

Relinquishment Report PL951 Halti

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1 Key License History

As a response to the Ministry of Petroleum and Energy invitation to to apply for acreage in the Awards in Predefined Areas 2017, Concedo ASA and Aker BP ASA applied for a production license covering parts of the six blocks 7121/5, 6, 8, 9 and 7122/4, 7 (central part of the Hammerfest Basin). One prospect (Halti) within the Middle Triassic Kobbe Formation was identified. The Halti Prospect was considered to have large resource potential in a robust structure with good economy and the upside volumes had stand-alone volume potential.

The area was awarded in APA 2017 on the 02.03.2018, as Production License 951 (Fig. 1.1).

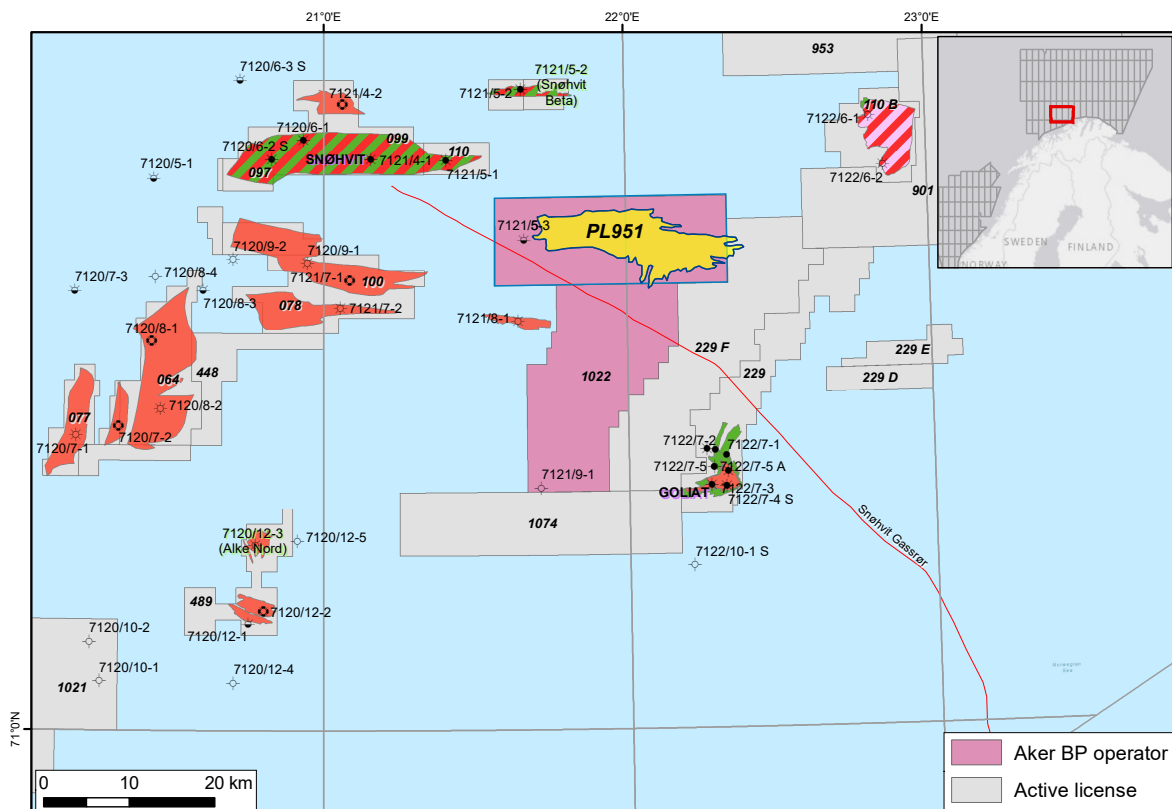


Fig. 1.1 PL951 Location map

1.1 License Owners

The stakeholders in PL 951 consists of:

- Aker BP ASA (40%), Operator
- Concedo ASA (20%)
- DNO Norge AS (20%)
- Vår Energi AS (20%)

The initial partners in the license were Aker BP ASA (40%), Eni Norge AS (20%), Concedo ASA (20%) and DNO Norge AS (20%). In December 2018, Eni Norge AS changed name to Vår Energy AS.

1.2 Award and Work Program

Production license 951 was awarded in APA 2017 on the 02.03.2018. The License was awarded with an initial period of seven years. Work commitment (within 2 years) was to:

- Reprocess 3D seismic and/or acquire 3D seismic
- Decide to drill a well

Due to delay in seismic reprocessing, a one-year extension of the decision gate to drill a well was applied for in October 2019. The Ministry of Petroleum and Energy subsequently granted six month extension of the deadline.

The current licence decision to drill deadline is 2nd September, 2020.

During the license period, four EC and/or MC meetings and three work meetings were held by the operator to share and discuss prospectivity evaluations with the licence partners. These are listed in Table 1.1.

Table 1.1 MC and/or EC activities in the PL951 License

Date	Activity	Description
2018		
02.03.2018	License awarded	As part of the Awards in Predefined Areas 2017
05.04.2018	MCEC meeting #1	Formal and administrative issues, prospect inventory, common database etc. Partner presentations
22.06.2018	ECWM	Common database, reprocessing of seismic, APA2018. Partner presentation
11.12.2018	MCEC meeting #2	3D reprocessing and way forward
2019		
09.07.2019	ECWM	Seismic reprocessing; FWI test results and way forward. Partner presentation
27.11.2019	MCEC meeting #3	Results from seismic reprocessing, status on new interpretations and volumes. Partner presentation
2020		
11.02.2020	ECWM	Status on velocity model update, updated reservoir depositional model. Partner presentations
07.05.2020	MCEC meeting #4	Depth conversion Halti Prospect, Updated prospect evaluation, volume and risk, Drill or Drop recommendation presented to partners

The work obligations have been fulfilled and the opportunities outlined in the licence were fully evaluated.

1.3 View on prospectivity

The PL 951 is located in the Hammerfest Basin on the northern part Central Hammerfest Terrace and 26 km north of the Goliat Field (Fig. 1.1 and Fig. 1.2).

One prospect has been identified. The Halti Prospect is defined by a 3-way fault dependant closure within the Middle Triassic coastal plain to shallow marine deposits in the Kobbe Formation. Top seal is marine shales, in the lowermost Snadd Formation, deposited during Ladinian flooding event. Source rock is Steinkobbe Formation shales, proven in the Goliat Field. Lateral seal towards north is intra Snadd shales. Channels features have not been observed juxtaposed to the Halti Prospect on the seismic, but thin thief sands can not be excluded. The main risk is considered to be reservoir quality and presence.

Reservoir potential in the Realgrunnen sub-group and upper Snadd Formation was tested in 2001, when Well 7121/5-3 was drilled by Den norske stats oljeselskap (Equinor). The well contained oil

and gas shows. Volume potential left updip of this well is limited, and only small closures are observed in this stratigraphic level within the license. In PL951, only minor segments of high amplitude channel features are observed within the Snadd Formation.

Marginal resource potential and high risk prospectivity makes a positive drill decision unlikely and the license partnership has taken the decision to relinquish PL 951.

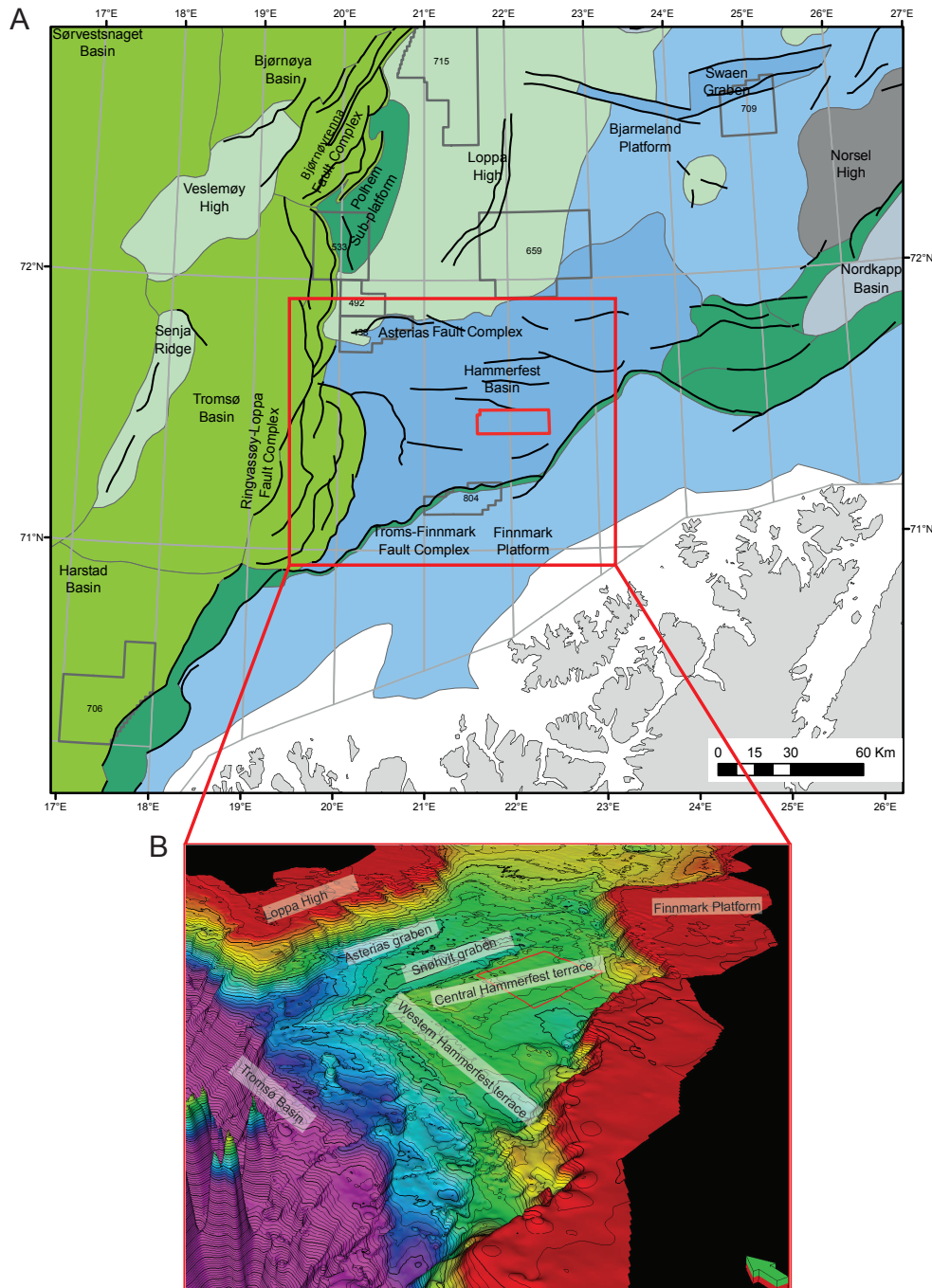


Fig. 1.2 Location of PL951 A) the main structural elements in the Southwestern Barents Sea. B) A 3D view of a regional BCU seismic surface illustrating the location of the application are on the informally named Central Hammerfest terrace

2 Database

2.1 Seismic Database

The seismic database agreed in the licence consist of three vintages of merged 3D surveys, Fig. 2.1. Subsequent to the award of PL951, the partnership agreed to reprocess seismic within an area of 980 km².

Reprocessed seismic ABP19M01 (PSDM and PSTM) dataset has been used for detailed prospectivity evaluation. Released 2D seismic has been utilized in areas without 3D seismic data. This include relevant NBR lines, BSS01 and BSSD01.

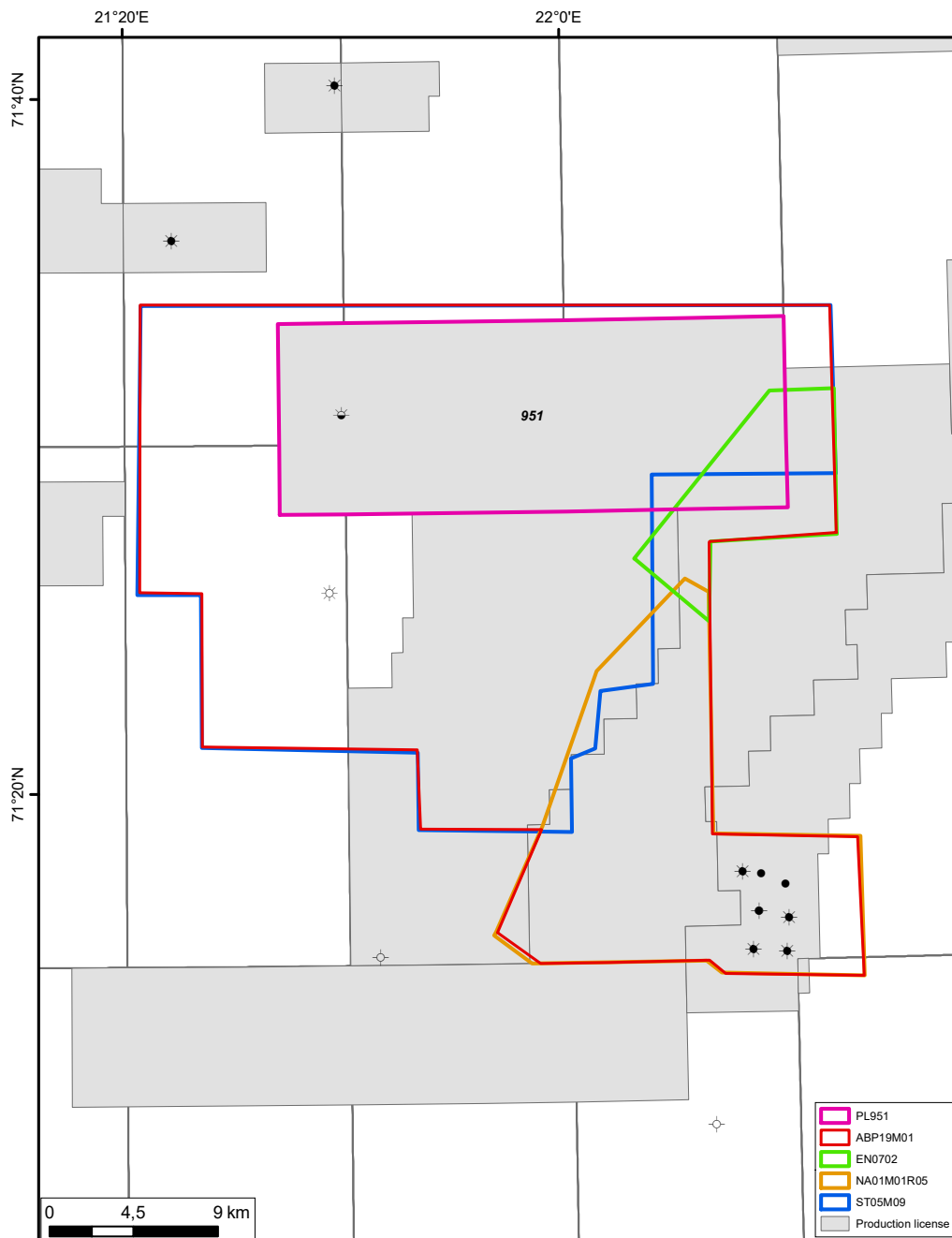


Fig. 2.1 Seismic database PL951

2.2 Well Database

The exploration wells includes in geological and geophysical studies and prospect evaluation are displayed in Fig. 2.2. and listed in Table 2.1.

Key wells include:

- 7120/9-2 Albatross
- 7120/12-2 Alke
- 7121/5-2
- 7121/5-3
- 7121/8-1 Blåmann
- 7222/6-2 Tornerose
- 7122/7-1, 2, 3, 4S, 5, 5A and 6 (Goliat Field)
- 7122/10-1 S Goliat Eye

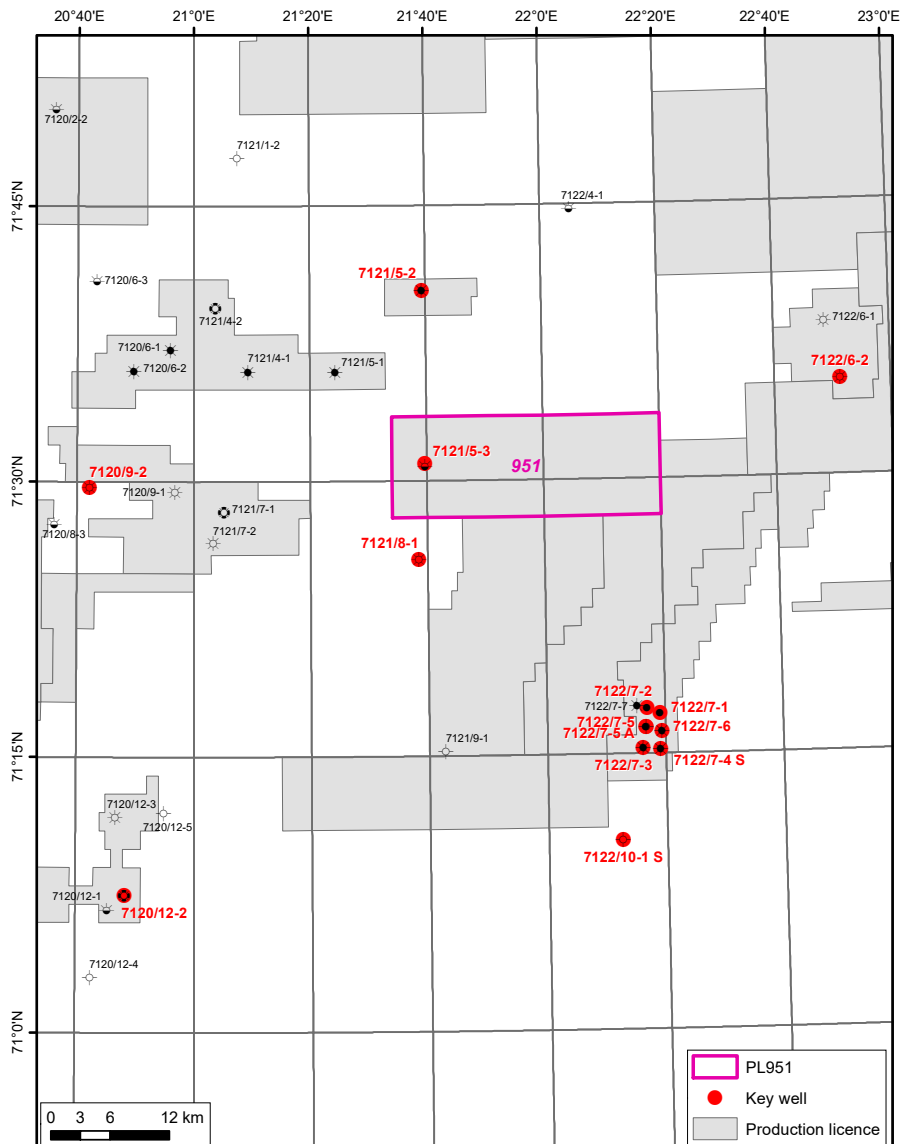


Fig. 2.2 Well database Key wells highlighted in red

Table 2.1 Key Wells *Key wells used in the evaluation of the Halti Prospect and other prospectivity in the PL951*

Well	NPDID	Year P&A	TD (mMD)	Content	Levels with HC or shows	TD Stratigraphy
7120/9-2 Albatross	107	1984	5072	Gas	Kapp Toscana Gp. & Fruholmen Fm.	Røye Fm.
7120/12-2 Alke Sør	122	1981	4680	Gas/Condensate	Stø & Snadd Fms.	Basement
7121/5-2 Snøhvit Beta	907	1986	2543	Oil/Gas	Stø Fm.	Fruholmen Fm.
7121/5-3	4244	2001	2265	Oil/Gas shows		Snadd Fm.
7121/8-1 Blåmann	8159	2017	2260	Gas	Stø Fm.	Snadd Fm.
7122/6-2 Tornerose	5327	2006	3070	Gas	Snadd Fm.	Kobbe Fm.
7122/7-1 (Goliat Field)	4173	2000	1524	Oil	Tubåen Fm.	Snadd Fm.
7122/7-2 (Goliat Field)	4391	2001	1418	Oil	Tubåen Fm.	Snadd Fm.
7122/7-3 (Goliat Field)	5214	2005	2726	Oil/Gas	Tubåen, Snadd & Kobbe Fms.	Tempelfjorden Gp.
7122/7-4 S (Goliat Field)	5406	2006	2550	Oil/Gas	Kobbe & Klappmyss Fms.	Havert Fm.
7122/7-5 (Goliat Field)	5439	2006	2228	Dry		Klappmyss Fm.
7122/7-5 A (Goliat Field)	5465	2006	2186	Oil	Kobbe Fm.	Kobbe Fm.
7122/7-6 (Goliat Field)	7051	2013	2026	Oil/Gas	Fruholmen & Kobbe Fms.	Klappmyss Fm.
7122/10-1 S Goliat Eye	8257	2017	1525	Dry		Kobbe Fm.

3 Geological and Geophysical studies

Geological and geophysical studies performed:

- Merge and Reprocessing of seismic 3D data
- New velocity model
- Updated Reservoir model

Seismic interpretation in the licence area is primarily carried out on the reprocessed seismic data (ABP19M01). Seismic to well ties were performed for the nearby wells within the reprocessed dataset and the synthetic to real seismic match is good to moderate for all the wells. Seismic horizons that were interpreted in the area are; Seabed, URU, Top Kveite, Top, Kolmule, Top Knurr, Top Fuglen, Top Snadd, Top Kobbe, Top Klappmyss. Intra Kobbe horizons are both interpreted manually and autotracked in Paleoscan. Top reservoir is defined by Top Kobbe and base reservoir is set to a low amplitude/reflective intra Kobbe interval (Fig. 3.1).

A new velocity model for depth conversion is based on the seismic velocities from the PSDM processing of the ABP19M01 seismic cube.

The updated reservoir model is based on integration of seismic interpretation, seismic attributes, well data (including core plug measurements) and recent publication on reservoir model for the Goliat Field. License work (G&G) has given the following results:

- Reprocessed 3D seismic data has improved imaging. Potential for several reservoir intervals with internal shale seal within the Kobbe Fm. Channel features observed in middle and upper Kobbe Formation. There are still challenges related to resolution of the dataset when defining internal Kobbe Formation features.
- The new velocity model flattened the Halti structure giving reduction in gross rock volumes.
- Updated reservoir model have increased risk on reservoir quality and increased confidence in top seal (Ladinian flooding event)

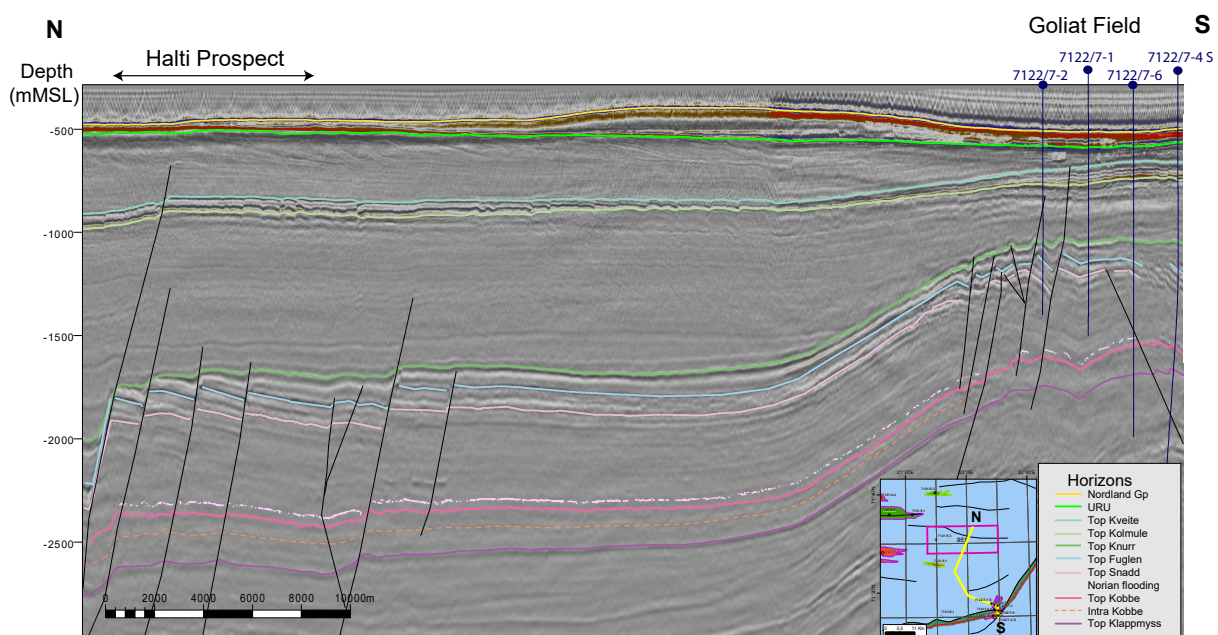


Fig. 3.1 Seismic horizons interpreted in PL 951

4 Prospect Update

Reprocessed 3D seismic data with better resolution has generally improved the confidence in the structural and prospect mapping. One data set for tie to Goliat Field, increased confidence in seismic tie and interpretation from Goliat wells to Halti Prospect.

The new velocity model has flattened the Halti structure giving a reduction in column height up to 100m and changed the prospect outline slightly. On the new seismic data, the Halti Prospect is still a robust 3-way closure bounded by an East -West trending fault towards North and a spillpoint towards the South (Fig. 4.1).

An increase in accommodation space in Halti area related to Goliat area has been mapped within the Kobbe Formation (Fig. 3.1). The increase in thickness northwards is observed throughout the Kobbe Formation and is considered a general trend and not restricted to parts of the formation.

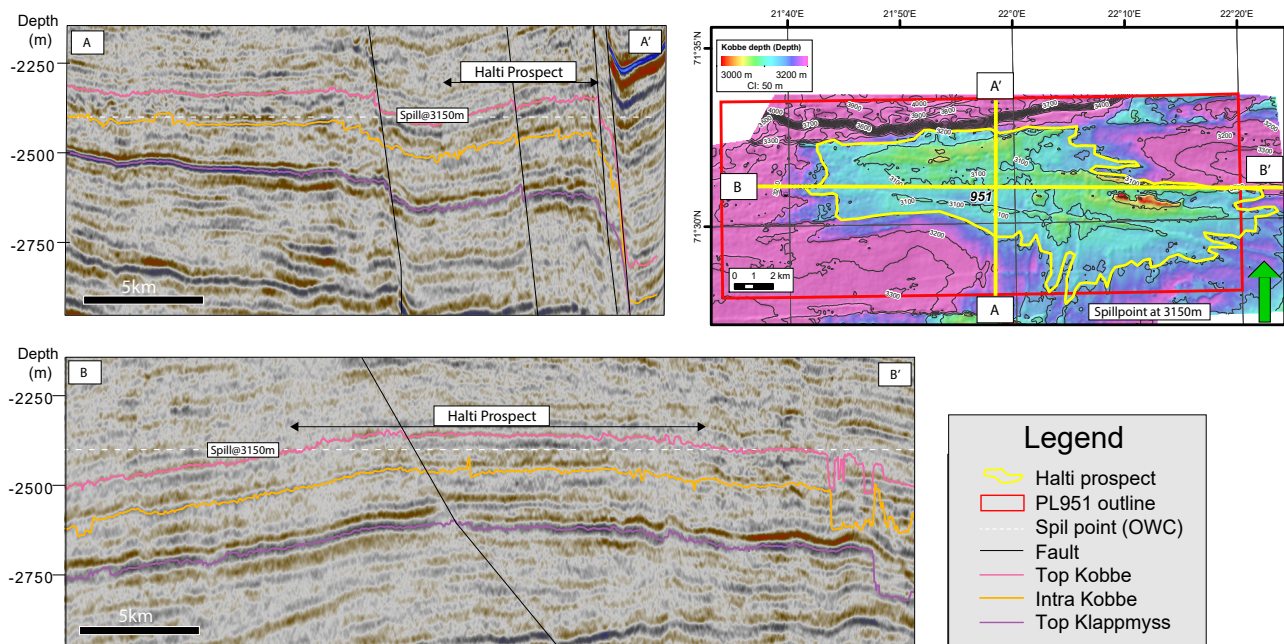


Fig. 4.1 Seismic sections across the Halti prospect *Seismic inline and crossline through the Halti prospect showing the structural setting and spillpoint.*

In the APA 2017 application depositional environment in the Halti Prospect was considered to be shallow marine shoreface deposits, time equivalent to fluvial deposits observed in Goliat wells. Attribute analyses on the new seismic reveal channelized features throughout Kobbe Formation separated by low amplitude intervals, interpreted to reflect shale dominated deposits.

In the updated reservoir model (dominated by deltaic to coastal plain deposits, Fig. 4.2 and Fig. 4.3), reservoir interval is dominated by heterolithic deposits with thin sand beds associated with channel features in the Halti Prospect (Fig. 4.4).

Since there is limited data on Fennoscandian sourced Kobbe sands with maximum burial depth corresponding to Halti reservoir, core plug measurements from quartz rich Realgrunnen sandstones has been used in addition to log interpretation from nearby wells (i.e. Alke and Goliat wells). The core plug measurements indicate tight to low porosity/low permeability for the sandstones in Halti (assumed Fennoscandian source).

Only a few meter thick intervals with fair porosity are observed in wells when adjusted for retention (max Burial depth). Thus reservoir parameters used in APA 2017 is considered to be too optimistic.

Reservoir quality is main risk for Halti, due to the heterolithic reservoir (thin sands) and cementation related to maximum burial depth.

Top seal for the Halti Prospect has been redefined from uppermost Kobbe Formation shales to marine shales in lowermost Snadd Formation (Ladinian flooding event). There is not observed any channel features juxtaposed to Halti on northern bounding fault. The confidence in trap and seal has increased in the new evaluation.

Table 4.1 shows the risk summary and resource distribution for Halti Prospect at the time of application award (APA2017) compared to final evaluation.

Table 4.1 Risk and resource summary for the Halti Prospect

Descriptions		Halti (APA application)	Halti (PL951)
Risk factors		Risk	Risk
Reservoir	Reservoir Presence	0.5	0.7
	Reservoir Quality	0.6	0.3
Trap & Seal	Trap Geometry	0.7	0.9
	Seal Presence	0.8	1.0
Source	Source Presence	1.0	1.0
	Migration and timing	0.8	0.7
Retention	Retention		1
POS		0.13	0.13
Mean Rec. total resources (10⁶ Sm³ OE)		39.4	19.7
Mean Rec. oil resources (10⁶ Sm³ OE)		27.4	14.9

When applied for in APA 2017, the Halti Prospect had a low probability of success (13%) with reservoir presence (0.5) and quality (0.6) as main risk.

Through geological and geophysical analyses the risk related to reservoir quality has changed from 0.6 to 0.3 and the confidence on reservoir presence increased from 0.5 to 0.7.

Top seal is considered to be lowermost Snadd Formation marine shales, proven in nearby wells. This is reflected in seal presence adjusted from 0.8 to 1 displayed in the risk and recourse summary (Table 4.1).

The probability of success for Halti Prospect is 13% and the base case hydrocarbon recoverable reserves are estimated to 94 mmboe recoverable resources in oil case. The main risks associated with the Halti Prospect is reservoir quality, in addition to reservoir presence and migration and timing.

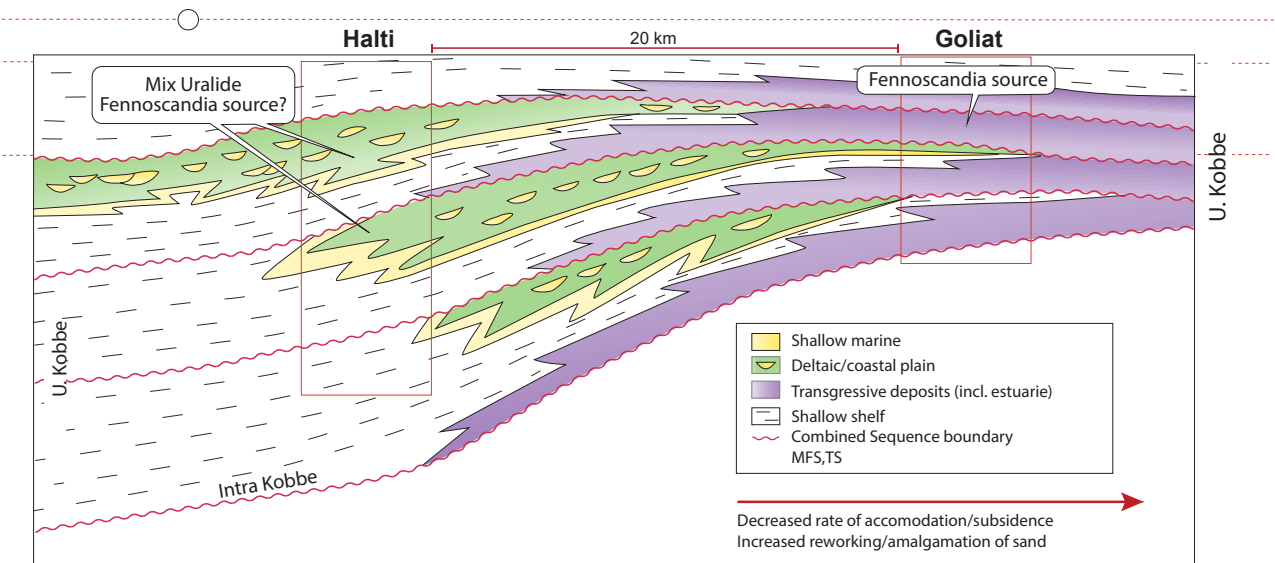


Fig. 4.2 Geoprobe from Goliat Field to Halti Prospect, Upper Kobbe Formation *Simplified and schematic depositional model of the upper part of Kobbe Formation. Bypass and reworking in Goliat area due to limited accommodation spaces related to sediment supply and stacking of estuarine deposits. Coastal deposits preserved in the Halti area.*

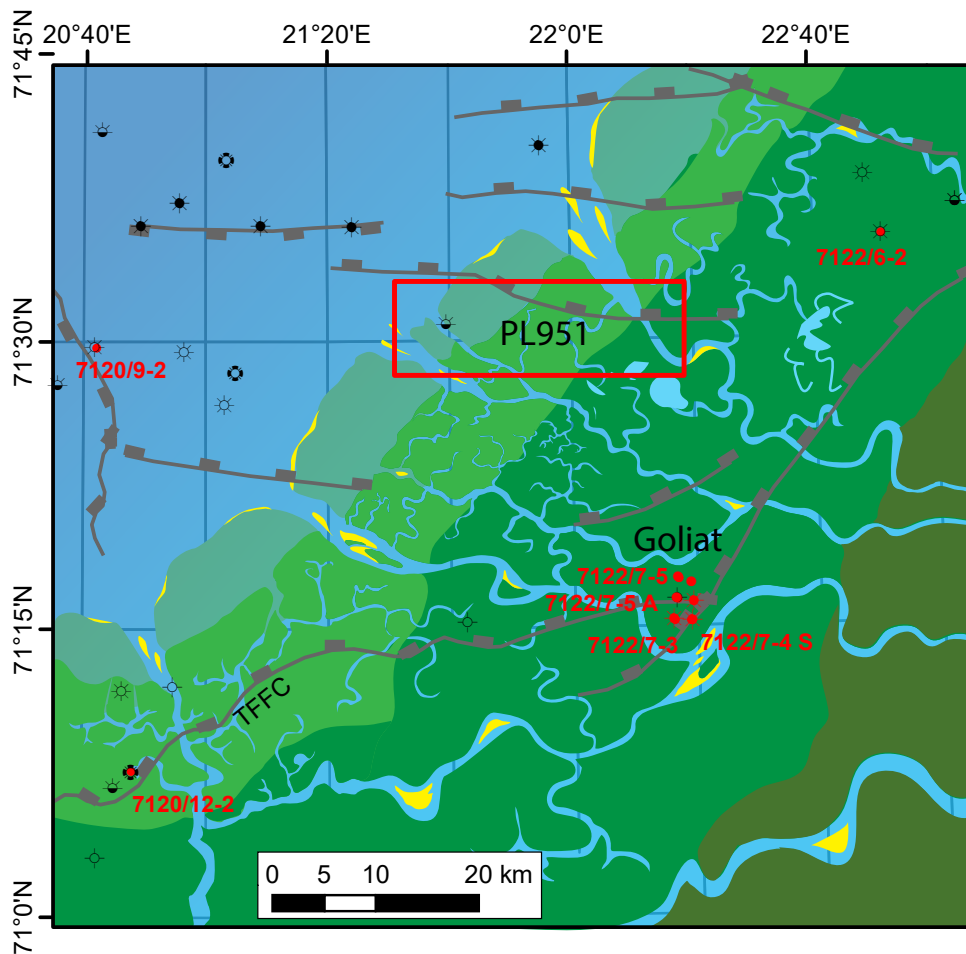


Fig. 4.3 Kobbe Formation Gross Depositional Environment *Revised Gross depositional environment for the Halti Prospect (max regression) showing transition from alluvial plain (brownish) to offshore transition/shelf in blue in a mud-rich tidal dominated coastal environment.*

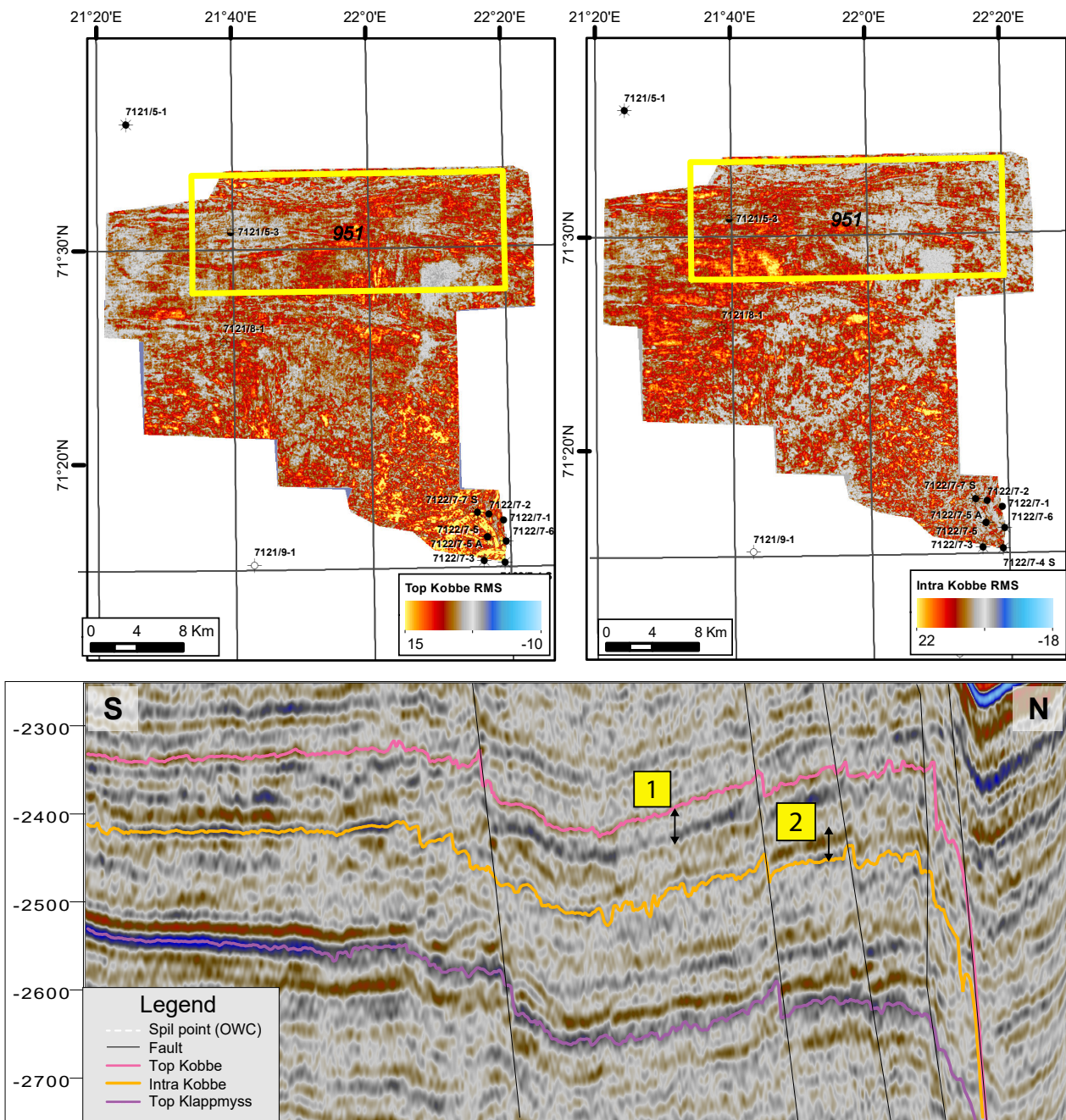


Fig. 4.4 Kobbe Fm amplitude maps in the Halti - Goliat area Amplitude maps within two intervals in the Kobbe Fm illustrating the poor development of channel sands (bright amplitudes) within the Halti structure. Low channel continuity and amplitudes indicates poor reservoir development.

5 Conclusion

Geological studies carried out to put the licence area into regional geologic context as part of the work program has improved the understanding of PL951. Detailed seismic interpretation, geophysical evaluation and reservoir studies have highlighted the significant challenges to de-risk the reservoir quality of the Halti Prospect in the licence.

The overall resource potential and associated risks for the prospect identified in PL951 are presented in Table 5.1.

The resource potential in Halti is borderline to marginal and the associated risk is high. Geological risk is high (COS 13%) with very high risk on reservoir quality associated with heterolithic reservoir in the deeply buried Kobbe Formation. The prospect is not viewed as a drilling candidate and the licensees have thus decided to relinquish the license.

Table 5.1 New XaitPorter Table

Prospect name	P (prospect)/ L (Lead)	Litho-/Chronostratigraphy	Phase	Main risks	POS %	Resources mean Total Rec. (10 ⁶ Sm ³ OE)	Resources Mean Oil Rec. (10 ⁶ Sm ³ OE)
Halti	P	Kobbe Fm/ Middle Triassic	Oil&Gas	Reservoir	13	19.7	14.9
Updip of 7121/5-3	L	Realgrunnen/ M Jurassic - L Triassic	Oil&Gas	Seal			

6 References

APA 2017. Application for production license in blocks 7121/5, 6, 8, 9 & 7122/4, 7, Aker BP