



REPORT

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SUBJECT:	PL806 Full Relinquishment Report
ABSTRACT:	The evaluation has concluded that PL806 is a low materiality asset with a high risk associated to hydrocarbon occurrence.
DESCRIPTION:	

Rev.2	20/04/2017	Final Version	Prepared	Verified	Approved
Rev.1	03/04/2017	Draft Version			



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1. KEY LICENCE HISTORY

PL806 (302 km² of total acreage) is operated by Eni Norge AS (40%) in a joint venture with Edison Norge AS (20%), Dea Norge AS (20%) and Petoro AS (20%). The licence is located 80km away from the Norwegian coast in the Barents Sea, approximately 30km north of the Nucula discovery (PL393) and 130 km east of the Goliat field (PL229), in a water depth of 350m.

PL806 was awarded on the 6th of February 2015, after the 2014 APA Round, with the obligation of purchasing 3D seismic data and a Drill or Drop Decision to be taken within the 6th of February 2017.

The initial Licence period expires on the 6th of February 2023.

The work obligation was to acquire 3D seismic data and it has been honoured by acquiring the Bjarmeland 3D-seismic dataset. The area has been fully reinterpreted with the 3D seismic which allowed better definition of the entire licence. A revision of the petrophysics has been done by Eni Norge on the two wells present within the acreage, together with AVO reconnaissance and a fault seal analysis study performed on the main prospect.

The main exploration potential of the licence is represented by the Ama Dablam prospect, a fault assisted structure at Realgrunnen Subgroup level, located on the down-thrown block of the 7124/3-1 Bamse technical discovery drilled 10 km to the west in 1987.

The in-place hydrocarbon volumes and risk of the Ama Dablam prospect have been reviewed following the two years of geological and geophysical work following the licence award.

The revised exploration potential of the licence led to a negative economical evaluation and therefore the operator recommended to the partnership to relinquish PL806 at the drill or drop decision deadline of February 6th, 2017. This recommendation was supported unanimously by the three other partners in the joint venture.

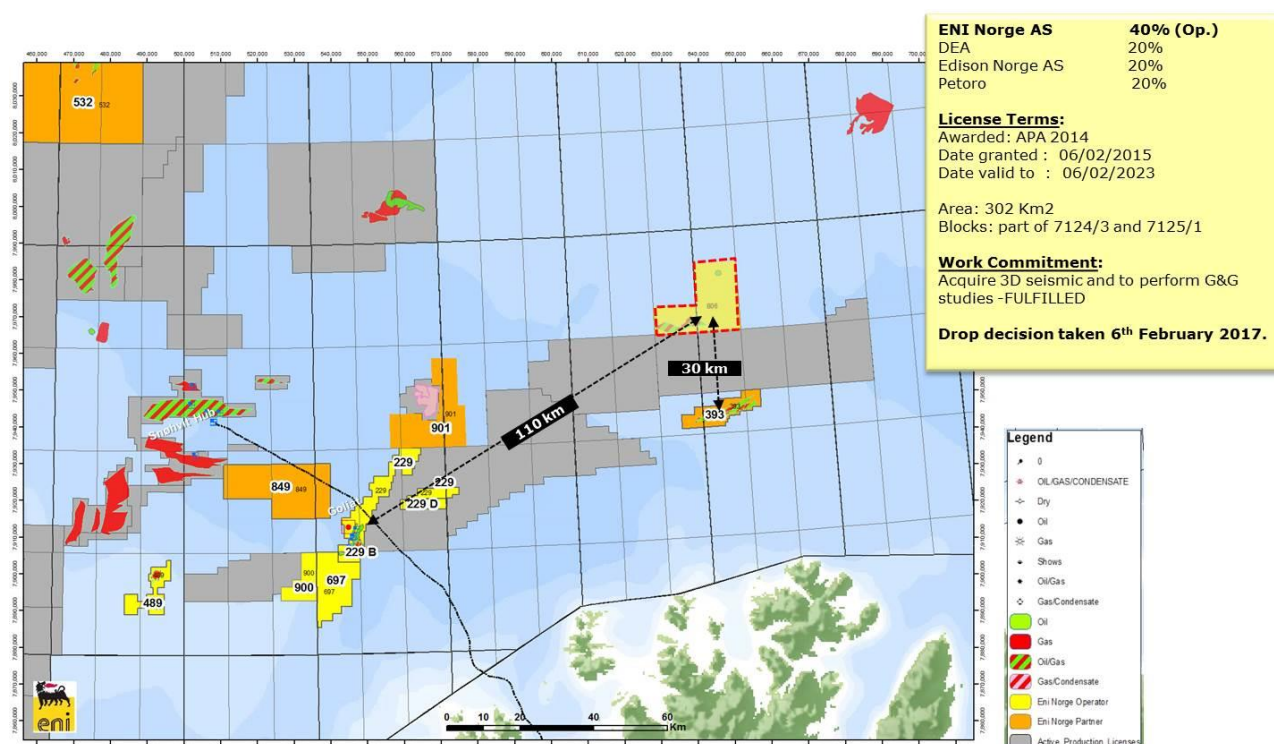


Figure 1: Location Map and summary for Production Licence 806

2. DATABASE

2.1 Seismic

The 3D seismic database (Figure 2) consists of part of the multi-client Polarcus POL1101 "Bjarmeland Platform MC 3D" (NPDID 7505) covering the PL806 area.

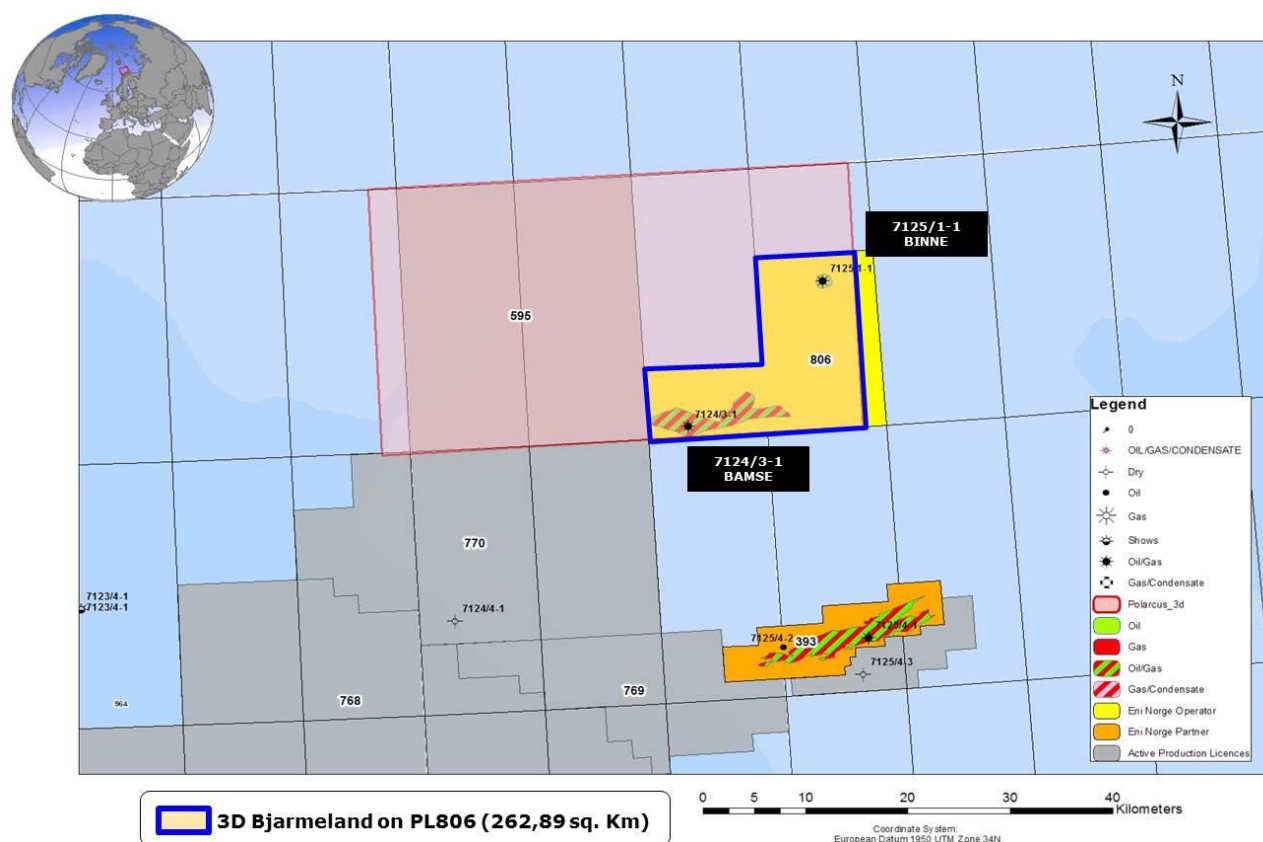


Figure 2: Seismic and well database used in PL806 evaluation. The blue outline shows that part of the 3D within the licence common database.

2.2 Well data

PL806 contains two technical discoveries: 7124/3-1 (known as Bamse, NPDID 1066) and 7125/1-1 (known as Binne, NPDID 1350). Both wells were used in the technical evaluation of the licence and considered as reference for petrophysical and sedimentological model for the area.

2.3 Special Studies

The following studies have been carried out involving the PL806 licence.

- AVO study on angle stacks at both Realgrunnen Subgroup and Kobbe Fm levels.
- Petrophysical re-evaluation of the two wells drilled on the blocks.
- Fault seal study carried out on all faults affecting the main Ama Dablam prospect to evaluate sealing potential critical to any trapping.

3. REVIEW OF GEOLOGICAL AND GEOPHYSICAL STUDIES

AVO STUDY

An AVO study performed internally based on theoretical AVO models and amplitude maps extracted from angle stacks, confirmed the expectations regarding the reservoir quality at the Ama Dablam prospect, see Figure 3.

The following is a summary of the results:

REALGRUNNEN

- AVO lithology projection map shows likely presence of better Stø Fm. at Ama Dablam prospect.
- Fluid Replacement Modelling suggests hydrocarbons should be discernible from brine, however the AVO fluid projection map does not allow good discrimination between fluids and background.

KOBBE

- AVO attribute maps shows inconclusive results with no amplitude pattern.
- Theoretical AVO model (weak Class II-III) built from well suggests little fluid discrimination possible.

Top Realgrunnen, AVO Projections

- AVO projection lithology map suggests Stø fm. (better quality) on Ama Dablam prospect
- AVO projection fluid map does not allow good discrimination between fluids and background

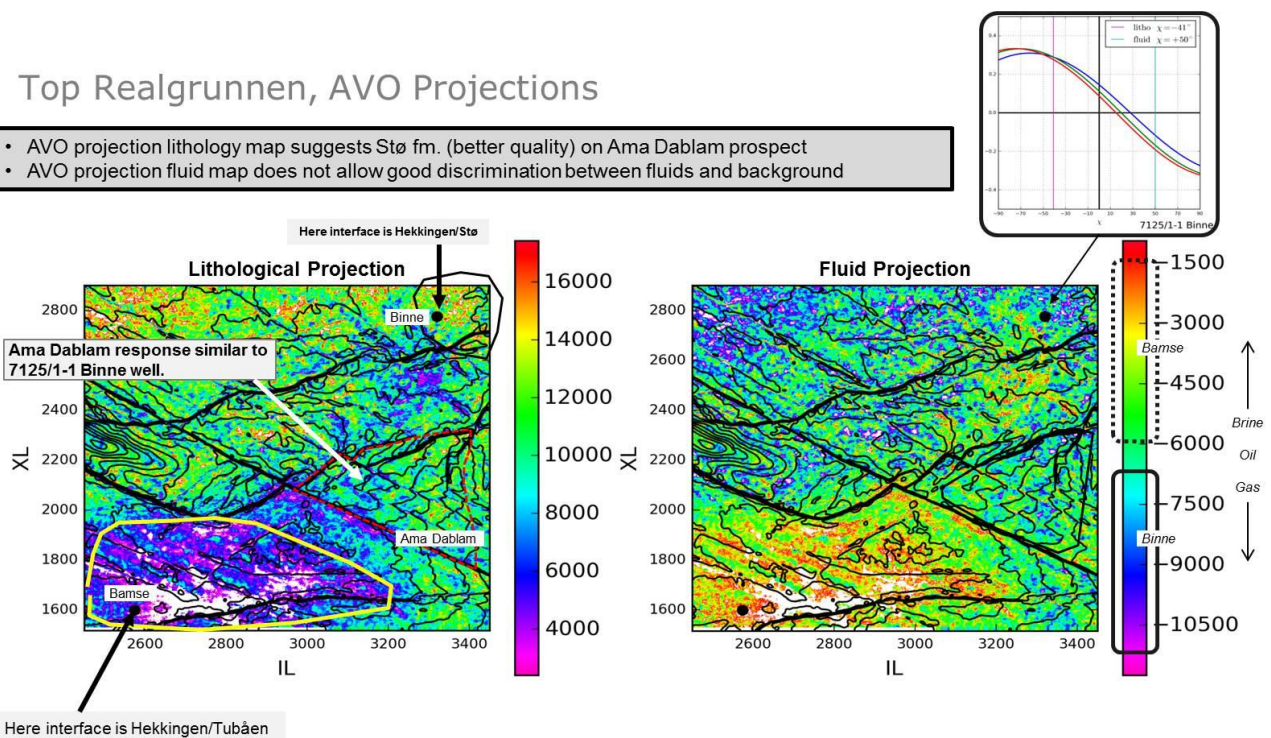


Figure 3: Top Realgrunnen AVO lithological and fluid projections

The amplitude maps extracted on near and far angle stacks were combined together using the AVO projection approach. This is a way to examine AVO effects beyond the acquired angles to enhance differences and in practical terms it is implemented through the following equation:

$$\text{Projection}(\Psi) = \text{Near} \cdot \cos\Psi - \text{Far} \cdot \sin\Psi$$



By extending the AVO models beyond the conventional 0-30 degrees angle range for different fluid states, the curves converge at a certain pseudo-angle, called the lithology projection angle (i.e., where no difference between fluids exist), while they diverge and reach a maximum difference at another angle, called the fluid projection angle. These two angles can be derived from theoretical models and then applied to the seismic data. In absence of a robust reference model, the interpreter can also create a set of projections using a range of pseudo-angles ranging from -90 to +90 for example and examine qualitative differences (the fluid map could show for example a sharp change around the fluid contact while the lithology map would still show the underlying sedimentological features).

Figure 3 shows the lithology and the fluid Projection maps at the Realgrunnen; the lithology map shows similarities between the prospect area and the Binne area, suggesting that the Stø Fm. is present at both locations. The fluid map however does not show any discernible difference between fluid responses at Ama Dablam thereby not reducing the perceived risk of a non-hydrocarbon phase being present.

PETROPHYSICAL RE-EVALUATION

The 2015 Eni Norge re-evaluation of the two wells in the licence confirms the view at the time of the application with no significant changes revealed.

FAULT SEAL STUDY (ENI's Fault Seal Analysis FSA)

The fault seal analysis performed in 2016, confirmed the assumption that the sealing potential of the main NW-SE fault, bounding the prospect to west, is essential to large column heights.

Due to low shale gouge values along the key fault the first sand-on-sand juxtaposition is the most likely leaking point. Using this value for the in-place volumes calculation, this corresponds to a limited amount of hydrocarbon occurrence. A range of possible deeper spill points have also been used in the volumetric calculations with a lower probability of occurrence.

In conclusion the fault seal analysis study does not support the occurrence of large hydrocarbon volumes due to a high risk of sand to sand juxtaposition at shallow depths.

4. PROSPECT UPDATE REPORT

PL806 was awarded in February 2015 based on the identification of the Ama Dablam prospect (Figure 4) interpreted on 3D seismic data. Volumes calculated for APA 2014 are listed in Figure 5.

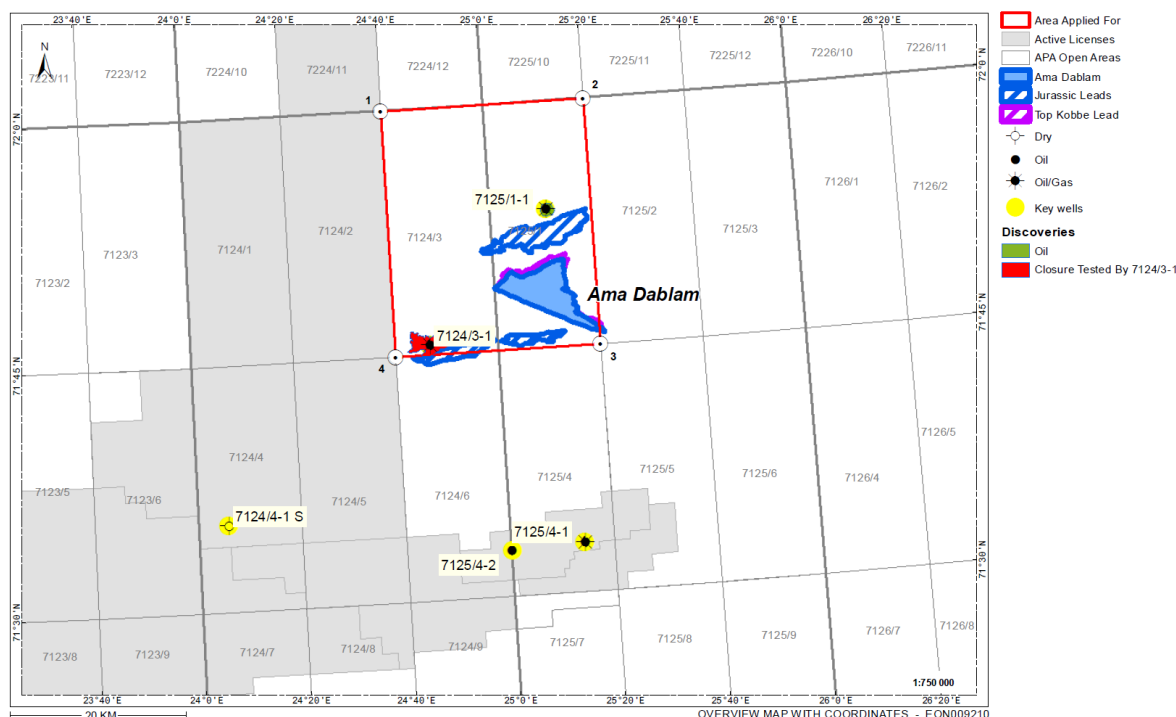


Figure 4: The Ama Dablam prospect outline at the time of application in 2014

Discovery/ Prospect/ Lead name ¹	D/ P/ L ²	Case (Oil/ Gas/ Oil&Gas) ³	Unrisked recoverable resources ⁴						Probability of discovery ⁵ (0.00 - 1.00)	Resources in acreage applied for [%] ⁶ (0.0 - 100.0)	Reservoir		Nearest relevant infrastructure ⁸	
			Oil [10^6Sm^3] (>0.00)			Gas [10^9Sm^3] (>0.00)					Litho-/ Chrono- stratigraphic level ⁷	Reservoir depth [m MSL] (>0)	Name	Km (>0)
			Low (P90)	Base (Mean)	High (P10)	Low (P90)	Base (Mean)	High (P10)						
7125/1 Ama Dablam Realgrunnen	P	Oil&Gas	7,39	32,90	67,20	1,72	8,05	16,40	0,26	100,0	Realgrunnen SUBGp./ Lower to Middle Jurassic	1370	Goliat	120
7125/1 Ama Dablam Kobbé	P	Oil&Gas	1,73	9,57	20,70	0,42	2,34	5,05	0,18	100,0	Kobbé Fm./ Middle Triassic	1975	Goliat	120

Figure 5: APA 2014 Ama Dablam prospect volumes.

After the licence award, the blocks have been further interpreted and the Ama Dablam prospect remained the main structure with a morphology still largely the same as was identified at the time of the application.

As was identified in the APA round, despite there being a good 3-way dip and fault closed element to the trap, the key NW-SE striking fault would still need to seal to allow sufficient volumes to be held.

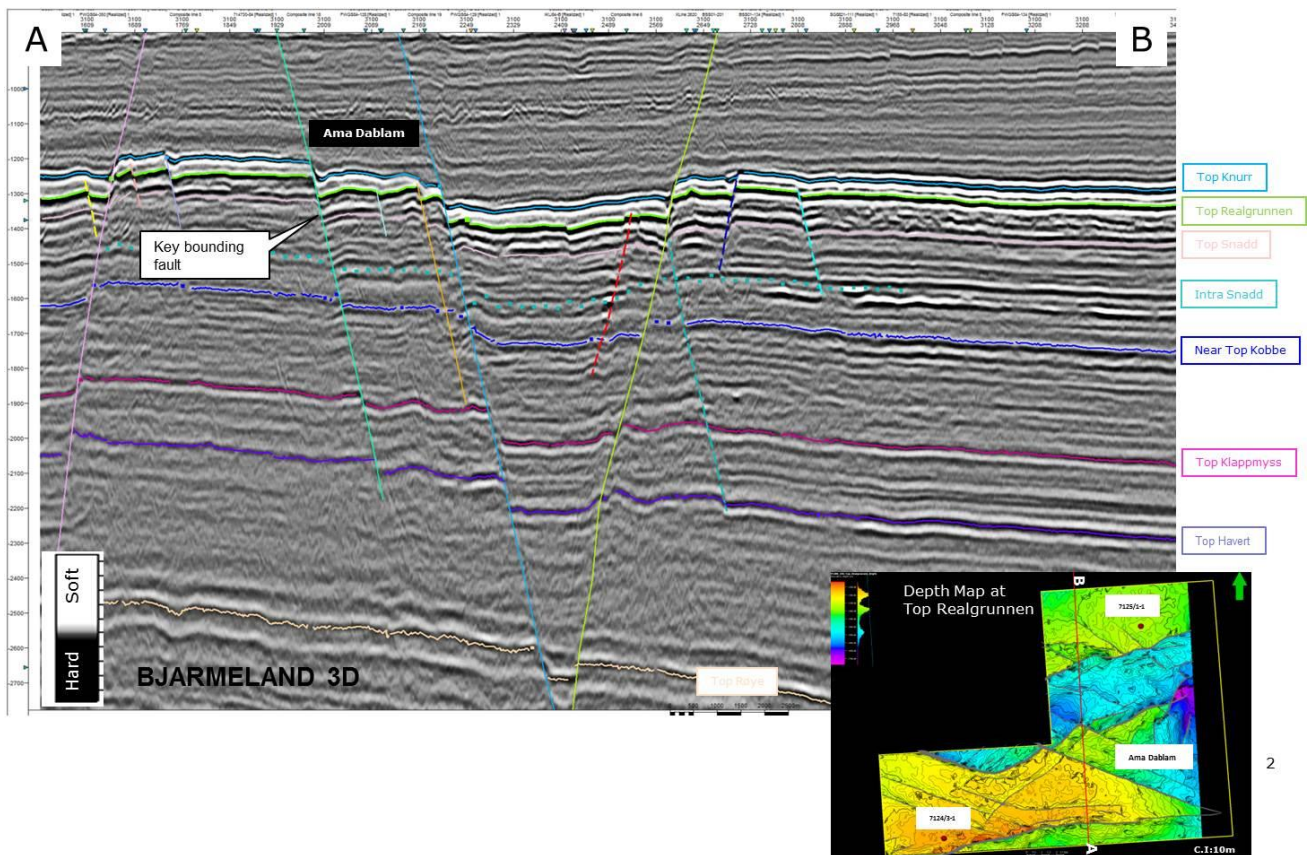


Figure 6 shows the downthrown position of the Ama Dablam prospect and the key fault needed to seal.

Following the detailed analysis of the critical fault's sealing potential, it was concluded that large hydrocarbon column heights were unlikely to be supported due to a relatively shallow sandstone-on-sandstone juxtaposition and low shale gouge values. The sandstone-on-sandstone juxtaposition at 1392m became the most likely and shallowest spill point while a shale gouge enhanced fault seal deepest contact was calculated at 1460m (

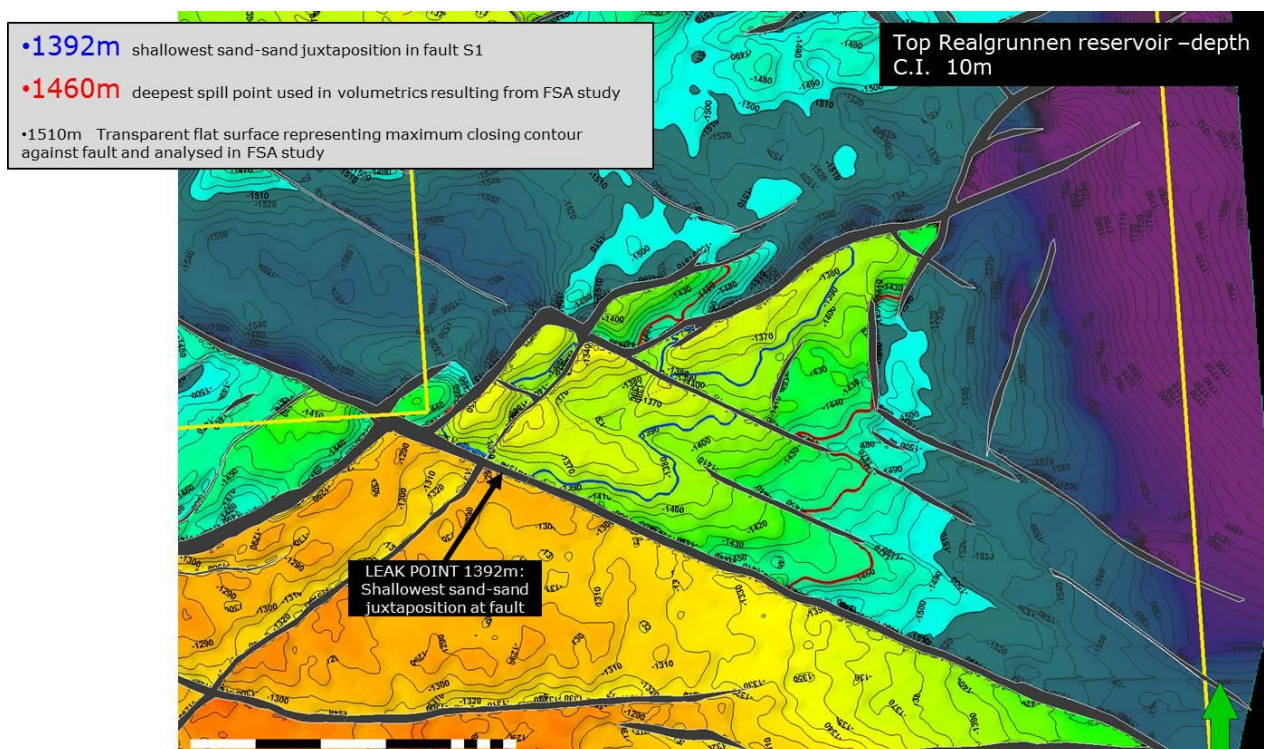


Figure 7). This gave a maximum hydrocarbon column of 121m which is more in accordance with that found in the Barents Sea.

The range of potential spill points was used as input to calculate the hydrocarbons in-place.

Table 1 - PL806 volumetric assessment 2016

Table 1 shows the 2016 volumetric estimation for PL806 and the main Ama Dablam mean oil volumes in-place at 91.8 MBBLs. This is a 56% reduction of the mean case oil volumes estimated at the application stage.

Another limiting factor on potential column heights was the underfilled traps on the licence. Bamse 7124/3-1 is filled to just 70% of the mapped structural closure while Binne 7125/1-1 is filled to just 60%. With both structures having good oil shows much deeper than the present oil accumulations it is thought that traps on the licence suffered greatly during the Cenozoic uplift periods. The overall POS of the Ama Dablam prospect in the final evaluation is 19%.

No potential was attributed to the Kobbe unit in the latest evaluation due to the low volume potential and very high risk.

Prospect name	OIL (Mbbbl)				Solution gas (Gm3)				Gas in place (Gm3)			
	P10	P50	P90	Pmean	P10	P50	P90	Pmean	P10	P50	P90	Pmean
Ama Dablam	183.64	68.78	33.9	91.8	3.24	1.22	0.6	1.62	7.2	2.1	0.7	3.12
Bamse upthrown	54.28	41.4	14.19	37.73	0.88	0.67	0.23	0.61	2.1	0.77	0.18	0.96

Table 1 - PL806 volumetric assessment 2016

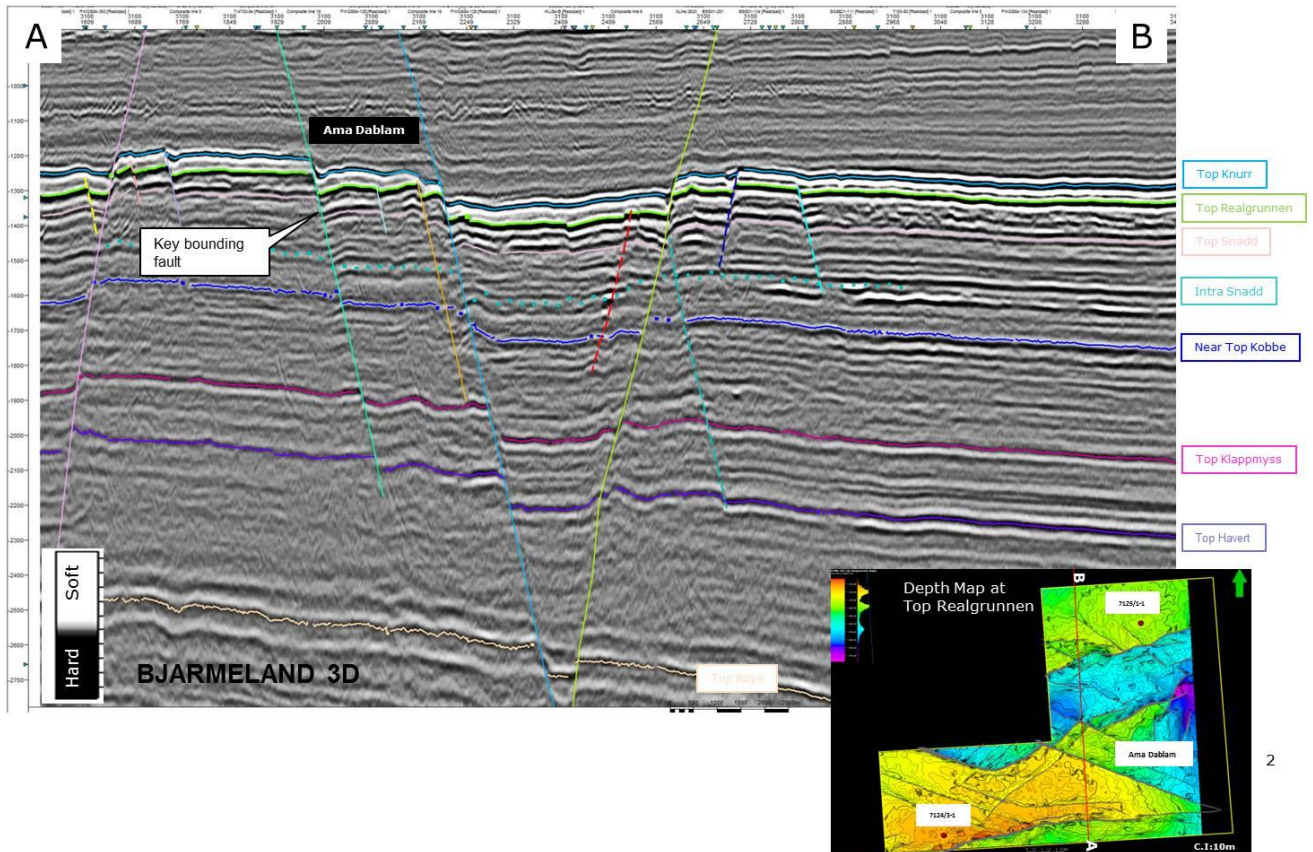


Figure 6: Seismic line through the downthrown Ama Dablam prospect in PL806

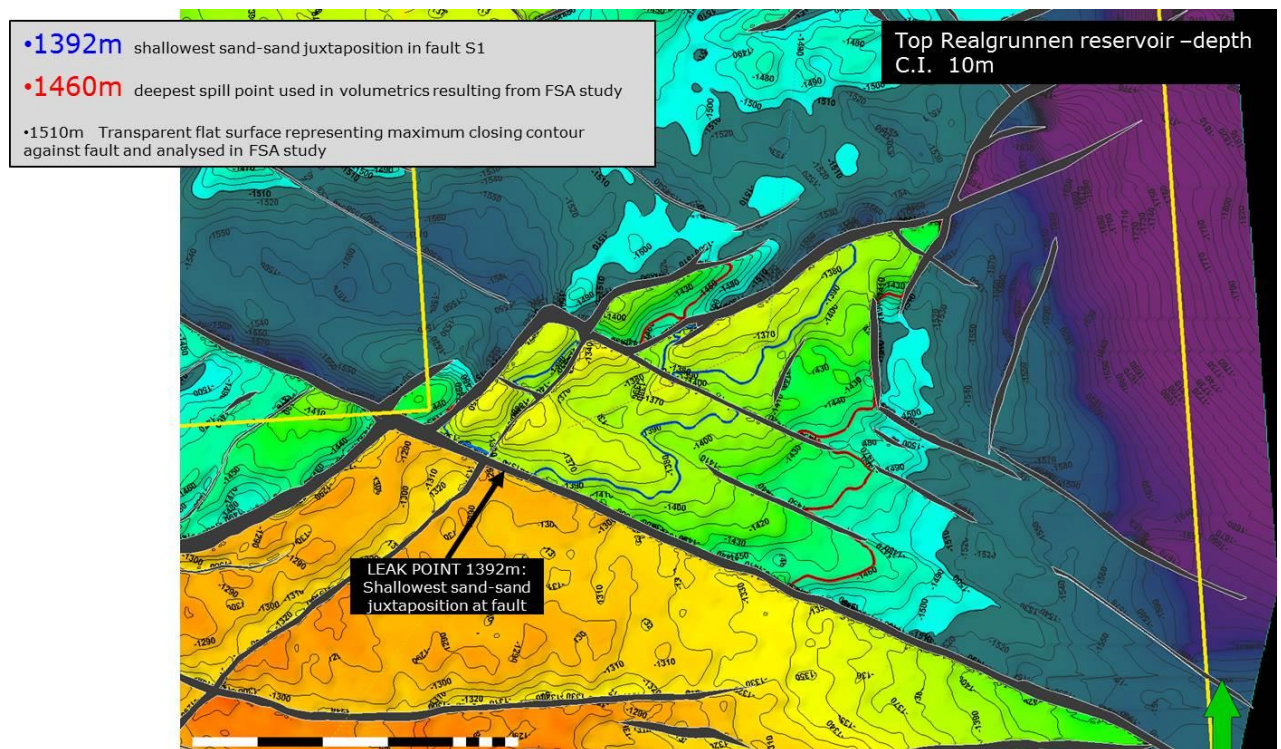


Figure 7: The Ama Dablam prospect at the Top Realgrunnen Subgroup target and the range of potential hydrocarbon contacts used in the volumetric evaluation.

Figure 8 shows the prospectivity of PL806 at the time of the drill or drop decision. No other previously identified leads were elevated to prospect status but additional remaining potential segments within the greater Bamse structure were identified. The associated volumes are relatively minor and are summarised in Table 1 - **PL806** volumetric assessment 2016

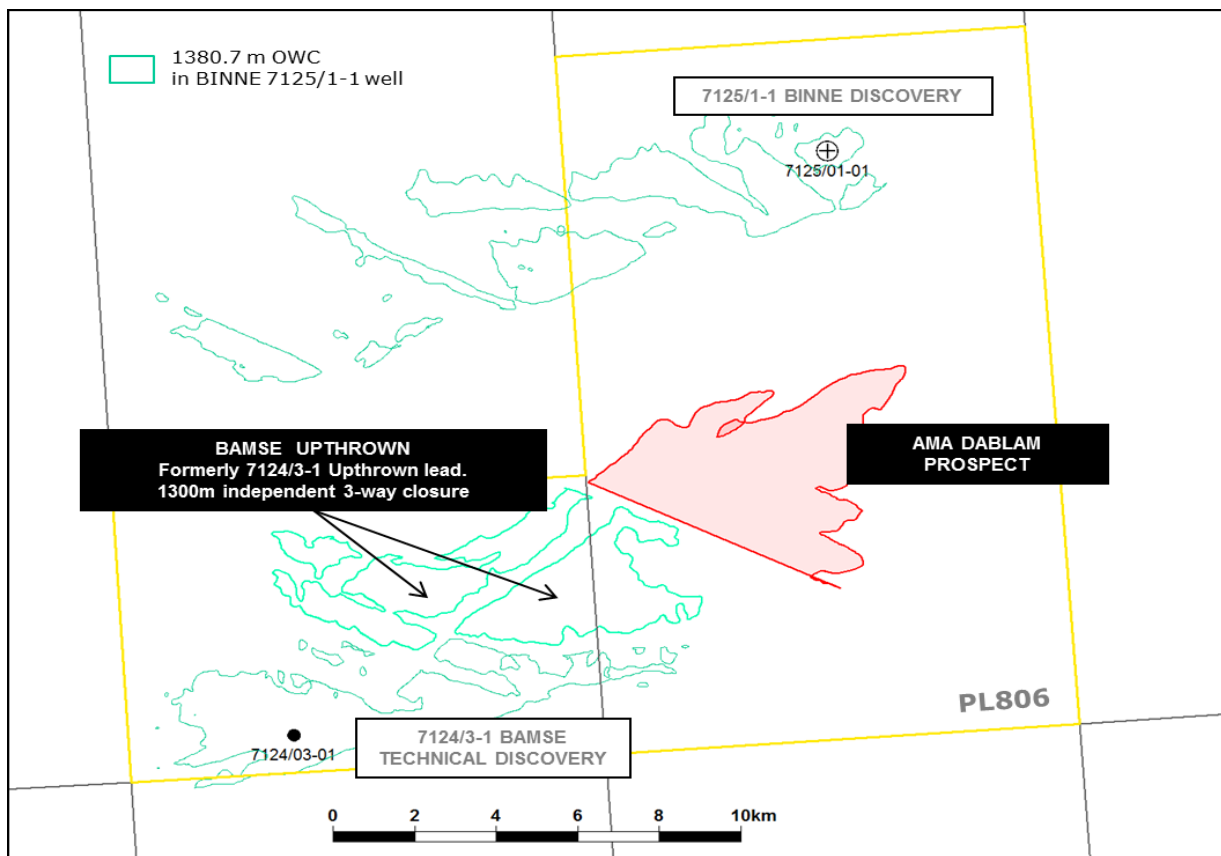


Figure 8: PL806 2016 prospectivity map



5. TECHNICAL EVALUATIONS

The volumes of hydrocarbon in-place for the Ama Dablam prospect have been estimated using PRES 7.1 (Eni's in-house software for volume calculation) and following the most recent interpretation and studies. The volumetric estimations are relevant to the Realgrunnen Subgroup (Table 1); the target map has been depth converted using the stacking velocities derived from 3D PSTM data (Bjarmeland 3D seismic) and tied with the nearest wells. Input parameters have been derived from the nearest reference wells, semi-regional geological knowledge and fault-seal analysis results.

The play and local risk associated to the prospect has been estimated using PAPA++ (Eni's in-house risk assessment tool).

The limited amount of hydrocarbons associated to the Ama Dablam prospect cannot justify a stand-alone development; therefore an economical evaluation has been performed taking into account a possible joint development with the nearby Nucula discovery (PL393 – Eni Norge partner).

Economics, based on this assumption, have been fully developed and led to negative results.

6. CONCLUSIONS

Eni Norge has revised the geological and technical evaluation of PL806 since the award in 2015.

The work commitment in the licence has been fulfilled with the acquisition of the Bjarmeland 3D seismic data.

Based on the result of the geological and geophysical studies performed, the Ama Dablam prospect shows a limited hydrocarbon potential and no additional relevant prospectivity has been identified within the acreage.

Therefore a decision to relinquish the license has been taken. The recommendation has been unanimously supported by the JV partners.