



PL 897 – Licence status report

Summary

PL897 (Equinor Energy AS Op/50%, Repsol Norge AS/30%, M Vest Energy AS/20%) was awarded in February 2017 (APA 2016) with drill/drop decision to be taken within August 2019 (including 6 months extension).

Since licence award the primary focus within the PL897 license has been the Cretaceous Harald prospect. Harald is defined as a large fault block with Nise Fm. reservoir, where the prospect has been evaluated on both 2D EM data and 3D seismic. The license purchased 3D CSEM data to fulfil the work program, with conclusions suggesting a neutral DHI evaluation. A quantitative geophysical analysis of pre-stack ST10004 was performed, but the study did not give any HC indication to trigger a full analysis due to no support for a large column in the gather data. The lack of DHI is regarded as the main risk in this area, where all discoveries are associated with a clear DHI. A 6 months license extension was applied for and granted by authorities to wait for 6706/6-2S Marisko well results in PL847. Lack of strong DHI indications in Marisko prospect could give positive synergies, given discovery, in Harald evaluation. The Marisko prospect was dry giving no uplift in current DHI understanding of Harald. Updated volume and risk for Harald gives a mean gas volume of 19,2 GSm³ and a Pg of 13% including DHI down grade.

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1 Licence history

<u>License:</u>	PL897						
<u>Awarded:</u>	10.02.2017						
<u>License blocks:</u>	6706/12 & 6707/10						
<u>License period:</u>	Expired original/extended 10.02.2019/10.08.2019 (Drop Decision 10.08.2019)						
<u>License group:</u>	<table> <tr> <td>Equinor Energy AS</td> <td>60% (Operator)</td> </tr> <tr> <td>Repsol Norge AS</td> <td>30%</td> </tr> <tr> <td>M Vest Energy AS</td> <td>20%</td> </tr> </table>	Equinor Energy AS	60% (Operator)	Repsol Norge AS	30%	M Vest Energy AS	20%
Equinor Energy AS	60% (Operator)						
Repsol Norge AS	30%						
M Vest Energy AS	20%						
<u>License area:</u>	418.5 km ² (Figure 1-1)						
<u>Work program:</u>	CSEM acquisition/purchase – fulfilled. Decision to drill/drop, deadline August 10 th , 2019.						
<u>Meetings held:</u>							
27.03.2017	EC/MC startup meeting (1)						
19.06.2017	EC work meeting						
18.09.2017	EC work meeting						
24.11.2017	EC/MC meeting (2)						
20.06.2018	EC work meeting						
31.10.2018	EC/MC meeting (3)						
<u>Work performed:</u>							
2017:	License start-up						
2017:	Harald Prospect mapping / Seismic interpretation / Quantitative geophysical evaluation of the Harald prospect / start-up CSEM evaluation						
2018:	CSEM evaluation & modelling/ scenario testing / Evaluation of remaining prospectivity Applied for extension based on 6706/6-2 S Marisko well outcome						
2019:	Decision made not to drill within the license						
<u>Reason for surrender:</u>	None of the evaluated prospects within PL897 are regarded as drilling candidates (Table 4-3).						

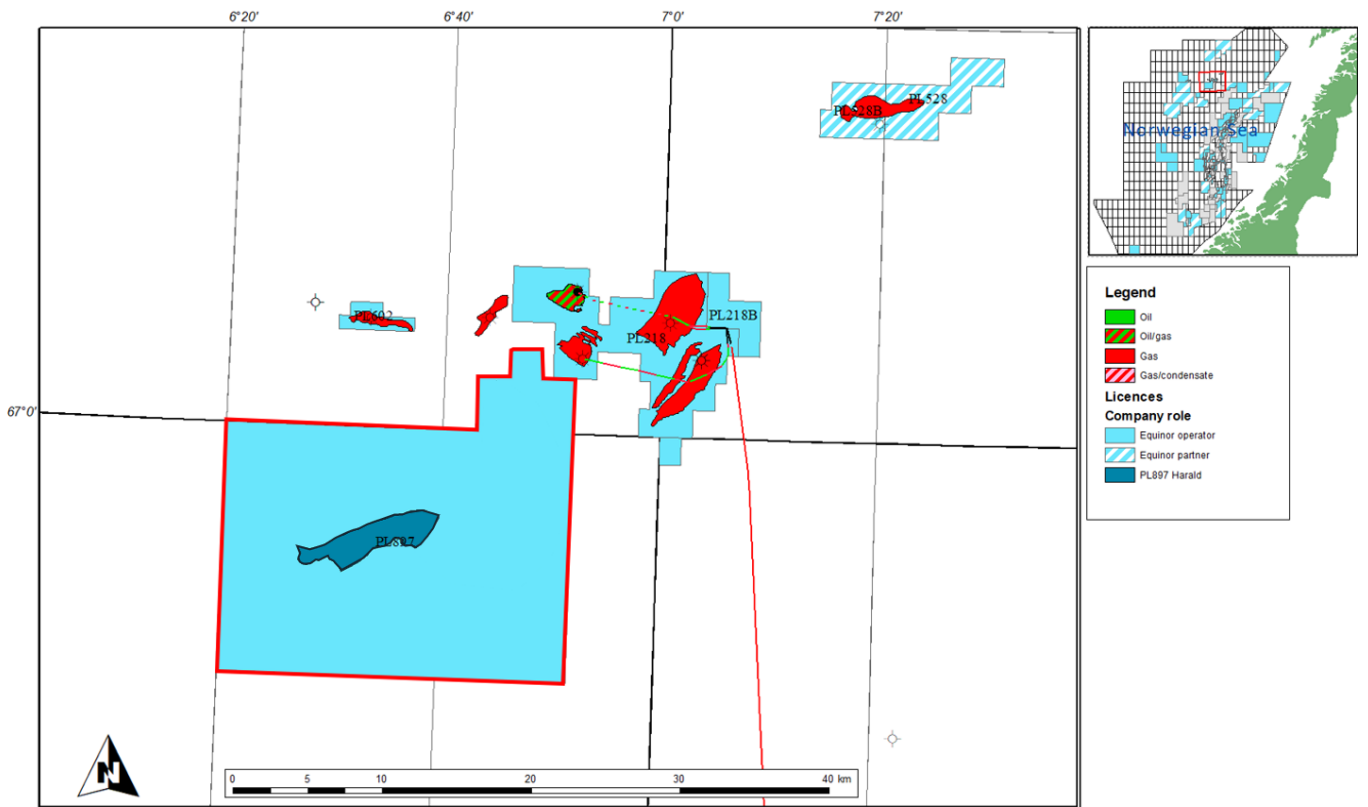


Figure 1-1 PL897 location (red outline) with main prospect Harald indicated on the map.

2 Database overviews

2.1 Seismic data

The ST10004 3D seismic data was used for interpretation of Harald. An overview of the seismic data is shown in figure 2-1.

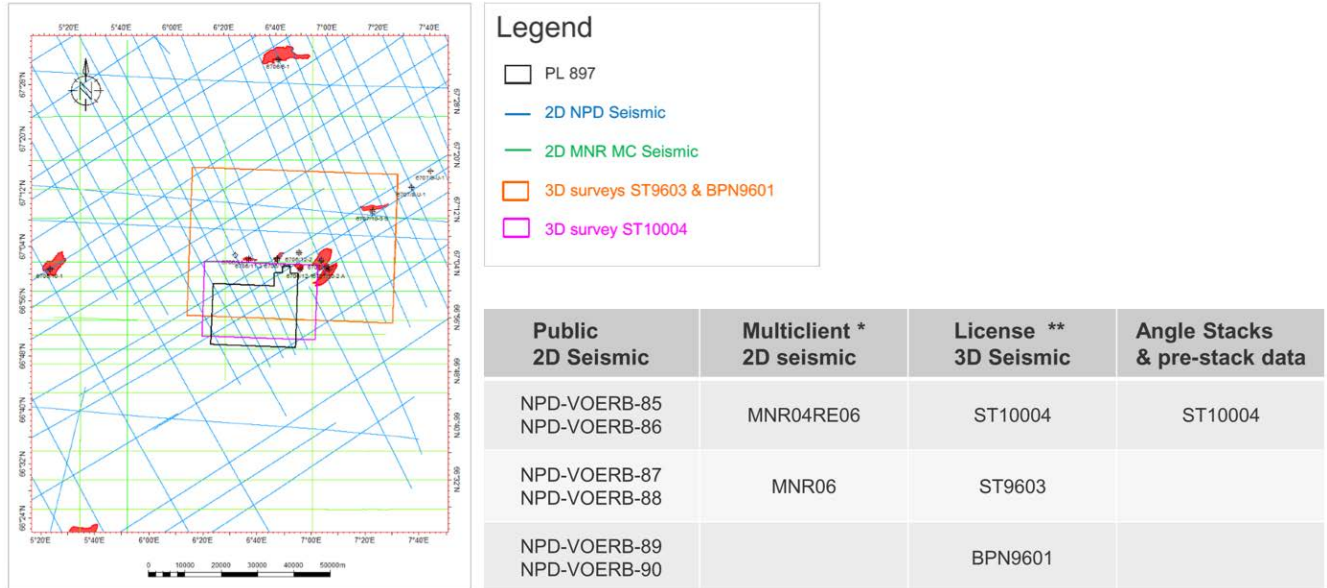


Figure 2-1 Map of common seismic and well database for PL897

As part of the license work program the CSEM MCPL763 was purchased, illustrated in Figure 2-2.

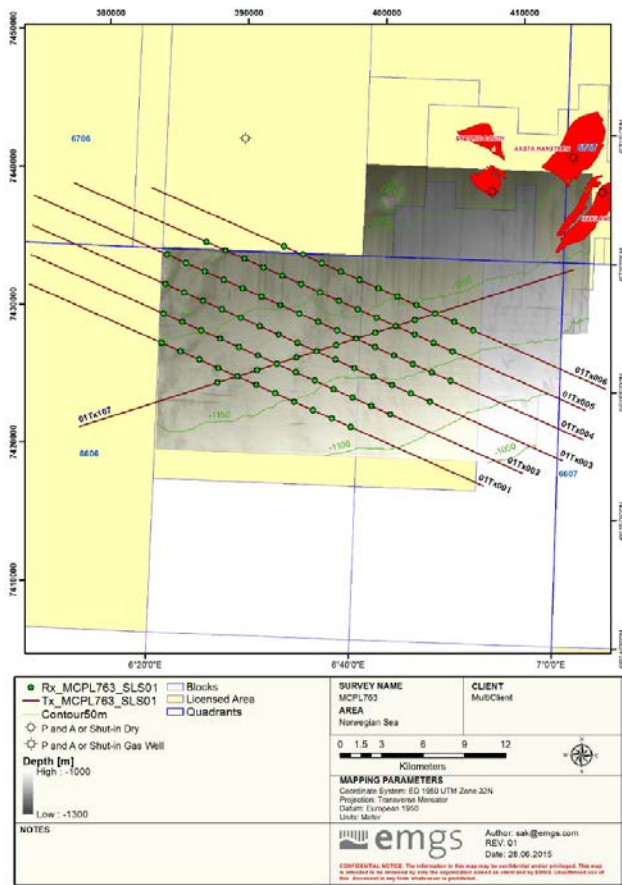


Figure 2-2 Base map of CSEM survey MCPL763

2.2 Well data

A list of all wells in the common well database for PL897 is listed in Table 2-1.

Table 2-1 List of all wells in common well database in PL897.

Well	Name	Year	Operator
6604/2-1	Gullris	2011	BG Norge
6605/1-1	Obelix	2009	Statoil
6704/12-1	Gjallar	1999	Saga
6705/10-1	Asterix	2009	Statoil
6706/6-1	Hvitveis	2003	Esso
6706/11-1	Ægir	1998	Statoil
6706/11-2	Gymir	2015	Statoil
6706/12-1	Snefrid Sør	2008	Statoil
6706/12-2	Snefrid Nord	2015	Statoil
6706/12-3	Roald Rygg	2015	Statoil
6706/10-1	Luva	1997	BP
6706/10-2 S	Haklang	2008	Statoil
6706/10-3 S	Ivory	2014	Centrica

3 Results of geochemical, geological and geophysical studies

The regional geological framework for PL897 area is described in the application for blocks 6606/2,3 and 6706/12 (APA2016) written by Repsol Norge AS.

No geological or geochemical studies have been performed beside evaluation of the prospectivity.

A quantitative geophysical analysis was performed on the pre-stack ST10004 datasets, due to poor imaging related to remobilized ooze bodies in the overburden and uncertain DHI within the Harald structure. The feasibility study gave no geophysical support of a larger gas column in the gather data and did not give a clear HC indication to trigger a full analysis of the Harald structure. The studies observed small closures outside the Harald structure with clear gas responses (AVO class 3).

The purchased MCPL763 CSEM data was evaluated through inversion and sensitivity studies, with the conclusion that there was no clear response at Harald prospect level, and that the resistivity trend observed in the APA application seem to be related to a shallower structure and possible other components, such as intrusions.

4 Prospect update

The PL897 area is in the southern flank of the Vema Dome in the Vøring Basin, immediately south of the Aasta Hansteen gas field. The focus has been the Harald Nise Fm. Prospect as the main driver for the APA application in 2016 based on



Updated reservoir and fluid parameters and volume potential for Harald prospect is summarized in

Table 4-1 and Table 4-2, and the updated risking is described below. Several prospects and leads were identified in the license, but not updated in the license period due to low volume and/or high risk. An overview of license additional prospectivity and volumes is given in Figure 4-4 - Additional prospectivity for PL897 Figure 4-4 and

Table 4-3.

Table 4-1 Harald prospect parameters for volume input.

Parameters Reservoir/fluid	Nise reservoir level		
	Min	Mean	Max
Reservoir thickness [m]	1165	1804	2243
N/G [decimal]	0.65	0.82	0.9
Porosity [decimal]	0.2	0.23	0.26
Gas saturation [decimal]	0.65	0.82	0.95
Wet gas shrinkage factor [decimal]	1	1	1
Expansion factor gas (1/Bg) [Sm ³ /Sm ³]	242	262	282
Condensate yield [Sm ³ /1e ⁹ Sm ³]	14.5	24.5	34.5
Recovery factor non assoc. gas [decimal]	0.58	0.68	0.78
Recovery factor condensate [decimal]	0.42	0.52	0.62

Table 4-2 – Volume potential Harald.

Prospect	In-place resources P90 – mean - P10 [G Sm ³]	Recoverable resources P90 - mean - P10 [G Sm ³]	Pg	HC phase split (%)
Harald Nise Fm.	8.8 – 28.8 - 55	5.95 – 19.4 – 37.1	13 %	100% gas

The Nise reservoir is interpreted to be deep marine basin floor fan deposits of Campanian age, sourced from East Greenland. These turbiditic sandstones are proven as working reservoirs in the nearby Luva, Snefrid Sør, Snefrid Nord, Haklang and Roald Rygg wells, and expected gross thickness is more than 700m.

Given the nearby discoveries, with reservoir in the Nise Formation, the play risk for the area is set to (**P-play = 1.0**). The probability for reservoir is: (**P-res = 1.0**) for the prospect.

The **Harald prospect** (Figure 4-1 and Figure 4-2) is characterized as a rotated, fault-bounded 3-way structural closure, with a structural spill point towards east at 3550m TVD MSL. Apex is located at 3270m, close to the main bounding fault to the North. Remobilised Ooze bodies in the overburden above the Harald structure, results in poor seismic data quality at prospect level and mask the expected amplitude responses. Only minor areas with bright amplitude responses has been observed within the Harald structure. For the Harald structure the seismic imaging is challenging, so the P_{trap} geometry is set to 0.7. There is a thick shale above the Top Nise reservoir, and faults observed to be sealing from the discoveries in Luva, Haklang, Snefrid South and North, Gymir and Roald Rygg. The P_{trap} is set to 0.7

$P_{trap} = P_{geom} * P_{seal} = 0.7 * 0.7 = 0.49$ for the prospect.

A moderate charge risk (**P charge = 0.8**) is set for the Harald prospect, since the prospect is more downflank than the Snefrid South and North discoveries.

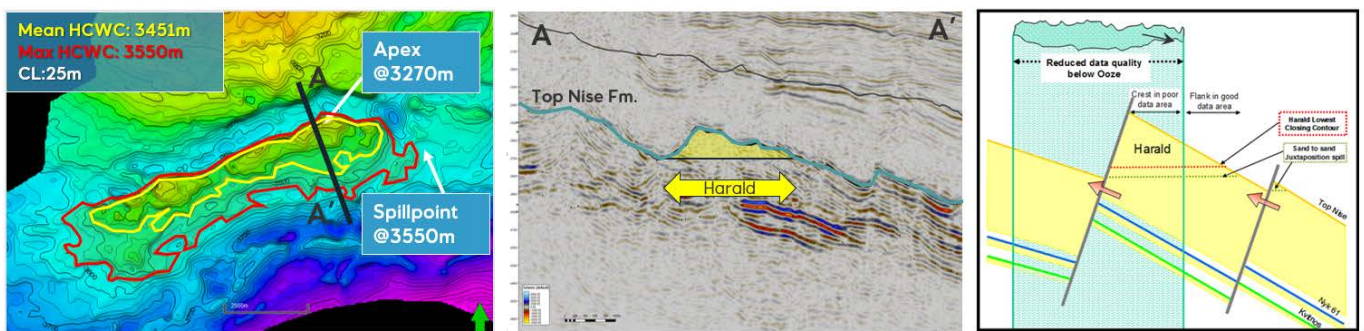


Figure 4-1 Harald Prospect top reservoir depth map (left); geo sketch illustrating area of poor seismic section through Harald on ST10004 (mid) data quality due to ooze in overburden(right). Apex, spill point, mean and max Hydrocarbon water contacts for the Harald Prospect are all illustrated on the depth map.

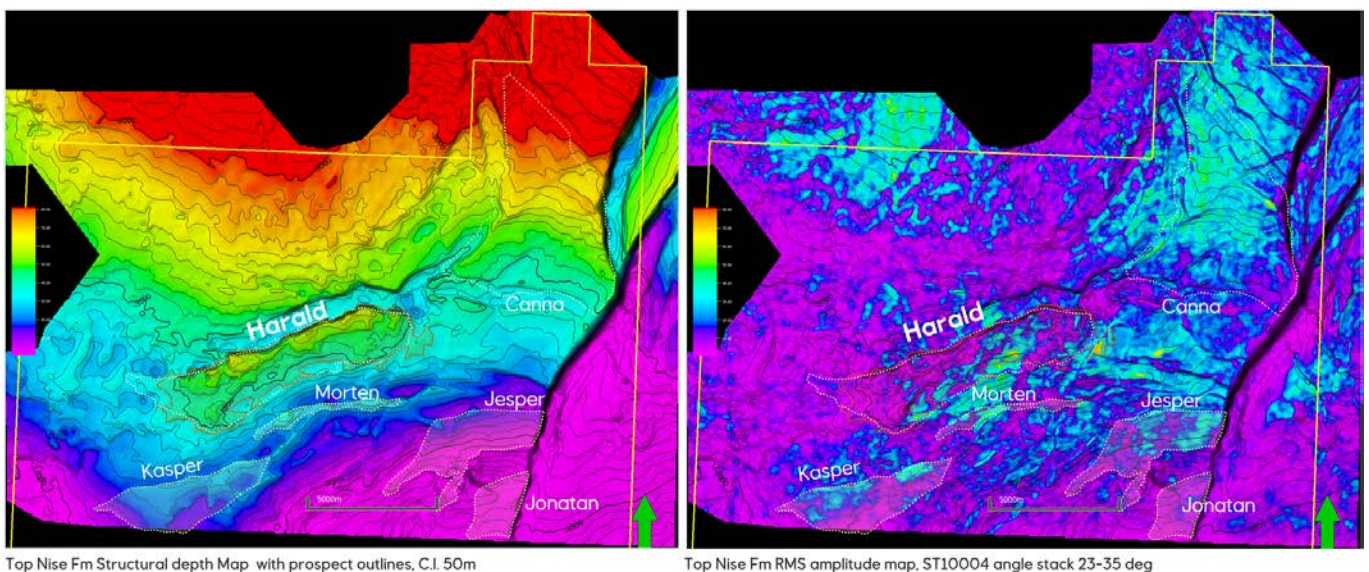


Figure 4-2 Top Nise Formation Structural depth map and RMS amplitude map.

Harald Risking: Initial probability of discovery for Harald is **39% (P(g) = 0.39)**

A strong DHI downgrade has been applied due to lack of clear flat spots and amplitude conformance in the seismic data.

[REDACTED]

[REDACTED]

[REDACTED]

Other prospectivity in the license: Other structural traps in the Nise Formation has been identified, i.e. the Kasper, the Jesper, the Jonathan and the Canna North prospects. The Kasper, Jesper and Jonathan prospects where identified from APA 2016 by Repsol, while The Canna North is from earlier work performed by Statoil (former Equinor).

In the license period Springar Formation ('Baktus revised') and a lead in Paleocene ('Sonja') was mapped out (Figure 4-4 and

Table 4-3).

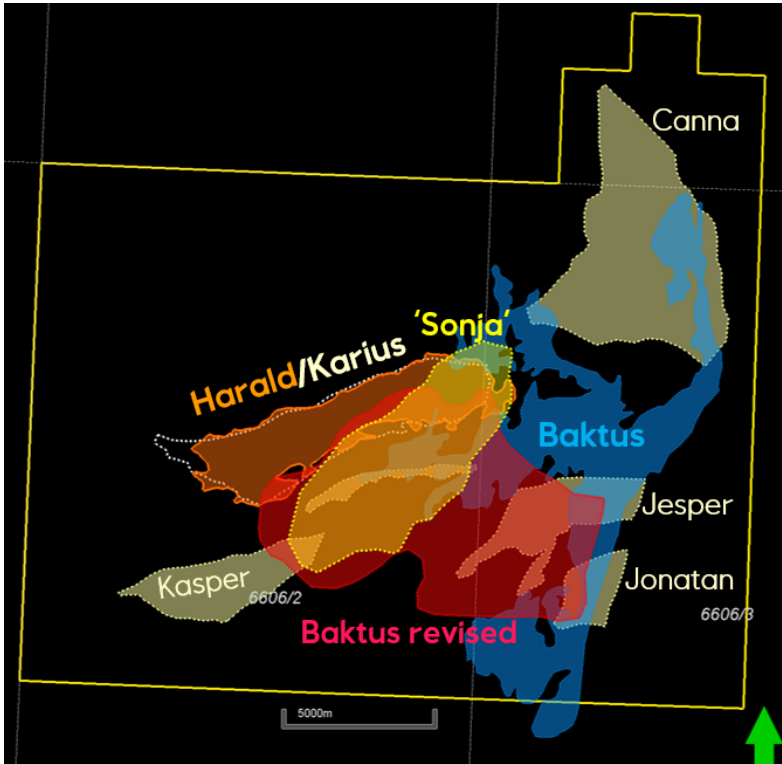


Figure 4-4 - Additional prospectivity for PL897

Table 4-3 – Volume potential for identified prospects in PL897

Prospect/Lead	Probability	Inplace Gas (GSm ³)	Rec. Gas (GSm ³)
'Sonja' - Paleocene Lead		7,4	4,4
Baktus Springar **	0,17	25,7	16,8
Baktus revised Equinor		16,8	10,9
Harald Nise	0,39/0,13*	28,3	19,1
Karius Nise**	0,28	20,9	14,2
Kasper Nise**	0,23	9,5	6,7
Jesper Nise**	0,23	11,5	8,0
Jonatan Nise**	0,20	9,0	6,3
Canna North Nise	0,04	4,3	2,8

* Pg/ Pg w/DFI Uplift/downgrade

** From APA 2016 Application, written by Repsol

5 Technical evaluation

No technical evaluation has been performed since APA 2016 application.

6 Conclusion

The work programme for the initial period of PL897 has been fulfilled by the partnership. The partners of PL897 agreed that Harald prospect did not qualify as an exploration drilling candidate in PL897 based on evaluation of no hydrocarbons in the structure. The dry 6706/6-2 S Marisko well gave additional support for the decision.

7 References

APA2016; "Awards in predefined areas – Part of blocks 6606/2,3, 6706/12 Harald (Repsol)"