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PL740 B/C Relinquishment Report

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1 Licence History

PL740 B covers part of blocks 31/4 and 31/7 on the eastern flank of the Brage Field in the Northern North Sea. PL740 C is located in Block 31/7, (Fig. 1.1).

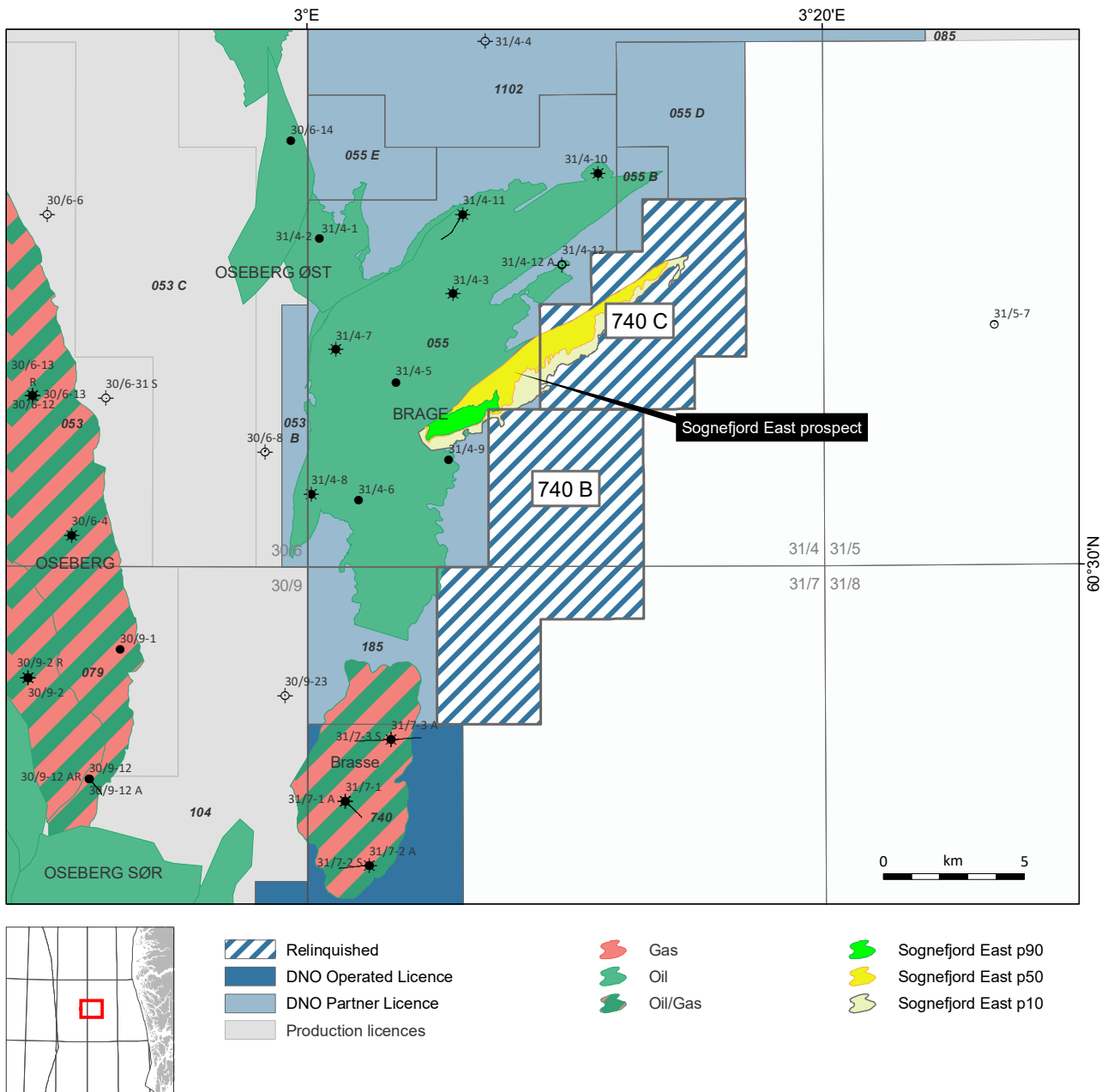


Fig. 1.1 PL740 B and PL740 C location map

PL740 B was awarded in 2017 as an extension to PL740 during APA 2016, following the Brasse discovery in 2016 when it was realised that the 31/7-1 Brasse accumulation could continue northwards outside the PL740 license.

PL740 C was awarded in 2018 during APA 2017 as a further extension to the north following re-interpretation of the entire area after appraisal wells 31/7-2 S and 31/7-2 A in 2017.

Faroe Petroleum with an interest of 50% was originally the operator for both licenses, until the takeover by DNO. Vår Energi (former Core Energy and Point Resources) with an interest of 50% is the other partner in the licenses.

The licenses were relinquished in February 2020 when re-evaluation of the Sognefjord East prospect on the eastern flank of the Brage Field turned out to be located mainly within the Brage Unit.

Table 1.1 PL740 B and PL740 C overview

	740 B	740 C
NPDID production licence	28941829	30977811
Status	INACTIVE	INACTIVE
Main area	North Sea	North Sea
Licensing activity	TFO2016	TFO2017
Date granted	10.02.2017	02.03.2018
Date valid to	07.02.2020	07.02.2020
Stratigraphical	NO	NO
Original area [km2]	57.831	42.722
Current area [km2]	0.000	0.000

Table 1.2 PL740 C and PL740 C equities

Company	PL740 B and PL740 C Equity
DNO Norge AS	50% and operator
Vår Energi AS	50%

The work commitment

Both licenses were extensions of the PL740 license which had a work program consisting of merging 3Ds and a drill or drop decision within 2 years. The work program was fulfilled by acquisition of already merged 3Ds and drilling of wells 31/7-1 and 31/7-1 A and purchase and re-processing of new 3D.

Application and decision on deadlines

There has been no application for extended deadlines in the licenses.

Meetings

PL740 B and PL740 C mapping and prospectivity were discussed in several meetings in the license, specifically after the discovery well in 2016 and appraisal wells in 2017 and 2018/2019 respectively. A final meeting with recommendations were held in December 2019.

Reason for relinquishment

There is only one mapped prospect in the two licenses, the Sognefjord East Prospect (formerly Brasse Extension). The prospect is an elongated narrow faultblock. A Brage Fensfjord production well near the crest of the structure found a thin oil-filled (3m) Sognefjord Formation. The main risk for the prospect is trap. Chance of success for the up-side is estimated to **18%** with a most likely total size of **4mill Sm³** STOOIP, whereof 50% is located within the Brage Unit.

The JV concluded that the opportunity was sub-commercial and decided to relinquished the area in order to make it available for APA round application by the Brage Unit owners.

2 Database Overview

The seismic database shown in Fig. 2.1.

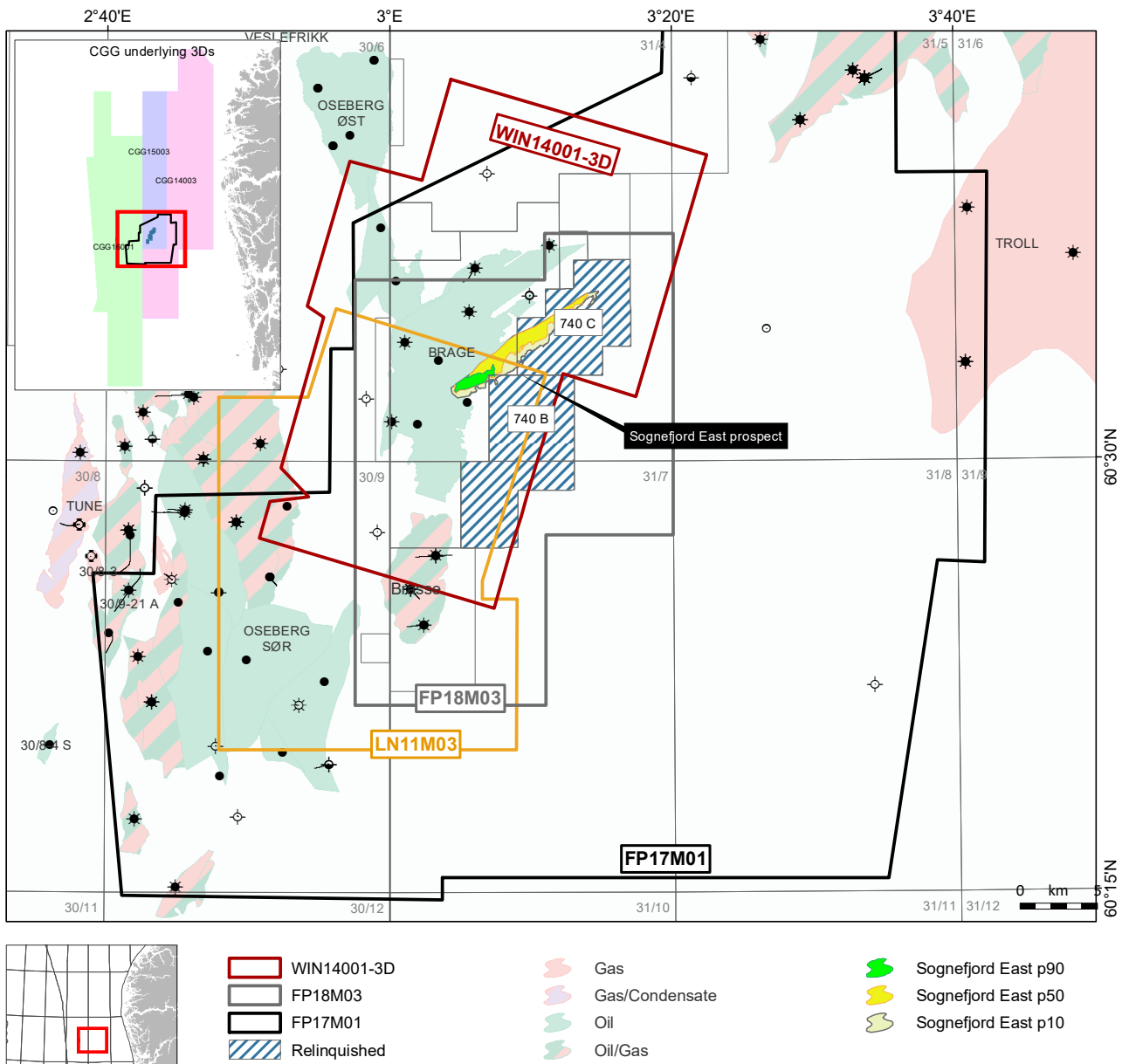


Fig. 2.1 PL740 B and PL740 C seismic database

The well database is shown in Fig. 2.2. The Brage development wells on the eastern flank of the Brage Field have been incorporated in the evaluation for understanding the distribution and facies of the Sognefjord formation reservoir.

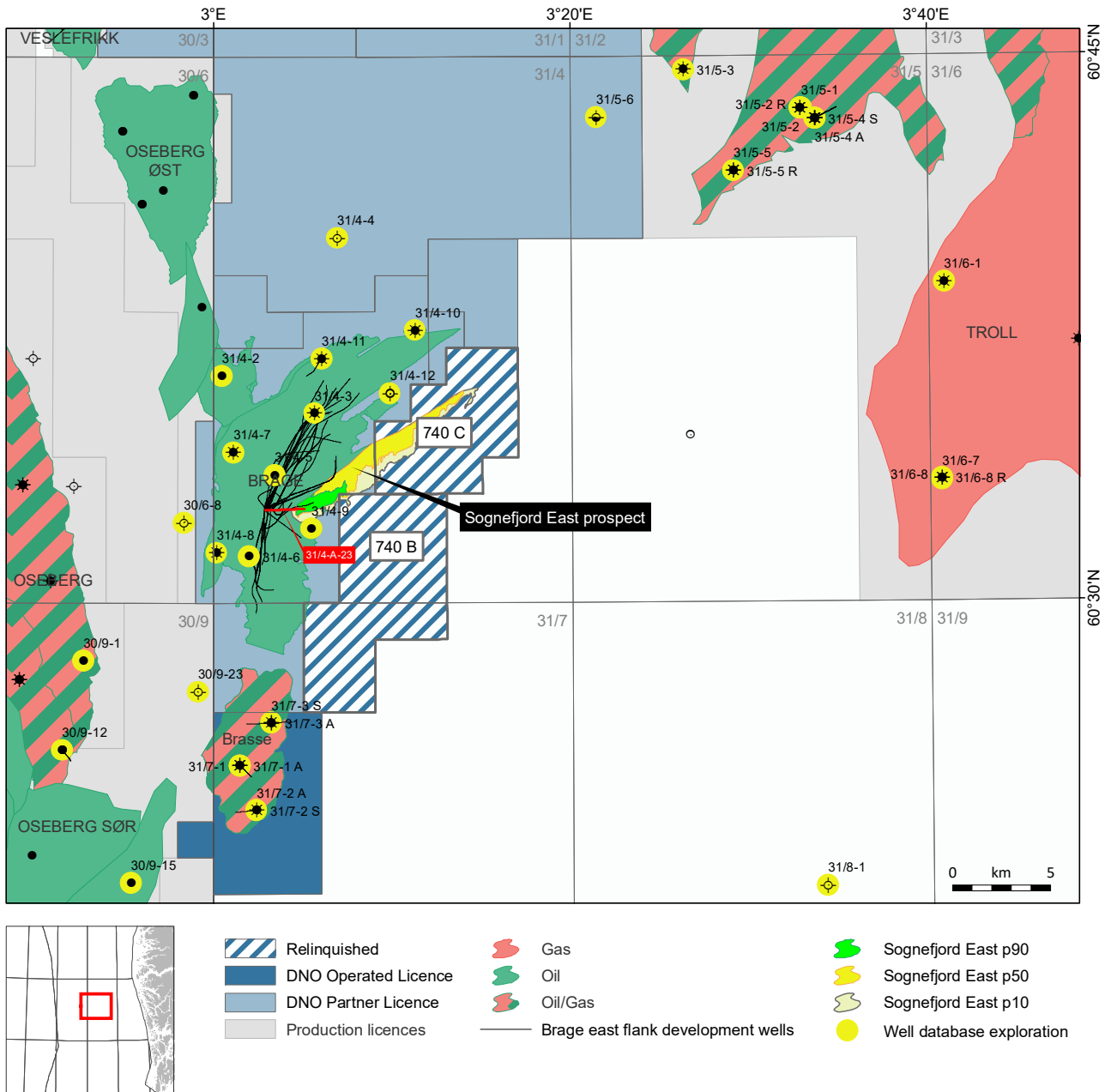


Fig. 2.2 PL740 B and PL740 C well database

2.1 Seismic data

The 3D survey LN11M03, consisting of reprocessed and merged relinquished surveys NH 9204, NH9802 and NH 0402, and regional 2D data were initially used for the evaluation of PL740. After the discovery wells were drilled in PL740 in 2016, 2300km² of the CGG Multiclient Horda surveys were purchased. The main underlying surveys were CGG14003, CGG15003 and CGG16001. These are datasets acquired using CGGs BroadSeis™ and BroadSource™ configuration. Original quality of the data was not good for the area and two re-processing projects, FP17M01 and FP18M03, Fig. 2.1 , were undertaken in order to improve the data quality and try to resolve inherent challenges in the seismic data. These two datasets have been used as the main seismic interpretation database for PL740 B and PL740 C. In addition, the WIN14001 survey has been used during the evaluation.

Seismic database is shown in Table 2.1

Table 2.1 PL740 B and PL740 C seismic database

Merged and reprocessed	Survey Name	NPDID	Acquisition Year	Market availability
FP17M01, FP18M03	CGG14003 (part of)	7984	2014	Yes
	CGG15003 (part of)	8194	2015	Yes
	CGG16001(part of)	8332	2016	Yes
LN11M03	NH0402	4256	2004	
	NH9204	3532	1992	
	NH9802	3925	1998	
	WIN14001	8019	2014	No

2.2 Well data

A list of all the relevant exploration wells used in the license evaluation is provided in Table 2.2

Table 2.2 PL740 B and PL740 C Well database

Wellbore	NPDID	Operator	Completed year	Purpose	Content	# HC levels	HC formations
30/6-8	77	Norsk Hydro	1982	WILDCAT	DRY		
30/9-15	2223	Norsk Hydro	1994	WILDCAT	OIL	1	NESS FM
30/9-23	6182	StatoilHydro	2009	WILDCAT	DRY		
31/1-1	5765	Marathon	2008	WILDCAT	DRY		
31/2-16 S	1453	Norsk Hydro	1989	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM
31/2-16 SR	1820	Norsk Hydro	1991	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM
31/2-5	210	Shell	1980	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM
31/2-5 R	500	Shell	1981	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM
31/2-5 R2	501	Shell	1984	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM
31/4-10	2617	Norsk Hydro	1995	APPRAISAL	OIL/GAS	2	SOGNEFJORD FM, FENSFJORD FM
31/4-11	4147	Norsk Hydro	2000	WILDCAT	OIL/GAS	3	SOGNEFJORD FM, FENSFJORD FM, BRENT GP
31/4-12	5051	Norsk Hydro	2005	WILDCAT	DRY		
31/4-3	402	Norsk Hydro	1980	WILDCAT	OIL/GAS	2	SOGNEFJORD FM, FENSFJORD FM
31/4-4	214	Norsk Hydro	1981	WILDCAT	DRY		
31/4-5	403	Norsk Hydro	1981	APPRAISAL	OIL	1	FENSFJORD FM
31/4-6	43	Norsk Hydro	1982	APPRAISAL	OIL	1	FENSFJORD FM
31/4-7	235	Norsk Hydro	1984	APPRAISAL	OIL/GAS	2	FENSFJORD FM, STATFJORD GP
31/4-8	312	Norsk Hydro	1986	APPRAISAL	OIL/GAS	1	STATFJORD GP
31/4-9	1026	Norsk Hydro	1987	APPRAISAL	OIL	1	FENSFJORD FM
31/5-3	101	Saga	1984	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM
31/5-5	2059	Norsk Hydro	1993	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM
31/5-5 R	4593	Norsk Hydro	2002	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM
31/5-6	4128	Norsk Hydro	2000	WILDCAT	OIL SHOWS		
31/7-1	7954	Faroe	2016	WILDCAT	OIL/GAS	1	SOGNEFJORD FM
31/7-1 A	8008	Faroe	2016	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM
31/7-2 A	8213	Faroe	2017	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM
31/7-2 S	8174	Faroe	2017	APPRAISAL	OIL	1	SOGNEFJORD FM
31/7-3 A	8644	Faroe	2019	APPRAISAL	OIL/GAS	1	SOGNEFJORD FM, FENSFJORD FM
31/7-3 S	8616	Faroe	2018	APPRAISAL	DRY		
31/8-1	6604	E.ON Ruhrgas	2011	WILDCAT	DRY		

In addition, relevant development wells on the eastern flank of the Brage Field have been used. These wells are shown in Fig. 2.2

3 Geological and Geophysical Studies

Studies

The following geological and geophysical studies have been carried out to aid in the technical evaluation. It should be noted that most of the studies were done specifically for the Brasse Discovery or for the Brage Field, but were also applicable for license PL740 B and PL740 C prospect evaluations.

Table 3.1 Relevant studies that have been done

Study	Results of study
Purchase of regional 3D seismic dataset	Provided improved regional understanding of structural and depositional models
Re-processing twice, in-house seismic data enhancement	Mitigation of inherent challenges in the seismic such as peg-leg and seabed multiples at reservoir level which is a severe constraint for reservoir characterization
AVO modelling and evaluation	Provided better understanding of seismic offset behaviours
Seismic inversion, in-house and by WinDea	Calibration to blind wells gave important information about validity of various inversion methods. Velocity inversion provided valuable information about local velocity behaviour.
Brage development wells study	Revealed overlooked hydrocarbon column in Sognefjord in well 31/4-A-23
Sognefjord Formation focussed biostratigraphic, sedimentological and petrophysics study	Provided improved understanding of depositional sequences in Sognefjord and the lateral petrophysical properties of these sequences
Hydrocarbon families and semi-regional migration study	Fingerprint analysis provided excellent basis for classification of oil-families and migration routes in the area
Prospect evaluation	The Sognefjord East prospect risk has a higher trap risk and smaller volumes than previously anticipated

Based on the results of the above mentioned studies, a detailed revised evaluation of the former Brasse Extension prospect (Sognefjord East prospect) revealed that the prospect had a considerably higher trap risk than previously anticipated. This is the case even though a small oil accumulation was found within the prospect area.

4 Prospect Update

Background

After the Brasse discovery in 2016, a semi-regional geological model of the Sognefjord Formation Fig. 4.1 was implemented. This was based on core data, biostratigraphy from wells and seismic interpretation. The age of the formation in wells 31/7-1 and 31/7-1 A was predominantly Oxfordian, while in well 30/9-23, located in the Oseberg sub-basin to the west, a 55m thick massive sand sequence of Kimmeridgian age was encountered. An equivalent age sequence was found in well 31/8-1 in the Stord Basin and in wells on the Troll Field. Based on seismic interpretation and geological concepts, it was predicted that this sequence would be present on the northeastern part of Brasse and downflank on the east side of the Brage Field.

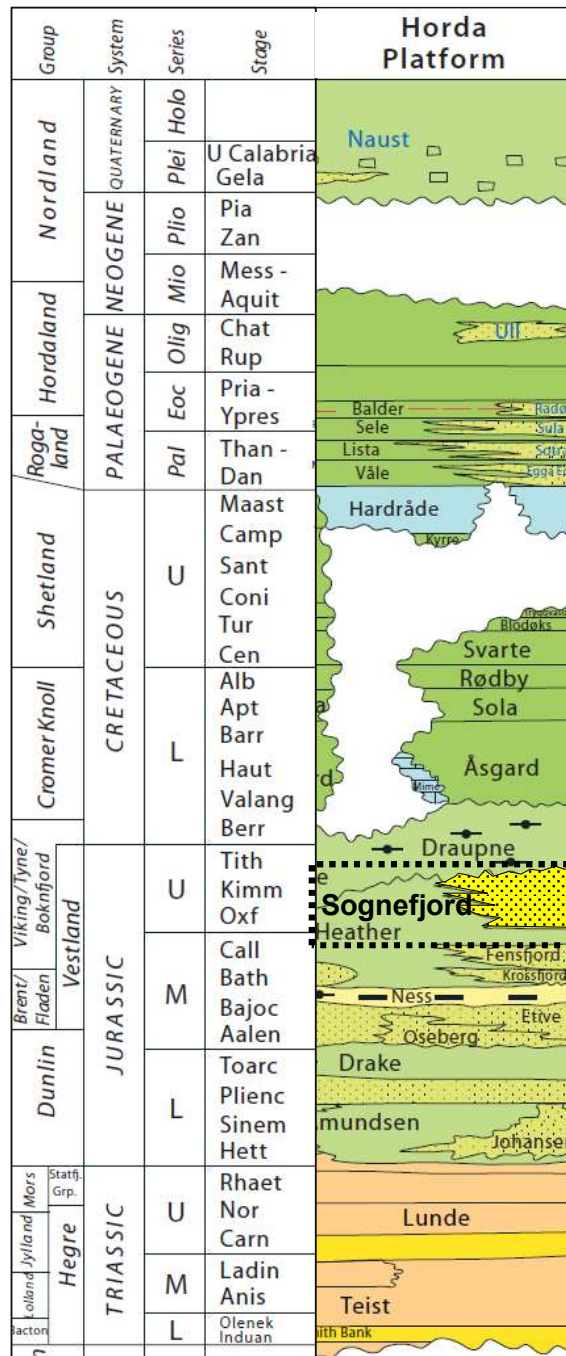


Fig. 4.1 Stratigraphy of the Horda Platform The Sognefjord Formation range from Early Oxfordian to Late Kimmeridgian in age

A possible trapping mechanism would be westwards pinchout/truncation onto the Brage High and northwards faultseal by numerous small, but distinct faults. Filling of the trap would take place by fill/spill from Brasse and migration from Oseberg in the west. This model was the basis for acquiring PL740 B and PL740 C.

Well **317/3 S** was located within a small closure on the northeastern part of the Brasse structure. The purpose was to find out if the prognosed Kimmeridgian sequence was present and hydrocarbon-bearing. The well was dry, but confirmed the geological model, finding 37m of very high quality Sognefjord Kimmeridgian age reservoir, Fig. 4.2.

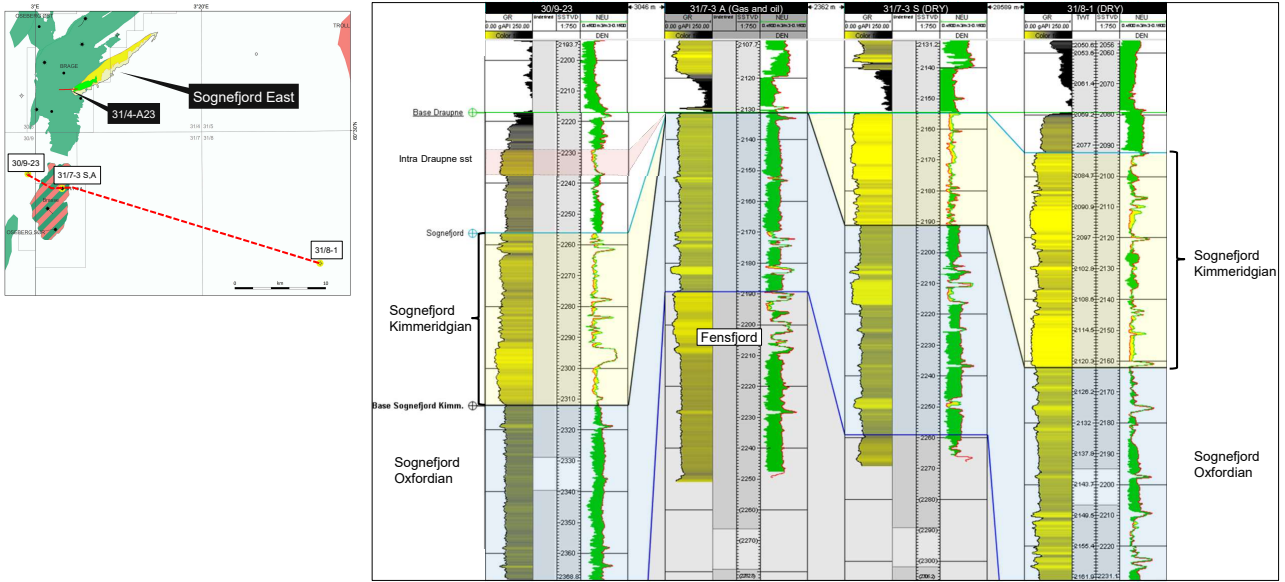


Fig. 4.2 West - east well correlation

A Brage development well, **31/4-23**, encountered a 3m vertical oil-column in a good Sognefjord sand more than 40m deeper than the OWC seen in Brage Sognefjord Formation previously, Fig. 4.3. This sand is interpreted to be part of the Kimmeridgian sand system found in 317/3 S. This is encouraging, but the well is located within a local closure and oil may be limited only to that closure. The sand is below seismic resolution and the lateral continuation downflank is not verifiable.

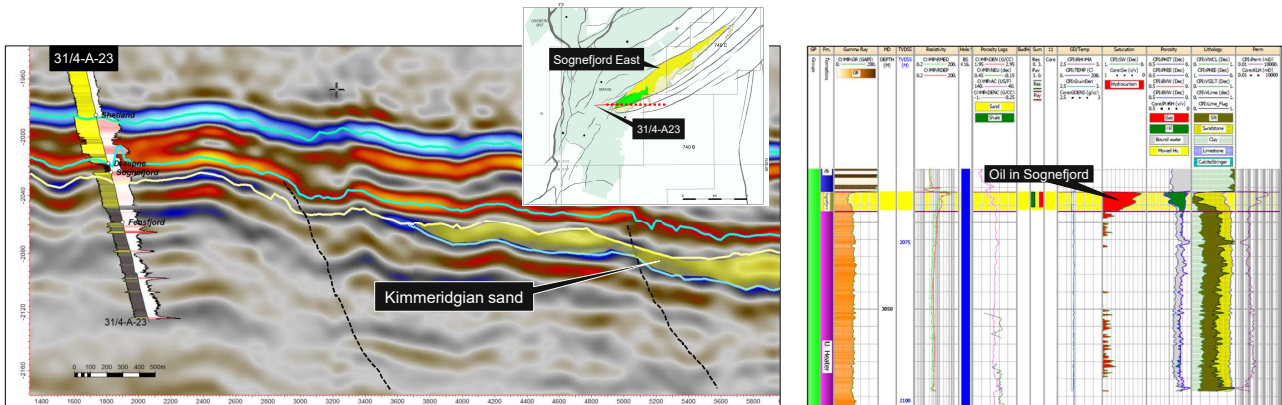


Fig. 4.3 Well 31/4-A-23 west - east seismic and CPI

Wells **31/4-9** and **31/4-12** were drilled on the eastern flank of the Brage Field, targeting both Sognefjord and Fensfjord formations. Well 31/4-9 encountered about 55m of silty Sognefjord Formation with very good oil shows. Well 31/4-12 encountered a gross Sognefjord thickness of more than 80m with a massive sand interval of 20m in the upper half of the formation, Fig. 4.4. This well had no shows at all, indicating a potential trap between this well and 31/4-9.

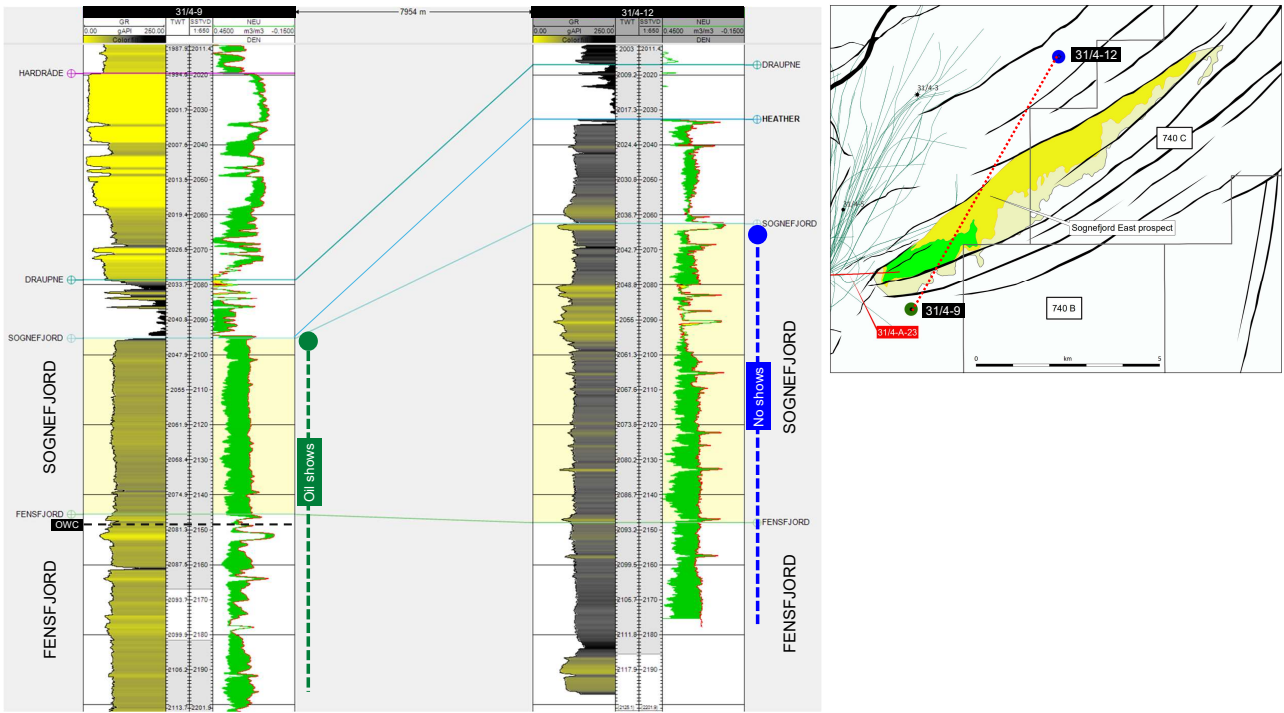


Fig. 4.4 Well correlation 31/4-9 to 31/4-12

Migration routes

A comprehensive oil typing and migration study was conducted involving several wells from Oseberg, Oseberg S, Brasse and Brage.

Mapping

Revised evaluation of the Brasse Extension prospect revealed that the prospect identified in APA rounds is present Fig. 4.5 . However, the sealing mechanism towards north will have a larger risk than estimated previously, due to small fault throw and thick Kimmeridgian sand. In addition, required westward pinchout is challenging to predict due to seismic resolution issues.

Sognefjord East prospect comparison, 2017 vs 2019

- Revised evaluation of the Brasse Extension prospect has revealed that previously assumed sealing mechanism towards north will not work due to small fault throw and expected thick Kimmeridgian sand
- A development well, 31/4-23, has encountered a 3m vertical oil-column in a good Sognefjord sand more than 40m deeper than the OWC seen in Brage Sognefjord previously. This sand may be part of the Kimmeridgian sand system found in 31/7-3 S. This is encouraging, but the well is located within a local closure and oil may be limited only to that closure
- Compared to earlier estimates, the Brasse Extension has decreased in volume and has a very high single risk, namely trapping mechanism. A large part of the volume is located within the Brage Unit

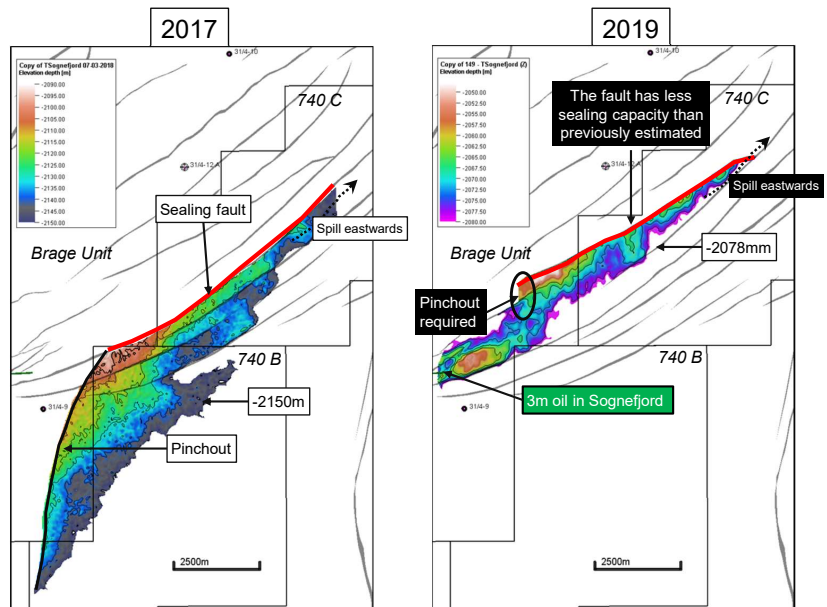


Fig. 4.5 Sognefjord East prospect comparison, 2017 vs 2019

Volumes and risk

Compared to earlier estimates (ref. Fig. 4.5), the Brasse Extension has decreased in volume. The p50 volume is estimated to **4 million Sm³** with about 50% located within the Brage Unit.

The prospect has a main single risk, namely trapping mechanism. The chance of discovery is estimated to **18%**.

5 Technical evaluation

The Sognefjord East estimated resources, however, may be interesting as tie-back volumes to the Brage production facilities.

Lateral distance from the Brage platform is 3-4km, and the upside of the structure could be tested at low costs by a sidetrack to a future Fensfjord producer on the east flank of the Brage Field.

6 Conclusion

One prospect in the Sognefjord Kimmeridgian reservoir has been identified in licenses PL740 B and PL740 C. The prospect is an upside to a small oil column encountered in Well 31/4-A-23.

The actual potential of this prospect in PL740 B and PL740 C is quite limited, in combination with high degree of risk. (ref. 4 Prospect Update). The partnership therefore decided to relinquish the two licenses.

The prospect area is, however, a natural extension to the Brage Unit where the P90 volumes are located and a potential commercial volume may be a valuable addition to the Brage reserves base.

Lateral distance from the Brage platform is 3-4km and the upside of the structure could be tested at low costs by a sidetrack to a future Fensfjord producer on the east flank of the Brage Field.

The main prospect risk is trap which may be mitigated by improved seismic resolution.