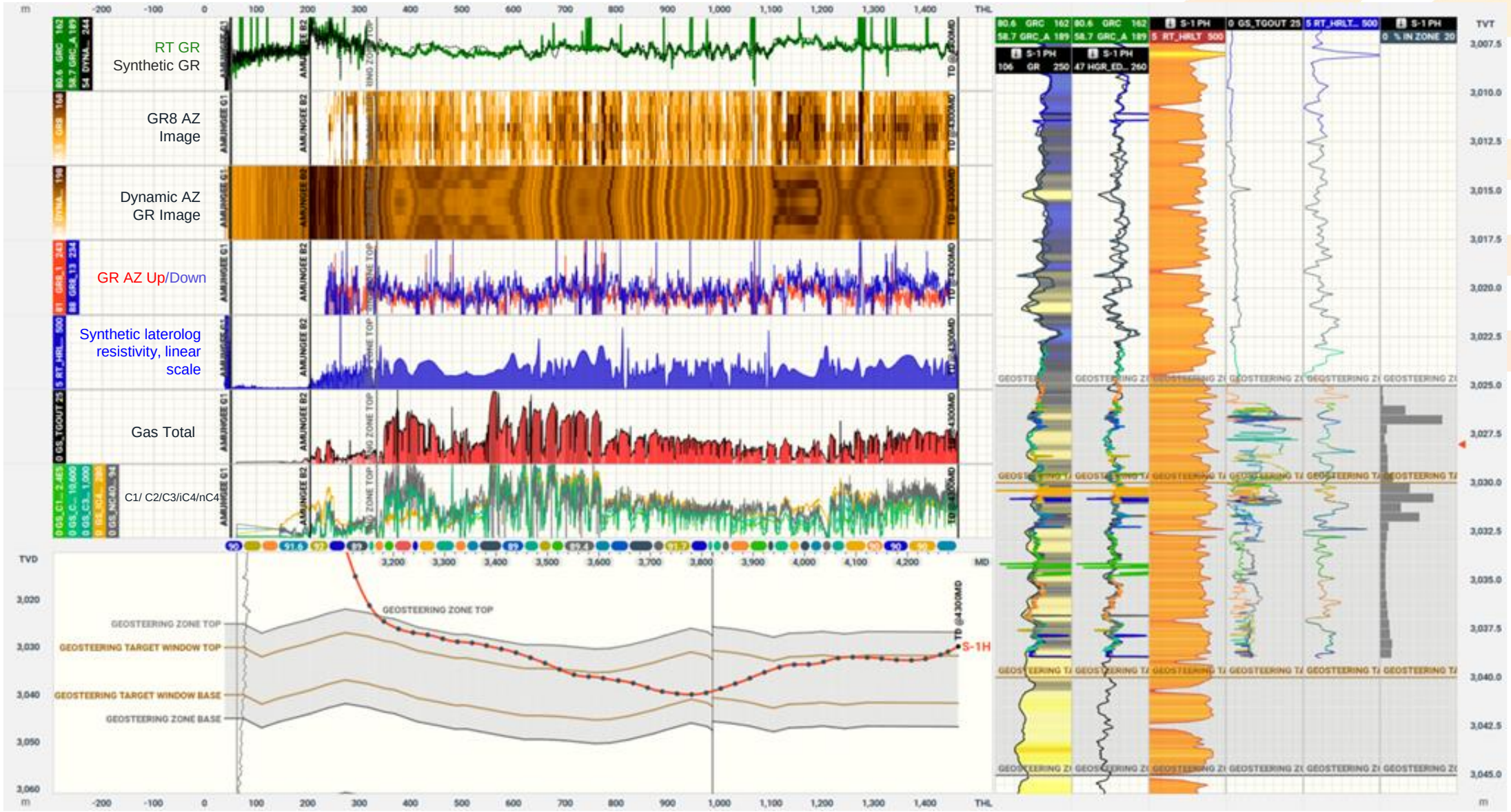

Average Total Gas vs Average Synthetic Resistivity Comparison, horizontal and vertical track

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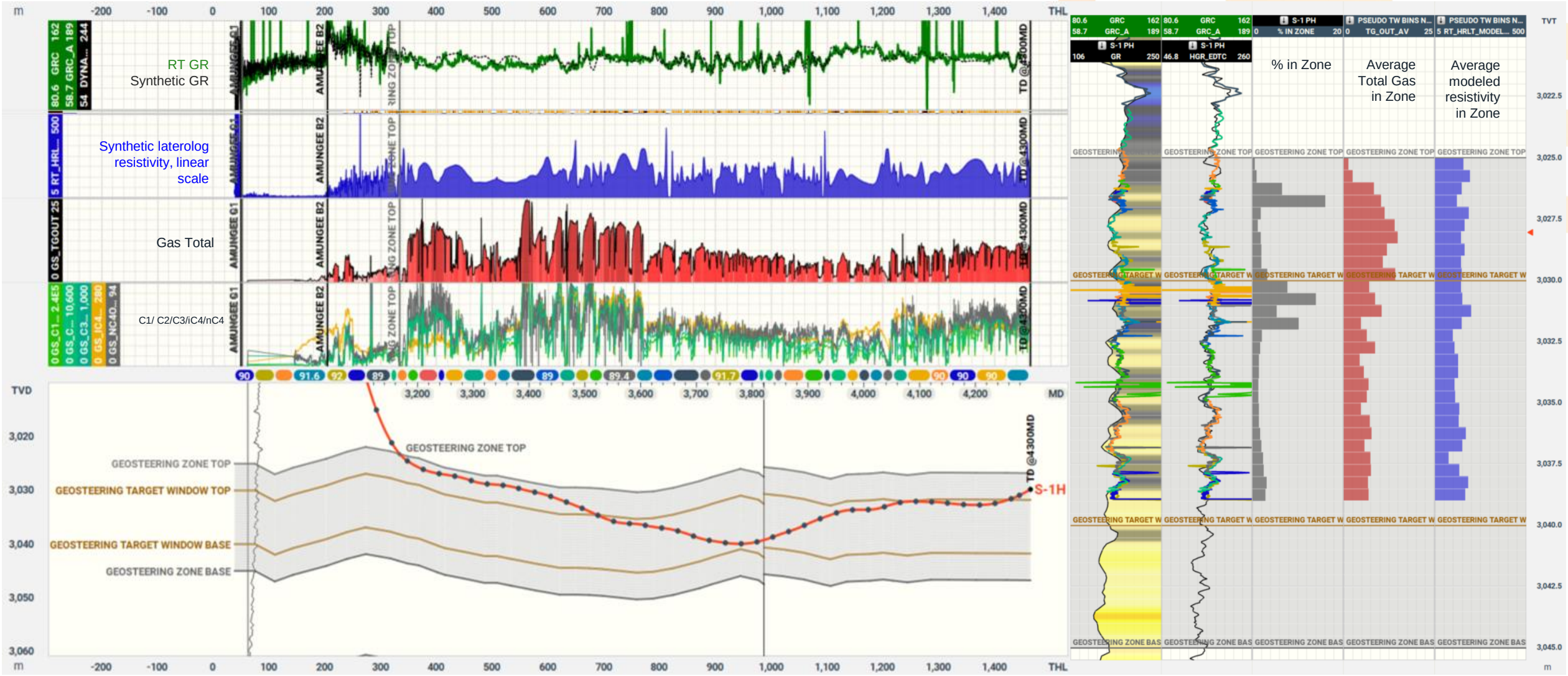

Map View Shenandoah 1-H area

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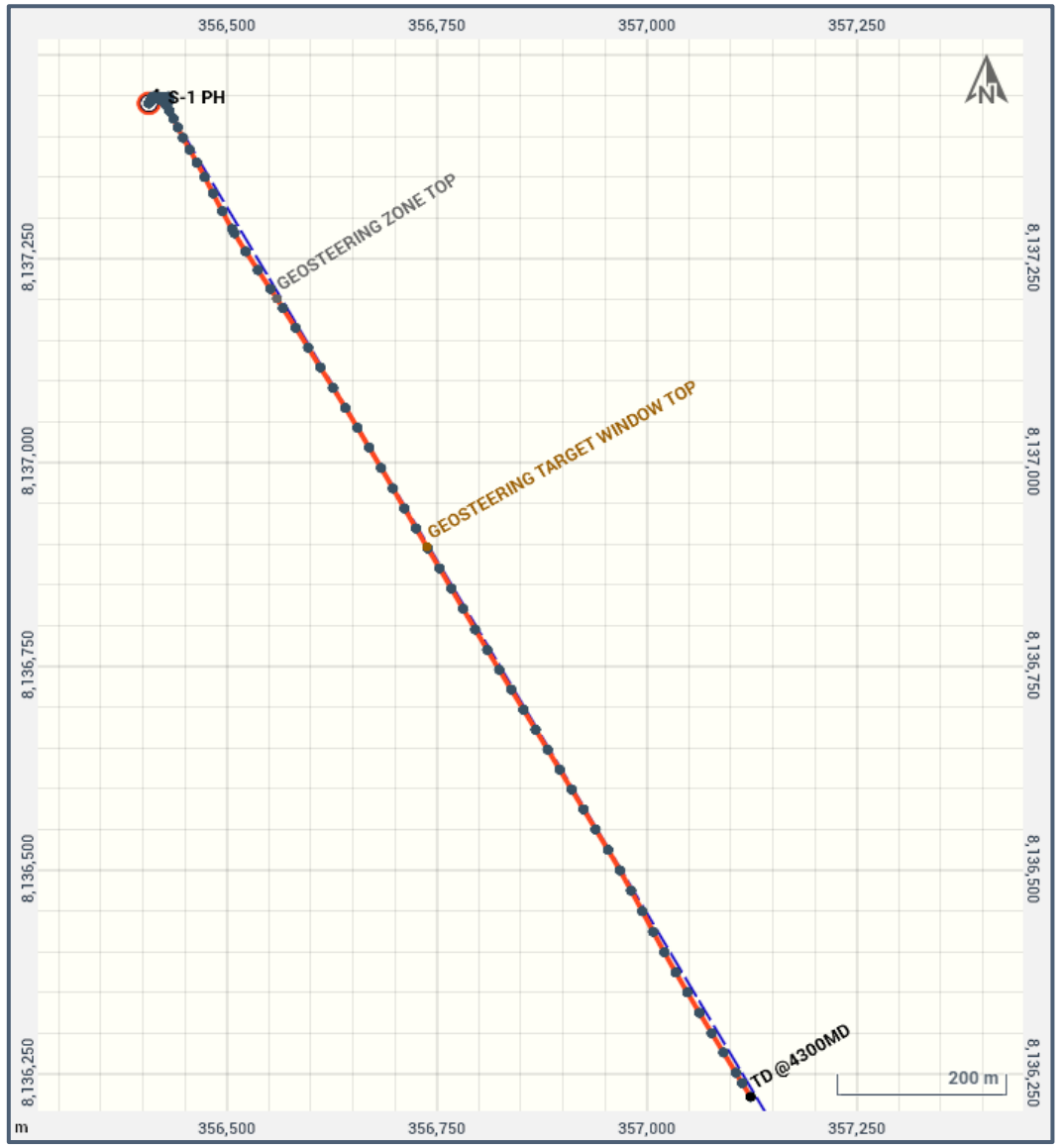
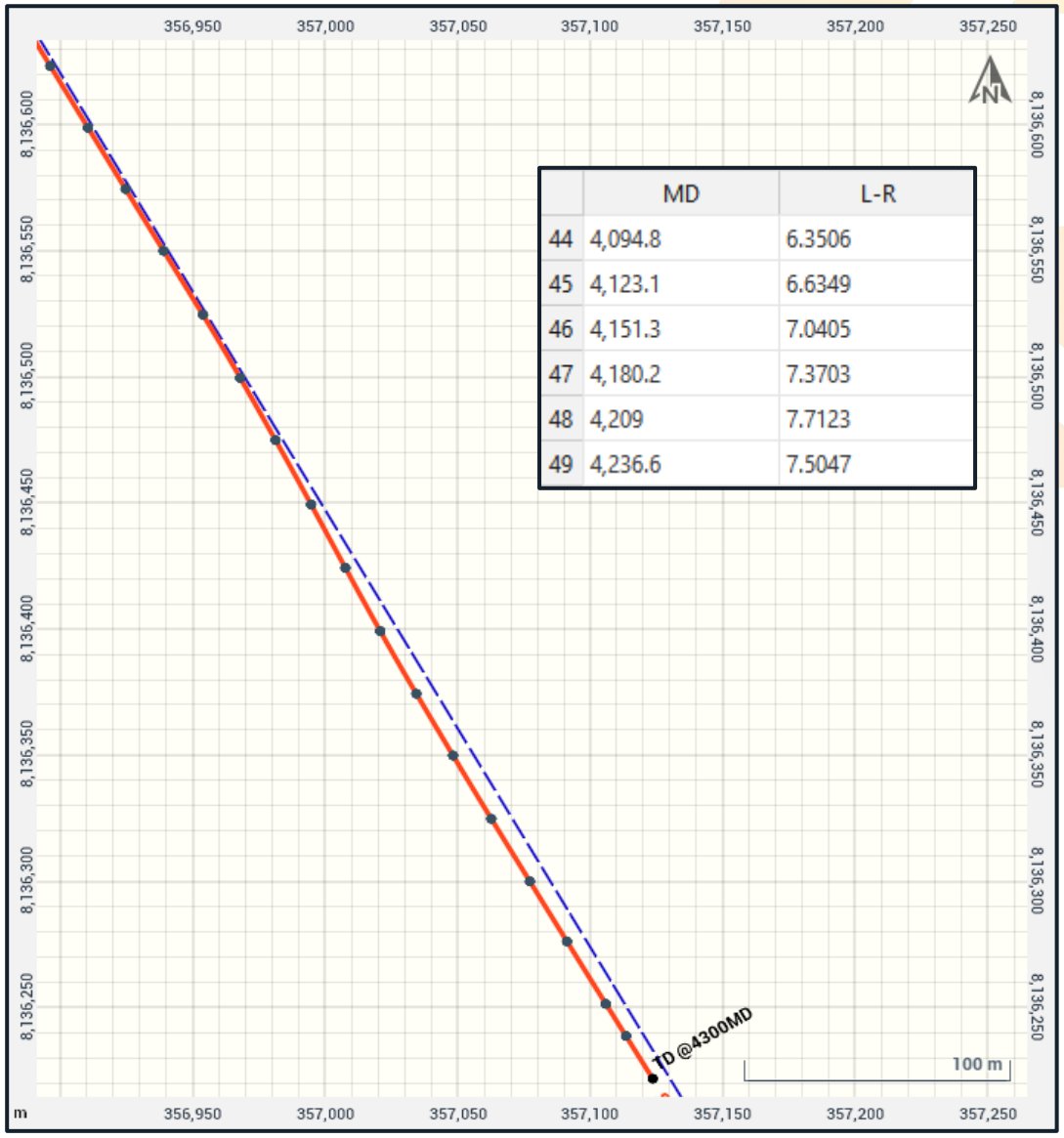


Map View S-1H trajectory and tops



	MD	L-R
44	4,094.8	6.3506
45	4,123.1	6.6349
46	4,151.3	7.0405
47	4,180.2	7.3703
48	4,209	7.7123
49	4,236.6	7.5047

Map View showing maximum deviation in AZ along the lateral section of about 7.5m right at 4236.6 MD

Summary

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- ROGII team delivered geosteering service 24/7
- GR logs and Azimuthal GR logs-based interpretations, in combination with updated dynamic GR log and Dynamic images calculated from Type well logs , support the geosteering process, RT feed of data allow updating StarSteer geosteering model to make informed decisions to adjust wellpath inside TVD window interval.
- Good correlation, when compared RT logs and Type well provided logs. Also, Pseudo Type well logs generated based on interpretations made for the intervals, drilling up and down in stratigraphic section, matches with horizons interpreted bed dip trend.
- Sinusoid features interpreted from RT GR image supported interpretation for the well path drilled, although in some intervals image interpretation was challenging
- At ~3822m MD, Interpreted a displacement of ~1.9mTVD, that displacement sets well path into a deeper stratigraphic TVD position.
- At about 4180 m MD due to large circulation hours on mud motor it was decided to minimize sliding interval to prevent mud motor failure
- Client decided to TD well at 4300 m MD
- Drilled Total Lateral length from Reference Point (Geosteering Zone Top @3169.4mMD) = 1130.67m MD, reservoir contact 100%, assuming the target interval between Geosteering Zone Top and Geosteering Zone Base.
- Streamed issues were reported and solved efficiently.

Observations:

- In sliding intervals GR image was not available, average GR noisy
- Faster response to changes from DD when giving recommendations for adjustments with a target line in TVD/VS/Projected inclination
- Strong BHA build tendency