PL 957 – Licence status report

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1 Licence history

Licence: PL957

Awarded: 22.06.2018

License period: Expires 22.06.2025
Initial period: 7 years

License group: Equinor Energy AS 100% (Operator)

License area: 953.436 km^2

Work programme:

Work program	Decision	Task status
Study of geology and geophysics		
Acquire 3D seismic		
	Decision to acquire new geophysical data (EM)	22.06.2021
	Decision to drill	22.06.2021
EM acquisition		
	Decision to drill	22.06.2022
Drill exploration well		
	Decision to enter extension period	22.06.2024
	Decision to enter extension period	22.06.2025

Meetings held:
Equinor Energy AS is solitary license owner

Work performed:

2018:	Licence start-up.
2017:	Acquisition of TGS17003 (AMS17) - multiclient 3D seismic survey
2017-2018:	Processing of AMS17
2018:	Acquisition of TGS18001 (AMS18) - multiclient 3D seismic survey
2018-2019:	Processing of AMS18
2019:	AMS-MS-MERGE - merge of AMS17/18
2018-2020	Prospect evaluation and screening for additional prospectivity

Reason for surrender:

PL957 is surrendered for the following reasons:

- Reduced volumes: Gross rock volume is reduced significantly after new interpretation on 3D seismic.
- Higher risk: In 24th round application prospect risk was 13%. New prospect risk is 6%.
- Phase change: In 24th round application phase was expected to be most likely oil (60% oil/ 40% gas). A new evaluation of phase has revealed most likely pure gas phase.
- Trap: In 24th round trap was considered moderate risk. Trap is considered high risk after new interpretation on 3D seismic of trap as apex is situated in a giant vent system.
- Depositional model: In 24th round sediments were assumed to be turbidites from Greenland. New interpretation has revealed a possible long-distance sediment transport from Norway. Reservoir is still considered high risk.
- AVO: A DFI downgrade has been added to the overall risk.
- Business case: First pass evaluation with a gas case indicates a challenging and costly development.
- Strategy: It is not mapped out valuable follow up potentials in the vicinity to PL957

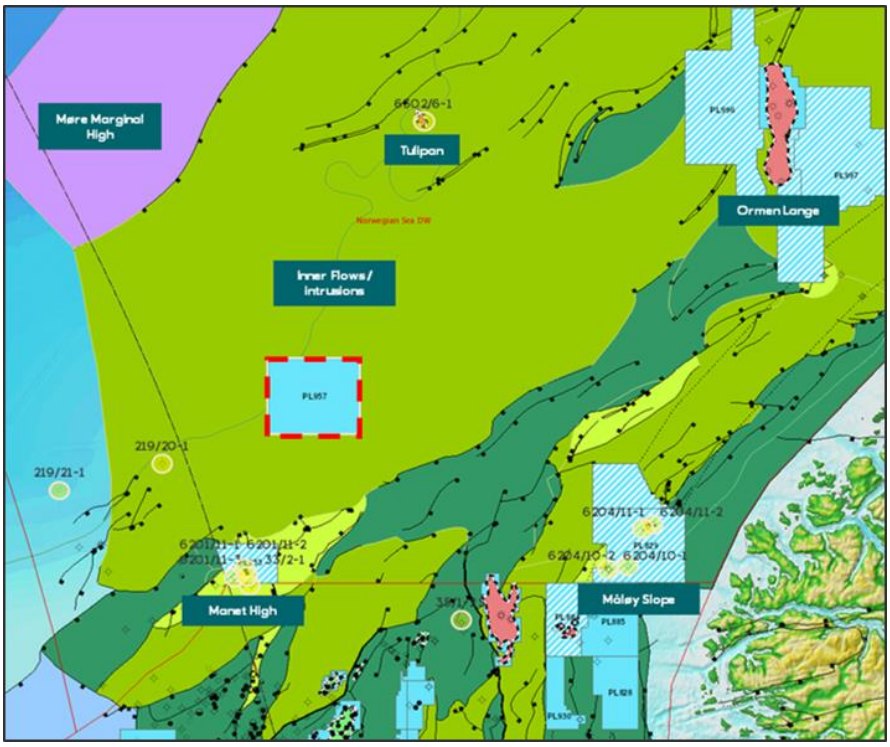

Figure 1.1 – Location map for PL957 in the Norwegian Sea

2 Database overviews

2.1 Seismic data

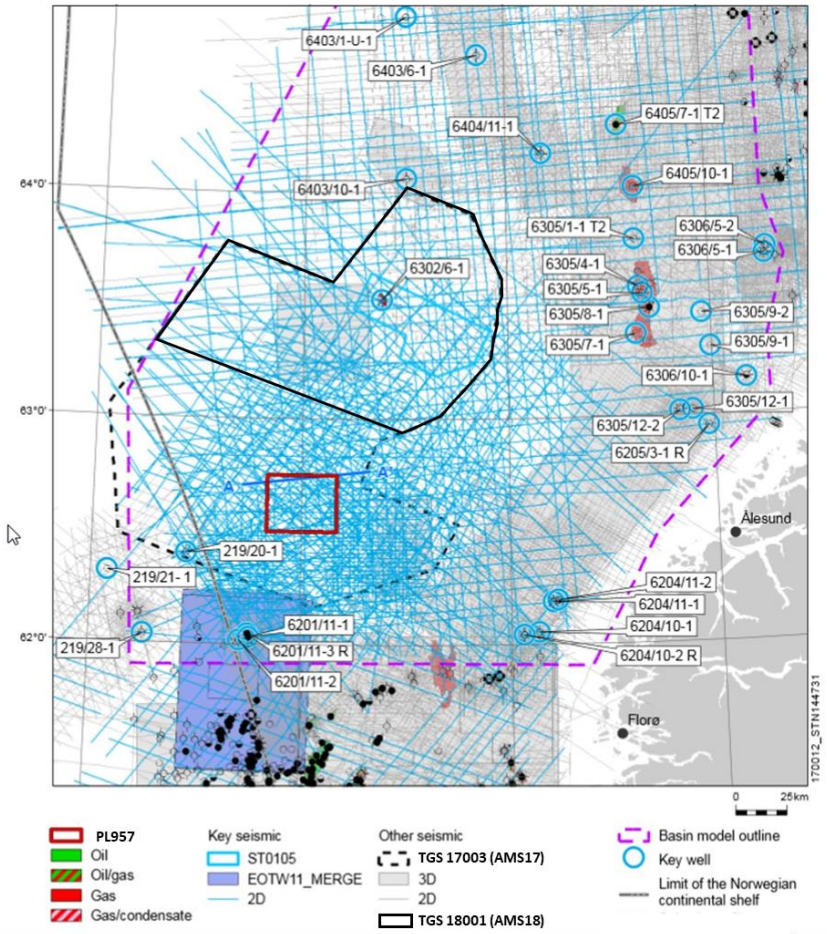

Figure 2.1 – Seismic database, PL957in red outline. This map show all available seismic and wells in the Møre Basin, but only the 3D surveys TGS17003 and TGS18001 has been used in PL957

Table 2.1: List of seismic surveys used in PL957

Survey name	Survey Type	Processing type	NPDID
TGS17003 (AMS17)	3D	PSTM	8439
TGS18001 (AMS18)	3D	PSTM	8594
AMS-MS-MERGE	3D	PSTM	8439

2.2 Well data

The well database used in the evaluation of PL957 is given in Table 2.2.

Table 2.2 - Well database for PL957

Well name	Alias/field	Year	Operator	Status	NPDID
6201/11-1	A-prospec	1987	Den norske stats oljeselskap	Oil	1134
6201/11-2		1993	Den norske stats oljeselskap	Dry	1549
6201/11-3R	Albert	2012	Lundin Norway AS	Oil	7110
6204/10-1	J-prospect	1995	Den norske stats oljeselskap	Dry	2666
6204/10-2R	L-prospect	1997	Den norske stats oljeselskap	Dry	3258
6204/11-1		1994	Den norske stats oljeselskap	Gas	2205
6204/11-2	I-prospect	1997	Den norske stats oljeselskap	Oil shows	3249
6205/03-1R	B-prospect	1990	Norsk Hydro Produksjon AS	Shows	1510
6302/06-1	Tulipan	2005	Statoil Petroleum AS	Gas	5086
6305/01-1T2	Ormen Lange	1998	Norsk Hydro Produksjon AS	Dry	3555
6305/04-1	Ormen Lange	2002	Norsk Hydro Produksjon AS	Gas	4441
6305/05-1	Ormen Lange	1997	Norsk Hydro Produksjon AS	Gas	3144
6305/07-1	Ormen Lange	1998	BP Norway Limited U.A.	Gas	3535
6305/08-1	Ormen Lange	2000	Norsk Hydro Produksjon AS	Oil/Gas	4109
6305/09-1	Blåveis	2001	Norsk Hydro Produksjon AS	Dry	4297
6305/09-2	Dovregubben	2011	Det norske oljeselskap ASA	Dry	6502
6305/12-1	C-prospect	1991	Norsk Hydro Produksjon AS	Shows	1808
6305/12-2	E-prospect	1993	Norsk Hydro Produksjon AS	Shows	2207
6306/05-1	Eirikson-Nansen	1997	Amerada Hess Norge AS	Gas	3060
6306/05-2	Hagar	2015	Repsol Exploration Norge AS	Dry	7726

6306/10-1	Skalmen	1990	A/S Norske Shel	Oil/gas shows	1551
6403/06-1	Edvarda	2006	Statoil Petroleum AS	Dry	5296
6403/10-1	Solsikke	2002	Norsk Hydro Produksjon AS	Dry	4602
6404/11-1	Havsule	2002	BP Amoco Norge AS	Dry	4465
6405/07-1T2	Ellida	2003	Statoil Petroleum AS	Oil	4749
6405/10-1	Midnattsol	2007	Statoil Petroleum AS	Gas	5565
6403/01-U-1	Mørerandhøgda	2014	Oljedirektoratet	Scientific	7560
214/27-1	Torridon	1985	Chevron Exploration North Sea Ltd	Gas	UK well
219/20-1	Ben Nevis	2003	Sovereign Oil & Gas PLC	Dry	UK well
219/28-1		1984	Sovereign Oil & Gas PLC	Dry	UK well

3 Results of geological and geophysical studies

The following work have been performed since the license was awarded:

- Intrerpretation of several key horizons regionally and inside the licence on new 3D data
- Interpreted Reinen prospect and Kalven lead on 3D data
- Updated prospect evaluation of Reinen prospect
- 3D data show Draken lead from 24th round is no longer a closure
- New velocity model
- AVO/LFP study
- Reservoir studies based on 3D data show a possible sediment input from Norway
- Trap/vent analysis

4 Prospect update report

PL957 and Reinen prospect is situated in an underexplored part of the southern Møre Basin deep-water. The assumed Thanetian reservoir level is disturbed by magmatic intrusions from the breakup event in late Palaeocene/early Eocene time.

A new interpretation of the Reinen trap on 3D seismic (broadband seismic survey AMS17/18 collected post-award) show a four-way closure but the size of the trap is reduced from 150 km2 to 25 km2 at mean hydrocarbon contact. A new volume calculation, together with a change in phase prediction has given a reduced STOIIP of 184 MSm3 to GIIP of 26 GSm3 for the Reinen prospect. A new evaluation of the Cretaceous source and migration concludes with very low possibility of oil expulsion thus the new Reinen prospect evaluation is based upon a pure gas phase. Migration concept of the 24th licensing round is still considered valid.

The reservoir concept of a Greenland provenance is rejected for a discreet observation of a possible deep-marine fan derived from Norway based on seismic thickness- and amplitude-maps between Upper Paleocene and Paleocene/Eocene unconformity. However, derisking of the reservoir is challenging as Thanetian/Ypres play is

underexplored in the area with no analogue wells with sandstone sourced from Norway in the Møre Basin. Thanetian reservoir is basis for prospect evaluation.

In the 24th licensing round evaluation a moderate risk was put on trap seal. New Interpretation of the 3D seismic show a giant vent through the reservoir sourced from several intrusions in the apex area of the prospect. Faults can be traced from the vent level all the way up to base Naust and a high risk of top seal leakage is inevitable. A new velocity model also has shifted the apex almost 200 m shallower thus increased risk of a blown trap.

An AVO study has been carried out on the AMS17 seismic. AVO modelling reveal expectations of DHI in both gas and oil case. There are no indications of DHI in the seismic of the Reinen prospect and a DHI downgrade is required.

Table 4.1 – PL957 Volume and risk summary

Opportunity/ Prospect/ Segment/Scenario	In-place resources* P90 – mean – P10 (GSm^3)	Recoverable resources** P90 – mean – P10 (GSm^3)	Pg	HC phase split (%) oil, gas, multi-phase
Reinen 2020	3.61 – 26.5 – 59.8	2.36 – 15.9 – 38.8	6	100% Gas
Reinen 24th round	38.2 – 183.7 – 408.3	15.0 – 62.2 – 126.3	12	60% Gas / 40% Oil
Kalven Lead	3.9 – 7.2 – 11.4	2.5 – 4.7 – 7.4	6	100% Gas

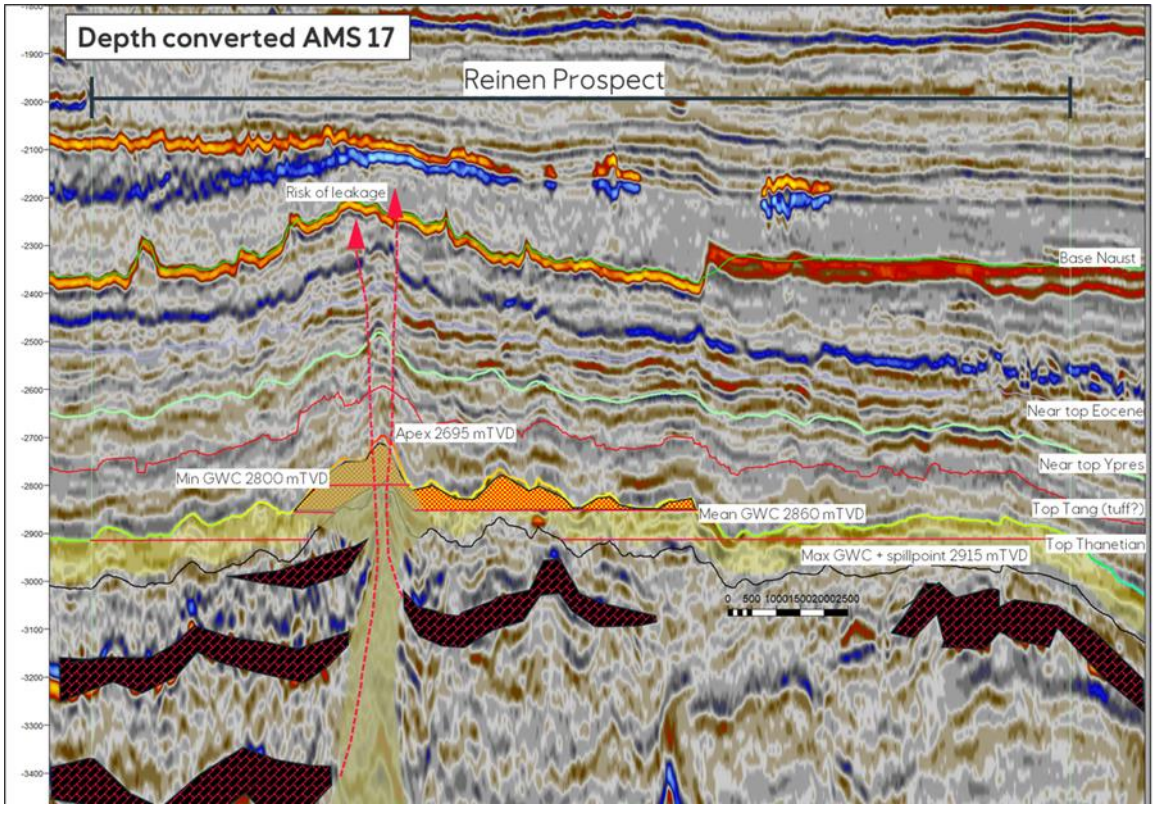

Figure 4.2 – W-E seismic cross section through central parts of the Reinen Prospect.

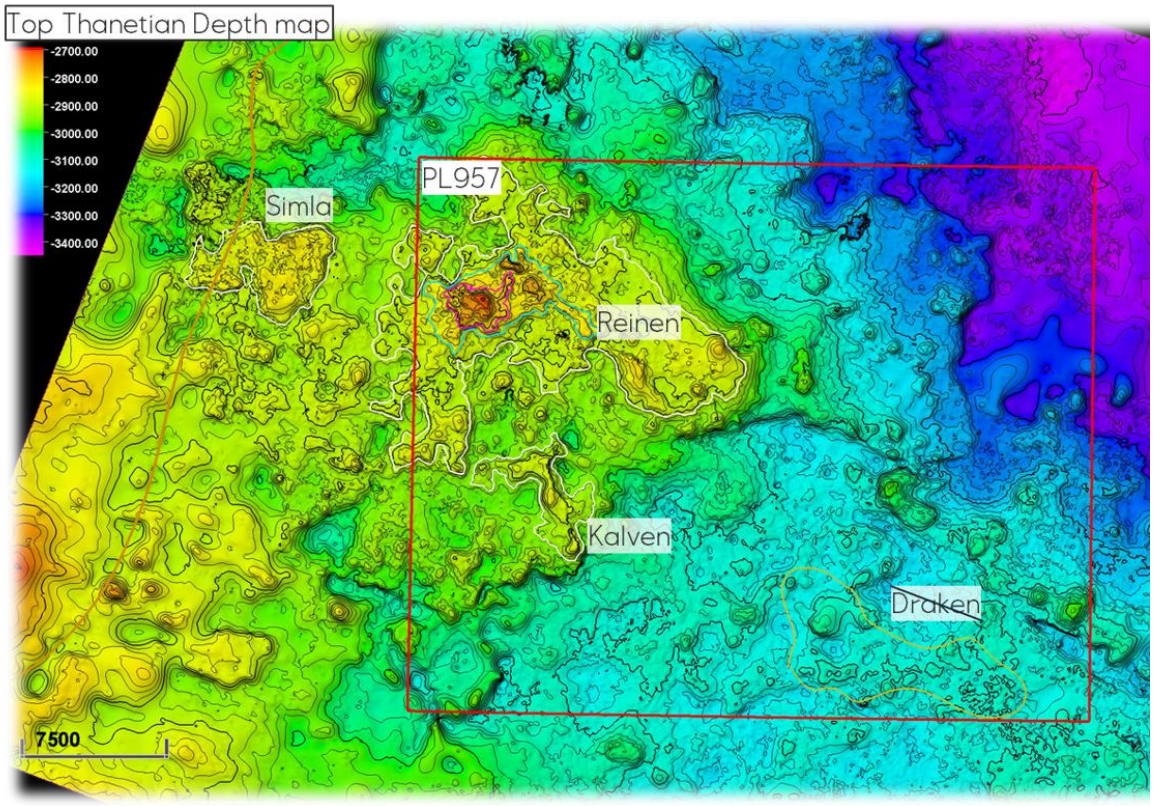

Figure 3.1 – Licence outline and Top Thanetian depth map with evaluated prospect Reinen and Kalven lead. Simla is a lead to the west of PL957 of similar concept to Reinen and Kalven. Draken lead is no longer a closure after 3D data interpretation update.

5 Technical evaluation

No economical evaluation, but a valuation screening has been performed based on a pure dry gas case and mean inplace volumes of 20GSm3. This volume is marginal for a stand-alone solution and a tie-in candidate is needed. The nearest infrastructure in place is Ormen Lange, 200km to the east and not within reach. Tie-in to Peon can be an alternative, but Peon is yet not sanctioned and flow assurance will be technically demanding and expensive due to the 140 km distance. Flow lines and umbilicals alone would need an investment of 5-6 BNOK.

6 Conclusion

The work program for PL957 has been fulfilled. The Reinen prospect has been evaluated within the specified time frame and geological and geophysical studies have been completed. After a full evaluation, Equinor will relinquish PL957 due to the very low probabilities for finding commercial hydrocarbon accumulations.