PL1013, PL1013 B – Licence status report

2025-024352

Summary

PL1013 and PL1013 B are located on the Dønna Terrace in the Norwegian Sea, east of the Fossekall satellite field, north of Norne.

The PL1013 licence was applied for in the 2018 APA and licence extension PL1013 B in APA 2020. The licences were originally applied by Petrolia NOCO as an operator (60%, now 20%) and INEOS E&P (40%, now Orlen Upstream). Drill decision in the licence was taken in 2022, to drill the Løvmeis (former Rafiki) prospect. Equinor joined the licence with 40% equity after the well decision had been taken and took over operatorship from Petrolia NOCO.

Well 6608/10-R-2 H (T2) Løvmeis pilot was drilled in Q4-2024, as an exploration well, from the existing Fossekall R-template in the neighbouring licence (PL128). For the case of discovery, it had been planned to convert the well into a producer by drilling a producer sidetrack within the reservoir.

The Løvmeis exploration pilot well entered the Mid Jurassic reservoir (Ile Fm.) near the apex of the prospect and encountered a relatively high degree of water saturation. It is interpreted that the well encountered the transition zone of the oil-water contact within a small 4-way closure. Updip volume potential is neglectable, and the well was classified as dry.

Remaining volume potential was evaluated in 2020. All other prospects within the licence are considered not to be of commercial interest as each of those prospects has a low geological probability and / or low volume potential.

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1 Licence history

Licence: PL1013, PL1013 B

Awarded: 01.03.2019

Licence period: Initial period PL1013: 01.03.2019 - 01.03.2026
Initial period PL1013 B: 19.02.2021 - 01.03.2026

Licence group:
Equinor Energy AS 40 % (Operator)
ORLEN Upstream Norway AS 40 %
Petrolia NOCO AS 20%

Licence area: PL1013 – 67 km^2
PL1013 B – 10 km^2

Work programme:

Geological and geophysical evaluation of the prospectivity, purchase of the 3D seismic and maturation to drill decision of the Løvmeis prospect have been finalized. The initial drill or drop (DoD) decision was extended by one year (from 01.03.2021 to 01.03.2022). In 2022, Equinor ASA joined the licence and took over the operatorship. The BoK decision milestone was further extended by 1 year (until 01.03.2025), due to the complexity of testing the Løvmeis prospect with a keeper well from the Fossekall R template in the neighboring licence, PL128.

Meetings held:

09.04.2019	MC startup meeting
27.06.2019	EC work meeting
21.08.2019	EC work meeting
24.10.2019	EC work meeting
27.11.2019	MC meeting
06.05.2020	EC work meeting
25.06.2020	EC work meeting
24.09.2020	EC work meeting
04.11.2020	EC work meeting
25.11.2020	MC meeting
24.02.2021	EC work meeting
05.05.2021	EC work meeting
15.06.2021	EC work meeting
20.08.2021	EC work meeting
21.09.2021	MC/EC meeting
01.10.2021	EC work meeting
29.11.2021	MC/EC meeting

05.10.2022	MC meeting
14.11.2022	MC/EC meeting
28.02.2023	EC work meeting
28.03.2023	EC work meeting
08.06.2023	EC work meeting
28.11.2023	MC/EC meeting
20.03.2024	EC work meeting
17.06.2024	EC work meeting
13.08.2024	EC work meeting
24.09.2024	EC work meeting
11.26.2024	MC/EC meeting
20.01.2025	EC work meeting

Work performed:

High quality seismic data was utilized for prospectivity evaluation including the purchase and conditioning of the PGS16005NWS broadband data. Seismic interpretation was updated to verify results against interpretation on vintage seismic data (ST11M04). Additionally, extensive geological and geophysical studies were carried out, including fault seal analysis, structural interpretation, seismic amplitude analyses, biostratigraphic update, sedimentology, petrophysics and rock physics study, petroleum system analysis and basin modelling, velocity modelling and depth conversion. Based on the studies, a drill decision was taken to drill the Løvmeis (former Rafiki) prospect. For possible production, static and dynamic reservoir models were built. The Løvmeis prospect was drilled by the 6608/10-R-2 H (T2) well in 2024.

Reason for surrender:

The partnership decided to relinquish the licence after drilling the Løvmeis well (6608/12-R-2 H, 6608/12-R-2 HT2). The well was classified dry with very little upside potential. The remaining prospectivity in the area constitutes small prospects with high risks and poor economy.

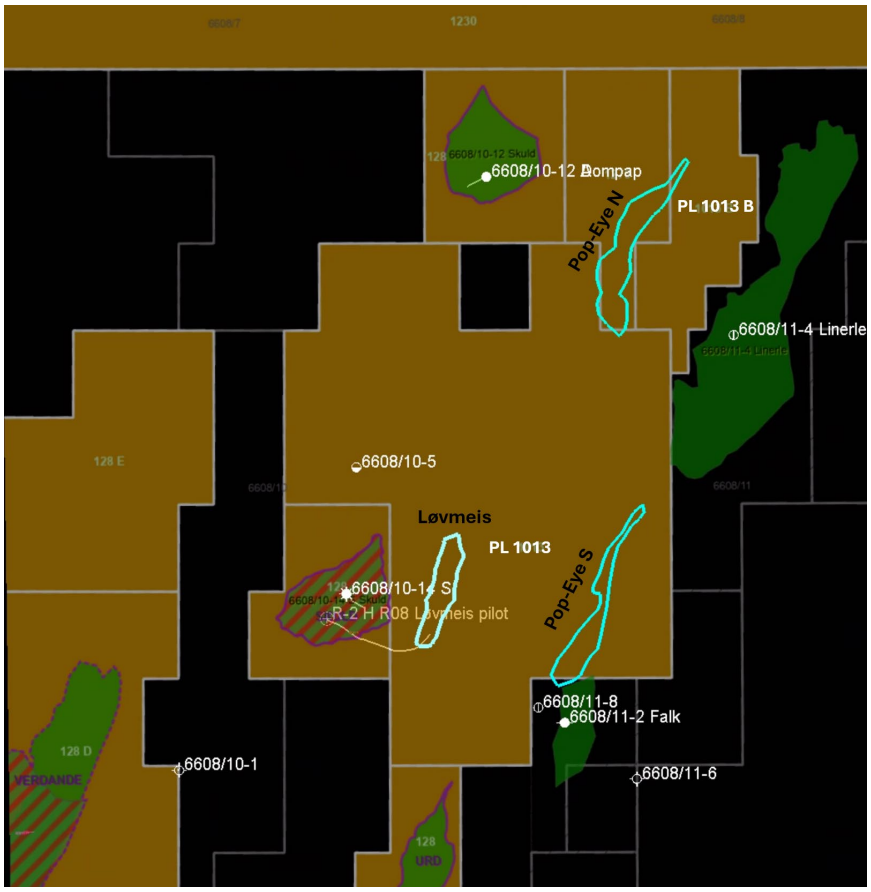

Figure 1 Location of PL1013 and Løvmeis prospect, which was tested (dry) by 6608/10-R-2 HT2 Løvmeis pilot well in Q4-2024.

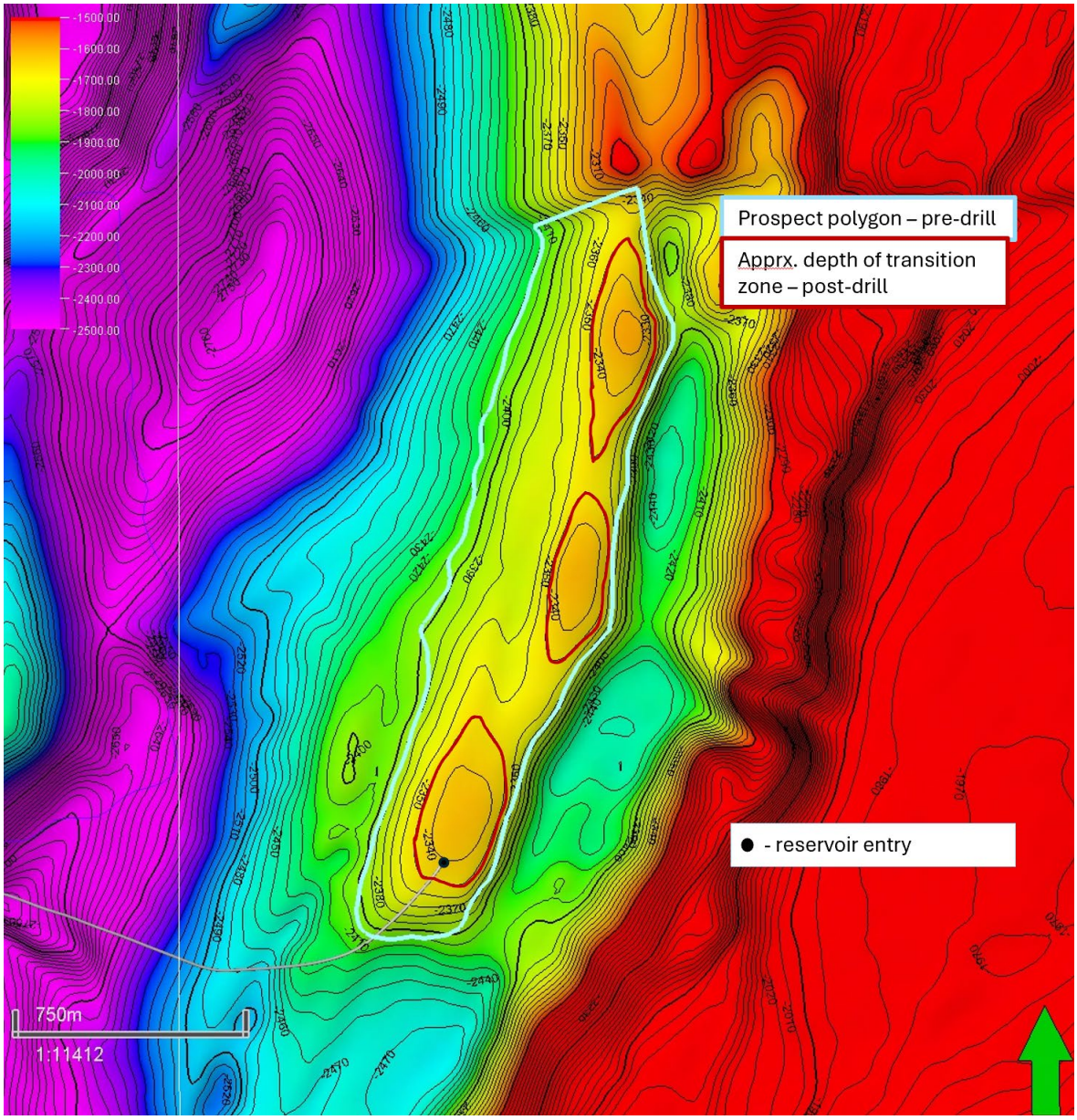

Figure 2 Structural depth map with depth contour lines indicating minimal remaining updip potential above reservoir entry of the Løvmeis exploration pilot well.

2 Database overviews

2.1 Seismic data

The seismic database (Table 1) consists of released and licenced 3D seismic surveys (Figure 3) as well as licence focused conditioned seismic data.

Table 1 Overview of common seismic database.

Seismic survey	2D/3D	Year	Comment
ST04M17	3D	2004	Released
PGS16005NWS	3D	2016	
PGS16005PNR19NWS	3D	2019	Sharp Reflection conditioning
PGS16005PNR21NWS	3D	2021	PGS16005PNR19NWS + PL1013B area
ST11M04	3D	2012	MAZ PSDM dataset

Figure 3 Map view of key 3D seismic surveys for PL1013 and PL1013 B.

2.2 Well data

The common well database consists of released exploration wells in the Dønna terrace (Table 2). 6608/10-14 S (Fossekall) is considered key well for the prospect evaluation, proving the working play model, including reservoirs, source and migration.

Table 2 Overview of key well database.

Well name	Operator	Result	Completed	TVD m RKB	TD Fm/Gp	Public
6507/2-4	Eni Norge	Gas/Cond (Marulk)	2008	3600	Lyr Fm	Yes
6507/3-9 S	BP Norge	Gas	2012	2946	Lange Fm	Yes
6507/3-12	Statoil	Gas	2017	3451	Tofte Fm	Yes
6608/8-2	StatoilHydro	Dry	2007	2831	Red Beds	Yes
6608/10-1	Statoil	Dry	1989	3436	Åre Fm	Yes
6608/10-2	Statoil	Oil/Gas (Norne)	1992	3677	Åre Fm	Yes
6608/10-3	Statoil	Oil/Gas (Norne)	1993	2919.5	Åre Fm	Yes
6608/10-4	Statoil	Oil/Gas (Norne)	1994	2800	Åre Fm	Yes
6608/10-5	Statoil	Dry	1995	3198	Åre Fm	Yes
6608/10-12	StatoilHydro	Oil (Dompap)	2008	3179.3	Red Beds	Yes
6608/10-14 S	Statoil	Oil/Gas (Fossekall)	2010	2771	Åre Fm	Yes
6608/10-15	Statoil					
6608/10-17 S	Statoil	Oil (Cape Vulture)	2017	3294	Spekk Fm	Yes
6608/11-2	Statoil	Oil (Falk)	2000	2215	Grey Beds	Yes
6608/11-4	Statoil	Oil (Linerle)	2004	2317	Red Beds	Yes
6608/11-6	Statoil					
6608/11-8	Statoil	Dry	1986	1970	Åre Fm	Yes
6608/10-P-1 H	Statoil	Observation	2013	2642	Åre Fm	Yes
6608/10-P-2 H	Statoil	Observation	2012	2595	Not Fm	Yes
6608/10-P-3 H	Statoil	Oil/gas production	2016	2601	Åre Fm	Yes
6608/10-P-4 H	Statoil	Oil production	2013	2570	Åre Fm	Yes
6608/10-R-1 H	Statoil	Water injection	2012	2719	Åre Fm	Yes
6608/10-R-4 H	Statoil	Water injection	2013	2764	Åre Fm	Yes

3 Results of geological and geophysical studies

Detailed work to understand the prospectivity in the PL1013 and PL1013 B licences was executed on the Lower and Middle Jurassic interval. Løvmeis, as the main prospect in the licence, was the focus of the evaluation.

Source and migration

In the area, Upper Jurassic Spekk and Melke formations are the main oil prone source rocks. The Spekk Formation (Fm.) is early to mid-mature in the basin west of PL1013.
Løvmeis was assumed to be charged via Fossekall. Expulsion of hydrocarbons to the west of PL1013 started in the Cenozoic and continued until present day. Inversion may impact the traps, as faults shows signs of Cenozoic inversion elements. Pop-Eye prospects can be charged via a series of dynamic traps in Norne & Urd fields to the south or through fault leakage from Løvmeis.

Reservoir quality

Primary reservoir in the area is the Ile Fm. representing transgressive distal lower shoreface to inner shelf deposits, and Tofte Fm. representing proximal regressive shallow marine deposits. Secondary reservoirs are Tilje and Åre formations representing regional floodplain to tidal shallow marine setting. Reservoir properties and depositional environment is expected to be analogous to Fossekall 6608/10-14S (Skuld Field) for Ile, Tofte and Åre formations.

Trap and seal

Løvmeis is sitting in a complex structural setting along the Revfallet Fault Complex. The trap is a fault bounded structure requiring multiple faults to seal. Significant seal risk was assumed to be associated to potential self-juxtaposed reservoir along bounding faults, which have low displacements. Fault seal analysis indicates 25 m maximum column height for Løvmeis, however higher column heights are proven in other fault dependent fields and discoveries in the area in the order of 100 - 130 m. Hanging wall traps, such as the one for the Løvmeis structure, are challenging to seal as they require big enough throw (and a sealing unit at the base) in order to generate juxtaposition seal. Løvmeis relied more on membrane seal, which was flagged as questionable given the depth of the prospect. Potent Middle Jurassic seal of the Not Fm. shale is proven in the area provide a robust top seal.

Geophysical studies

Both PGS16005NWS and ST11M04 datasets were utilized for geophysical de-risking. Seismic conditioning was performed on PGS16005NWS resulting in the PGS16005PNR19NWS and PGS16005PNR21NWS datasets (Table 1). The conditioning workflows were performed by Sharp Reflection. AVO processing was performed on both seismic datasets resulting in AVO products such as Intercept, Gradient, Fluid and Lithology cubes and others. These products were utilized to de-risk the Løvmeis prospect.

4 Prospect update report

The main prospect in the licence was the Løvmeis prospect which was drilled with a keeper well from the Fossekall R- template in 2024 and was classified as dry.
Remaining prospectivity constitutes the Pop-Eye N and S prospects, evaluated by the previous operator Petrolia NOCO and presented to the partnership in 2021. The licence has not updated the evaluation of these prospects since.

Table 3 Overview of volume potential within PL1013 and PL1013 B.

Prospect	Segment/Lithostrat	Depth at apex [m TVD MSL]	HC phase	In place [mmboe]			Recoverable [mmboe]			Pg [%]
				P90	Mean	P10	P90	Mean	P10	
Pop-Eye N	Ile, Tofte	1700	oil	19.4	58.1	100.8	6.8	**32**	60.5	17
Pop-Eye N	Tilje, Åre	1700	oil	2.6	13.7	21.7	0.4	**3.3**	7.6	17
Pop-Eye S	Ile, Tofte	1690	oil	8.6	24.9	48.3	3	**13.7**	29	13
Pop-Eye S	Tilje, Åre	1700	oil	1.3	9.6	15.7	0.2	**2.3**	5.5	13

Pop-Eye structures were evaluated by Petrolia NOCO and presented to the partnership in 2021 (Table 3, Figure 4). Pop-Eye N is an upthrown fault block with reasonable volumes, however, main part of the prospect is located outside of PL1013 and PL1013 B licences. Pop-Eye S is a hanging wall pitchout trap with low volumes and low Pg (Figure 4).
After drilling the Løvmeis structure, the licence has decided not to spend more effort to further de-risk the Pop-Eye prospects.

Løvmeis exploration well (6608/10-R-2 H (T2)) encountered the transition zone of the oil-water contact and was classified as dry. During the post well evaluation the depth map has been updated that together with the AVO Fluid response revealed limited and segmented up-dip potential (Figure 2).

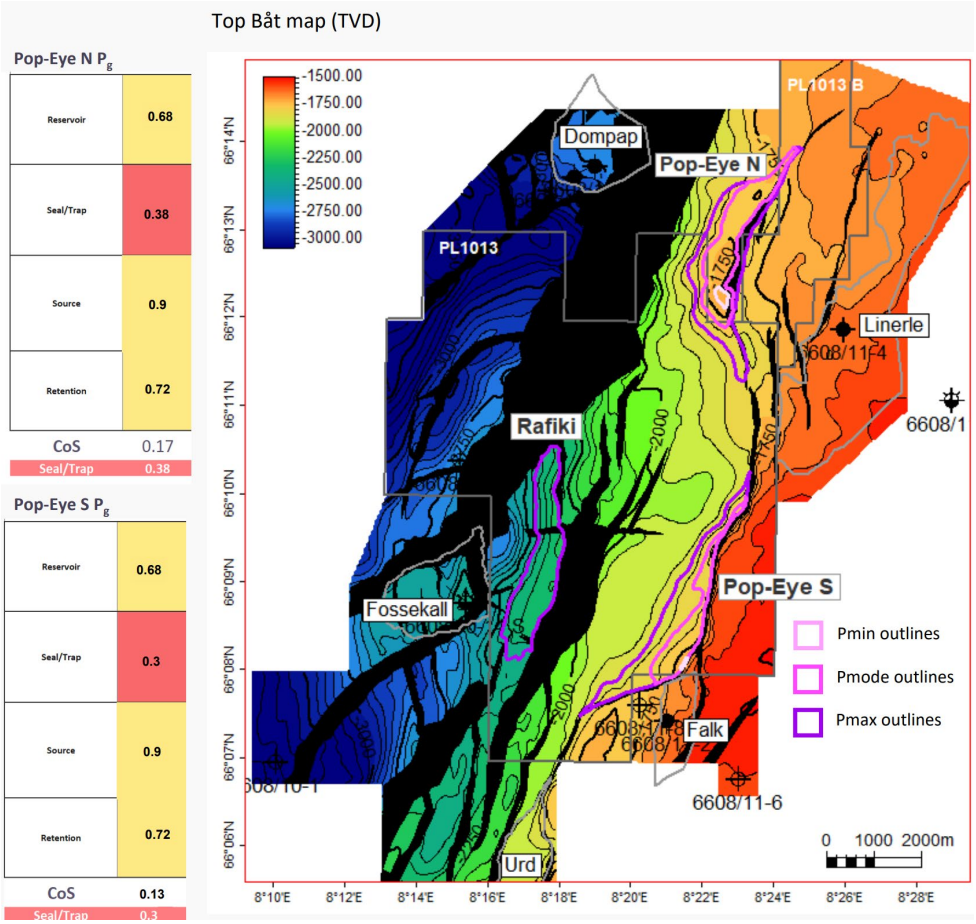

Figure 4. Structural map and risking of Pop-Eye N and S prospects (From Petrolia NOCO). Note: Rafiki is the original name of Løvmeis. However the final Løvmeis prospect that was drilled, includes only the southern portion of the original Rafiki prospect.

5 Technical evaluation

Løvmeis prospect (drilled) is located 1 km to the East of the Fossekall (Skuld) field and 1.5 km from the Fossekall R-template.

Løvmeis well (6608/10-R-2 H (T2)) was drilled and classified dry in 2024 with limited upside potential. Development plan included a producer side-track from the exploration well and an injector. However, the exploration well results did not trigger development.

Additional prospects (Pop-Eye N and S) are farther away from the existing subsea templates, as such drilling them with a keeper well is not possible. Pursuing them with an exploration campaign is not supported by the licence given the low geological probabilities and / or volume potential.

6 Conclusion

The licence partnership has unanimously decided to surrender PL1013 and PL1013 B at the decision to concretize (BoK) deadline on 01 March 2025, due to the limited volume potential and lack of further drilling candidate.

Appendices

1. Shapefile: Pop-Eye N
2. NPD Table 5 Prospect data status-report-surrender – Pop-Eye N