



REPORT

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SUBJECT:	<b>PL712 License Full Relinquishment Report</b>
ABSTRACT:	The PL712 evaluation result as low materiality asset with a high risk associated to hydrocarbon occurrence.
DESCRIPTION:	

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## 1. KEY LICENSE HISTORY

PL712 license is located in the Western part of the Barents Sea area at a distance of 260 km from the Norwegian coast (Fig. 1). The license consists of 2 blocks, 7218/6 (part) and 7219/4 for a total of 465,173 km<sup>2</sup> and lies in about 400m water depth.

PL712 is in the north western margin of the Bjørnøya Basin opposed to the PL532 Johan Castberg oil and gas discoveries (45 km toward south east) within the same basin area.

The J.V. present configuration consists of:

- Eni Norge AS 40% (operator)
- Statoil Petroleum AS 20%
- BP Norge AS 20%
- Petoro AS 20%

The license was awarded in the 22<sup>nd</sup> Bid Round and granted on 21<sup>st</sup> June 2013 with drill or drop decision to be taken within 21<sup>st</sup> June 2015 and with obligation to purchase the existing multi-client 3D volume (SWB11 & 12 merge 3D PSTM). One year extension in the decision to drill or drop the license was granted by the Authority (21<sup>st</sup> June 2016), with commitment to perform a 3D PSDM processing of original 3D survey. The work commitments have been fulfilled.

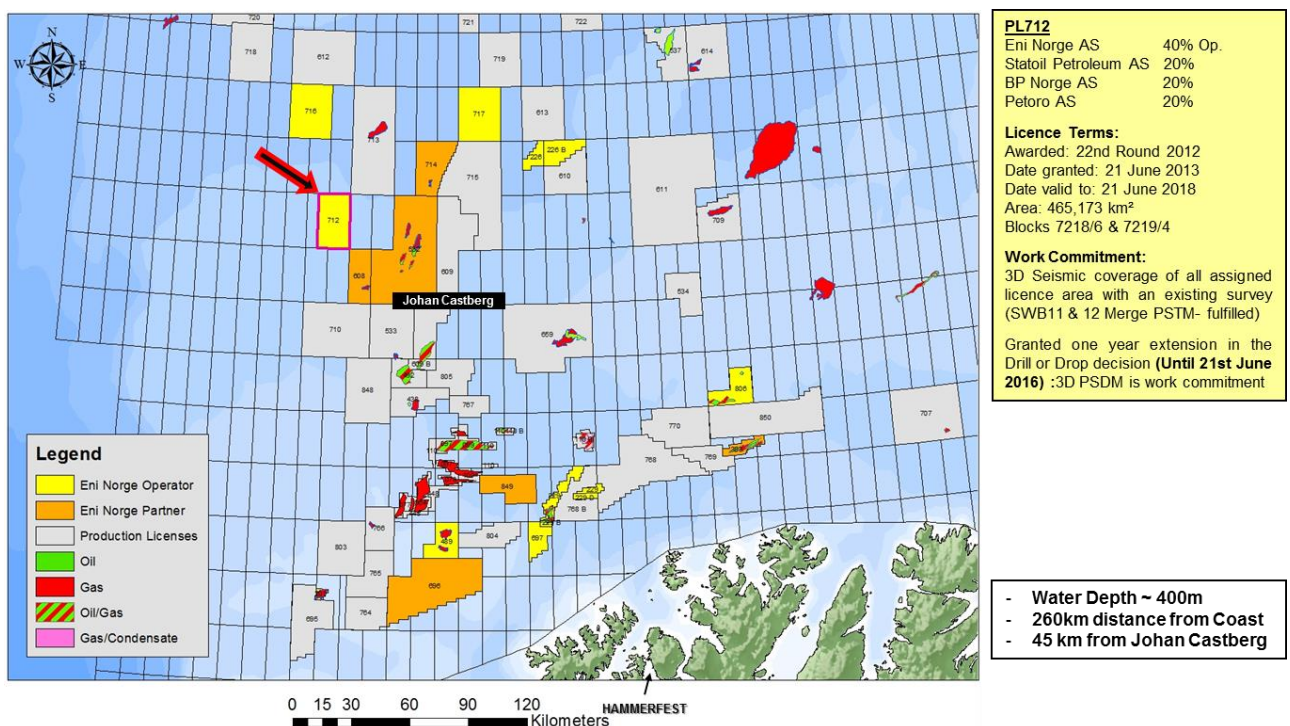


Figure 1: PL712 Location Map

Reason for relinquishment

Based on the technical and economical evaluation which has been carried out on Big Brother Prospect and considering that no further prospectivity is present in PL712, Eni Norge's recommendation is to drop the license before the drilling decision.

**2. DATABASE**

The blocks 7218/6 and 7219/4 are located in the Southern part of the Bjørnøya Basin in the transition zone between the Bjørnøya West and Bjørnøya East areas North East of the Veslemøy High. The seismic interpretation in the PL712 area was carried out on the multi-client 3D survey Fugro-SWB11 & SWB12 merge acquired in 2011 and 2012, in addition to numerous 2D seismic lines inside and outside the 3D area (Fig. 2 and table 1). The SWB11 and SWB12 original 3D PSTM seismic merged volume received from CGG presented several problems such as residual multiples and post stack merge, causing strong difference in imaging at the merge boundary (time shift and amplitude variation) and also the presence of shallow gas causing amplitude drop and push down effects. In consideration of the poor quality of the time domain seismic data set, the joint venture decided to perform a 3D PSDM processing in Eni HQ, Milan. Significant improvement in the data quality has been achieved: residual multiple effect is reduced; overall improvement of the reflection continuity and faults resolution is obtained; no merging effects are evident in the final PSDM; increased confidence on targets depth and rock volume achieved.

The wells license database is represented by 4 wells: 7219/8-1, 7219/9-1, 7220/7-1 and 7220/8-1 (Fig. 2).

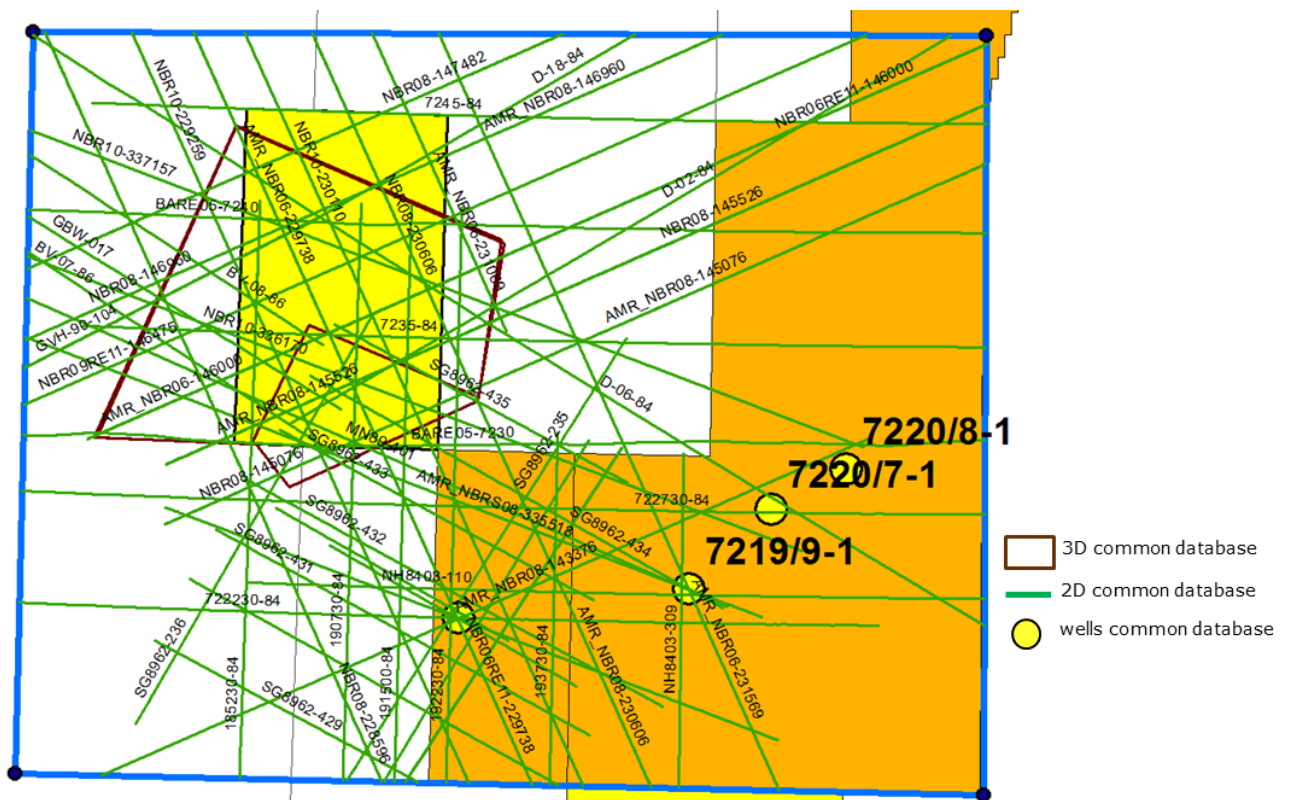


Figure 2: PL712 2D/3D seismic coverage and wells database



LINE	First_SURV	Shape_Leng
AMR_NBR06-146000	AMR-NBR	81,011782
AMR_NBR06-229738	AMR-NBR	68,584776
AMR_NBR06-231069	AMR-NBR	27,252306
AMR_NBR06-231569	AMR-NBR	68,970484
AMR_NBR08-143376	AMR-NBR	68,974971
AMR_NBR08-145076	AMR-NBR	74,026351
AMR_NBR08-145526	AMR-NBR	73,889186
AMR_NBR08-146960	AMR-NBR	62,719437
AMR_NBR08-147482	AMR-NBR	48,470502
AMR_NBR08-228596	AMR-NBR	68,662624
AMR_NBR08-230606	AMR-NBR	68,765929
AMR_NBR08-334609B	AMR-NBR	54,119905
AMR_NBR08-335518	AMR-NBR	64,948585
BARE05-7230	BARE05	79,346614
BARE05-7240	BARE05	78,813987
BV-07-86	NPD-BJV1-86_NPD-BJV2-86	30,517435
BV-08-86	NPD-BJV1-86_NPD-BJV2-86	28,900644
GBW-017	GBW-88-TFE	30,304364
GVH-90-104	GVH-90	27,211618
MN89-401	MN89-3	63,131485
NBR06RE11-146000	NBR06	81,024265
NBR06RE11-229738	NBR06	68,578129
NBR08-145076	NBR08	73,988455
NBR08-145526	NBR08	73,89442
NBR08-146960	NBR08	62,707703
NBR08-147482	NBR08	48,347854
NBR08-228596	NBR08	68,473762
NBR08-230606	NBR08	68,762042
NBR09RE11-146475	NBR09RE11	75,786268
NBR10-229259	NBR10	68,444631
NBR10-230110	NBR10	68,647754
NBR10-336170	NBR10	68,238287
NBR10-337157	NBR10	73,39843
NH8403-110	NH8403	60,689687
NH8403-309	NH8403	27,872154
SG-9106-203	SG9106	33,042234
SG-9106-449	SG9106	23,475464
SG-9106-460	SG9106	22,029963
SG8962-234	SG8962	33,037648
SG8962-235	SG8962	43,455332
SG8962-236	SG8962	39,164857
SG8962-429	SG8962	24,733339
SG8962-430	SG8962	34,903262
SG8962-431	SG8962	35,18542
SG8962-432	SG8962	39,015886
SG8962-433	SG8962	29,480971
SG8962-434	SG8962	39,103369
SG8962-435	SG8962	27,486987
185230-84	OLD_NPD-BJSY_BJRE-84_PROC_WEST	48,142004
190730-84	OLD_NPD-BJSY_BJRE-84_PROC_WEST	48,059722
191500-84	OLD_NPD-BJSY_BJRE-84_PROC_WEST	48,007992
192230-84	OLD_NPD-BJSY_BJRE-84_PROC_WEST	47,981165
193730-84	OLD_NPD-BJSY_BJRE-84_PROC_WEST	29,388073
722230-84	OLD_NPD-BJSY_BJRE-84_PROC_WEST	70,789168
722730-84	OLD_NPD-BJSY_BJRE-84_PROC_WEST	79,34966
7235-84	OLD_NPD-BJSY_BJRE-84_PROC_WEST	74,306671
7245-84	OLD_NPD-BJSY_BJRE-84_PROC_WEST	73,63764
D-02-84	OLD_NPD-BJRE-84-NPD-FI-84	63,259738
D-06-84	OLD_NPD-BJRE-84-NPD-FI-84	92,50695
D-18-84	OLD_NPD-BJRE-84-NPD-FI-84	32,368298

TABLE 1: 2D SEISMIC DATABASE

### 3. REVIEW OF GEOLOGICAL FRAMEWORK

The PL712 is located at the north easternmost part of the Veslemøy High in its transition to the southern part of the Bjørnøya Basin. The deep Cretaceous Bjørnøya Basin is one of the major basins in the western Barents Sea region, and together with the other major structural elements (Veslemøy High, Bjørnøyrenna Fault Complex and Loppa High) has experienced a prolonged geologic evolution. The recent commercial discoveries of Skrugard (wells 7220/8-1 and 7220/5-1), Havis (well 7220/7-1) Drivis (well 7220/7-3S), Skavl (well 7220/7-2) and the gas discoveries of Kramsnø (7220/4-1) and Nunatak (7220/5-2) in PL532 and Iskrytall (7219/8-2) in PL608 (Eni as partner) have proven an efficient oil and gas petroleum system in the Bjørnøya Basin.

The PL712 license HC prospectivity is limited to the cretaceous play of Big Brother Prospect, several wells found in the western Barents Sea support the potential of this play (e.g.: Nunatak in PL532, Salina in PL533 (Eni operator) and the well 7120/2-3S-Skalle Prospect).

The proven Jurassic play in the Barents Sea cannot be considered in the PL712 license area. The Realgrunnen target is very deep, around 6500m, and the expected porosity effectiveness for such a deep target is to be considered practically null. Physiographically, the Big Brother Prospect is located within the Bjørnøya Trough that is a bathymetric depression and an area that was largely influenced by late Cenozoic glacially driven erosion and transportation of huge amounts of sediments in relation to the uplift and erosion of the shelf and the subsidence along the southwestern Barents Sea margin. Water depth above the Prospect is in the order of 400 m.

The HC prospectivity of PL712 is described as below:

- Presence of an efficient source rocks; Upper Jurassic Hekkingen Fm. and Upper Cretaceous Kolje Fm.
- Secondary and probably mostly Tertiary migration from source to the structure by lateral and vertical migration from adjacent Bjørnøya basin.
- Single hydrocarbon pool: lower cretaceous mass flow reservoir.
- Structural trap related to the post-Jurassic strike-slip movement along the main fault in the block area.
- Upper Cretaceous Kolje and Kolmule shales as a seal rock for the Knurr reservoir and intra-formational and lower Knurr shales as a top seal for the Intra Barremian reservoir.

Big Brother prospect is a 3-way dip closure structure against a main NE-SW trending fault which displays a large amount of fault throw. This fault interpreted as strike-slip is active since Lower Cretaceous after the deposition of the Knurr fm. The fault is also considered responsible of the prospect structuration. The structure is persistent from Top Knurr to Intra Barremian and deeper levels.

The reservoir targets of the Big Brother prospect are considered to be in the lower Cretaceous Top Knurr formation (Valanginian-Hauterivian) and Intra Barremian formation (Earliest Barremian). The reservoir facies presence and effectiveness is still to be fully understood in the area and, based on a semi regional sedimentological study performed in HQ Milan in 2014, must be pointed out the uncertainty of the reservoir facies presence and its effectiveness.

For the Big Brother prospect the top seal is not considered as a risk; for the Top Knurr Fm. target the top seal is represented by thick shales of Kolje and Kolmule Fm. (presence of the shale has been proven from the nearby Byrkje well, 7218/08-1), while for the Intra Barremian target, top seal is represented by Intra Barremian intra-formational shale and lower part of the Knurr shale.



The Upper Jurassic Hekkingen Fm. is expected to be the main source rock for the license. Its presence is proven in all the wells that penetrated the Upper Jurassic stratigraphic levels in the surrounding area of PL712. Additional source rocks could be represented by the organic rich shales at the Lower Cretaceous Knurr, Kolmule, and Kolje formations regionally observed in several Barents Sea wells.

#### **4. PROSPECT UPDATE**

After the PL712 license award, the hydrocarbon potential of the license has been initially computed based on the depth converted CGG 3D PSTM volume and on the G&G studies results. The prospect volumes and risk have been validated in April 2015 by the technical assurance review team in HQ Milan.

In consideration of the poor quality of the CGG PSTM multi-client volume, the JV decided in 2015 to carry out a 3D PSDM processing in HQ Milan. After the 3D PSDM delivery in early 2016, new volumes have been calculated and revised; the PL712 license prospectivity has been presented to the internal peer review team on March 2016 for validation and shared with the JV partners. Significant improvement in the data quality has been achieved on the new depth volume as compared to the original CGG processed and depth converted time volume. After the updated seismic interpretation and mapping, the Big Brother prospect geometry and surfaces depth have changed; the definitions of the prospect and of the main structural trends are much clearer; to be noted that the different geometry of the intra-Barremian closure causes an expansion of the hydrocarbon area for the deeper target with a relevant effect on the related hydrocarbon volumes.

Volumetric calculations were run with the PRES 7.1 for the two targets of the prospect using the new interpreted maps (Fig. 3); in consideration of the results of the semi-regional PSM study both the oil and gas scenarios are considered (hydrocarbon phase Chance - Oil Ring with Gas Cap 30% vs Gas Case 70%). Input parameters for the volumetric are based on the semi-regional knowledge of the area, taking into account that no reference well can be used as analogue for this play.



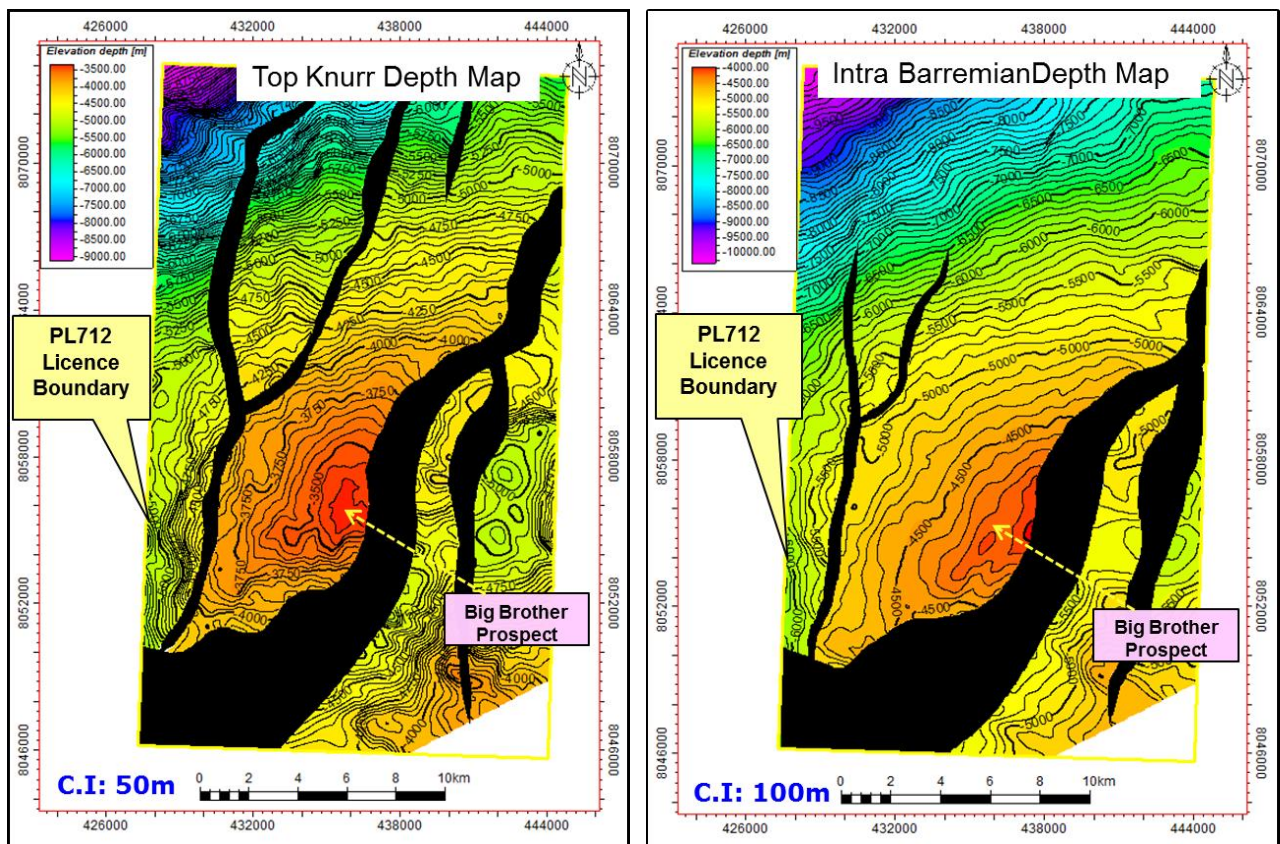


Figure 3: Top target maps interpreted on the new 3D PSDM seismic volume

Reservoir distribution maps, based on semi-regional sedimentological modelling, are inferring a shale dominated slope succession in the area of Big Brother and the only well drilled in the Byrnoya Basin (7219/08-01) was found with a very low N/G of around 5%. For these reasons it was decided to apply a generic distribution of net to gross giving the highest probability to the lowest input value 0.05 and a minor probability to 0.3. The N/G range used in PRES was 0.05-0.10-0.15-0.30 with respective samples weight values of 60-25-10-5.

A gross thickness range of 400-600-900 m has been used for the top Knurr target and a range of 700-950-1200 m for the Intra Barremian target. The hydrocarbon columns distribution accounted for the performed pressure study results do not exclude the possibility of a gas column exceeding 600 meters at the Top Knurr reservoir (an oil column could be therefore even larger); in consideration of above, assumption of a maximum HC column of 600 m was made. A most likely value of 200 m was adopted on the basis of PT regional knowledge, while the minimum value was kept at 100 m.

The porosity input in PRES is 8-14% for Knurr target and 8-12% for intra Barremian target. This low porosity values account for the uncertainty to find a reservoir with good properties and for the effect of depth on the target level reservoirs.

Based on the low porosity, and assumed low permeability, water saturation for oil scenario has been considered in a range of 25-45%, while for gas it is 15-45%.

Based on the hydrocarbon phase uncertainty and considering the outcomes of the several discoveries in the vicinity, Oil ring with gas Cap case (30% chance of success) and dry gas case (70 % Chance of success) phases were runs for both targets.



Final validated HIIP and relevant POS of the Big Brother prospect are summarized in the following tables:

HYDROCARBONS INITIALLY IN PLACE (PRES) Post-TAR - Oil Case (30%)														
PROSPECT	TARGET	OIL (Mbo)				GAS CAP (GScm)				SOLUTION GAS (GScm)				POS
		P90	P50	P10	Mean	P90	P50	P10	Mean	P90	P50	P10	Mean	
Big Brother	Top Knurr	21,7	81,3	291,1	<b>127,9</b>	0,00	0,11	0,86	<b>0,32</b>	0,50	1,87	6,67	<b>2,94</b>	17%
	Intra Barremian	5,0	26,8	113,9	<b>47,0</b>	0,00	0,02	0,15	<b>0,06</b>	0,14	0,75	3,17	<b>1,31</b>	17%
	<b>Total</b>				<b>174,9</b>				<b>0,38</b>				<b>4,25</b>	

TABLE 2: BIG BROTHER PROSPECT HYDROCARBON INITIALLY IN PLACE, KNURR AND INTRA-BARREMIAN TARGET

PROBABILITY OF SUCCESS (PAPA) Post-TAR																	
PROSPECT / WELL	TARGET	PLAY CHANCES				LOCAL CHANCES					POsg	OVERALL CHANCES (INCLUDING DHI CONDITIONING IF APPLICABLE)					
		RESERV PLAY	SEAL PLAY	SOURCE PLAY	PLAY	RESERV LOCAL	SEAL LOCAL	TRAP	CHARGE	LOCAL		RESRV	SEAL	SOURCE	TRAP	CHARGE	POS
Big Brother	Top Knurr	40%	90%	100%	36%	63%	100%	85%	90%	48%	17%	25%	90%	100%	85%	90%	<b>17%</b>
	Intra Barremian	40%	90%	100%	36%	63%	100%	85%	90%	48%	17%	25%	90%	100%	85%	90%	<b>17%</b>

TABLE 3: BIG BROTHER PROSPECT PROBABILITY OF SUCCESS

## 5. TECHNICAL EVALUATIONS

The Gas potential of the Big Brother prospect has not economically being evaluated. No Gas production Hub with pipeline to a new hypothetical LNG plant is in place nor is planned for the west Barents Sea area. The cost and feasibility of new pipeline to the existing facilities of Snøhvit and Melkøya LNG (two complete trains and already discovered gas volumes waiting for development in the vicinity) makes the Gas project uneconomic. All the gas discoveries in the Johan Castberg area are stranded; Iskrytall, Kramsnø, Nunatak, Isfjell and Salina are un-economic per se or in synergy. No gas pipeline is economically viable as demonstrated in previous EAR economics for the above mentioned discoveries.

The Big Brother Oil project only has been modelled developing both the Cretaceous targets on the Resources decision tree, using three PRES scenarios for the Knurr formation along with the Intra Barremian target mean, respectively. Three out of the 7 oil discovery total cases have been fully evaluated (Knurr-scenario 1, Knurr-scen 1 & Intra Barremian mean and Knurr-scenario 2), while the other four cases outcome have been derived using the NPV/Resources regression curve. As no Gas facilities are presently available in the western Barents Sea, the 70% Gas case chance has been accounted as dry well case.

The Oil case project development is based on the assumption of a subsea tieback to the Johan Castberg FPSO via 45 Km Pipe-in-Pipe, using 2 or 3 standard four-slot templates, depending on scenario.

Oil production profiles have been assumed on decline curves basis and relevant number of wells, producers, water and gas injectors, are compliant with the development schemes and drilling rig timing.

Economics, based on the abovementioned assumptions, are fully developed for 3 cases, the NPV/Resources regression curve has been used to retrieve the other cases; negative NPVs are replaced by Dry well case on 4 discovery branches.



[REDACTED]

In compliance with the Eni Norge strategy in the Barents Sea, in view of the uneconomical Big Brother oil project assessment, the decision of relinquish the license has been taken.

[REDACTED]

## 6. CONCLUSIONS

Eni Norge has revised the technical evaluation of PL712. The prospectivity of the license is represented by one single prospect, Big Brother, with two targets in the Cretaceous sequence.

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

The work commitment has been fulfilled.

**Eni Norge recommends on behalf of PL712 to relinquish the license due to lack of potential.**