

OLJEDIREKTORATET

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Deres ref.:

Vår ref.:
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Utvinningstillatelse 568 - Tilbakeleveringsrapport

Med referanse varsel om oppgivelse av utvinningstillatelse 568 til OED datert 30/9-2014, vennligst finn vedlagt tilbakeleveringsrapporten.

Med hilsen,
for Talisman Energy Norge AS

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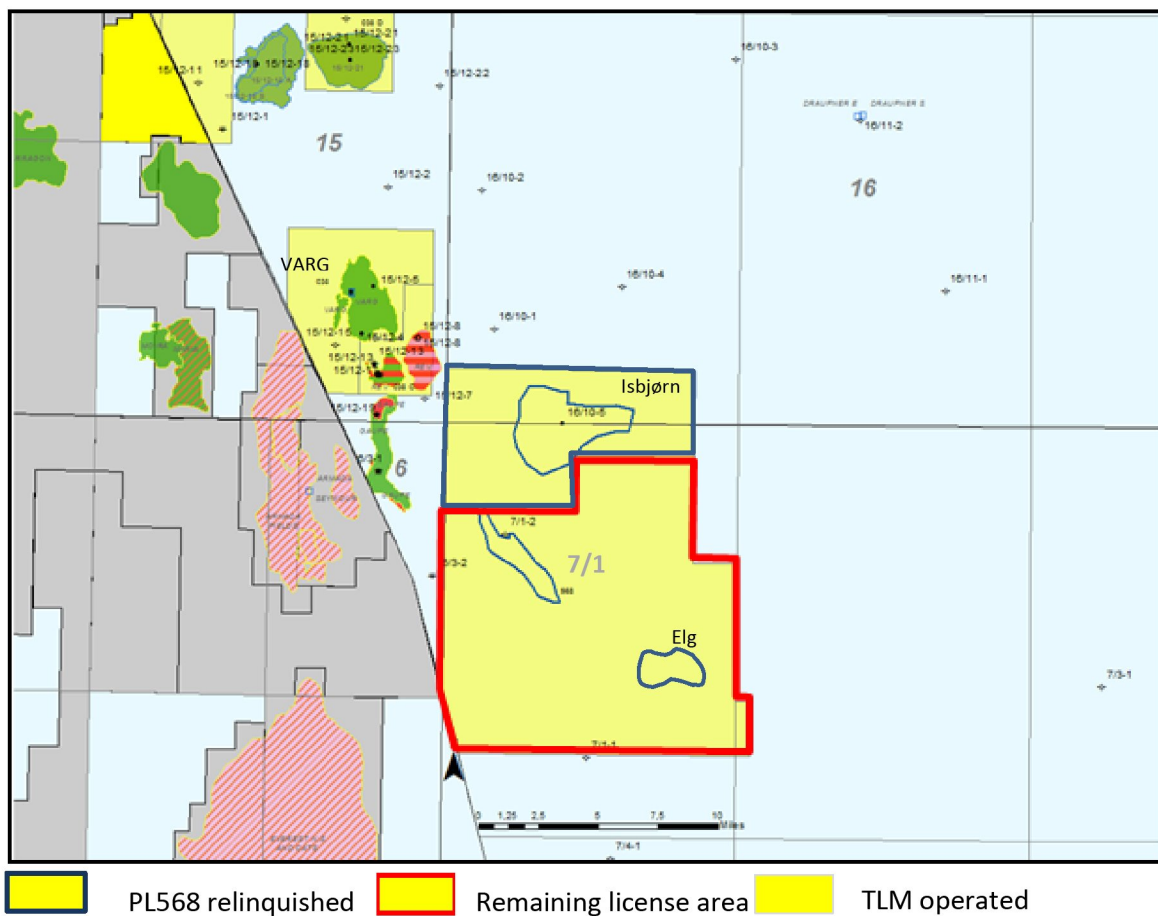
Team Lead Exploration

Vedlegg:
PL568 Relinquishment Report

PL568

Relinquishment Report

November 2014



TALISMAN
ENERGY

PL568 Relinquishment Report

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1 Key License History

1.1 Executive Summary

The 568 license is located in the northern part of Jæren High. This is an area close to mature oil fields and recent hydrocarbon discoveries, with the Gaupe discovery situated in the immediate West, and the oil-producing Varg field to the North-West.

The main plays in the license area are in the Jurassic and Triassic reservoir intervals in pod-interpod settings. The main risks are related to source and charge of hydrocarbons, as it is dependent on a mature local basin or a long-distance migration route from the Fisher Bank Basin on the UK side. The concept of local kitchen is working in other areas further north (Grevling discovery, 2009), which was the analog used to reduce this risk for the identified prospects in the license.

The area was applied for in APA 2010 and the PL568 was awarded in February 2011. Due to the drilling of a dry well, Isbjørn 16/10-5, in 2012, the license area was reduced in 2013 to focus on the remaining prospectivity, mainly the Elg prospect, in the southern part of the license. Figure 1.1 shows an overview of current versus the initial license acreage in addition to outlines for defined prospects.

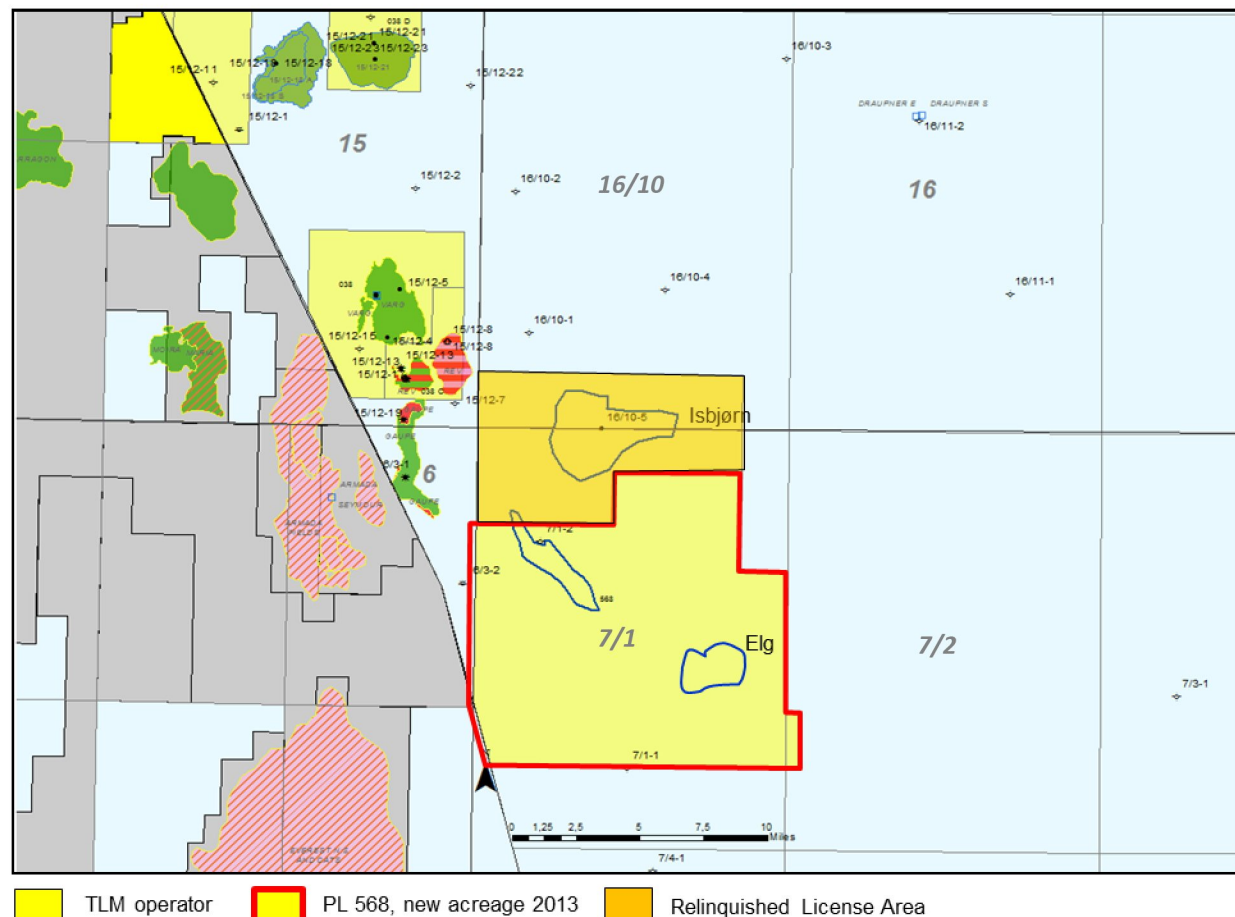


Figure 1.1 PL568 historic and current licensed area.

The license work program is listed in section 1.2. The work program has been fulfilled, and the main objectives were to obtain new data and conduct studies in order to reduce risk and improve the understanding of the prospectivity. After drilling one firm, dry well, the Isbjørn well 16/10-5, the geological risks in the area increased, and likelihood for an economic viable discovery is regarded as small. This is the basis for the application of a full relinquishment of the license.

1.2 Work Program and duration

PL568 was awarded in February 2011 with Talisman Energy Norge AS as the operator (40%). Det Norske (20%), Petoro (20%), Skagen44 (10%) and Det Norske (10%) are partners.

License history, applications and deadlines can be summarized as follows:

- Talisman Licence History:
 - Acquired directly in APA 2010
 - Reduced license area in 2013 after dry well 16/10-5 in 2012
 - Recommendation to license partners for full relinquishment May 2014, as technical work of the license indicates no prospectivity of commercial value left to evaluate.
- Initial Commitments & Restrictions:
 - Conduct G&G Studies and drill one firm exploration well within 3 years
- Initial period of 6 years:
 - DoC decision by 4.2.2015 (Complete concepts studies)
 - DoC decision by 4.2.2016 (Conduct concepts studies)
 - PDO decision by 4.2.2017
- License Meetings:
 - ECMC 2/yearly from license award
 - License Work meeting 2/yearly from license award
 - Partner Audit/Well planning pre-well 16/10-5
 - Post well Audit

The main part of the work program was performed during 2011 and 2012 and the Isbjørn well was drilled Q4 2012. Site Survey and shallow boreholes were acquired to prepare the Isbjørn prospect for drilling in 2012 (Figure 1.2).

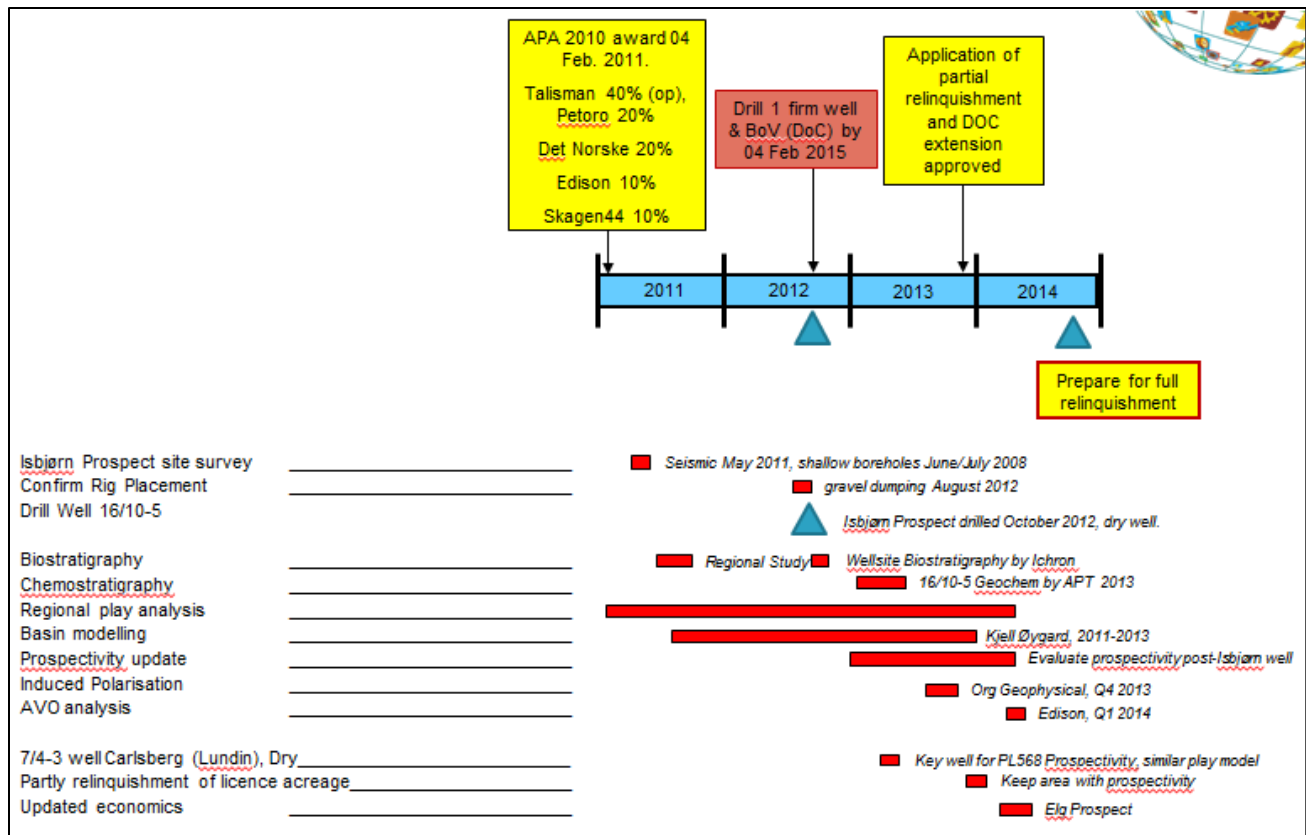


Figure 1.2 License history and studies conducted.

2 Database

2.1 Seismic Database

The 3D seismic data used for PL568 evaluations is shown in Figure 2.1. License partners agreed on a 3D volume that covers the entire license acreage as a common seismic database for the license; NH0201_FINMIG_IESXEXP (2001), acquired by Norsk Hydro in 2002, processed by CGG and consists of 800 km² of good quality data.

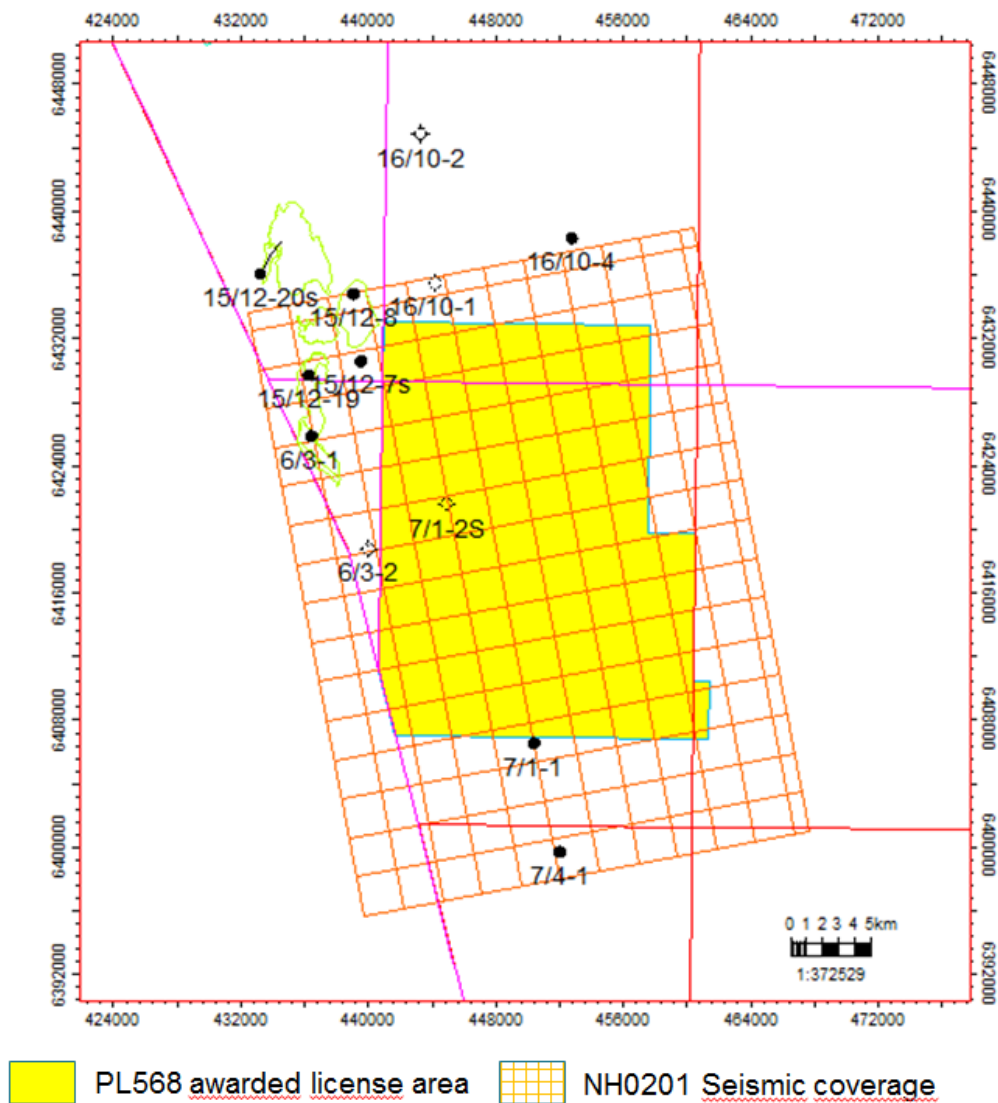


Figure 2.1 Common Seismic Database.

2.2 Well Database

Well data used in PL568 evaluations are shown in Figure 2.2 and Table 1.

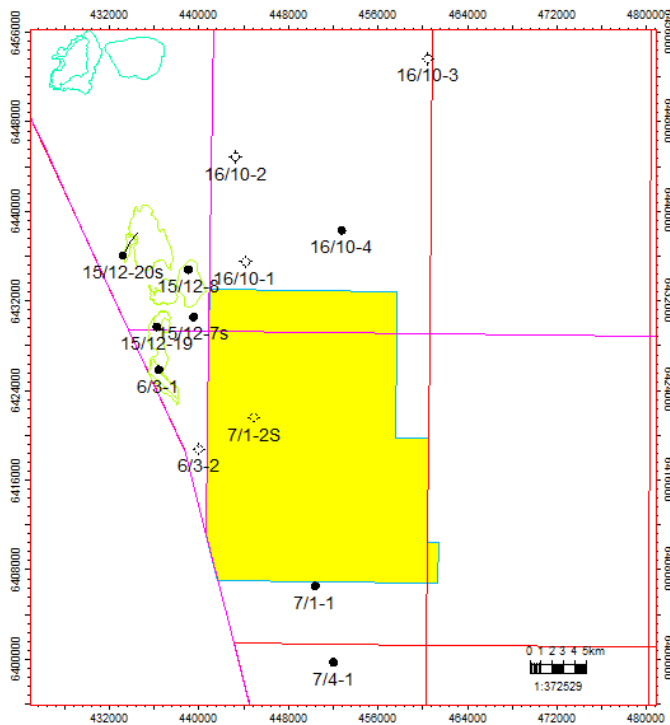


Figure 2.2 Well Database.

Well	Year	Result	TD Depth (mTVD)	Oldest penetrated age
6/3-1	1985	Oil/Gas	3560	Late Triassic
6/3-2	1986	Shows	4085	Early Permian
7/1-2S	2008	Shows	3158	Middle Jurassic
7/1-1	1971	Dry	2808	Triassic
7/4-1	1993	Dry	3133	Late Permian
16/10-1	1986	Dry	3151	Late Permian
16/10-2	1991	Dry	3148	Triassic
16/10-3	1996	Dry	2849	Triassic
16/10-4	1998	Dry	2580	Late Permian
15/12-7S	1991	Dry	3529	Triassic
15/12-8	1991	Gas/Condensate	3052	Triassic
15/12-19	2008	Oil/Gas	3211	Triassic
15/12-20S	2008	Oil	3142	Triassic

Table 1 Common Well Database.

Some wells outside the seismic survey have been added for analog and well information. Also, in addition to the Isbjørn well 16/10-5 drilled in 2012, the Carlsberg well 7/4-3 drilled 2013, was traded

from Talisman, and used as Triassic analog for prospect evaluation for PL568. Both wells were dry with no hydrocarbons, and increased the risking parameters of source and migration within the license.

3 Review of geological framework

3.1 Studies Performed

Several comprehensive studies have been performed in the license since award. The purpose of these studies has been to increase confidence in the geological and geophysical understanding of area potential. An overview of studies performed within PL568 is listed below:

- Basin Modeling Study (Kjell Øygard, 2011).
 - To calibrate with wells within and outside the license
- Seal Capacity Study (Ikon Geopressure, 2011)
 - To establish likely overpressure prior to drainage in Isbjørn
 - To compare aquifer and hydrocarbon seal capacities for key wells in area
- Gas Chimney Study (DGB, 2011)
 - Assess validity of chimney processing in the vicinity of the Isbjørn prospect.
 - Assess top seal risk for Isbjørn prospect, based on chimney processing.
 - Assess HC charge risk for the Isbjørn prospect, based on chimney processing
 - Apply Waveform Segmentation to Top Reservoir horizon to assess reservoir facies and distribution.
- Palynological & Correlation Study (Dieter Kadolsky, 2011)
 - To determine age and depth of Jurassic sediments in key wells
- Regional Jurassic Facies Study (Dieter Kadolsky, 2011)
 - To create facies maps of Jurassic sequences containing reservoir rocks, in support of the evaluations of the Isbjørn
- Induced Polarity Study (Org.Geophysical, 2013)
 - To identify the possible presence of increasing and measurable pyrite concentration above prospects, and calibrate to known hydrocarbon accumulations on the same survey.
- AVO Analysis (Edison, 2014)
 - Focus on AVO effects in the Elg prospect reservoir interval

3.2 Results of Block Evaluation

The License area, which covers almost the entire block 7/1, and parts of block 16/10 and 7/2 (Figure 1.1), sits in a migration shadow from the deeper basins in the Viking and Central Graben on the UK side. The main prospectivity in the license is the Jurassic Ula sands, which sit in the interpod areas above salt ridges. The salt distribution is a controlling factor on the Triassic and Jurassic sediment distribution. Highs of salt seem to follow the structural development of the basement in the area. Where the salt indicate more dissolution and/collapse there has been room for more accommodation space for Jurassic sediments. Figure 3.1 illustrates the play model of both the Jurassic and Triassic prospectivity in the area, where the Triassic pods stand out as highs due to differential loading onto the salt, and the Middle and Upper Jurassic sediment are re-deposited off the pods into the interpods above the salt highs. The

Triassic pods may act as lateral seals for the Jurassic sediments where they consist of tight sands, or separate prospects if the sands are of good reservoir quality. Due to few wells drilled in Triassic pods in the area, and highly variable Triassic sand-quality distribution make it challenging of separating out the better prospects. The APA mainly focused on the Isbjørn prospect, which sits in an interpod setting, with a down faulted basin to the west (indicated in Figure 3.1). Post-drill Isbjørn, the Elg lead listed in the APA was matured further, which sits in a classic interpod setting in the southern part of the license (Figure 1.1), surrounded by Triassic pods.

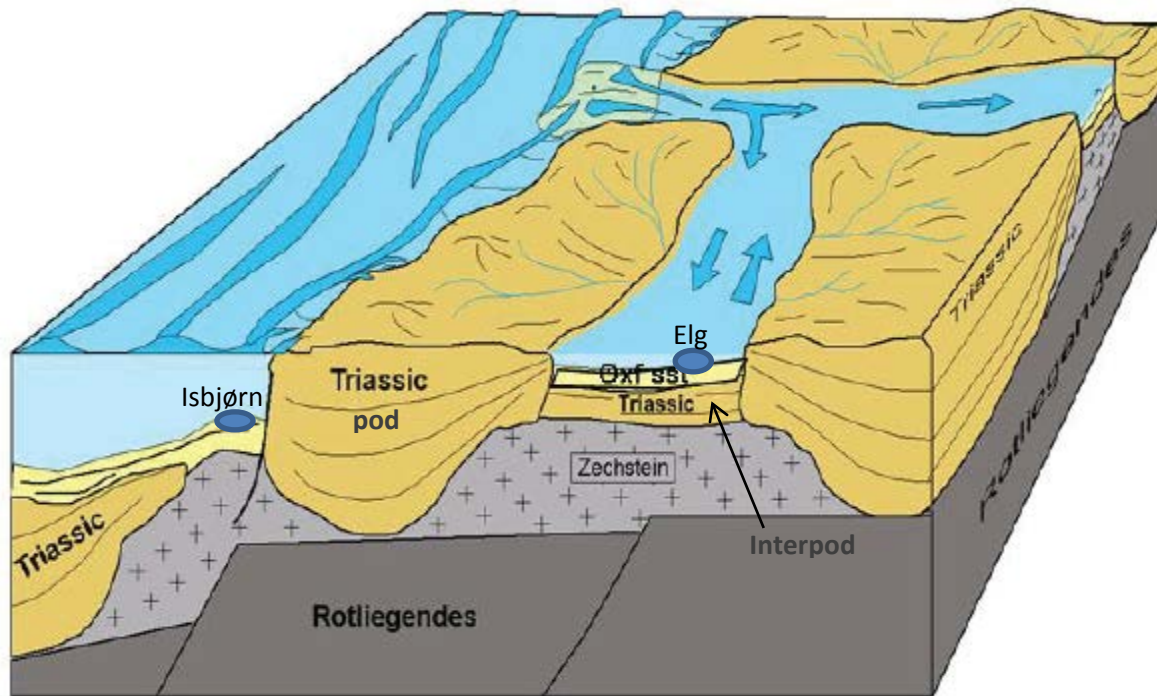


Figure 3.1 Pod-Interpod Evolution (Figure from Dong Regional Exploration Presentation, 2003).

In the initial prospect evaluation of the Isbjørn structure, the source was believed to be a local kitchen in a short distance from the structure. This concept has worked for other prospects in the same area, and helped de-risk the Isbjørn prospect. Basin modeling indicated a mature local basin, but with some risk of the depth due to uncertainty in velocity modeling. Post-drill of the Isbjørn well proved an immature basin and/or migration failure as it proved to be shallower than modeled for. This result increased the risk for further prospectivity in the license as the concept of a working local basin didn't work, and resulted in a too high risk for a long migration route from the Fisher Bank Basin into Jurassic interpod sediments in on the Elg structure.

Figure 3.2 is a charge-map from the basin modeling study done post-Isbjørn well with an updated new top reservoir Ula Fm map based on the well-results. This map shows limited charge into Isbjørn and the southern Elg lead, latter one being dependent on a long migration from the UK side.

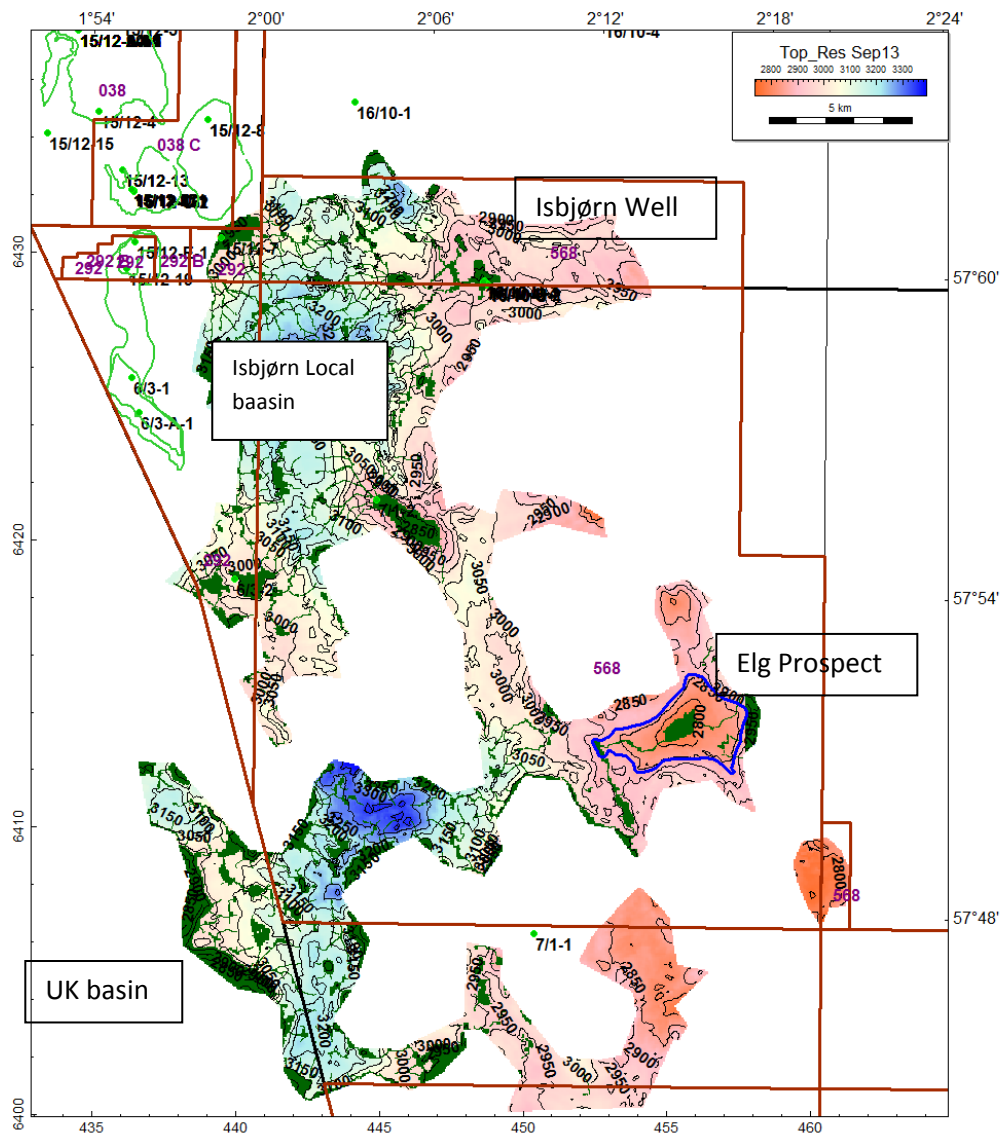


Figure 3.2 Ula Formation sand distribution in PL568 and migration/HC fill (dark green).

4 Prospect Update

The Production license 568 is located south-east of the oil-producing Varg field in the Northern North Sea. The source rock in the area is the Mandal/Draupne Formation from the deep Central and South-Viking Graben on the UK sector, but the PL568 most probably is located in a migration shadow from this, so the prospectivity is dependent on sourcing from local kitchens.

Other wells in the area have been drilled with the objective to demonstrate commercial petroleum deposits originating from corresponding strata. The dry wells 6/3-2 and 7/1-2s both sit in the same block and license and within the same play concept. Both wells were dry due to source and/or migration failure. These two wells sit in a different charge position to the deeper basins in West than Isbjørn, and were believed to be sourced from this rather than the local kitchen near Isbjørn structure.

The area applied for, with the main prospect Isbjørn, and additional leads, are outlined in Figure 4.1. The resulting acreage awarded in 2011 covers only the southern part including the Isbjørn prospect (Figure 1.1). After drilling of Isbjørn, the only lead evaluated as prospective, was the Elg lead in south. Due to dry wells in the area, un-economical volume evaluation and increased risk of source and migration, this will not be a good candidate for further drilling. Several studies done for this prospect to de-risk the presence of hydrocarbons didn't give any positive results, and Elg prospect had therefore higher risk than Isbjørn.

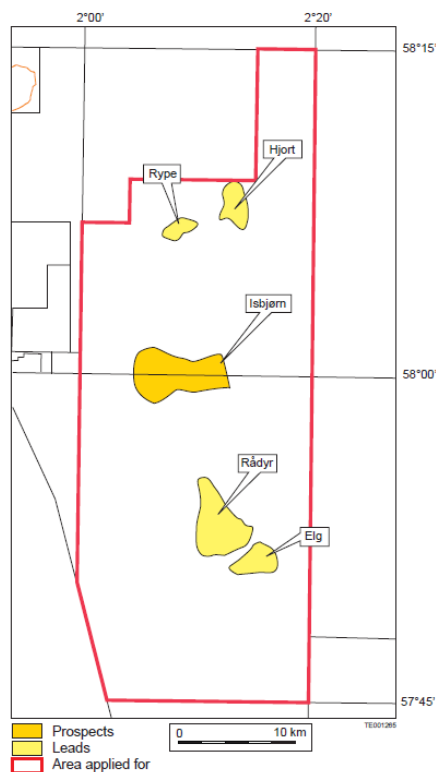


Figure 4.1 APA acreage applied for with Isbjørn prospect and 4 leads (both Triassic and Jurassic).

The pre-drill probability of detecting a petroleum deposit was 23% for the Isbjørn prospect. This was considerable lower probability as compared to the APA application from 2010 (0.32, Table 2). The probability was reduced due to increased geological and structural understanding, which increased the uncertainty of sand distribution and hydrocarbon generation, and migration into the structure. The well proved thick sand of excellent reservoir character, but was without any trace of hydrocarbons.

Discovery/ Prospect/ Lead name	D/ P/ L	Unrisked recoverable resources						Probability of discovery	Part in acreage applied for %	Reservoir		Distance to infra- structure (km)
		Oil 10 ⁶ Sm ³			Gas 10 ⁹ Sm ³					Litho-/ Chrono- stratigraphic level	Reservoir depth (m MSL)	
		Low	Base	High	Low	Base	High					
Isbjørn	P	1,35	6,04	27,35				0,32	100	Upper Jurassic Oxfordian	2640	17
Rådyr	L		4,75						100	Triassic	2650	26
Elg	L		4,04						100	Upper Jurassic Oxfordian	2400	29
Rype	L		4,04						100	Upper/Middle Jurassic	2500	16
Hjort	L		3,24						100	Upper/Middle Jurassic	2550	22

Table 2 Npd format prospect summary table APA2010

As a result of the combined studies and re-evaluations of the different leads performed in the area, the risk for several play elements has increased and it has not been possible to support an increased probability for discovery on the Elg prospect (Table 2). It is at present not considered that further studies can de-risk the prospect and alter the chance of success materially.

Prospect	P90 (mmboe)	P50 (mmboe)	P10 (mmboe)	Pmean (mmboe)	Risk
Isbjørn	29	85	252	44	0.23
Elg	8	22	60	29	0.14
Total				73	

Table 2 Revised License Prospect Summaries.

5 Technical Evaluations

The PL568 is located in the Northern North Sea, near the UK border, about 17 km south-east of the Talisman Operated Varg FPSO. Pre-drill of the Isbjørn prospect, a development solution pending the size of the prospect and at the time a potential Grevling development would be expected. It was foreseen that Isbjørn would be developed as a part of an area solution. In the development scenario presented for Isbjørn, a subsea tie-back to the Varg FPSO was the basis for the economics with the underlying assumption that the Varg FPSO will be operative for the expected field-life.

In Figure 5.1 an illustration of the planned development scenario is shown for the Isbjørn prospect. Since the Elg prospect is located further away from the Varg Field, and require a longer pipeline, higher volumes are needed to meet the economic threshold.

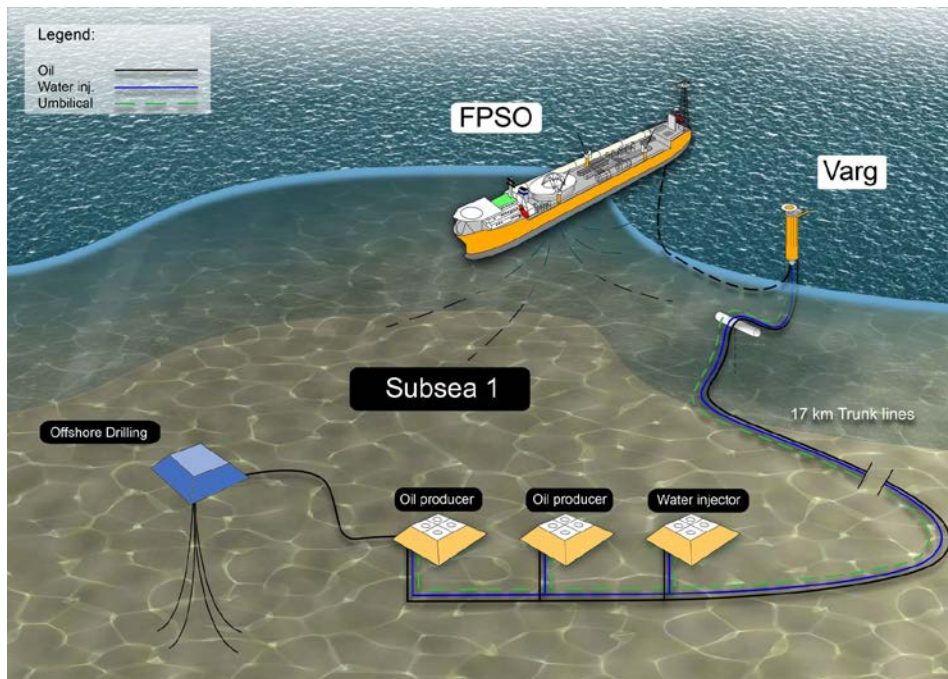


Figure 5.1 Development Solution Isbjørn P50 case

6 Conclusions

The license partners in PL 568 consider that the technical work done is comprehensive since the time of license award and that the geological and commercial risk for the remaining prospectivity is too high. The main risk elements are associated with the presence of a working petroleum system and timing of potential migration versus timing of forming of the structures.

Although some limited potential remains within the license, the risk is unacceptable high and will not justify further drilling. Comprehensive technical studies done on the remaining prospectivity has not reduced any risk parameters significantly since the dry Isbjørn well, and the operator evaluate that there are limited studies to further de-risk.

The recommendation to relinquish is based on this evaluation and concludes that there are no viable exploration targets within the PL568 acreage. The partnership has therefore agreed to relinquish the entire license area.