PL 783 License Surrender Report

Parts of block 25/10

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License surrender status report PL 783

Reference is made to the letter sent to MPE dated 03.02.2017 (our reference: AU-EXP NUKE ANS-00035) regarding the surrender of production license 783 (PL 783). This report outlines the key license history, database, prospects and evaluations of PL 783 and fulfills the requirement by the NPD for a license status report within 3 months of surrender.

1 KEY LICENSE HISTORY

Production license 783 is located on the Heimdal Terrace in block 25/10 (Figure 1.1) and was awarded 6th of February 2015 as a part of the 2014 APA round. Statoil Petroleum AS was awarded the operatorship with 80% equity, and Suncor Energy Norge AS was awarded a 20% share. Work obligations were to reprocess 3D seismic and decide on a Drill or Drop within 06.02.2017. A unanimous drop decision has been made for PL 783. The work obligations are fulfilled and the license partnership wishes to surrender the entire license to the authorities.

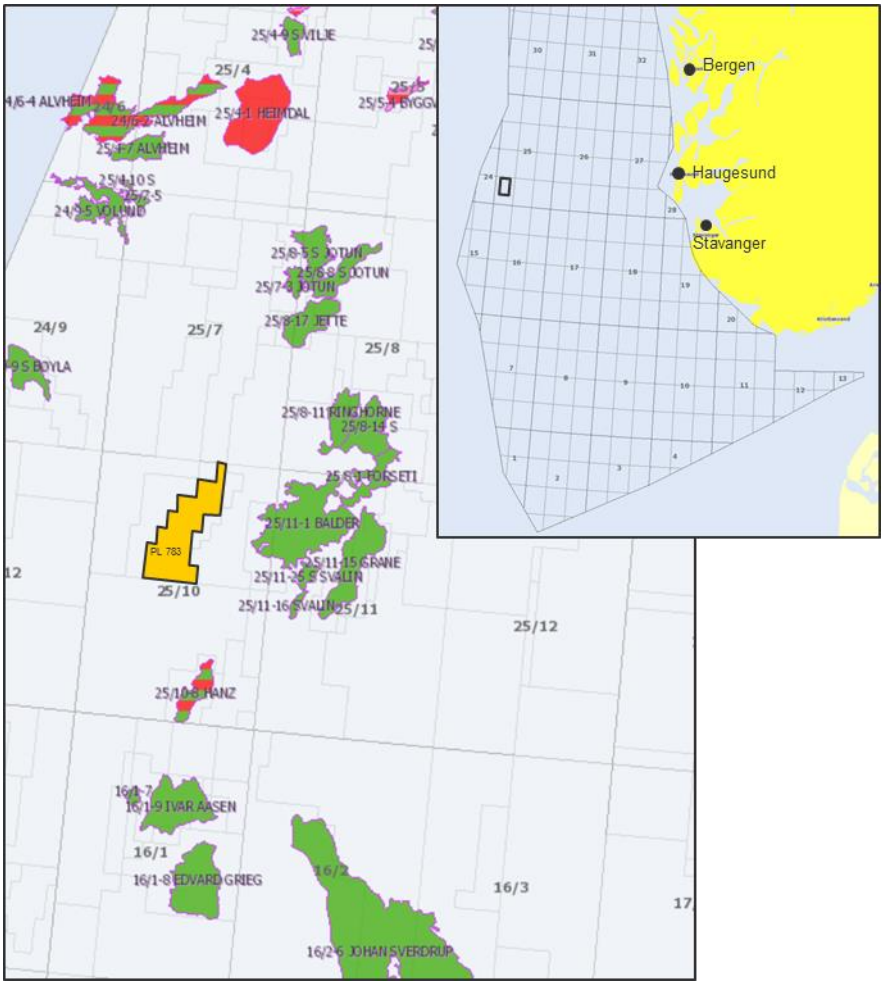

Figure 1.1 – Location map for PL 783 in the North Sea.

Work commitments

- Reprocess 3D seismic: 06.02.2017
- Drill or Drop Decision: 06.02.2017
- BOK: 06.02.2019
- BOV: 06.02.2021
- PDO: 06.02.2022

Management and Exploration committee meetings

- 06.03.2015: MC/EC meeting
- 03.11.2015: MC/EC meeting
- 21.06.2016: EC meeting
- 29.11.2016: MC/EC meeting

Reasons for license surrender

Prospectivity is identified within the license, however the geological understanding and interpretation has changed since the license was awarded, and the licensees does not see PL 783 as an optimal location to test the prospective interval. Consequently, PL 783 is dropped.

2 DATABASE

2.1 Seismic data

The ST15M06 survey was used for interpretation (Figure 2.1). This survey is a reprocessed merge of several PGS Geostreamer datasets generated on behalf of the license group. Reprocessing was performed by Schlumberger Geosolutions in 2015 and included both pre-stack time and depth migration.

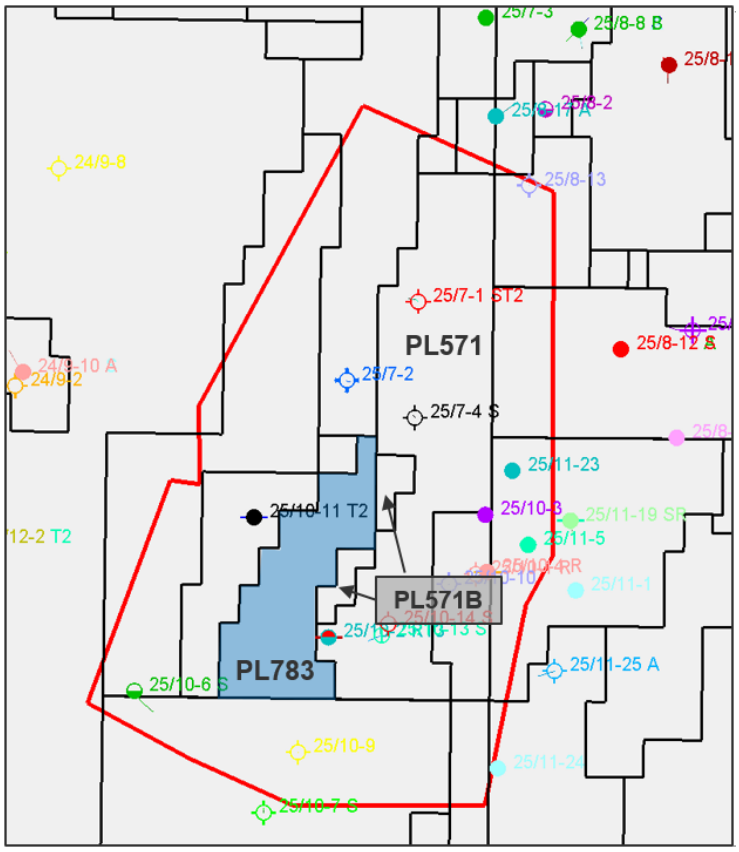

Figure 2.1 – Outline of reprocessed 3D seismic data ST15M06 used for updated evaluation in 2016.

Table 2.1 - List of seismic surveys in the common database.

Dataset	Type	Data owner	Year	NPDID	Market available
ST15M06	Reprocessed merge	License owned*	2015	N/A	No
MC3D-NVG10	Input to merge	PGS	2010	7189	Yes
MC3D-SVG11_ATL	Input to merge	PGS	2011	7378	No
MC3D-SVG11_RAM	Input to merge	PGS	2011	7378	No
EM0101	Input to merge	ExxonMobil	2001	4097	Partly
*ST15M06 covers a larger area. The part of ST15M06 which is in the common database (Figure 2.1) is owned by the license.					

2.2 Well data

The well database used in the evaluation of PL 783 is given in Table 2.2.

Table 2.2 - Well database for PL 783

Well	Oldest penetration	Drilling operator	Content	Completion year	NPDID
25/10-13S	Triassic	Suncor	Dry	2015	7704
25/10-14S	Triassic	Suncor	Dry	2016	7794
24/12-1R	Triassic	Statoil	Oil shows	1978	513
25/4-1	Triassic	Elf	Oil/Gas	1972	359
25/4-5	Triassic	Elf	Oil/Gas	1981	201
25/7-1S	Pre-Devonian	COP	Dry	1986	898
25/7-2	Middle Jurassic	COP	Gas/condensate	1990	1494
25/8-1	Early Permian	Esso	Oil	1970	173
25/10-2R	Pre-Devonian	Esso	Oil	1972	511
26/10-6S	Middle Jurassic	Statoil	Shows	1996	2728
25/10-9	Early Jurassic	Lundin	Dry	2009	6120
25/10-10	Late Permian	Exxon	Dry	2010	6345
25/10-11T2	Jurassic	Marathon	Oil/Gas	2011	6563
25/11-1	Pre-Devonian	Esso	Oil	1967	143

2.3 Special studies

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

- Seismic reprocessing as part of the work program for the license
- Seismic mapping
- Biostratigraphy
- Migration and hydrocarbon phase
- Pressure and seal capacity

3 REVIEW OF GEOLOGICAL AND GEOPHYSICAL STUDIES

The following observations and conclusions were made from the work described in paragraph 2.3 Special studies.

Seismic mapping

A regional geological framework is described in the APA 2014 application. Further work was built on the existing framework and re-interpretation on new, reprocessed seismic data with improved data quality. The work has been focused on the main prospect, Drangsdalen from APA 2014, which is summarized in Chapter 4.

Re-interpretation of faults and reflectors have been performed on the new reprocessed dataset with increased resolution and better imaging. The prospect mapping is conceptual since no direct well tie can be made into the downfaulted terrace in question. Base Triassic and Base Cretaceous Unconformity can be mapped with fairly high confidence. The Mid Triassic Unconformity can also be mapped with a relatively high confidence. Top and Base Reservoir/Statfjord Group is more conceptual and assumes an average thickness for the Statfjord Group of 180 m based on expected thicknesses and jump correlation to wells on the Utsira High, in combination with honoring the seismic data. Details and result of updated interpretations are summarized in Chapter 4 with focus on the Drangsdalen prospect.

Biostratigraphical work

A biostratigraphical work was performed on 25/10-2 R (drilled in 1972) with an aim to add more information to the area since the seismic interpretation is conceptual. The original biostratigraphy work on 25/10-2R is old and uncertain, and a new evaluation was done to get more clarity regarding the ages of the sediments from the well. The new analysis was done on cuttings from 25/10-2 R since no cores were taken. The result was that the investigated interval most likely contains sediments of Late Jurassic, Early Jurassic and Permian age. However, due to cavings and few in situ fossils, the result was not conclusive, and does not add valuable information for the PL 783 evaluation.

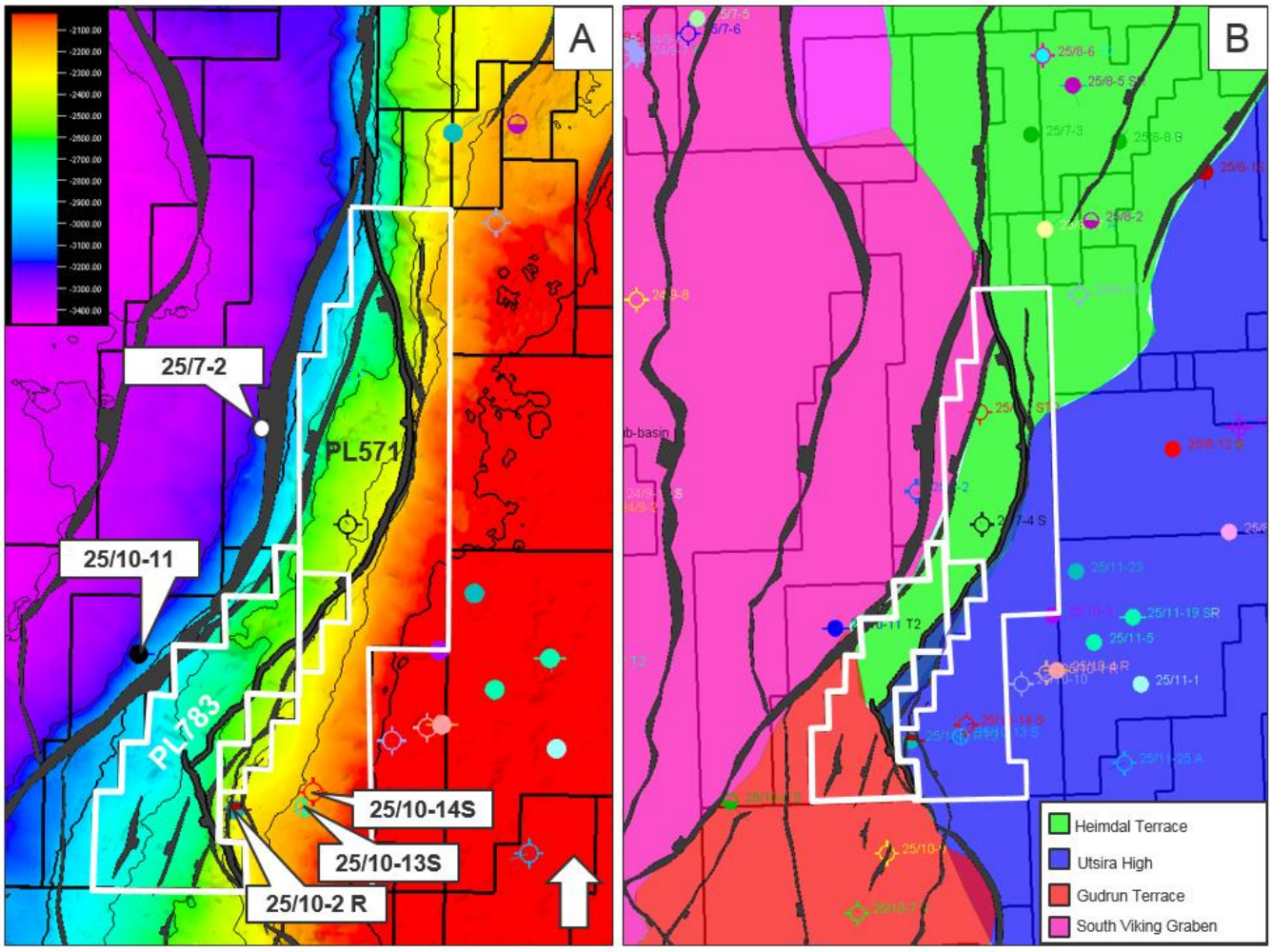

Figure 3.1 – A) BCU (time) map with main fault polygons. PL 783 and PL 571 is marked on the map together with wells 25/10-2 R, 25/10-13S, 25/10-14S, 25/10-11 and 25/7-2. The fault polygons define the downfaulted terrace between the Utsira High and the South Viking Graben (SVG), crossing the license boundary from PL 783 to PL 571. B) Map showing the geological provinces.

Migration and hydrocarbon phase study

In the APA 2014 application, oil was the expected hydrocarbon phase for the Drangsdalen prospect, based on the 25/10-2 R well (Figure 3.1A) with proposed Draupne Formation oil shows in the Upper Jurassic Viking Group and the Permian Rotliegend Formation, migrated from the deeply buried and mature Viking Group in the South Viking Graben. However, when revisiting 25/10-2 R and the reported oil shows, a low maturity source rock is rather suggested, migrated from a local source. Hence these shows are no longer supportive for an oil case in the same sense as previously assumed. In addition, two new wells have been drilled in PL 571 (25/10-13S and 14S in 2015, Figure 3.1A), which were both dry and had no shows.

The migration and hydrocarbon phase for this area is complex. In 2016, the possibility of two possible migration routes into the PL 783 area were examined. The source rocks used for the modelling are Draupne and Heather Formations. Migration from the Gudrun Terrace (Figure 3.1B) with oil as the hydrocarbon phase was tested, but the hydrocarbons will most likely migrate towards east before reaching the Heimdal Terrace. Migration from the

South Viking Graben will favor the Heimdal Terrace and PL 783, though the phase will most likely be gas and oil, or gas only. The prospective interval could be charged with oil if only the uppermost part of the Draupne Formation is contributing hydrocarbons, otherwise there is a high risk of charge with gas/condensate. This is based on the 25/7-2 and 25/10-11 wells just down flank from the prospect which proved gas, condensate and oil.

Pressure and seal capacity work

A work on pressure and seal capacity was carried out for the area, since the terrace in question has no pressure measurements and it is surrounded by wells with both high overpressure (>150 bar) to the West (SVG) and hydrostatic pressure to the East (Utsira High) and Southeast. Two scenarios were tested: 1) The terrace has 150 bar overpressure like the Gudrun Terrace. In this case the seal cannot hold hydrocarbons. 2) The terrace has hydrostatic pressure. The pressure study concludes that the terrace could be located in a hydrostatic pressure cell, and in that case, there are no obvious constraints on the hydrocarbon column height.

4 PROSPECT UPDATE

The primary prospect of the 2014 application was the Drangsdalen prospect (Figure 4.1 A, partly located within PL 571). Drangsdalen was an Upper Triassic/Lower Jurassic Statfjord Group prospect located on the Heimdal Terrace in block 25/10. The concept was a downfaulted trap charged by the mature Viking Group source rocks in the South Viking Graben, and sealed off by Dunlin Group shales and Cretaceous marls, mudstones and carbonates of the Cromer Knoll and Shetland Groups.

Re-interpretation of reprocessed seismic data in 2016 has changed the size and trap geometry of the prospect. The Drangsdalen trap was relying on a northern trapping mechanism which is no longer valid: A NE-SW trending fault was mapped on the old data set (MC3D_NVGSVGM2013), delimiting the prospect from the remaining part of the Heimdal Terrace to the north (Figure 4.1 A). Increased resolution on the new reprocessed seismic does not indicate any fault trapping mechanism in the northern part of Drangsdalen, hence migration of hydrocarbons will continue to migrate northwards on the Heimdal Terrace into PL 571 (Figure 3.1 B, Figure 4.1 A) and what is recognized as the Blomstølen (Statoil) / Sebastian (Suncor) prospect. Although the maximum extent of this prospect is assumed to extend into PL 783, more than 70% of the hydrocarbon volumes are assumed to be within PL 571. The partnership does not see PL 783 as an optimal location to test the prospective Statfjord Group. The Drangsdalen prospect as defined in APA 2014 by a separate closure, is no longer valid.

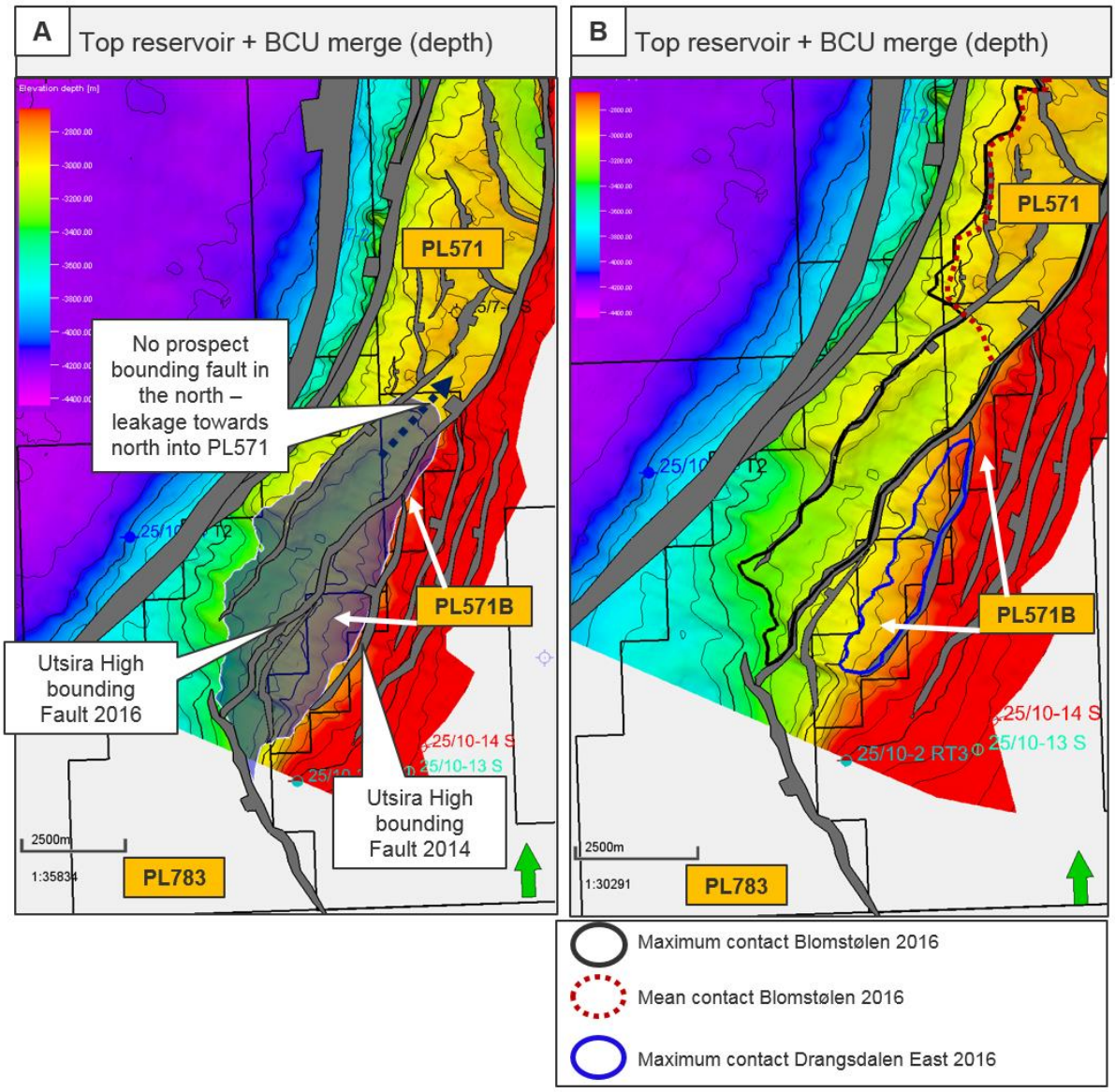

Figure 4.1 – Main changes in seismic interpretation: A) Drangsdalen 2014 maximum prospect outline, delimited by a prospect bounding fault to the north, which is no longer supported by the seismic data. Migration of hydrocarbons will continue into PL 571. The main Utsira High bounding fault is changed ~1.5 km towards West. B) 2016 seismic interpretation result: Prospective Statfjord Group interval stretching mainly in PL 571, maximum case covers PL 783. The remaining Drangsdalen East is located on the Utsira High, partly in PL 783 and PL 571B.

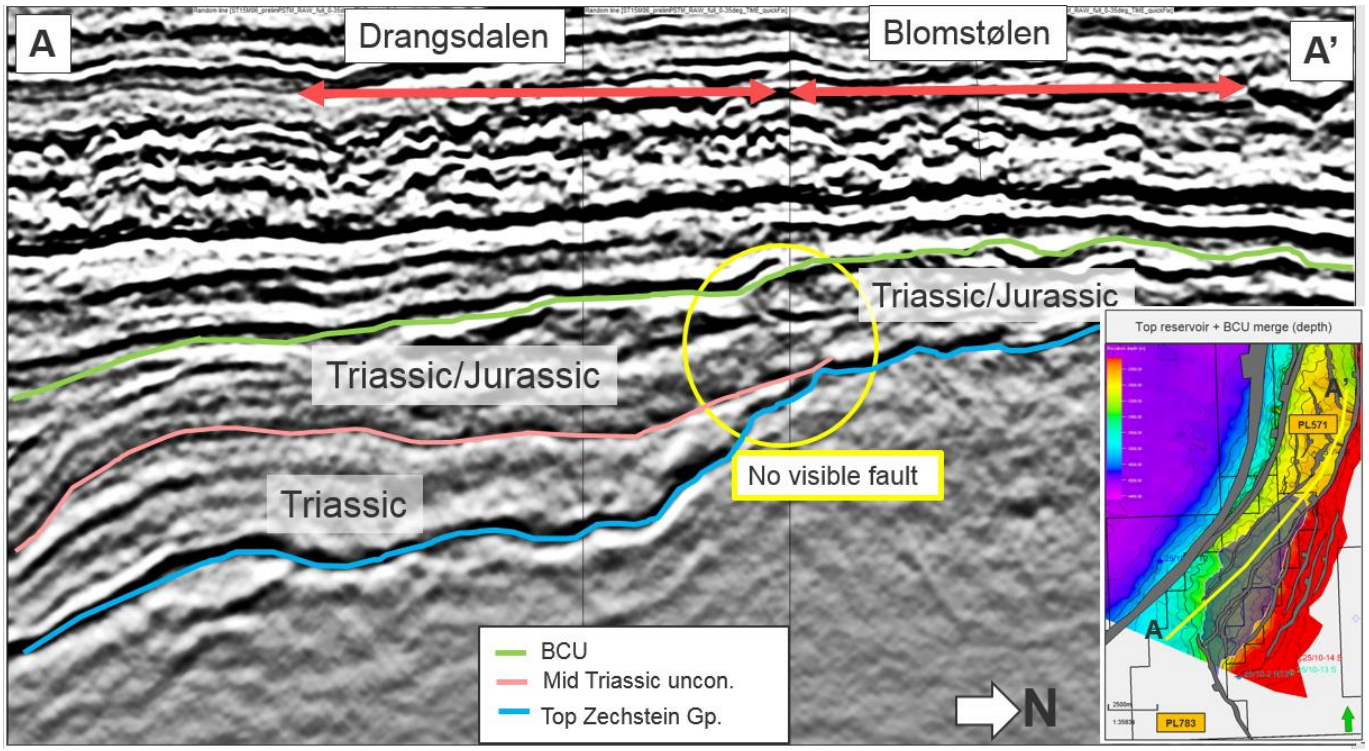

Figure 4.2 – Interpretation on reprocessed seismic (ST15M06) does not indicate any fault trapping mechanism in the northern part of Drangsdalen, hence migration of hydrocarbons would migrate towards north into PL 571. The APA 2014 Drangsdalen prospect outline is projected on the location map.

Improved seismic imaging also changed the structural interpretation of the main Utsira High Bounding fault and the glide complex in parts of the prospect. It is believed that the Triassic and Jurassic packages were gliding on top of the Zechstein Group from the Utsira High in the East towards the Heimdal Terrace in the West (Figure 4.3). Consequently, the Utsira High Bounding fault and the up-dip fault blocks have moved from their original position. The effects are that the bounding fault is interpreted approximately 1.5 km further west of the previous interpretation (Figure 4.1 A), hence decreasing the original trap. In addition, the interpretation of the Mid Triassic Unconformity is partly modified to a shallower position in the glide complex area (Figure 4.4), allowing less space for the Statfjord Group beneath the Base Cretaceous Unconformity and consequently less reservoir in parts of the previous Drangsdalen prospect compared to the 2014 evaluation. The remaining part of the Drangsdalen prospect on the Utsira High, named Drangsdalen East (Figure 4.3 and 4.4), is partly located in PL 783, but mostly in PL 571B, and a small fraction within PL 571. However, for Drangsdalen East, the volumes are very small and the risk is high (Table 4.1).

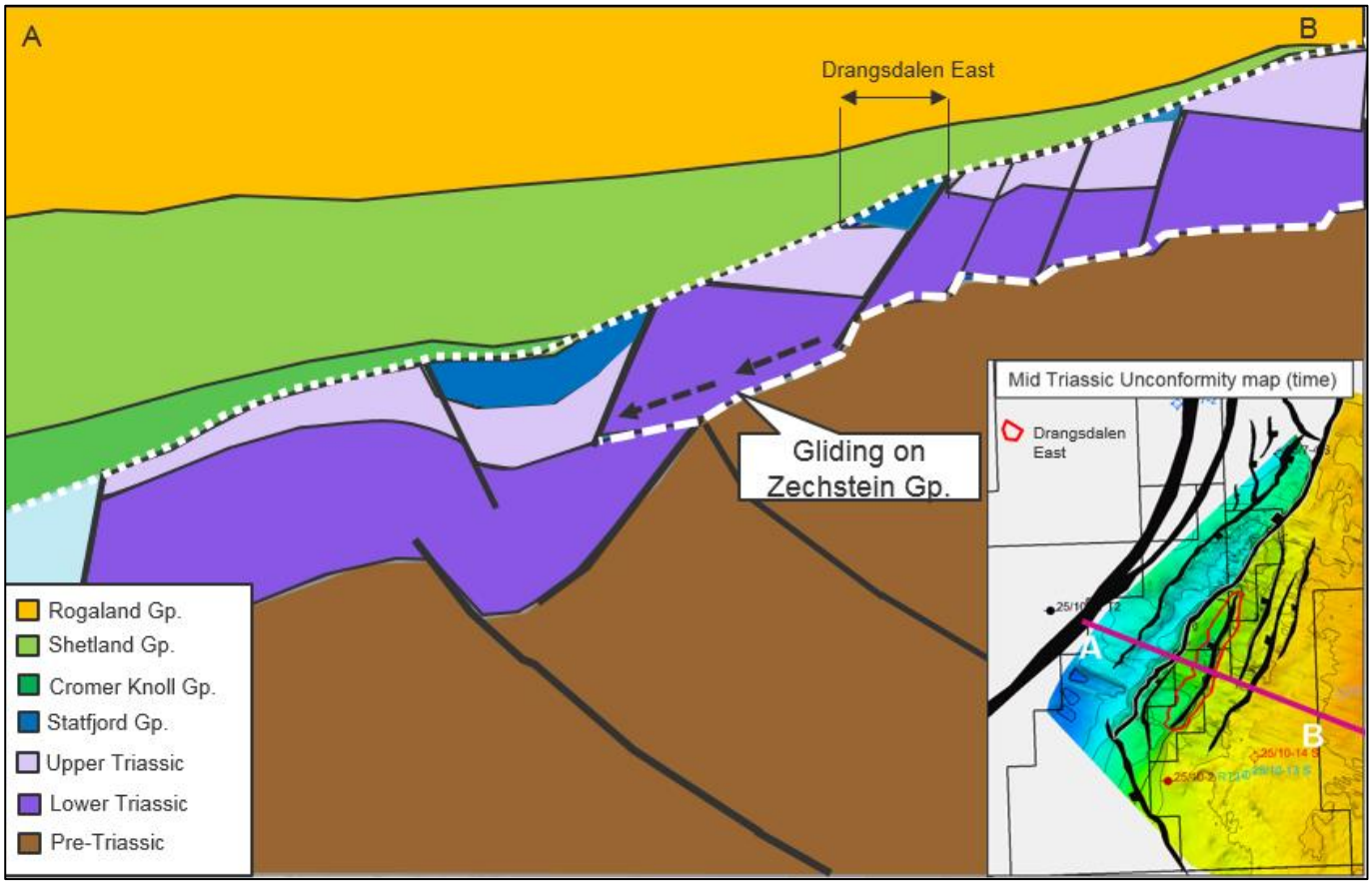

Figure 4.3 – Geosection through the prospective area illustrating the 2016 interpretation. Arrows illustrate how the gliding of Triassic and Jurassic packages might have moved on top of the Zechstein Group (stippled in white).

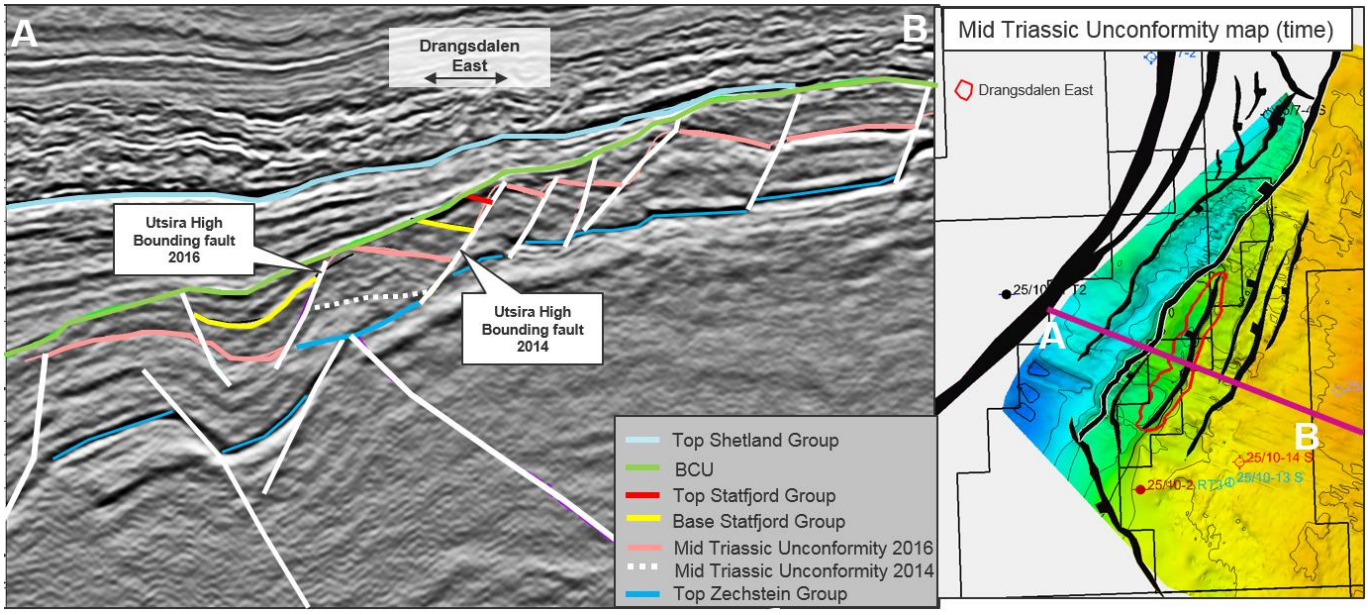

Figure 4.4 – Seismic cross section through the prospective area showing the 2016 interpretation, and highlighting the major interpretation changes from 2014 to 2016.

Table 4.1 – Volume estimates for the remaining Drangsdalen East.

	HC phase	HC phase probability	Inplace recources (MSm^3oe), total structure			Recoverable recources (MSm^3oe), total structure			Probability of discovery	Within Licence % PL 783
			P90	Mean	P10	P90	Mean	P10		
Drangsdalen East	Gas & Oil / Gas only	50/50	0.6	1.72	3.34	0.33	0.93	1.79	12.6	24

The secondary opportunity identified in PL 783 is the Lower Triassic Sirdalen lead, stratigraphically below Drangsdalen with almost identical prospect outline. Based on the well results from 25/10-13S and 14S (which were drilled up-dip from Sirdalen, Figure 3.1 A) showing tight sands/poor Triassic reservoir quality, the lead has not been evaluated further.

5 TECHNICAL EVALUATIONS

The Drangsdalen prospect is no longer valid. A technical evaluation has consequently not been carried out for the remaining prospectivity within the license.

6 CONCLUSIONS

The primary prospect driving the application for the license area was the Drangsdalen prospect. Updated evaluation of newly reprocessed seismic after the license was awarded could not provide the necessary trapping mechanism to define the prospect. It is believed that petroleum potential still exists within the Statfjord Group in the license, but that this a part of a larger structure mainly located in PL 571. A decision to drop the production license PL 783 has therefore been made within the license.