

PL482 Relinquishment report

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1 INTRODUCTION

1.1 License owners

Det norske oljeselskap ASA (65%) - Operator
Petoro AS (20%)
Skagen44 AS (15%)

1.2 Award and work program

The license was awarded on the 29th February 2008 for an initial period of 6 years following APA Licensing Round 2007 and applies to all formations. Work obligations include:

- Acquisition of adequate seismic survey and G&G work by 01.03.2010
- Drill or drop decision by 01.03.2010 - extended to 28.08.2010
- Decision on continuation by 01.03.2012 - extended to 01.03.2013
- Submit a PDO by 01.03.2014

The largest prospect, Skaugumsåsen (Fig. 1.1 and Fig. 1.2), was drilled in August - September 2011 by the Aker Barents drilling rig. The well was plugged & abandoned as a minor oil and gas discovery.

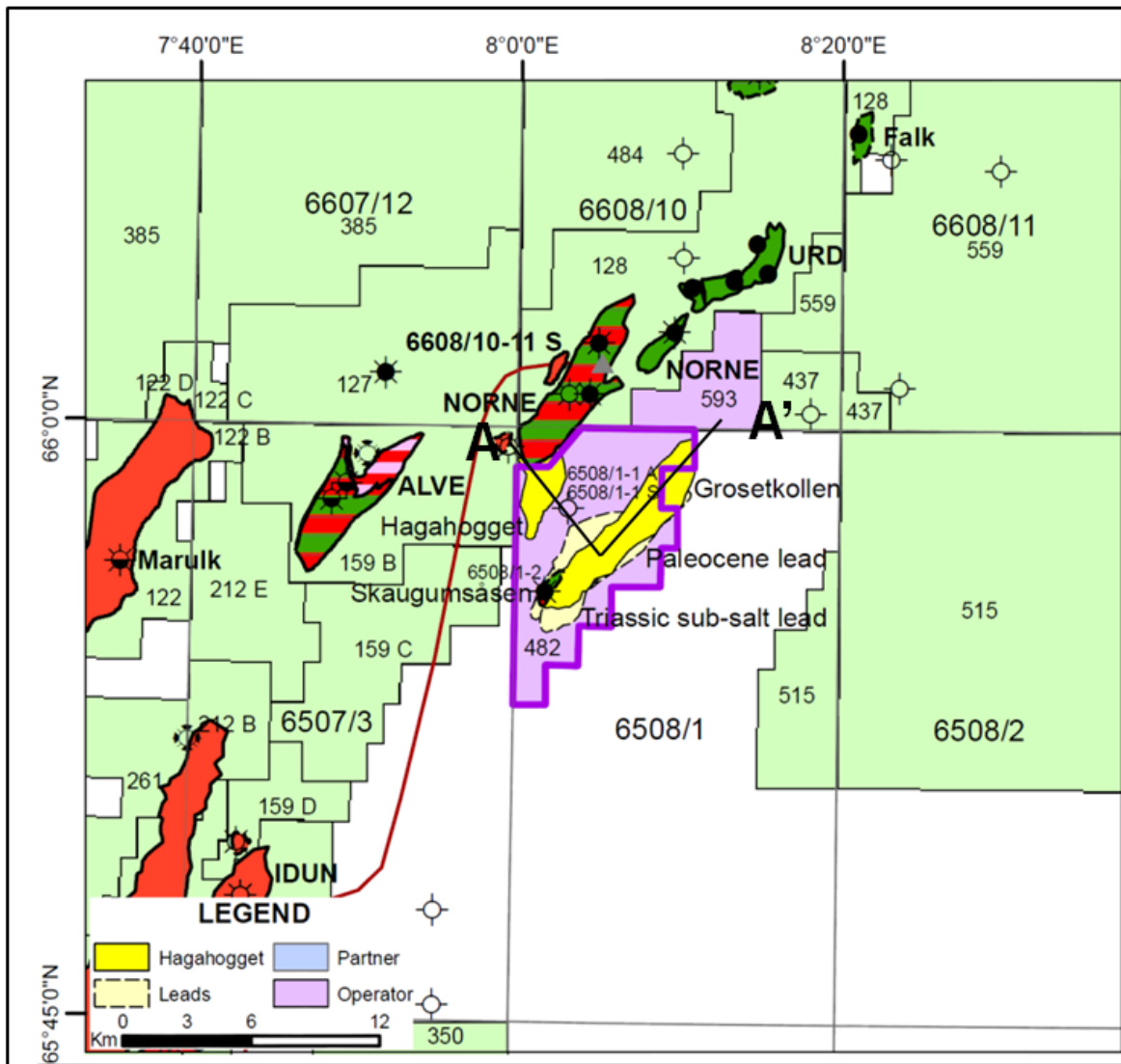


Fig. 1.1 PL482 license area with position of geoseismic section indicated

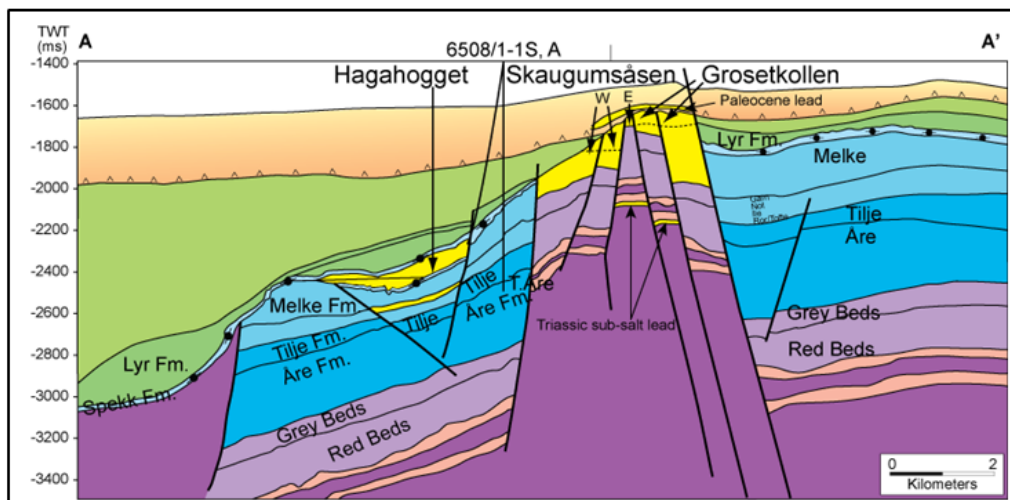


Fig. 1.2 Geoseismic section across the Nordland Ridge with the Skaugumsåsen, Grosetkollen and Hagahogget structures

1.3 PL482 pre-drill prospectivity

As part of the 2007 APA license application, a number of prospects and leads were identified within the proposed license area. The main play model for the prospects, the Late Triassic to Middle Jurassic NPD play NJL, JM-2, is proven with a number of fields and discoveries along the flank of the Nordland Ridge and on the Dønna Terrace. Reservoirs of Tilje and Åre formations have good quality and are present in almost all wells semi regionally. Structural traps for this play model are usually fault dependent, with varying degrees of sealing capacity. Migration from Spekk Fm. shales and Åre Fm. coals and coaly claystones is thought to be taking place from the Træna Basin to the west also at present. The main uncertainty for the Skaugumsåsen and Grosetkollen prospects in PL482 is whether hydrocarbons have migrated this far up onto the ridge, and whether the bounding faults are sealing. Main risk for the Hagahogget prospect is reservoir presence.

A table showing the expected recoverable reserves for all of the prospects and leads prior to drilling the first well in the license, is presented below, in Table 1.1.

Table 1.1 Summary of estimated recoverable reserves

PL 482					GROSS RECOVERABLE RESERVES / RESOURCES					
					Low		Base		High	
CATEGORY	RESERVOIR LEVEL	HC	RF (%)	POS (%)	Oil (MSm ³)	Gas (GSm ³)	Oil (MSm ³)	Gas (GSm ³)	Oil (MSm ³)	Gas (GSm ³)
PROSPECTS										
Skaugumsåsen W	L. Jurassic/U. Triassic	oil	25	22	4,2		7,5		11,4	
Skaugumsåsen E	L. Jurassic/U. Triassic	oil	25	11	2,7		4,3		6,2	
Grosetkollen	L. Jurassic/U. Triassic	oil	25	19	0,4		6,4		15,8	
Hagahogget*	U.-M. Jurassic	oil /gas	45/65	1	1,3	5	1,7	7,1	2,1	9
Leads										
Paleocene	Paleocene	gas		<10						
Triassic sub-salt	M. Triassic	oil		<10						

* Within license area

2 DATABASE

2.1 Seismic database

The seismic coverage of the license area is listed in Table 2.1 and shown in Fig. 2.1.

Table 2.1 Seismic database

Seismic survey	Cubes	Comment
EN0804	Near, far and full fold	Limited to the license area
ST04M14	Near, far and full fold	Used for AVO purposes
PL 593 3D Merge	Full fold	Merged SG9605M, ST9203 and ST03M03, ST04M14 and EN0804 (parts)

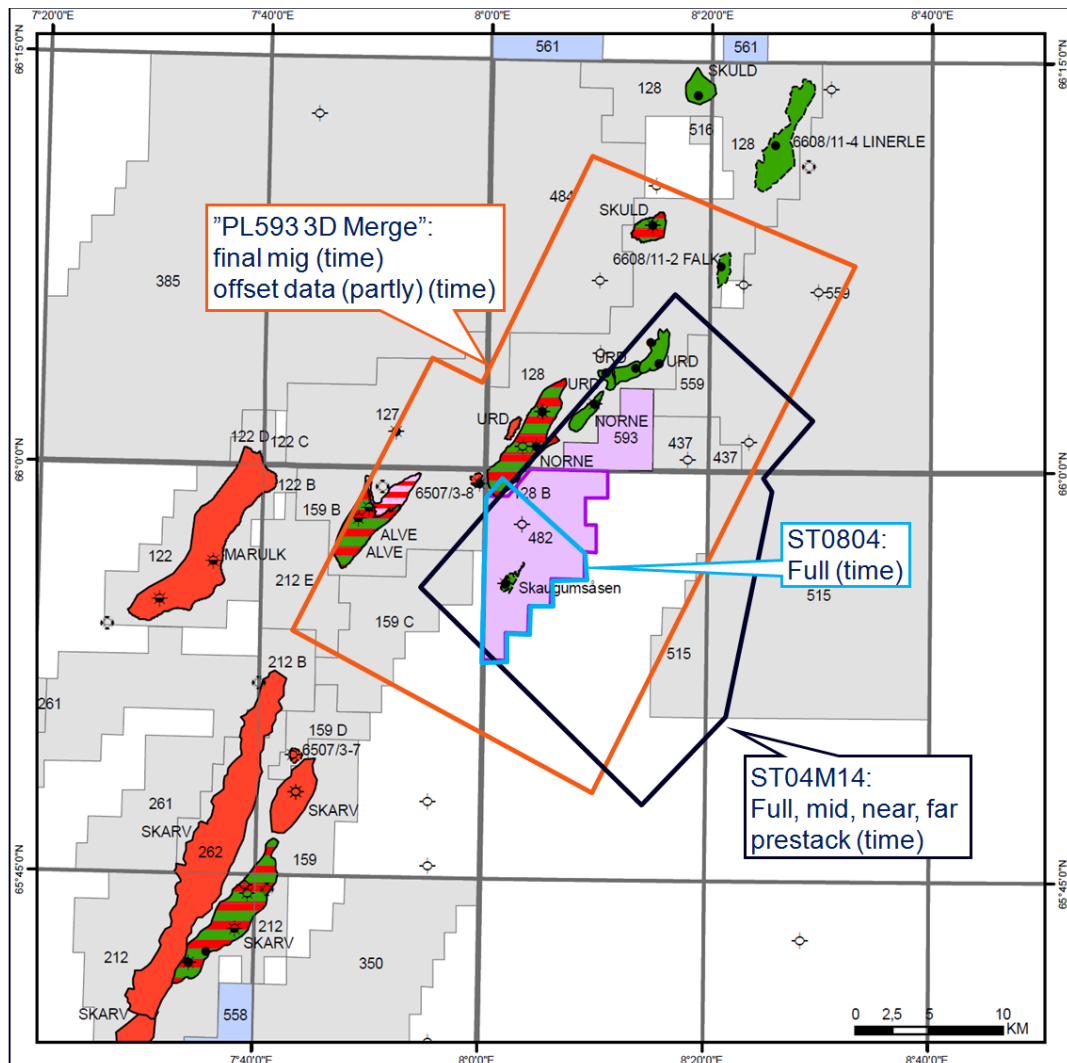


Fig. 2.1 Seismic coverage of license area

Primary dataset used for the interpretation of the license area is the EN0804 3D dataset. This dataset is of very good quality, but does not cover the entire Skaugumsåsen structure to the north. The northern part of the structure has been interpreted on the ST04M14 3D data, and this dataset has also been used for AVO purposes.

Post-drilling, the license area, including the drilled structure has been reinterpreted on the PL593 merged 3D dataset.

The polarity of both datasets is SEG normal and close to zero phase. Seismic structural interpretation was performed on the full stack data, and AVO (amplitude versus offset) analysis was undertaken on the offset stacks of the ST04M14 dataset.

2.2 Well data

Fig. 2.2 shows the wells in the common license database. The wells are also presented in Table 2.2 which includes information on when the wells were drilled, total depth and oldest penetrated formation, result, operator and owner status.

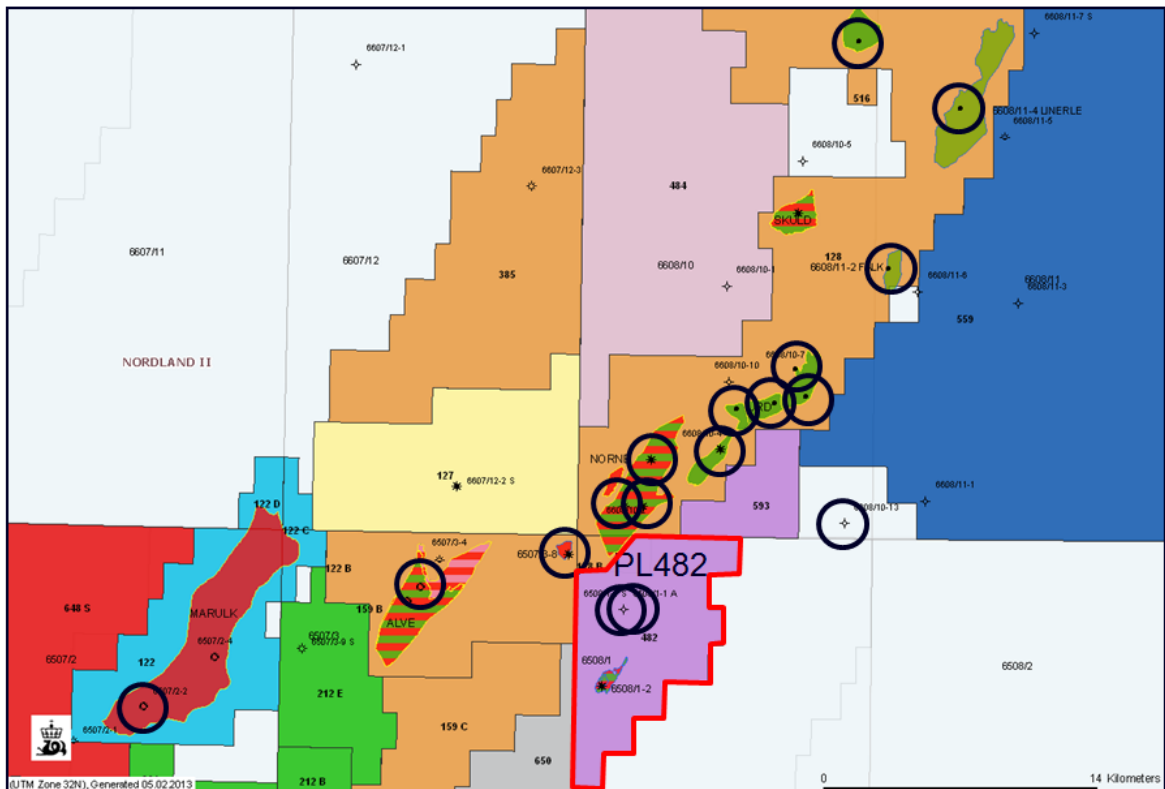


Fig. 2.2 Map of wells in common database

Table 2.2 Common well database

Well	Drilled	TD (MD RKB) / Formation	Result	Oper.	Owner status
6507/2-2	1991	3953 / Åre	Gas/cond	N. Hydro	Released
6507/3-1	1990	4757 / Åre	Gas/cond	STO	Released
6608/10-2	1992	3678 / Åre	Oil & gas	STO	Released
6608/10-3	1993	2921 / Åre	Oil & gas	STO	Released
6608/10-4	1994	2800 / Åre	Oil & gas	STO	Released
6608/10-6	2000	2115 / Åre	Oil	STO	Released
6608/10-7	2001	2108 / Åre	Oil	STO	Released
6608/10-8	2002	2660 / Tilje	Oil	STO	Released
6608/10-9	2003	2400 / Åre	Oil	STO	Released
6608/10-11S	2006	3725 / Tilje	Gas	STO	Released
6608/10-13	2009	1444 / Åre	Dry	StatoilHyd.	Detnor traded
6608/11-1	1986	1620 / Grey Beds	Dry	STO	Released
6508/1-1S	1999	2750 / Åre	Dry	Saga	Released
6508/1-1A	1999	2861 / Melke	Dry	Saga	Released
6507/3-8	2009	2990 / Tilje	Gas	StatoilHyd.	Released
6608/11-2	2000	2215 / Grey Beds	Oil	STO	Released
6608/11-4	2004	2317 / Red Beds	Oil	STO	Released

The closest tie well to 6508/1-2 well is the 6508/1-1 A&S wells, which were drilled 4,5km to the NNE. These wells were dry.

The most relevant wells regarding depth, trap and reservoir for the Skaugumsåsen structure are the 6608/11-2 and 6608/11-4, at the Falk and Linerle discoveries, respectively.

Hydrocarbons in these accumulations are biodegraded, especially the oil in the Linerle discovery.

Other wells with similar reservoirs are wells on the Norne and Urd fields, though these structures are more deeply buried.

2.3 Special studies

The ST04M14 3D seismic dataset was acquired by the license group as part of the work program (acquisition of adequate seismic survey). This dataset, with full, near, mid and far offset stacks, has been utilised in the following Det norske in-house studies:

- Rock physics modelling, AVO modelling, inversion and LFP prediction (lithology-fluid prediction)

Other in-house studies performed:

- Basin modelling (pre- and post-drilling of the Skaugumsåsen (6508/1-2) well)

External work for the PL482 license share-holders is:

- "Reservoir potential of Middle-Late Jurassic (Melke-Spekk) along the Nordland Ridge" (APT, 2009)

This study was performed in order to identify and date sands of suspected Late Jurassic age that could be present to the east of the Norne Field in the Hagahogget Prospect (Upper Jurassic reservoir) upflank and in likely connection with the Norne Field.

3 SKAUGUMSÅSEN EXPLORATION WELL 6508/1-2

3.1 Skaugumsåsen pre-drill prospect evaluation

The Skaugumsåsen structure is a 2-way fault-dependent trap situated on the Rødøy High part of the Nordland Ridge. The structure is down-faulted from the most elevated parts of the ridge. Main target was reservoir sandstones belonging to the Early Jurassic Båt Group. Åre Formation was expected to constitute the main part of the reservoir, but the Tilje Formation was also a possible reservoir present. Top reservoir was expected to be penetrated at 1715 m RKB. Secondary target was Paleocene sandstones of the Tare Formation. A small 4-way closure at BCU (top reservoir) level at the apex of the structure was mapped. This closure was believed to contain non-commercial amounts of gas. Expected main HC-phase for the prospect was oil below this clearly visible gas flat-spot. A structural column of up to 240 m was predicted, with a most likely column of 174 m. A fill-spill migration would be to the south and east. The main risk for the Skaugumsåsen structure was fault-seal towards the Skaugumsåsen E Prospect and to the Grosetkollen Prospect further to the north. An intermediate risk was expected to be related to the migration into the prospect. No risk was associated to the presence of reservoir sandstones, and the quality was also believed to be a low-risk issue.

Mean expected recoverable resources was estimated to 7.5 MSm³ of oil, with a probability of discovery of 22 %.

A top reservoir depth map is shown in Fig. 3.1. A seismic section is shown in Fig. 3.2.

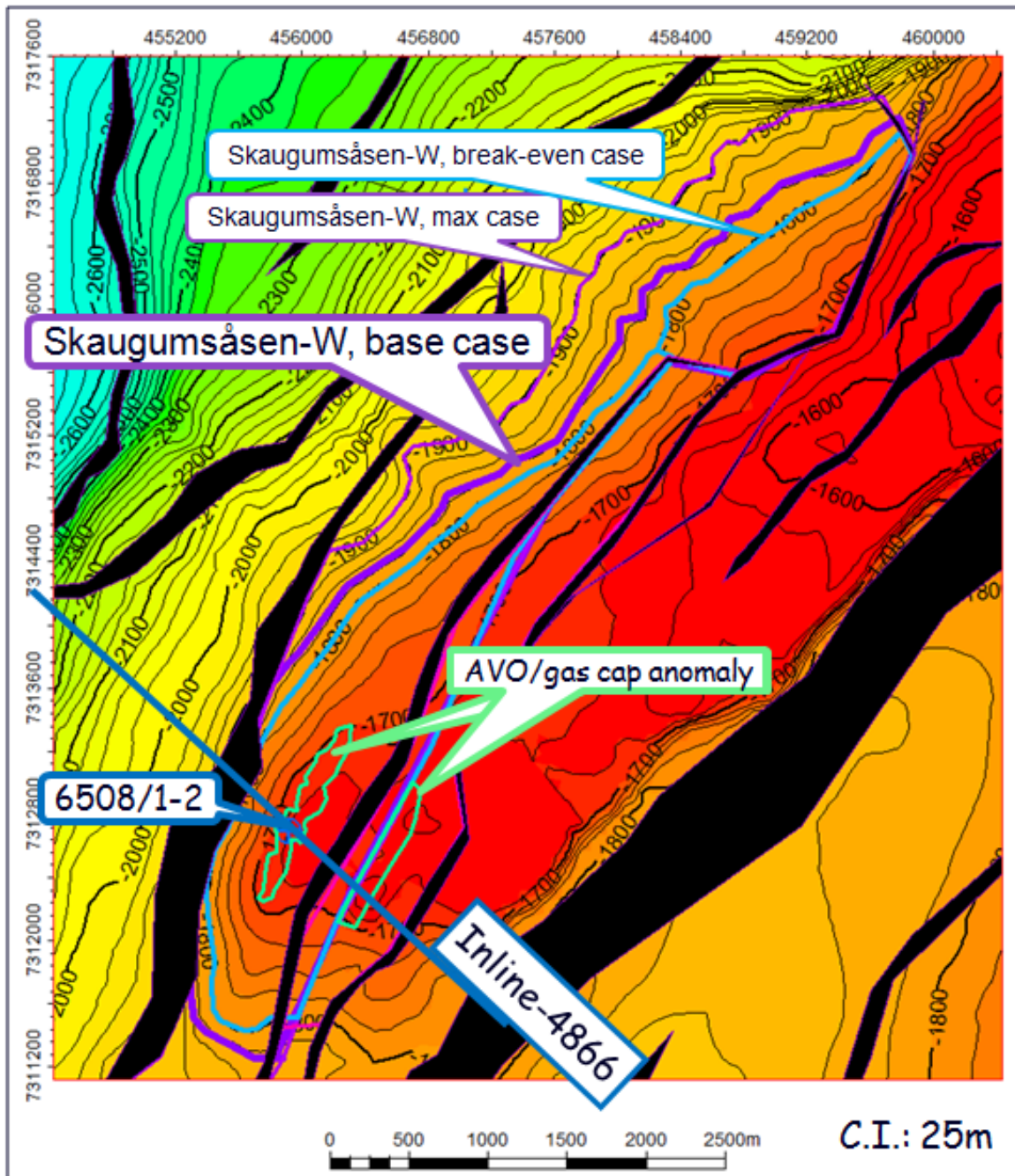


Fig. 3.1 BCU (top reservoir) depth map. Faults displayed are at Åre coal level

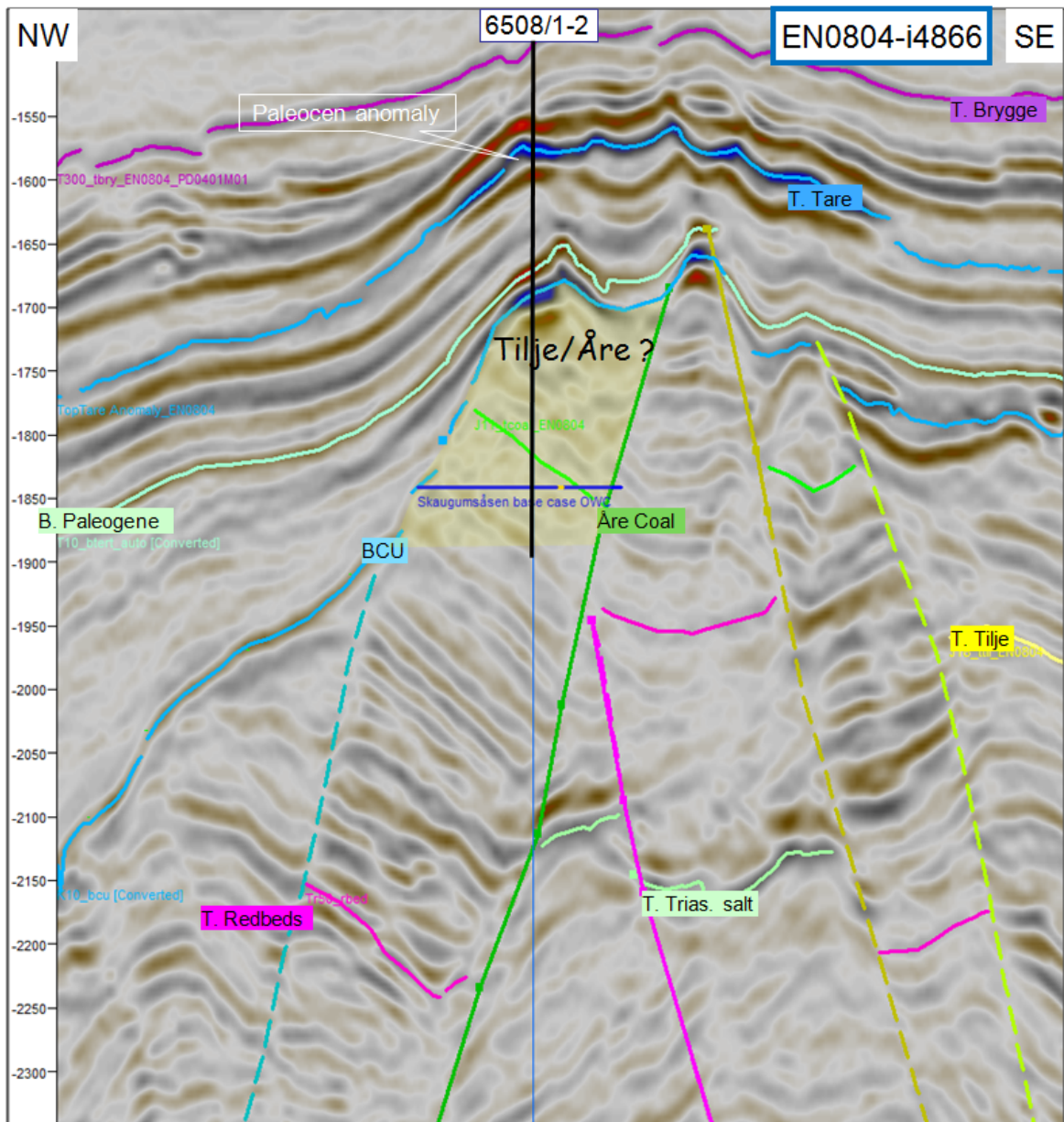


Fig. 3.2 Seismic section NW-SE through the Skaugumsåsen structure

3.2 Well 6508/1-2

3.2.1 Objectives

Exploration well 6508/1-2 was the first well to be drilled in PL482. The main objective was to investigate the hydrocarbon potential of the Early Jurassic Båt group with the Åre and possibly Tilje formations, both containing possible reservoir sands.

The Skaugumsåsen structure is situated along the Rødøy High part of the Nordland Ridge. A number of faults are separating the structure from the Træna Basin to the W. The main faults are striking NE-SW. Skaugumsåsen is a two-way closure dependent on fault-seal towards the N and E, and with a small 4-way closure.

The probability of a discovery (oil with a thin gas cap) was calculated to be 22 % with the highest risk associated with the fault seal, and secondary, migration from the basin. A detailed migration pathway from the basin was not interpreted due to large uncertainties in the definition of seismic horizons and of faults. Also the sealing capacities and properties of faults between prospect and basin were difficult to predict.

Hence, the main objective with the Skaugumsåsen W well was to test the hydrocarbon potential of a structure in an elevated position on the Nordland Ridge and in relative proximity to the Norne and Urd fields. Reservoir depth is analog to the Falk and Linerle discoveries. The Skaugumsåsen structure is, however, east of the main Norne-Urd NE-trending migration pathway.

No sidetrack was planned.

After completion of the well program, the plan was to permanently plug and abandon the well.

3.2.2 Well results

A 18.2 metre column of gas was proven in the Ror Formation just below the Base Cretaceous Unconformity, and 22.3 meters of biodegraded oil were proven in the Ror and Tilje formations. Proven volumes are estimated to less than 1 million Sm³ recoverable oil equivalents. Only minor amounts of sand with some possible (inconclusive) gas saturation was penetrated in the Paleocene (Tare Formation).

The well was spudded on the 20th of August 2011, and was permanently plugged and abandoned on the 11th of September 2011. Well 6508/1-2 reached a total depth of 1810 m MD RKB in siltstones/claystones of the Tilje Formation.

The prognosed vs. actual stratigraphy is presented below (Fig. 3.3) together with a CPI (Fig. 3.4) of the reservoir interval.

The age of the reservoir penetrated in 6508/1-2 was somewhat younger than predicted. Reservoir properties proven were very good, with considerably higher net-to-gross than expected. The porosities were also very good, but slightly lower than prognosed.

A synthetic seismogram of the Skaugumsåsen well is shown in Fig. 3.5.

Fig. 3.6 displays a seismic section through the well position. Formation tops are updated post-well .

For further details on the discovery, see "6508/1-2 Skaugumsåsen Discovery Report (Det norske, 2012).

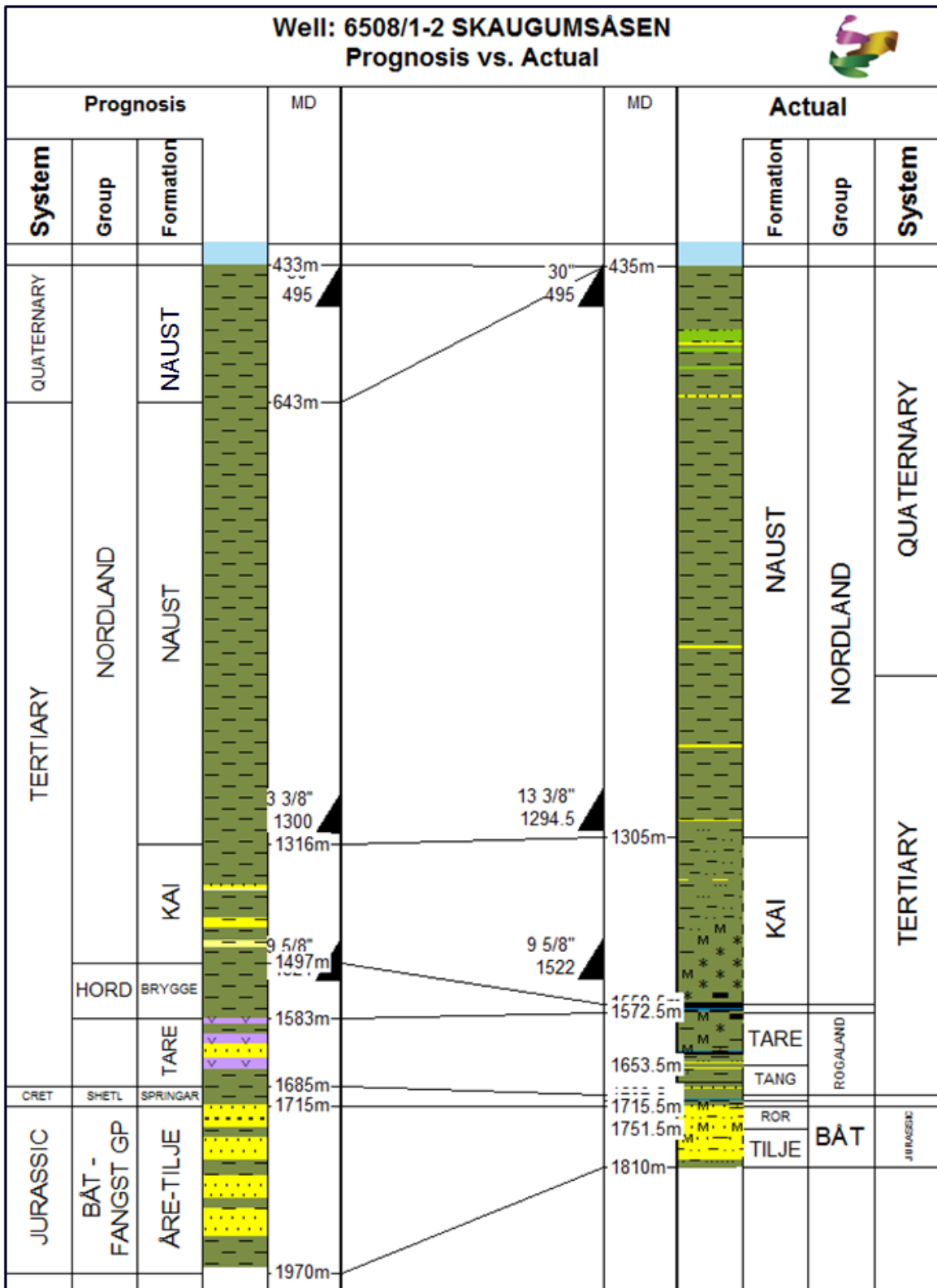


Fig. 3.3 Litho- and chronostratigraphic column for the 6508/1-2 well

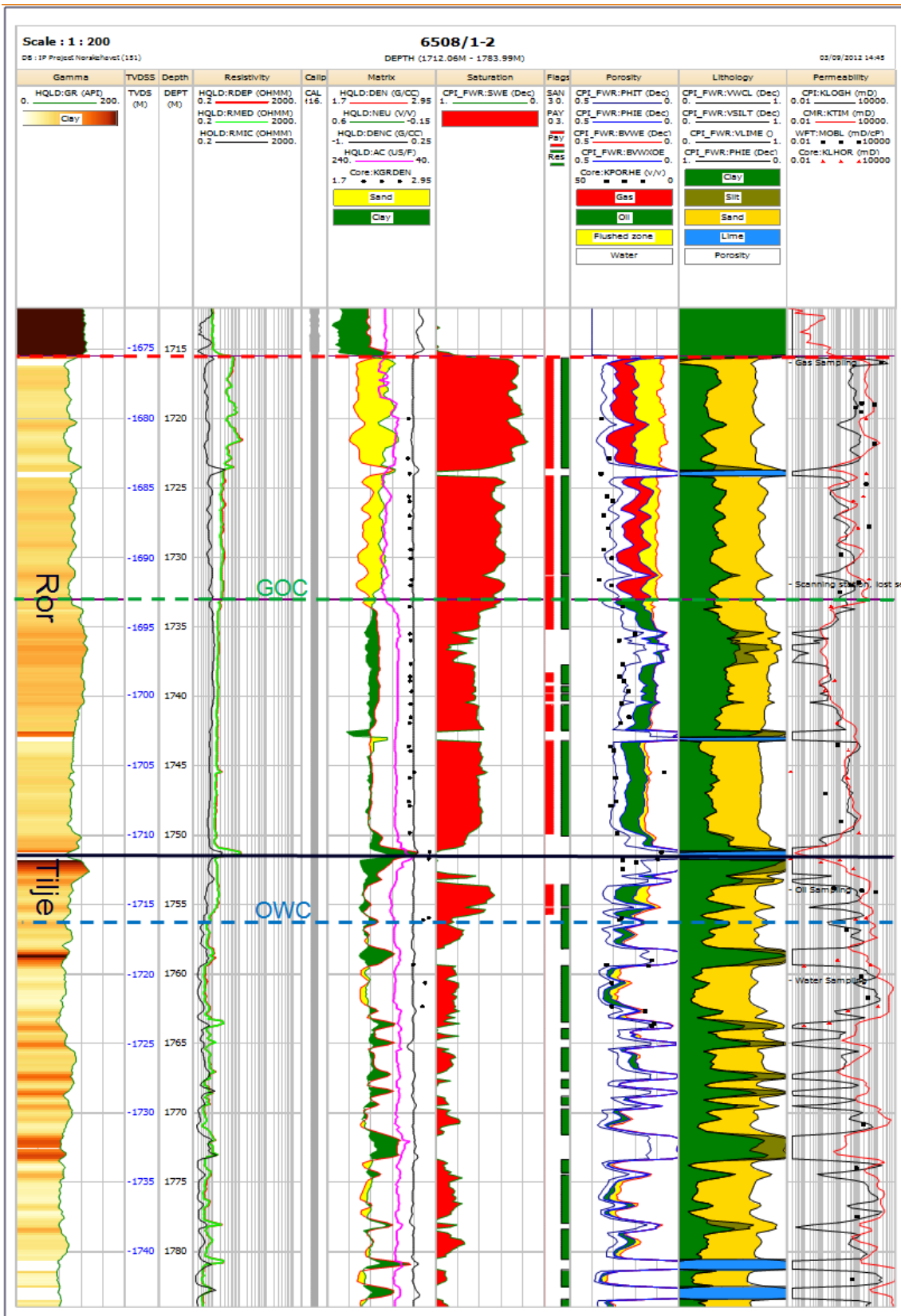


Fig. 3.4 CPI (composite petrophysical interpretation) of well 6508/1-2

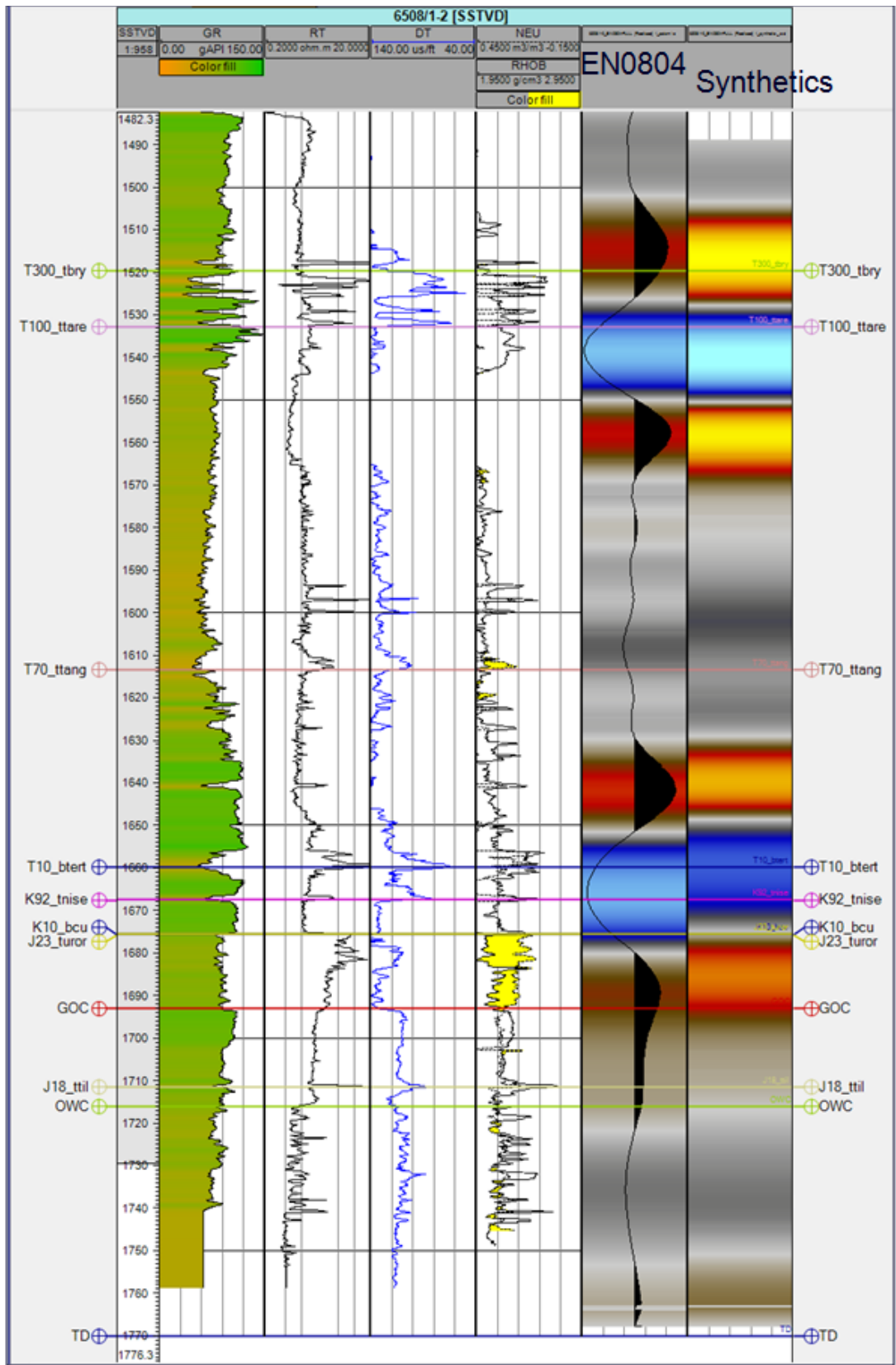


Fig. 3.5 Synthetic seismogram across the 6508/1-2 well position

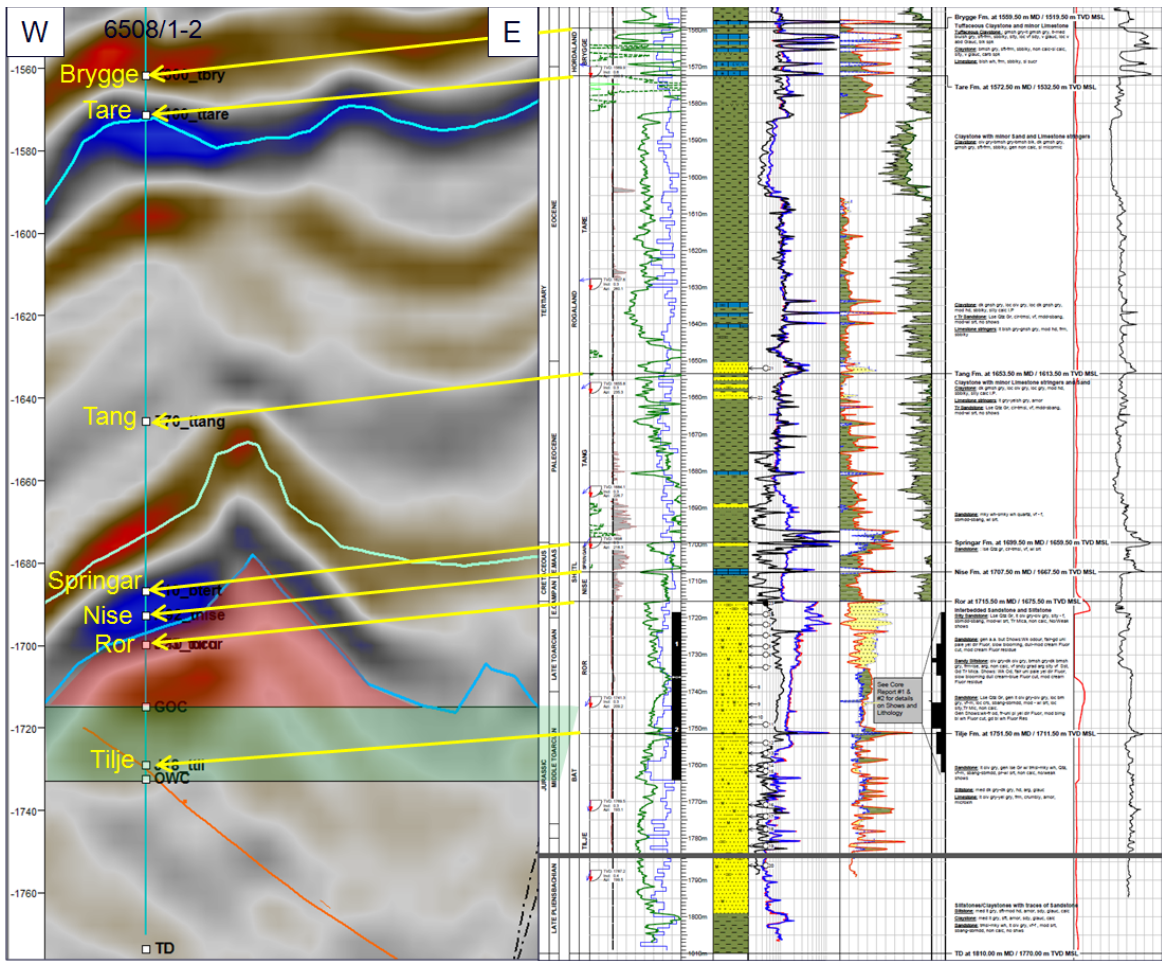


Fig. 3.6 Seismic section of the 6508/1-2 discovery with updated formation tops. See Fig. 3.1 for location of the seismic section EN0804-i4866

4 REMAINING PROSPECTIVITY

The drilling of the Skaugumsåsen structure, proved a Lower Jurassic reservoir of good quality and a working hydrocarbon system. However, the amounts of hydrocarbons proven are at this stage far less than economically feasible.

There is a possibility that oil and gas has migrated through the Skaugumsåsen W segment and is filling Skaugumsåsen E to the same level (insignificant volumes) or even a larger area (Grosetkollen Prospect), which implies a max case for this larger structure of about 14 MSm³ of recoverable oil. This concept has a very high risk on fault-seal to the east and north-east towards the most elevated parts of the Nordland Ridge. No indications of gas, as can be seen at top reservoir level in the Skaugumsåsen discovery, are seen in the Grosetkollen area.

Reservoir age is also increasing to the north, and large part of the Grosetkollen reservoir is expected to be of Triassic age. Hence, the reservoir properties are likely to be poorer than the Jurassic reservoir proven in Skaugumsåsen W.

A map of this larger Grosetkollen Prospect case can be seen in Fig. 4.1.

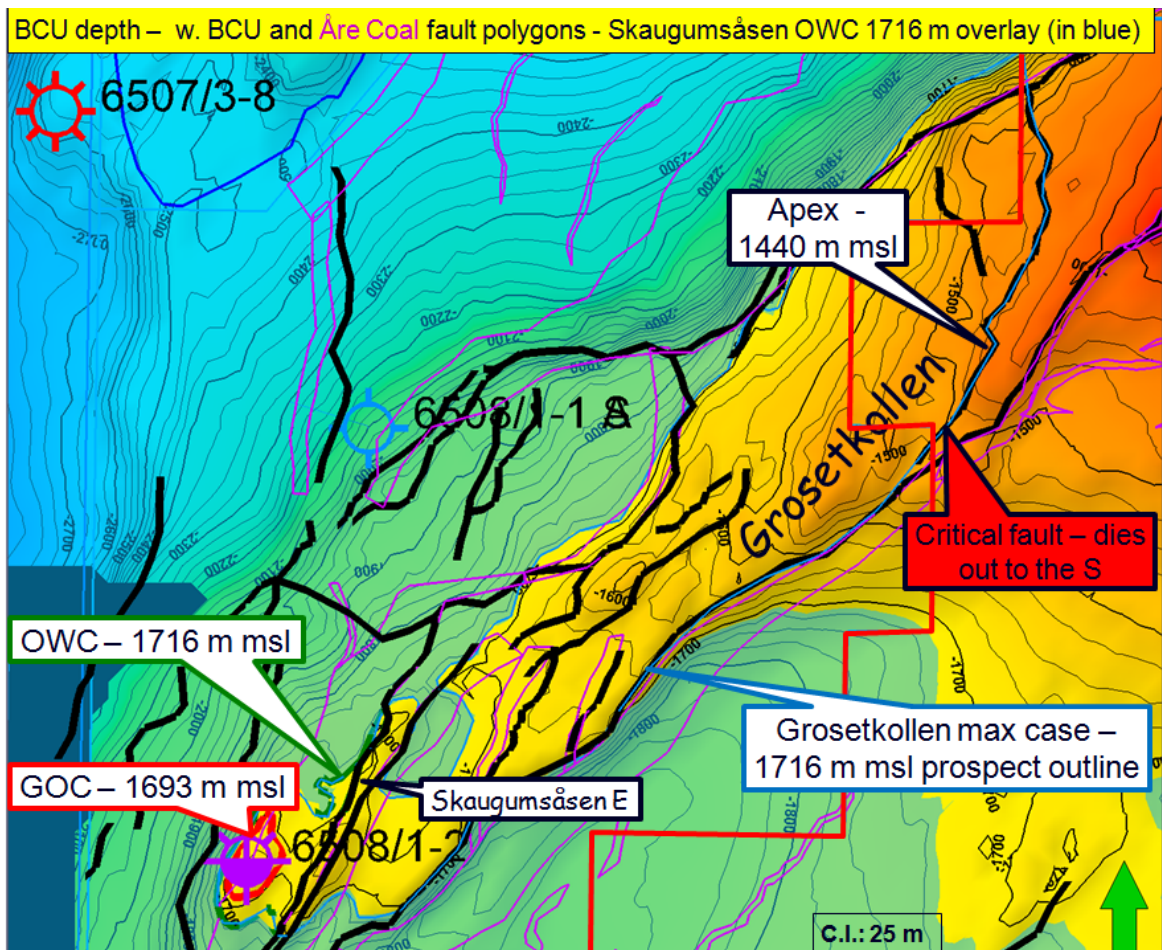


Fig. 4.1 Remaining prospectivity around the Skaugumsåsen discovery

Analyses of the hydrocarbons in Skaugumsåsen unveil a rather undersaturated, significantly biodegraded oil with a relatively high viscosity. Modelling of maturity and migration patterns points to an inferred large fetch area. This implies a relatively long range migration from a kitchen area to the south-west, with onset of migration in Late Tertiary. No fresh oil

is seen, and the conclusion to be drawn is that only a minor accumulation migrated into the Skaugumsåsen structure before the migration ceased (closing of faults?).

Paleocene possibilities in the PL482 area are after the 6508/1-2 well considered very high risk (on both reservoir and migration) and are no longer considered an interesting lead.

An Upper Jurassic prospect, Hagahogget, is after extensive seismic interpretation and biostratigraphical work believed to have a very high risk on reservoir presence.

Triassic sub-salt is yet untested in the area, but could be an interesting upside potential given a larger discovery in the Jurassic. Reservoir and charge is estimated to have a very low chance of success.

An overview of remaining prospectivity is shown in Table 4.1.

Table 4.1 Summary - remaining prospectivity

PL 482					GROSS RECOVERABLE RESERVES / RESOURCES					
					Low		Base		High	
CATEGORY	RESERVOIR LEVEL	HC	RF (%)	POS (%)	Oil (MSm ³)	Gas (GSm ³)	Oil (MSm ³)	Gas (GSm ³)	Oil (MSm ³)	Gas (GSm ³)
PROSPECTS										
Skaugumsåsen E	L. Jurassic/U. Triassic	gas/oil	25	40?	0,1		0,5		10	
Grosetkollen ¹⁾	L. Jurassic/U. Triassic	oil	25	14	0,1		3,9		9,9	
Hagahogget ²⁾	U.-M. Jurassic	gas/oil	45/65	1	1,3	5	1,7	7,1	2,1	9
Leads										
Triassic sub-salt	M. Triassic	oil		<10						

¹⁾Total prospect

²⁾Within license area

The lisencc group judge the Skaugumsåsen discovery, at present, to be non-commercial, and the remaining prospectivity to be of high risk and relatively low potential, and therefore the partnership relinquish PL482.