

PL 971 Relinquishment Report

Relinquishment of PL971, parts of blocks 8/3, 8/6, 9/1 and 9/4

Reference is made to the notification on license decision to NPD dated 12.08.2020, regarding the drop decision in production licence 971 (PL971).

This report outlines the license history, the database, the prospect and the technical evaluation of the PL971 and fulfils the requirement by the NPD for a license status report within 3 months of relinquishment.

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1 Licence history

PL971 is located on the western margin of the Egersund Basin, West of the Yme Field. It comprises parts of blocks 8/3, 8/6, 9/1 and 9/4. PL971 was awarded through the APA 2018 with the Storhaug as the main prospect.

<u>Licence:</u>	PL971
<u>Awarded:</u>	01.03.2019
<u>License period:</u>	Expires 01.03.2026 Initial period: 2 years
<u>License group:</u>	Equinor Energy AS 70% (Operator) M Vest Energy 30%
<u>License area:</u>	302.033 km ²
<u>Work programme:</u>	Obtain 3D seismic Decision to drill an exploration well or drop by 01.03.2021
<u>Meetings held:</u>	
24.04.2019	EC/MC start-up meeting
15.11.2019	EC/MC meeting
12.06.2020	EC/MC meeting
<u>Work performed:</u>	
2019:	Licence start-up.
2019:	Geological/geophysical evaluation of prospectivity on 3D seismic surveys.
2020:	Drop decision made.

Reason for relinquishment:

Prospectivity in PL971 has been re-evaluated on released 3D seismic surveys. Prospect maturation has reduced the volumes and increased the risk of the main prospect Storhaug in the Vestland Group. The source maturity and migration are the main risks. In summary, no drillable prospects have been identified in the licence.

2 Database overviews

2.1 Seismic data

As part of the licence obligations, the 3D seismic surveys MC3D-EGBEXT2008 and MC3D-EGB2008 have been used to re-assess the main prospect Storhaug. Previously, the Storhaug prospect was mapped on 2D seismic surveys of various vintages. The 3D seismic surveys were released in Q1 2019.

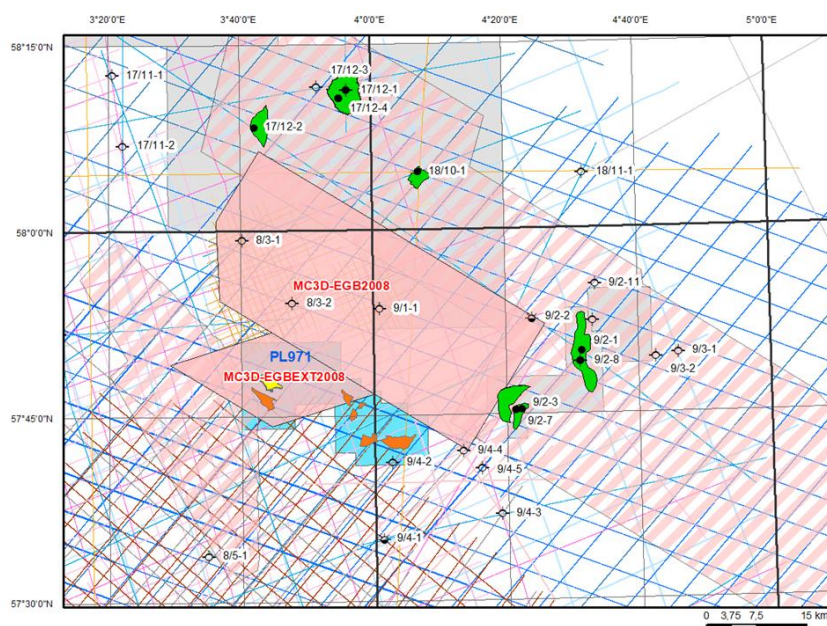


Figure 2.1 Seismic common database of PL971

Table 2.1 List of 2D and 3D seismic surveys in PL971 common database

Seismic survey	2D/3D	Year	Time shift ms + down, - up	Relative quality for mapping Vestland Gp. reservoir
CGME96	2D	1996	-23	Good
CNST-86	2D	1986	-27	Fair - noisy trace-trace
G94-91	2D	1991	-15/-20	Fair - noisy trace-trace
GNSR-91	2D	1991	-23	Fair - noisy trace-trace and multiples
NSR04	2D	2004	-12	Fair - smeared trace-trace
NSR05	2D	2005	-15	Fair - smeared trace-trace
PSE78	2D	1978	-50	Poor - multiples
SHD97	2D	1997	-20	Fair - reverberating multiples
ST8118	2D	1981	0	Poorest - noisy trace-trace
UG97	2D	1997	-10	Good
UG198	2D	1998	10	Good - Multiples
ST8302	2D	1983	-23	Poor
ST8410	2D	1984	-22	Poor
MC3D-EGB2005	3D	2005	Base survey	Very good 3D time-migrated data
SST2000	3D	1999	0	Very good
MC3D-EGB2008	3D	2008	0	Very good
MC3D-EGBEXT2008	3D	2008	0	Very good

2.2 Well data

The well database used in the evaluation of PL971 is listed in Table2.1

Table 2.2 Well database of PL971

Wells	Year	Drilling operator	Present licence	Status	Age at TD
8/1-1	1972	Phillips Petroleum Company Norway	Open	Dry	Late Permian
8/3-1	1966	Esso Exploration and Production Norway A/S	Open	Dry	Pre-Devonian
8/3-2	1982	Den norske stats oljeselskap AS	Open	Dry	Triassic
8/5-1	2013	Lundin Norway AS	Open	Dry	Triassic
8/9-1	1976	Conoco Norway Inc.	Open	Dry	Late Permian
9/1-1 S	2011	Premier Oil Norge AS	PL972	Dry	Triassic
9/2-1	1987	Den norske stats oljeselskap AS	PL316	Oil	Triassic
9/2-2	1987	Den norske stats oljeselskap AS	Open	Oil shows	Triassic
9/2-3	1990	Den norske stats oljeselskap AS	PL316	Oil	Middle Jurassic
9/2-4 S	1994	Den norske stats oljeselskap AS	PL316	Oil	Middle Jurassic
9/2-5	1995	Den norske stats oljeselskap AS	PL316	Oil	Middle Jurassic
9/2-6 S	1996	Den norske stats oljeselskap AS	PL316	Oil	Middle Jurassic
9/2-7 S	1997	Den norske stats oljeselskap AS	PL316	Oil	Middle Jurassic
9/2-8 S	1998	Den norske stats oljeselskap AS	PL316	Oil shows	Late Permian
9/2-9 S	1999	Den norske stats oljeselskap AS	PL316	Oil	Middle Jurassic
9/2-11	2010	Talisman Energy Norge AS	Open	Dry	Middle Jurassic
9/3-1	1986	A/S Norske Shell	Open	Dry	Triassic
9/3-2	2005	Paladin Resources Norge AS	Open	Dry	Triassic
9/4-1	1968	Conoco Norway Inc.	Open	Shows	Late Permian
9/4-2	1970	Texaco Exploration Norway AS	PL971	Dry	Triassic
9/4-3	1972	Conoco Norway Inc.	Open	Dry	Triassic
9/4-4	1977	Saga Petroleum ASA	Open	Dry	Triassic
9/4-5	2006	ExxonMobil Exploration and Production Norway AS	Open	Dry	Carboniferous (undefined)
10/4-1	2015	Wintershall Norge AS	Open	Dry	Late Permian
10/7-1	1992	Esso Exploration and Production Norway A/S	Open	Dry	Late Permian
17/10-1	1969	A/S Norske Shell	Open	Dry	Triassic
17/11-1	1968	A/S Norske Shell	Open	Dry	Late Permian
17/11-2	1976	A/S Norske Shell	Open	Dry	Triassic
17/12-1, R	1971	Phillips Petroleum Company Norway	Open	Dry	Oligocene
17/12-2	1973	Phillips Petroleum Company Norway	PL972	Oil	Devonian
17/12-3	1980	Phillips Petroleum Company Norway	PL972	Dry	Triassic
17/12-4, A and B	2009	BG Norge AS	PL972	Oil	Triassic
18/10-1	1980	Elf Petroleum Norge AS	PL972	Oil	Triassic
18/11-1	1974	Elf Petroleum Norge AS	Open	Dry	Pre-Devonian

3 Results of geological and geophysical studies

The following work has been performed since the licence was awarded:

- Mapping of the key horizons on the released 3D seismic surveys MC3D-EGBEXT2008 and MC3D-EGB2008:
 - Seabed, Top Lista Fm., Top Shetland Fm., Top Cromer Knoll Gp., Top Tau Fm., Top Egersund Fm., Top Sandnes Fm., Top Bryne Fm., Top Skagerrak Fm., Intra Triassic, Top salt and Base salt
- Well-tie of wells to MC3D-EGB2008
- Update of some key horizons on the 2D seismic
 - Top Tau Fm., Top Egersund Fm., Top Sandnes Fm. and Top Bryne Fm.
- Mapping of the main faults on the released 3D seismic surveys MC3D-EGBEXT2008
- Fault seal and trap analysis with triangle plots based on key wells 8/3-2, 9/1-1 S, 9/4-5 and 18/10-1
- New depth conversion models
- Updated prospect evaluation and risks

4 Prospect update report

The play for the Storhaug prospect and the leads comprises Middle-Upper Jurassic deltaic sandstone reservoirs of the Bryne and Sandnes Fm., sourced by Upper Jurassic organic-rich marine shales of the Tau Fm., capped by Upper Jurassic Egersund Fm. shales with limestone stringers. The play is proven in the Egersund basin by the Yme field to the East and the Brisling (Sandnes Fm.) and Vette and Mackerel (Bryne Fm.) discoveries to the North. The discoveries are all under-filled by varying degrees, highlighting the main risks of source maturity and migration.

The 3D survey MC3D-GBEXT2008 covers the northern part of the licence with the main Storhaug prospect. The adjacent 3D survey MC3D-EGB2008 covers 4 key wells, which have been used for seismic calibration (Figure 2.1). The surveys are of adequate quality for prospectivity maturation. Overall, good confidence in the mapping of the key horizons and faults.

Storhaug is in large parts a flat structure (Figure 4.1) and depth conversion sensitive. Several velocity models have been investigated. The depth differences at top reservoir are within the uncertainty range. The Storhaug prospect geometry is re-defined as a combination of dip closure and fault seal (Figure 4.1 and Figure 4.2). The expected fault sealing capacity of the main bounding fault is in excess of the trap closure height. The shales of the Egersund Fm. (and the Tau Fm.) are expected to be very good top seals.

The Bryne Fm. has been mapped on the 3D seismic surveys and is mostly thin over the prospect, reducing the volumes.

The expected source kitchens for the prospect and leads in PL971 are untested. There is a high risk that the source rock is not mature enough to expel sufficient oil and that the migration to the Storhaug prospect is very challenging. Under-fill of the prospect is likely. The degree of under-fill is uncertain. No DHI's are expected in the Bryne Fm. and Sandnes Fm.

The updated volumes and risks of the Storhaug prospect are listed in Table 4.1.

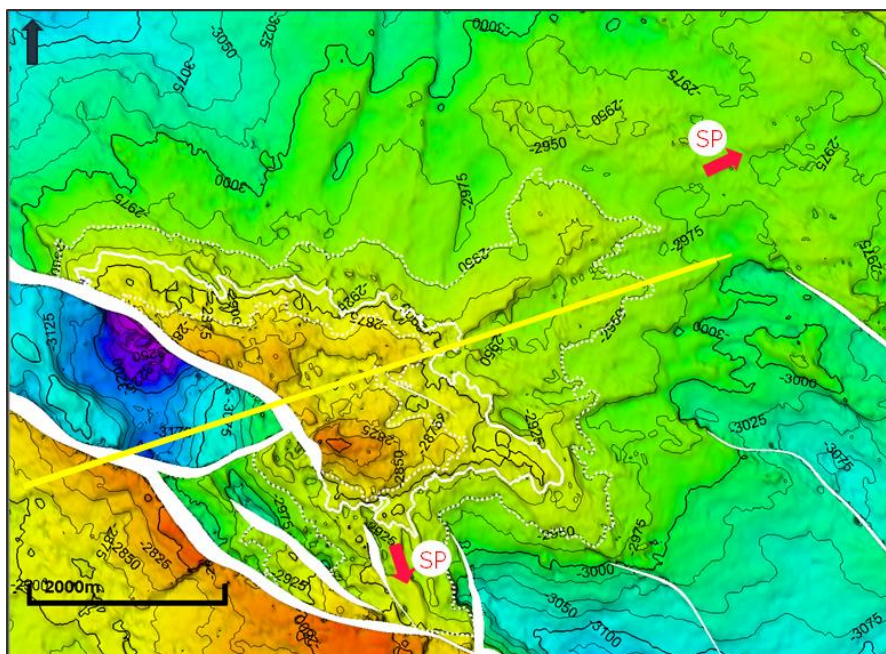


Figure 4.1 Storhaug prospect on Top Bryne Fm. depth map with P90-Mean-P10 outlines and potential spill-points

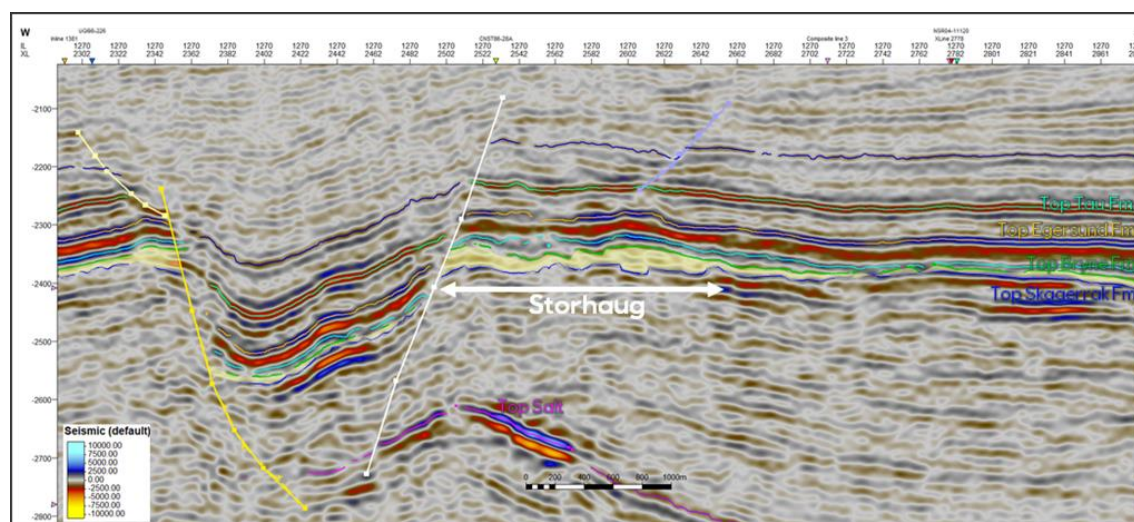


Figure 4.2 W-E seismic section through Storhaug prospect

Table 4.1 Volumes and risks for the Storhaug prospect

Discovery / Prospect / Lead name	D / P / L	Case (Oil/Gas/Oil&Gas)	Un-risked recoverable resources						Probability of discovery
			Oil 1e6 Sm3			Assoc Gas 1e9 Sm3			
			Low (P90)	Base, Mean	High (P10)	Low (P90)	Base, Mean	High (P10)	
Storhaug	P	Oil	0.69	2.51	5.15	0.04	0.14	0.29	0.11

5 Technical evaluation

Access to hosts in the area is limited and potential field development would require a stand-alone solution. The updated volumes of the main prospect Storhaug have been significantly reduced since APA 2018 and are well below the economic thresholds for a stand-alone, conventional or unmanned production platform.

6 Conclusion

The work programme for PL971 has been fulfilled. After a full evaluation of the licence, prospectivity is considered small with very high risk. Due to the lack of value in the licence, PL971 Management Committee has decided to drop the licence.