



PL 695 – Licence status report

Doc. No.
2021-008569
Valid from:

Rev. no.

Summary

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1 Licence history

License: PL695 - blocks 7018/3, 7018/6, 7019/1

Awarded: February 8th, 2013

License period: Expires February 8th, 2023
Initial period: 8 years; Initial extended 10 years

License group:

Equinor Energy AS	40% (Operator)
Lundin Energy AS	40%
Petoro AS	20%

License area: 180.084 km² (current); 589.873 km² (licence award)

Work program: Seismic acquisition and decision to drill or drop within February 8th 2016.
Extended to August 8th 2021.

Meetings held:

25.02.2013	MC startup meeting	24.11.2016	ECMC meeting
05.11.2013	ECMC meeting	03.10.2017	EC work meeting (CSEM)
18.02.2014	EC work meeting (core workshop)	11.12.2017	ECMC meeting
06.11.2014	ECMC meeting	28.05.2018	EC meeting
11.12.2014	EC work meeting (seismic reprocessing)	30.11.2018	ECMC meeting
20.10.2015	EC meeting	19.10.2020	ECMC meeting
03.12.2015	ECMC meeting	28.01.2021	EC meeting

Work performed:

2013: Merge/reprocessing of FP12 and EN0701 into LN13M01
 2014: Seismic reprocessing (LN13M01), sedimentology, geochemistry, prospect evaluation
 2015: Seismic reprocessing (EN0701LNR15), 2D seismic acquisition (LN15302), fluid replacement analysis (AVO), geochemistry, sedimentology, fault seal analysis, prospect evaluation
 2016: Seismic reprocessing (EN0701LNR16), prospect evaluation
 2017: CSEM acquisition and evaluation (Sjampis prospect)
 2018: CSEM scenario testing, prospectivity screening
 2019: No subsurface work performed (waiting on results from Well 7018/5-1 in the adjacent PL960)
 2020: Decision to relinquish 80% of the licence
 2021: Decision to surrender licence

Reason for surrender:

[REDACTED]. The recent results from Well 7018/5-1 in PL960 do not provide any geophysical uplift to the PL695 prospects. No drilling candidates are currently identified in the licence.

2 Database overviews

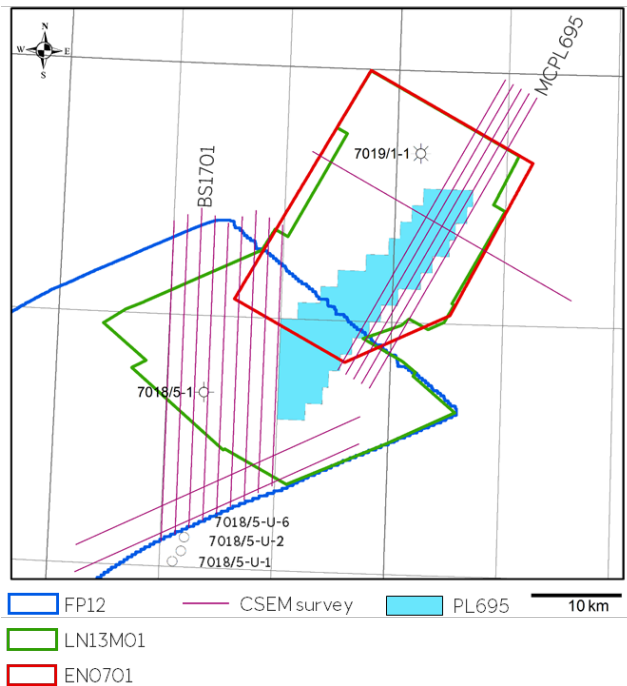


Figure 1 PL695 seismic and well data overview

Seismic survey	Survey type	NPD id	Dataset	Year	Available in DISKOS
FP12	3D	8526720518	FP12 (PSTM) FP12SHR14 (PSDM)	2012 2014	Yes
LN13M01	3D	9825038542	PSTM	2013	Yes
EN0701	3D	2899278402	EN0701LNR15 (Kirchhoff PSDM and Beam) EN0701LNR16 (PSTM)	2015 2016	Yes
LN15302	2D	10085393634	Line: LN15302-4001 Line: LN15302-4002 Line: LN15302-4003 Line: LN15302-4004	2015	Yes
MCPL695	CSEM		Line: NBR08-225415_trace: 2400 - 12400	2016	No
BS1701	CSEM		Line: MCG1001-186_trace: 1 - 11500	2017	No

Table 1 Seismic database

Well	NPD ID	Year
7019/1-1	4145	2020
7120/12-2 (Alke Sør)	122	1981
7122/7-3 (Goliat)	5214	2006
7122/7-4S (Goliat)	5406	2006
7122/7-5 (Goliat)	5439	2006
7122/7-6 (Goliat)	7051	2013
7219/9-1	1138	1988
7220/8-1 (Johan Castberg)	6484	2011
7324/8-1 (Wisting)	7221	2013
7018/5-U-1	1591	1990
7018/5-U-2	1592	1990
7018/5-U-6	1602	1990

Table 2 Wells database

2.1 Seismic data

An overview of the seismic data used in the evaluation of PL695 is shown in Figure 1 and Table 1.

2.2 Well data

An overview of the wells used in the evaluation of PL695 is shown in Table 2.

3 Results of geological and geophysical studies

Seismic acquisition and reprocessing

The northern part of FP12 (300 km²) was purchased and merged with EN0701 to provide continuous seismic coverage over the main prospects. The broadband processing boosted noise in the data and resulted in diffracted multiples and frequent migration artifacts. The resulting survey (LN13M01) experienced severe problems with seismic imaging, amplitude scaling and multiple attenuation. It was not significantly better than the legacy surveys and was not reliable for DHI analysis. Further attempts were made to improve the quality of EN0701 with focus on the main prospect, Sjampis (EN0701LNR15; Figure 2). A final reprocessing attempt was made with focus on demultiple and noise removal over Sjampis (EN0701LNR16; Figure 3). A PSDM option on this final dataset was not exercised as it was unlikely to add significant value to the prospect. A flat event was observed at 790 ms early in the reprocessing; care was taken to not destroy this during the multiple attenuation processes. One reprocessing of the FP12 survey was made over the Friskis prospect (FP12LNR16). A summary of the reprocessing vintages over Sjampis is shown in Figure 2 and Figure 3. Further documentation was presented at EC meetings 20.10.2015 and 24.11.2016.

Four high 2D resolution seismic lines were acquired in 2015 (LN15203). The acquisition was intended to help the structural interpretation in the southwestern part of the licence and to reveal any seismic DHI's. One of the lines provides a tie to the IKU boreholes to the southwest of the PL695. The lines over the Sjampis prospect are severely affected by multiple noise, and while the data over Friskis is better, image quality is not good enough to improve the interpretation.

AVO

Fluid replacement modelling of the Stø Formation in wells 7019/1-1, 7220/8-1, 7219/9-1 and 7324/8-1 indicates that it should be possible to distinguish between brine and oil-filled reservoir. However, no hydrocarbon-related seismic amplitude anomalies are identified in Sjampis.

CSEM

An 80 km² CSEM survey (MCPL695) was acquired over Sjampis in 2017. [REDACTED]

[REDACTED]

Fault Seal

The sealing capacity (juxtaposition and shale gouge ratio, SGR) of the Finnmark Platform boundary fault has been analysed. The input to the analysis included six depth horizons (Permian to Aptian), two faults in depth and the stratigraphy from wells 7019/1-1 and 7120/12-2. Several wells on the Goliat Field were used as additional input. The study identified that seal capacity increases up to an SGR of approximately 50 % and it improves down-structure. Based on the modelled stratigraphy, potentially large column heights (several hundred meters) could be retained, and fault seal is not likely to be a major risk.

Sedimentology

Depositional models for the Stø and Knurr formations have been constructed from core descriptions and facies analysis of Well 7019/1-1. The Stø Formation comprises massive and plane-laminated sandstones that represent a high-energy, shallow marine shoreface system with some tidal influence (tidal channels and tidal flats). The Knurr Formation core represents a deeper water environment characterized by submarine gravity flows (turbidite sandstones and debris flows).

Geochemistry

The source rock maturity of the Hekkingen Formation has been evaluated in 7019/1-1, 7018/5-U-1 and 7018/5-U-2. Average TOC in these wells is 5 %, 4 % and 7.7 % respectively; average HI is 260 of mgHC/g, 216 mgHC/g and 150 mgHC/g respectively. The Hekkingen Formation is oil-mature in the northern part of the licence and immature in south. A paleo oil column identified in 7019/1-1 indicates the possibility of a hydrocarbon spill route into Sjømpis. While source rocks of Triassic age are unproven in this area, basin modelling indicates that the Kobbe Formation is also oil mature close to the Sjømpis and Friskis prospects, and gas-mature further northwards. Friskis is most likely dependent on vertical migration from lower-middle Triassic source rocks.

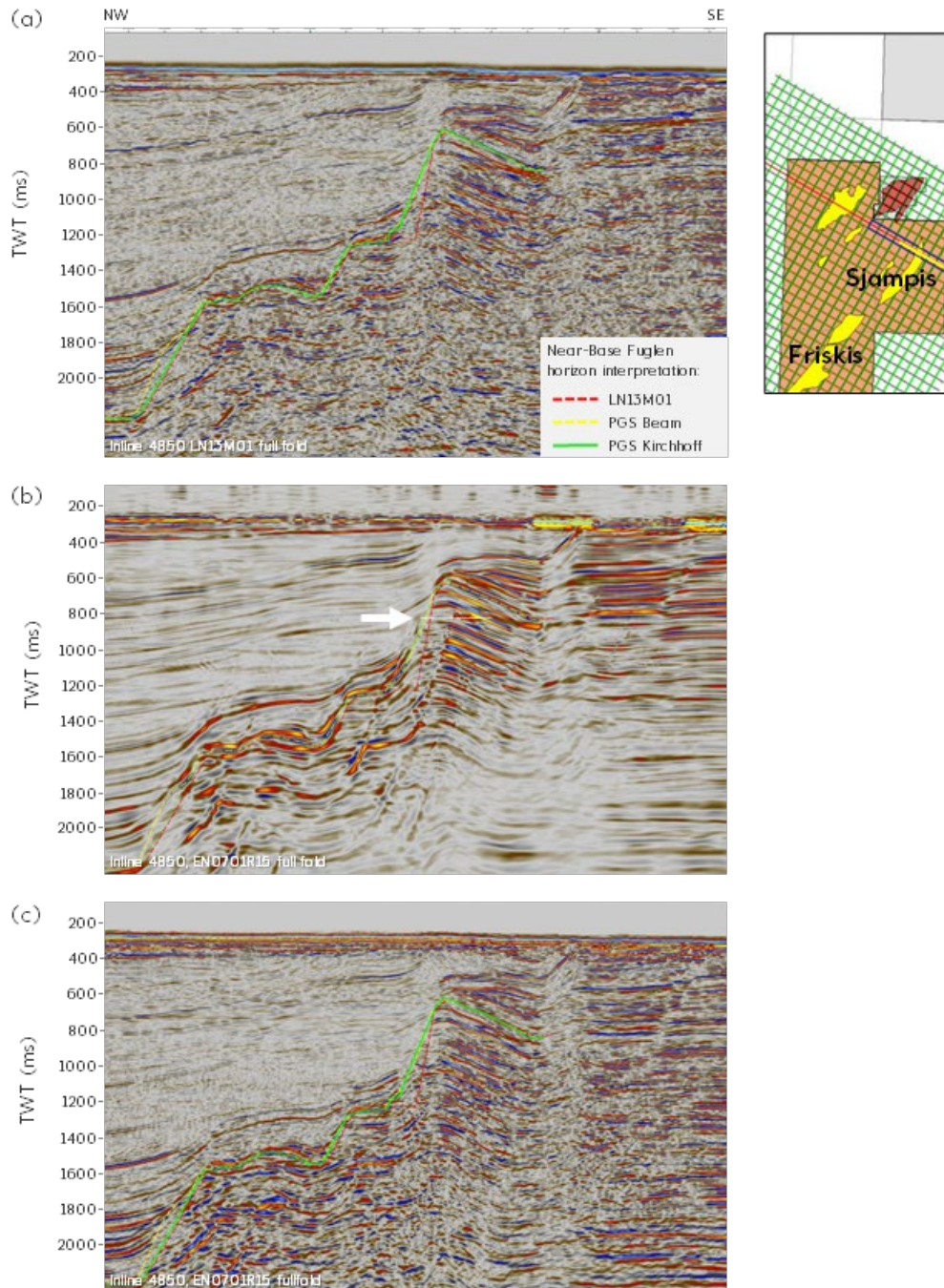


Figure 2 Seismic reprocessing over the Sjampis prospect in 2014, inline 4850

(a) LN13M01 (b) EN0701R15 Beam reprocessing (c) EN0701R15 Kirchhoff reprocessing.

Reprocessing improved the quality of the seismic, but the data are still affected by multiples and fault shadow effects. The Kirchhoff PSDM has less multiple energy than the legacy data and was used for both structural interpretation and AVO analysis. The Beam PSDM was used for the interpretation of faults but is not suitable for amplitude analysis. The interpretation of top reservoir is similar on all seismic vintages, with only minor differences around the faults. Care was taken during multiple attenuation not to remove the flat event (arrowed).

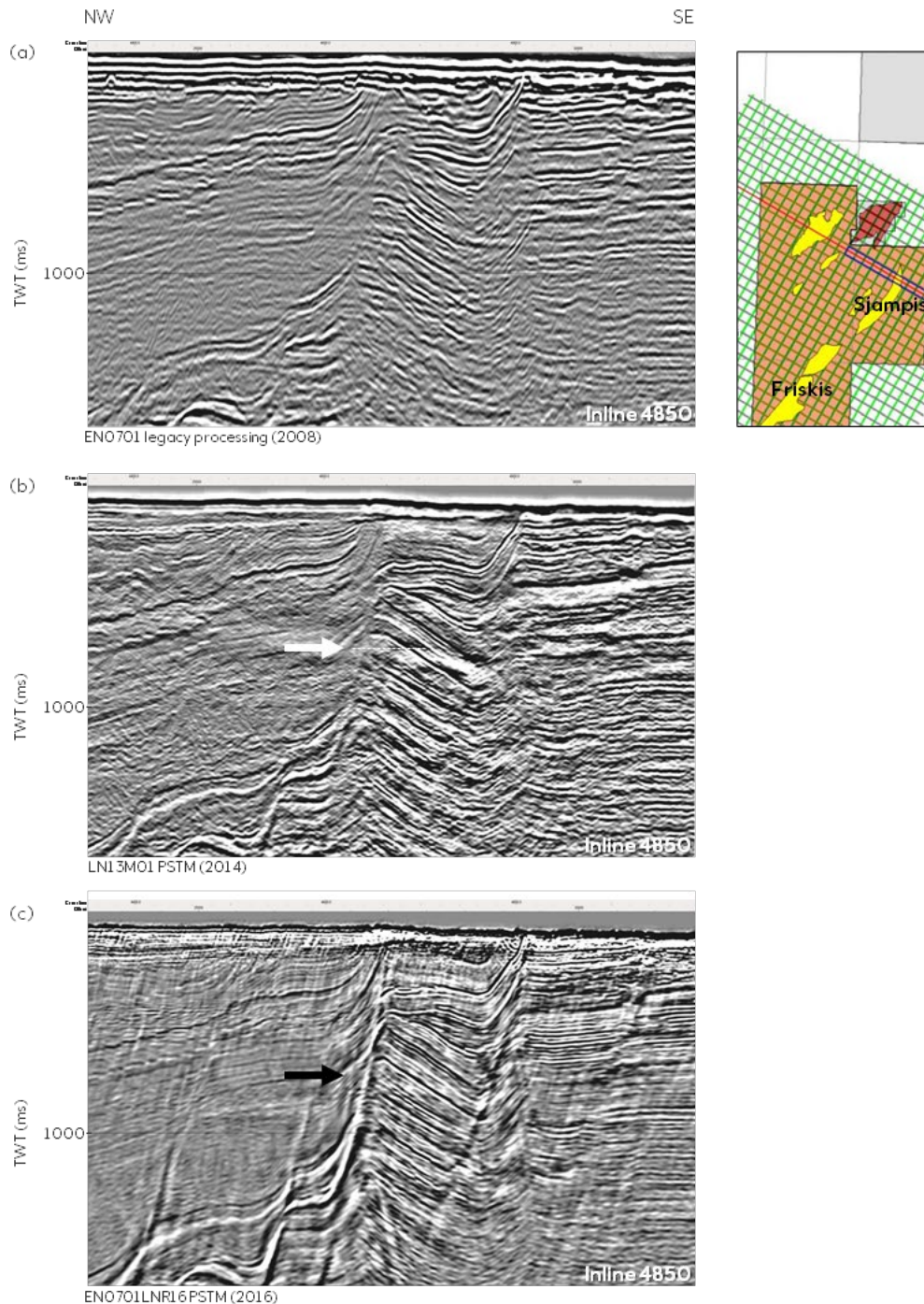
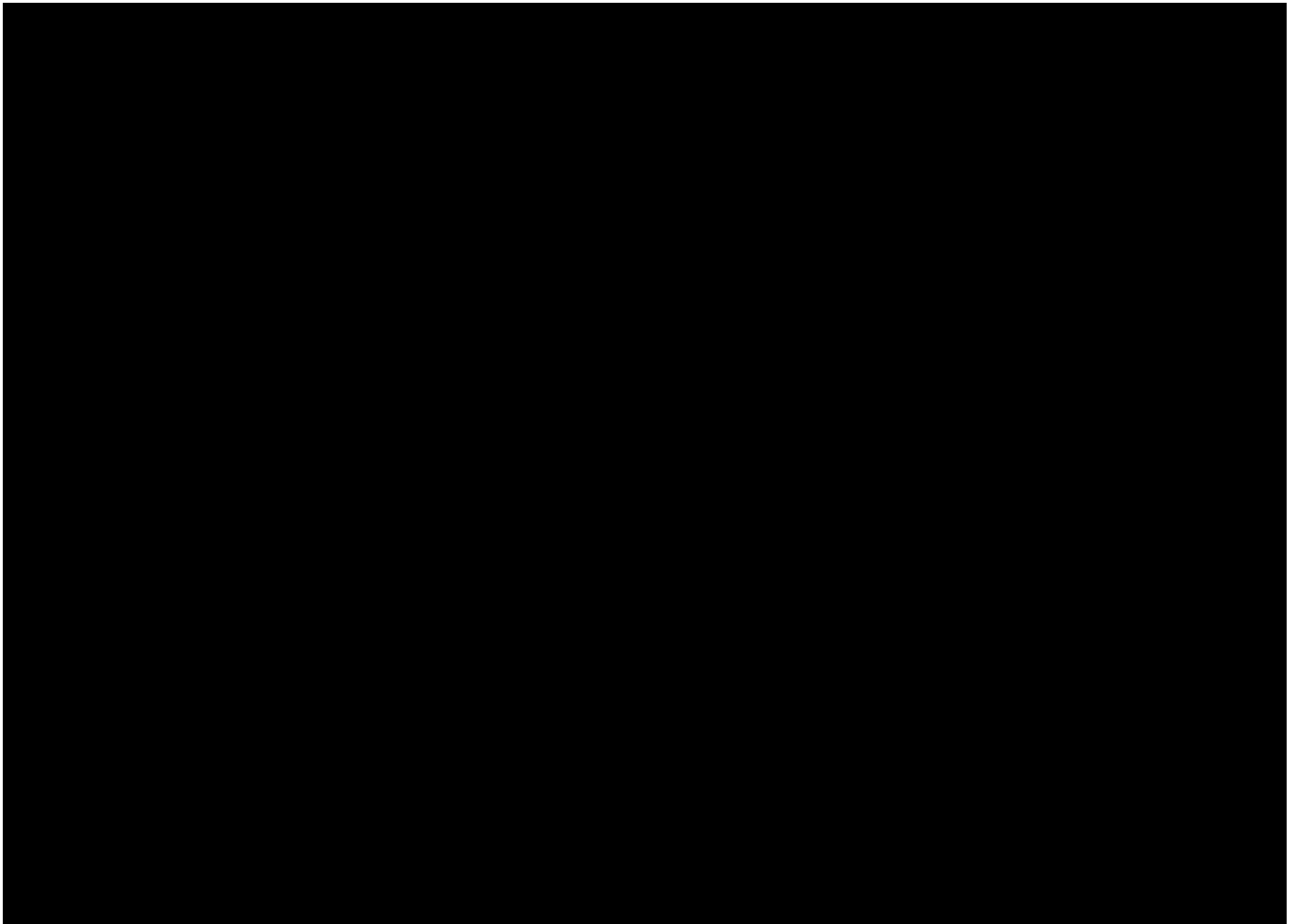


Figure 3 Seismic reprocessing over the Sjampis prospect in 2016, inline 4850 (reverse polarity)
 (a) EN0701 legacy processing (b) LN13M01 PSTM (c) EN0701R16 PSTM; the 2016 Kirchhoff reprocessing results in a better seismic image than earlier reprocessing attempts, but noise and remnants of multiples are still evident. The flat event observed at 790 ms in the earlier reprocessings (white arrow) is removed in the final reprocessing (black arrow); it is thought this was a multiple caused by a primary event in the Cretaceous overburden.

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4 Prospect update report

Approximately 80% of the licence area that was awarded in 2013 was relinquished on 06.02.2021. The remaining prospects are three downfaulted, rotated fault blocks- Sjampis and Friskis and Jimmy (Figure 5).

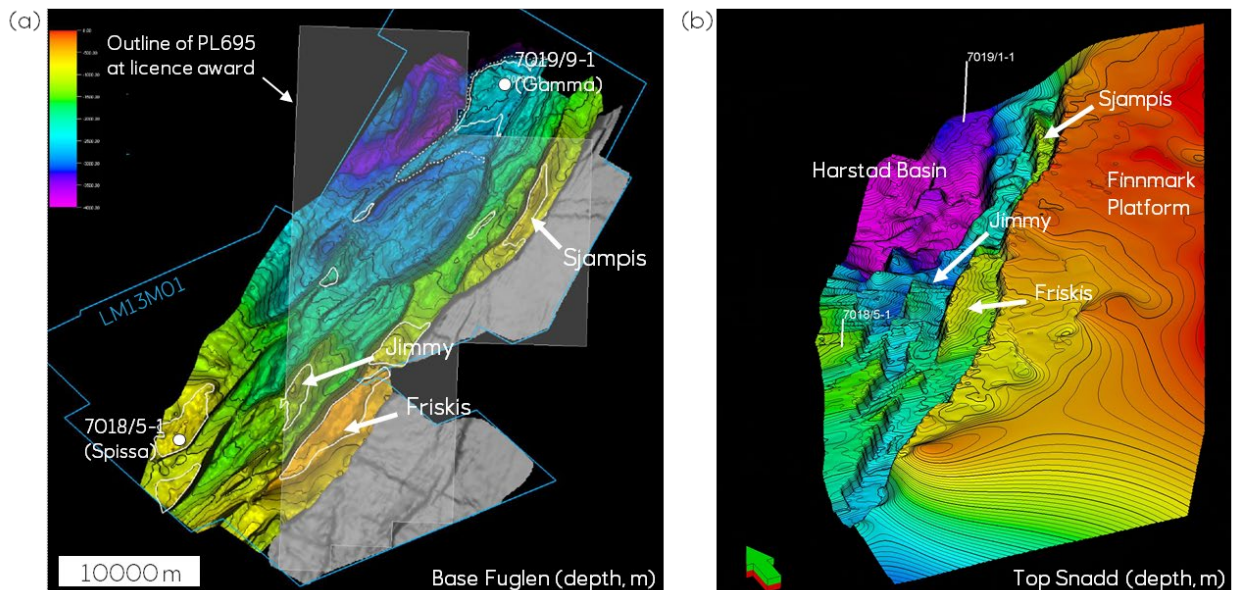


Figure 5 (a) Structure map and (b) perspective view showing the remaining prospects in PL695.

The main prospect is Sjampis which is situated in the northern part of the licence approximately 5 km from the 7019/1-1 (Gamma) gas discovery. Sjampis was most recently evaluated on EN07LNR16 (Figure 6 and Figure 7), although the top reservoir time and depth maps are similar to those from the previous processing vintage. Minor improvements have been made possible by the better fault definitions. The trap comprises a small 3-way faulted dip closure with the potential for deeper sealing against the Finnmark Platform boundary fault to the east.

The main prospective reservoir in Sjampis consists of shallow marine sandstones of the Lower to Middle Jurassic Stø Formation. The Knurr, Kobbe and Snadd formations represent secondary potential in separate vertically stacked segments. A potential seal to the main reservoir is provided by the Late Jurassic Fuglen and Hekkingen formations, while the top seals for the Snadd and Kobbe segments are provided by marine shales of Norian and Ladinian age respectively.

Sjampis is situated up-flank from Well 7109/9-1 on a potential hydrocarbon spill route from the Gamma discovery. The observation of light oil shows in the well point indicate the likelihood of migration into Sjampis although the associated spill of CO₂ from an earlier phase of biodegradation is a potential risk. Sjampis does not have a DHI: no hydrocarbon-related seismic amplitude anomalies are identified and the seismic flatspot seen on legacy surveys was removed by the latest reprocessing. It is acknowledged that biodegraded oil may not give any amplitude anomaly.

Friskis represents secondary potential in the Triassic. It is situated in the southern part of the licence, approximately 10 km from Well 7018/5-1 recently drilled on the Spissa prospect, an analogue structure in PL960. Friskis was most recently evaluated on EN0701LNR15 and has very limited CSEM coverage which is insufficient for a full evaluation of the prospect (Figure 8). The prospect comprises vertically stacked segments in the Fruholmen, Snadd and Kobbe formations. The Fruholmen Formation is partly eroded by the base Quaternary unconformity and carries a high trap risk, but at the Snadd and Kobbe levels the trap seems to be robust. The Snadd and Kobbe formations carry a higher reservoir risk than in Sjampis because their reservoir potential is unproven in this area. The most likely hydrocarbon charge is via fill-spill from the north.

A large volume potential in Sjampis and Friskis depends on the deep filling of both structures and effective sealing by the Finnmark Platform boundary fault. The fault is seen on seismic to breach the sea floor (Figure 6). The main risk for both prospects is therefore trap seal. Reservoir quality in the Friskis Kobbe segment also carries a significant risk.

The Jimmy lead represents minor upside potential in the Stø Formation in a small downfaulted block immediately west of Friskis (Figure 8). It was evaluated on LN13M01 and has not been further matured. No other leads or prospects are identified in the licence.

A volume and risk summary is presented in Table 3. The most recent volume assessment of Sjampis is documented in ECMC 11.12.2017. The most recent volume assessment of Friskis is detailed in ECMC 11.12.2017 and 24.11.2016. The most recent assessment of Jimmy was presented in ECMC 06.11.2014.

Table 3 PL695 volume and risk

Prospect	Formation	Oil case, recoverable MSm ³			Gas case, recoverable GSm ³			Pg	Evaluation year
		P90	Mean	P10	P90	Mean	P10		
Sjampis	Stø	6.0	35.5	78.0	0.7	4.2	9.0	0.25	2017
	Knurr	0.1	2.9	7	0	0.2	0.6	unrisked	
	Snadd	1.5	3.4	5.8	0	1.2	2	0.22	
	Kobbe	4.5	14	27.6	3.1	9.1	17.8	0.17	
Friskis	Fruholmen	6.0	26.1	52.2	1.0	4.2	8.3	0.01	2015
	Snadd	4.8	15.5	29.1	1.9	5.6	10	0.11	
	Kobbe	11.5	31.2	56.0	7.9	20.0	34	0.25	
Jimmy	Stø	0.7	5.4	20.4	-	-	-	unrisked	2014

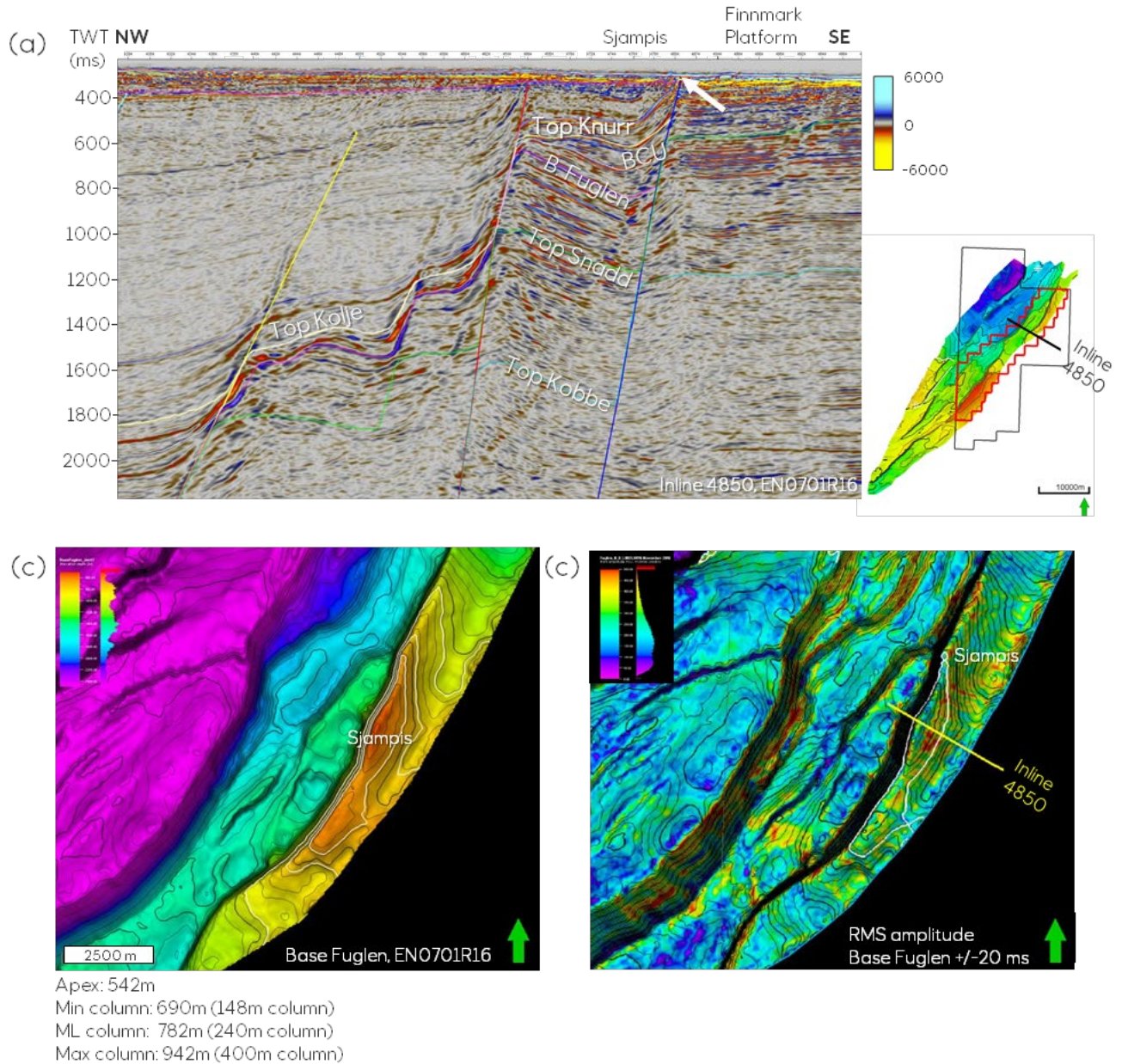
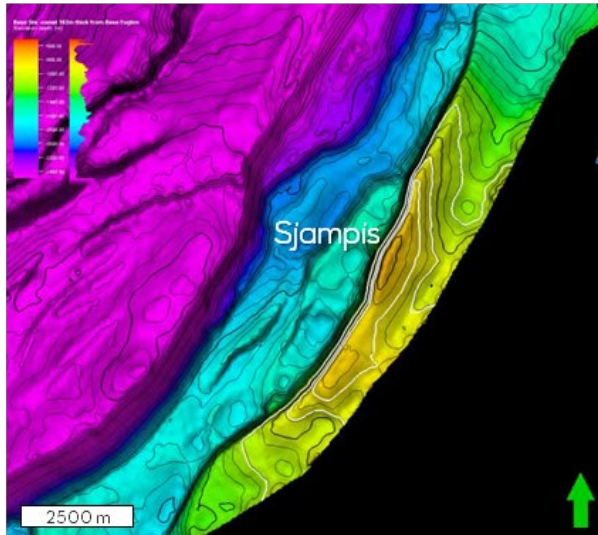


Figure 6 Sjampis prospect (a) Seismic line (b) Base Fuglen (top reservoir) depth map (c) Base Fuglen RMS amplitude extraction.

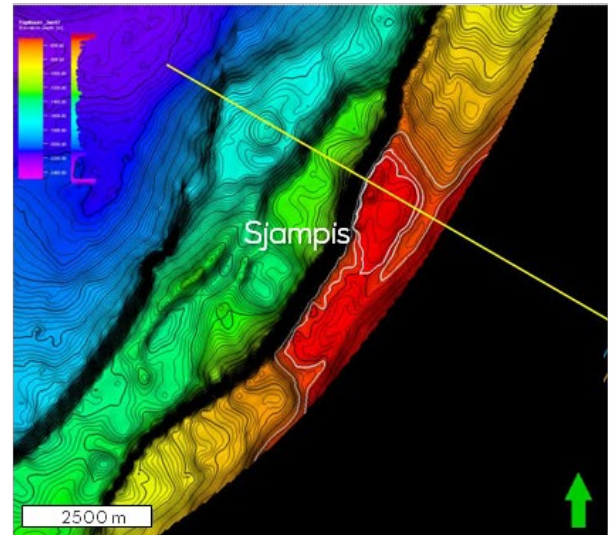
The Finnmark Platform bounding fault breaches the seafloor (arrowed) and represents the main risk to the prospect. No clear amplitude anomaly with conformance to structure is observed on any of the seismic reprocessings. Licence boundaries on inset map: grey=PL695 at licence award; red= PL695 remaining area.

Sjampis Normela/Tubåen



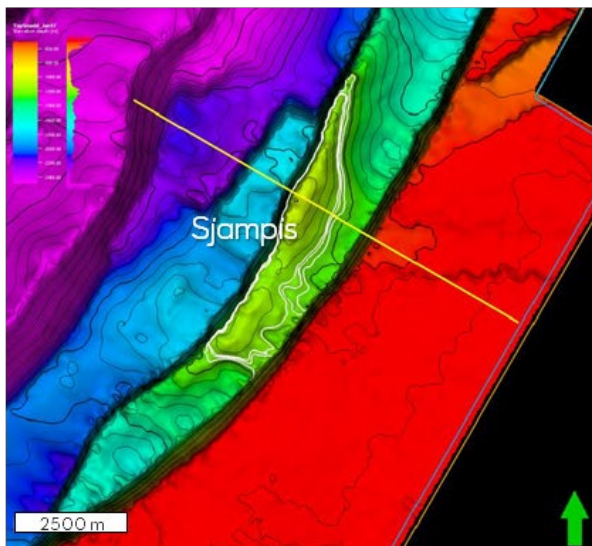
Apex: 703m
Min column: 690m (0m column)
ML column: 782m (79m column)
Max column: 942m (238m column)

Sjampis Knurr



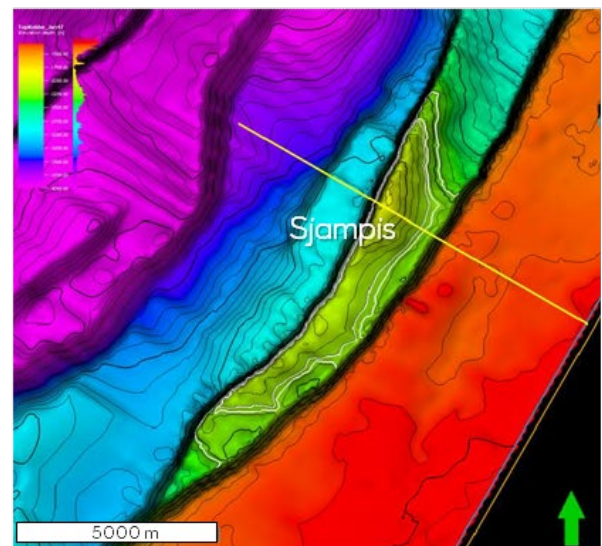
Apex: 442m
Min column: 499m (57m column)
ML column: 512m (70m column)
Max column: 562m (120m column)

Sjampis Snadd



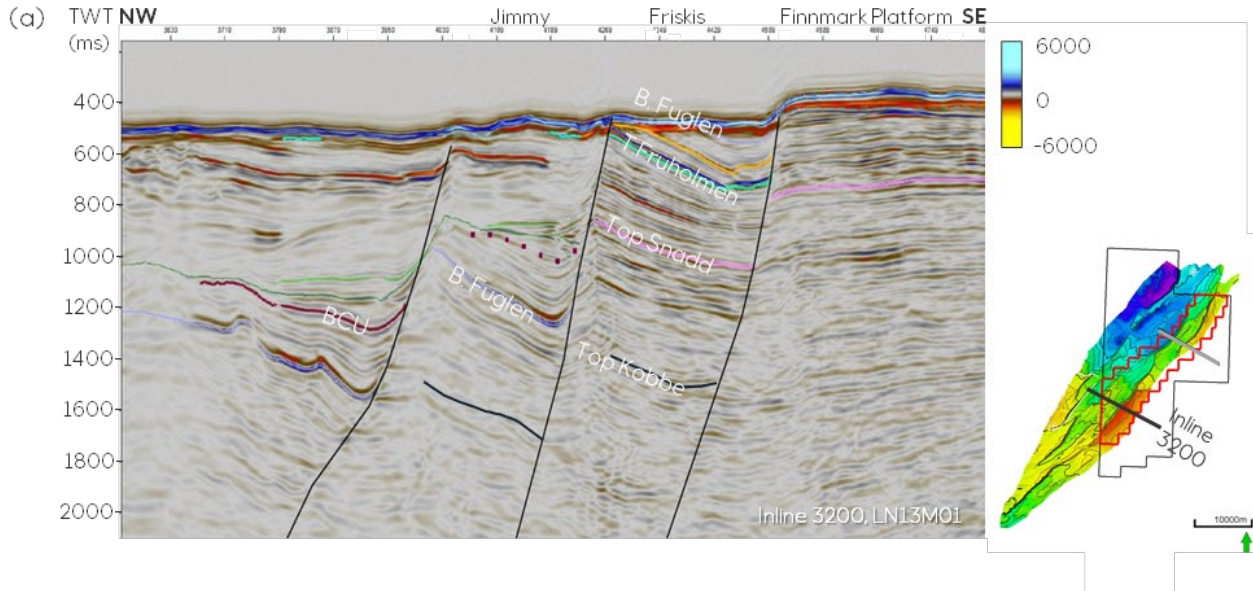
Apex: 998m
Min column: 1186m (188m column)
ML column: 1198m (200m column)
Max column: 1218m (220m column)

Sjampis Kobbe

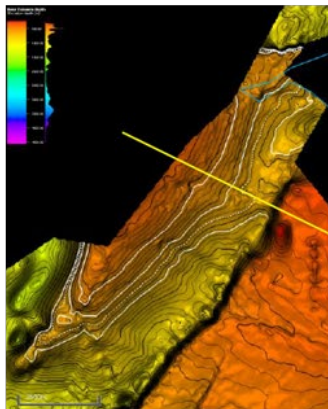


Apex: 1882m
Min column: 2153 (271m column)
ML column: 2182m (300m column)
Max column: 2282m (400m column)

Figure 7 Depth maps of secondary closures within the Sjampis prospect

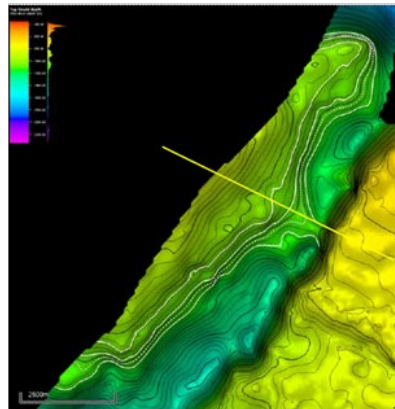


(a) Friskis Fruholmen



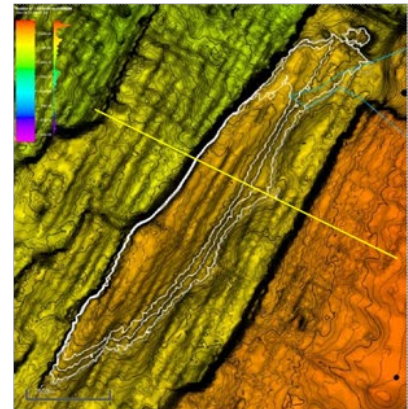
Apex: 375m
525m (150m column=Min)
625m (250 column=ML)
725m (350m column=Max)

(b) Friskis Snadd



Apex: 836m
1036m (200m column=Min)
1086m (250 column=ML)
1110m (3-way closure)
1136m (300m column=Max)

(c) Friskis Kobbe



Apex: 1890m
2140m (250m column=Min)
2190m (300 column=ML)
2240m (350m column=Max)
2260m (4-way closure)

Figure 8 Seismic section and depth maps of structural closures in the Friskis prospect

5 Technical evaluation

A valuation of the Sjampis prospect was undertaken by Equinor (Statoil) when it entered the license in 2016. The development scenario for the Stø reservoir assumes a steel jacket with 7 platform-drilled wells (3 producers, 3 water injectors, 1 gas injector). The drillability of wells has not been evaluated, but the thin overburden of only 500 m could represent a challenge for the injection wells. [REDACTED]

[REDACTED] The MEV of Friskis is expected to be towards the upper end of this range due to the poorer reservoir properties of the Kobbe Formation.

Conclusion

During the 2012 APA it was thought that the large downfaulted fault blocks along the eastern margin of the Harstad Basin might be an analogue to the Johan Castberg Field. While the structure of the fault blocks is reasonably well defined on seismic, it has been difficult to make a conclusive geophysical assessment of their reservoir potential due to the relatively poor seismic quality. Three seismic reprocessing attempts have been made to improve the image quality over Sjampis. Reprocessing has improved the data, but some noise and remnant multiple artifacts are still present. No hydrocarbon-related amplitude anomalies are identified, and while the CSEM evaluation is inconclusive, the current data do not support deep filling of the prospect. The lack of a seismic flatspot on the most recent reprocessing also suggests limited volume potential.

It was hoped that a hydrocarbon discovery by Well 7018/5-1 in PL960 would derisk the Sjampis prospect. Preliminary geochemical analysis has identified traces of migrated hydrocarbons [REDACTED] [REDACTED] However, as the Stø Formation was water-bearing, the result does not provide any geophysical uplift to the prospects in PL695. Some further maturation of both Sjampis and Friskis might be possible with additional CSEM data, though current indications are that further work would most likely result in a geophysical downgrade to the prospects.

Given the current lack of geophysical support for large hydrocarbon volumes in Sjampis and Friskis, the licence partnership is agreed in its decision to relinquish the licence.