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AU-EXP NOR ELNS-00088

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Stavanger 19.05.2014.

## Licence Relinquishment Report PL 552

Reference is made to the letter sent to MPE dated 04.03.2014 (our ref AU-EXP NOR ELNS-00077) regarding the expiry of the production licence 552.

### 1 INTRODUCTION

Production licence 552 was awarded on February 19<sup>th</sup> 2010 as part of the 2009 APA round. Statoil AS is operator with 53.896% and shares the licence with Petoro (30%), Idemitsu Petroleum Norge AS (12.468%) and RWE Dea Norge AS (3.636%). Work obligations were within two years from award, to drill one exploration well into the Jurassic Brent Group and to decide on further development (BoV) and within four years to deliver PUD.

The initial period for PL 552 expires on February 19<sup>th</sup> 2014, by which time a drill or drop decision has to be taken.

### 2 BACKGROUND AND LICENCE HISTORY

PL 552 covers parts of block 34/7 (total area of 67.892 km<sup>2</sup>) (Figure 1). The licence is located on the Tampen Spur, in the southern part of the Pancake basin north of the Gullfaks Field and between the Tordis/Snorre fields and Visund Field.

The remaining prospects in the licence are located in the western part, along the Inner Snorre fault. In the foot wall block the Triassic Raja and Torpedo prospects are mapped while the remaining Upper Jurassic hydrocarbon potential is found in the hanging wall, in the Karpe Nord prospect. The Raja and Torpedo prospects comprise the Lower Lunde Formation (Alke Formation) and Lomvi Formation reservoirs. The Karpe Nord prospect comprises the Draupne Formation sandstone reservoir. The depth to the prospects is approximately 3000 m TVD MSL.

### 3 DATABASE

The Karpe Sør and the Svarthå prospects were explored in 2012 by the 34/7-35 S/ST2 well and were found waterfilled. The well data acquisition and results are reported in Final Well Report.

### 4 TECHNICAL WORK AND MEETINGS

The Upper Jurassic Draupne sandstone in the Karpe prospect was one of the main target for the 34/7-35 S well, but was absent in the well. The depositional model for the Upper Jurassic sandstone is proven in the well by the good quality reservoir sandstone found in the Heather Formation. The other reservoir target, Svarthå prospect of

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Middle Jurassic Brent Group, was water wet (TD was set in the Ness Formation). The well found that the Upper Jurassic source rocks were immature at the prospect location. The heat flow in the Pancake Basin was also lower than expected, and the source rocks were both thinner and leaner than expected. Thus, the expelled hydrocarbon volumes to this part of the Pancake basin are significantly smaller than previously thought. Thus the most likely cause of failure is lack of migration for both the Karpe and Svarthå prospects. Conclusions regarding the seal-potential of the Inner Snorre Fault are uncertain. Based on the above observations and studies there is no remaining prospectivity in the Middle Jurassic Brent Play.

Additional technical work carried out included:

- Biostratigraphy study
- Density imaging and structural analysis
- Geochemistry study
- LFP study
- Seismic amplitude study
- Basin modelling
- Prospect evaluation
  - Volume calculation
  - Risk and technical economical evaluation

The following Management and Exploration committee meetings have been held in the license:

- EC/MC meeting – 28.4.2011
- EC/MC meeting – 19.9.2011
- EC/MC meeting – 9.3.2012
- EC/MC meeting – 12.12.2012
- EC/MC meeting – 30.1.2013
- EC/MC meeting – 25.11.2013
- EC/MC meeting – 10.2.2014

In addition the following work meeting has been arranged in the license:

- EC work meeting – 17.10.2012

## 5 PROSPECT EVALUATION

A source rock and migration evaluation has been performed for the prospects in PL552 in the southern Pancake Basin. The evaluation also includes revision of previous work. To summarise, there is a very high confidence and low risk on source rock presence in PL552, but a high risk is assessed on charge and migration for the remaining mapped prospects. The previous study was too optimistic on modelled source rock maturity, source rock properties, and consequently also on the expelled hydrocarbon volumes. Revised petroleum expulsion modelling shows that generated and expelled volumes are significantly smaller and not sufficient to fill the prospects. In case of success, there is a high risk that traps will be underfilling due to limited charge.

The ST08M08 PSDM seismic data is of good quality and the interpretations are of good confidence. A new seismic acquisition or reprocessing are therefore unlikely to provide much more information.

A full geophysical study performed on the ST08M08 PSDM seismic in 2008 concluded that sand or hydrocarbon presence could not be confidently predicted in the area. The LFP work carried out as part of the 34/7-35 ST2 post-well process makes the same conclusions. The poor sonic data quality in the well makes it difficult to predict the expected seismic amplitude response of hydrocarbon-filled reservoirs in the Upper Jurassic play model. A new AVO study from January 2014, of the ST0601Z10, has not provided any new information with regards to DHI presence within the prospects.

The risk has increased for all the prospects after drilling the exploration well. The main risk is now related to migration (see above) but also trap sealing has a high risk due to potential leakage along the Inner Snorre fault or by thief sands. The risks are summarised in Table 2.

## 6 RESOURCES

A summary of estimated resources and risks for the mapped prospects in PL552 is shown in table 1 and table 2. Raja Lomvi is regarded as the most attractive remaining prospect in the license. Oil is the most likely phase with a probability of discovery 19 % and estimated mean recoverable volumes of 2.7 MSm<sup>3</sup> o.e.

**Table 1 PL552 prospect volumes**

<b>Well:</b>		<b>Prospect/discovery name:</b>						
<b>UNDISCOVERED</b>	Prospect segments	In-place res. (MSm <sup>3</sup> oe) 100%, Total Structure			Recoverable res. (MSm <sup>3</sup> oe) 100%, Total Structure			Pg %
		P90	Mean	P10	P90	Mean	P10	
<i>Pre drill segment</i>	Karpe Nord	-	11.5	-	0.3	2.8	7	13
<i>Pre drill segment</i>	Raja Lower Lunde	-	3.7	-	0.5	1.1	1.9	13
<i>Pre drill segment</i>	Raja Lomvi	-	7.5	-	1.4	2.7	4.2	19
<i>Pre drill segment</i>	Torpedo Lower Lunde	-	4.4	-	0.3	1.3	2.9	4
<i>Pre drill segment</i>	Torpedo Lomvi	-	7	-	0.5	1.8	3.6	5

**Table 2 PL552 prospect risks**

Prospect segments	P-Play			P-Prospect/Segment							Discovery	
	Reserv	Source	Seal	Reservoir		Source			Trap		Pg	Pg (DFT)
				pre-sence	produc-ability	pre-sence	migra-tion	hc-phase	geo-metry	seal		
Karpe Nord	1	1	1	0.80	0.80	0.90	0.50	1.00	0.90	0.50	0.13	0.13
Raja Lower Lunde	1	1	1	1.00	0.70	0.90	0.40	1.00	1.00	0.50	0.13	0.13
Raja Lomvi	1	1	1	1.00	0.90	0.90	0.40	1.00	1.00	0.60	0.19	0.19
Torpedo Lower Lunde	1	1	1	1.00	0.70	0.90	0.20	1.00	1.00	0.30	0.04	0.04
Torpedo Lomvi	1	1	1	1.00	0.90	0.90	0.20	1.00	1.00	0.30	0.05	0.05

All values in %-factor

## 7 TECHNICAL / ECONOMICAL EVALUATION

Prior to drilling the 34/7-35 ST2 well the commercial analysis for the Raja prospect showed a positive NPV using a sub-sea tie-back to Vigdis Nordøst. After drilling the 34/7-35 ST2 well the discovery probability for Raja was reduced. A new commercial analysis has not been performed because the new risked volume is regarded to be too low to support a new drilling candidate decision for PL552. The minimum economic volume is estimated to be 2

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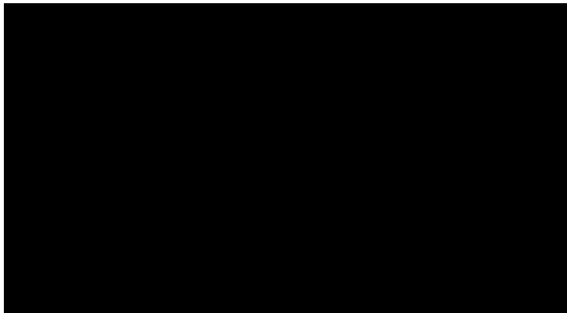
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Msm3 oe. Thus a discovery in both the Lower Lunde and Lomvi reservoir segments in Raja is required for a robust economic development, which is regarded as unlikely.

## 8 SUMMARY AND CONCLUSIONS

The work programme for the initial period of PL552 has been fulfilled. The prospects Karpe Sør and Svarthå have been explored by the wells 34/7-35 S/ST2 within the specified time frame and geological, geophysical studies have been completed.

The PL552 licence has three remaining prospects. None of these prospects are sufficiently economically attractive to warrant drilling an exploration well to extend the licence period. The PL552 Management Committee has therefore decided to let the licence expire.



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## 9 FIGURES

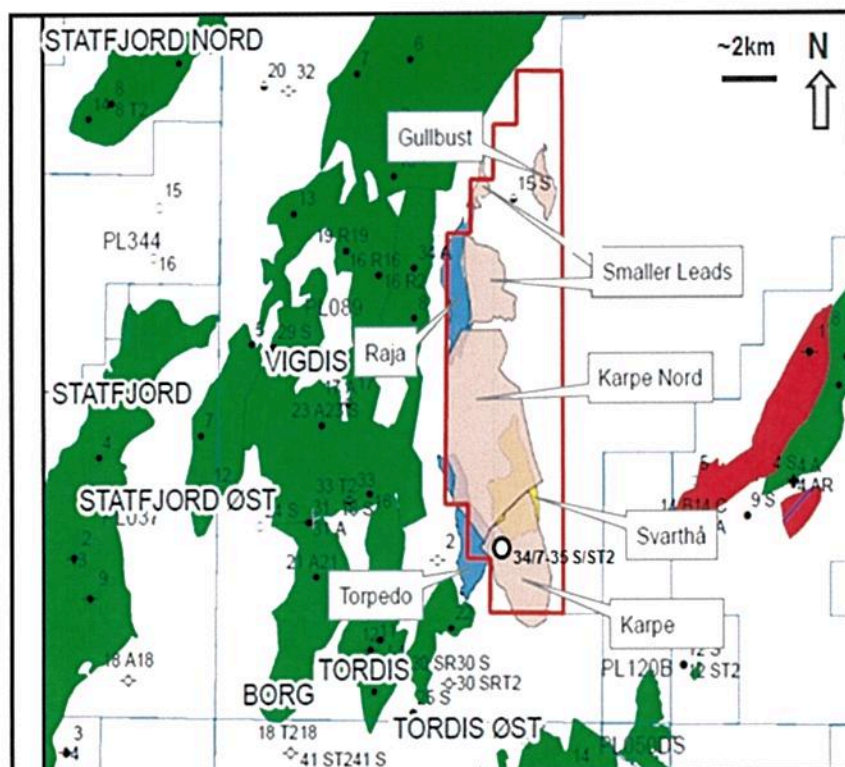


Figure 1: PL552 area map and prospect locations. Also including the outline of the drilled Karpe Sør (Karpe) and Svarthå prospects

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Updated figures (fig 2 and 3) of relinquishment report PL552 (page 6).

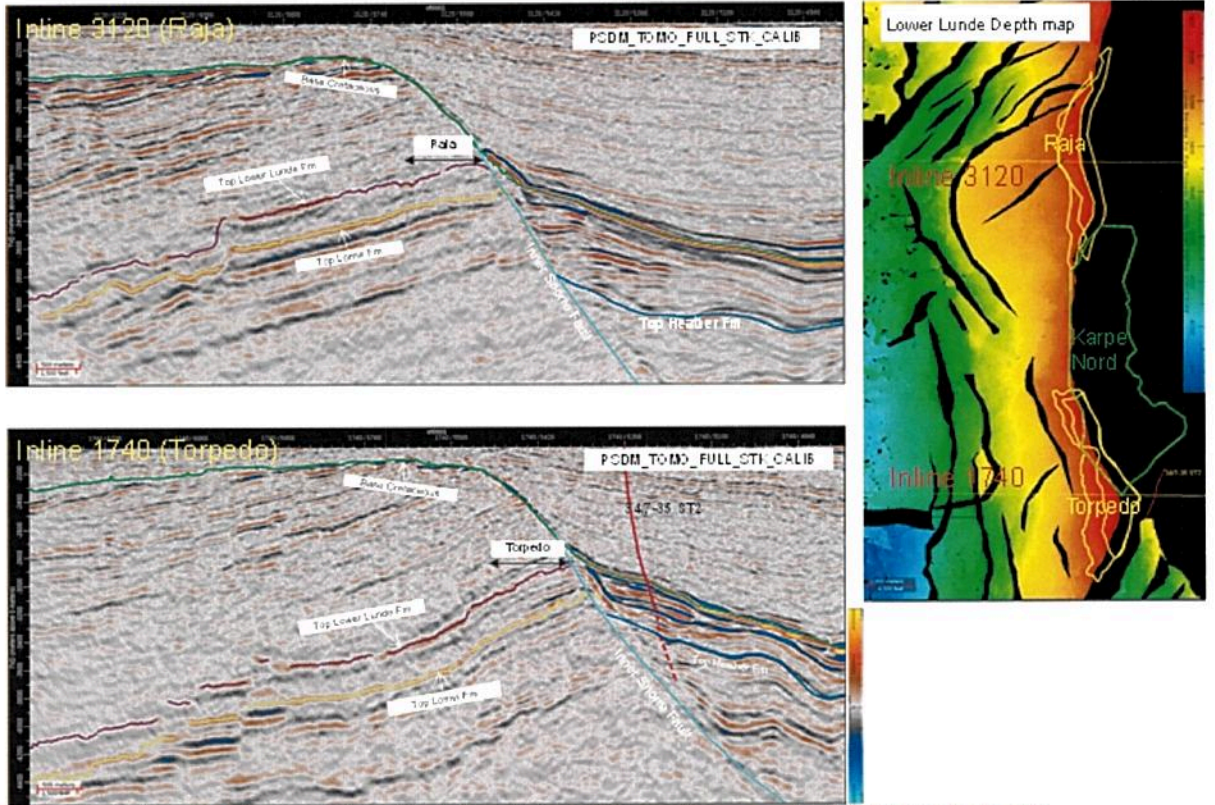


Figure 2: East-west seismic sections illustrating Raja and Torpedo prospects. West towards the left.

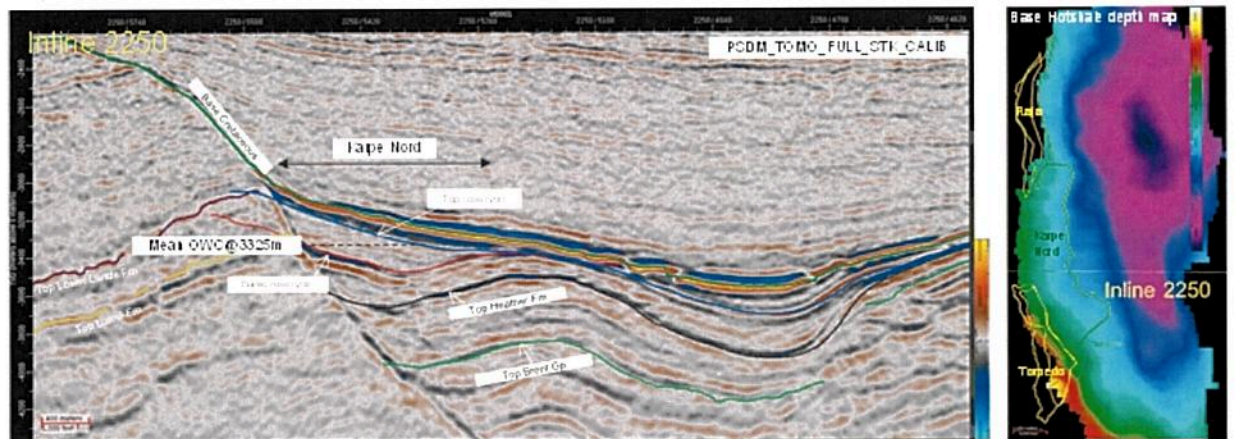


Figure 3: East-west seismic section illustrating Karpe Nord prospect. West towards the left