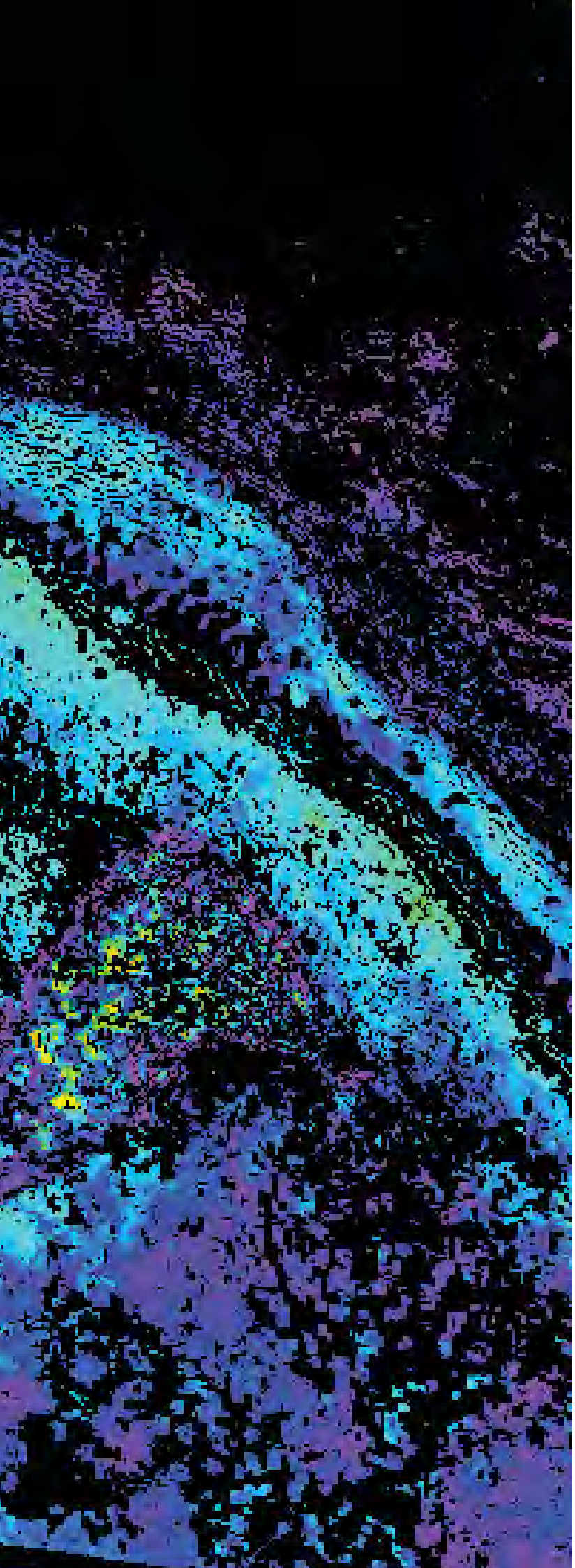

Relinquishment Report

PL411

Blocks
17/1 & 26/10

Spring Energy

NORECO

PL411 Relinquishment Report

Document last updated 01-06-2012 13:24 CEST

PL411 Relinquishment Report

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1 License history

Production License PL 411 was granted to Norwegian Energy Company ASA (Noreco) as an operator with 100% interest on February 16 2007 as part of awards in APA 2006. At the time of award the license consists of blocks 26/10, 26/11, 17/1 and part of 17/2 Fig. 1.1 . Later, in October 2008, Spring Energy came in as a partner with a 30% license share. The license was active for 5 years and 3 months and a total of five partner meetings were held during this period.

- 17 February 2009 (EC/MC Meeting No. 1)
- 1 December 2009 (EC/MC Meeting No. 2)
- 19 November 2010 (EC/MC Meeting No. 3)
- 12 April 2011 (EC/MC Meeting No. 4)
- 16 November 2011 (EC/MC Meeting No. 5)

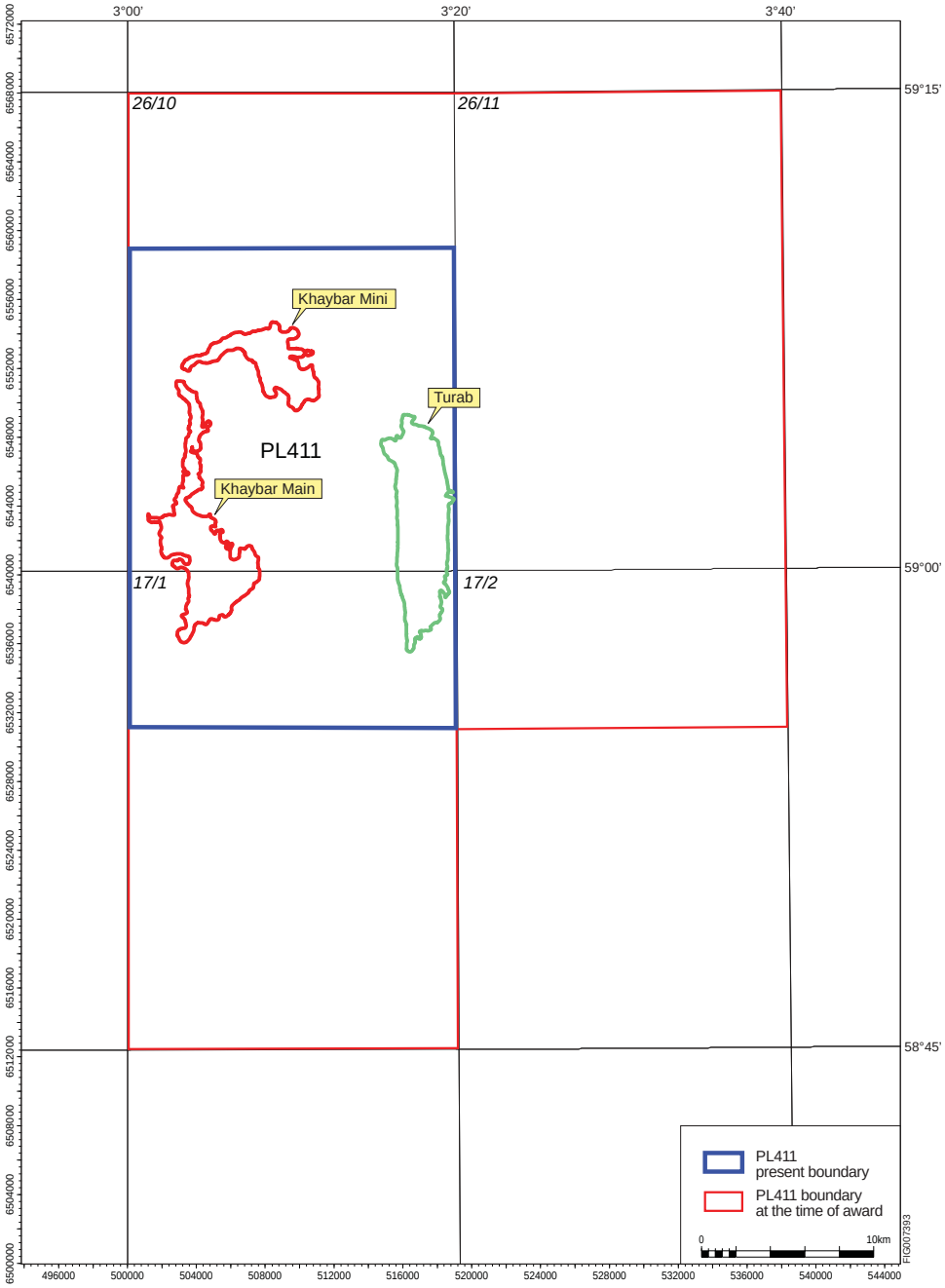

Fig. 1.1 PL411 - Prospects Map

The first phase of work obligations which had to be fulfilled within 1 years from award, included the following:

- Purchase available 2D and do interpretation
- Decide to acquire a minimum 200 km² of 3D Seismic or drop

These two obligations were met during the first year with a purchase of a total of 1722 km 2D Seismic to conduct seismic interpretation and update the regional work. Also, it was decided to go ahead with a 470 km² full fold 3D Seismic with a PGC Multiclient Acquisition in Q2 2009. A subsequent PGS processing was planned for Q3 2009. The survey was planned to be 470 km², but grew to 874 km² during the start up phase. The next phases of work obligations were:

- Within three years decide to drill a well or drop the license. Before drilling, the operator was obligated to bring in a competent North Sea operator as a partner
- Within Five years deliver PDO or drop the license

The Acquisition & Processing of PGS Multiclient 3D seismic survey MC3D-SBS-2009 was delayed and the final products were delivered in Q2 2010. Due to this delay, the licensees applied for an extension of the drill/drop decision. This was approved with a new drill/drop deadline February 17, 2011.

Following the interpretation of the new 3D seismic, one large prospect (Turab) was defined. The HC charge to this prospect was modeled to come from the Åsta Graben. This was the same kitchen area expected to charge Svaneøgle (17/6-1) drilled by the operator Noreco, in the neighbouring PL545 in Q1 2011. The licensees decided to wait for results from the Svaneøgle well before taking a drill decision on Turab and applied for a 3-months extension to the drill/drop date. This was approved and the new date was May 16, 2011.

The Khaybar prospect was identified in the Oligocene Utsira/Skade Formations. The partners decided to conduct an EM survey in order to de-risk the Oligocene prospect. In may 2011 the partnership in PL411 decided a partial relinquishment and a further one year extension for conducting the EM Survey in fall 2011 was granted. The license acreage was then reduced to 532 km² from an original 1777 km² . This was approved and a new deadline for drill/drop was set to May 16, 2012.

The EM results were negative and the license was relinquished.

2 Database

The original common well database included 32 wells. Later the results of well 17/6-1 in the neighbouring PL545 license was also included. All the petrophysical logs and borehole samples such as cores and cuttings description were used for all the technical evaluations. A list of all the wells used is provided in Fig. 2.1 & Table 2.1.

As for the seismic database, originally only 2D seismic data with different vintages have been used (see Fig. 2.2). Later a new multi-client 3D seismic survey (MC3D-SBS-2009) (Fig. 2.3) was acquired as part of work program obligations. This survey was just covering the prospect areas, where as, the rest of the 2D surveys were covering the entire license.

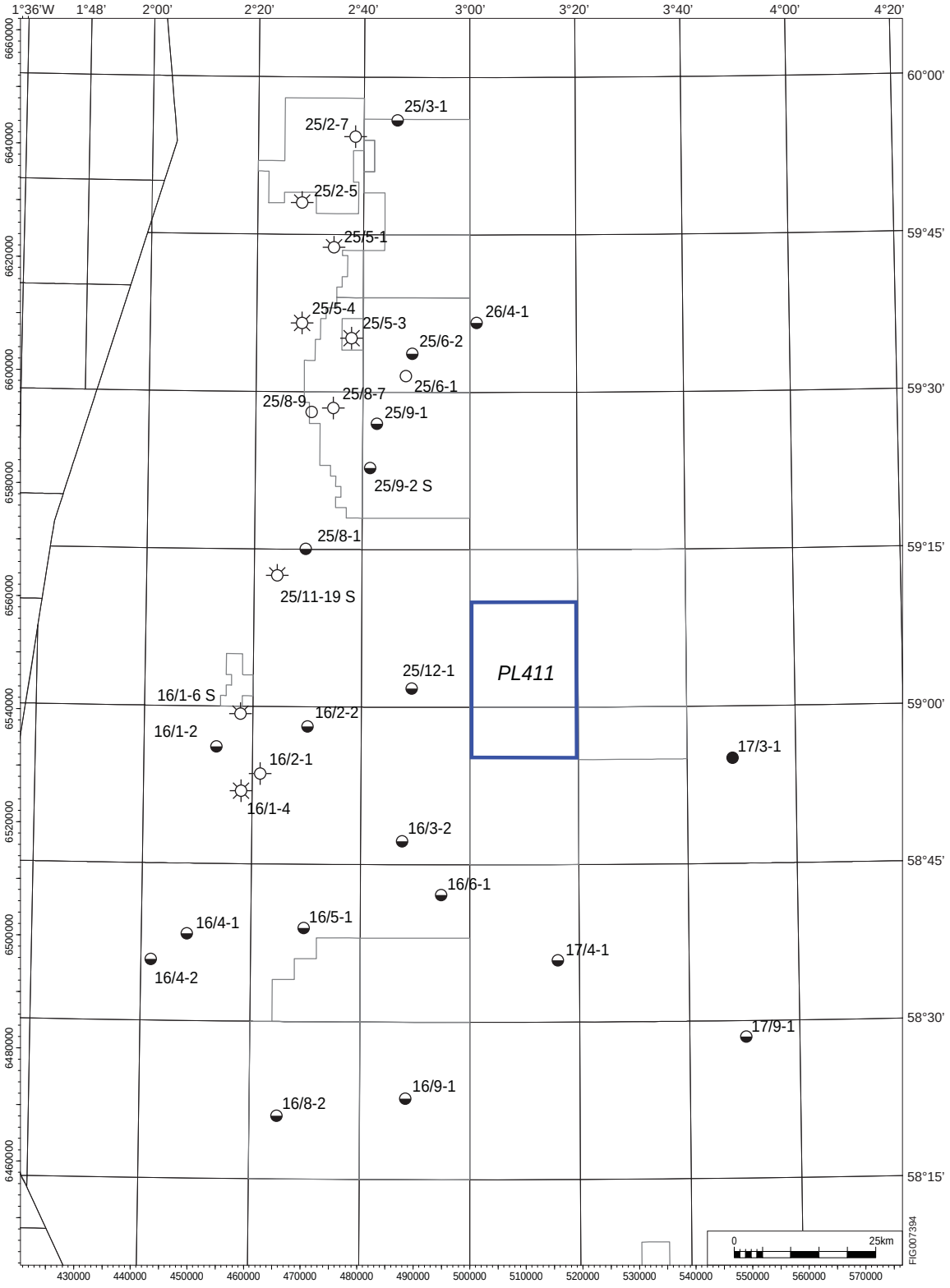

Fig. 2.1 List of wells database

Table 2.1 List of Wells Cont'd

Well	Year	Content	Seismic tie	Digital logs
16/1-2	1976	Dry	X	X
16/1-4	1993	Gas/cond.	X	X
16/1-6, 6S	2003	Oil/Gas	X	X
16/2-1	1967	Shows	X	X
16/2-2	2001	Dry		X
16/3-2	1976	Dry	X	X
16/4-1	1984	Dry	X	X
16/4-2	1990	Dry	X	X
16/5-1	1971	Dry	X	X
16/6-1	1968	Dry	X	X
16/8-2	1980	Dry	X	X
16/9-1	1968	Dry	X	X
17/3-1	1995	Gas	X	X
17/4-1	1968	Dry	X	
17/9-1, 1R	1974	Dry	X	X
25/2-5	1976	Oil/Gas	X	X
25/2-7	1982	Shows		X
25/3-1	1989	Dry	X	X
25/5-1, 1A	1987	Oil/Gas		X
25/5-3	1990	Gas/cond.	X	X
25/5-4	1991	Gas/cond.	X	X
25/6-1	1986	Oil	X	X
25/6-2	1992	Dry	X	X
25/8-1	1970	Oil		X
25/8-7	1995	Shows		X
25/8-9, 9A	1997	Oil	X	X
25/9-1	1995	Dry	X	X
25/9-2S	2003	Dry	X	X
27/11-17	1993	Dry	X	X
25/11-19S, SR	1995	Oil/Gas	X	X
25/12-1	1973	Dry		X
26/4-1	1987	Dry		X

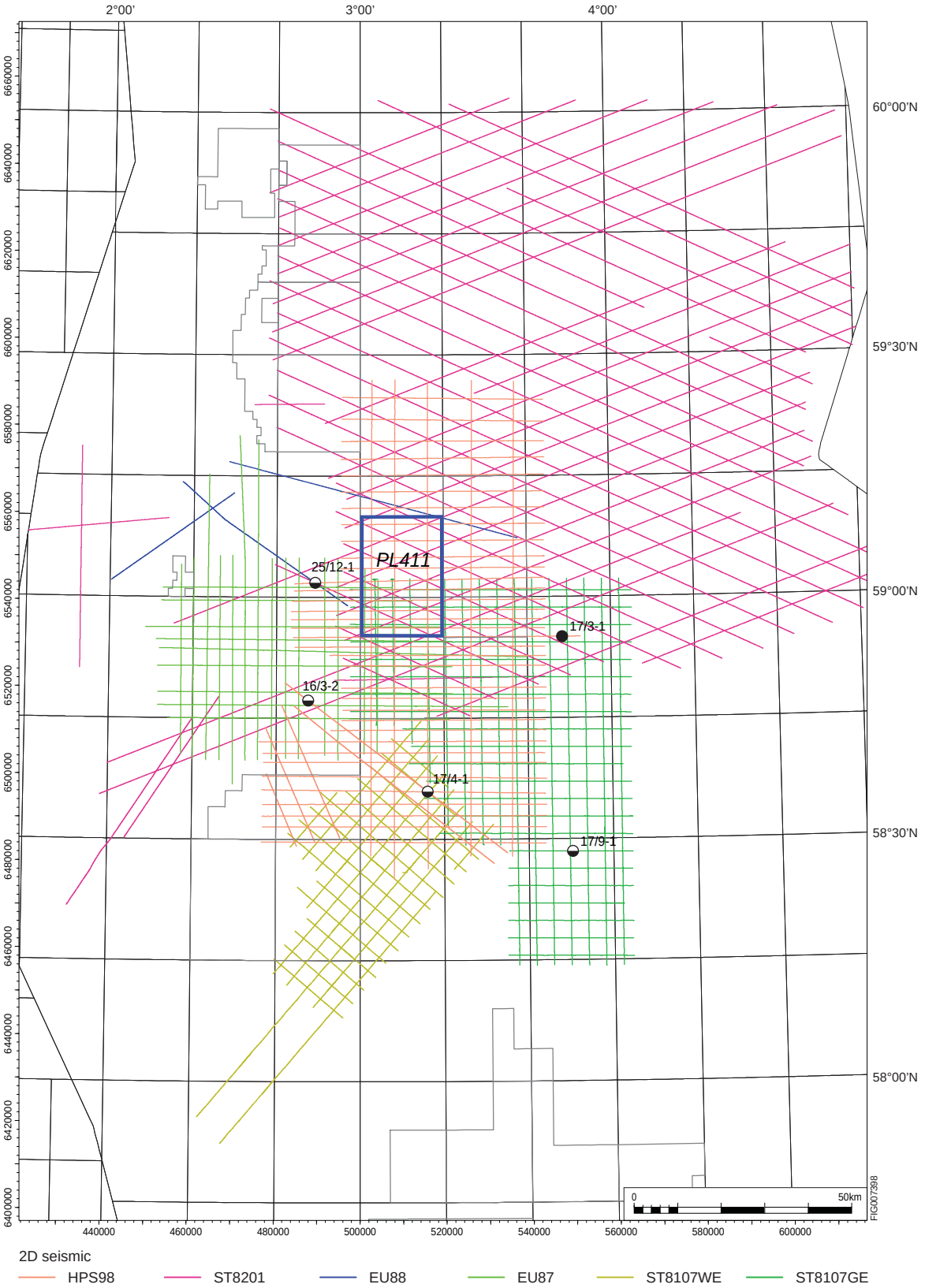

Fig. 2.2 2D Seismic Database

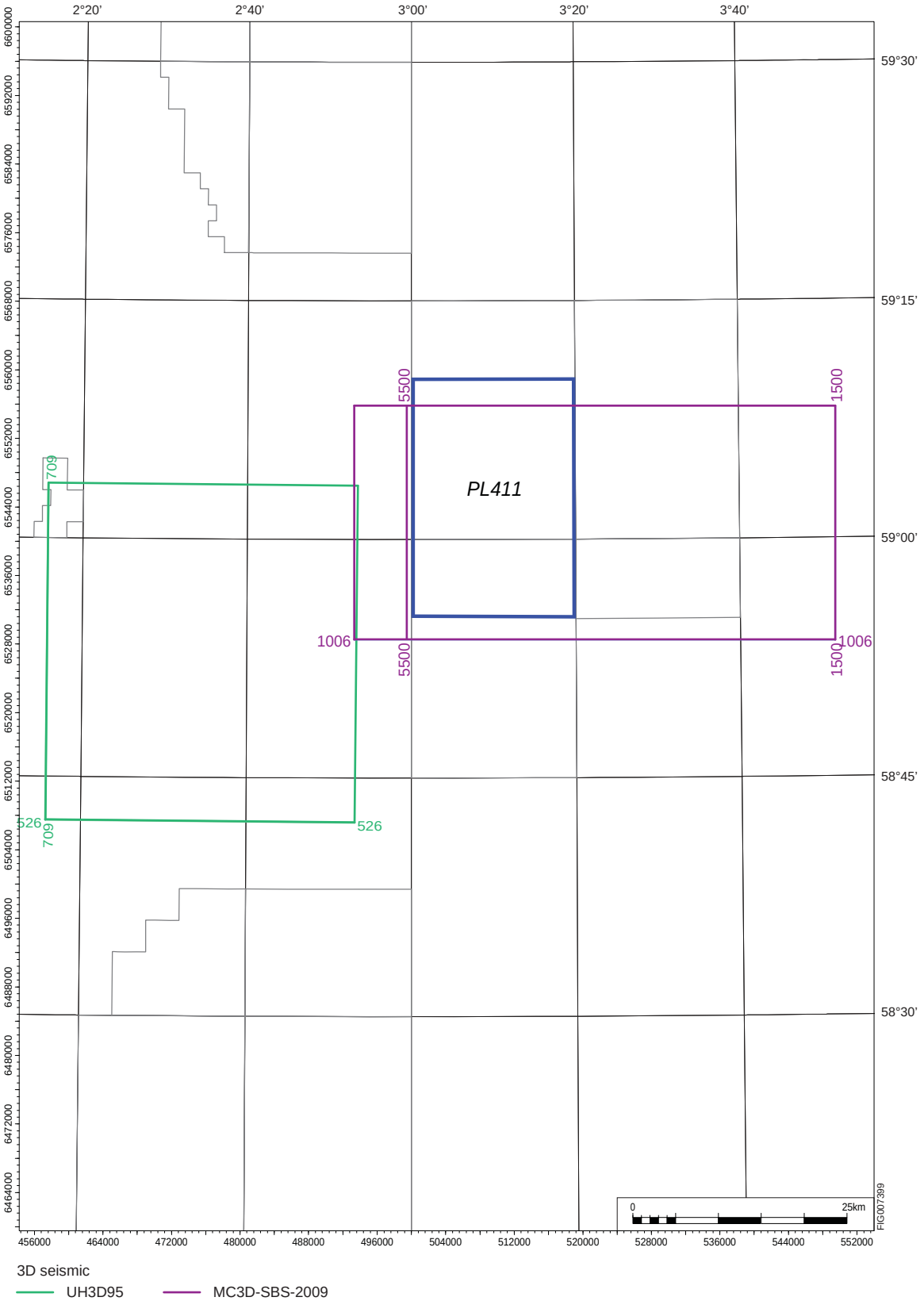

Fig. 2.3 3D Seismic Database

An EM Survey was conducted. The survey was performed in a single profile of 8.5 Km from SW (left) to NE(right). A survey outline has been included in Fig. 2.4.

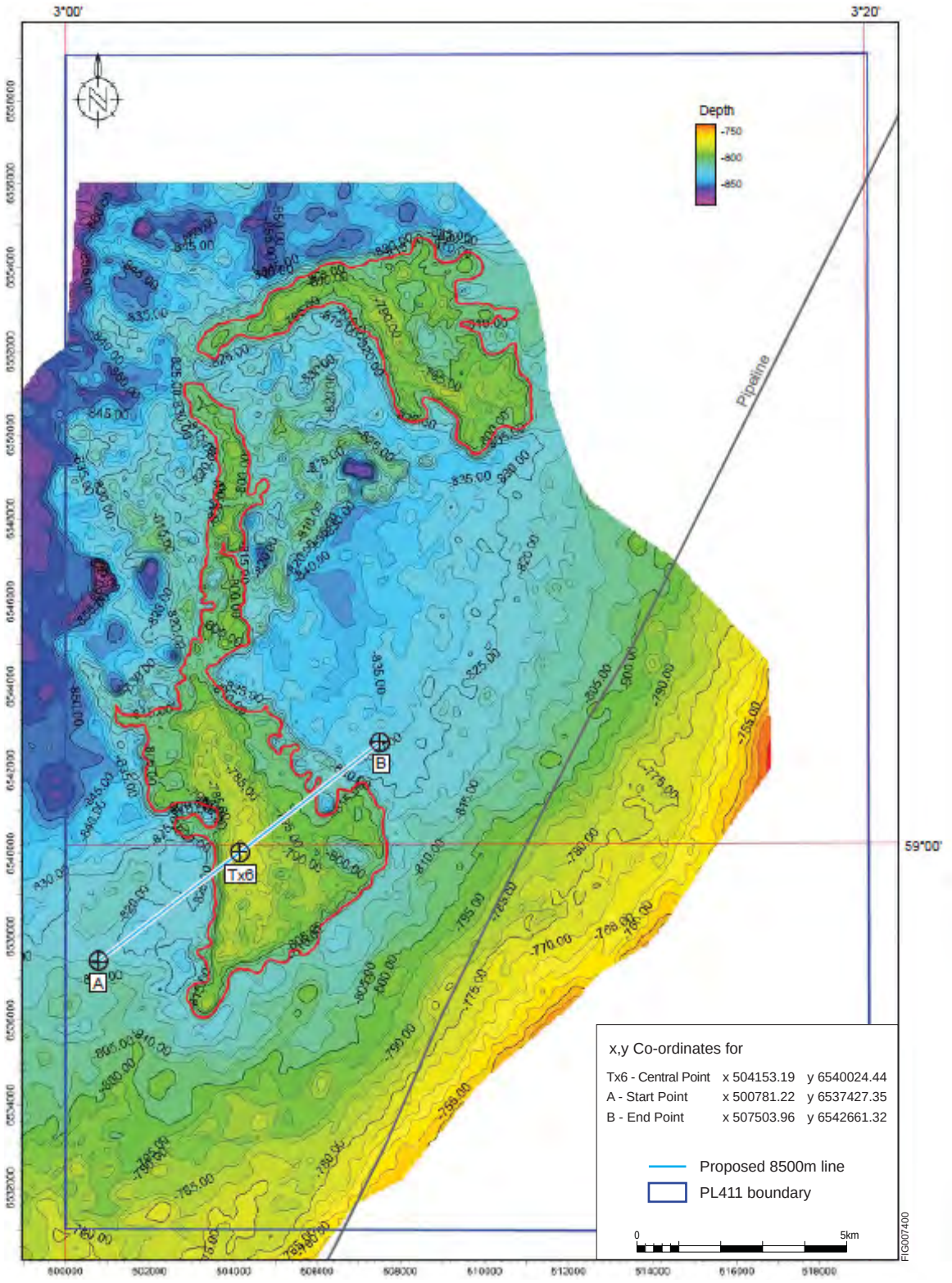

Fig. 2.4 EM Survey Conducted in PL411

3 Review of geological framework

The detailed description of the given geological framework for the area of the license can be found described in the APA 2006 (Application in Predefiined Areas) document.

The key play models discussed in the APA 2006 license application were:-

- Middle Jurassic Play Model
- Post Paleocene Play Model

Of these play models, the middle Jurassic one was considered to be the most significant in terms of hydrocarbon potential with Sandnes Fm of the Vestland Gp as the main reservoir. The traps were interpreted to be rotated fault blocks or local horst blocks. The primary source rock was considered to be Late Jurassic Tau Fm with shales of Egersund Fm as the seals. Previously this play model was not proven as the mature source rock in Åsta Graben was untested. A small gas discovery in the offset well 17/3-1 has been evaluated. Prior to drilling of the Svaneøgle well (17/6-1) the following reasons were considered as the causes of failure for the well 17/3-1:

- Inefficient hydrocarbon generation and/or migration
- Structural tilting of the trap during Miocene Uplift
- Presence of thief sands near the crest of the robust structural closure.

Svaneøgle was technically a discovery, but the minor amounts of hydrocarbons are attributed to the lack of mature source rock in the Åsta graben. After 17/6-1, the small gas discovery in 17/3-1 is attributed to a local source in Bryne Fm. As the source maturation remains to be the biggest geological uncertainty in this region, it was decided not to test the same play model in the Turab prospect.

For the post Paleocene play, the Oligocene prospect (Khaybar) was matured as a possible drilling candidate. Reservoir is in the Utsira/Skade Fm and the source rock was modeled to be in the Viking Graben with the spill from the Grane field. The seal was identified to be the shales in Hordaland Gp. The trap is a mound with four-way dip closure, possibly formed by re-mobilized sands in Utsira/Skade Fm.

A fluid inclusion study/report for the well 25/12-1 was traded in order to understand the migration from the Viking Graben. There were some indications of HC in Skade Fm in addition to a clear HC anomaly at Paleocene level.

An EM survey was performed to de-risk the Oligocene Khaybar prospect, but no positive anomaly was found. The possibility of heavy oil at such a shallow depth is a challenge for a development.

After the evaluation, the partners decided to drop the license.

4 Prospect update

For the APA 2006 license application, a cluster of Middle Jurassic and post Paleocene Leads were identified. The seismic cover was poor and the leads were poorly defined. Following a new 3D seismic acquisition in the license area, two prospects were identified and matured as a possible drilling targets

1 - The Middle Jurassic, Turab and

2 - The Oligocene, Khaybar. Fig. 4.1

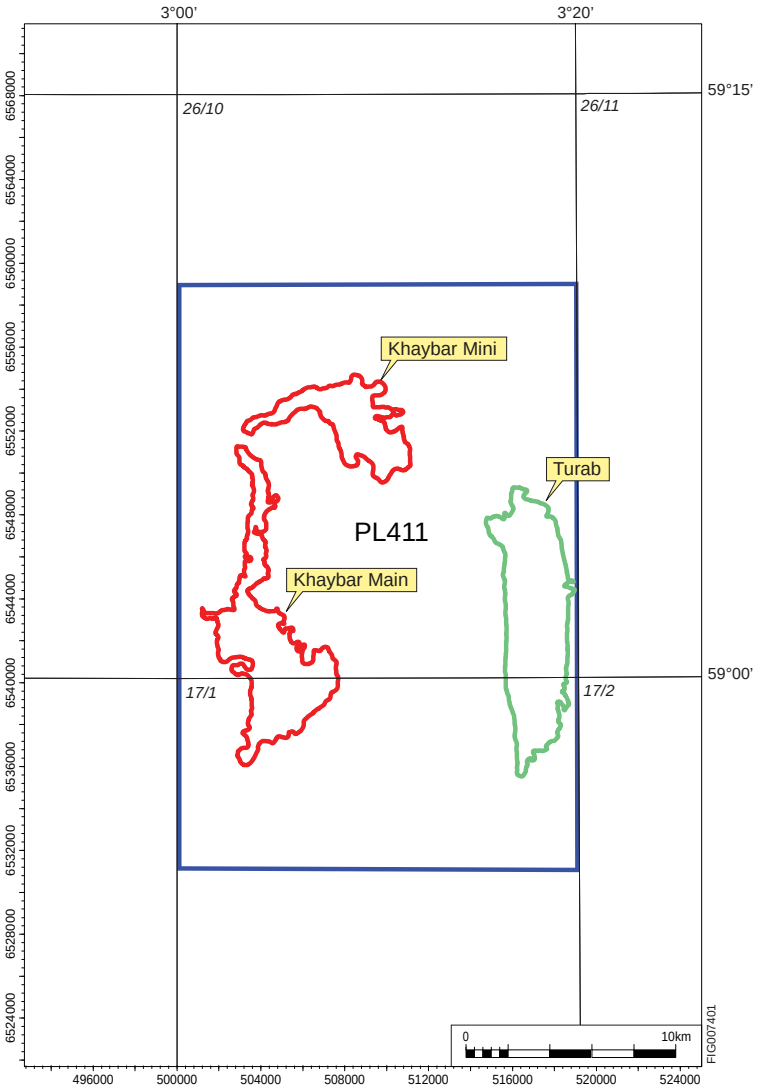

Fig. 4.1 PL411 The Turab (Middle Jurassic) & Khaybar (Oligocene) Prospects

The Turab Prospect

The Turab prospect was considered to be the most promising. The reservoir was expected in the Sandnes Fm and a source rock in the Late Jurassic Tau Fm. The interpretation and mapping on the newly acquired 3D seismic revealed a well defined four-way closure (Fig. 4.2) along a horst block (Fig. 4.3). The areal extent of the prospect is 33.2 km^2 with a vertical relief of 85 m. The HC migration was modeled to come from the Åsta Graben. As the Svaneøgle well (17/6-1) was a test of the same source rock system, the negative result of the well had severe implications for the Middle Jurassic prospectivity in the license. It was decided not to drill the Turab Prospect.

The Khaybar Prospect

Following the failure of Svaneøgle, focus shifted to shallower possibilities. In the APA 2006 application, a scenario where hydrocarbons were trapped along a pinch-out towards the East in Skade Fm was discussed . With the new 3D seismic this lead was worked thoroughly. The matured prospect was named 'Khaybar', with reservoir in Utsira Fm of Oligocene/Miocene age Fig. 4.4. The trap (a four-way dip closure) was likely to be a sand mound as a result of re-mobilized sand along a channel in the Utsira Fm Fig. 4.5. The prospect is comprised of two separate closures; the bigger one was referred to as Khaybar Main, and, the smaller was named as Khaybar Mini. The size of Khaybar

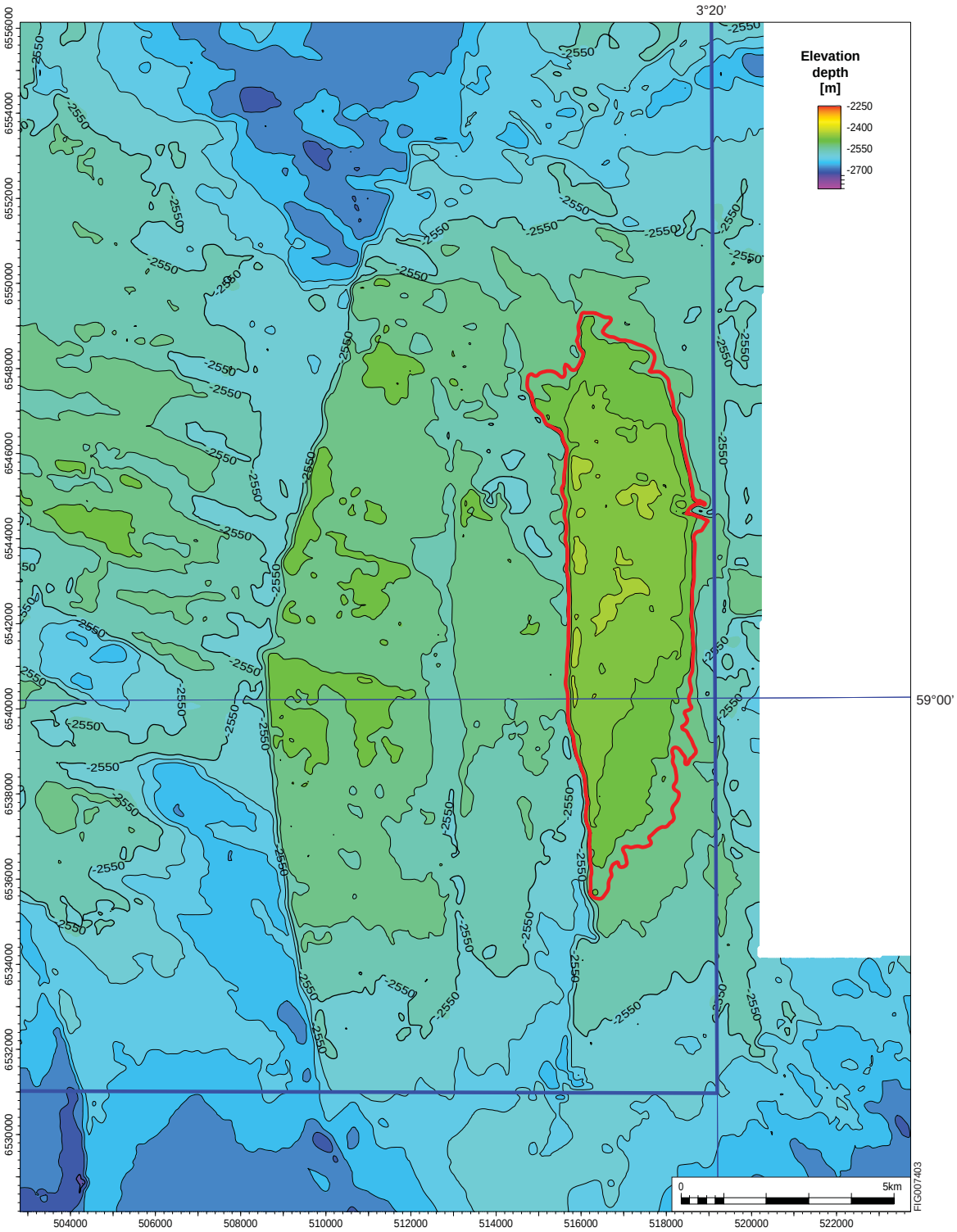

Fig. 4.2 Top Sandnes Depth Map

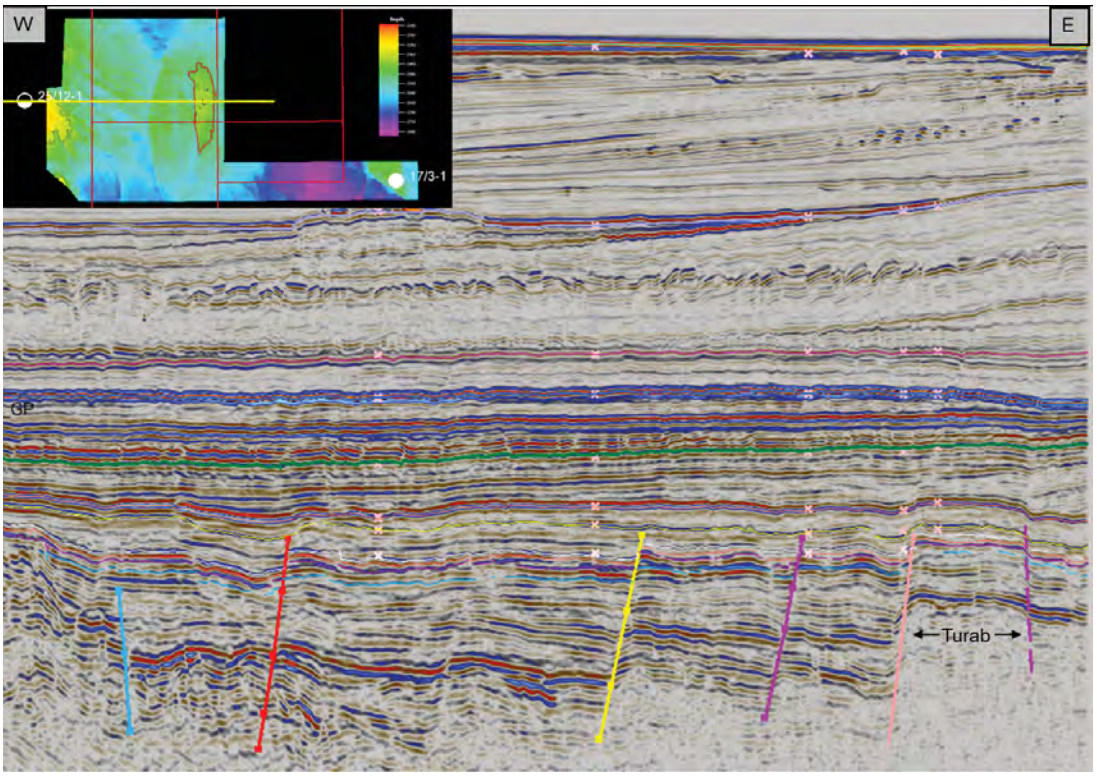

Fig. 4.3 The Turab Prospect

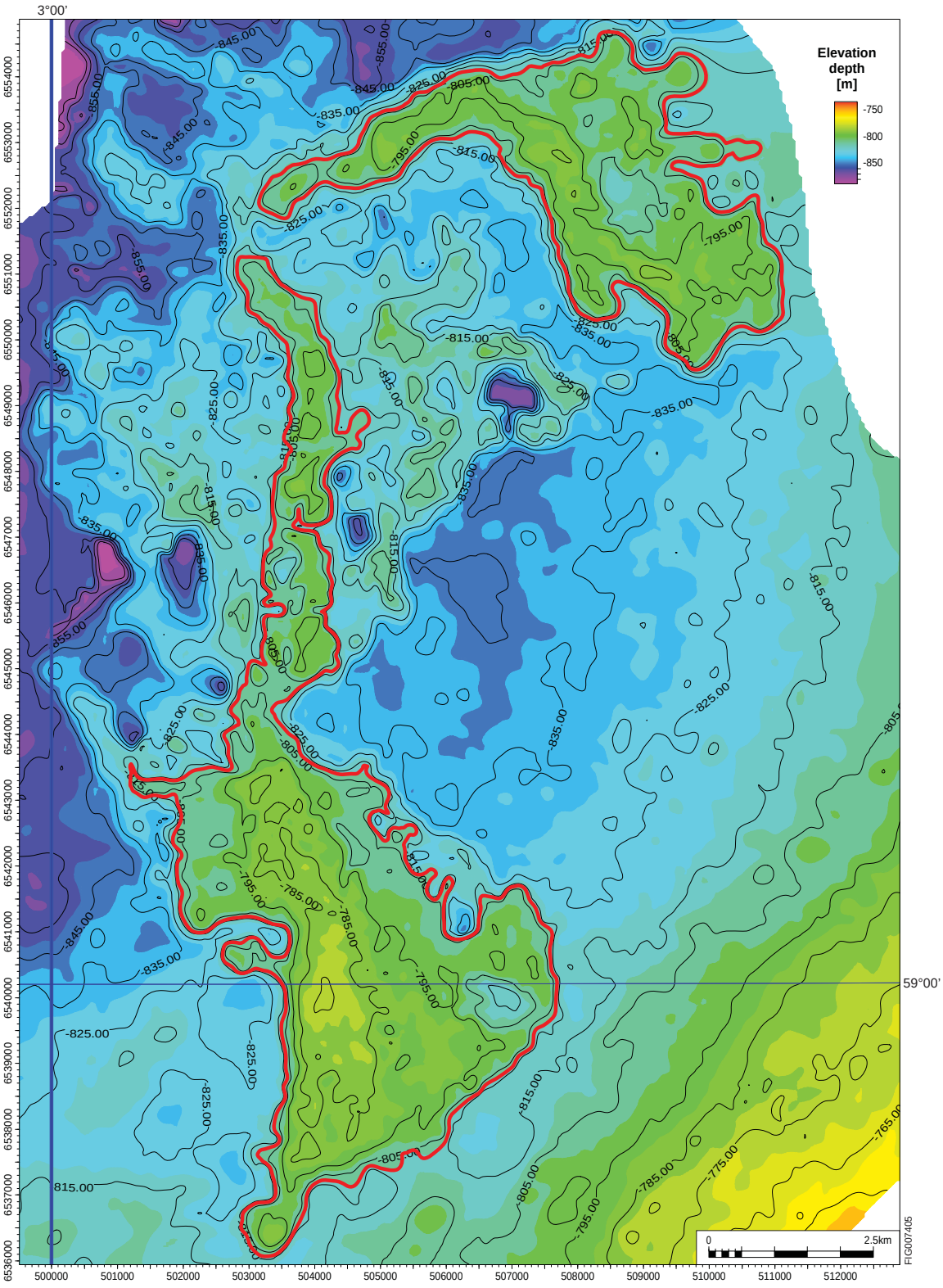

Fig. 4.4 Top Utsira Depth Map

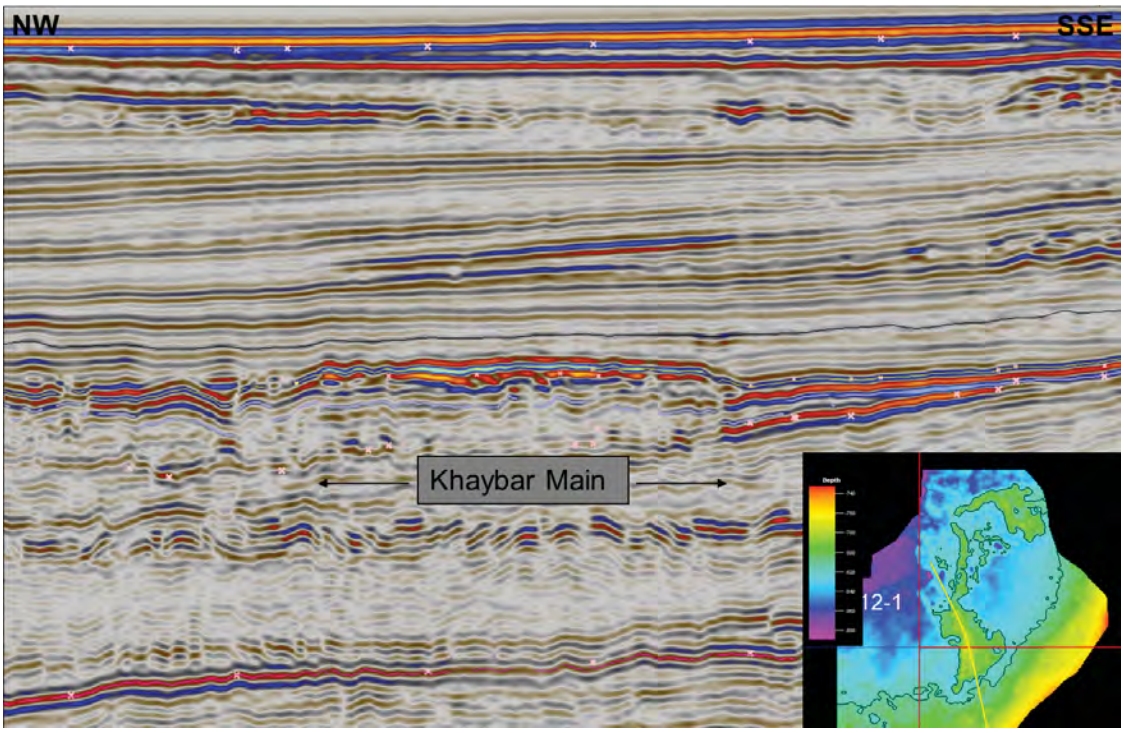

Fig. 4.5 The Khaybar Prospect

Main is 29.4 km2 with a vertical relief of 38 m, where as, the size of Khaybar Mini is 15.1 km2 with a vertical relief of 27 m. The shales of Hordaland Gp are likely to seal the trap. The HC migration was modeled from the mature Viking Graben, specially from the Grane Field. Following a regional interpretation of the Top Rogaland Gp reflector Fig. 4.6, it was revealed that a structural tilt supports the HC migration via carrier beds towards East. In order to help understand this, a fluid inclusion study for well 25/12-1 was also traded. Some indications for HC was found at Oligocene Skade Fm Fig. 4.7. In order to de-risk this prospect an EM survey was also acquired, but, unfortunately it did not show any positive anomaly. Considering the shallow depth of the reservoir and the likelyhood of heavy oil (considering the spill from Grane), there were a number of development challenges. The partners decided not to drill the prospect.

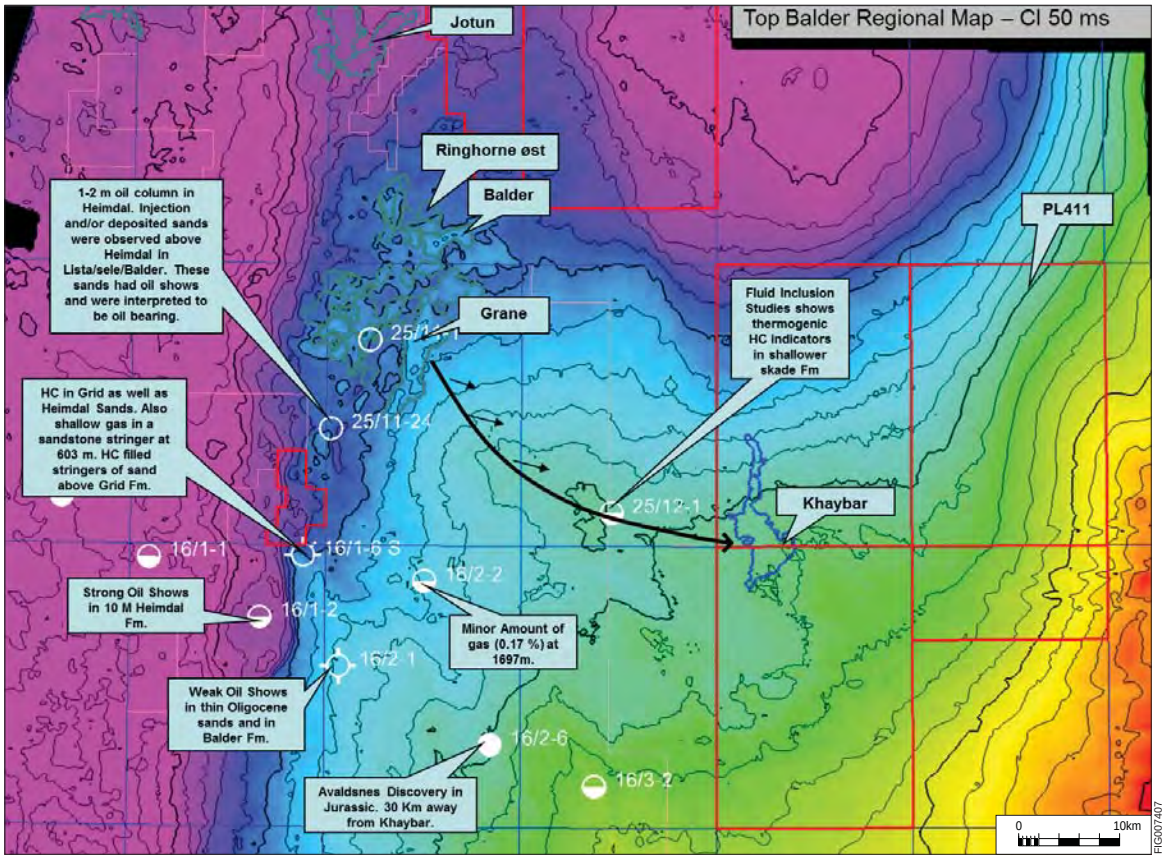

Fig. 4.6 Top Rogaland Gp

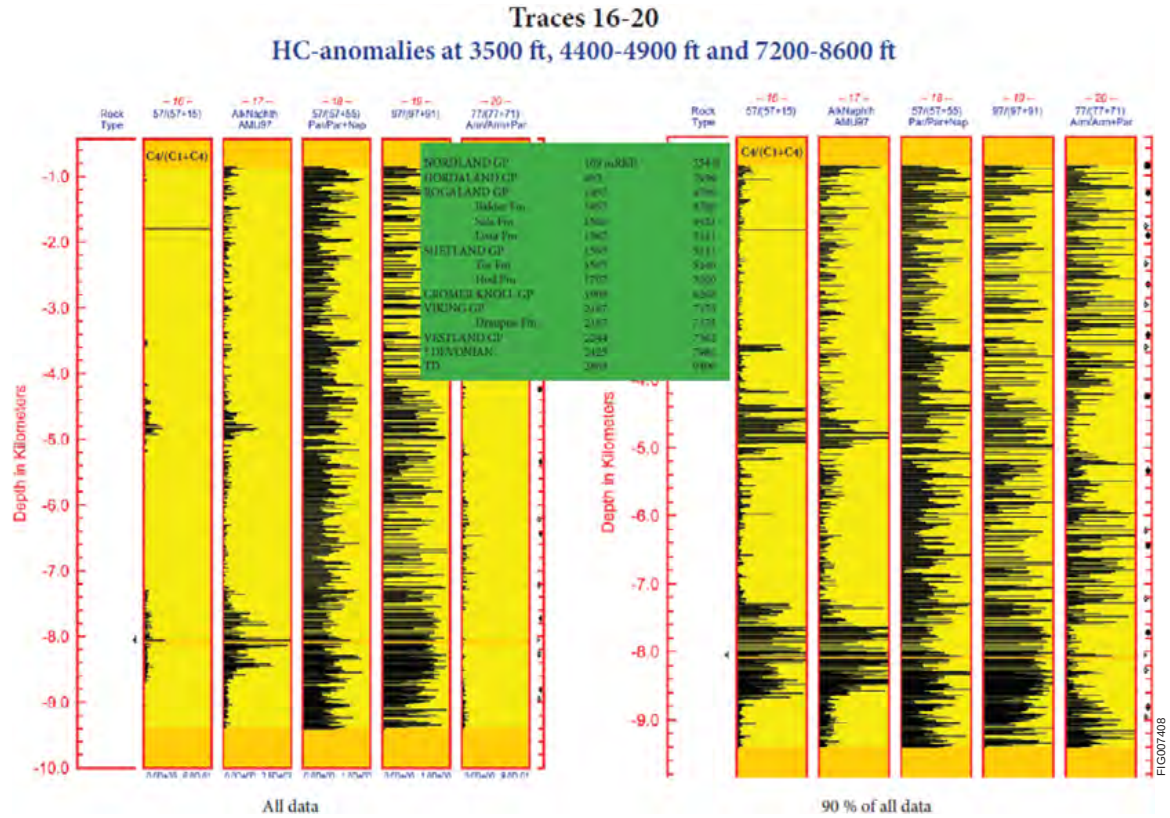

Fig. 4.7 HC Anomalies in 25/12-1

5 Technical evaluations

No technical evaluations were performed for either prospect.

6 Conclusions

At the time of submitting an APA 2006 license application, a number of potential leads were identified within the license area. It was only after the new seismic acquisition that two prospects were matured as possible drilling targets. Unfortunately, after the failure of Svaneøgle's well (17/6-1) in terms of finding commercial quantities of hydrocarbons, the middle Jurassic prospect Turab was degraded since it was modeled to receive the charge from the same basin that proved non-productive for Svaneøgle. The well results also put a question mark on the quality of Sandnes Formation, which was the main reservoir for Turab. So, it was decided to leave this prospect untested.

After Svaneøgle, the license was worked focusing on the pre Paleocene prospectivity and the Khaybar prospect was defined. An EM Survey was undertaken in order to de-risk the HC accumulations. A negative EM anomaly together with a heavy oil scenario at a very shallow depth, made it difficult to recommend a well to test the prospect. With no more known prospectivity remaining for the license, it was finally decided to relinquish the area on15.05.2012.

Table 6.1 Prospect Turab Data

Block	Prospect name	Discovery/Prosp/Lead	Prosp ID (or New	NPD approved?
26/10 & 17/1	Turab	Prospect	NPD will insert data	NPD will insert data
Play (name / new)	Structural element	Company/ reported by / Ref. doc.		Year
NPD will insert data	Patch Bank Ridge	Noreco/Mohammad Shabih		2012

Oil/Gas case	Resources IN PLACE					
Oil	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 106 Sm3	30.1	42.0	55.1	0.869	1.3	1.9
Gas 109 Sm3						

	Resources RECOVERABLE					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 106 Sm3	11.8	16.6	22.5	0.348	0.52	0.76
Gas 109 Sm3						

	Which fractiles are used as:		Low:	P90	High:	P10
Type of trap	Water depth (m)		Reservoir Chrono (from - to)		Reservoir Litho (from - to)	
Horst Block	160		Middle Jurassic		Sandnes Fm	
Source Rock, Chronc	Source Rock, Litho		Seal, Chrono		Seal, Litho	
Upper Jurassic	Tau Fm		Middle Jurassic		Egersund Fm	
Seismic database (2D/3D):	MC3D-SBS-2009					

Probability of discovery:				
Technical (oil+gas case)	0.15		Prob for oil/gas case	0.15
Probability (fraction):	Reservoir (P1)	Trap (P2)	Charge (P3)	Retention (P4)
	0.7	0.9	0.24	1

Parametres:	Low	Base	High	Comments
Depth to top of prospect (m)	2420	2520	2560	
Area of closure (km2)	29.8	29.8	29.8	
Reservoir thickness (m)	100	100	100	
HC column in prospect (m)	100	100	100	
Gross rock vol. (109 m3)	700.6	700.6	700.6	
Net / Gross (fraction)	0.3	0.6	0.9	
Porosity (fraction)	0.15	0.18	0.20	
Water Saturation (fraction)	0.2	0.35	0.5	
Bg. (<1)				
Bo. (>1)	1.05	1.15	1.25	
GOR, free gas (Sm3 /Sm3)				
GOR, oil (Sm3 /Sm3)	20.0	29.9	49.99	
Recovery factor, main phase	0.3	0.4	0.5	
Recovery factor, ass. phase	0.4	0.4	0.4	
Temperature, top res (deg C) :	98	Pressure, top res (bar) :		250

For NPD use:

Innrapp. av geolog:		Registrert:		Map OK:		Nr:
Dato:		Dato:		Dato:		

Table 6.2 Prospect Khaybar Data

Block	Prospect name	Discovery/Prosp/Lead	Prosp ID (or New	NPD approved?
26/10 & 17/1	Khaybar	Prospect	NPD will insert data	NPD will insert data
Play (name / new)	Structural element	Company/ reported by / Ref. doc.		Year
NPD will insert data	Patch Bank Ridge	Noreco/Mohammad Shabih		2012
Oil/Gas case	Resources IN PLACE			
Oil	Main phase		Ass. phase	
	Low	Base	High	Low	Base	High
Oil 106 Sm3	42.3	60.9	84.7	0.377	0.59	0.918
Gas 109 Sm3						
	Resources RECOVERABLE					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 106 Sm3	6.02	9.05	13.0	0.09	0.15	0.229
Gas 109 Sm3						
	Which fractiles are used as:		Low:	P90	High:	P10
Type of trap	Water depth (m)		Reservoir Chrono (from - to)		Reservoir Litho (from - to)	
Four Way Closure	160		Oligocene - Miocene		Utsira Fm	
Source Rock, Chronc	Source Rock, Litho		Seal, Chrono		Seal, Litho	
Upper Jurassic	Draupne FM		Miocene		Hordaland Gp	
Seismic database (2D/3D):	MC3D-SBS-2009					
Probability of discovery:						
Technical (oil+gas case)	0.23		Prob for oil/gas case		0.23	
Probability (fraction):	Reservoir (P1)	Trap (P2)	Charge (P3)	Retention (P4)		
	0.9	0.8	0.4	0.8		
Parametres:	Low	Base	High	Comments		
Depth to top of prospect (m)	773	810	850			
Area of closure (km2)	28.5	28.5	28.5			
Reservoir thickness (m)	60	60	60			
HC column in prospect (m)	30	30	30			
Gross rock vol. (109 m3)	247.1	347.8	467.8			
Net / Gross (fraction)	0.7	0.8	0.9			
Porosity (fraction)	0.25	0.3	0.35			
Water Saturation (fraction)	0.1	0.25	0.4			
Bg. (<1)						
Bo. (>1)	1.015	1.025	1.035			
GOR, free gas (Sm3 /Sm3)						
GOR, oil (Sm3 /Sm3)	5	10	15			
Recovery factor, main phase	0.1	0.15	0.2			
Recovery factor, ass. phase	0.25	0.25	0.25			
Temperature, top res (deg C) :	40	Pressure, top res (bar) :		80		
For NPD use:						
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Dato:		Dato:		Dato:		

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Prepared by NORECO 01.06.2012