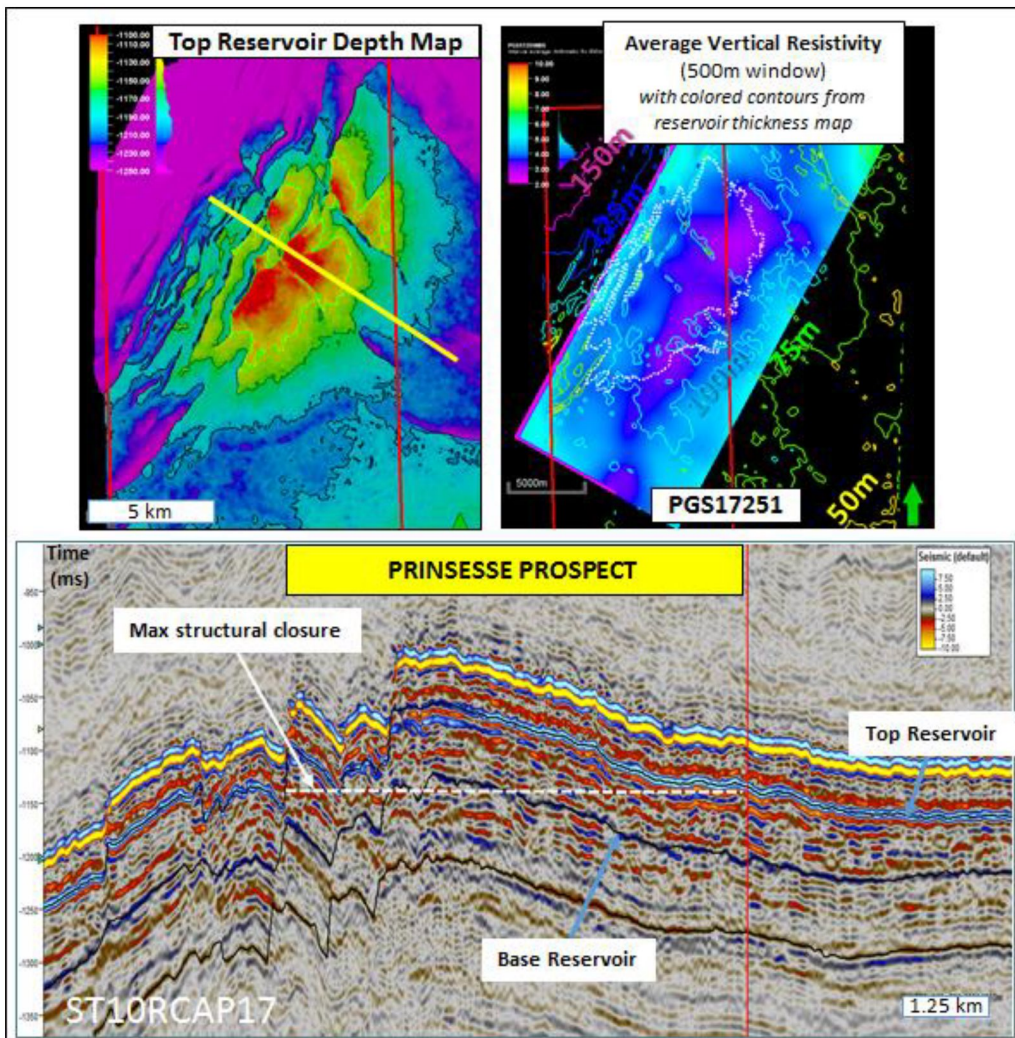




PL856 licence
Full Relinquishment Status Report NPD



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0.1	15.07.2018	For review		
1.0	24.08.2018	Issued for final comment on L2S		
1.1	07.09.2018	Issued to NPD		

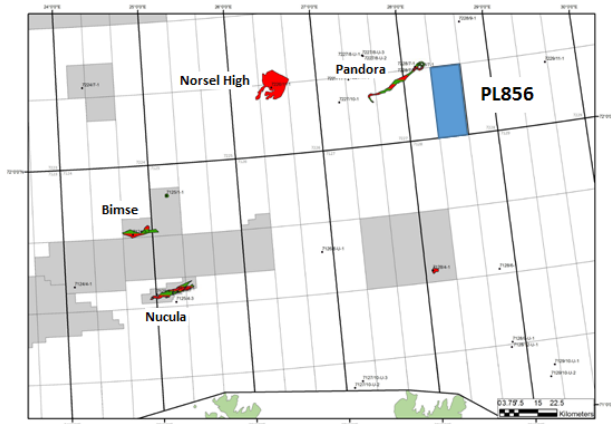
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1. History of the Production licence

Licence PL856, covering Block 7228/11 on the Barents Sea area, on the Norwegian Continental Shelf (NCS), is located ~240km north-west of Hammerfest, in ~280m water depth (ref. Figure 1). Licence area is 318.731 km².

PL856 Licence overview



General information

- Block 7228/11
- Capricorn 75% (Op), PGNiG 25%
- Date granted: 10th June 2016 (23rd Round award)
- **Drill or Drop: 10th June 2018**
- Exploration well to be drilled by: 10th June 2020
- Initial period expires 10th June 2021
- Area: 318,731 km²

Work commitment

Period	Phase	Duration (Year)	Work program	Decision at milestone	Expiry date
Initial	1	2	G&G studies. Reprocess 3D seismic	Drill or Drop	10 th June 2018
	2	3	Drill exploration well		10 th June 2021
	Sum	5	Extension period (years)	30	

Figure 1 : PL856 Prinsesse - licence location map & main milestones

The licence was awarded as part of the 23rd Licensing Round (Award date: 10th June 2016), with the first 2-year term due to expire on 10th June 2018. The firm work programme included reprocessing 3D seismic data within 2 years, and then proceed to Drill or Drop decision. In addition to this commitment, the licence acquired 3D CSEM survey to de-risk the retention. The partnership in the licence remained the same since the award until the end of the exploration phase: Capricorn Norge Operator with 75% working interest and PGNiG with 25%. The Table below summarizes the activity of the licence during the first phase, with a summary of the ECMC meetings and work meetings held:

Meeting Title	Date	Description
ECMC Meeting#1	15/06/2016	Establishment of the licence; review of the prospectivity; common database; work programme; 2016 budget
ECMC Meeting#2	09/11/2016	Seismic reprocessing status, semi-regional seismic interpretation, geochemistry and basin modelling and CSEM modelling; 2017 budget and work programme
Work Meeting #1	06/21/2017	Seismic reprocessing status, basing modelling with focus on charge
ECMC#3	16/11/2017	Reservoir development: Well correlation, biostratigraphy, reservoir parameters, CPI, seismic reservoir characterization, gather QC, 2018 work programme and budget
Work Meeting #2	23/02/2018	PGS17251 CSEM acquisition and unconstrained inversion results, impact on the Prinsesse prospect
ECMC#4	27/04/2018	Final ECMC Meeting with Drill or Drop recommendation: volumes and chance of success

Following the last ECMC Meeting, the JV partners decided to surrender PL856 based on the following points:

- The recoverable volumes (P90: 5.6 – Mean: 14.8 – P10: 26.2 MSm³) of the Prinsesse prospect are below minimum economical field size (estimated around 32 MSm³)
- Absence of DHI on the reprocessed seismic data (ST10RCAP17).
- Absence of CSEM anomaly on the PGS survey (PGS17251NBS).
- Marginal additional prospectivity in the licence.

2. Database overviews

2.1 Seismic data

As part of the work programme associated to the first phase, the ST10012T11 survey was reprocessed using two tie-lines from the SS1302 multiclient data. The reprocessed survey is named ST10RCAP17. In addition to this work commitment, the licence committed to acquire a CSEM survey over the main prospect (PGS17251 acquired by PGS in August 2017).

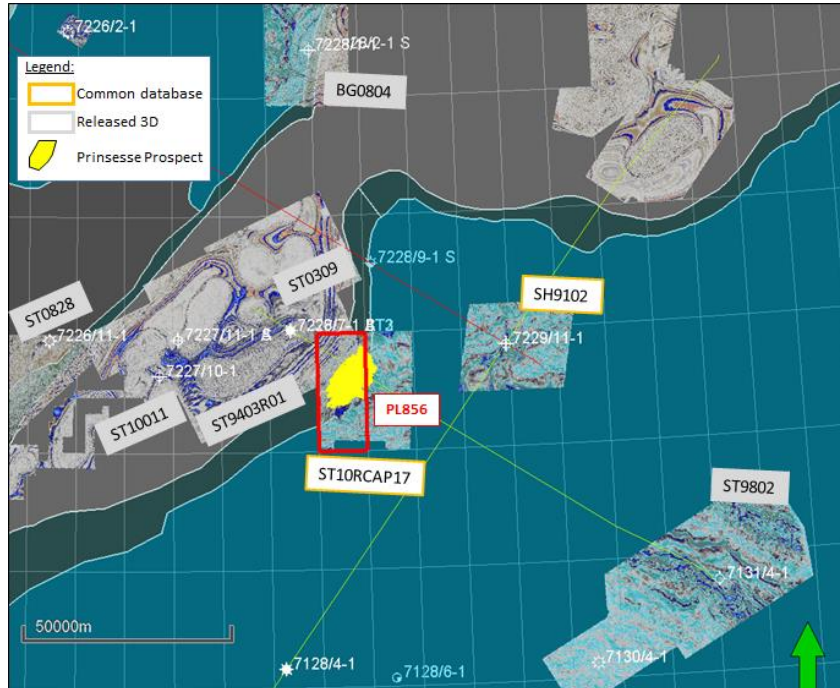


Figure 2: PL856 seismic database

The Table below summarizes the seismic / CSEM database used for PL856 licence

Survey Name	Type Data: 2D/3D/CSEM	Acq year	Proc Year	Public/Multiclient	NPDID
ST10012	3D seismic	2010	2011	Released	7277
SH9102	3D seismic	1991	1992	Released	3441
ST10RCAP17	3D seismic + 2D tie-lines	2010	2017		-
PGS17251	CSEM	2017	2017	Multiclient	8538
SS1302 -Snøspurv	2D	2013	2013	Multiclient	

2.2 Well data

No wells were drilled in the PL856 licence. The table below shows only the wells used for the technical evaluation and they were included in the common database.

Well Name	Year	TD (depth m TVDSS), Formation, Age	Status
7227/10-1	2014	3095, Kobbe Fm, Middle Triassic	Released
7227/11-1A	2006	3173, Ørn Fm, Early Permian	Released
7227/11-1S	2006	2269, Ørn Fm, Early Permian	Released
7228/1-1	2012	1671.5, Kobbe Fm, Middle Triassic	Released
7228/2-1S	1989	3976.5, Havert Fm, Early Triassic	Released
7228/7-1A	2001	2824, Klappmyss Fm, Early Triassic	Released
7228/9-1S	1989	4453.5, Ørn Fm, Early Permian	Released
7229/11-1	1993	4603.7, Ørn Fm, Late Carboniferous	Released
7131/4-1	2005	1270, Kobbe Fm, Middle Triassic	Released
7128/4-1	1993	2504, Basement, Pre-Devonian	Released
7128/6-1	1991	2519.5, Basement, Pre-Devonian	Released

3. Results from geological and geophysical studies

The PL856 licence performed many geological and geophysical studies. The description of these and the results are listed below:

1. Seismic Reprocessing of ST10012

Reprocessing performed by Western Geco under supervision of Capricorn Norge processing experts.

- **Objectives:**
 - Improve multiple attenuation, especially diffracted multiples (several passes of 3D SRME and similar techniques).
 - Improve noise attenuation (several passes of noise attenuation in all processing domains (shots, receivers, offset-planes)).
 - Improve vertical resolution (2ms processing (Prinsesse) & broadband processing techniques for flat-streamer surveys).
 - Improve lateral and temporal positioning of dipping events (structures, faults) (Kirchhoff PSTM and detailed velocity work incl. eta-field).
 - Optimise AVA response (noise attenuation and amplitude preservation processing).
- **Results:**
 - Wider bandwidth and higher frequency content.
 - Angle stacks and gathers with preserved true amplitude.
 - The Prinsesse trap does not change in depth.
 - No DHI observed at Prinsesse target.

2. Semi-Regional seismic mapping of all 2D/3D released data (Capricorn study)

- **Objectives:**
 - Understand the reservoir development.
 - Understand the source rock development.
 - Mapping key horizons for basin modelling.
- **Results:**
 - Excellent control on reservoir distribution and thickness (used in volume assessment).
 - Limited extent of possible Triassic Source rocks in the drainage cell (input to Basin modelling).
 - Improved understanding of charge (carrier beds and source rocks distribution).

3. Petroleum systems modelling (Capricorn study)

- **Objectives:**
 - Model the migration toward the Prinsesse prospect.
 - Quantify the amount of hydrocarbons generated.
- **Results:**
 - The prolific Upper Jurassic Hekkingen Fm source rock did not reach maturity at maximum burial and did not contribute charge to the Prinsesse prospect.
 - The Kobbe and Lower Snadd Fms reached maturity at maximum burial. No high quality Triassic source rocks of significant thickness have however yet been encountered in the Nordkapp Basin.
 - The paleo-accumulation in 7228/9-1 S, used for calibration, shows that the Prinsesse Prospect is charge constrained.
 - The 7228/9-1 S structure is not filled to spill and hence has not contributed to Prinsesse.

4. Petrophysical study of Jurassic and Triassic reservoirs of the common database wells (Capricorn study)

- Objectives:
 - Understand the reservoir properties used in the volume calculation for the main prospect and leads.
- Results:
 - Full reservoir information from all relevant offset wells: NTG, porosity, saturation.
 - Good reservoir properties expected for the Realgrunnen Sg. in Prinsesse (Avg. Phi 20.5% and NTG 83.5%).

5. CSEM feasibility study for Jurassic and Triassic targets (Capricorn study)

- Objectives:
 - Investigate detectability of an HC accumulation in Prinsesse by CSEM data for potential 3D acquisition.
- Results:
 - 1D modelling indicates that the P50 scenario for Prinsesse would be visible on CSEM data but that the P90 scenario is at the detectability limit. As the P90 scenario volumes would not be economic, Prinsesse prospect is not supported for drilling in the absence of a CSEM anomaly.
 - Three technologies considered (EMGS, PGS, Petromarker) in the feasibility and PGS towed streamer option considered to be the best for Prinsesse.

6. Seismic reservoir characterisation (Capricorn study)

- Objectives:
 - Produce and scan AVO attributes to identify potential DHIs in Prinsesse.
 - Model reservoir seismic response in surrounding wells, evaluate the visibility of a potential oil-water contact and the impact of variations within the Fuglen Fm package on seismic response at top reservoir.
- Results:
 - The dimming observed at the crest of the structure is partly enhanced by the seismic obscured area below shallow fluid escape features. However, combined with the observation of an underlying (partly-flat) hard event, it indicates the presence of a limited gas accumulation at the crest of Prinsesse. Note that, in this scenario, the brightening observed along the flank of the structure remains unexplained, though it is not likely to be related to hydrocarbon presence as it is observed in the overlying Hekkingen Fm non-reservoir level as well.
 - The brightening of the top reservoir peak within the structural closure of Prinsesse can be explained by an increased thickness of Fuglen Fm shales (wedging of the full section towards Nordkapp Basin) if dimming at the crest of the structure is disregarded due to data quality issue. Fluid discrimination in this case (oil vs. brine) is challenging.
 - The absence of a visible OWC indicates either oil presence in a lower NTG section or, more likely, absence of oil below the gas accumulation.
 - No AVO attributes in support of an oil column in Prinsesse were identified.
 - Absence of brightening at top Fruholmen Fm indicates that Prinsesse is not likely to be filled to spill.

7. 2.5D & 3D CSEM Inversion

- Objectives:
 - Identification of resistive body in the Prinsesse prospect.
- Results:
 - Lack of a CSEM anomaly strongly suggests an economic HC accumulation is not present (the case assessed during the 23rd Round is not supported by CSEM data).

4. Prospect update report

The main prospect identified in the 23rd licensing round is named Prinsesse. It is well defined on the licence 3D seismic data (ST10RCAP17) as a 3-way dip closure at middle Jurassic/Upper Triassic Realgrunnen subgroup (Stø and Tubåen formations), with fault seal against Cretaceous strata required to the west. The reservoirs were deposited in paralic and fluvial environments.

The source rock expected are the Triassic organic-rich shales of Snadd and Kobbe formations (analogue to the Wisting discovery). The top seal is provided by Upper Jurassic shales of the Fuglen and Hekkingen formations.

The key prospect risk is the ability to retain hydrocarbons in the trap during the different phases of uplift with c. 1400m of overburden removed by erosion. Overall Chance of Success is 18% (ref. Figure 3), with Trap/Retention (40%), Source (80%) and Migration (70%). All the other risk parameters are set to 100%. At the start of the licence, Prinsesse recoverable volumes had the following range: 16 – 42 -70 MSm³ (P90-Mean-P10).

Figure 3 below shows the prospect at the application stage.

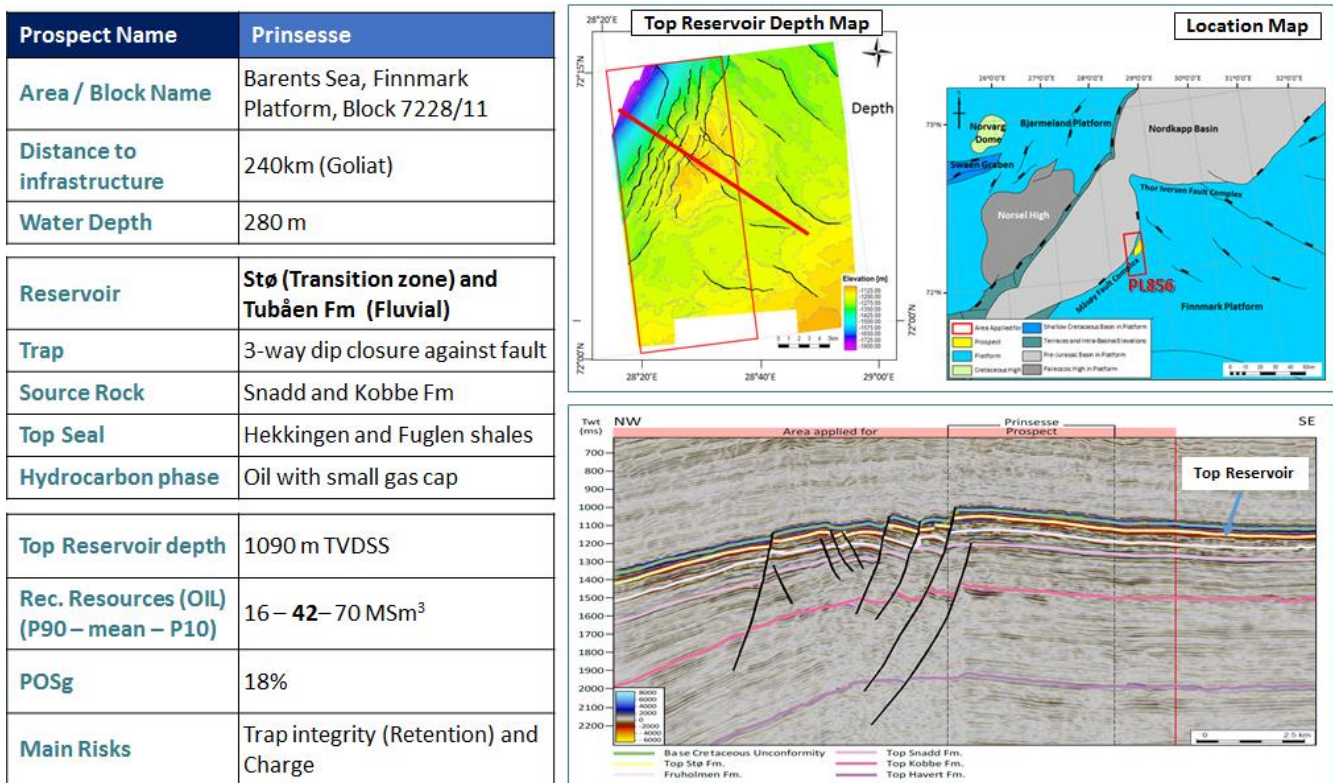


Figure 3: Prinsesse prospect assessment at the start of PL856 licence

The reprocessed seismic does not show any DHIs (e.g. amplitude/AVO anomaly with conformance to structure, flat spot), which are expected in such good reservoir (7324/8-1 Wisting, 7220/8-1 Skrugard analogues). The CSEM 3D survey acquired over the Prinsesse Prospect shows a clear conductive body (brine-bearing reservoirs).

The basin modelling, calibrated to the 7228/11-1 S paleo-accumulation, indicates that the Prinsesse Prospect is charge constrained.

The CPI studies of offset wells for the Tubåen reservoir changed the reservoir parameters used in the Prinsesse assessment summarized in the table overleaf.

Reservoir parameters	P90	Most Likely	P10
Crest of the prospect (mMSL)		1070	
GRV (10^6 Sm^3)	515	1155	2177
Gas Oil contact (GOC) (mMSL)	1090	1095	1110
Oil Water contact (OWC) (mMSL)	1140	1160	1180
Net to Gross	0.75	0.83	0.92
Porosity	0.18	0.20	0.23
Gas saturation	0.75	0.80	0.85
Oil saturation	0.75	0.80	0.85
1/FVF (Bo)	0.76	0.80	0.84
Oil Recovery factor	0.29	0.36	0.41

The Final assessment of the Prinsesse Prospect shows a range of recoverable volumes of 5.6 to 26.2 MSm³. The geological probability of success remains unchanged at 18%.

Figure 4 shows the prospect summary sheet for the final prospect assessment.

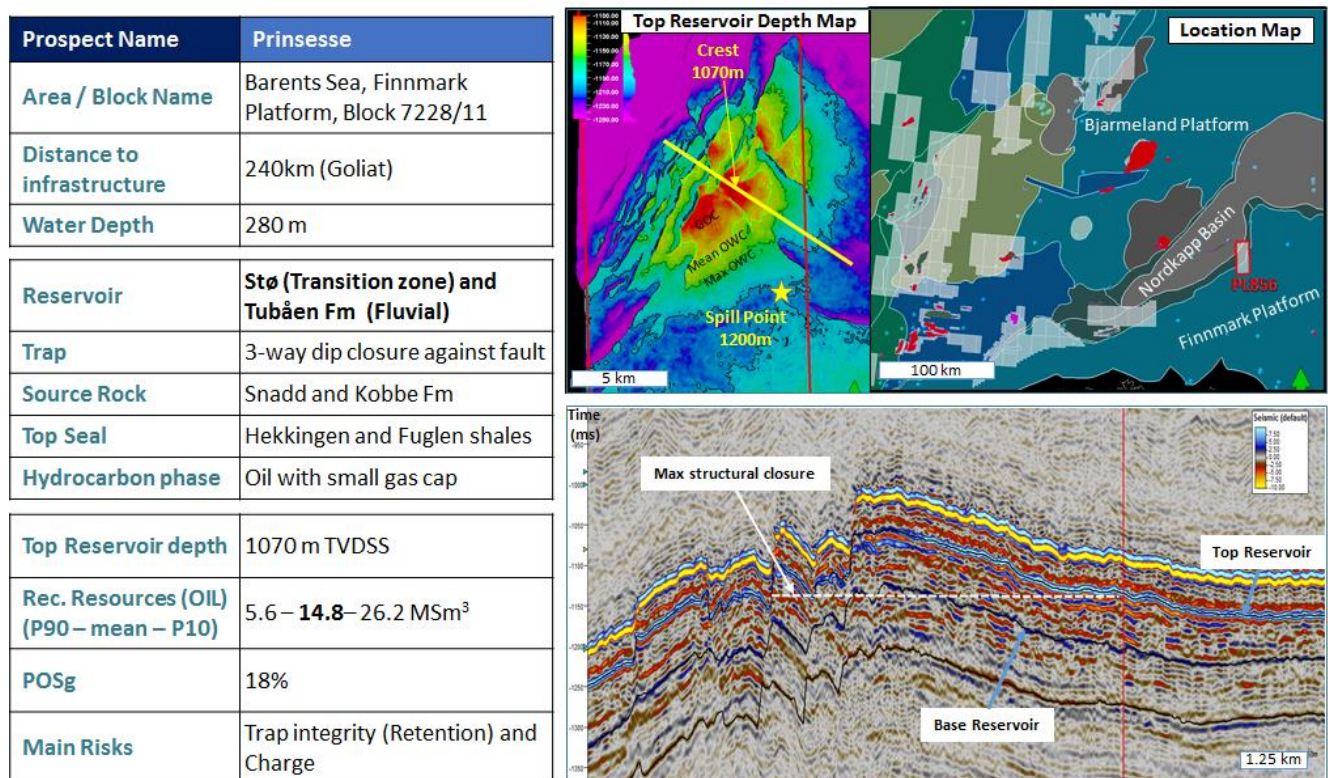


Figure 4: Prinsesse prospect assessment at the drill or drop stage

In addition to the main prospect, all stratigraphic intervals were studied and several leads were identified in PL856:

- Late Carnian channels (Lead A and Lead B) have limited area (<3km²) within structural closure. Low lateral NTG and high risk on top seal - Low volumes.
- Early Carnian (Lead C) interpreted as very low lateral NTG within structural closure - Low volumes.
- Kobbe Fm (Lead D) presents an amplitude anomaly at the crest of Prinsesse structural closure. Low NTG, porosity and permeabilities expected based on surrounding wells – Low volumes – High risk on reservoir quality.
- Bjarmeland Gp cold water build-ups (Lead E) facies identified but no closure present – No trap.
- No build-up facies at Ørn Fm level within structural closure – High reservoir risk within closure.

- Clastic reservoirs of the Soldogg Fm are beyond 4km depth (5.5km max burial depth), which make this interval gas-bearing most likely with high risk on reservoir quality.

Figure 5 shows a composite of seismic amplitudes maps and sections illustrating the identified leads.

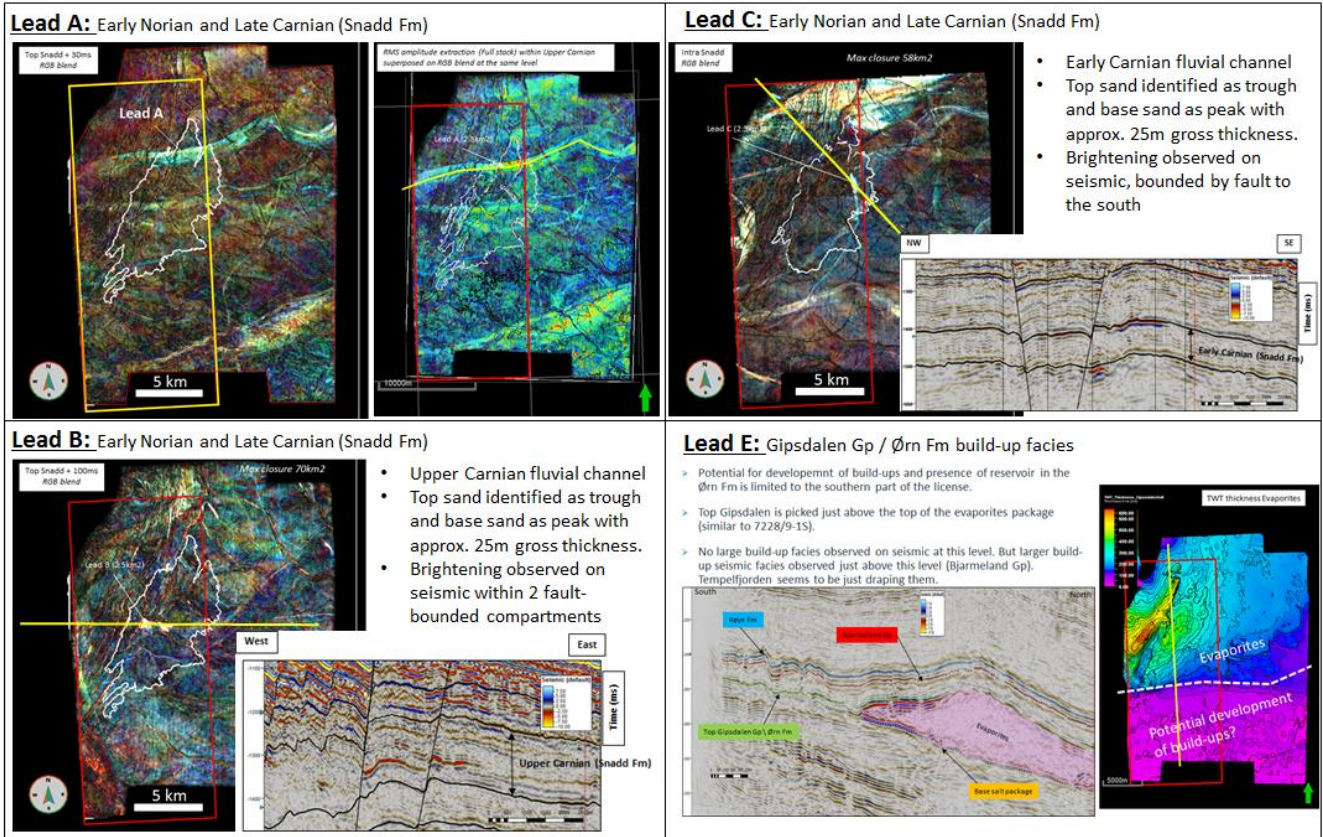


Figure 5: Leads identified in PL856

5. Technical evaluation

The minimum economical field size for a stand-alone development of Prinsesse is estimated to 32 MSm³. With a volumes range of P90: 5.6 – P10: 26.2 MSm³ the Prinsesse prospect is falling short of this threshold. No development concept studies were therefore carried out.

6. Conclusion

The work performed demonstrated a lack of seismic and CSEM anomalies suggesting a significant oil accumulation in the Prinsesse prospect. The basin modelling study demonstrates that the prospect is charge constrained.

The PL856 JV partners have decided to relinquish the licence based mainly on the non-economical volumes assessed for the Prinsesse prospect with even the P10 volumes below the minimum economic field size.

In addition, the identified leads are either volumetrically insignificant and/or very high risk.

Figure 6 below shows a map of the Prinsesse prospect and the leads identified in PL856. Volumes are not quoted but they are marginal.

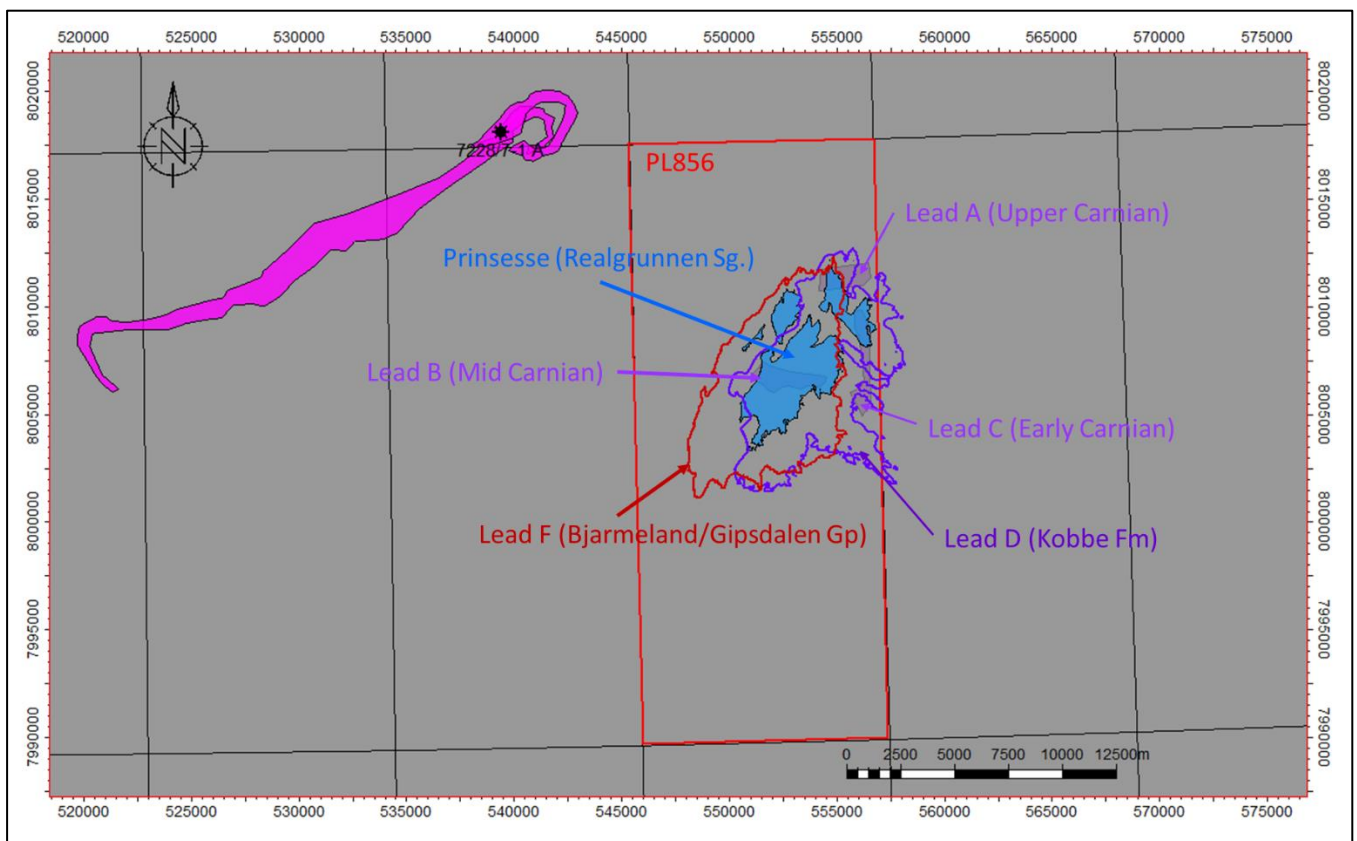


Figure 6: Prinsesse Prospect and leads identified over PL856 licence