

# PL1075 Relinquishment

---

Status Report



## Table of Contents

1 Key license History	1
2 Database	3
3 Geological and Geophysical Studies	4
4 Prospect Update	5
5 Technical Evaluations	8
6 Conclusions	9

## List of Figures

1.1 PL1075: Location Map .....	1
2.1 PL1075: Seismic Database.....	3
4.1 Trollfjord Prospect – Realgrunnen Target - Maps.....	5
4.2 Trollfjord Prospect – Realgrunnen Target – Fault Throws .....	5
4.3 Trollfjord Prospect – Kobbe Target - Maps.....	6
4.4 Trollfjord Prospect – Kobbe Target – Fault Throws .....	6
4.5 Trollfjord Prospect – Seismic Random Line 1 .....	7
4.6 Trollfjord Prospect – Seismic Random Line 2.....	7

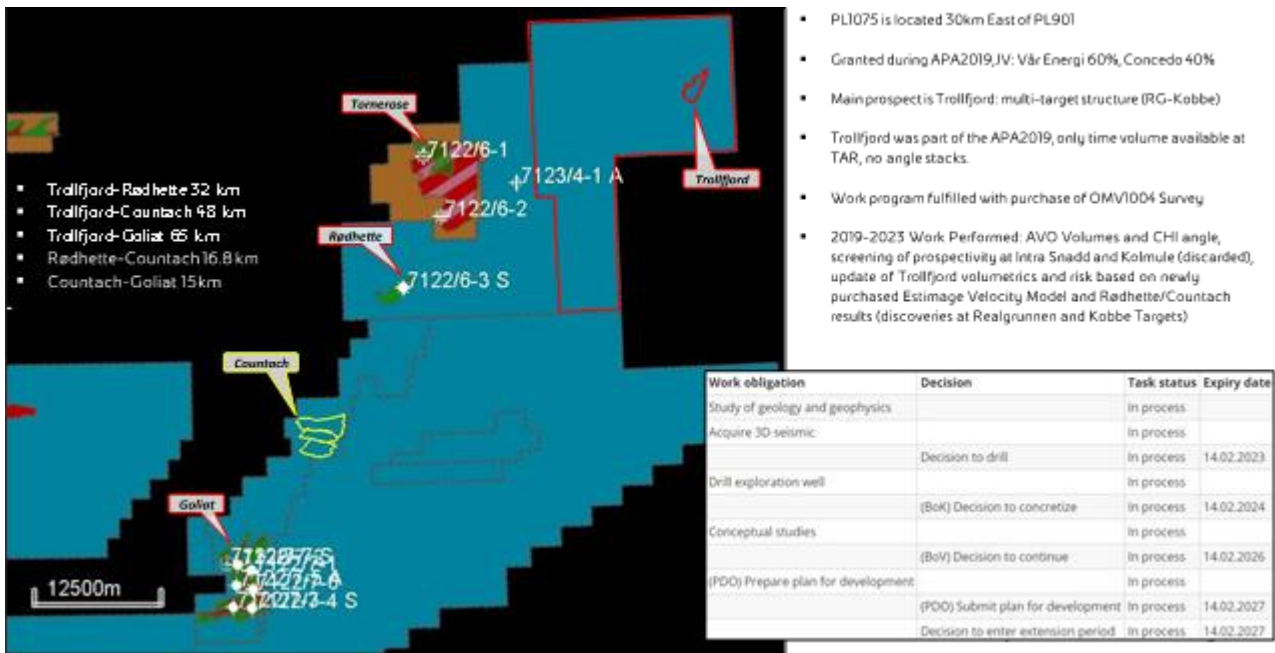
## List of Tables

5.1 PL1075: Volumes & Risk Summary .....	10
--	----

 vår energi

## 1 Key license History

The PL1075 license, located in the Barents Sea NW of the Goliat Field, see Fig. 1.1, was awarded as part of the APA2019 licencing round, on 14th February 2020. The license group consists of Vår Energi (60% Op.) and Concedo 40%. The PL1075 license contains the Trollfjord Prospect (Total structure HIIP Pmean 34.55 Mbbbl), which is a 3-way closure at the Realgrunnen and Kobbe targets (Fig. 1 ).



**Fig. 1.1 PL1075: Location Map & Licence Work Obligation**

The original licence work program consisted of a two years exploration phase with G&G work and to acquire 3D seismic covering the licence area. The OMV1004 3D survey was utilized as the common seismic database for the licence. The pre-stack gathers were acquired and reprocessed to fulfil the work obligation.



## 2 Database

The OMV1004 3D seismic volume is the main seismic volume used in the interpretation of the prospectivity in the PL1075 licence. The survey consists of 988 subsurface lines covering a full fold area of approx. 223 km<sup>2</sup> and is considered good quality 3D for interpretation. During the APA application work, depth conversion was carried out by extrapolation of the velocities from the ST17M04 PSTM and PSDM, which is the 3D volumes used as the basis for interpretation of the Rødhette prospect in the neighbouring PL901 licence. Depth conversion of the updated licence interpretation work was performed using the regional Estimage Velocity model.

The ST17M04 3D volumes is a reprocessing of parts of ST05M9 (a merge of 3 surveys, ST0509, ST0515 & ST0306) and OMV1004. The ST17M04 PSDM was processed following a modern broadband workflow, and a comprehensive de-multiple and depth model building workflow by DUG.

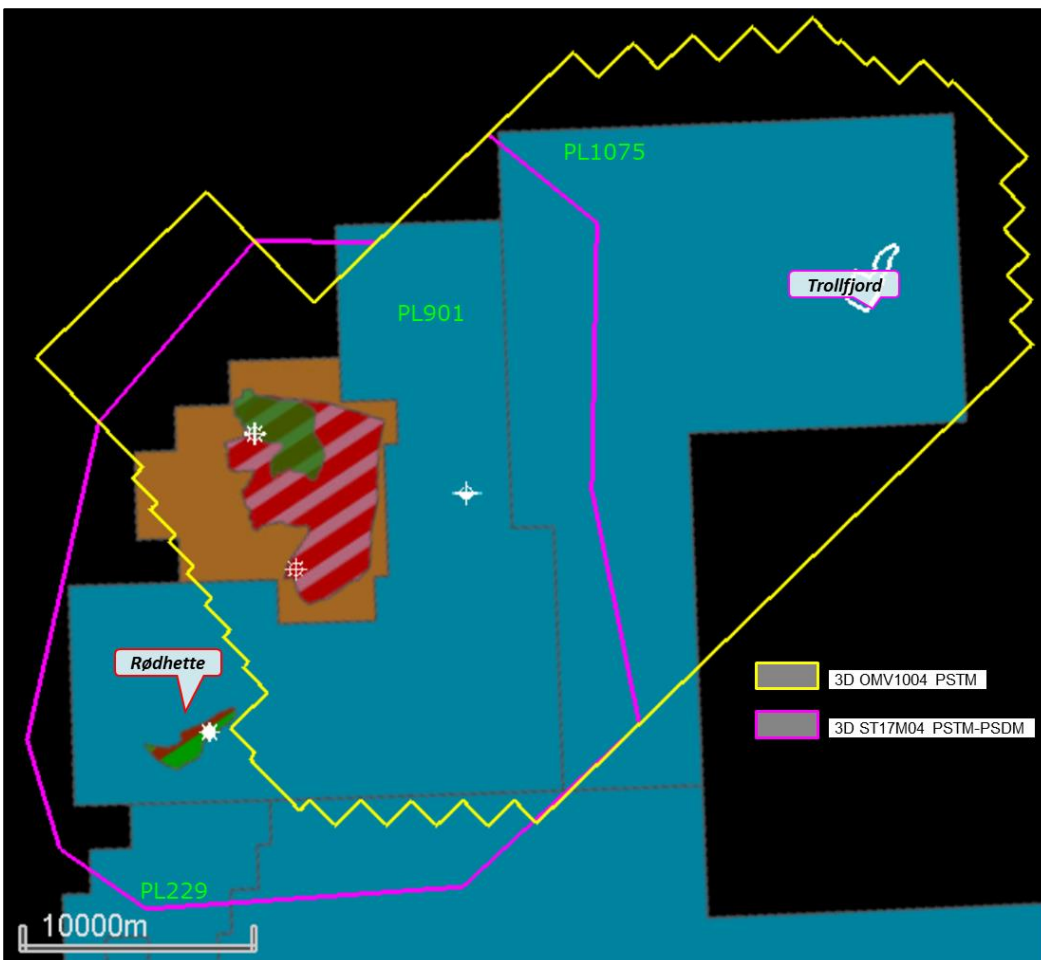


Fig. 2.1 PL1075 Seismic Database



### **3 Geological and Geophysical Studies**

The analysis and interpretation of seismic amplitudes on the Trollfjord prospect was carried out in-house with amplitude extractions on the different angle stacks (Near, Mid, Far) as well as in the Intercept, Gradient and CHI 20 (Inverted EEI) volumes. Amplitudes extractions at the Top Realgrunnen were used to constrain the oil and gas columns used for the volumetric calculations for the Trollfjord prospect. A different approach was used for the Kobbe target since no amplitude anomaly was observed at this level: Min OWC was set as a 4-way closure, and Max OWC was set 10m shallower than the structural spill point.

### 4 Prospect Update

The Trollfjord prospect is located inside license PL1075 towards the eastern margin of the Hammerfest Basin. The structure has a 304m vertical relief (fault-assisted structural spill at 2200 m tvdss), fault-bounded horst structure at the Realgrunnen Subgroup reservoir level defined by two fault sets directed NNE-SSW and WNW-ESE (Fig 4.1 & 4.2). The trap appears as a rotated fault block with the top Realgrunnen down-faulted to the north, east and south; and with a dip closure to the west.

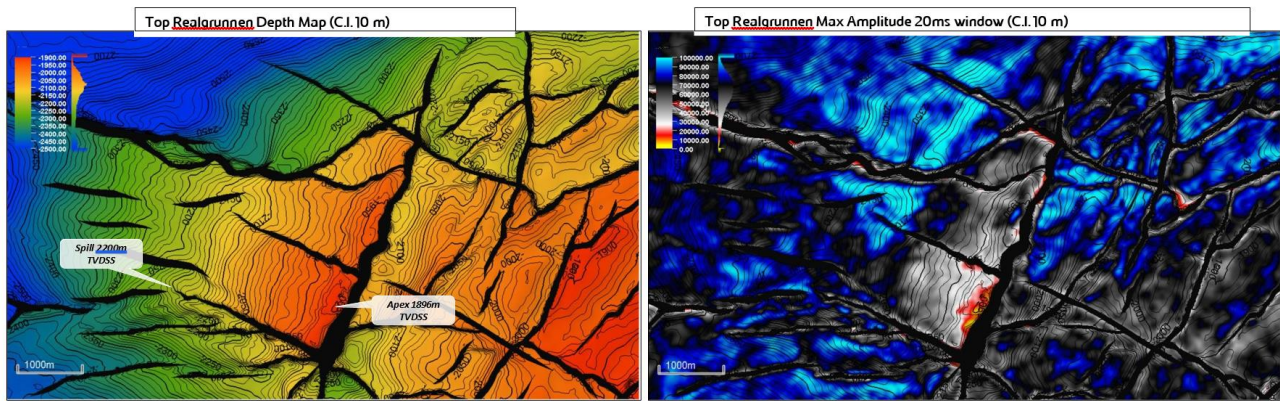


Fig. 4.1 Trollfjord Prospect – Realgrunnen Target – maps

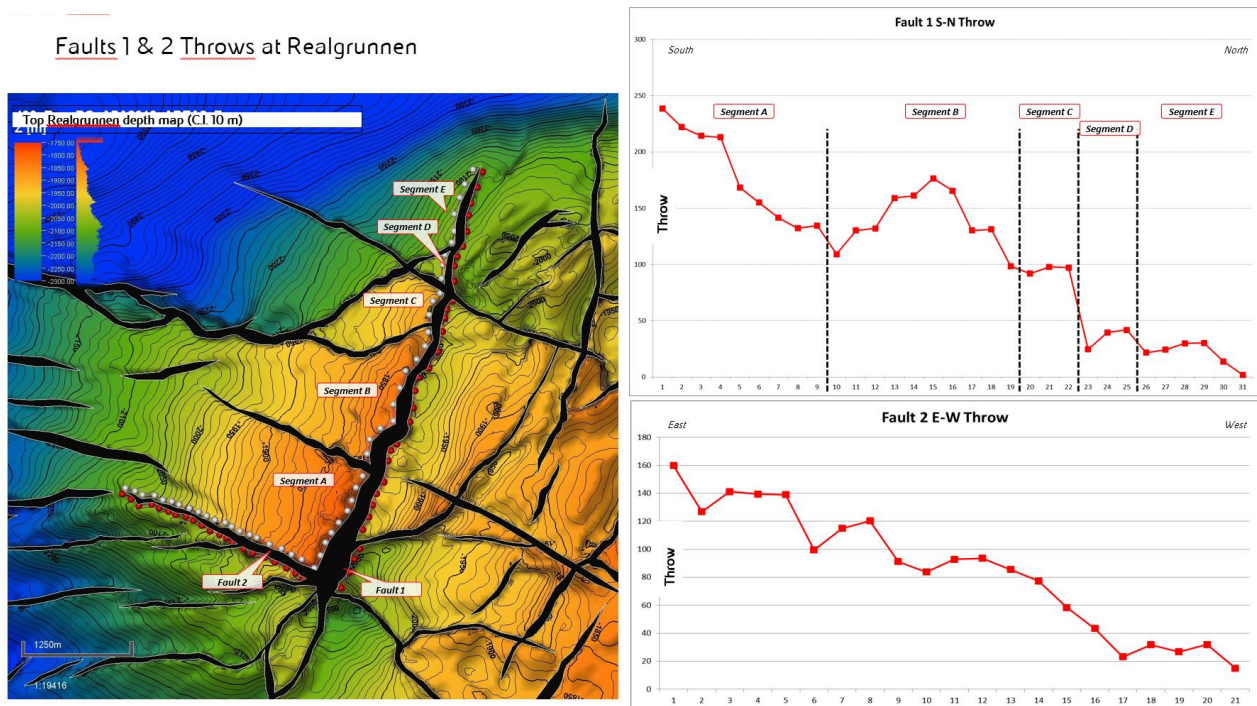


Fig. 4.2 Trollfjord Prospect – Realgrunnen Target – fault throws

At the deeper Kobbetarget the structure has a 140m vertical relief (fault-assisted structural spill at 2710 m tvdss) and is also a fault-bounded horst structure defined by two fault sets directed NW-SE and NE-SW (Fig. 4.3 & 4.4 ). The trap appears as a rotated fault block with the top Kobbetarget down-faulted to the east and south, and a dip closure to the west and north. All closure cases of

the Trollfjord Kobbe prospect rely on fault seal on the eastern and southern bounding faults (2 faults). Since the Kobbe Fm within the Trollfjord Kobbe prospect is mapped to be juxtaposed against Kobbe Fm along the eastern bounding fault to the prospect, the lateral seal is provided by shale gauge within the fault zone of the eastern bounding fault to the prospect. The top seal is provided by shale lithologies in the overlying Ladinian aged Snadd Fm. Fig. 4.5 & 4.6 display seismic lines crossing the Trollfjord prospect structure.

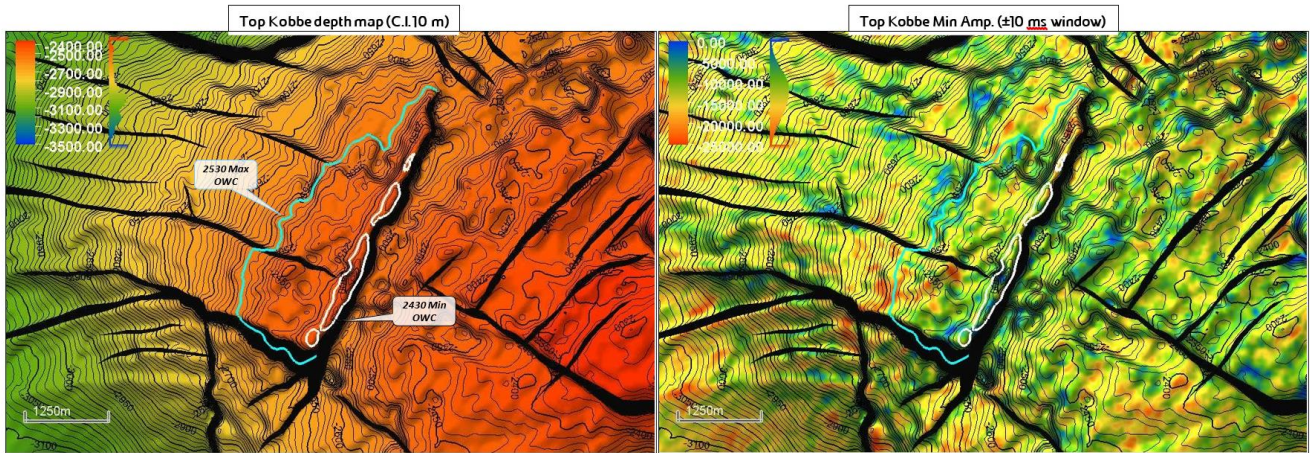


Fig. 4.3 Trollfjord Prospect – Kobbe Target – maps

### Fault Throw at Kobbe

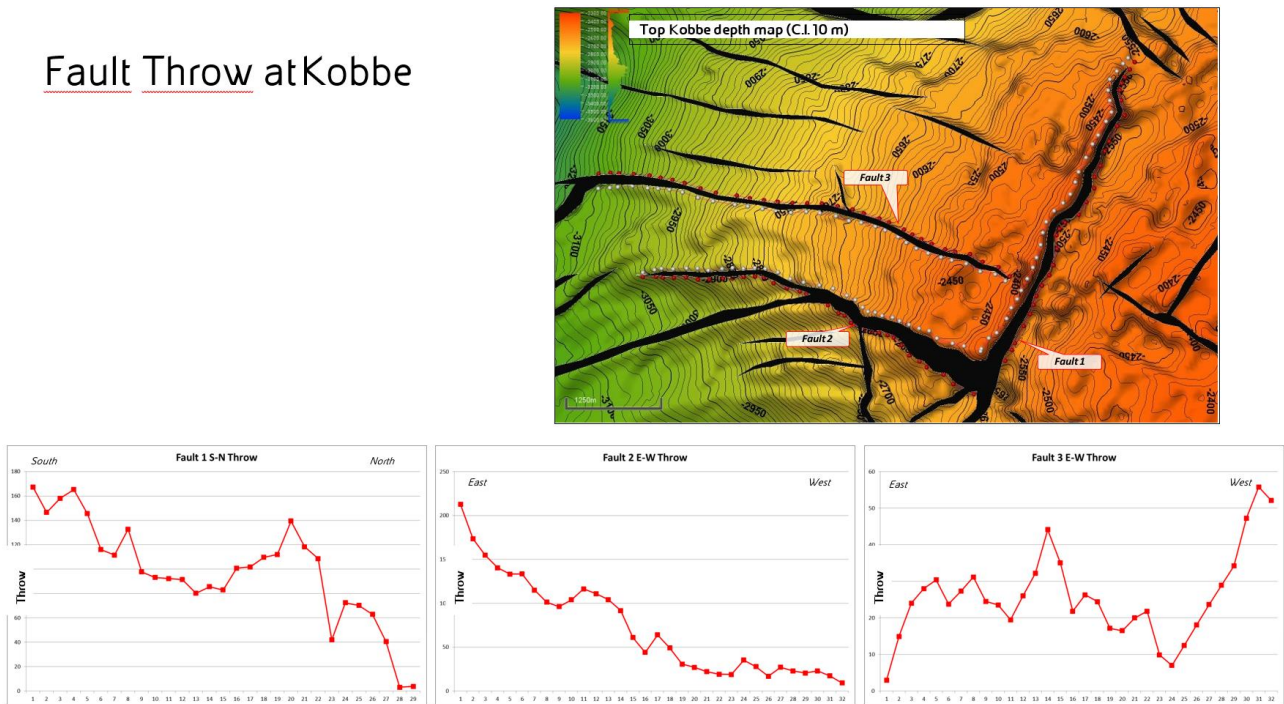
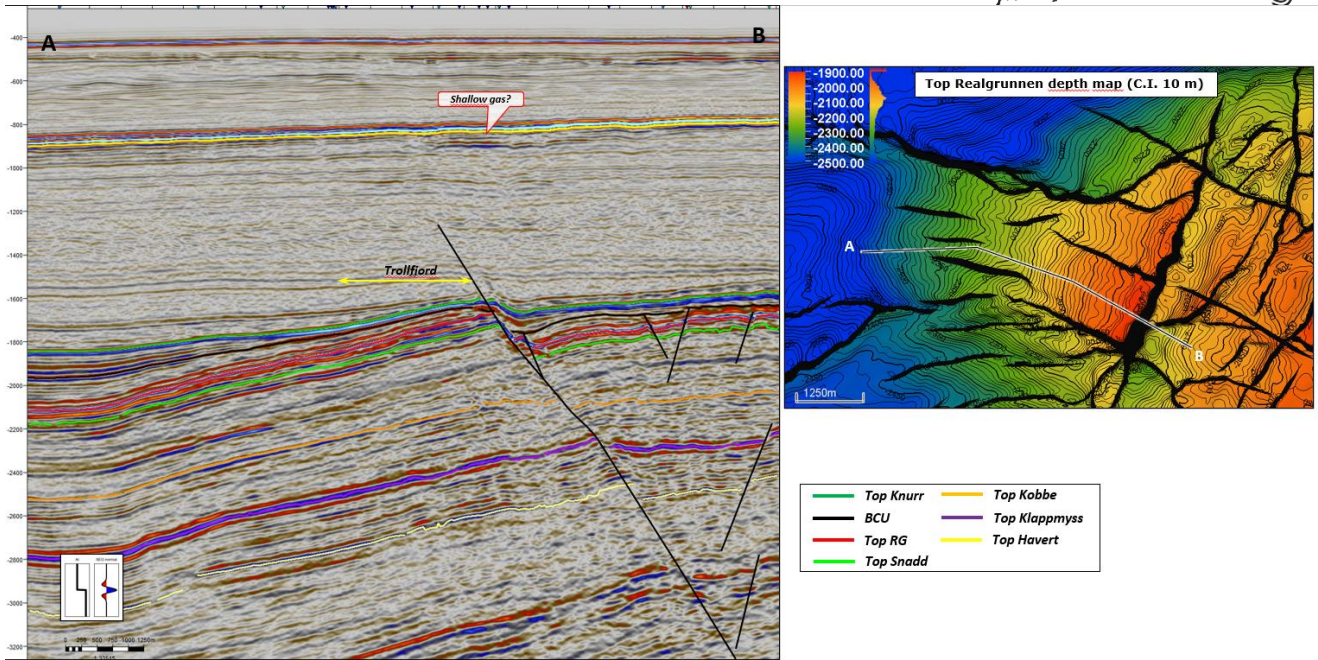
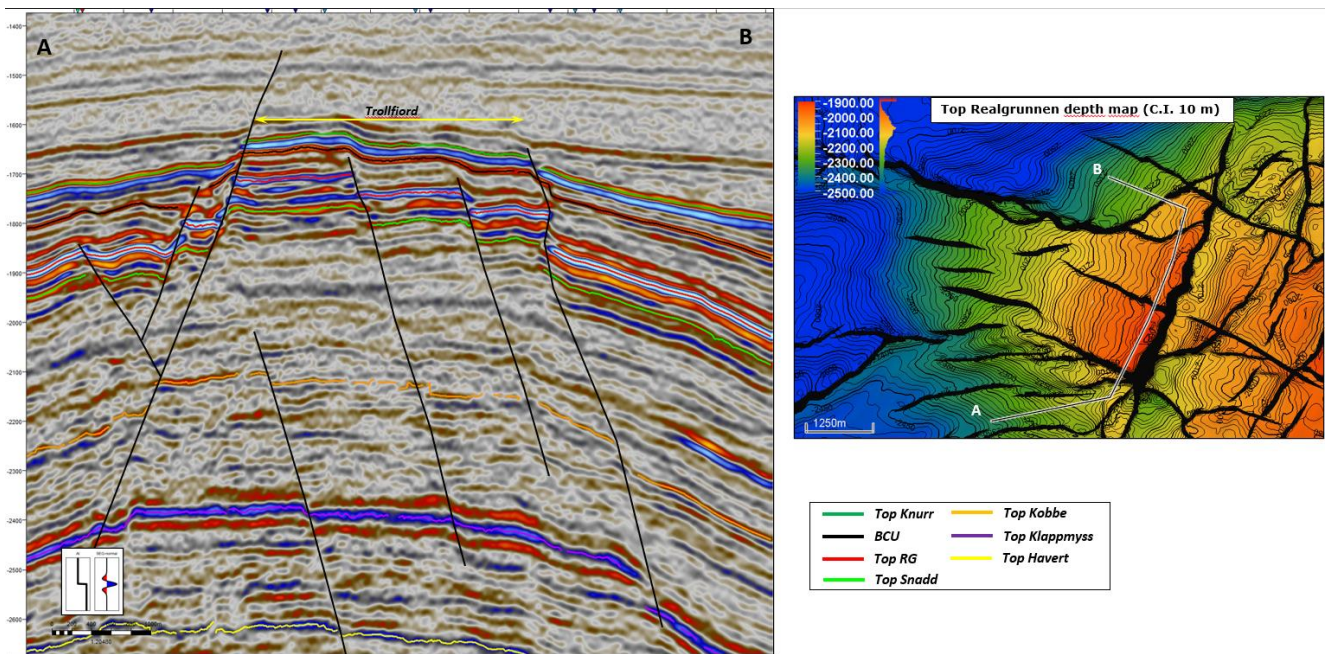


Fig. 4.4 Trollfjord Prospect – Kobbe Target – fault throws



**Fig. 4.5 Trollfjord Prospect – TWT Seismic Random Line (OMV1004 3D)**



**Fig. 4.6 Trollfjord Prospect – TWT Seismic Random Line (OMV1004 3D)**

**Seal**

For the Realgrunnen target the top seal is provided by the Upper Jurassic Hekkingen formation while for Kobbe the top seal consists of the Snadd Formation. The top seal is provided by the same shales of the Fuglen and Hekking Fms. Analysis of seal capacity of the Hekkingen and Fuglen Fms has been performed to see if the maximum possible hydrocarbon column in the Trollfjord Realgrunnen prospect can be contained by the top seal, based on corrected reservoir fluid pressures and FIT/LOT data from wells in the Hammerfest Basin. This analysis shows that the pressure created by the maximum hydrocarbon-column possible in the Trollfjord Realgrunnen prospect does not meet the fracture gradient of the overlying top seal and can be contained.

Since the Kobbe Fm within the Trollfjord Kobbe prospect is mapped to be juxtaposed against

Kobbe Fm along the eastern bounding fault to the prospect, the lateral seal is provided by shale gauge within the fault zone of the eastern bounding fault to the prospect. The top seal is provided by shale lithologies in the overlying Ladinian aged Snadd Fm.

## Charge

The Trollfjord Realgrunnen prospect relies on 2 charge concepts which are not mutually exclusive:

- Charge from Upper Jurassic Hekkingen Fm. source rock via a fill and spill route in Realgrunnen Sub Gp reservoir from the Jeger prospect in PL901
- Charge from Steinkobbe Fm organic rich shales into Kobbe Fm reservoir in the Trollfjord area, with re-migration into the Realgrunnen Sub Gp

Maturation modelling of Hekkingen and Lower Kobbe (Steinkobbe Fm) source rock intervals for the eastern Hammerfest Basin show that:

- Hekkingen Fm is not mature for hydrocarbon generation and expulsion at present day in the eastern Hammerfest Basin and migration from this interval must occur over long distances from the western and northern Hammerfest Basin.
- Lower Kobbe (Steinkobbe Fm) organic rich shales are early to main oil window mature in the Trollfjord prospect are



## 5 Technical Evaluations

### Volumetrics & Risking

A summary of the calculated in-place volumes and associated risk for each of the prospects and leads is found in Table 5.1.

**Table 5.1 PL1075: Volumes & Risk Summary**

Trollfjord	HIIP mboe	POS avg
Realgrunnen	20	34%
Kobbe	15	14%

Main risking for the Trollfjord reservoir levels are outlined below:

#### **Realgrunnen**

- Trap has been given a chance of 65%. Trollfjord is a well-defined, fault-bounded 3-way closure. However, leaking along fault planes during the several reactivation phases may have occurred and is a well-known phenomenon in the area at this stratigraphic level.
- Charge is set at 70%. Although the charging route of the Trollfjord requires a long distance migration and the structure is perfectly positioned to receive charging from west, the presence of amplitude anomaly is interpreted as indication of an effective reservoir and hydrocarbons presence.

Overall, the local chance is 28%, with a DHI upgrade to 34%. This because of the strong and depth conformant amplitude anomaly at Top Realgrunnen reservoir in all the angle stacks, IG and CHI20 extractions

#### **Kobbe**

- Reservoir has been given a chance of 50%. The presence and quality of the Kobbe is relatively poorly constrained and the available data points consist on the Countach discovery and the Nucula wells, which are located respectively at 50km to the SW and 60km to the ENE.
- Seal has been given a chance of 85%. The Snadd Formation is also mapped both seismically and by wells across the entire area on interest. However, local sandstone layer may be present and compromise its sealing capabilities.
- Trap has been given a chance of 70%. Trollfjord is a well-defined, fault-bounded 3-way closure. Differently from the Realgrunnen target, leaking along fault planes seem not to interest the Kobbe reservoir probably due to the larger amount of clay smearing along fault planes.
- Charge is set at 60%. Although the charging route of the Trollfjord requires a long-distance migration and the structure is perfectly positioned to receive charging from west. However, the lack of amplitude anomaly suggests either poor reservoir qualities or no hydrocarbon's presence.

Overall, the local chance is 18%, with a DHI downgrade to 14%.

## **Economics**

The economics run for the APA2019 application assumed a tie-back to facilities for a discovery in the Rødhette well (7122/6-3 S), which produced a positive EMV for the prospect at the time. As the Rødhette well will not be produced, the Trollfjord prospect economy has been re-assessed and is now negative.



## **6 Conclusions**

The PL1075 licence was applied for as additional acreage to feed what was expected to be a facilities hub following a successful Rødhette well in PL901. Without the infrastructure to tie into, the prospectivity in PL1075 is uneconomic and so the JV unanimously voted to relinquish the licence.