

PL 544 Relinquishment Report

August 2016

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1. Summary and Conclusion

The evaluation of PL 544 resulted in a prospect portfolio consisting of two main prospects; Biotitt and Fosen which were drilled by wells 16/4-7 and 16/4-10 respectively during the PL544 licence period. Exploration well 16/4-7 drilled Jurassic sandstones in a four-way dip closure beneath the 16/4-4 well in the Biotitt prospect but the well was dry – apparently lacking effective migration. 16/4-10 sought the same Jurassic sandstones updip in a small 4-way with stratigraphic upside in the Fosen prospect. It encountered middle Jurassic reservoirs but was also dry, lacking either effective migration or seal. Remaining prospectivity in PL 544 is assessed to be low so a decision to relinquish the license was made by the partnership on the 9th of August 2016.

2. Introduction

PL 544 comprises 256 km² of block 16/4. The license is located in the southern part of the Utsira High, just south of the Luno II discovery (Fig. 1).

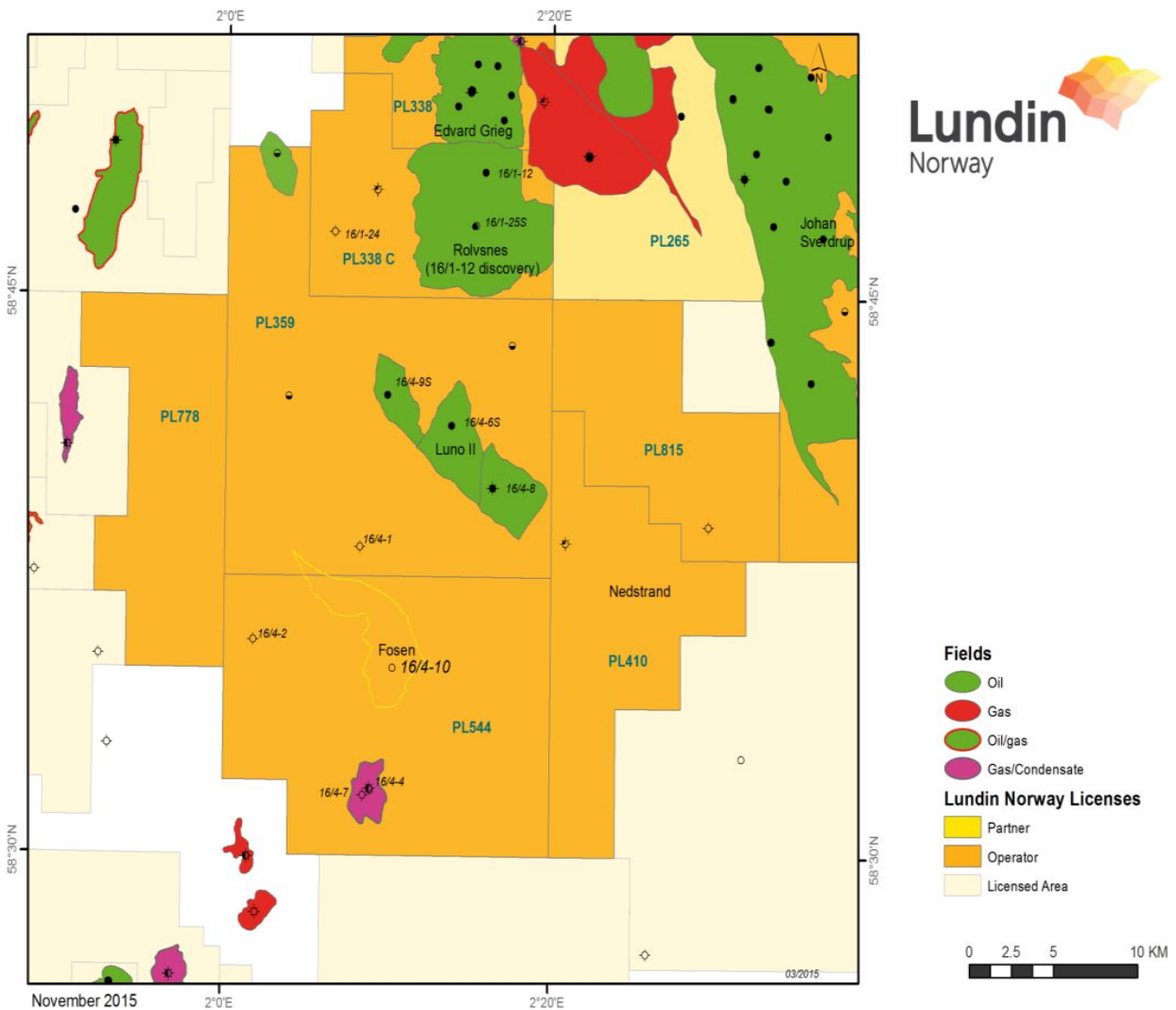


Figure 1: PL 544 location with wells 16/4-7 (Biotitt) and 16/4-10 (Fosen).

3. License award

PL544 was awarded as part of TFO 2009 on 19th February 2010, with a five years (3+2) initial license period to Lundin (70% and operator) and Bayerngas (30%). This partnership drilled the 16/4-7 well. The initial period was extended with deadline for BOV decision 19th February 2017. From 29th of February 2016 Lundin reduced its share to 40% (kept operatorship) divesting 30% to Lime Petroleum and Wellesley Petroleum took over Bayerngas' 30% share. This Partnership drilled the 16/4-10 well and kept the licence up to relinquishment

The 2009 application identified a single main prospect comprising Jurassic reservoir target (Fig. 2) beneath the Palaeocene gas condensate discovery proven by well 16/4-4 (drilled by Statoil in 2007 in former licence PL339) which TD'd in the Upper Cretaceous.

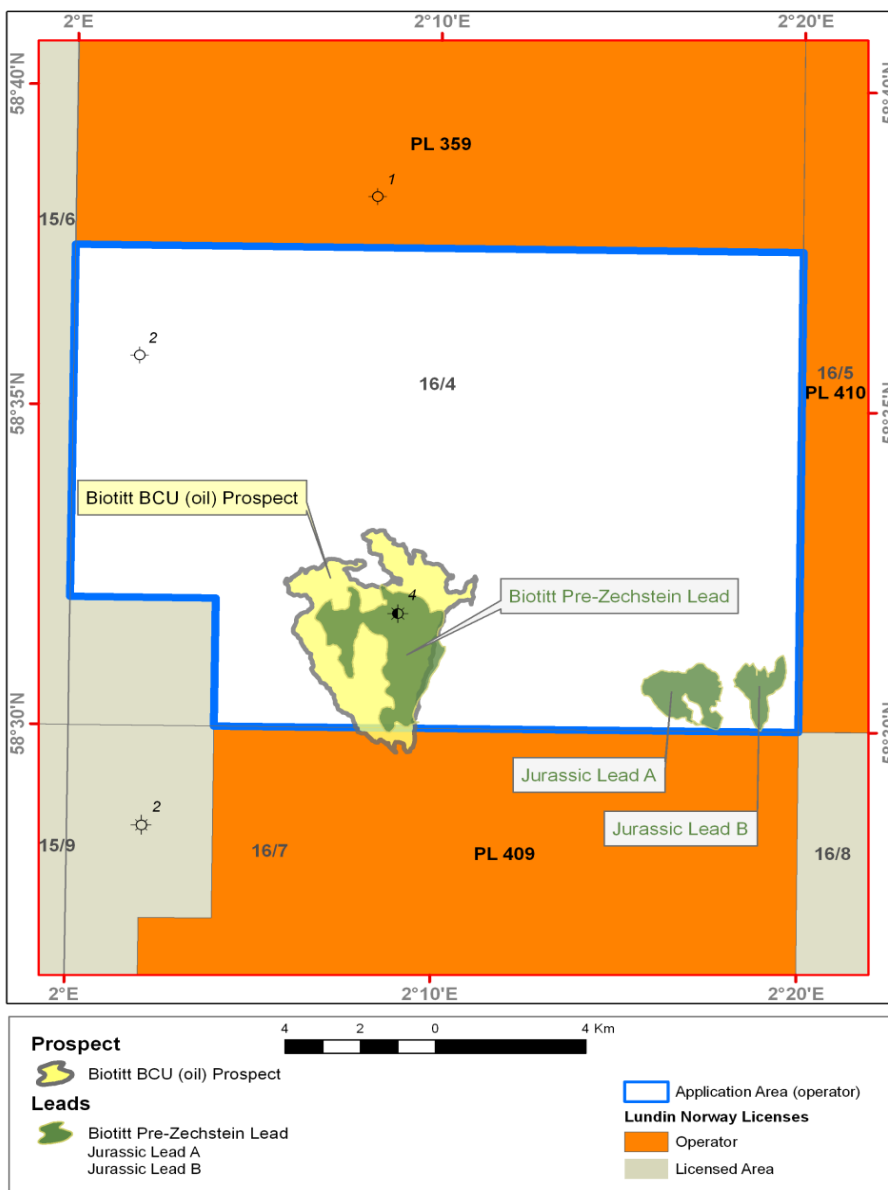


Figure 2: Prospectivity portfolio at APA 2009.

4. Completed work program and special studies

The original work commitment was to conduct relevant geological- and geophysical studies and to drill an exploration well into the Jurassic/Triassic succession beneath the Paleocene Biotitt discovery.

The original drilling commitment was fulfilled by exploration well 16/4-7 in 2013.

Geophysical studies utilized the 3D survey LN10M06 for defining the Biotitt Jurassic prospect and drilling well 16/4-7. LN10M06 is a merge of seven 3D seismic surveys. This 1783 km² prestack merge survey was reprocessed in collaboration with PL 359. A post stack merge of the same seven surveys, LN10M01 was also used in the interpretation.

A new Broadseis survey (LN12M02) was acquired by Lundin in 2012 across its multiple licences in the area. This high quality dataset has formed the basis for prospect interpretation and well placement and depth conversion since 2013. Lundin regularly undertakes re-imaging reprocessing of this dataset for different objectives across the region, creating many volume versions which are shared with Partners.

Depth conversion has been done using calibrated stacking velocities. The neighboring wells in blocks 15/6, 16/4, 16/5, 16/7 and 16/8 were used to adjust depth surfaces at the well locations.

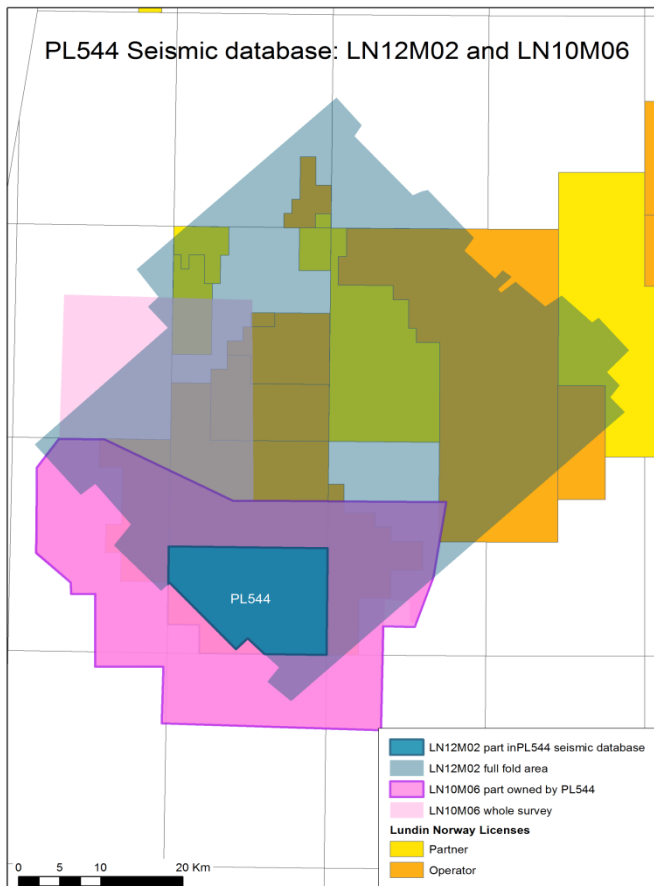


Figure 3: 3D seismic coverage of the LN12M02 and LN10M06 datasets.

5. Pre-drill prospectivity evaluation

Biotitt Prospect

The Biotitt prospect comprised a four-way dip closure with Jurassic objectives. The trap covered a closure of some 20km² with a vertical relief of 117 m. The prognosed apex was 2423 m MSL.

The primary target was sandstones of mid-upper Jurassic age in Hugin to Heather Formations. Uppermost Jurassic Ula Fm sandstones in a Kimmeridgian shoreface were identified in the well implying that the 'Ula trend' play extends northwards onto the Ling High Terrace and represents a new play type due to the relatively 'late' onlap of these Upper Jurassic sediments onto older Triassic, Skagerrak sediments.

Cap rocks of the Biotitt prospect were assumed to be lower Cretaceous shales or Chalk or shales. And the main risk was assessed to be migration into the Jurassic reservoir.

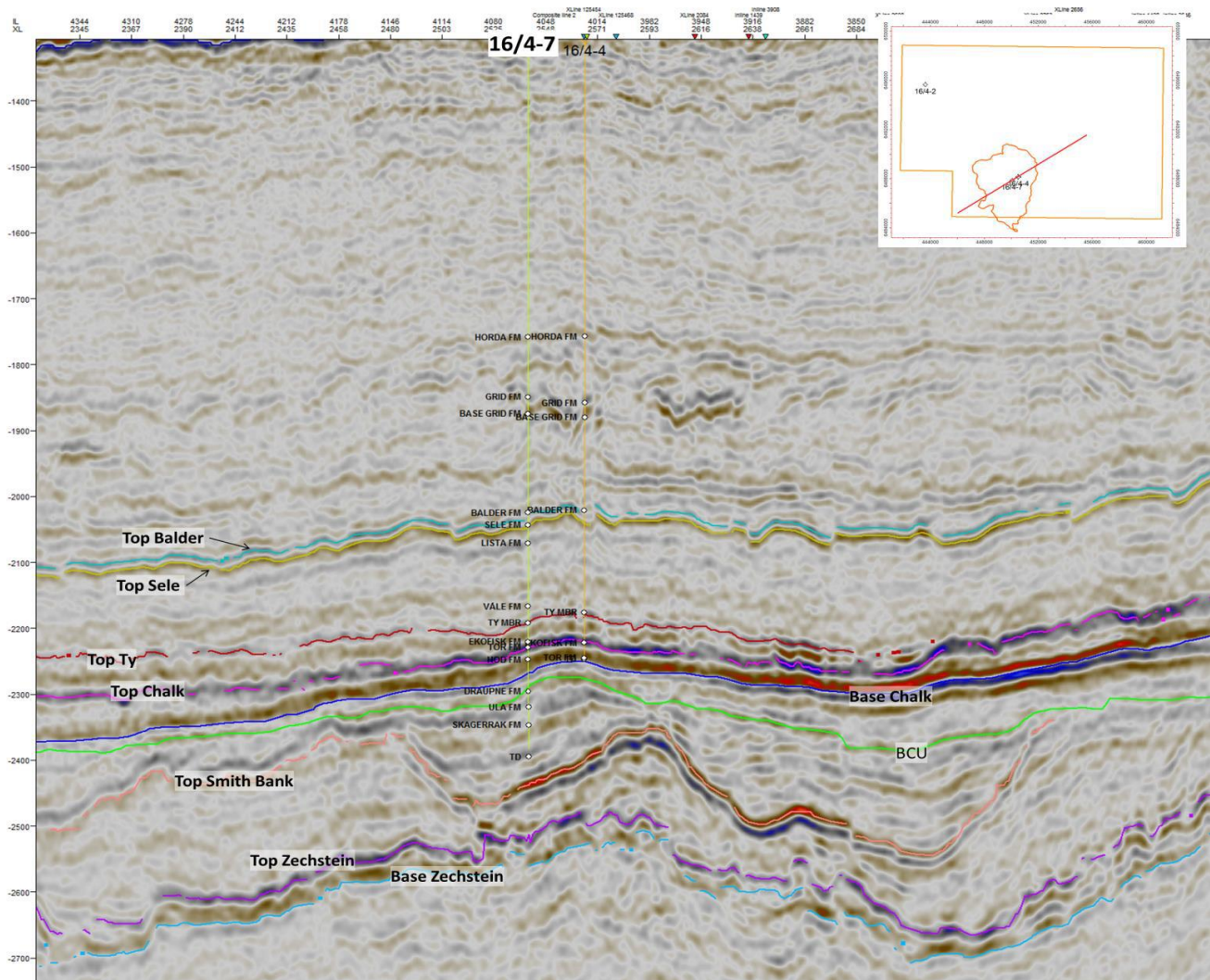


Figure 4: Random Seismic Line between wells 16/4-4 and 16/4-7.

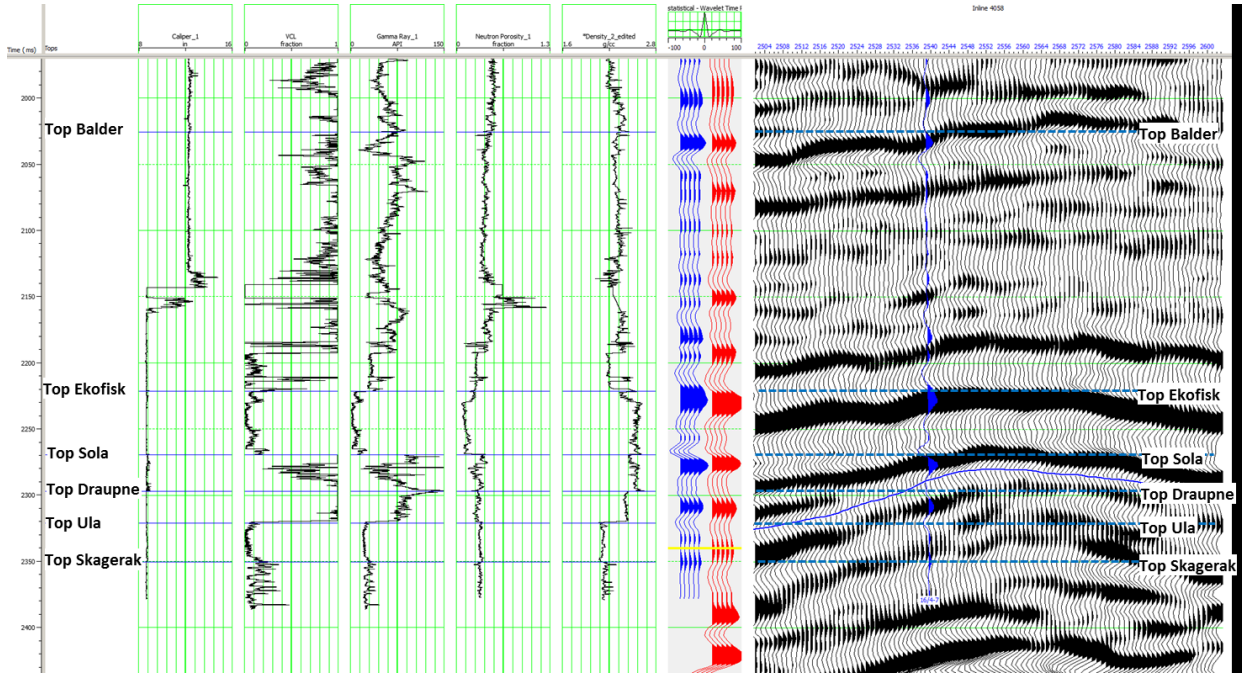


Figure 5: Seismic tie to well 16/4-7 to LN10M06.

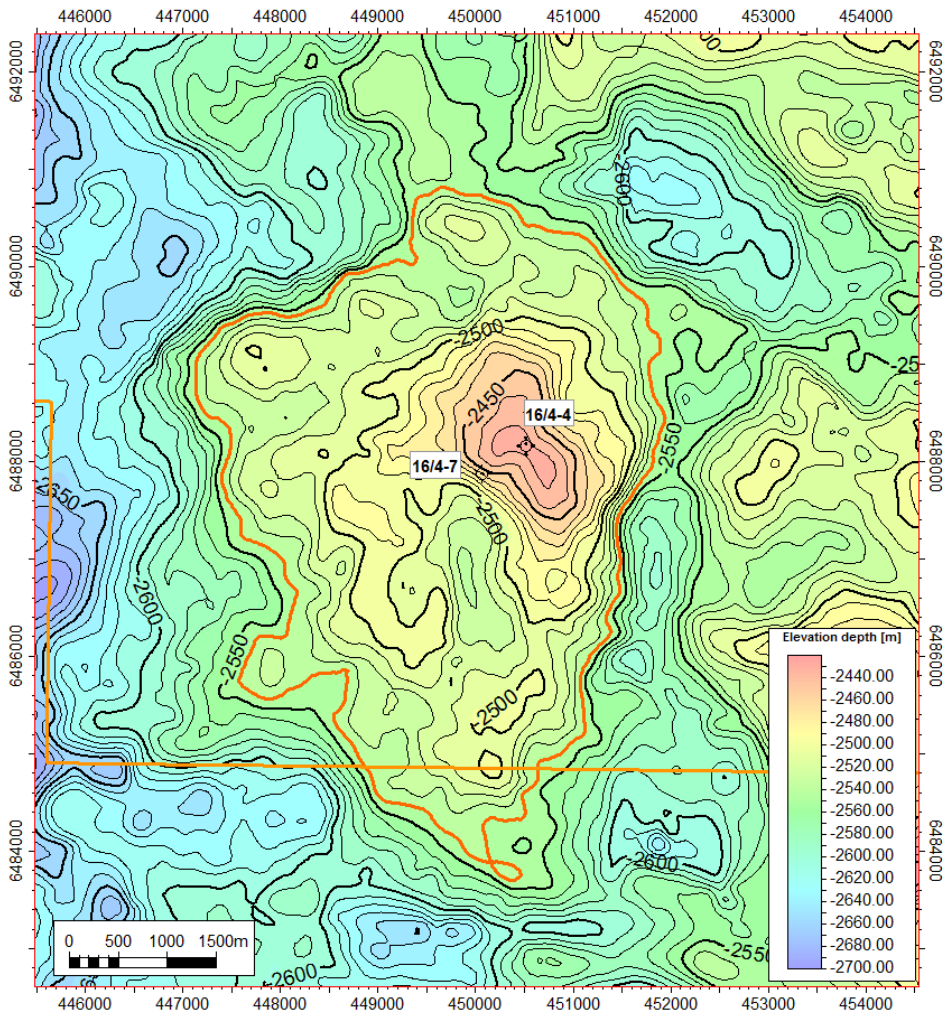


Figure 6: Well 16/4-7, top reservoir / BCU depth structure map.

Fosen Prospect

The Fosen prospect comprised Jurassic reservoir sands within a small four-way dip closure with upside stratigraphic-trap potential. The pre-drill top reservoir (BCU) map is shown in Figure 7, which also illustrates the prospect outline. The prospect trap comprised a closure of 21km² with a column of 88 m. The prognosed apex was 2357 m MSL. Base case pre-drill volumes in place was estimated to be 192 MMboe.

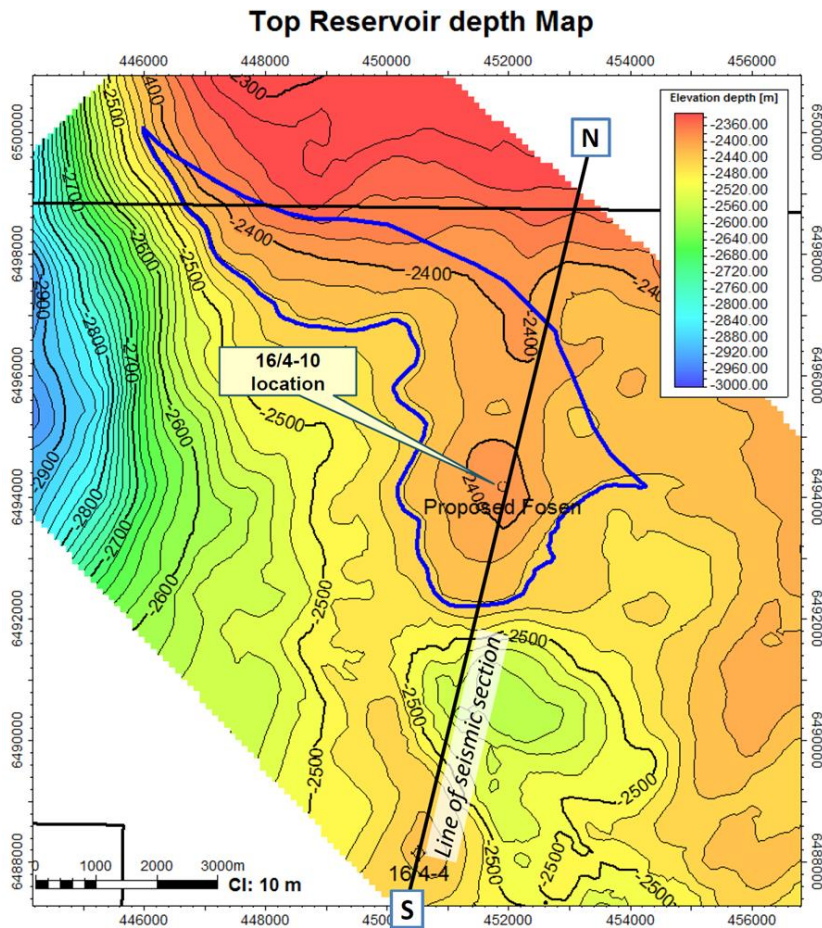


Figure 7: Pre-well Top Reservoir Depth Map showing prospect outline.

The prospect was defined by the subcrop/pinchout of top Smith-Bank reflector and a BCU depth map. Draupne to Hugin sands were envisaged as reservoir, with Upper Jurassic/Cretaceous shales assumed to constitute the topseal. Smith Bank Fm was needed to be a base seal to prevent trapped hydrocarbons leaking laterally updip. The semi regional setting of the prospect in map and section form are shown on Figures 8 and 9 respectively.

Key risks were identified to be effectiveness of the Smith Bank base seal, the possible presence of sub-seismic Upper Jurassic thief sand and lack of effective migration into the trap. With the integrity of the base seal being the main risk factor. Accordingly a chance of success at 22% was suggested.

An overview of the petroleum systems showed that the Fosen prospect was in a more favourable position than the Biotitt prospect in light of the Luno 2 discovery.

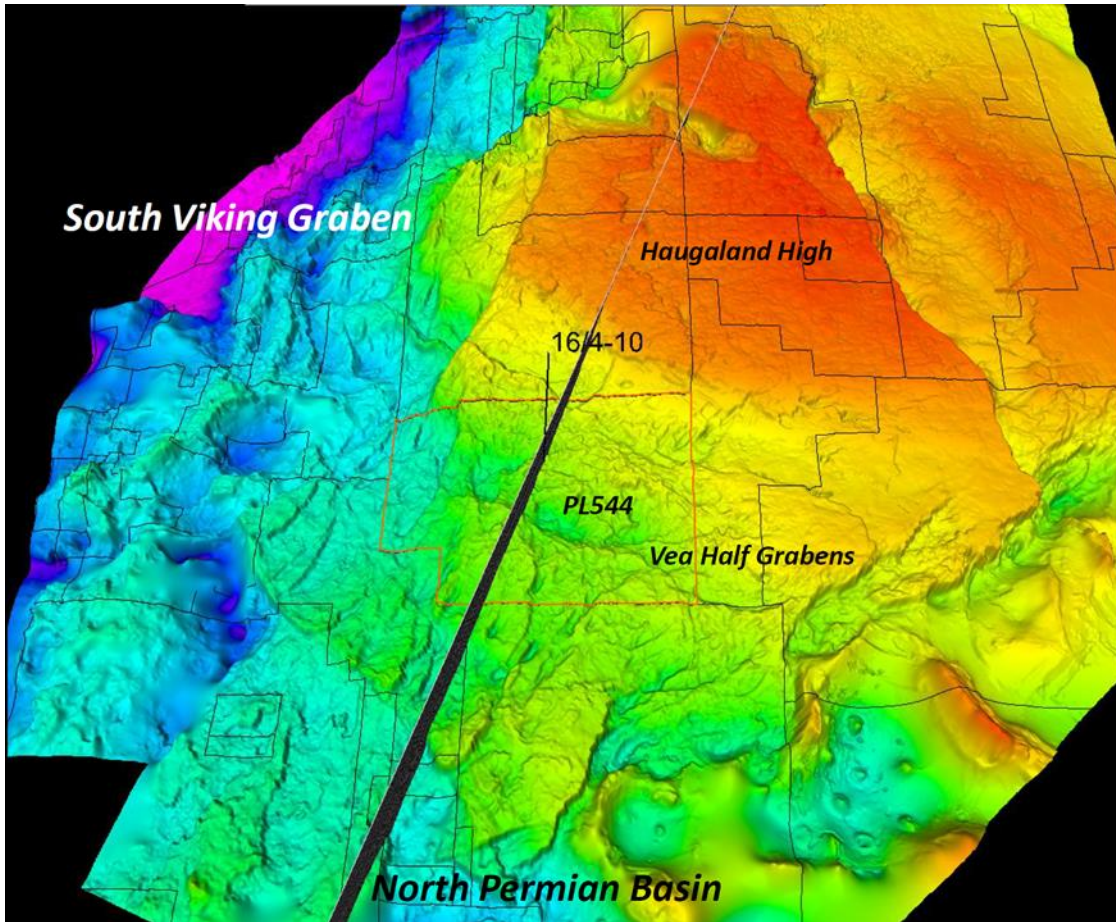


Figure 8: Location of 16/4-10 Fosen well in Top Permian Surface, showing location of seismic line of Figure 9.

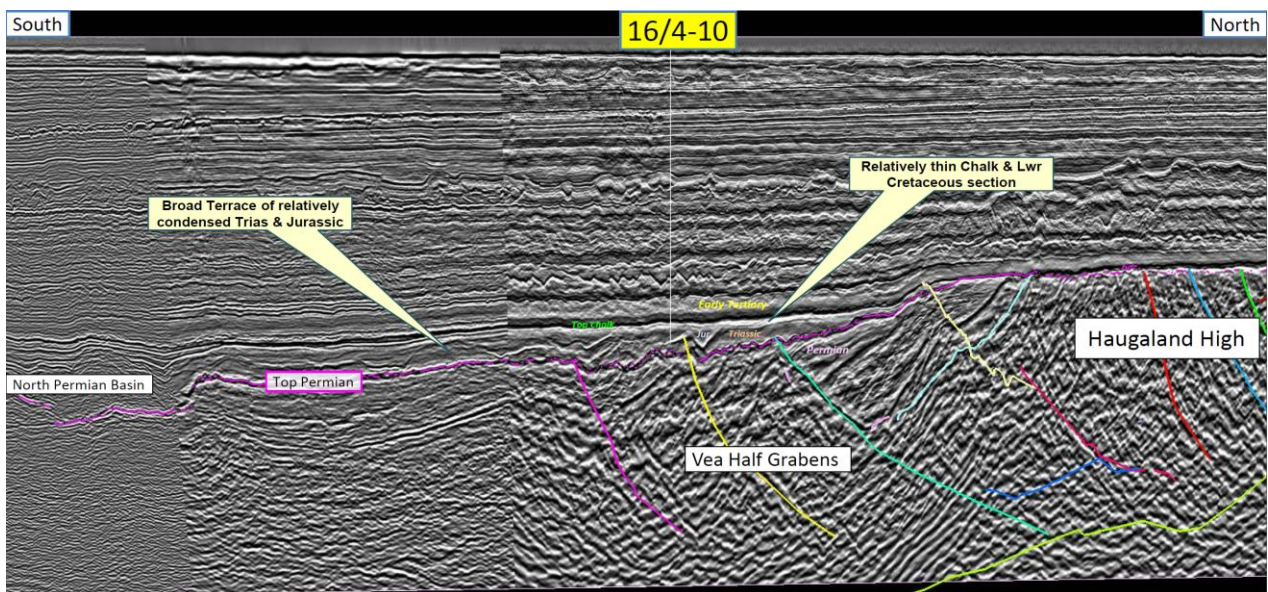


Figure 9: Regional Seismic Line illustrating structural setting of 16/4-10 well in context of Haugaland High to north and North Permian Basin to South. Line location shown in Figure 8.

6. Well results

16/4-7 (Biotitt)

The well was drilled as a vertical well at the following location:

X: 450081,97 m E	Y: 6487872,88 m N	UTM Zone 31N
Lat: 58°31'37.87"N	Long: 2°8'34.40"E	ED-50
Line intersection: (LN10M06)	Crossline 2539	Inline 4058

The well was spudded on the 23.07.2013 and reached a TD of 2600.0 m RKB in the Triassic Skagerrak Fm. The well was plugged and abandoned on the 21.08.2013.

Well 16/4-7 was successfully drilled and encountered Jurassic sandstones at 2488.8 m TVD RKB (2463.8 m TVD MSL), only ~8 m deeper than prognosed. These sandstones were defined as Kimmeridgian age and consequently are assigned to be Ula rather than Hugin Formation. Prognosed versus actual lithology is shown in Figure 10.

The reservoir was of excellent quality, but was water-filled with only very weak visible oil shows seen in two sidewall cores. With an apparently robust 4-way closure identified, it seems that this prospect failed either due to lack of effective (sufficient) migration or due to topseal leakage. The thickness of the Ula Formation was 40 m.

Skagerrak Formation sandstones with good reservoir quality were found unconformably underlying the Ula Formation with very weak oil shows seen in a sidewall core taken at the top of the formation.

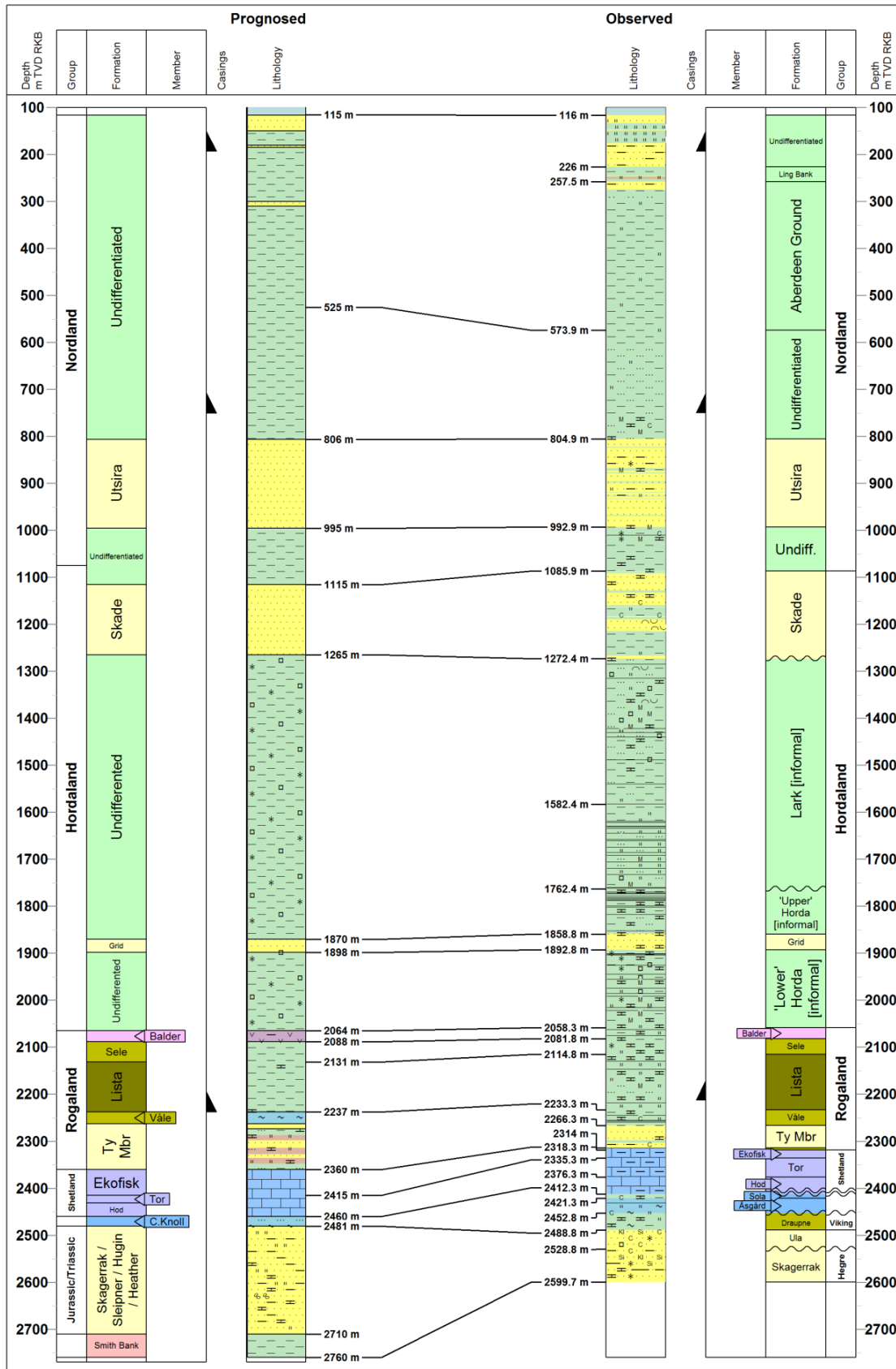
Ty Formation sandstones were encountered as prognosed in the well with a gross thickness of 47.5 m. The Ty Formation sandstones were slightly pressure depleted compared to neighboring well 16/4-4, probably reflecting Sleipner East production nearby. The Ty Fm was wet in the well as it drilled outside the small 4-way closure that trapped the 16/4-4 Palaeocene discovery. The well was plugged and abandoned as a dry well.

Results versus prognosis

Down to top Ty Member the Formation tops came in as within the assigned uncertainty ranges in the prognosis.

The Top Chalk came in ~42 m shallower than predicted and the internal Shetland Group showed discrepancies up to ~80 m (Top Tor) compared to the prognosis. The Shetland Group had similar thickness as predicted.

A thicker Cromer Knoll Group and Draupne Formation were developed at well location, hence the Top Reservoir prognosis was only predicted ~8 m too shallow.



Well: 16/4-7

Gravitas template v2.05 [20110802] - AJC Document date 04.02.2014

Figure 10: Well 16/4-7, pre and post drilling correlation. Depths in TVD.

Table 1: Well 16/7-4, reservoir properties.

Zone Name	Interval	Gross	Reservoir Summary			
			Net	N/G	PHIE	SW
	m MD RKB	m	m		frac	frac
Ty fm	2254-2318	64	45	0.703	0.265	1.0
Ula	2487-2529	42	41.65	0.992	0.32	1.0
Skagerrak	2529-2576	47	47	1.0	0.294	1.0

The cut-off criteria used for the Ty and Ula and Skagerrak Formations:

Net reservoir:

Volume of clay: ≤ 0.5

Porosity: ≥ 0.1

No pay has been calculated due to lack of hydrocarbons in the well.

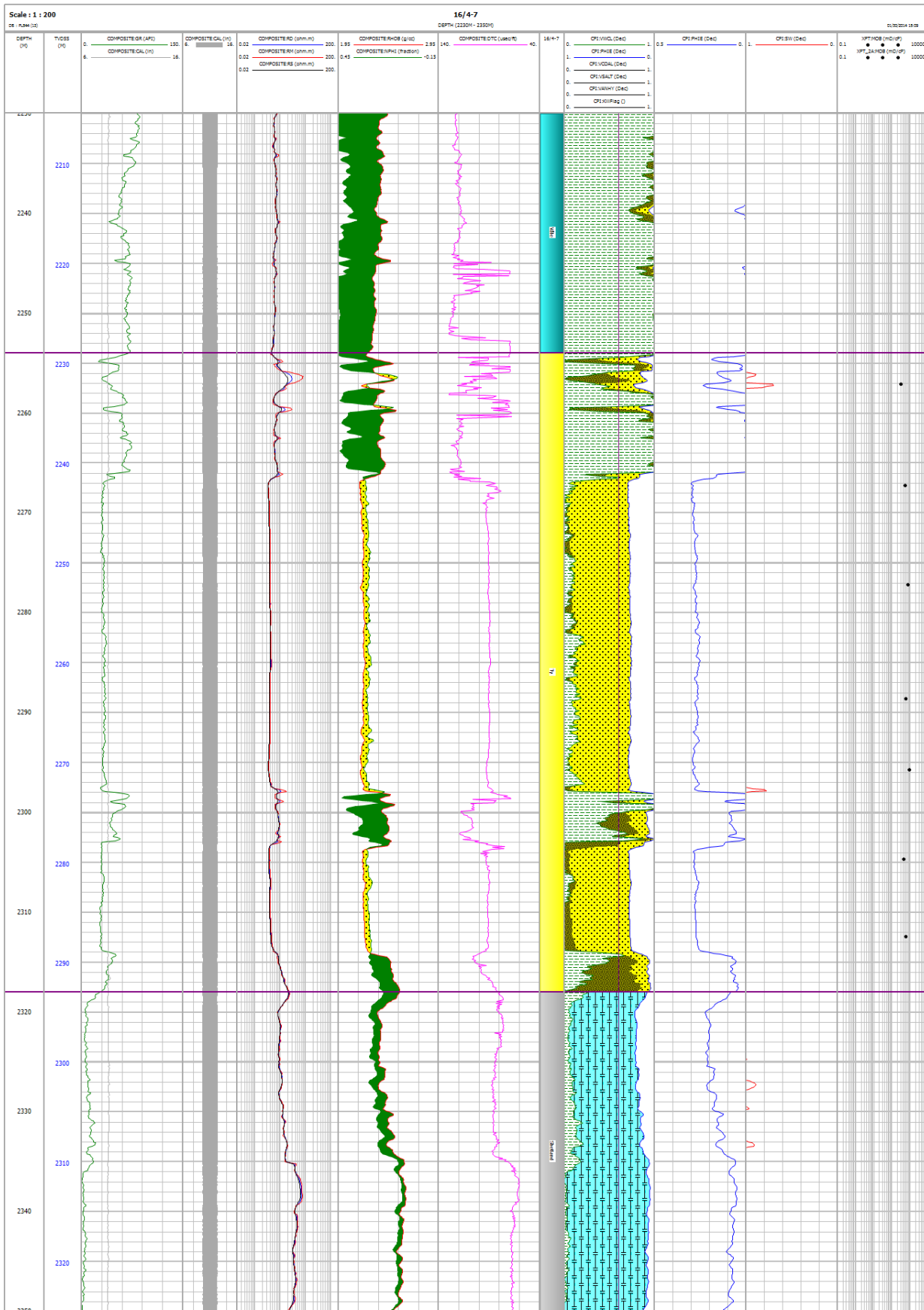


Figure 11: Well 16/4-7, petrophysical interpretation of the Ty Formation.

16/4-10 (Fosen)

The well was drilled at the following location:

X: 451899.85 m E	Y: 6494197.58 m N	UTM Zone 31N
Lat: 58° 35' 3.07" N	Long: 2° 10' 21.94" E	ED-50
Line intersection: (LN10M06)		

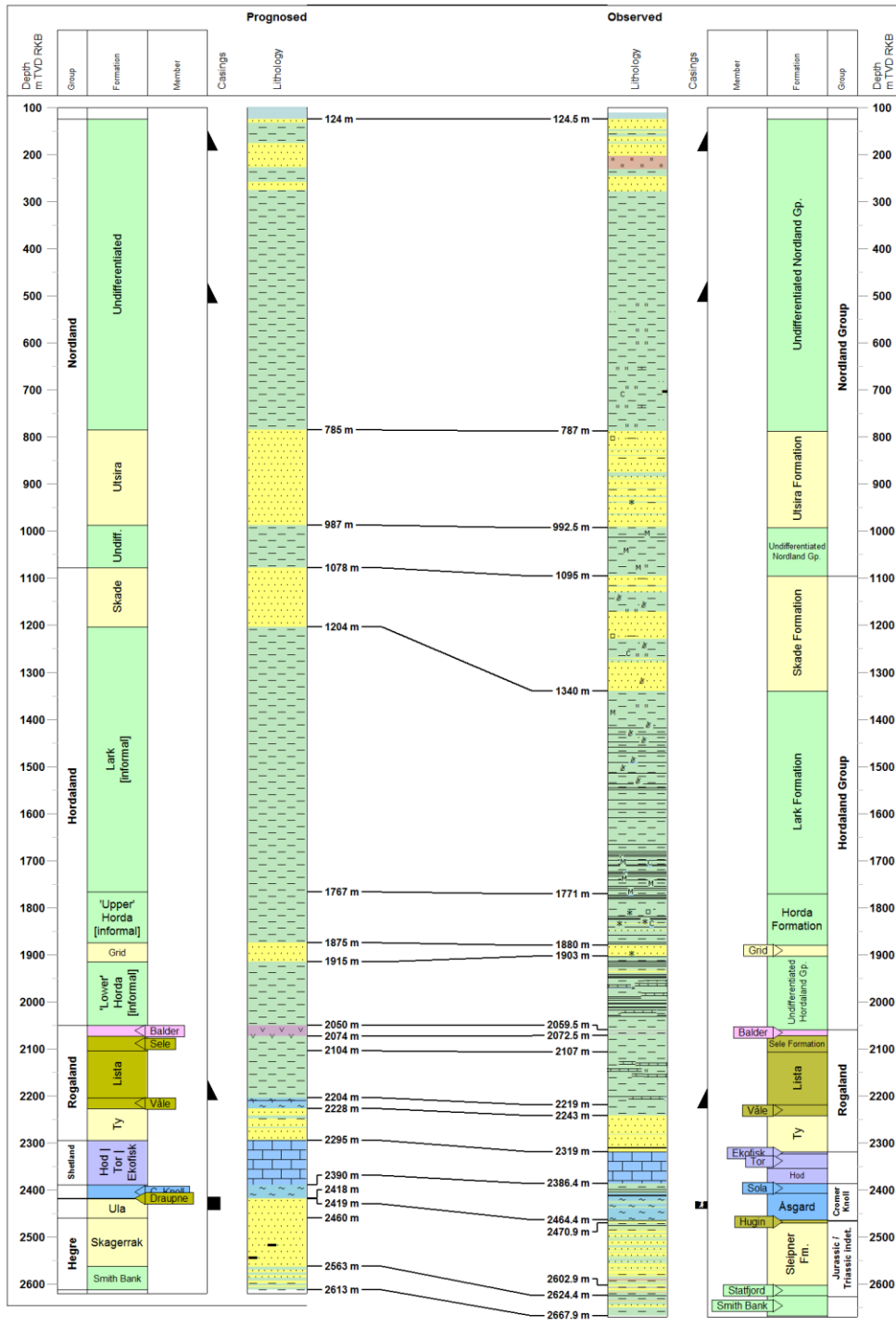
The well was spudded on the 24.01.2016 and reached a TD of 2668.0 m RKB in the Early Triassic Smith Bank Fm. The well was plugged and abandoned on the 08.03.2016.

The well encountered a thick section of Jurassic reservoir which was mostly dated as middle Jurassic age with good reservoir properties. The reservoirs were not hydrocarbon bearing but did contain weak hydrocarbon shows.

The well was dry. Reason for failure is most likely due to a lack of efficient migration into the trap, although an ineffective lateral seal updip is also a potential reason for failure.

The well drilled through the soft seismic marker and TD'd in Triassic Smith Bank Formation. Limited data could be gathered from the lower sections of the well due to extensive caving problems causing fill of the TD section and difficulty re-entering the hole.

No hydrocarbons were encountered in the Ty Fm – there was no closure at the well location.



Well: 16/4-10

Gravitas template v2.05 [20110802] - A/C Document date 16.05.2016

Figure 13: Well 16/4-10, pre and post drilling correlation. Depths in TVD.

Table 2: Well 16/4-10, average reservoir properties.

Zone Name	Interval		Gross	Net	N/G	Av Phi	Av Sw	Av Vcl
	Top	Bottom						
Ty	2240	2317	77	74.75	0.971	0.243	0.994	0.119
Hugin	2464.5	2471	6.5	5.5	0.846	0.198	0.943	0.237
Sleipner	2471	2603	132	85.9	0.651	0.22	0.936	0.141
Statfjord	2603	2624.5	21.5	4.6	0.214	0.19	0.929	0.137
Smith_Bank	2624.5	2647.49	22.99	5.34	0.232	0.161	0.998	0.115

Cut-off criteria used:

Net reservoir:

Volume of clay: ≤ 0.5

Porosity: ≥ 0.10 for Ty Formation

≥ 0.12 for Hugin-, Sleipner Fm and Statfjord Gp and
Smith Bank Fm.

No pay has been calculated due to 16/4-10 is a dry well.

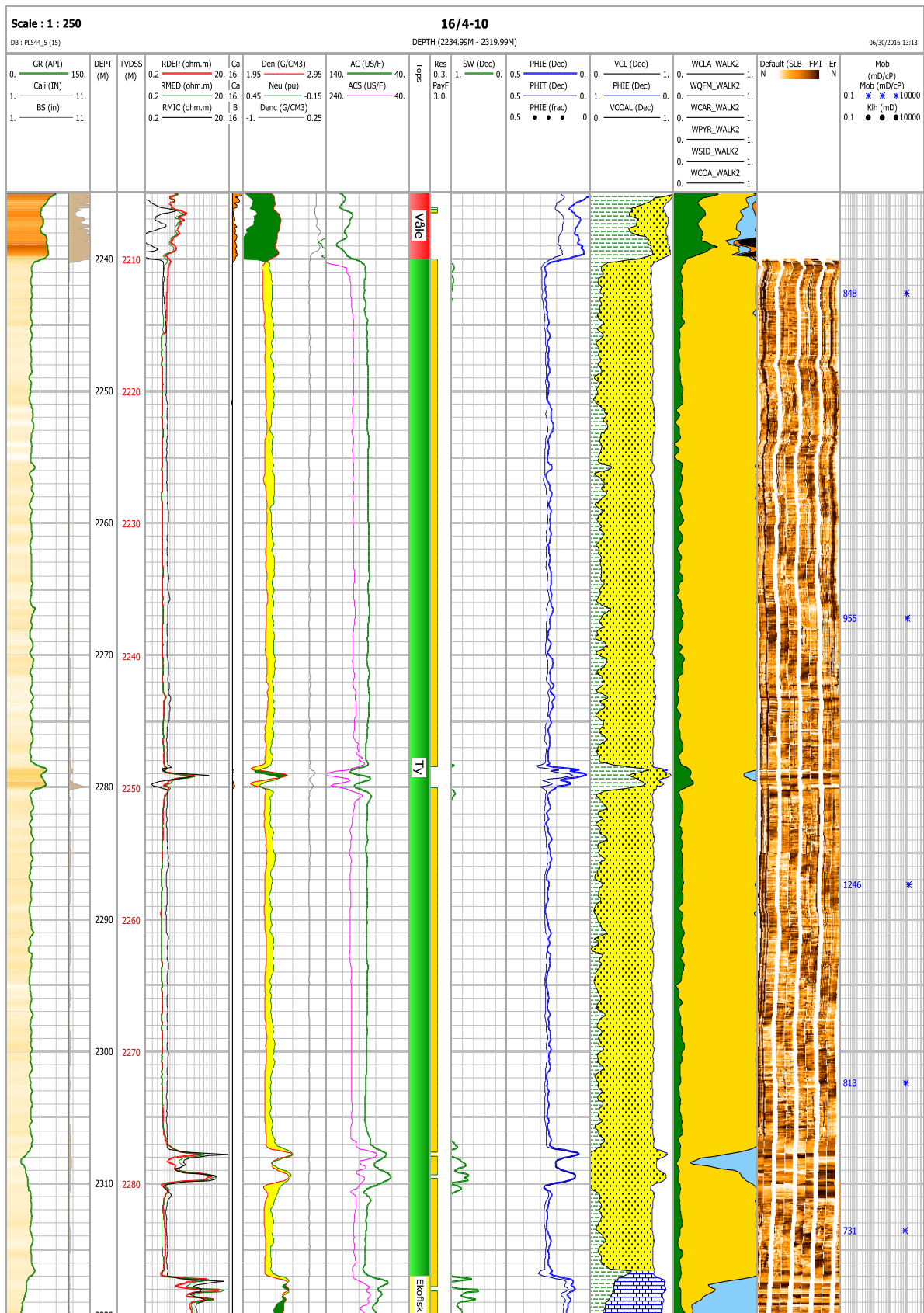


Figure 14: Well 16/4-10, Ty formation - petrophysical interpretation.

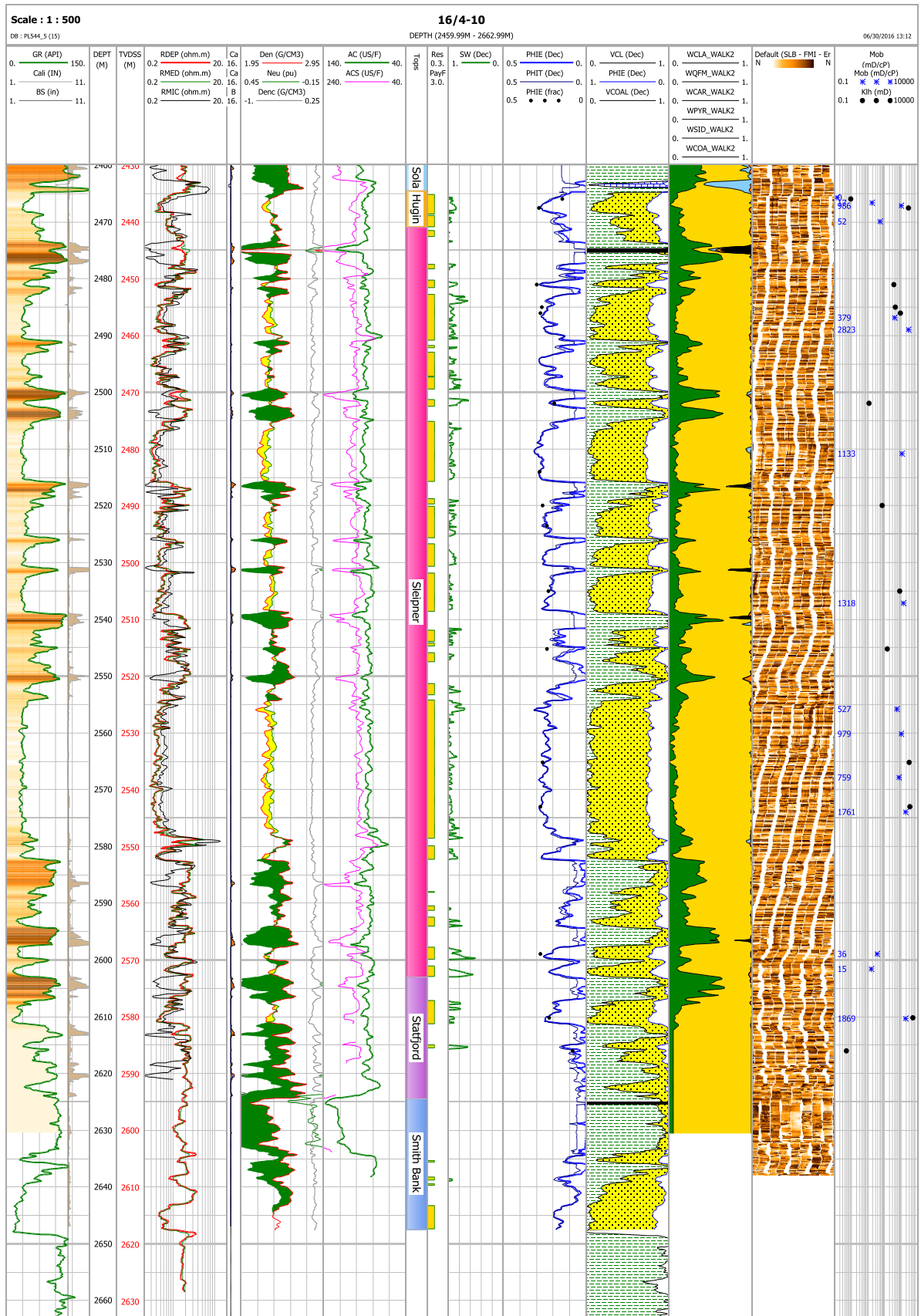


Figure 15: Well 16/4-10, Hugin-, Sleipner formations, Statfjord group and Smith Bank formation - petrophysical interpretation.

7. Remaining prospectivity evaluation

The remaining prospectivity in PL 544 is interpreted to be low. The two wells drilled within the license area (Biotitt, 16/4-7 and Fosen, 16/4-10) have been defined as dry. Subsequent analysis of well data and interpretation of seismic data does not indicate enhanced prospectivity within the license.

The Fosen Sør prospect is a directly analogous prospect geometry to that tested by the Fosen well – a Jurassic stratigraphic trap. The Fosen result greatly increases the migration and trap risks for this prospect such that it is deemed very unlikely to contain any hydrocarbons. The 16/5-6 well drilled the Rome prospect in the summer of 2016 in the neighbouring licence to the east (PL 776) and it was also dry. With an apparently robust 4-way trap at BCU and (albeit poor quality) reservoir beneath the BCU closure, it seems that also that well failed due to a lack of efficient charge.

There are consequently no discoveries in the PL544 licence to take a DG2 (BOV) on or future prospects to drill within the licence acreage. The remaining prospectivity is considered unattractive and a decision to relinquish the license has been made by the partnership.