REPORT

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SUBJECT:	**PL816 License Full Relinquishment Report**
ABSTRACT:	The PL816 evaluation result as low materiality asset with a high risk associated to hydrocarbon occurrence.
DESCRIPTION:	

			[redacted]		
Rev.	03/05/2018	Final Version	Prepared	Verified	Approved

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1. KEY LICENSE HISTORY

PL816 consists of two blocks, part of 17/4 and part of 17/7, located in the North Sea at the Eastern side of the Utsira High (Figure 1). The licence covers an area of 360.382 km^2, with water depth averaging 100 m and it is operated by Eni Norge AS (70%), with Concedo ASA (30%) as partner. PL816 is located about 40 km SE of Johan Sverdrup supergiant, and about 130 km from the Norwegian coast.

The license was awarded on February 5th 2016 (APA 2015 application) and had the commitment to acquire 3D seismic, and perform G&G studies (all commitments are fulfilled). Following the completion of Phase 1, a Drill or Drop decision shall be taken by February 5th 2018. In case an exploration well is drilled, results will be thoroughly analysed and a decision to Concretize (BoK) or Drop will be made by February 5th 2020.

Prospectivity in PL816 lies in the Jurassic Vestland Gp. (Sandnes and Bryne Fms.) and in the Triassic upper Hegre Gp. (Skagerrak Fm.). Specifically, a prospect (Sejs Prospect) has been defined in the licensed area with its westernmost portion included within license PL776.

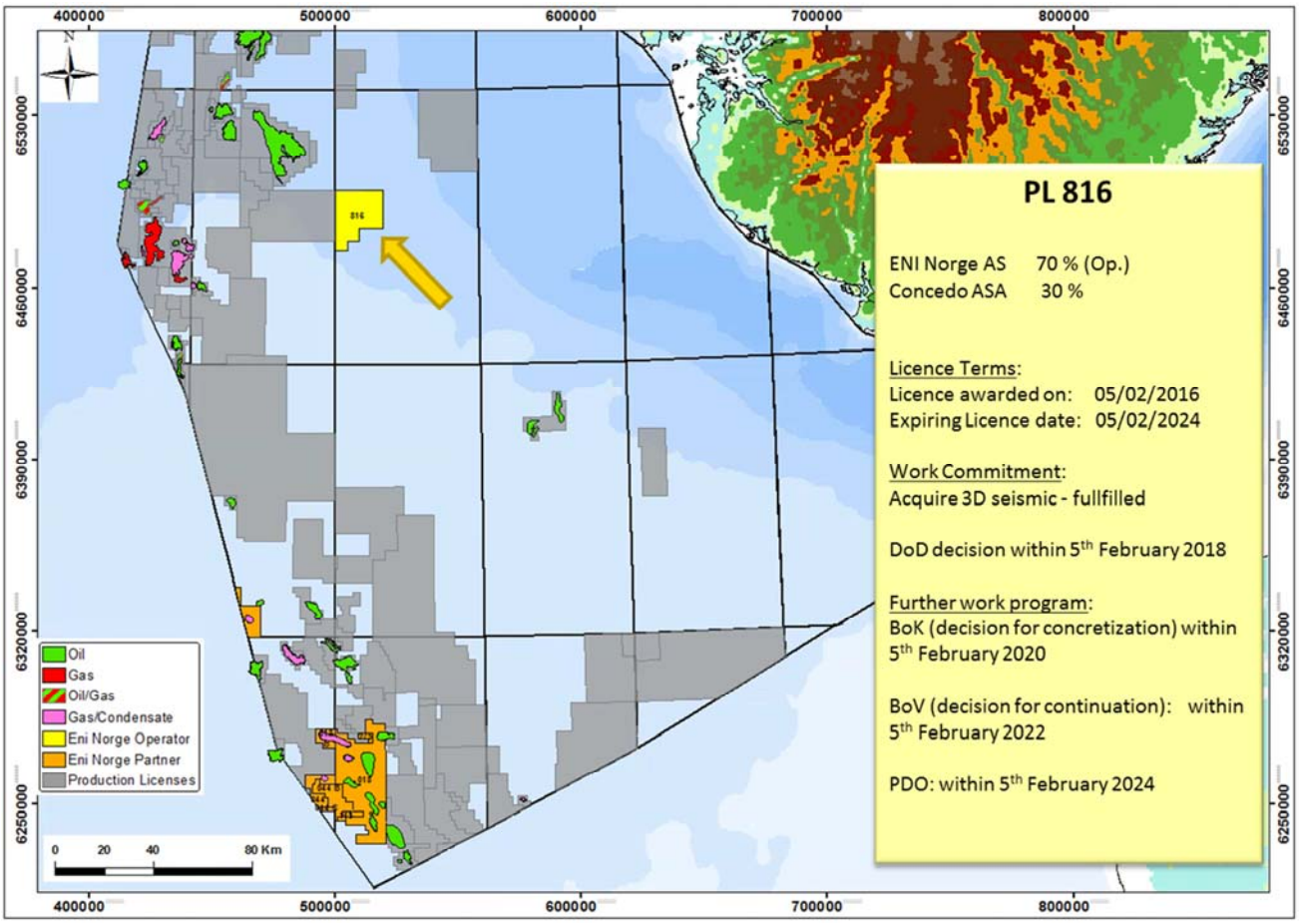

Figure 1: PL816 Location Map

Reason for relinquishment

Based on the technical and economical evaluation which has been carried out on Sejs Prospect and considering that no further prospectivity is present in PL816, Eni Norge's recommendation is to drop the license before the drilling decision.

2. DATABASE

The seismic interpretation and mapping of the Sejs prospect was carried out by Eni Norge on the 3D PSTM and, later on the 3D PSDM PGS16902VIK seismic volume, acquired and processed by PGS in 2016/2017 (Figure 2). Moreover, the PL816 licence seismic data base includes all publicly available 2D and 3D seismic data along with purchased multi-client 2D and 3D survey.

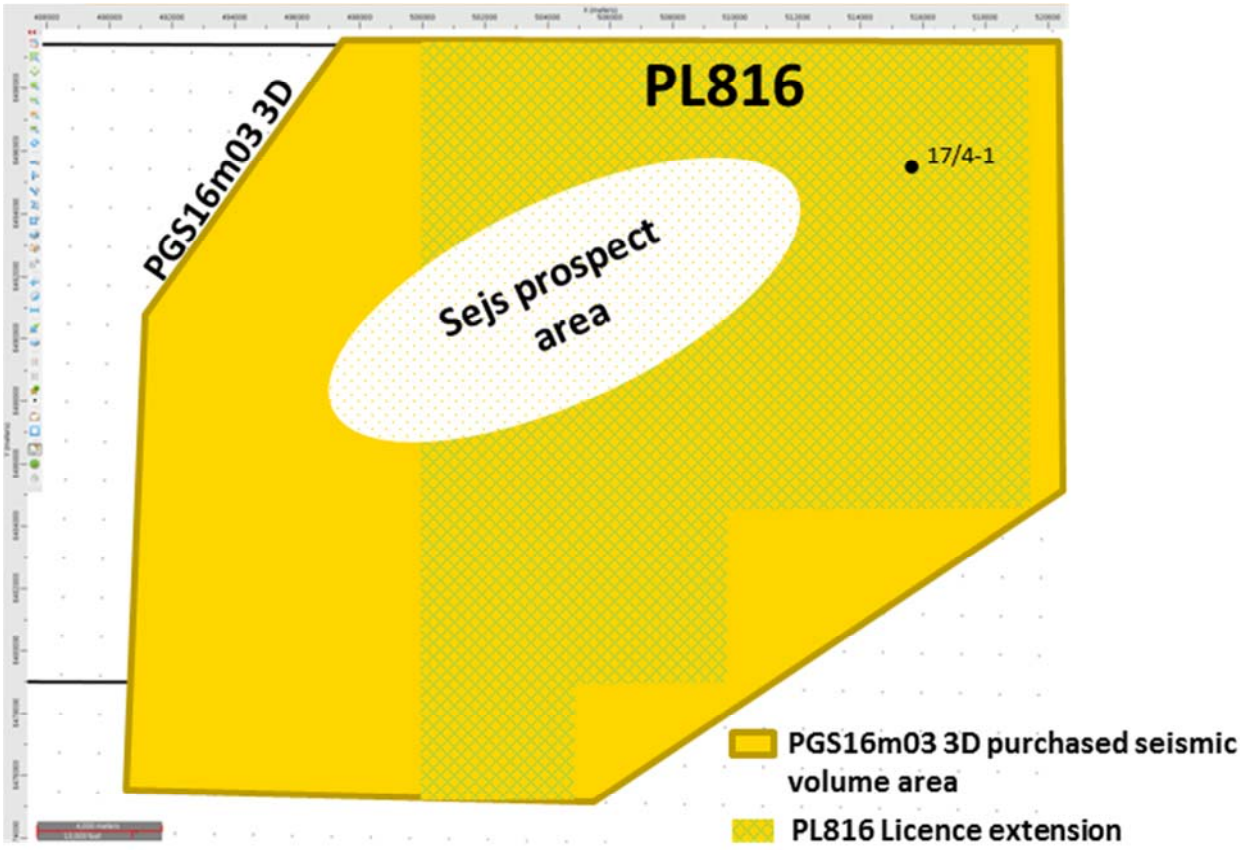

Figure 2: PL816 3D seismic coverage

The well database consists of data from 10 exploration wells shown in Figure 3. Wells were chosen for data availability in analogue reservoir intervals in the vicinity of the prospect, with

wells 17/4-1 and 16/9-1 particularly important for petrophysical evaluation and well-to-seismic ties.

Name	Status	Wellbore Completion date	License	Total Depth (MD m RKB)	Oldest penetrated age	Oldest penetrated formation	Reservoir with HC	Core at prospect reservoir level (MD m RKB)
16/9-1	Dry	12.07.1968	PL002	3655	Late Permian	Zechstein Gp.		Vestland Gp. (2936-2405.5)
17/9-1R	Dry	11.06.1974	PL002	3161	Late Triassic	Skagerrak Fm.		Skagerrak Fm (3073-3077.3)
17/4-1	Shows	26.08.1968	PL007	3997	Early Permian	Rotliegend Gp.	Hordaland Gp.	Sandnes Fm. (2271-2288)
16/6-1	Dry	19.01.1968	PL007	2060.5	Pre-Devonian	Basement		
16/11-2	Dry	23.07.1973	PL016	2378	Late Permian	Zechstein Gp.		
16/8-1	Dry	29.10.1976	PL020	2301	Triassic	Smith Bank Fm.		
16/8-2	Dry	13.08.1980	PL020	3585	Late Permian	Zechstein Gp.		
17/3-1	Gas discovery	20.08.1995	PL188	2852	Pre-Devonian	Basement	Sandnes Fm.	Sandnes Fm. (2388-2417.9)
16/8-3S	Dry	01.05.2013	PL360	3261	Permian	Rotliegend Gp.		
17/6-1	Oil discovery	07.02.2011	PL545	3065	Late Triassic	Skagerrak Fm.	Sandnes Fm.	

Table 1: reference wells for PL816

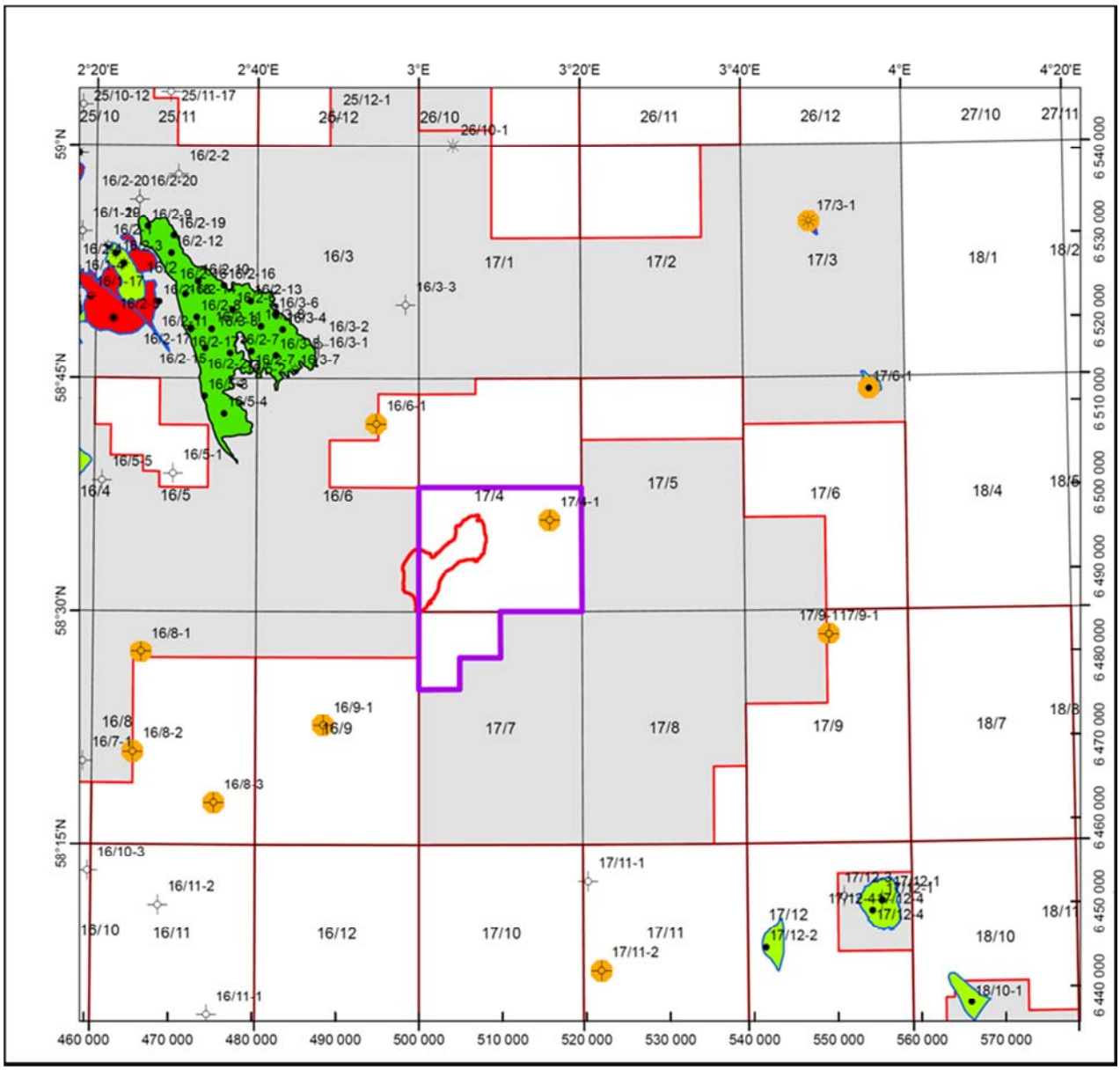

Figure 3: PL 816 well database

3. REVIEW OF GEOLOGICAL FRAMEWORK

PL816 licence is located in the North Sea at the Eastern side of the Utsira High and is facing the inner Ling Depression Basin. The Ling Depression is a NE-SW-trending, Late Jurassic-Early Cretaceous graben separating the Utsira High (UH) from the southern Sele High (SH) and marks the northern limit for the Permian Salt Basin.

Prospectivity in PL816 lies in the Jurassic Vestland Gp. (Sandnes and Bryne Fms.) and in the Triassic upper Hegre Gp. (Skagerrak Fm.). Specifically, a prospect (Sejs Prospect) has been defined in the licensed area with its westernmost portion included within license PL776.

The play chased by the Sejs prospect is Middle Jurassic sandstones, unconformably overlying Triassic alluvial sandstones, sourced by one main oil-prone source (Draupne Fm. and correlatives). The play is largely proven in the area, in particular after the discovery of Johan Sverdrup. Moreover, this play contains small discoveries in the immediate surroundings of the prospect (wells 17/3-1, 17/6-1 and 17/12-1), with reservoir rocks belonging to the Bryne and Sandnes Fms., and Late Jurassic shales of the Tau Fm. as the main source rock. Additionally, the play is also comprised of Triassic rocks (Skagerrak Fm. and possibly Gassum Fm.), which on the west of the PL816 area yielded hydrocarbons in a number of wells (e.g. 15/9-15, 15/9-17, 15/5-2, 16/1-9). Both Middle Jurassic and Triassic sandstones are interpreted to be reservoir in the Sejs prospect. Triassic sandstones likely belong to the Skagerrak Fm., and although of variable quality, they typically show excellent reservoir properties with high N/G in the uppermost part of the formation. Seal is represented by the Late Jurassic marine mudstones (Egersund and Tau Fms.), with additional or main sealing provided by shales and marls of the Cromer Knoll Gp.
Results from the 2D restoration study and seismic section observations indicate that the whole closure of Sejs is segmented in two separated closures by a significant NW-SE trending fault (Figure 4). The North-East segment of the Sejs prospect, up dip the well 17/4-1, has a maximum spill point @ 2230 meters. The Sejs prospect 4-way closure (Figure 5) has an area of approximately 50 km^2 at the Jurassic/Triassic target level (43 km^2 in the licence). The 4-way closure has its culmination at 2112 m and a spill to the E at 2180 meters, which separates the structure from a faulted anticline structure which was tested in 1968 by well 17/4-1. The NW-SE trending normal fault delimiting the larger 3-way closure is salt-cored with the salt forming an irregular wall.

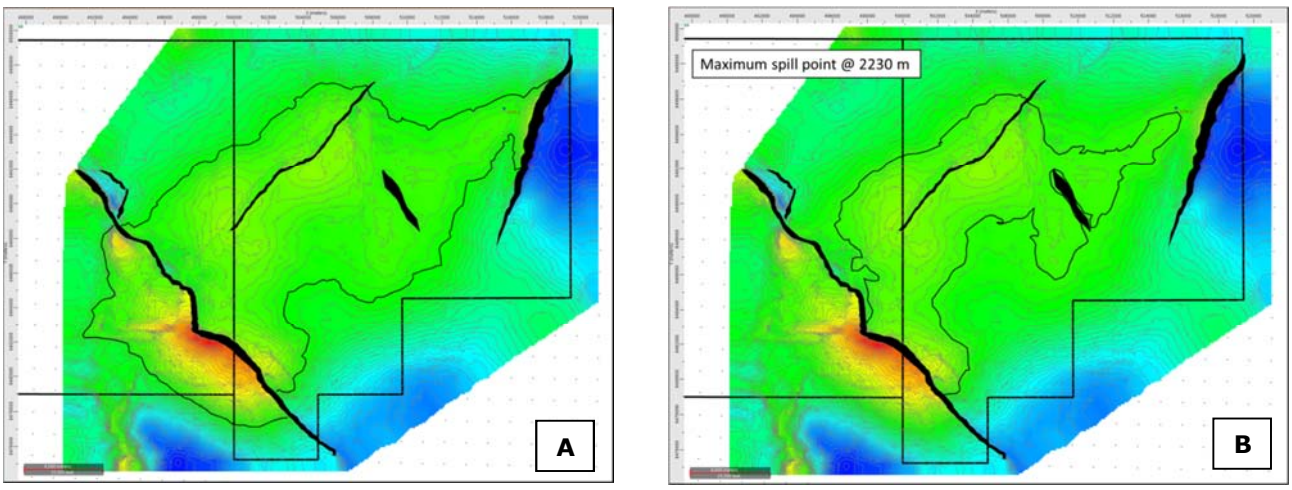

Figure 4: A) whole structure of Sejs segmented by the salt-cored fault and B) north-east segment of Sejs up-dip the well 17/4-1 and with a spill point at 2230 m

According to the Eni Norge structural interpretation and isopach maps between age calibrated seismic horizons, the trap was in place in Paleocene and evolved to the present-day geometric configuration in Middle-Late Miocene time, when its positive relief was enhanced by a regional uplift/inversion phase traditionally related to transpression. The anticline of the Sejs 4-way prospect shows two local culminations (Figure 5), and it is affected by a minor fault that gives origin to a compressional feature just inside the anticline. The effects of the fault on the reservoir compartments are considered, at the current level of knowledge, as negligible since the fault seems to generate a sort of saddle with very minor displacement at the level of clastic reservoir.

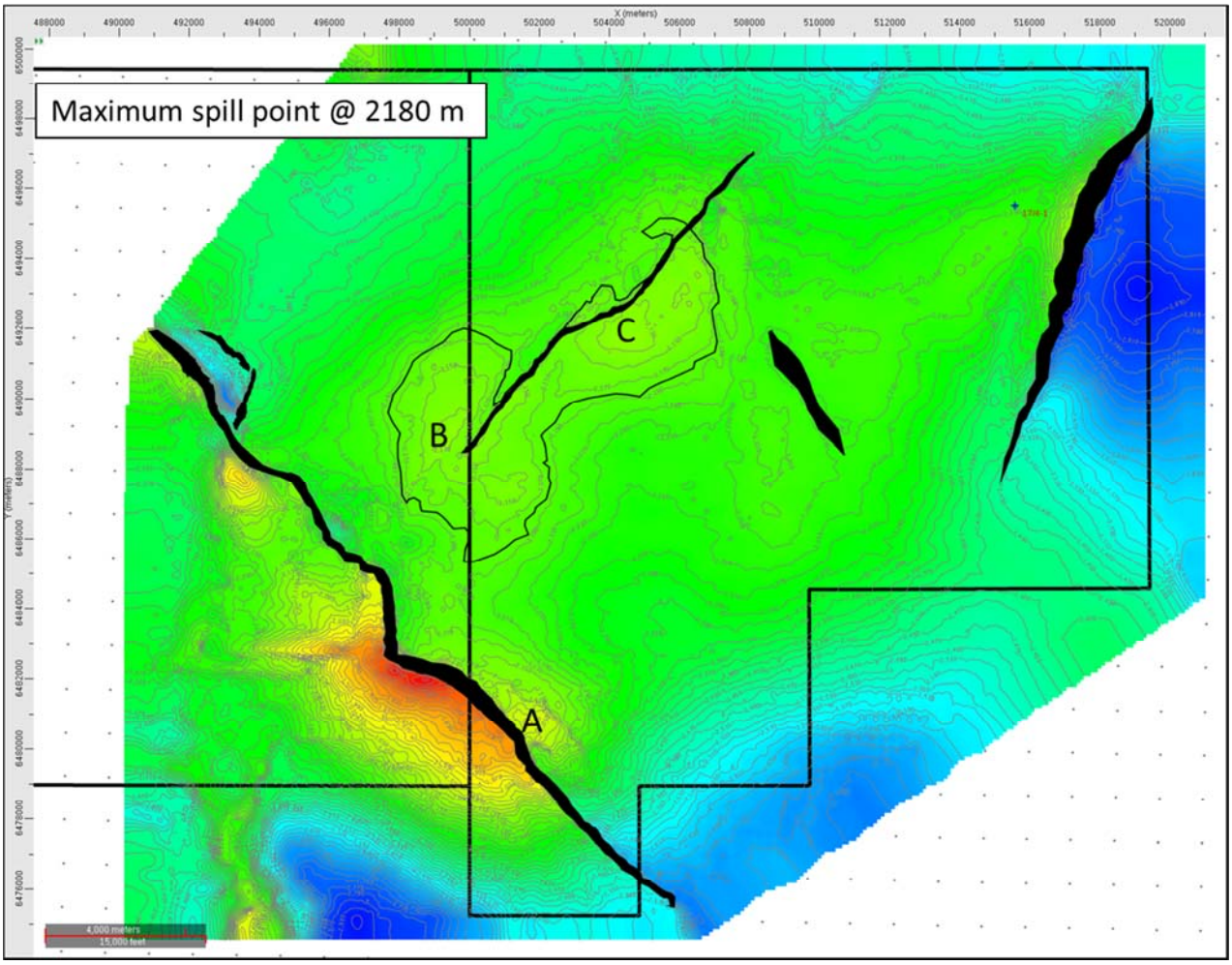

Figure 5: Sejs 4way closure on the top reservoir map (Top Vestland Gr)

Seismic mapping and data from well 17/4-1 support the notion of Upper Triassic-Middle Jurassic reservoir rocks. Specifically, the Triassic section consists of the upper part of the alluvial Skagerrak Fm. (Hegre Gp.), while the Jurassic section (Vestland Gp.) is mostly comprised of the nearshore Sandnes Fm. (Callovian) overlying coastal/delta plain deposits of the Bryne Fm. (Bathonian).
Sedimentological logging (as part of the Eni Norge Sedimentological study) of the Sandnes Fm. cored by well 17/4-1 allowed us to better constrain its depositional system, which has been interpreted as a river-dominated delta front. The primary seal of the clastic reservoir is clearly defined by the Kimmeridgian shales, which locally are called Draupne Fm. The unit also acts as

the main source in all the Norwegian North Sea. The integrity of the cap rock, in terms of lithology, is not an issue since that is by definition the more regional transgressive event of the entire region, not affected by local clastic inputs. In addition to that, also the overlying Cromer Knoll Gp. acts as a seal since it largely consists of shales and tight fine grained sediments. Moreover, it is very thick in the area of the prospect and the risk of the damage of the seal integrity is remote.

The Draupne Fm. in the North Sea acts as the main source rock. A 3D Petroleum System Modelling (PSM) study was performed with the main scope to define whether it is possible that the Ling Depression (inner basin), within the relevant time frame, could have generated and expelled significant volume of hydrocarbon that migrated into the Sejs prospect (PL816). Four source rocks have been simulated (Upper Draupne, Lower Draupne, Heather and Middle Jurassic) Generally speaking the SRs maturity in the area of interest resulted to be slightly higher than 0.7%, which corresponds to a very early maturity stage, therefore maturity can be considered as one of the main risk factors for exploration in Ling Depression area.
As a consequence of the low maturity, only the Middle Jurassic SR (the deepest of the fourth), expelled limited amounts of gas with associated oil.

Following the results of the Petroleum System Modelling completed in July 2017, Eni Norge has conducted several internal specialistic studies to improve the understanding of the area. Specifically, play-based exploration, petrophysical, well-to-tie seismic, updates on geochemistry, 2D restoration and AVO analysis internal studies were conducted, with some of them carried out by ENI E&P Milan Headquarters in collaboration with Eni Norge. In addition Eni Norge purchased a Hydrocarbon & Seal evaluation study performed by Geoprovider (Figure 6).

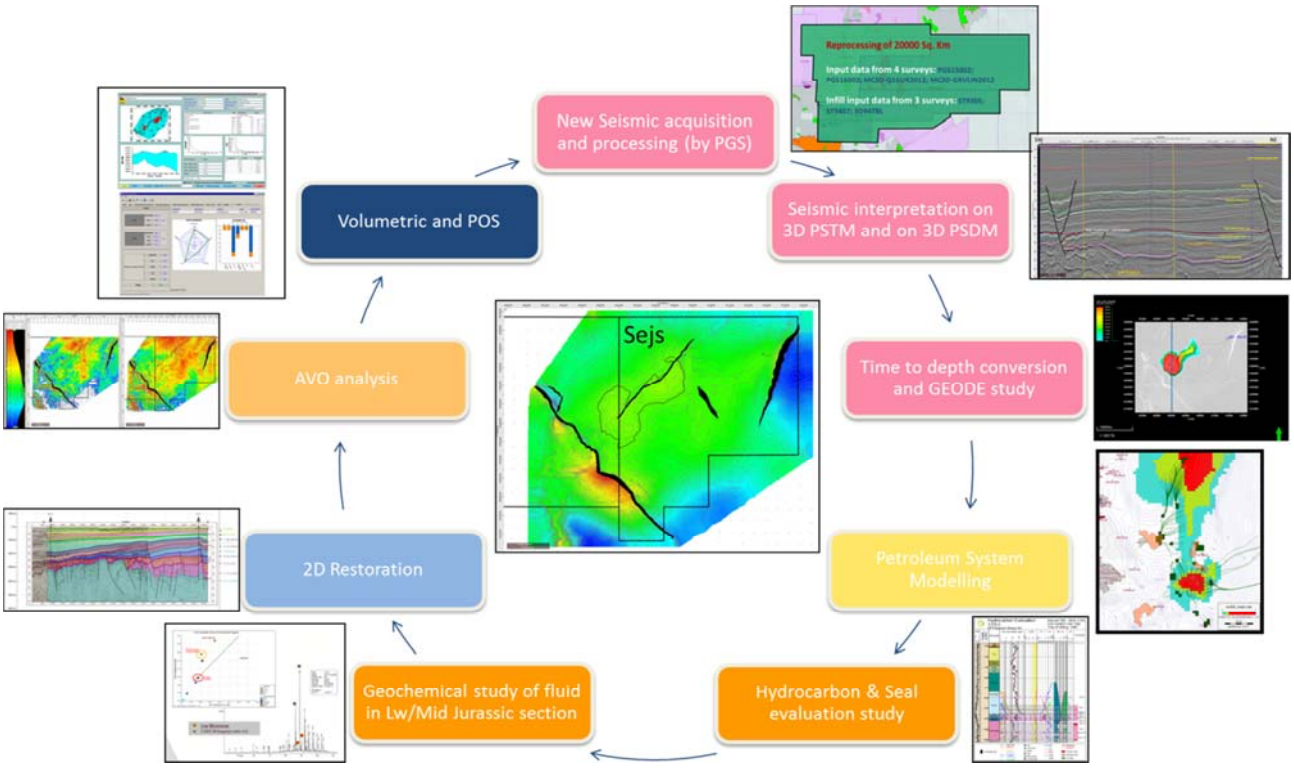

Figure 6: Exploration and G&G studies performed on prospect Sejs.

The seismic interpretation performed on the new 3D PSDM volume confirmed the existence of the 4 way trap with a maximum vertical closure of 68 m. The geochemistry studies have been

performed on cuttings and cores from the surrounding wells and confirmed the result of the petroleum system modelling, highlighting the lack of HC in the nearest wells and, in particular, the absence of HC passage in the well 17/4-1, that is the closest to the Sejs prospect. The 2D restoration confirmed that an accumulation in Sejs of HC generated and expelled by the Southern Viking Graben it is not possible, in fact the salt-cored fault bounding Sejs in his western part was acting as a barrier during the Paleogene (expulsion timing in the Southern Viking Graben). The AVO analysis result with the Near/Far amplitude maps showing little or no conformities to the structure.

4. PROSPECT VOLUMETRIC

The volumetric estimate of the HC potential of Sejs is based on Eni Norge interpreted maps generated using the 3D PSDM - PGS 16902VIK seismic volume acquired and processed in 2016/2017. The interpretation has been carried out during July-September 2017. The resource estimates for the Sejs prospect were carried out utilizing the Eni in-house software PRES. The input parameters used in the resource calculations are reported in Tables 2 and 3. Both, a pure gas scenario with a probability of occurrence of 80% and a pure oil scenario with a probability of 20% were considered taking into account the PSM results. A mixed trap fill with oil rim and gas cap has been discarded because the estimation of the gas column and of the oil rim percentages cannot be based on the modelling results with the given uncertainties.
Results from the 2D restoration study and seismic section observations indicate that the whole closure of Sejs is segmented by a significant NW-SE trending fault in two separated closures (Figure 5A). The Southern one is linked to the Viking Graben petroleum system, with virtually no possibility of charging, therefore no volumetric have been computed. The Northern closure (Figure 5B) belongs to Ling Basin petroleum system; it lies mostly on PL816 and is considered as the real subject of the HC potential calculation. The volumetric have been calculated for the 4 way closure in Figure 6 with a maximum spill point at 2180 meters.

	Gross Thickness (Triangular)	Apex (m)	Vertical closure (m)	Spill Point (m)	Total HC Column (%)	N/G %	Porosity %	SW %	FVF Gas (function)	FVF Oil (function)
Mid. Jurassic Top Vestland/Up. Triassic Skagerrak	Top & Bottom	2112	68	2180	0.15-0.8 (generic distribution)	0.20-0.60	14-18-22	0.2-0.3-0.4	218-247-272	1.07-1.16-1.26

Table 2: Reservoir parameters

PL816 Sejs Parameters for Volumetric (Formation Volume Factor)									
	Depth (m)	Temperature (F)	Pressure (Psi)	N2%	CO2%	H2S%	Oil G	Gas G	GOR (Scf/bbl)
Mid. Jurassic Top Vestland/Up. Triassic Skagerrak	2112	165-175-185	3500-4000-4500	0	0	0	28-32-36	0.7	50-250-450

Table 3: Overview of the calculated FVFs for Gas and Oil

Mid Jurassic Top Vestland and the Upper Triassic Skagerrak formation have been considered as a unique reservoir. Neither pressure separation nor effective sealing intervals were recognised between the Skagerrak Fm. and the Jurassic intervals in nearby wells, and hence a tank reservoir model was used for volumetric calculation. Moreover, from well 17/6-1 it appears that the porosity and the N/G of the 2 formations are very similar.
In our evaluation for the hydrocarbon column has been assumed a generic distribution equal to 0.15-0.80. The lower value of 0.15 is in accordance with the result of the petroleum system modelling study showing that no HC accumulation is possible in the Sejs prospect, the higher value of 0.8 represent the uncertainty of the PSM study. The weight assigned to the HC fraction of 0.15 is 90 while a weight of 10 has been assigned to the HC fraction of 0.80.

For the Net to Gross, in addition to the CPI processed, the range (uniform distribution 0.2-0.6) is based on the available wells in the area. The range in porosity (triangular 0.14-0.18-0.22) is derived from the key well reports taken both from the NPD website and from the Eni Norge Regional petrophysical evaluation. In comparison, Johan Sverdrup has an average porosity of 28%. It is shallower and not affected by calcite cement as is expected in Sejs prospect, following the results of well 17/4-1. The chosen range of water saturation equal to 0.2-0.3-0.4 is based on the regional knowledge of the behaviour of clastic reservoirs in the area. The Formation Volume Factor has been calculated from fluid properties of nearby field and discoveries, and from pressure and temperature data from the nearby wells (17/4-1, 17/3-1 and 17/6-1). Formation Volume Factor for gas is 218-247-272 and for oil 1.07-1.16-1.26. The GOR it is based on Johan Sverdrup and other nearby discoveries (Vette, Brisling). A triangular distribution of 50-250-450 Scf/bbl has been assumed.

Final validated HIIP and relevant POS of the Sejs prospect are summarized in the following tables (Tables 4, 5, 6, 7 and 8). Regarding the phase uncertainty in Sejs, our suggestion is to consider purely phase cases:

- A pure gas phase with a probability of 80% is supported by the abundance of gas in the migration system, by the gas potential of Middle Jurassic SR that is the only one that could expel in the Ling depression (Type III SR) and by migration losses that do not affect substantially the gas fraction.
- A pure Oil phase with a probability of 20% is justified by the oil show in Johan Sverdrup, by the low maturity of source rocks in general favourable to oil generation and expulsion if compared to gas, by the migration losses affecting the oil fraction and by the limited oil potential of middle Jurassic SR (Type III).

Sejs Prospect	Gas IIP Gm3				MBOE	POS (%)	
	P90	P50	P10	P mean		POSg	POSdhi
Mid. Jurassic Top Vestland/Up. Triassic Skagerrak	0.06	0.48	2.89	1.05	6,75	9%	

Table 4**:** gas volume in Sejs Prospect and POS

Sejs Prospect	Gas IIP Gm3				MBOE	POS (%)	
	P90	P50	P10	P mean		POSg	POSdhi
Mid. Jurassic Top Vestland/Up. Triassic Skagerrak	0.07	0.42	2.22	0.83	5.34	9%	

Table 5**:** gas volume in Sejs Prospect and POS, only into the licence PL816

Sejs Prospect	OOIP Mbbl				POS (%)	
	P90	P50	P10	P mean	POSg	POSdhi
Mid. Jurassic Top Vestland/Up. Triassic Skagerrak	1.38	10.14	64.57	23.05	9%	

Table 6**:** oil volume in Sejs Prospect and POS

Sejs Prospect	OOIP Mbbl				POS (%)	
	P90	P50	P10	P mean	POSg	POSdhi
Mid. Jurassic Top Vestland/Up. Triassic Skagerrak	1.46	8.92	49.44	18.22	9%	

Table 7: oil volume in Sejs Prospect and POS, only into the licence PL816

Final probability of success (geological) for the Sejs lead is 9%.

	Play				Local					Overall Geological Model					
	Reservoir	Seal	Source	Total	Reservoir	Seal	Trap	Charge	Total	Reservoir	Seal	Source	Trap	Charge	POSg
Mid. Jurassic Top Vestland Up. Triassic Skagerrak	100 %	100 %	40 %	40 %	85 %	95 %	95 %	30 %	23 %	85 %	95 %	40 %	95 %	30 %	9 %

Table 8: risk parameters and probability of success

5. TECHNICAL EVALUATIONS

The Sejs project has been modelled developing the Jurassic/Triassic target on the Resources decision tree, using three PRES scenarios. The Sejs field would be developed as tie-back to Johan Sverdrup field, for the oil scenario a Single oil producer, CRA 6 inch pipeline, gas lift, chemical injection, wellhead metering is foreseen (low oil case); two single oil producers, CRA 8 inch pipeline, gas lift, chemical injection, wellhead metering (mid oil case); template with 4 oil producers, CRA 10 inch pipeline, gas lift, chemical injection, wellhead metering (high oil case). Visually the oil & gas cases look the same. The gas cases have 1 standalone (low), 2 standalone (mid) or a template (high) with 3 gas producers, and 1 empty slot.

Flowline will be 40 km, 6-12-14 inch size and made from corrosion resistant alloy. Chemical injection and wellhead metering would be available.

The production profiles have been generated by means of decline curve analysis. Initial wells rates of the producers in oil Scenario are assumed to be 2500-3000 bbl/d, and for the Gas Scenario the rates are assumed to be 1200-1500 Sm3/d.

The start-up for both scenarios Oil & Gas is set to be in 2025.

Six discovery cases (three oil discovery and three gas discovery) and one dry case have been developed for economic evaluation. The Looking forward EMV is -31.3 MNOK (-3.9 MUSD) Eni share for the whole structure and -31.6 MNOK (-3.9 MUSD) for the part located inside PL816 since only 74% of the structure is inside the license. Since it would have been meaningless to consider a development only for the portion of the prospect within the licence area, we have considered the full structure development and then, scenario by scenario, we have calculated the relevant NPV proportional to the OHIP inside/outside the block. The difference of the full structure EMV and of the PL816 portion EMV (that one to be validated) is minimum.

In compliance with the Eni Norge strategy in the North Sea, in view of the uneconomical Sejs gas/oil project assessment, the decision of relinquish the license has been taken.

Resolving the tree, a Drop Option is automatically chosen being NPV -31.3 MNOK the amount corresponding to the Eni share (-31,6 for the part of the prospect located into the licence).

6. CONCLUSIONS

Eni Norge has revised the technical evaluation of PL816. The prospectivity of the license is represented by one single prospect, Sejs, with one target in the Middle Jurassic/Upper Triassic sequence.

The Sejs HC project assessment has resulted to be uneconomical and, in compliance with the Eni Norge strategy in the North Sea, the decision to relinquish the license has been taken.

The work commitment has been fulfilled.

Eni Norge recommends, on behalf of PL816, to relinquish the license due lack of potential.