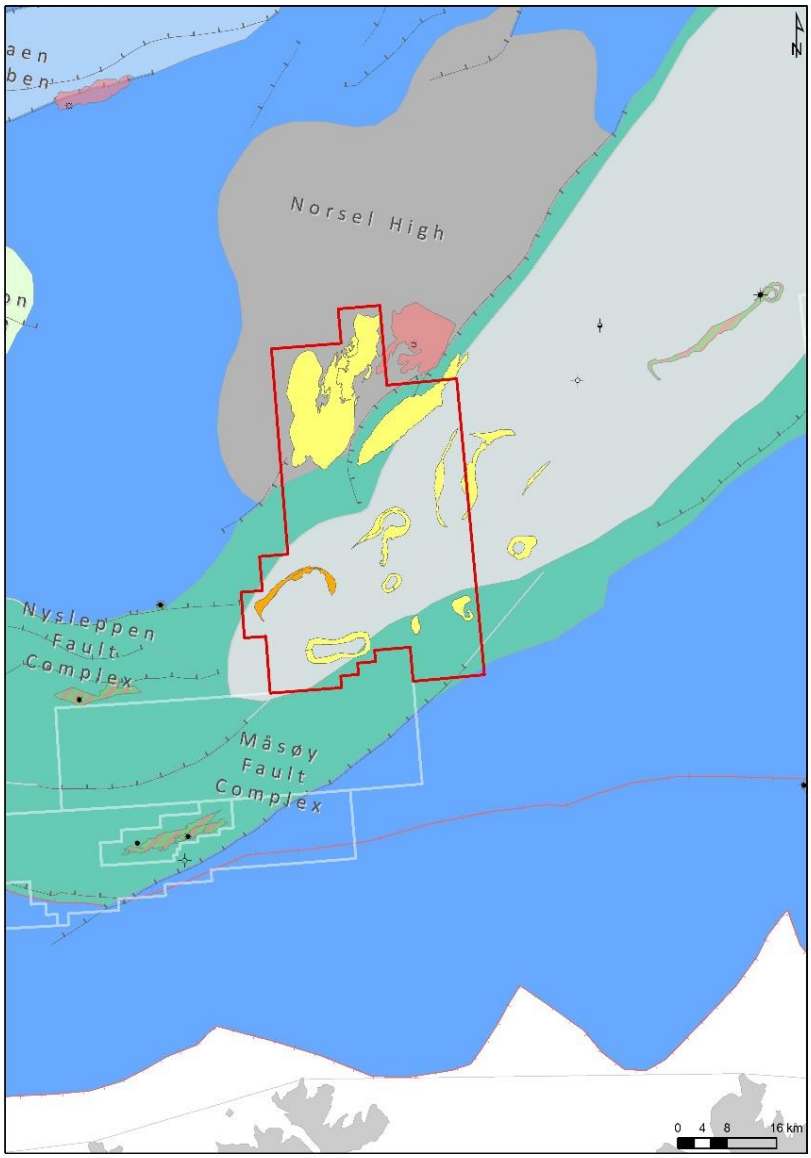
PL1024 Status Report



Repsol Norge AS

2020

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1 History of the production license

PL1024 was awarded on March 1st, 2019 as part of the APA 2018 license round to Repsol Norge AS (70%) as operator and DNO Norge AS (30%) as partner.

Initial work obligations and work periods

Within 2 years or before March 1st, 2021

- Conduct geological and geophysical studies
- Acquire new 3D seismic or drop decision

Within 4 years or before March 1st, 2023

- Acquire new 3D seismic
- Drill or drop decision

Within 6 years or before March 1st, 2025

- Drill exploration well
- Concretize (BoK) or drop decision

Within 8 years or before March 1st, 2027

- Conduct conceptual studies
- Continuation (BoV) or drop decision

Within 9 years or before March 1st, 2028

- Prepare development plan (PDO)
- Submit PDO or drop decision

Overview of meetings held

- Initial meeting: April 4th, 2019
- EC/MC meeting: November 11th, 2019
- Work meeting: April 2nd, 2020
- EC/MC meeting: June 18th, 2020

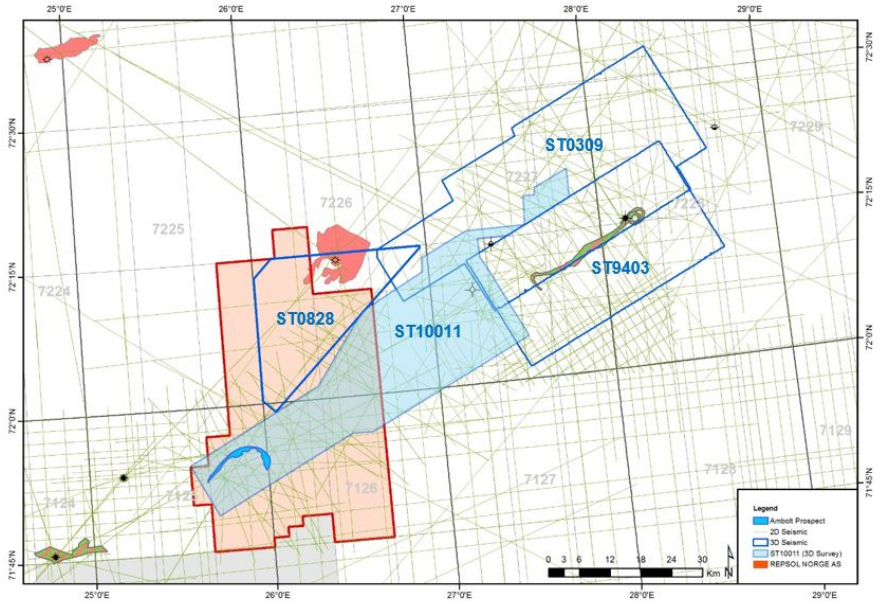
Grounds for surrender

The license work program was completed by conducting relevant geological and geophysical studies. Following the completion of the work program, the partnership has concluded that the main prospect is no longer a viable candidate, and further studies will not de-risk this opportunity. Based on this, the partnership has unanimously decided to surrender the production license.

2 Database overviews

2.1 Seismic data

The seismic database consists of publicly available 2D and 3D datasets in addition to a proprietary 3D dataset acquired through a trade agreement. A new seismic reprocessing inclusing both PSTM and PSDM was performed over 1144 square kilometers of the ST10011 3D survey constituting the key survey for this project. Detailed structural interpretation over the Ambolt prospect was carried out on both the PSTM and PSDM reprocessed dataset ST1011. The interpretation of the available 2D surveys was performed in order to build the regional framewok for the petroleum system model. All the seismic datasets used in the evaluation of the license are shown in Figure 2.1



Survey Type	Survey Name	Year
3D	NO_3D_ST10011	2010
	NO_3D_ST0828	2008
	NO_3D_ST9403	1994
	NO_3D_ST0309	2003
2D	NO_2D_NPD-FI-83	1983
	NO_2D_SG8737	1987
	NO_2D_NPD-FI-84	1984
	NO_2D_FRUHOLMEN	2007
	NO_2D_SG8821	1988
	NO_2D_HB01RE	2001
	NO_2D_FWGS84	1984
	NO_2D_SG8837	1988
	NO_2D_ST9007	1990
	NO_2D_MN9902	1999
	NO_2D_BSS01	2001
	NO_2D_NPD-FIOE1-86	1986
	NO_2D_SH9101	1991
	NO_2D_IKU	1984-1989
	NO_2D_ST9411	1994
	NO_2D_NPD-BJRE-BJSY-84	1984
	NO_2D_NPTS92	1992
	NO_2D_NBGS-90	1990
	NO_2D_MN87 (4-5-6)	1987
	NO_2D_BARE02	2002

Figure 2.1 Seismic Database Map

2.2 Well data

The well database is summarized on Table 2.1. Available well data was incorporated in the petroleum system model for calibration purposes.

Table 2.1 Wells database

Reference wells and available well data sets

Well Name	Completion Year	Prospect Name	LWD/WL	Core	Pressure Data	Test	CPI	Geochemistry	VSP
7124/3-1	1987	Bamse	x	Tubåen, Fruholmen	x		x	x	Checkshot only
7124/4-1 S	2011	Heilo	x				x	x	-
7125/1-1	1988	Binne	x	Stø	x		x	-	VSP & Checkshot
7125/4-1	2007	Nucula	x	Fruholmen	x		x	x	-
7125/4-2	2008	Nucula B	x		x		x	x	VSP & Checkshot
7125/4-3	2014	Ensis	x		x		x	-	Checkshot only
7128/4-1	1994	Omd Vest	x	SWC & Core Klappmyss to Soldogg	x	DST in Røye fm	x	x	VSP
7128/6-1	1991		x	Røye to Soldogg	x	DST in Røye fm	x	x	VSP
7130/4-1	2016	Ørnen	x	Røye	x	Gas@3031.6	x	-	-
7131/4-1	2005	Guovca	x	Garja	x		x	x	VSP
7224/6-1	2008	Arenaria	x	Tubåen	x		x	-	VSP
7224/7-1	1988	Samson Dome	x	Stø	x		x	x	VSP
7226/2-1, T2, T3	2008	Ververis	x	Tubåen to Klappmyss	x		x	x	VSP
7226/11-1	1988		x	Tubåen, Kobbe	x	DST Havert	x	x	VSP
7227/10-1	2014	Saturn	x		x		x	-	VSP
7227/11-1 S	2006	Uranus	x				x	-	VSP
7227/11-1 A	2006	Uranus	x				x	-	VSP
7228/1-1	2012	Eik	x				x	x	VSP
7228/2-1 S	1989		x	Hekkingen, Snadd	x		x	x	VSP
7228/7-1 A	2001	Pandora	x	Snadd, Klappmyss	x		x	x	VSP
7228/7-1 B	2001	Pandora	x		x		x	x	VSP
7228/7-1 S	2001	Pandora	x	Stø, Nordmela			x	-	-
7228/9-1 S	1990		x	Nordmela, Havert, Ørn	x		x	x	VSP
7229/11-1	1993	Castor	x	Polarrev	x		x	-	VSP

3 Results of geological and geophysical studies

The special studies carried out in the licence area are listed in Table 3.1. A summary of the major studies carried out after the licence was awarded are discussed below.

Integrated petroleum systems study

New basin modelling study and structural reconstruction was carried out in order to better assess the main risk factors. The model integrates several disciplines to assess the hydrocarbon potential in the Nordkapp basin; "Geological model, gross depositional environment, pressure analysis, source rock evaluation and kinetics, thermal model, timing and dynamic migration". The model considers up to 9 potential source rocks that could be present in the area. For the Ambolt prospect, the model suggests Snadd and Stø reservoirs are the ones with a better chance of receiving hydrocarbons, proposing Ørret formation (Late Cretaceous) and Kobbe-Snadd formations (Eocene) are the most likely source rocks to feed these reservoirs. The model also concludes that only small accumulations can be expected in the Ambolt Prospect.

3D seismic reprocessing

PSTM and PSDM reprocessing were performed over 1144 square kilometers on ST10011 NORDKAPP 3D seismic survey. The reprocessed area entirely covers the main prospect "Ambolt" among several other leads within the production license. The objective of the reprocessing was to improve the image at the flanks of the salt domes and to prove the presence of sand pinch-outs against the dome flanks to enable mixed stratigraphic-structural traps like the "Ambolt prospect concept". PSTM and PSDM new data significantly improved the seismic image. New seismic interpretation over the re-processed data shows the proposed trap model is no longer valid, and sands of the Realgrunnen group are folded and wrapping the salt domes and deformed by the diapiric movement. Proposed reservoir sands can be followed near to the surface where they are finally truncated at the base of the Pleistocene. This condition affects the main prospect "Ambolt" and can be also observed on the other Leads identified on the 3D seismic.

Table 3.1 Summary table with key studies

Study	Year	Author
IKU Stratigraphic Drilling Projects	1982-1993	IKU
Geophysical Atlas of the Barents Sea - Integrated Seismic, Gravity and Magnetic Interpretation	2004	TGS-NOPEC
Integrated Barents Sea Study - Geological History and Petroleum System Evolution	2005	Sintef
Barents Sea Stratigraphic Database	2005	Ichron Ltd.
Petrophysical Evaluation Norwegian Barents Sea	2007	TGS
Petroleum System evaluation	2007	Fugro Robertson
Barents Sea Acreage evaluation Study	2008	Horizons Energy Partners
Barents Sea Digital Atlas	2008	AGR
A chemostratigraphic evaluation of 14 wells from the Triassic/Jurassic of the Western Barents Sea	2008	Chemostrat
Integrated Barents Sea Study - Basin Modelling Update 2008	2008	Sintef

Evaluation of the hydrocarbon potential of the Paleozoic carbonates on the Loppa High, Barents Sea, Norway: petrography, isotopy and fluid inclusions	2010	Repsol
Sedimentology, petrography and reservoir quality of the Triassic (Induan-Carnian) in the Barents Sea	2012	Repsol
Interpretation of Gravity and Magnetic data, Barents Sea, Norway	2013	Repsol
Integrated petroleum geological model for the Norwegian Barents Sea	2014	Exploro geoservices
Structural evolution of the SE Barents Sea, Norway	2015	Repsol
Sedimentology, Stratigraphy and Reservoir Quality of the Jurassic of the Norwegian Barents Sea: A pilot study	2015	Repsol
Rock Physics analysis - Bjarmeland Platform, Barents Sea Norway	2015	Repsol
Integrated Petroleum system Model	2019	Repsol
3D Seismic Reprocessing ST10011 3D PSTM-PSDM	2019-2020	Repsol

4 Prospect update report

Prospect and leads

Originally one prospect, "Ambolt", was identified in the licence area (Figure 4.1). The trap of the prospect was mapped as a three way dip closure with truncation against a salt diapir (Figure 4.2). In addition several similar leads could be identified in the licence area, but no further evaluation was carried out due to poor seismic imaging and associated small volumes.

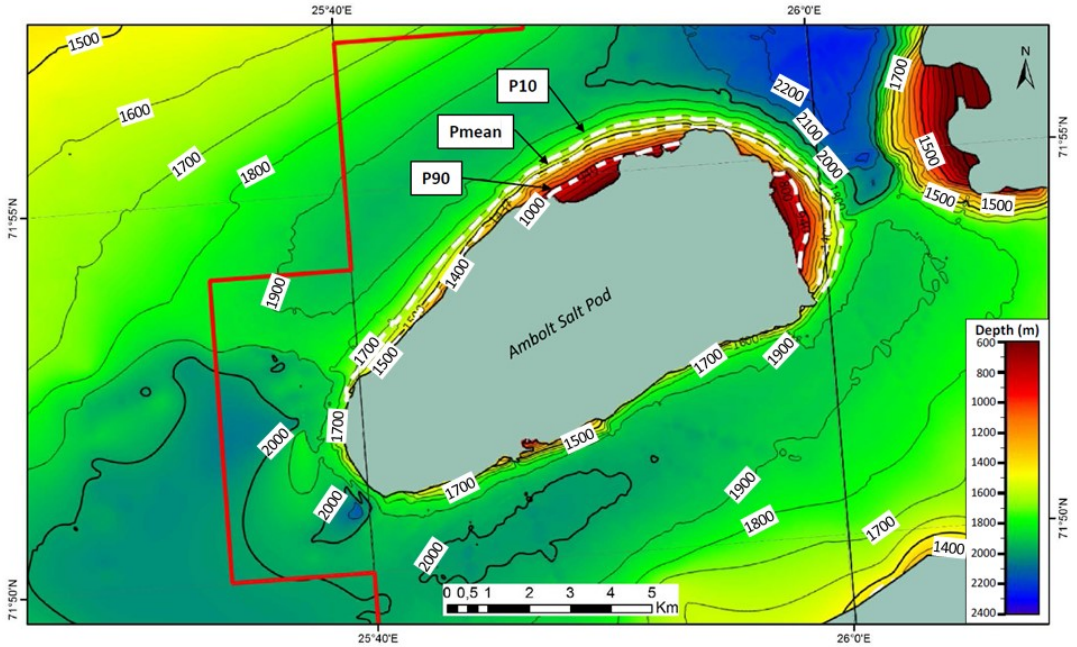


Figure 4.1 Original Ambolt prospect structure map

Sandstones in Realgrunnen and Storfjorden subgroups were expected to form potential reservoirs, whilst respectively Hekkingen formation, and shales in the upper part of Snadd formation makes up the top seal.

The PetSys modelling results suggest Hekkingen and Snadd potential source rocks are at present in the oil window, meanwhile Kobbe, Steinkobbe and Ørret potential SRs are in the gas window. Compartmentalization of fetch areas suggest short migration from local kitchens limiting potential for large accumulations. However due to the major uplift and erosion during Cenozoic, there is still big uncertainty related to the fluid phase as gas expulsion from basin center could have contributed to additional gas charge in the basins margins.

In order to improve the salt image on the seismic, the seismic survey ST10011 was reprocessed. Reprocessing improved the definition of the Realgrunnen subgroup and Snadd formation reflections, which revealed how these intervals do subcrop against the Base Pleistocene for all the salt domes in the mapped area, including the smaller Matryoshka and Flygeøgle leads (Figure 4.3). Although in some parts of the prospect the reservoir intervals may truncate against the salt dome, at the critical crestal area the reprocessed seismic shows clearly how reservoir intervals subcrop against the Base Pleistocene (Figure 4.4). Pleistocene

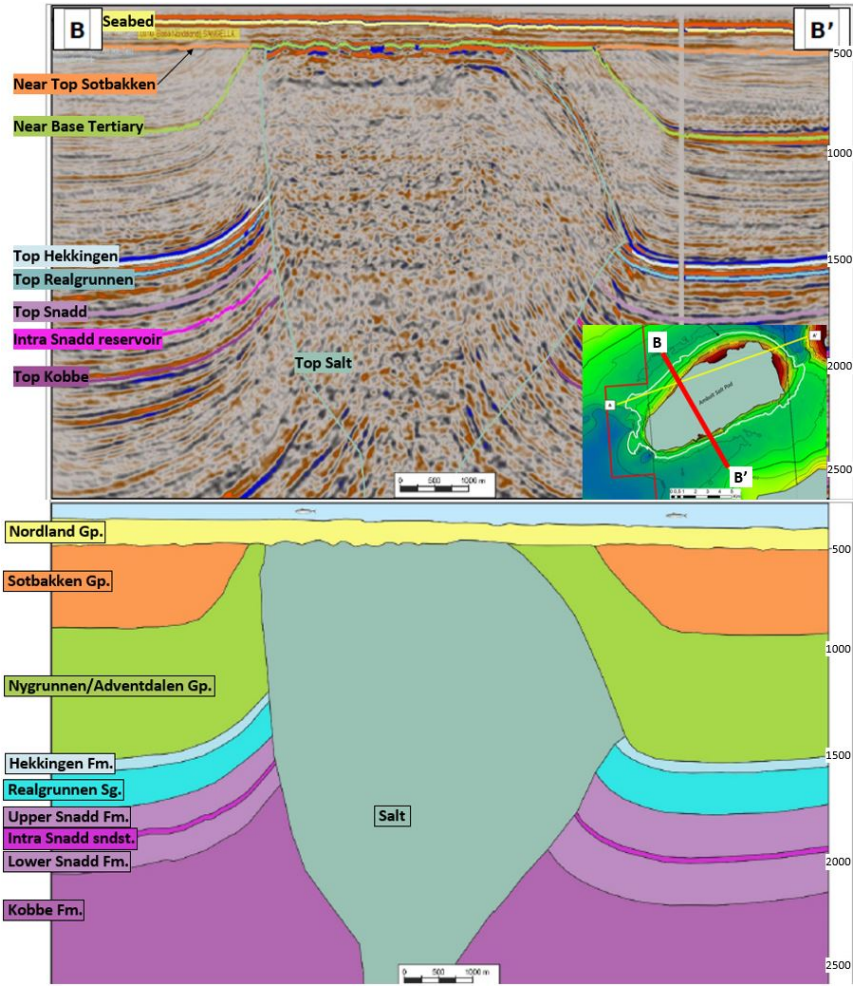


Figure 4.2 Section through Ambolt prospect
Original prospect definition relied on dip closure and truncation of reservoir against the salt diapir

consist mainly of unconsolidated glacial sediment which are not considered to suffice as seal. The interpretation of Intra Snadd reservoir and especially its possible truncation against Base Pleistocene is not as confident as the Top Stø formation interpretation, but this reservoir level is not considered large enough to be an economic drilling target even if a confident interpretation were possible.

In the northern flank, out of the reprocessed 3D area, Vestavinden and Reevenka leads are considered very high risk / low reward. The Vestavinden lead is defined as a downthrown 3-way dip closure against 2 main SW-NE normal faults (Nysleppen Fault Complex). The critical area of the closure is the relay between the 2 main faults which according to the interpretation is bounded by a small fault. The reservoir target is the Realgrunnen Sub-group (Middle Jurassic – Upper Triassic) sandstones deposited in a near-shore to deltaic environment. Seal is considered as the critical risk due to small throw of the faults and potential sands to sands juxtaposition across the faults. On the other hand, the Reveenka lead is defined as several subtle low relief 3-way dip closures against normal faults that have a common Lowest Closing Contour. Western closure of the structure is defined using two 2D seismic lines. Lateral seal is expected from fault seal. The fault throws are small and only the upper part of Realgrunnen sandstones has favourable juxtaposition (against Upper Jurassic

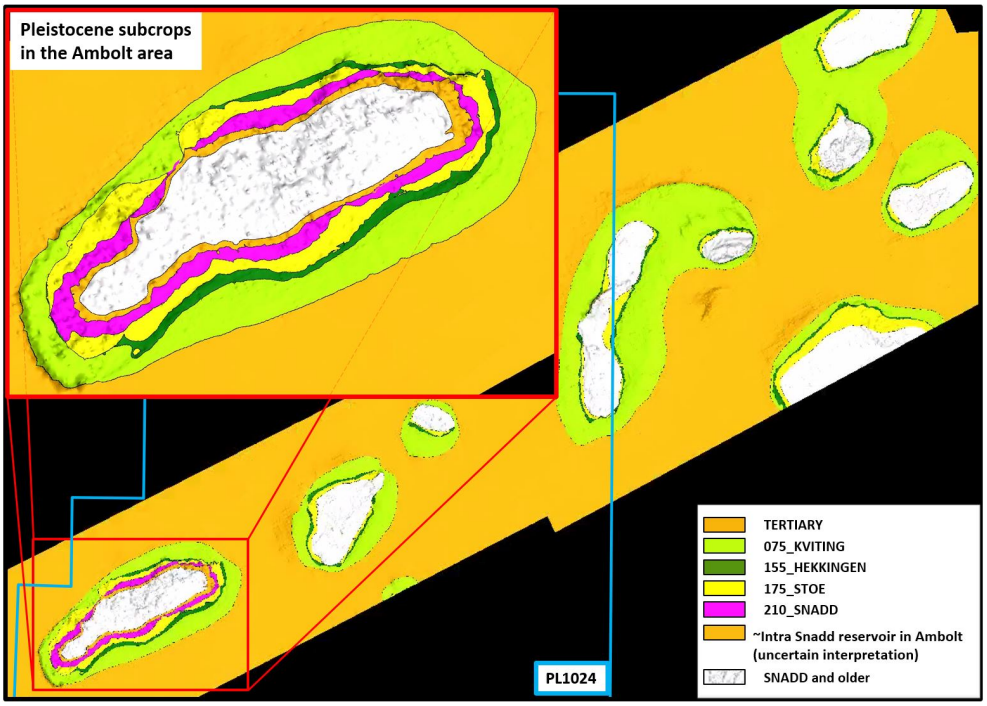


Figure 4.3 Base Pleistocene subcrops

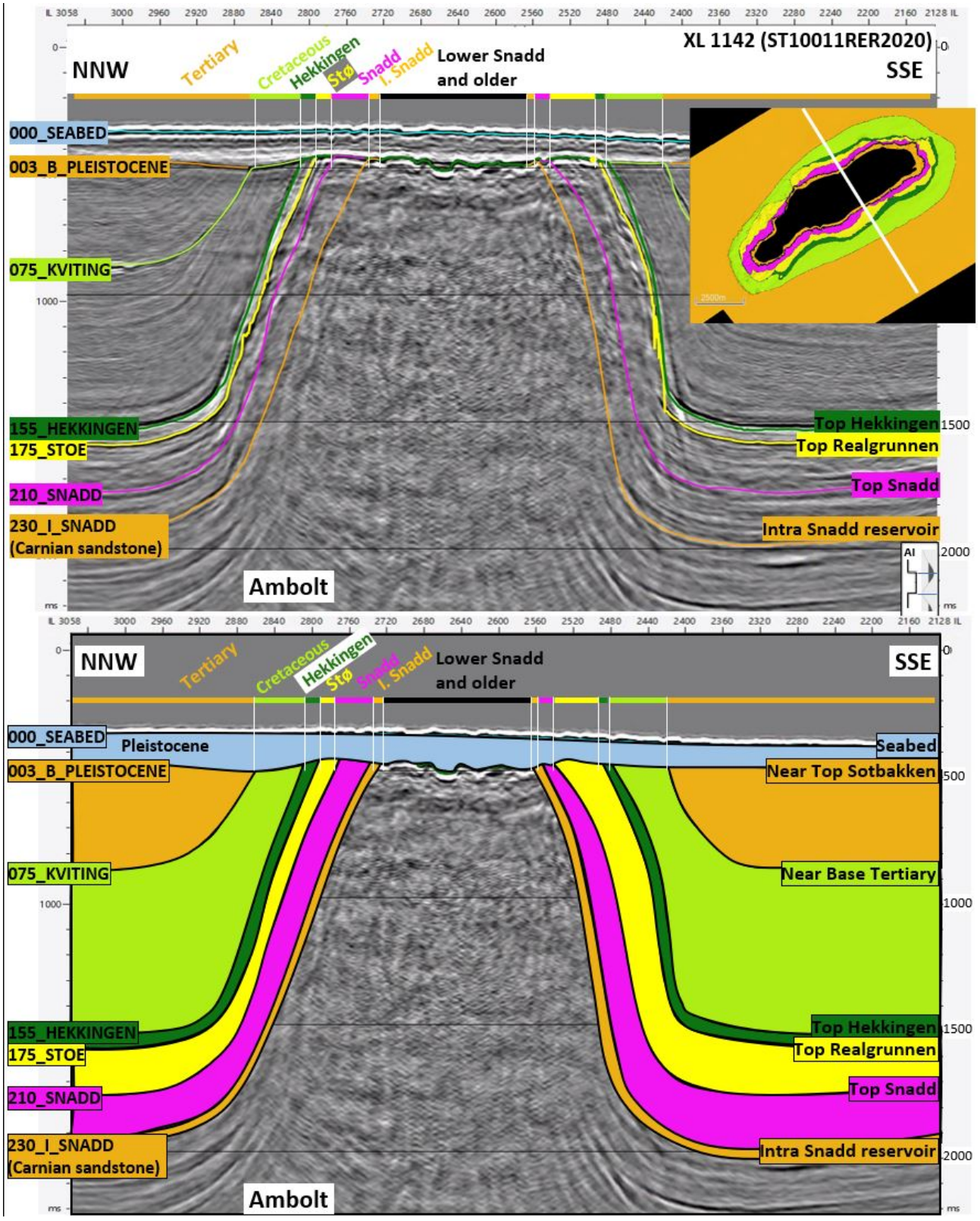


Figure 4.4 Reprocessed seismic across the Ambolt prospect

On reprocessed seismic it can easily be seen how Hekkingen and Stø formation subcrop against the Base Pleistocene in critical crestal part of the Ambolt prospect.

shales). The reservoir target is the Realgrunnen Sub-group (Middle Jurassic – Upper Triassic) sandstones deposited in a near-shore to deltaic environment. Trap is considered as the critical risk because the maximum vertical relief is only 40m which could be sensitive to the depth conversion. Western closure of the structure is defined using two 2D seismic lines.

5 Technical evaluation

A conceptual development plan consisting of an stand alone floater concept is considered for a potential discovery in the Ambolt prospect. The prospect is located 133 km north of Nordkapp at an estimated water depth of 238 meters. Development assumption for an stand-alone develpment in the Barents Sea at the Ambolt location requires significant volumes for a commercial project.

Following the completion of the prospectivity evaluation, no prospect or leads have been identified in the license that could reach the commercial threshold for this area. Based on this, no further technical evaluations have been carried out for possible development of the remaining prospectivity within the license.

6 Conclusion

The license work program was completed by evaluating the petroleum system modeling and reprocessing 1144 square kilometers of 3D seismic (PSTM+PSDM of the ST10011 3D seismic survey). The new seismic data imaging shows that the original trap concept for the "Ambolt" prospect is no longer valid, as the reservoir sands of the Realgrunnen Group (main target) are folded on top of the salt diapir and truncated at the base of the Pleistocene. The prospect integrity has been lost and the Ambolt prospect is no longer a viable drilling candidate. The new reprocessed seismic data provides sufficient quality to properly identify the absence of structural closure at the Ambolt structure. Additional data acquisition are not considered to be able to mitigate the absence of trap integrity. Since no alternative drilling candidate has been identified the partnership has unanimously decided to surrender the production licence.