PL704 Relinquishment Report

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1 Key License History

1.1 Introduction

The PL704 license is located at the northern part of the Gjallar Ridge in the Vøring Basin, an area of 645,767 km^2 in blocks 6705/10 an 6704/12. The PL704 partnership, has decided to surrender the license at the drill or drop decision point on 21st December 2017.

1.2 Key license history

Summary of award and participants

PL704 was originally awarded as part of the 22nd Concession Round on 21st June 2013. E.ON E&P Norge, now DEA Norge, was appointed operator of the license with a 40% share. The remaining ownership was distributed as follow: Repsol Exploration Norge AS 30% and MVest Energy AS (formerly Atlantic Petroleum Norge AS) 30%. The initial Drill or Drop decision date was set to 21st June 2017.

Initial work obligations and work periods

Within 2 years of the award (initially by the 21st June 2015):

- Perform geological and geophysical studies
- Decide to purchase 3D seismic in the area already covered by 3D seismic within the awarded acreage or drop the license

Within 4 years of the award (initially by the 21st June 2017):

- Purchase of 3D-seismic
- Decide to drill an exploration well or drop the license

Within 6 years of the award (initially by the 21st June 2019):

- Drill an exploration well
- Decide to concretise (BoK) or drop the license

Within 7 years of the award (initially by the 21st June 2020):

- Perform conceptual studies
- Decide to continue (BoV) or drop the license

Applications and grants for extension of deadlines

DEA Norge AS as operator for PL704 applied for a 6-month extension to the Drill or Drop decision in February 2017. This was approved on the 1st of June 2017 with a revised drill or drop decision on 21st December 2017. The Operator applied for this extension to be able to include the results from the PL705 Stordal well into the PL704 prospect evaluation before the Drill or Drop decision.

Overview of meetings held

The table below contains the list of meetings held during the license period:

Table 1.1 Overview of license meetings

Meeting Date	Overview
EC/MC meeting 1 29.08.2013	Establishment of the license, building the common database, sharing views on prospectivity, budget and work program
EC/MC meeting 2 18.11.2013	Update of the regional interpretation. Budget and Work Program.
EC/MC meeting 3 07.03.2014	Discussion whether to reprocess 2D lines or purchase reprocessed 2D seismic.
EC/MC meeting 4 24.11.2014	Updated interpretation of Jurassic and Upper Cretaceous levels, with preliminary volumes and risk. Initiated the 3D seismic acquisition discussion. Budget and Work Program.
EC/MC meeting 5 25.03.2015	Final volumes and risk on Jurassic level.
EC/MC meeting 6 19.05.2015	Seismic or Drop decision, decided to shift focus from the Jurassic to the Cretaceous play, budget and work program.
EC/MC meeting 7 12.11.2015	Re-cap Cretaceous prospectivity, 3D processing tender, Work program and Budget.
EC/MC meeting 8 09.11.2016	3D seismic processing and result, interpretation update, AVO study status, Work program and Budget.
EC work meeting 02.10.2017	GeoLink study, Fault Seal study, AVO modelling and 2D modelling in RockDoc, final update of prospectivity and risking.
EC/MC meeting 9 07.11.2017	Conclusion on prospectivty and relinquishment recommendation, Work program and Budget.

1.3 Reason for relinquishment

A full mapping of the license prospectivty has been performed and agreed the JV steering committee. The PL704 portfolio consist of several prospects and leads, where Cretaceous is the main play in the license. The initial focus of PL704 was the deep and untested Jurassic play. The estimated resource potential for the Jurassic play is high, but the geologic risk is too high to create an economical valuable project. At the Seismic or Drop decision gate in 2015 the exploration focus shifted from Jurassic to the Upper Cretaceous play, aligning with PL705 located towards north-east.

In April 2017, an exploration well was drilled in PL705 testing the Cretaceous Stordal prospect. The well was dry. The dry Stordal well has led to an increased risk of the Cretaceous prospectivity in PL704. The key geological risks are Trap validity and Retention, as well as Access to Charge in the northern part of the Gjallar Ridge. Following completion of the work program, the partnership concluded that no prospect had been identified that can justify exploration drilling, and the Joint Venture steering committee unanimously decided to drop the license.

2 Database

2.1 Seismic database

The most recent seismic interpretation was performed on the EO15M01 3D seismic data covering the major part of PL704 (Figure 2.1). In addition, the seismic database includes publicly available 2D data and multiclient 2D datasets (Figure 2.2 and Table 2.1).

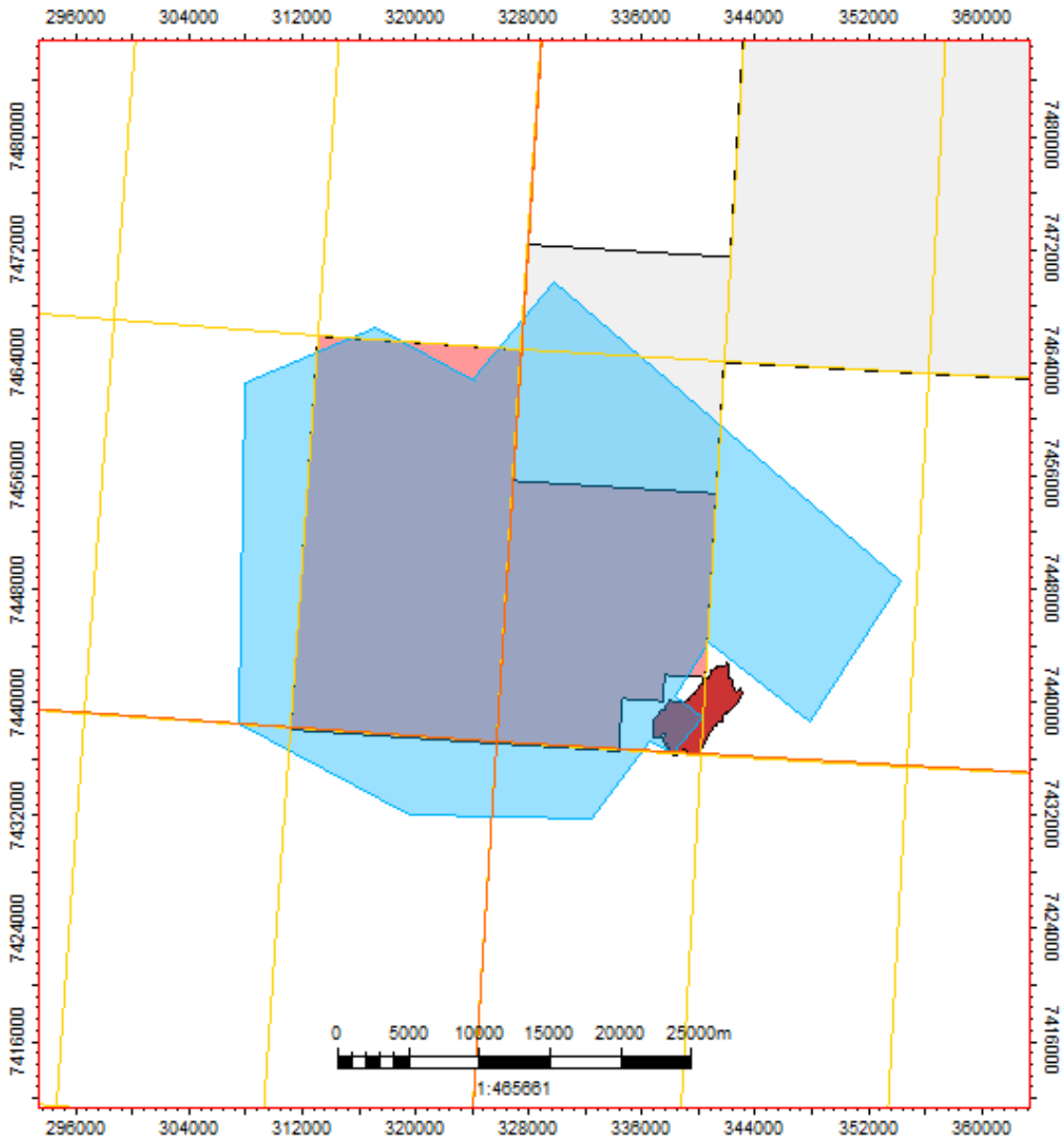

Figure 2.1 Outline of the EO15M01, the dataset used for the most resent seismic interpretation.

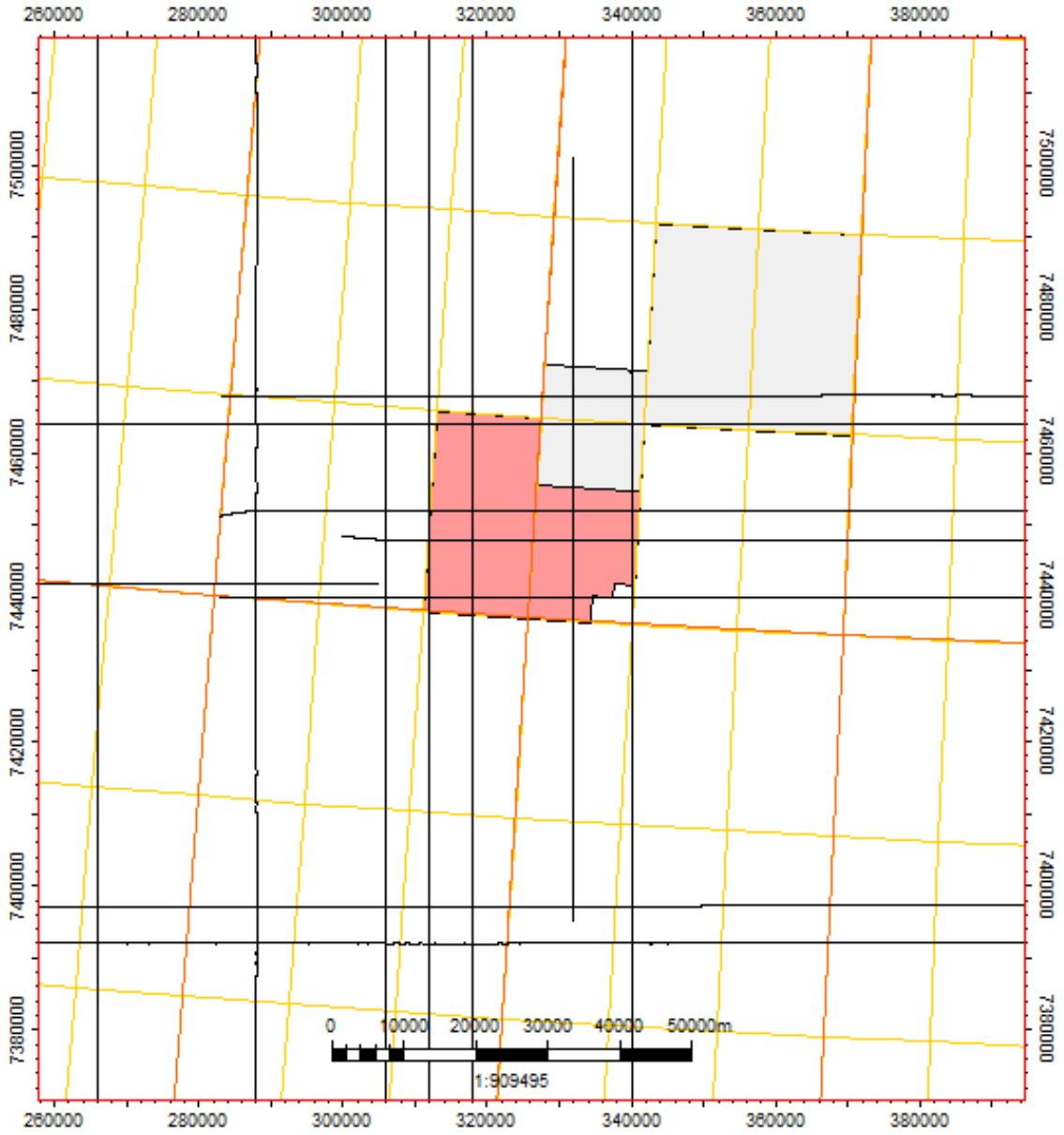

Figure 2.2 Map showing the 2D seismic database covering PL704

Table 2.1 PL704 seismic database

Survey name	Type	Category	Year	NPDID
AMR-MNR04-0312	2D	Multiclient	2014	4252
AMR-MNR04-0332	2D	Multiclient	2014	4252
AMR-MNR04-7452	2D	Multiclient	2014	4252
AMR-MNR04-7468	2D	Multiclient	2014	4252
AMR-MNR04-7440	2D	Multiclient	2014	4252
AMR-MNR05-7397	2D	Multiclient	2014	4298
AMR-MNR06-0256	2D	Multiclient	2014	4364
AMR-MNR07-7392	2D	Multiclient	2014	4450
AMR-MNR07-7448	2D	Multiclient	2014	4450
AMR-MNR07-7464	2D	Multiclient	2014	4450
AMR-MNR08-0266	2D	Multiclient	2014	4571
AMR-MNR08-0288	2D	Multiclient	2014	4571
AMR-MNR08-0306	2D	Multiclient	2014	4571
AMR-MNR08-0318	2D	Multiclient	2014	4571
AMR-MNR08-0340	2D	Multiclient	2014	4571
AMR-MNR08-7442	2D	Multiclient	2014	4571
SG9604	3D	Public	1996	3806
GRE02	3D	Public	2002	4159
ST0410	3D	Public	2004	4271
EO15M01	3D	License data	2015	Merger 3806 / 4271

The EO15M01 3D seismic data is a reprocessed merge of the SG9604 and the ST0410 3D seismic data. The merge and reprocessing was part of the license work commitment, and performed by Geokinetics in 2015 and 2016. The final result was delivered in April 2016.

2.2 Well database

The table below is listing the wells used in the license common database in the PL704 prospect evaluation.

Table 2.2 PL704 well database

Well	Operator	Year	NPDID	TD (mMD and age)	Results	Main use in the license evaluation
6706/11-1	Den Norske Stats Oljeselskap AS	1998	3202	4317, Late Cretaceous	dry	Petrophysical evaluation
6704/12-1	Saga Petroleum	1999	3759	4103, Late Cretaceous	dry	Seismic to well tie, Petrophysical evaluation
6706/6-1	Esso E&P Norway AS	2003	4705	3451, Paleocene	gas	Petrophysical evaluation
6605/8-1	Norsk Hydro AS	2005	4984	4513, Late Cretaceous	gas	Petrophysical evaluation
6605/1-1	StatoilHydro AS	2009	5979	3947, Late Cretaceous	dry	Seismic to well tie, Petrophysical evaluation
6705/10-1	StatoilHydro AS	2009	6044	3775, Early Cretaceous	gas	Seismic to well tie, Petrophysical evaluation
6603/12-1	A/S Norske Shell	2009	5985	3830, Late Cretaceous	gas	Petrophysical evaluation
6603/5-1S	A/S Norske Shell	2010	6348	5254, Early Cretaceous	dry	Petrophysical evaluation
6604/2-1	BG Norge AS	2011	6568	3551, Late Cretaceous	dry	Seismic to well tie, Petrophysical evaluation
6707/10-3	Centrica Resources AS	2014	7550	4789, Early Cretaceous	gas	Petrophysical evaluation
6706/11-2	Statoil Petroleum	2015	7709	2596, Late Cretaceous	gas	Petrophysical evaluation
6706/12-2	Statoil Petroleum	2015	7651	2754, Late Cretaceous	oil/gas	Petrophysical evaluation
6706/12-3	Statoil Petroleum	2015	7666	3336, Late Cretaceous	gas	Petrophysical evaluation
6705/7-1	Repsol	2017	8133	3290, Late Cretaceous	dry	Petrophysical evaluation

The locations of the wells are shown in Figure 2.3.

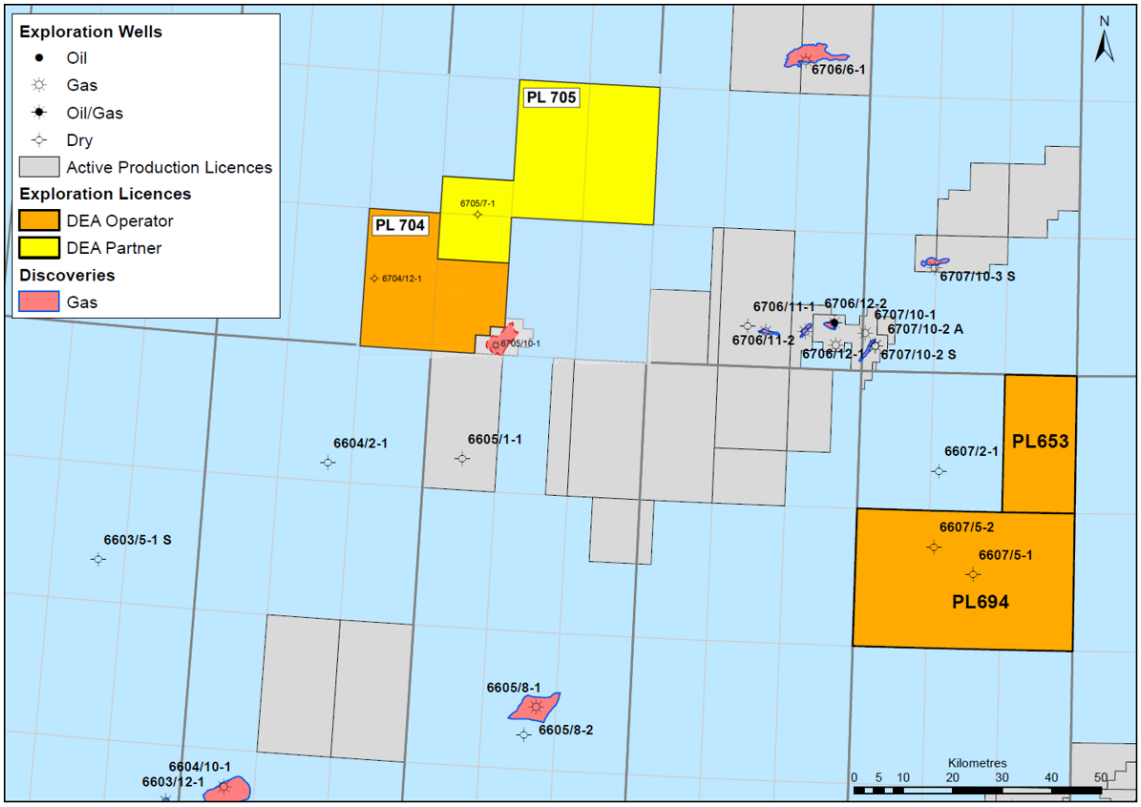

Figure 2.3 PL704 Well database

3 Review of Geological and Geophysical Framework

3.1 Performed studies

In connection with the license work, the prospect evaluation, the preparation of the seismic or drop, and then the drill or drop decision, the following geological and geophysical studies were undertaken:

Table 3.1 Special studies performed for PL704 prospectivity evaluation

Year (start)	Study	Author
2013	Seismic interpretation of 2D seismic surveys	DEA
2015/16	3D reprocessing	Geokinetics
2016	Seismic interpretation of EO15M01	DEA
2015/16/17	Rock physics / AVO analysis	DEA
2017	Detailed seismic stratigraphy study	Geolink
2015/2017	Fault seal analysis	DEA

Seismic interpretation of 2D seismic survey

In the first license period, 858.175 km AMR-MNR, reprocessed, 2D lines were purchased from TGS. The purchase was part of the license work commitment. The 2D seismic was used in the interpretation of the Jurassic section. In parallel, the Cretaceous section was interpreted using the SG9604 3D seismic dataset.

3D reprocessing

The seismic data available over the licensed area in 2015 were not suitable neither for detailed structural interpretation nor for AVO studies. It was therefore decided to reprocess and merge SG9604 and the southern part of ST0410. The tender award was given to Geokinetics UK after a tender process in which top quality seismic processing contractors had been included.

Project start-up was 18 August 2015 and data delivery was 20 April 2016. Project execution was according to plan with no major delays or issues.

The “broadband” processing workflow involved deghosting in order to improve high and low frequencies for both deep imaging and high resolution including side-lobe suppressions. A 2ms sampling interval was used in case the data were to be used later as a site survey. Other key processes in the workflow were: SRME and Radon de-multiple, Q compensation, pre-stack survey regularization, match and merge, and iterated migration velocity picking. In order to image deep and steeply dipping fault blocks a migration diameter of 10km was used.

The reprocessed data were of much higher quality than the original data, and enabled interpretation and better understanding of both the tectonic history and of the seismic amplitudes seen in the license (Figure 3.1 and Figure 3.2).

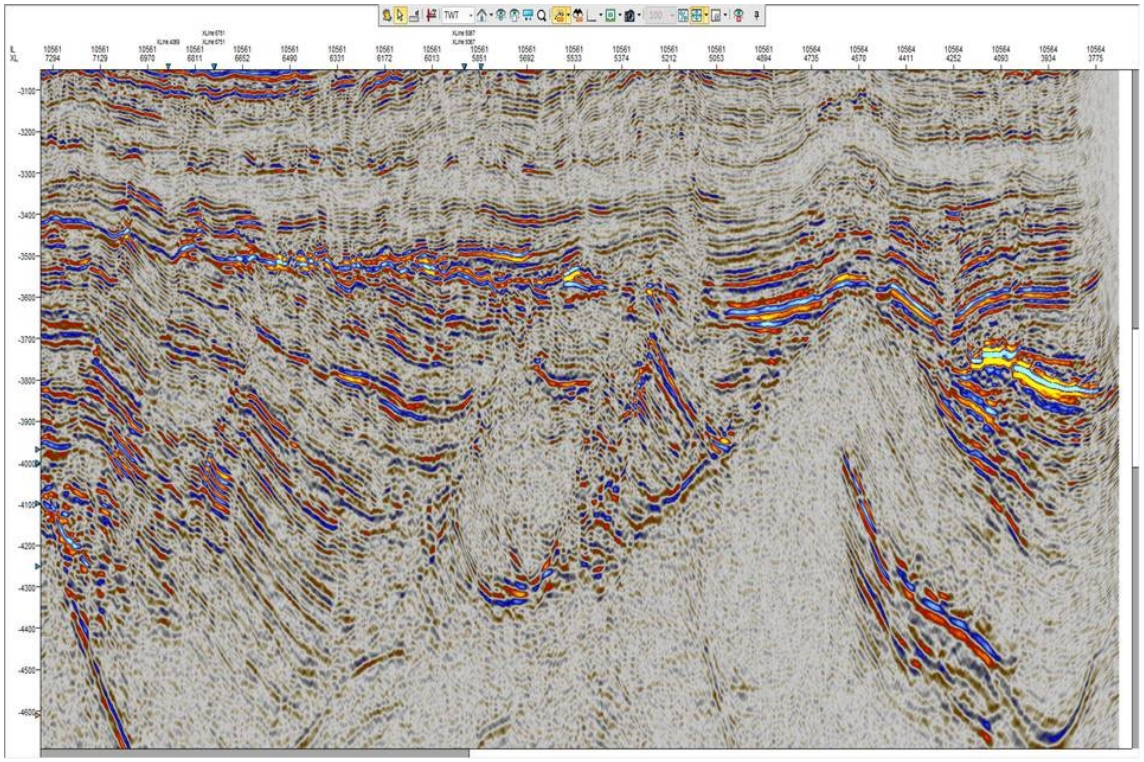

Figure 3.1 Original data before reprocessing.

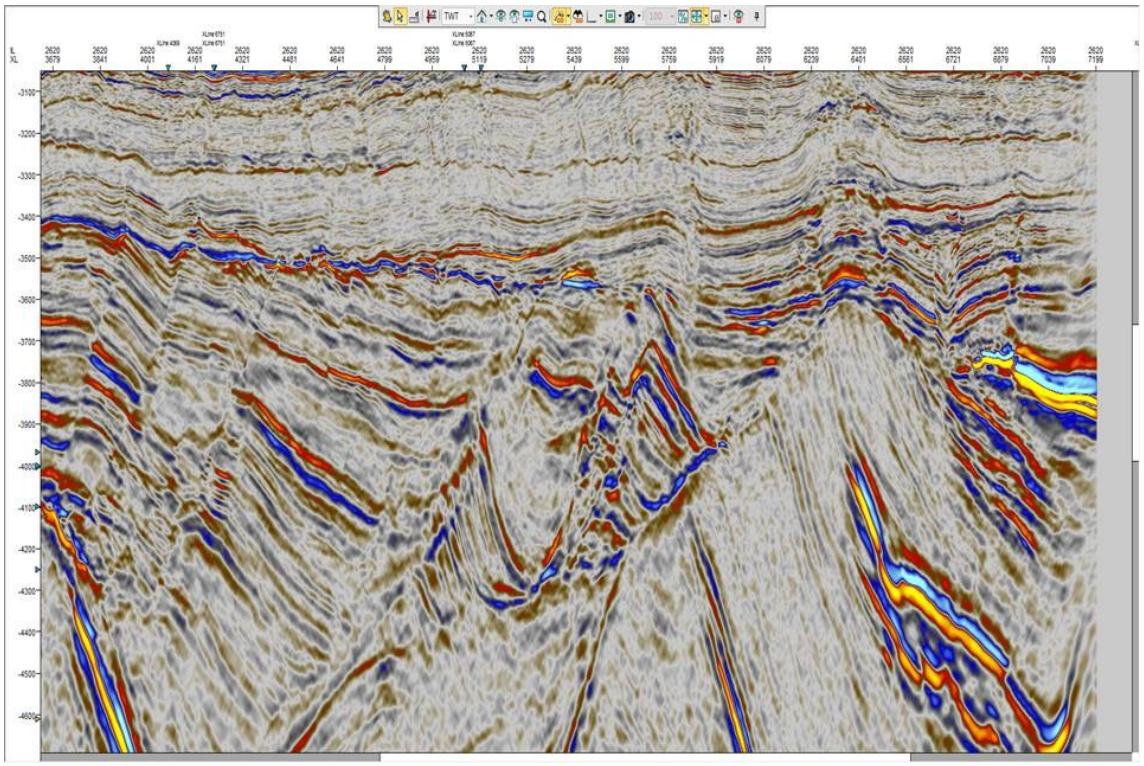

Figure 3.2 Data after reprocessing.

Rock physics / AVO analysis

An extensive quantitative interpretation study was performed in the license, consisting of the following:

- Seismic data conditioning
- Bayesian elastic inversion
- Extended elastic impedance inversion
- Fluid substitution and synthetic seismic modelling using the 6705/10-1 (Asterix), 6704/12-1 (Gjallar), 6705/7-1 (Stordal), and 6707/10-1 (Luva) wells.
- Two-dimensional seismic modelling and fluid substitution around the Stordal well (using the well logs).

An interesting finding of the inversion studies is that in this complex subsurface setting and with such a large license area with sparse well data, relative inversion is more meaningful than an absolute inversion.

The results of the above studies strongly indicate that hydrocarbon accumulations in Cretaceous sands in the license area should be associated with the following observations:

- Clearly visible amplitude anomalies in the seismic, particularly at higher reflection angles.
- A clear downflank amplitude shutoff at hydrocarbon/water contacts, and likely an associated flat spot in the sandstone layers.
- The geometry of the accumulations should be clearly outlined in seismic inversion volumes, particularly in the “fluid factor” cube obtained using extended elastic impedance at 20 degrees “chi” angle.

In addition, the fluid factor cube should, based on modelling and observations from inversions around the wells, show a clear separation of sands and shales, and give a fairly good estimation of (sand) layer thickness.

The main conclusion of the quantitative interpretation study is that the prospects are lacking clear evidence of hydrocarbon accumulations.

Detailed seismic stratigraphy study

A detailed stratigraphic and structural analysis of the Gjallar Ridge and the adjacent Vigrid Syncline was performed in 2017. The main objective with the study was to quantify the potential reservoir sandstone quality within each fault block in PL704. The study also defined the successive phases of rifting throughout Late Cretaceous and Paleocene times.

The conclusions of the study was that the paleobathymetry at Mid-Cretaceous time was different than at Early Tertiary time. A ridge was located where the Vigrid Syncline is located today, the ridge had a gentle slope towards East and a steep slope towards West (Figure 3.3). The ridge separated two basins which were subsequently filled during Santonian to Late Campanian time.

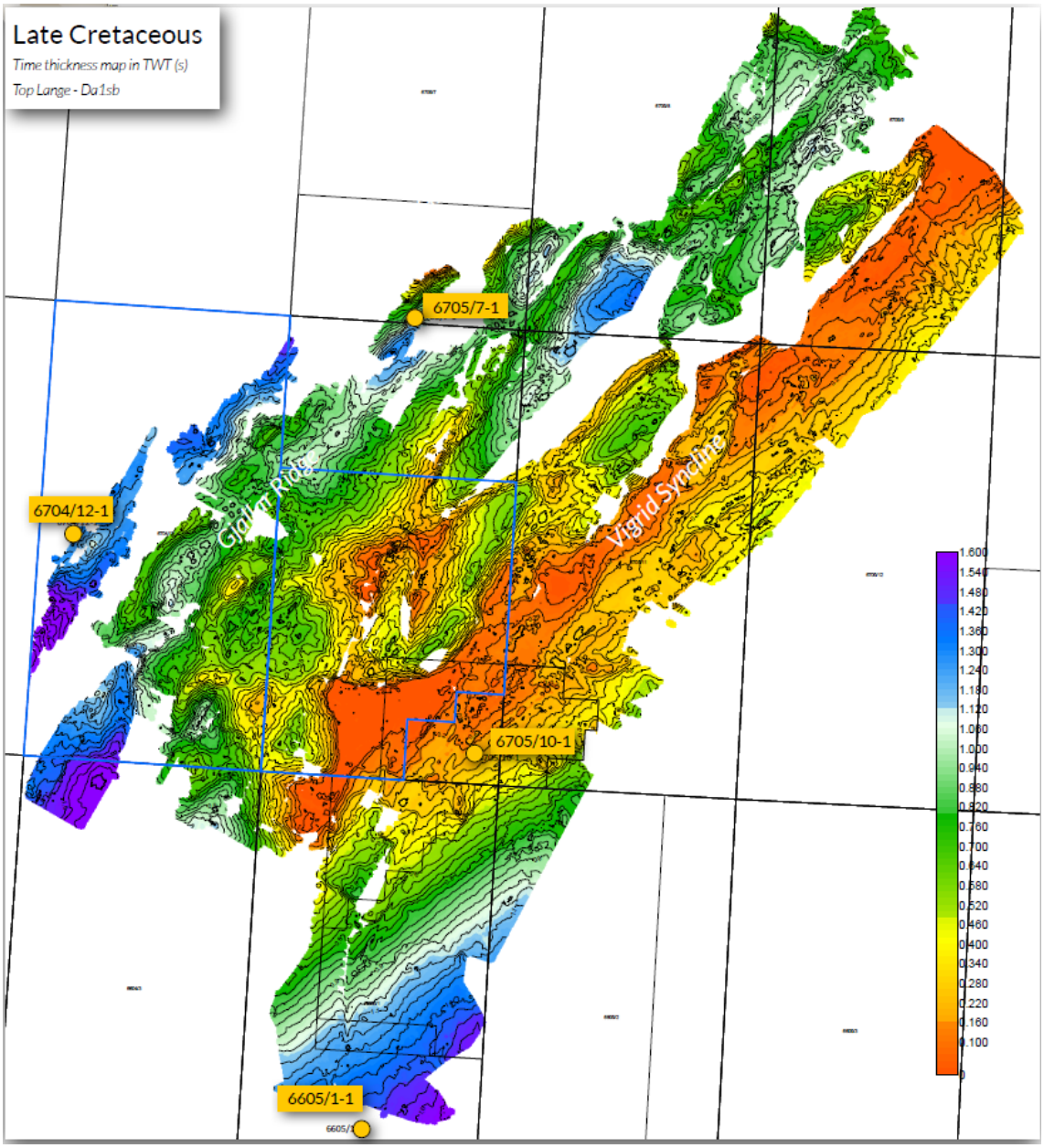

Figure 3.3 At Late Cretaceous time the Vigrid Syncline stood out as a ridge, and the current Gjallar Ridge was a depocenter in the area.

The Gjallar area was affected by two main synrift phases, Late Campanian – Lower Maastrichtian and in Late Maastrichtian. In Early Tertiary the eastern part of the area was uplifted, and the western part was deepened. In addition the central part of the Gjallar Ridge was affected by doming during Paleocene and Eocene time.

The main depocenter for the Nise Fm Delfin sandstones was over the Gjallar Ridge. The Schiller and the Kafka fault blocks are favorable located for deposition of good reservoir sandstones, while the Fontane structure is located in a more sedimentologicaly starved setting.

Fault seal analysis update

A fault seal study was conducted for the Schiller, Kafka and Fontane Cretaceous prospects from July to September 2017.

The fault seal analysis was performed before the final biostratigraphic study of the Stordal well was received.

Several gas chimneys and hydrothermal vents are observed, and mapped in the area (Figure 3.4). The vents are often aligned with normal faults. Vents are observed in association with two dry wells in or near the license (the Gjallar and the Stordal wells).

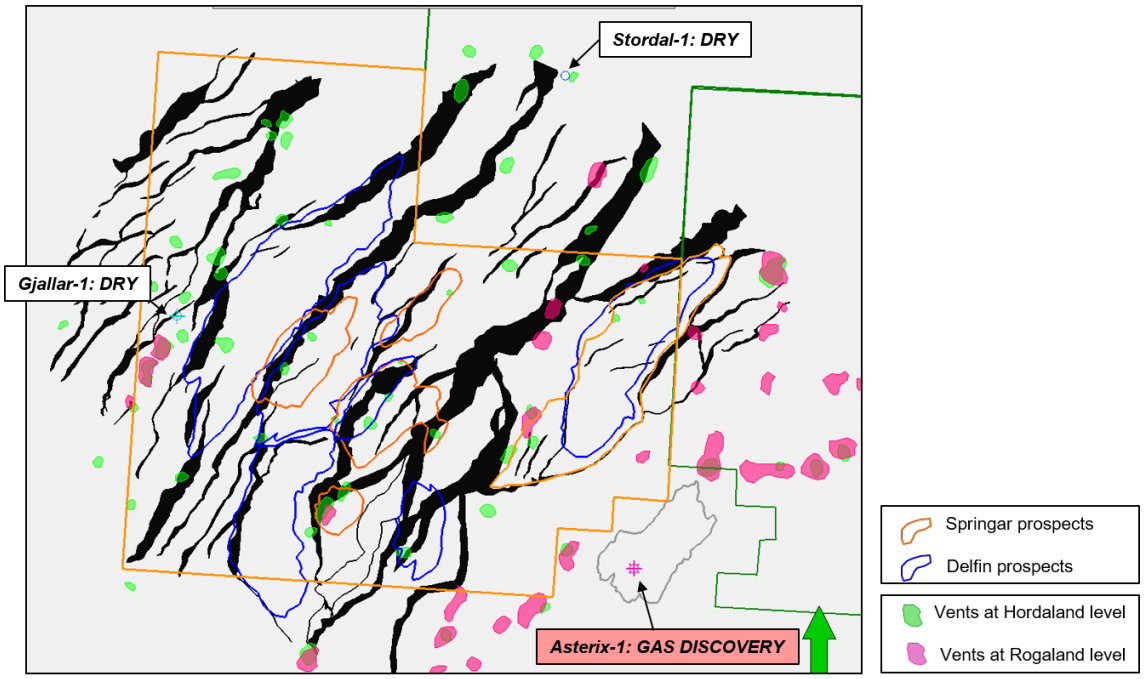

Figure 3.4 Gas chimneys and vents mapped in the area. The color code indicates the termination level. The mapped faults and prospects are marked in the map.

A 3D model was built in Traptester using BTU, Top Nise Fm, Top Delfin Mbr. and Top Cromer Knoll interpretations. The analysis focused on the four main faults in the area (Figure 3.5). The vshale log used for the analysis was a projection of the Stordal and the Gjallar composite wells.

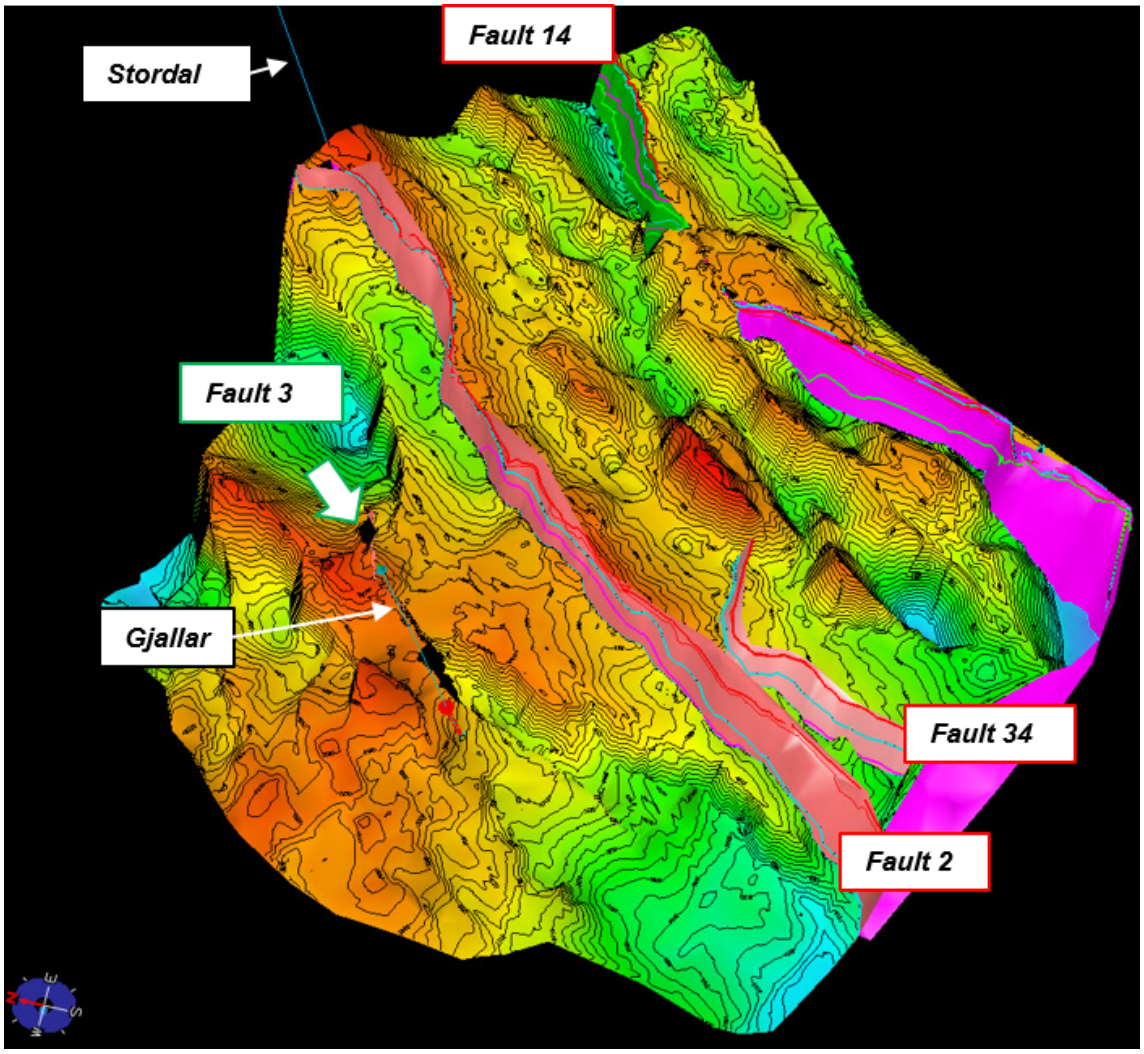

Figure 3.5 Four faults have been studied in the Fault Seal analysis.

Studies performed:

- 1D Triangle analysis
- Juxtaposition analysis
- Fault membrane analysis (SGR)

The poor well control in the area makes the seismic correlation across the faults challenging and it is difficult to predict the sediment package. The interpretation of the fault blocks indicates large thickness variations across the faults. The thickness variation is partly due to varying amount of deposition through time, different erosion at the Springar Fm level, and challenging interpretation due to a large degree of jump correlation across the faults.

The result of the study demonstrates that all prospects in PL704 have high vertical seal risk. All prospects have areas with sand-sand juxtaposition, and the main prospects Schiller, Kafka and Fontane have high lateral seal risk.

3.2 Results of block evaluation and major changes compared to original license application

The work carried out in the course of the license period was to illuminate the structural geology of the northern part of the Gjallar Ridge within the license area. This was done through purchase of 2D then 3D seismic surveys and analysis of these to assess the prospectivity. The license kept an open mind in its review of prospectivity and considered potential targets in both Jurassic and Cretaceous plays. The new structural picture after the interpretation of the 2D and 3D seismic data were key elements in the prospectivity evaluation.

Initially the focus in the license was on the deep untested Jurassic play, but due to poor seismic imaging, and large uncertainties in the depth of the Jurassic in the Gjallar Ridge area, the play has been deemed as being too high risk in the area.

Several Cretaceous structures are highlighted as possible prospects and leads in PL704. Screening has been done on the Tertiary play, but no potential has been identified due to lack of structural closures and reservoir indicators at Tertiary level.

4 Prospect Update

4.1 Prospects originally presented in license application

The PL704 is located in the northern part of the Gjallar Ridge in the northeastern part of the Norwegian Sea. Late Cretaceous rifting affects the area, and the dominating structural elements are NE-SW oriented fault blocks.

The prospect evaluation in the first license period focused on the evaluation of the exploration potential of the Middle Jurassic leads, Kjerag and Uburen (Figure 4.1and Updating...). In parallel the leads in Upper Cretaceous were evaluated (Figure 4.1and Table 4.1).

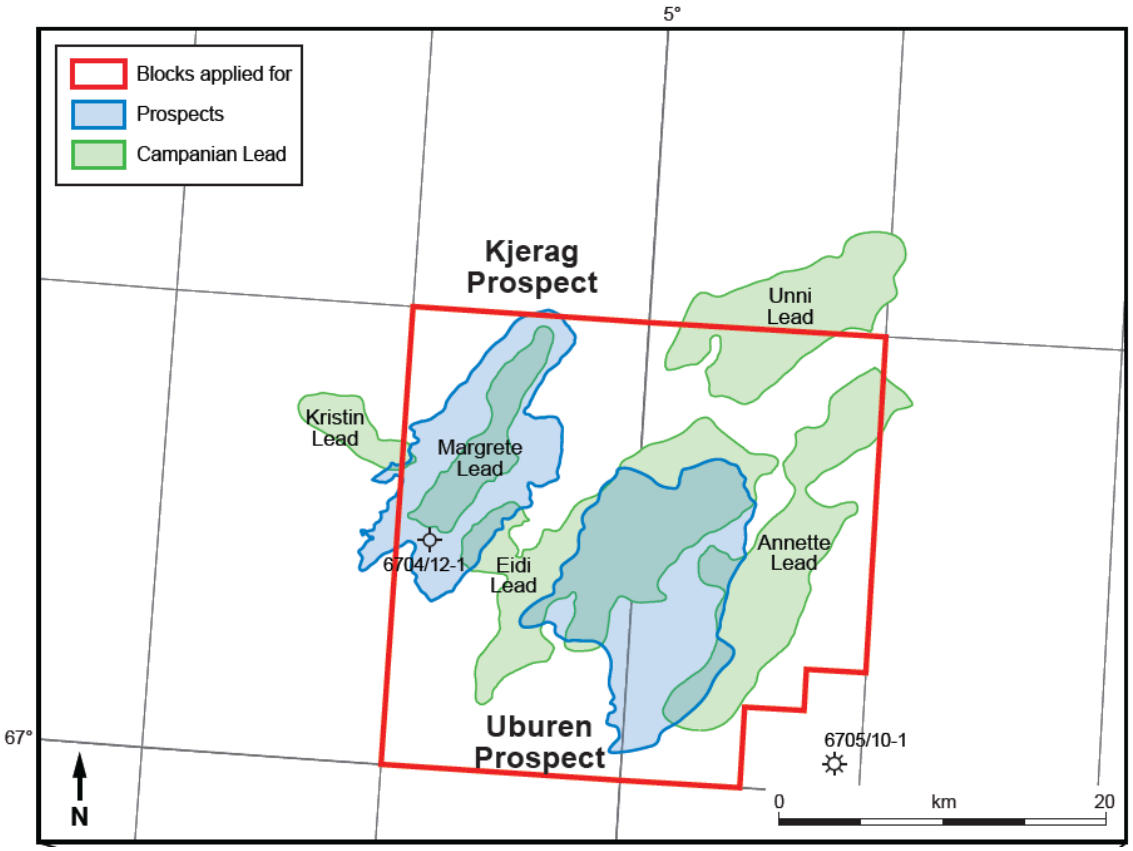

Figure 4.1 Prospects (blue) and leads (green) map showing prospectivity at the time of the license application.

Table 4.1 Main prospectivity applied for in APA 2011 by licensees.

Company	Name in application	Type	Age of reservoir	Comments
E.ON E&P Norge AS	Kjerag	Prospect	Middle Jurassic	Discarded due to high risk on the depth of the Jurassic play
E.ON E&P Norge AS	Uburen	Prospect	Middle Jurassic	Discarded due to high risk on the depth of the Jurassic play
E.ON E&P Norge AS	Kristin	Lead	Upper Cretaceous	Discarded due to high risk and small volumes
E.ON E&P Norge AS	Margrete	Lead	Upper Cretaceous	Discarded due to small volumes
E.ON E&P Norge AS	Unni	Lead	Upper Cretaceous	Is the Stordal structure, tested in PL705
E.ON E&P Norge AS	Eidi	Lead	Upper Cretaceous	New name of prospect is Schiller
E.ON E&P Norge AS	Annette	Lead	Upper Cretaceous	New name of prospect is Fontane

Two models for the Middle Jurassic interpretation were presented in the license; one deep and one shallow (Figure 4.2). The result of the 6603/5-1 S Dalsnuten well on the Gjallar Ridge, and the well tie from the Dalsnuten into the PL704, increased the risk of Middle Jurassic being deep in the PL704 area (Figure 4.2). At the Seismic or Drop decision 21st June 2015 a decision was made in the license to shift the focus from the Middle Jurassic play to the Upper Cretaceous play, and by that align the license portfolio with the PL705 located towards northeast.

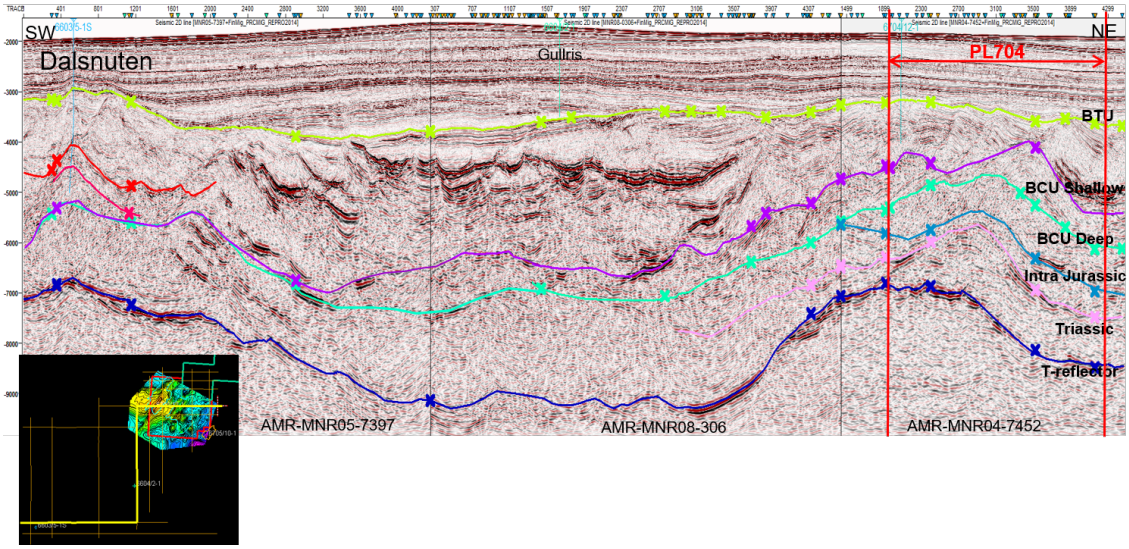

Figure 4.2 Seismic line showing well tie from the Dalsnuten well. In the PL704 area two possible BCU interpretations are demonstrated; one deep (green) and one shallow (purple).

4.2 Overview of PL704 prospectivity after mapping

An overview of the PL704 prospects and leads is provided in and illustrated in Figure 4.3 and Figure 4.4.

Table 4.2 PL704 Prospects and Leads

Prospect	Status	Age	Formation	Depth of crest (m)	Probability of finding HC (main risk)	Expected fluid	P90-P50-P10 tot. rec. volumes (MSm^3)
Schiller	Main prospect	Upper Cretaceous	Nise	3200	17% (Trap validity)	Gas	0.24 - 20 - 134
Fontane S	Prospect	Upper Cretaceous	Springar	2900	13% (Trap validity)	Gas	1.4 - 5.6 - 15.4
Fontane D	Prospect	Upper Cretaceous	Nise	3000	13% (Trap validity)	Gas	3.8 - 17.8 - 57.5
Kafka North S	Prospect	Upper Cretaceous	Springar	2550	45% (Trap validity)	Gas	1.4 - 3.8 - 7.8
Kafka North D	Prospect	Upper Cretaceous	Nise	2800	17% (Trap validity)	Gas	5.4 - 29.6 - 91.6
Kafka South	Lead	Upper Cretaceous	Nise	3300	17% (Trap validity)	Gas	1.9 - 8.5 - 28.8
Nietzsche S	Lead	Upper Cretaceous	Springar	2550	17% (Trap validity)	Gas	1.3 - 4.9 - 13.6
Nietzsche D	Lead	Upper Cretaceous	Nise	3150	13% (Trap validity)	Gas	1.7 - 5.9 - 15
Kästner	Lead	Upper Cretaceous	Springar	2700	39% (Trap validity)	Gas	0.7 -1.8 - 4.1
Vestly	Lead	Upper Cretaceous	Springar	2700	39% (Trap validity)	Gas	0.7 - 1.4 - 2.7
Prøysen	Lead	Upper Cretaceous	Nise	3000	11% (Trap validity)	Gas	0.3 - 1.8 - 7
Kjerag	Lead	Middle Jurassic	Fangst Gp	4150	10% (Reservoir presence)	Gas	18 – 62 - 150
Uburen	Lead	Middle Jurassic	Fangst Gp	3900	10% (Reservoir presence)	Gas	14 – 64 - 180

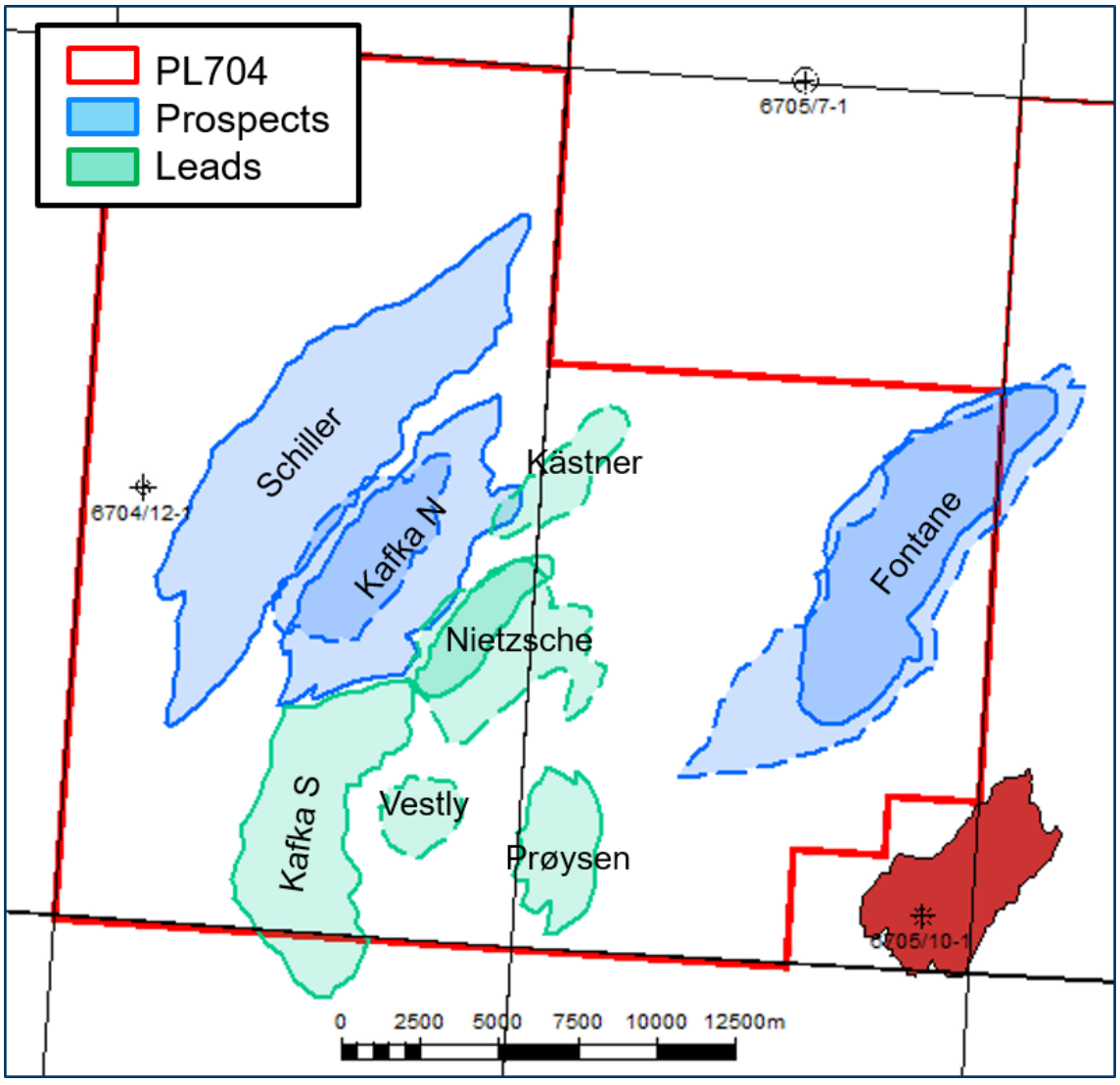

Figure 4.3 Upper Cretaceous prospects (blue) and leads (green). Springar Fm prospects and leads are marked with stippled lines, and Nise Fm prospects and leads are in solid lines.

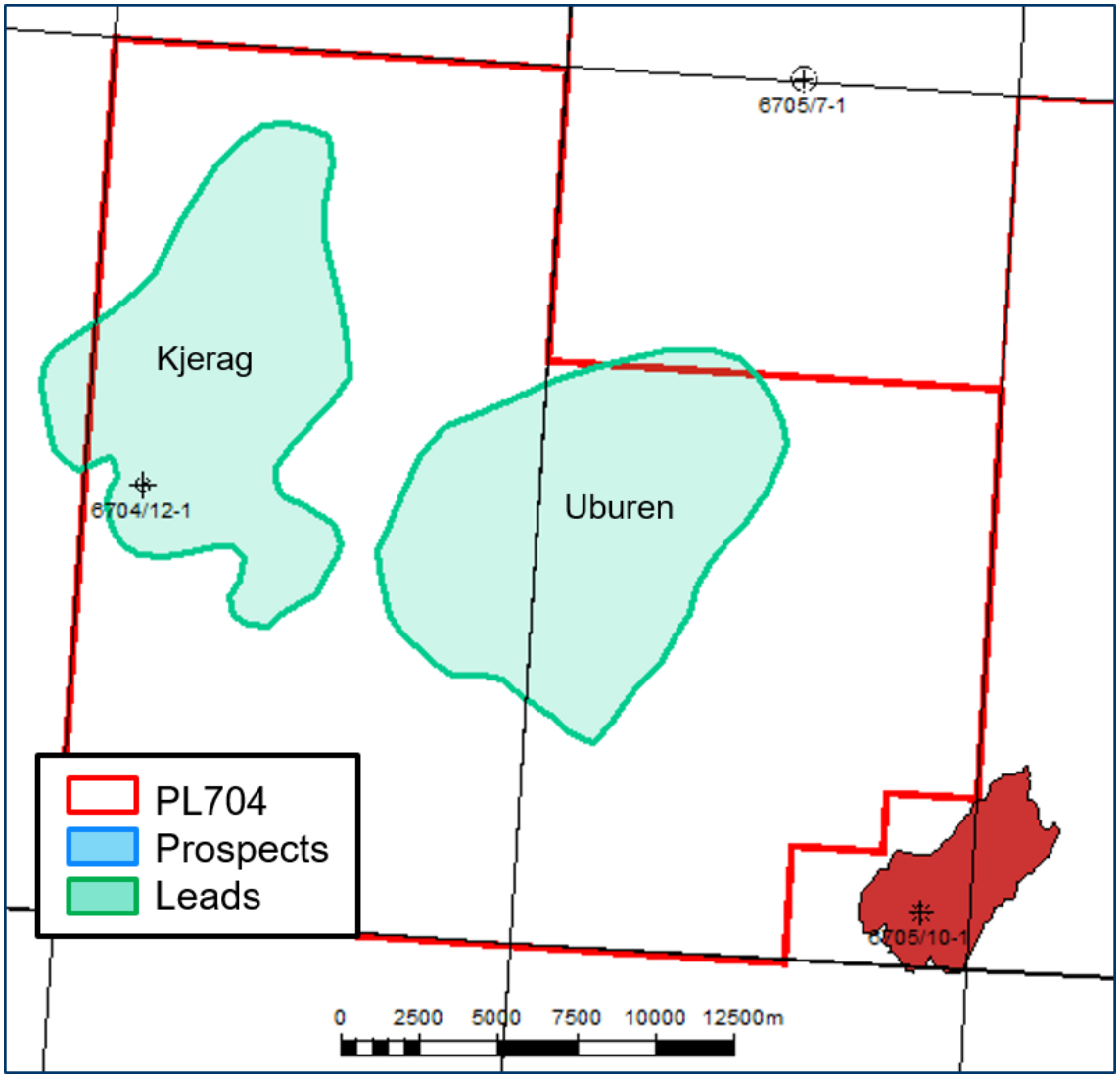

Figure 4.4 PL704 Middle Jurassic leads.

A total of five prospects in Upper Cretaceous, six leads in Upper Cretaceous, and two leads in the Middle Jurassic are identified and mapped. See Table 4.2.

The Upper Cretaceous play consist of several rotated blocks with stacked Upper Cretaceous Nise and Springar Formations reservoir. The rotated fault blocks have varying throw and parallel bedding with sand and shale deposits (figure). The correlation between the separate fault blocks are challenging.

The existing Upper Cretaceous discoveries in the Western Vøring Basin are associated with direct hydrocarbon indicators (DHIs), such as AVO anomalies and flat-spots.

The prospects in the PL704 have one or more of the following characteristics:

- Downflank brightening
- Upflank thinning
- Lack of flat spot
- Thin sand layers
- Relatively poor structural amplitude conformance
- Not convincing amplitude levels compared to surrounding structures

The DHIs observed in connection with the prospects and leads in PL704 are in general too small to defend an exploration well in the license.

Above the fault blocks, several gas escape structures are observed and mapped (Figure 3.4) indicating leakage of hydrocarbons along the Cretaceous faults during Tertiary time. The main risk for the Upper Cretaceous play is trap retention and seal risk.

Summarized in the Table 4.2 and illustrated in Figure 4.3 and Figure 4.4 are the prospectivity of PL704 after evaluation.

4.3 Schiller prospect

The main prospect in PL704 is the Upper Cretaceous Schiller structure, a three-way dip closure against a major NE-SW trending fault (Figure 4.5). The expected reservoir in the Schiller structure is the Nise Fm Delfin Member, proved in the Gjallar well in the adjacent fault block (Figure 4.6).

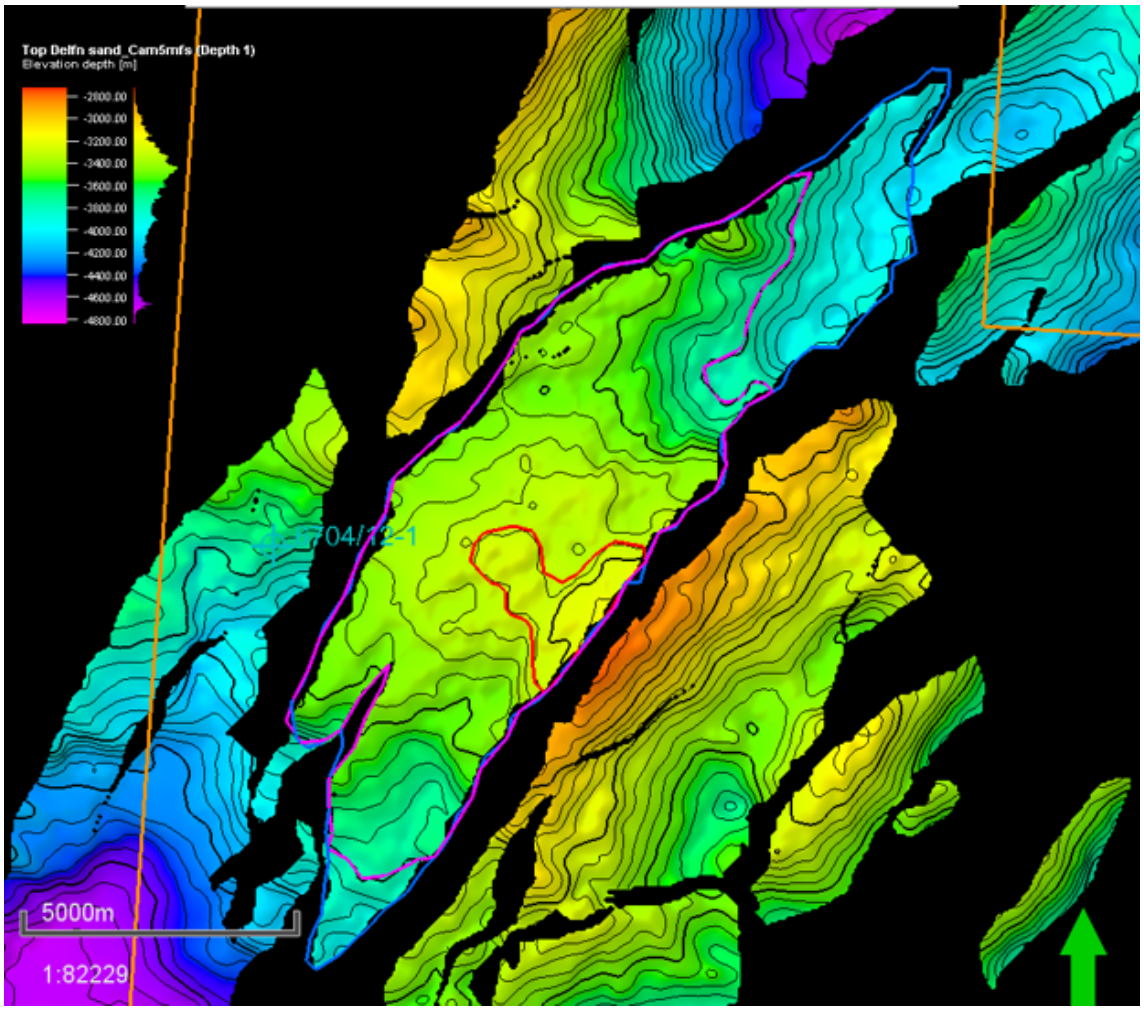

Figure 4.5 Top Reservoir map of the Schiller prospect.

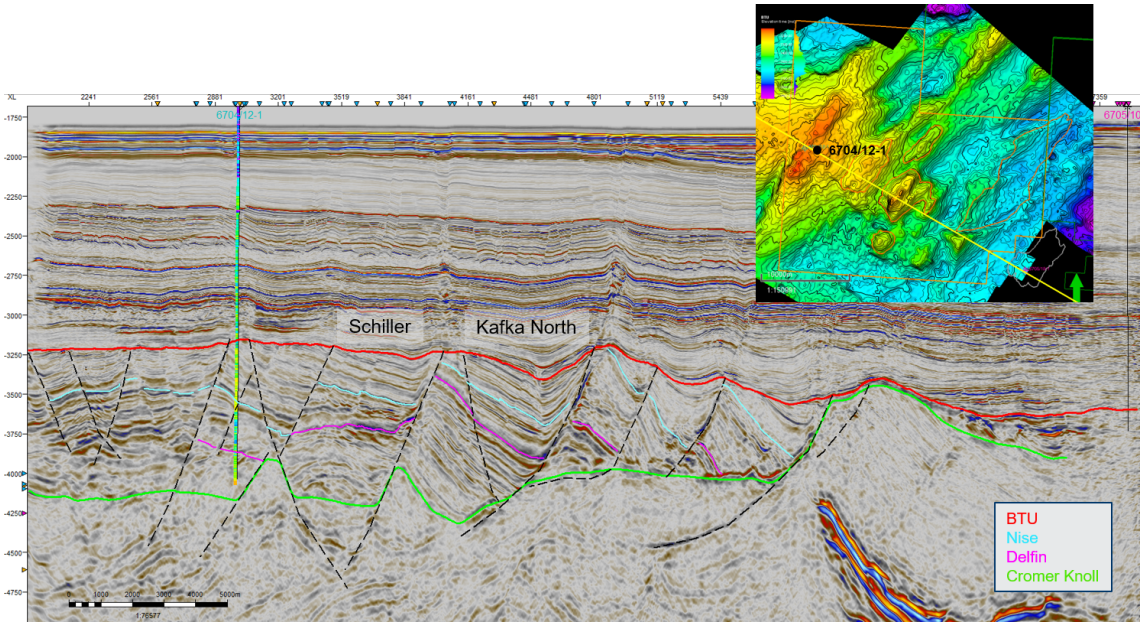

Figure 4.6 Seismic tie line from the Gjallar well into the Schiller structure. The Schiller structure is down-fauled from the Kafka North.

The reservoir consists of deep marine turbidite sandstones dipping slightly towards west. The Delfin Mbr shows good reservoir quality in the closest well, the 6704/12-1 Gjallar well. The P50 thickness in Schiller is 450m with a P50 net to gross at 47,5%.

The prospect has several small-scaled faults running though the Delfin Mbr reservoir, creating possible compartmentalization. This is supported by variable amplitude strength across the faults (Figure 4.7). This can influence the prospect reservoir quality.

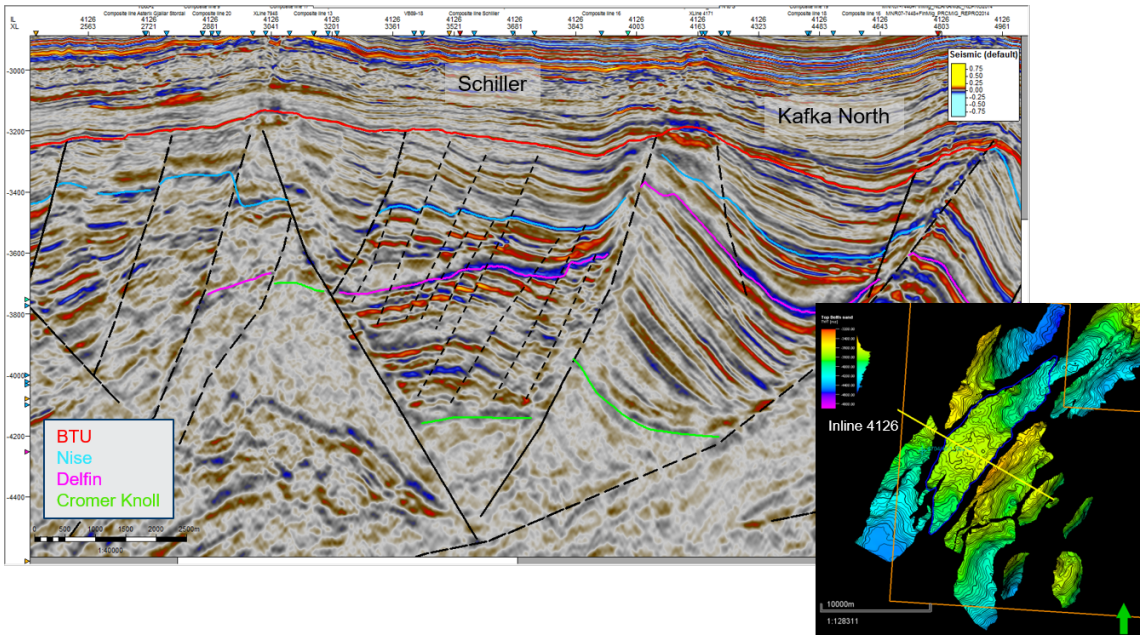

Figure 4.7 Seismic line through the Schiller propsects. The structure has several small scale faults cutting through the Delfin Mbr reservoir.

The main risk for this prospect is linked to the trap retention, as the structure is down-faulted. In the trap retention risk, both the risk of leakage across the eastern bounding fault and leakage into the Kafka North structure, and the possibility of top seal failure, are taken into account.

The top seal is Nise Fm shales. The amplitude image in the upper Nise Fm indicates presence of possible thin sandstones deteriorating the top seal potential. Two gas chimneys, terminating in the Hordaland Group, are located above the main fault in Schiller. The gas chimneys increases the seal risk in the prospect.

The definition of the P90 column is a fault bounded 3-way closure against the main fault towards east, the P10 case is dependent on faults towards east, west and south to seal, and the P50 case is mathematically derived between these (Figure 4.5).

The volume spread in the Schiller structure is wide due to the large uncertainty both in reservoir quality, column height and recovery factor. The P90 recoverable volumes are 0.24 MSm^3, the P50 are 20 $MSm^3$and the P10 recoverable volumes are 134 MSm^3. The chance of success in the Schiller structure is set to 17%, with the trap retention as the main risk.

Using the Seismic Amplitude Analysis Module (SAAM by Rose and Associates) on the Schiller prospect gave a DHI index of 4%, which is weakly negative for the probability of finding hydrocarbons. .

Table 4.3 NPD Table 5, Schiller revised resource volumes and probability estimate

Table 5: Prospect data (Enclose map)

Block	6705/10, 6704/12	Prospect name	Schiller	Discovery/Prosp/Lead	Prospect	Prosp ID (or New!)	NPD will insert value	NPD approved (Y/N)	
Play name	NPD will insert value	New Play (Y/N)		Outside play (Y/N)					
Oil, Gas or O&G case:	Gas	Reported by company	DEA Norge AS	Reference document	Relinquishment report			Assessment year	2017
This is case no.:	1 of 1	Structural element	Gjallar Ridge	Type of trap	Structural	Water depth [m MSL] (>0)	1400	Seismic database (2D/3D)	3D
Resources IN PLACE and RECOVERABLE		**Main phase**				**Associated phase**			
Volumes, this case		Low (P90)	Base, Mode	Base, Mean	High (P10)	Low (P90)	Base, Mode	Base, Mean	High (P10)
In place resources	Oil [10^6 Sm^3] (>0.00)								
	Gas [10^9 Sm^3] (>0.00)	0.40	32.00	76.00	215.00				
Recoverable resources	Oil [10^6 Sm^3] (>0.00)								
	Gas [10^9 Sm^3] (>0.00)	0.25	20.00	48.00	135.00				
Reservoir Chrono (from)	Campanian	Reservoir litho (from)	Nise	Source Rock, chrono primary	Jurassic	Source Rock, litho primary		Seal, Chrono	
Reservoir Chrono (to)		Reservoir litho (to)		Source Rock, chrono secondary		Source Rock, litho secondary		Seal, Litho	
Probability [fraction]									
Total (oil + gas + oil & gas case) (0.00-1.00)	0.17	Oil case (0.00-1.00)		Gas case (0.00-1.00)		Oil & Gas case (0.00-1.00)			
Reservoir (P1) (0.00-1.00)	0.80	Trap (P2) (0.00-1.00)	0.90	Charge (P3) (0.00-1.00)	0.70	Retention (P4) (0.00-1.00)	0.35		
Parametres:	Low (P90)	Base	High (P10)	*P50 values are used for base case in Resources section. Mean values are used for base case in Parametres section.*					
Depth to top of prospect [m MSL] (> 0)		3250							
Area of closure [km^2] (> 0.0)	40.0	45.0	50.0						
Reservoir thickness [m] (> 0)	260	455	650						
HC column in prospect [m] (> 0)	65	225	490						
Gross rock vol. [10^9 m^3] (> 0.000)	14.000	22.000	29.000						
Net / Gross [fraction] (0.00-1.00)	0.30	0.48	0.65						
Porosity [fraction] (0.00-1.00)	0.15	0.20	0.25						
Permeability [mD] (> 0.0)	50.0	400.0	800.0						
Water Saturation [fraction] (0.00-1.00)	0.40	0.30	0.20						
Bg [Rm3/Sm3] (< 1.0000)	0.0036	0.0034	0.0032						
1/Bo [Sm3/Rm3] (< 1.00)									
GOR, free gas [Sm^3/Sm^3] (> 0)									
GOR, oil [Sm^3/Sm^3] (> 0)									
Recov. factor, oil main phase [fraction] (0.00-1.00)									
Recov. factor, gas ass. phase [fraction] (0.00-1.00)									
Recov. factor, gas main phase [fraction] (0.00-1.00)	0.50	0.63	0.76						
Recov. factor, liquid ass. phase [fraction] (0.00-1.00)	0.50	0.63	0.76	For NPD use:					
Temperature, top res [°C] (>0)	90			Innrapp. av geolog-init:	NPD will insert value	Registrert - init:	NPD will insert value	Kart oppdatert	NPD will insert value
Pressure, top res [bar] (>0)	342			Dato:	NPD will insert value	Registrert Dato:	NPD will insert value	Kart dato	NPD will insert value
Cut off criteria for N/G calculation	1.Vcl < 0,4	2.Phi > 0,1	3					Kart nr	NPD will insert value

4.4 Remaining prospectivity

The PL704 contains several Upper Cretaceous prospects and leads. Four prospect levels are identified, split into two structures, in addition to Schiller: Kafka North Springar Fm, Kafka North Delfin Member, Fontane Springar Fm and Fontane Delfin Member (Figure 4.8).

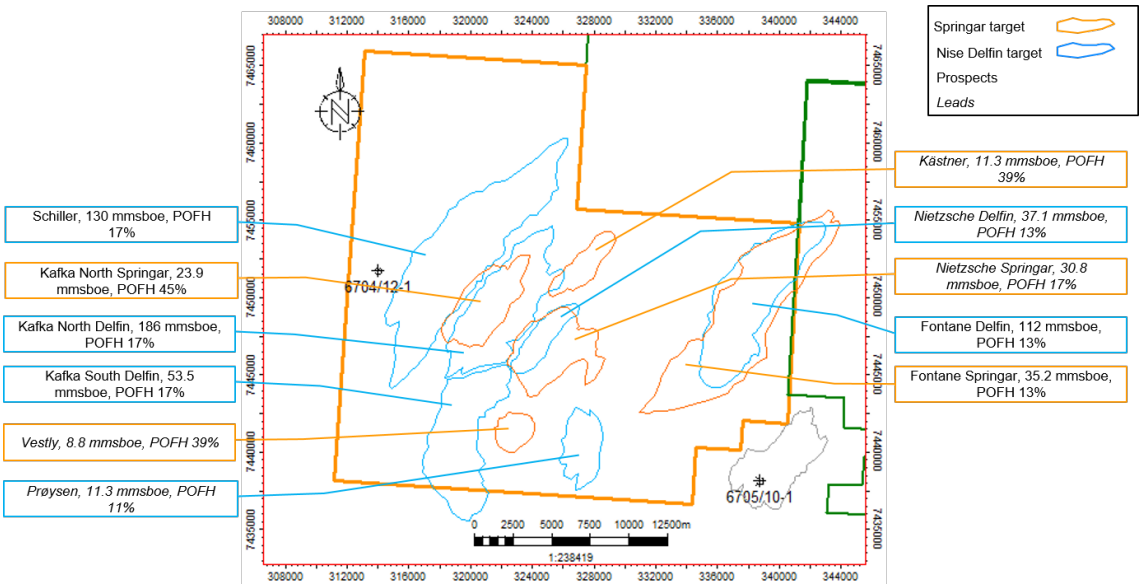

Figure 4.8 All prospects and leads in PL704 with volume and risk.

- The Kafka North is located in the fault block next to the Schiller structure (Figure 4.9). The Kafka North consist of two stacked segments, the Delfin Member in the Nise Fm and the Springar Fm. Kafka North is located shallower than Schiller, and consist of steeply dipping parallel-bedded Cretaceous section. Two vents extending up to Hordaland level is identified at the crest of the Kafka North structure. The Springar Fm segment have a possible flat-spot (Figure 4.10 and Figure 4.11). This is a positive hydrocarbon indicator, but the Springar Fm volumes are too small to defend an exploration well. The deepest segment, the Delfin Member, lack the bright amplitudes seen in the Delfin Member in Schiller, and have a low chance of success.
- Fontane is the easternmost prospect in the PL704. As for Kafka North the Fontane consists of two stacked prospective segments, the Delfin Member in the Nise Fm and the Springar Fm (Figure 4.12). Both Springar Fm and Delfin Mbr consists of parallel-bedded layers dipping towards east. The statigraphic study indicates that the Fontane structure created a local high during Late Cretaceous when the Delfin Mbr and Springar Fm were deposited. This has led to thinner reservoir sections in the Fontane structure compared to the structures located further west in the license (Figure 4.13). The Springar Fm in Fontane lack bright amplitudes, and the brightest amplitudes observed in the Delfin Mbr are down-flank on the structure. Both the Springar Fm and the Delfin Mbr have low chance of success.

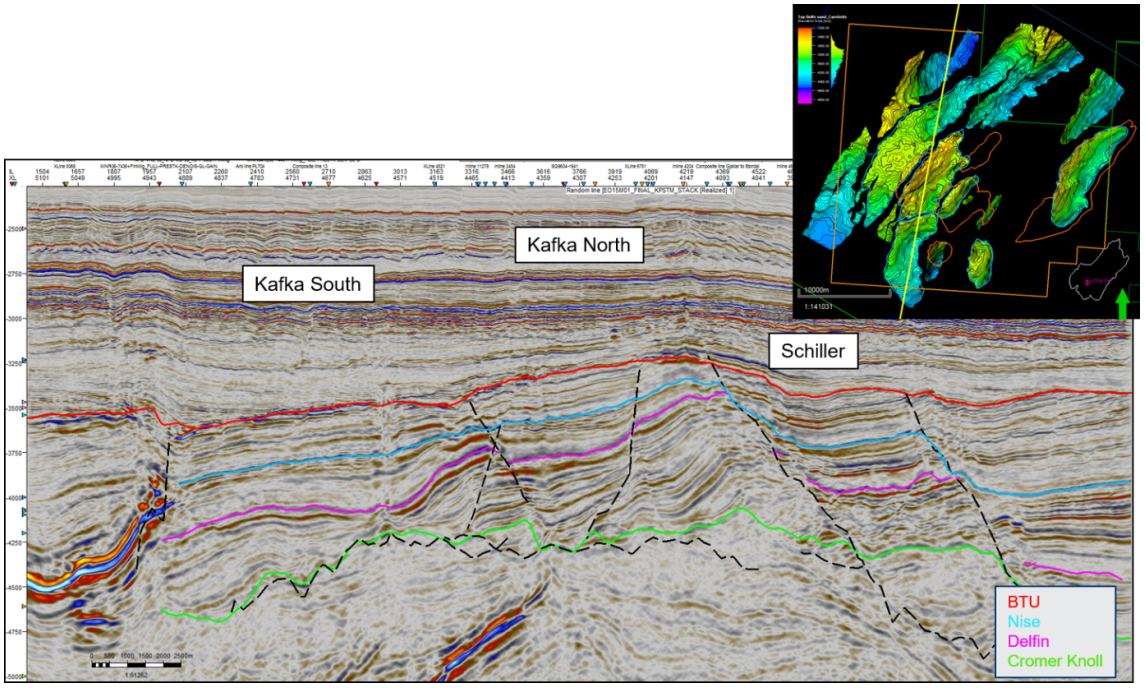

Figure 4.9 Seismic line through the Kafka North structure.

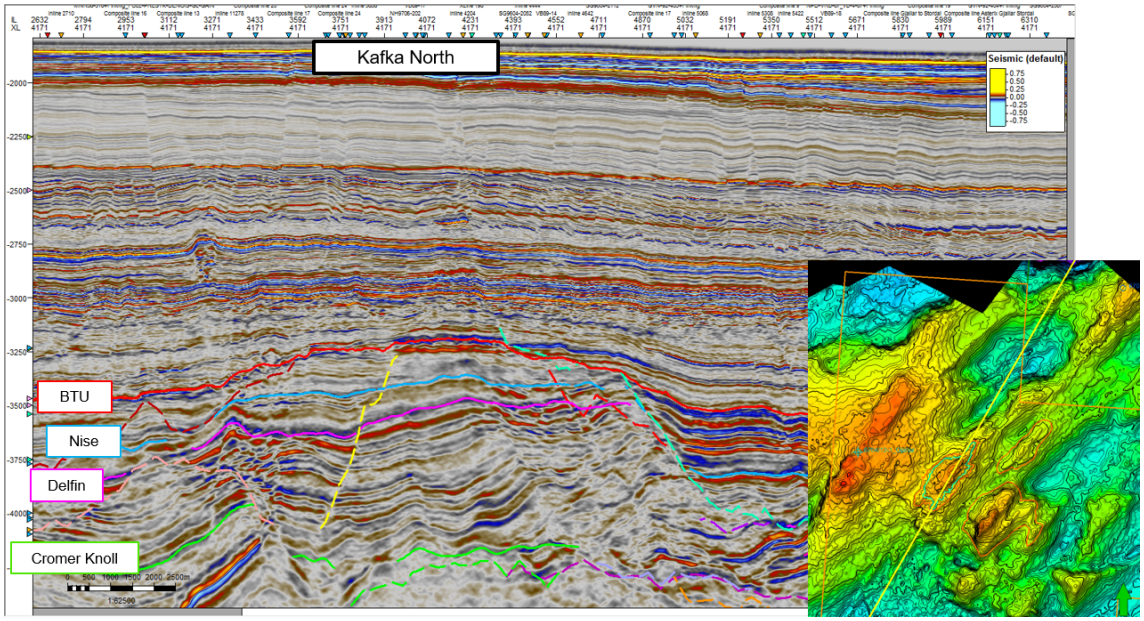

Figure 4.10 Seismic line through the Kafka North structure. Note the possible flat-spot at Springar Fm level.

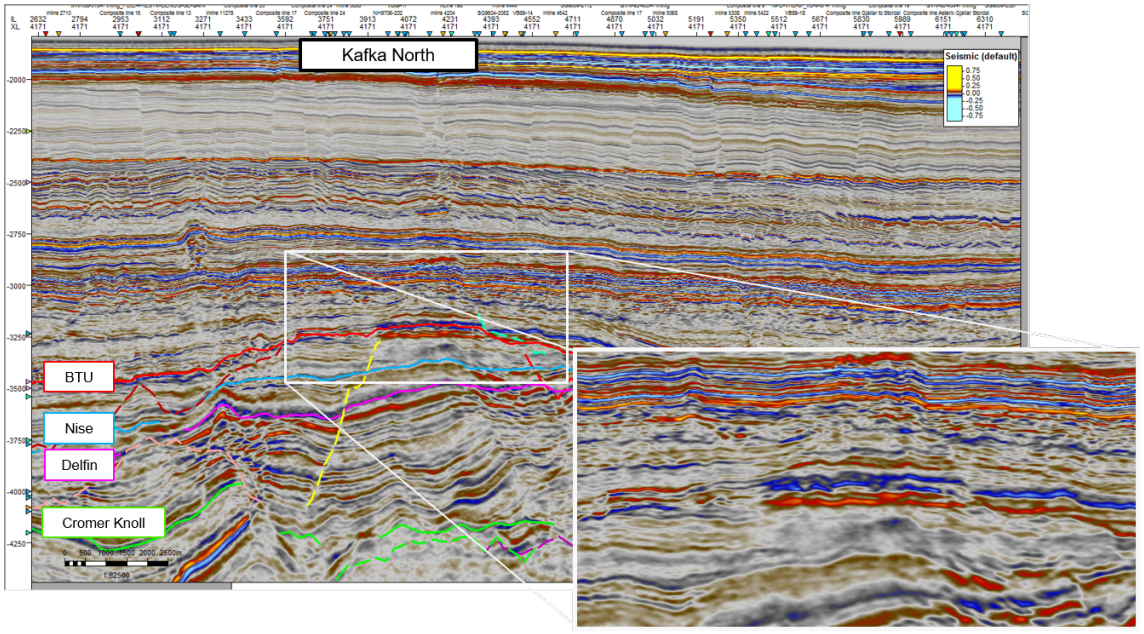

Figure 4.11 A zoom-in on the possible flat-spot in Springar Fm in Kafka North.

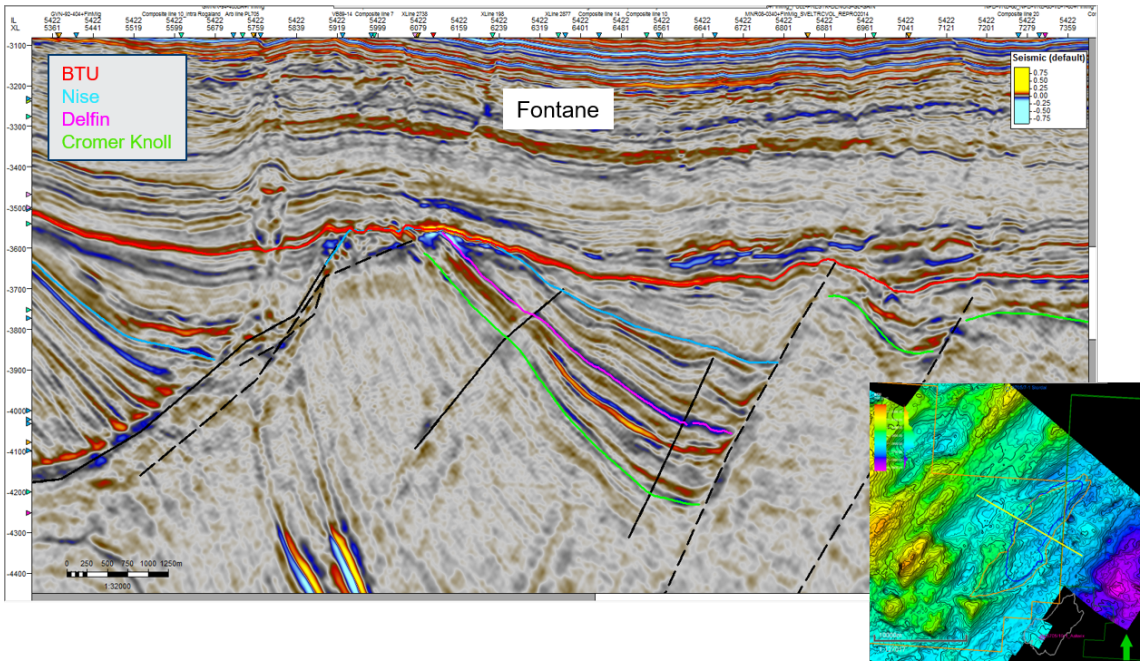

Figure 4.12 Seismic line through the Fontane structure.

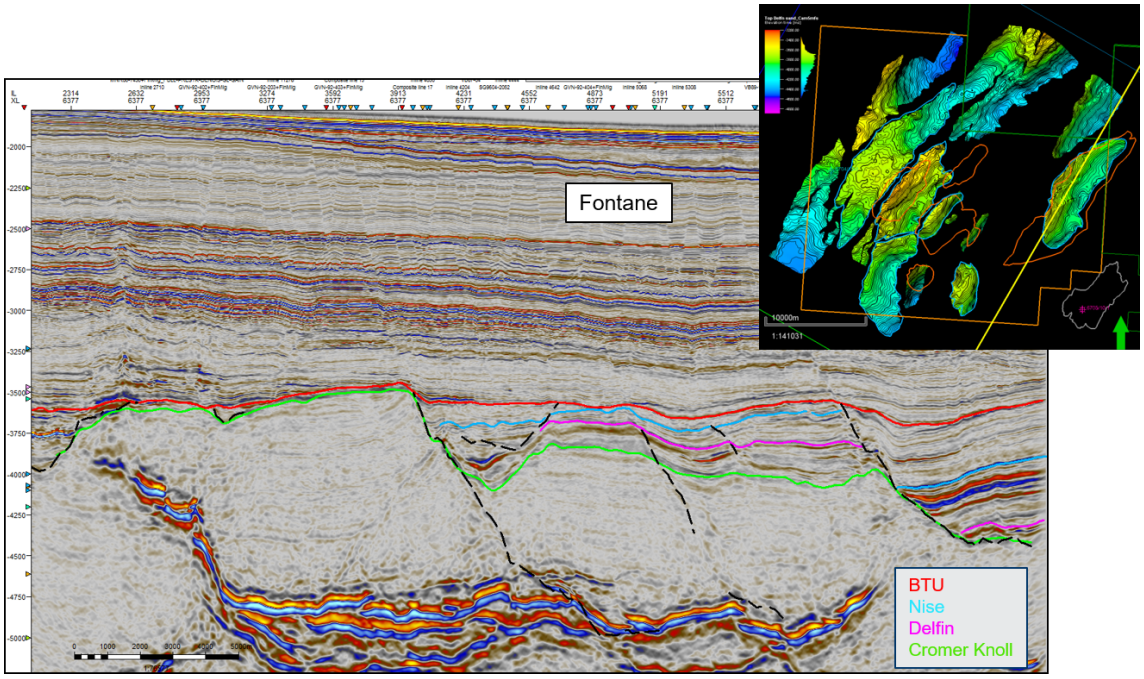

Figure 4.13 Strike line through the crestal part of the Fontane structure. The seismic signal is dim, with no direct hydrocarbon indicators.

In the license, eight leads are mapped in addition to the prospects. Six of Upper Cretaceous age and two of Middle Jurassic are (Table 4.2). The leads are either low in volume or high in risk, or a combination of these.

5 Technical Evaluation

DEA Norge has performed a full technical evaluation regarding a possible development in case of a discovery in the Schiller prospect. Properties were extrapolated from the discoveries in the area. Available infrastructure in the area is the Polarled gas export pipeline to Nyhamna, in addition to the Aasta Hansteen SPAR platform to be installed in the second half of 2018.

The development concept considered consist of 10 gas producers from three 4-slot templates with tie back to Aasta Hansteen. In addition, a possible standalone development has been considered, with a full process SPAR platform and gas export via Polarled.

The development study has assumed exploration drilling in 2019, appraisal drilling in 2020-2022 and first production in 2029. There is large uncertainty connected to the start-up date for a tie back solution, as it is dependent on the capacity of the Aasta Hansteen.

6 Conclusion

During the license period operated by E.ON E&P Norge, then DEA Norge, extending from 21st June 2013 to 21st December 2017, the partnership of PL704 has evaluated the exploration potential of the blocks.

The first phase work program included two years to perform geological and geophysical evaluation of the license, followed by a 3D seismic or drop decision. 858,175 km 2D AMA-MNR reprocessed seismic data were purchased and formed the basis for the initial prospectivity analysis. A decision to continue the license following the two years was made, and the SG9604 and ST0410 3D seismic data were purchased and re-processed. Special seismic studies (AVO, Impedance Processing, Fluid Substitution) and geological studies (Fault Seal Analysis, Sequence Stratigraphy) were performed to support the prospectivity evaluation. In February 2017, the partnership applied for a 6 months extension to the drill or drop decision. This was approved on the 1st June 2017 with a revised drill or drop decision on 21st December 2017. The extension was required to fully implement the nearby PL705 Stordal well results in the PL704 prospectivity evaluation.

Following the completion of the dry Stordal well, the partnership has implemented the well results and completed the prospectivity evaluation. On this basis, it was concluded that no prospects that can justify a positive drilling decision has been identified in the PL704 license.