PL209BS Status Report

Norske Shell

November 2023

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1. PL209BS HISTORY

PL209BS is a stratigraphic production license located in the Rås Basin, in the northern part of the Ormen Lange Field, extending from seabed to 20m above the Egga Fm and from 20m below the Kyrre Fm. The license area covers parts of block 6305/5 and 6305/4 (ref. Fig. 1). The license was awarded to A/S Norske Shell (current Operator 15%), Petoro AS (35%), Equinor Energy AS (operator at award, 25.9792%), PGNiG Upstream Norway AS (14.0208%), and Vår Energi ASA (10%) on 07.06.2022. Equinor Energy AS was the original operator when PL209BS was split of PL209. Norske Shell took over operatorship 01.04.2023.

The license was formed to allow all partners in the Ormen Lange Field a share in the Ormen Lange Deep well (6305/5-C-3 H). The drilling of the wildcat well was the primary work programme in the new license, and drilling ended 09.06.2022. It was classified as a dry well. The target of the well was the Lange/Lysing Fm in the Cretaceous. The Ormen Lange Deep well was plugged back and sidetracked into the Egga Formation as a production well for the Ormen Lange field (6305/5-C-3 AH).

Post-well evaluations have been concluded to investigate the remaining prospectivity in the license. Evaluations of the Paleocene and Miocene anomalies have been revisited in the Ormen Lange Unit, and the potential of these are regarded as low; no drillable candidate was identified.

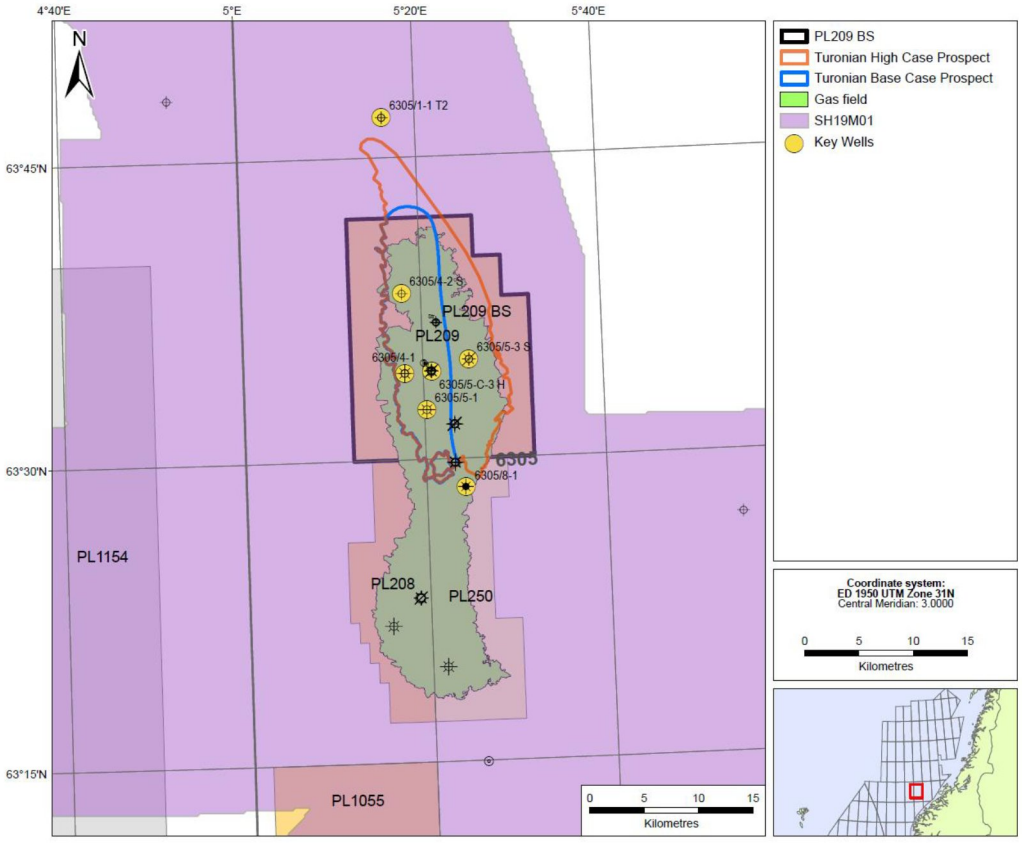

Figure 1 - Location PL209BS with Ormen Lange Deep Base and High Cases

STATUS OF WORK COMMITMENT

The main objective of the PL209BS license was to drill the Ormen Lange Deep well (6305/5-C-3 H) which was finished on 09.06.2022 as a dry well. Post-well analysis included petrophysical, geological and geophysical studies.

LICENSE MEETINGS

07.09.2023 EC work meeting #1

Additional meetings have been conducted in the Ormen Lange Unit to present and discuss the well results.

EXPLANATION OF GROUNDS FOR LAPSE

A technical summary for the evaluation is given in table 1. No drillable prospects have been identified, and the Partnership has agreed to relinquish the license.

Table 1 - Outcome of Technical Evaluation

Name	Play	Current status	Outcome of Technical Evaluation
Ormen Lange Deep	Turonian	Dry well	The objective of the 6305/5-C-3 H well was to test the potential for hydrocarbon-bearing reservoirs in the Lange Fm and the Lysing Fm in the Early Cretaceous (Turonian and Coniacian). The well encountered mainly siltstone with thin layers of sandstone and dolomite stringers in both formations. Acquiring pressure data was attempted with limited success, demonstrating that the formations were of very low permeability.
Miocene Anomaly	Miocene	Shallow anomaly	Previous studies have shown limited permeability in the Miocene Anomaly, and thus producibility is currently viewed as unlikely.
Paleocene Anomalies	Paleocene	Shallow anomaly	Previous studies have shown limited permeability in the Paleocene Anomalies, and thus producibility is currently viewed as unlikely.

2. DATABASE

COMMON WELL DATABASE

No new Common Well Database was set up when PL209BS was split from PL209. The table below (Table 2) shows the main exploration wells used to evaluate the remaining prospectivity in the license.

Table 2 – Main Exploration wells used for evaluation of remaining prospectivity

Well name	Common Name	NPDID	Drilled year (TD)	Result
6305/1-1	Ormen Lange North	3555	1998	Dry
6305/5-1	Ormen Lange	3144	1997	Gas
6305/5-C-3 H	Ormen Lange Deep	6661	2022	Dry
6305/4-2 S	Ormen Lange Appraisal	6441	2010	Gas
6305/4-1	Ormen Lange Appraisal	4441	2002	Gas
6305/8-1	Ormen Lange Appraisal	4109	2000	Gas

COMMON SEISMIC DATABASE

Similarly, to Common Well Database, no new Common Seismic Database was set up when PL209BS was split from PL209. The Table below (Table 3) shows the main survey used to evaluate the 6305/5-C-3 H well and remaining prospectivity in the license.

Table 3 - Main seismic survey used for evaluation of prospectivity

Survey name	NPDID	3D/2D	Aquisition/Repro year	Operator/owner
SH19M01 *		3D	2019	A/S Norske Shell

*SH19M01: reprocessed and merged seismic (see table 4 below).

Table 4 - List of seismic surveys behind SH19M01

Survey name	NPDID	3D/2D	Aquisition/Repro year	Operator/owner
SH14001	8042	3D	2014	Shell
NH9602	3784	3D	1996	Norsk Hydro
OLSE98	3915	3D	1998	PGS
AX0801	4507	3D	2008	Aker Exploration
Moere3D	4109	3D	2001	CGG

3. RESULTS OF GEOLOGICAL AND GEOPHYSICAL STUDIES

GENERAL GEOLOGICAL AND GEOPHYSICAL STUDIES

G&G studies were carried out to support the drilling decision of the exploration well. Other studies were also performed once this well's data was available (after drill). Next table summarizes the studies and findings.

Table 5 - Summary of G&G studies executed in PL209BS

Study	Comments & Results
Leading up to the decision to drill the exploration well in PL209BS the technical work has included:	
Seismic reprocessing and merge, velocity model update	In-house seismic re-processing of regional 3D merged dataset (SH19M01) and seismic velocity model update. The broadband processing resulted in an improved dataset: - Increased bandwidth in the data - Improved imaging in the shallow and deep - Calibrated velocities - Improved phase behavior - More balanced amplitude laterally and in time (vertically) Updated velocity model
Rock physics, seismic modelling and inversion	Rock physics and AVO inversion screening was performed in two iterations, first in 2018/19 and then an update was done in end 2022 to integrate Ormen Lange well results.
Assessment of Cretaceous depositional systems	Based on the new reprocessed data, new spectral decomposition maps were created to assess the Cretaceous depositional systems.
Estimation of volume and POS	Based on updated depth maps, volume estimations for the Ormen Lange Deep prospect were concluded. Main risks were reservoir presence and quality.
Well planning	Planning of the 6305/5-C-3 H exploration well was done in combination with the 2 development wells (6305/5-C-3 AH and 6305/7-D-4 H).
In 2022 the PL209BS license drilled exploration well 6305/5-C-3 H, further evaluations included:	
Analysis of well results and reporting	The 6305/5-C-3 H well primarily encountered siltstones with thin layers of sandstone and dolomite stringers in both Lange and Lysing Formations. Acquiring pressure data was attempted with limited success, demonstrating that the formations were of very low permeability. The well was concluded as a dry well.
Evaluation of remaining potential in the Upper Cretaceous as well as in the shallow intervals	Upper Cretaceous Play: - The PL209BS license outline covers most of the Ormen Lange Deep prospect, thus no further prospectivity has been identified in the Lange/Lysing Formations. - No sand was encountered in the section below Springar to TD, thus no prospectivity has been identified in the Upper Cretaceous section - Lower stratigraphy is assumed too deep Shallow intervals: - Shallow anomalies exist in the overburden, are treated as drilling hazards - The Miocene Anomaly has been studied in the unit in the past, but no flowable units have been encountered while drilling. - Several anomalies are seen in the Paleocene, similarly to the Miocene, but no flowable units have been encountered while drilling.

4. PROSPECT UPDATE REPORT

The main activity for this license has been the drilling and understanding of the Ormen Lange Deep well results. Moreover, a revisit of overburden anomalies has been presented to the partnership.

Ormen Lange Deep Dry Well – Turonian/Coniacian Play in PL209BS

The Ormen Lange Deep prospect is identified as a seismic anomaly in the Turonian and Coniacian. Only one well (6305/1-1 T2) has penetrated the interval, though outside the observed seismic anomaly. The 6305/5-C-3 H well has tested the anomalies near the crest in the SW part of the 4-way structures. Pre-drill, the main risk was sand presence and quality. Relative to the PL209BS outline, the well is located in a proximal location of a potential fan system developing from the south and only found tight sandstone stringers.

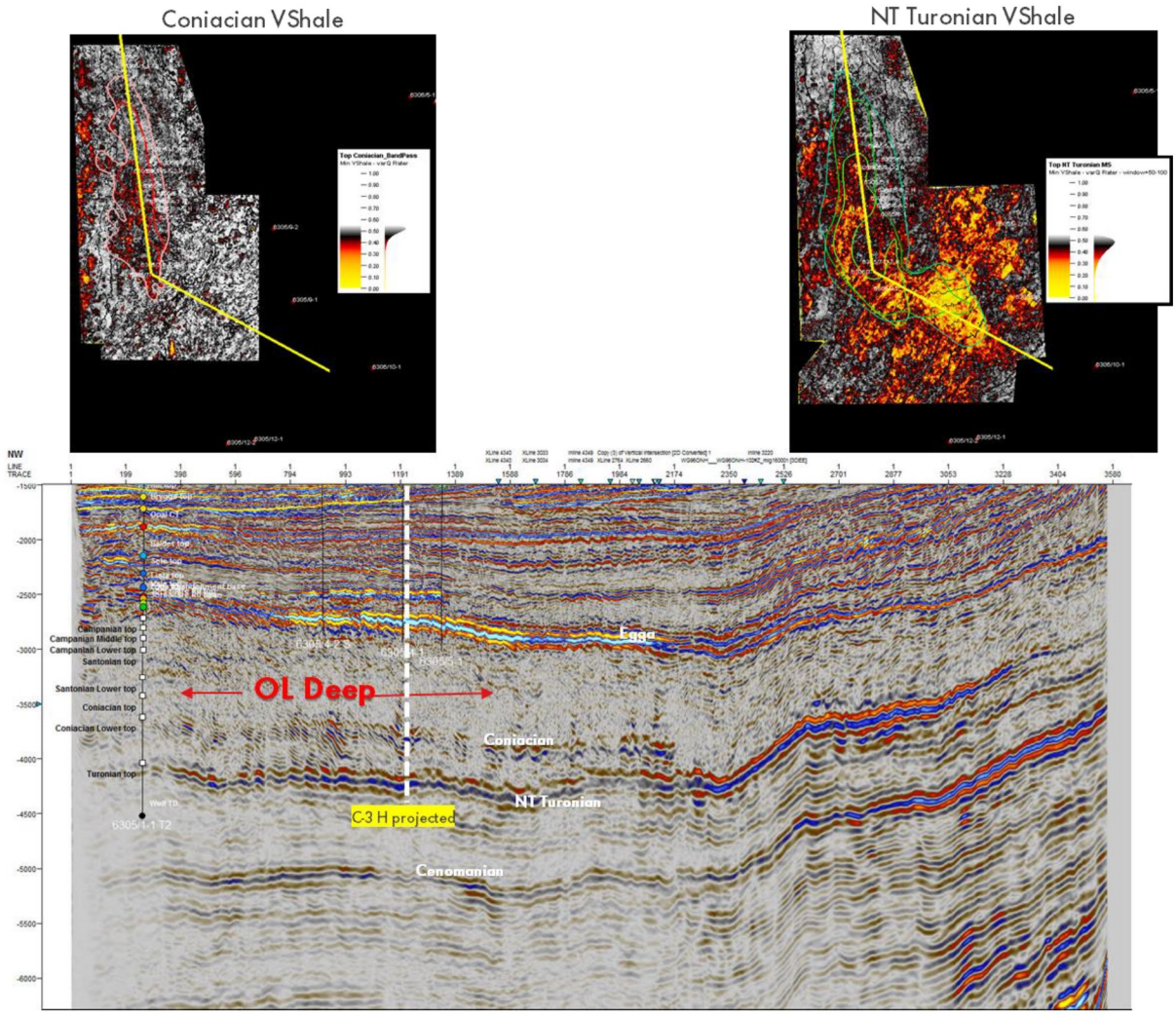

Figure 2 - Coniacian & Turonian VShale maps, and a seismic section of the target

The main reservoir targets, Lysing and Lange, were drilled and logged via LWD. Ten formation tester pressure measurements were attempted, and none reached a quality/valid pressure build-up, hence interpreting very tight layers. An additional wireline run consisting of measurements (electrical borehole image, tri-axial induction resistivity, and NMR poro perm) was logged to validate the properties of those tight layers. The additional data confirmed the tight nature / poor reservoir properties of the rock (Shell, 6305/5-C-3 H EOWR - Geology section & Formation Evaluation , 2022).

Subtle reflective packages observed on seismic seem to correspond with silty intervals with thin sandstone and dolomite beds in Nise and Lange/Lysing Formations.

As 6305/5-C-3 H tested the only structural trap in the PL209BS license area and the license covers most of the prospect outline, no further prospectivity has been identified within the license in the Upper Cretaceous.

Miocene Anomaly

The secondary target for 6305/8-1 was to evaluate the Miocene Channel feature observed on seismic. However, the interpreted channel was an erosional feature with erosion infill material of cyclic alternations of siliceous ooze and siliceous mudstones.

Core was taken in the 6305/4-1 of the Miocene, measurements showed <0.5 mD permeability, suggesting limited flow potential.

Paleocene Anomaly

A seismic anomaly is seen in Sele Formation and has been penetrated by wells.

The log character observed in the Ormen Lange wells over the Paleocene suggests a mud-prone heterolithics/hemipelagic mudstone. Again, flow potential of the Paleocene is considered very low.

5. TECHNICAL EVALUATIONS

New technical evaluations were carried out to evaluate the PL209BS volume potential after the outcome of 6305/5-C-3 H was finalized. Previous technical work on the anomalies in the overburden was revisited, though no new information from the 6305/5-C-3 H suggests that hydrocarbon production from these anomalies is likely.

6. CONCLUSIONS

The evaluation of the license has concluded with the following view:

- A better understanding of the Lange/Lysing system has been established after the 6305/5-C-3 H, suggesting that a potential sand-prone system does not reach the PL209BS area, where the 4-way structural trap is located.
- Producibility of shallow intervals with anomalies, Miocene and Paleocene, is viewed as unlikely.
- No other opportunities are identified in the PL209BS area.

As there were no work commitments for this license after the separation from PL209, and no drill-worthy prospect has been identified, the partnership unanimously decided to relinquish PL209BS.

7. REFERENCES

Shell, N. (2022). *6305/5-C-3 H EOWR - Geology section & Formation Evaluation .*

Shell, N. (2023). *PL997 Status Report.*