Relinquishment of PL 464

Relinquishment of PL 464

List of figures

List of tables

1 Key license history

1.1 License owners

The license owners of Production License 464(PL464) are:

55% Dana Petroleum Norway AS (Operator)

45% E.ON Ruhrgas Norge AS

PL464 is located on the Horda Platform, to the northeast of the Troll Field (Fig. 1.1). The area size of the license is 126,3km².

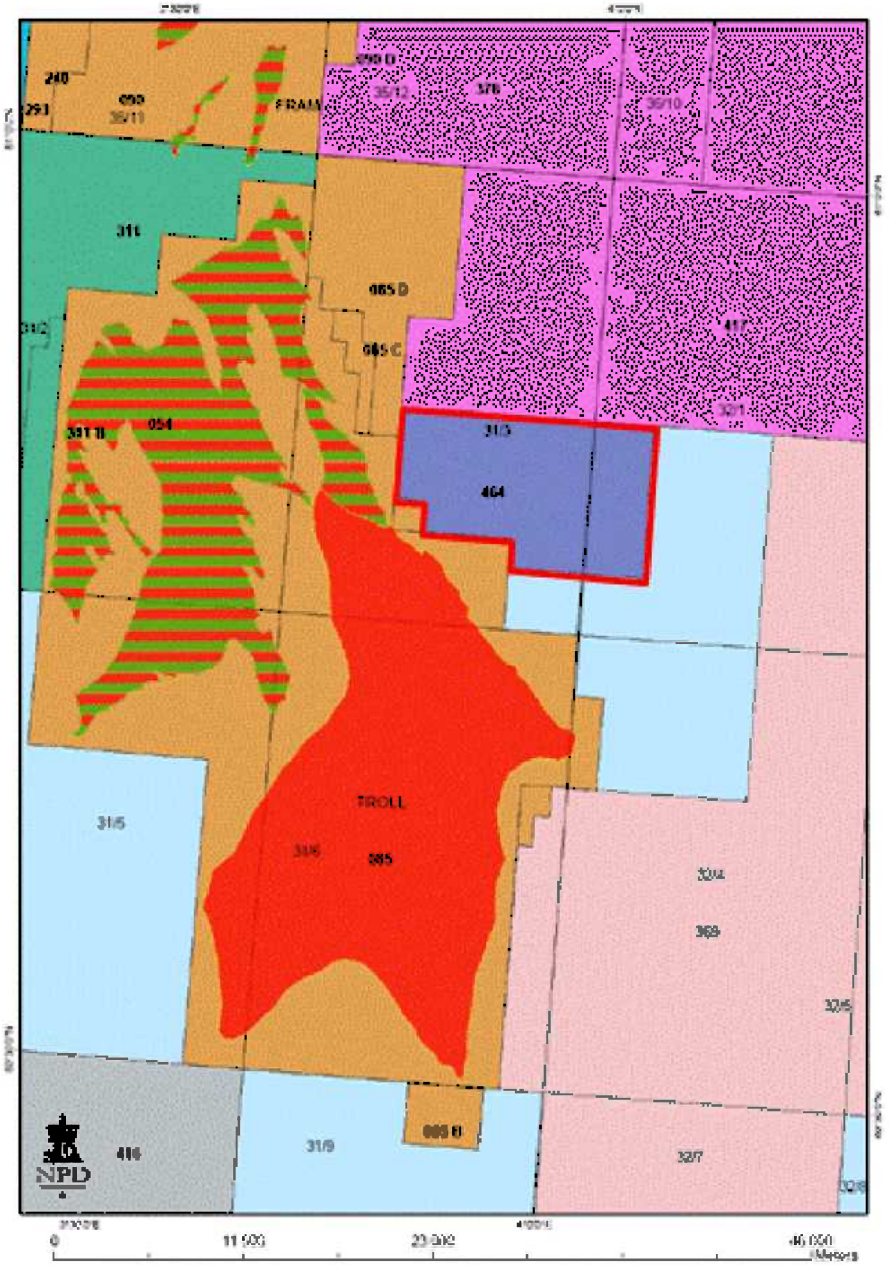

Fig. 1.1 Location map of PL464

1.2 License award and Work program

Production License 464 (PL464) was awarded on 29th February 2008 as part of the APA 2007 licensing round, with an initial period of 5 years. The work obligations put forward by the Authorities were divided into three phases:

1. Within 2 years: Acquisition of 3D seismic and technical evaluations leading to a Drill or Drop (DoD) decision
2. Within 4 years: Drill a well and perform technical evaluations leading to a Drop or Continue (DoC) decision
3. Within 5 years: Technical evaluations and concept studies leading to a Plan for Development or Drop decision

1.3 License extension

An application to postpone the Drill or Drop (DoD) decision by one year was submitted to the Ministery of Petroleum and Energy (MPE) on 1st December 2009. The license extension was approved by MPE on 13th January 2010.

The new date for the DoD decision was set to 28th February 2011.

1.4 License meetings

The following Management Committee (MC) and Exploration Committee (EC) meetings have been arranged:

The first PL46 MC meeting which established the license was held on 28th March 2008. Subsequently, the following license meetings have been arranged:

Combined MC and EC meetings
20th November 2008
19th June 2009
27th October 2009
25th November 2009
19th February 2010
25th June 2010
22nd November 2010

EC and Work meetings
2nd April 2009
17th November 2009

Additional communication between the licensees has utilized LicenseWeb.

1.5 Reason for relinquishment

The license work obligations (1st phase) have been completed. Based on results from the following studies the Management Committee of PL464 has concluded to not drill a well and to relinquish the license:

Structural interpretation
The structural interpretation show that the Volans structure consists of a relatively small structural closure for all potential reservoir levels. The mapped spill point is towards the south. No hydrocarbon shows are present in well 32/4-1T2, located on an updip structural trap south of the Volans structure.

Fluid substitution study
Jurassic prospects with hydrocarbons should be evident from seismic data (gathers, stacks and inversion products). No hydrocarbon indicators are observed from the potential reservoir levels.

Seismic inversion study
Visible discrimination in elastic parameters for the Triassic prospects is evident in the fluid substitution study (gas cases). No indications of hydrocarbons are seen from the seismic inversion products.

Hydrocarbon migration study
The source and migration studies show only minor possibilities for migration of hydrocarbons into the Volans structure. The main conclusion is that Volans is located in a migration shadow.

EM feasibility study
The 3D CSEM feasibility study indicates that commercial and non-commercial volumes in the Jurassic sequence are difficult to distinguish. The Triassic prospects is considered too deep for reliable EM responses. Acquisition of EM data is therefore not likely to further derisk the hydrocarbon potential of Volans.

Hydrocarbon volumes
Volume calculations based on the geological models show limited potential for the individual reservoir levels of Volans.

Risk evaluations
The possibility of success for all independent reservoirs of Volans are ranked as very low.

2 Database

2.1 Seismic database

A 3D survey (MC3D-Q31-2008) was acquired by PGS in 2008 (Fig. 2.1). It was acquired as an extension to the ST0803 Troll survey, operated by StatoilHydro. The co-acquisition was successful in terms of minimizing the seismic activity in the area and avoiding acquisition time share.

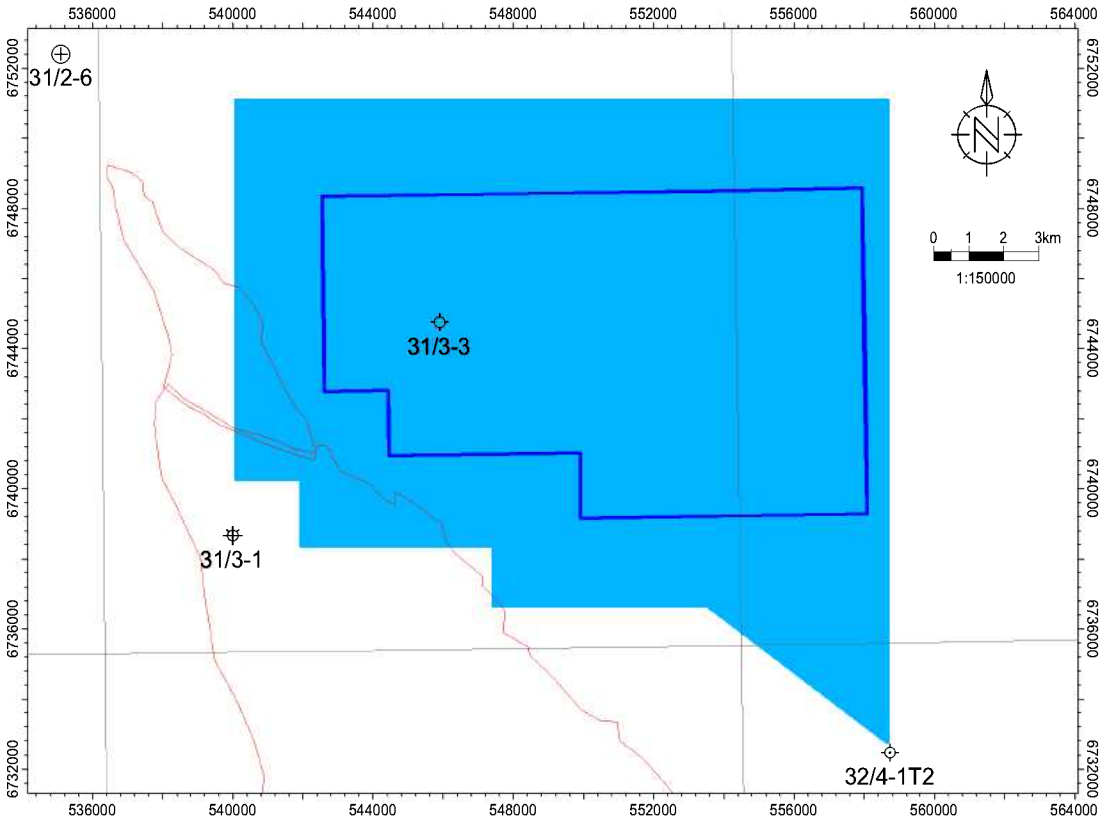

Fig. 2.1 MC3D-Q31-2008. Blue: 3D seismic coverage. Dark blue: PL464 license border

2.2 Well database

Table 2.1 (below) lists the wells that have been included as the license database.

Table 2.1: **Well database**

Well name	TD (MD) - Oldest penetrated age	HC	Year
31/2-5	2532 - Triassic	Oil/gas(Sognefjord)	1980
31/2-8	3375 - Triassic	Oil shows	1982
31/3-1	2374 - Triassic	Gas(Sognefjord& Fensfjord)	1983
31/3-3	2573 - Early Jurassic	Dry	1984
31/4-2	2900 - Triassic	Oil shows(Brent)	1979
31/4-3	4981 - Early Permian	Oil/gas (Heather sst)	1980
31/5-2	2500 - Triassic	Oil/gas(Sognefjord)	1983
31/5-3	2250 - Early Jurassic	Oil/gas(Sognefjord)	1984
31/6-1	4070 - Basement	Oil/gas (Sognefjord& Fensfjord)	1983
31/6-2	2020 - Early Jurassic	Gas (Sognefjord)	1983
31/6-3	2250 - Triassic	Dry	1983
31/6-5	2082 - Early Jurassic	Oil/gas(Sognefjord)	1984
31/6-8	2138 - Early Jurassic	Oil/gas(Sognefjord)	1985
32/4-1T2	3186 - Basement	Dry	1996
35/9-1	2350 - Basement	Oil/gas(Viking,Brent& Dunlin)	1989
35/11-1	3361 - Triassic	Dry	1984
35/11-4	3127 - Early Jurassic	Oil/gas(Sogne-Fensfjord&Brent)	1990
35/12-1	3020 - Early Jurassic	Oil shows	1992

3 Review of geological framework

3.1 Performed work and main results

Seismic interpretation

Seismic interpretation was carried out on the MC3D-Q31-2008 survey. The main interpreted reflectors were: Seabed, Top Shetland Group, Top Cromer Knoll Group, Base Cretaceous Unconformity, Top Sognefjord Formation, Top Brent Group, Cook Formation, Top Statfjord Formation, Lomvi Formation, Teist Reflector (Anisian) and Top Basement. The good quality 3D seismic data set led to high confidence of the interpreted surfaces (Fig. 3.1, Fig. 3.2 and Fig. 3.3).

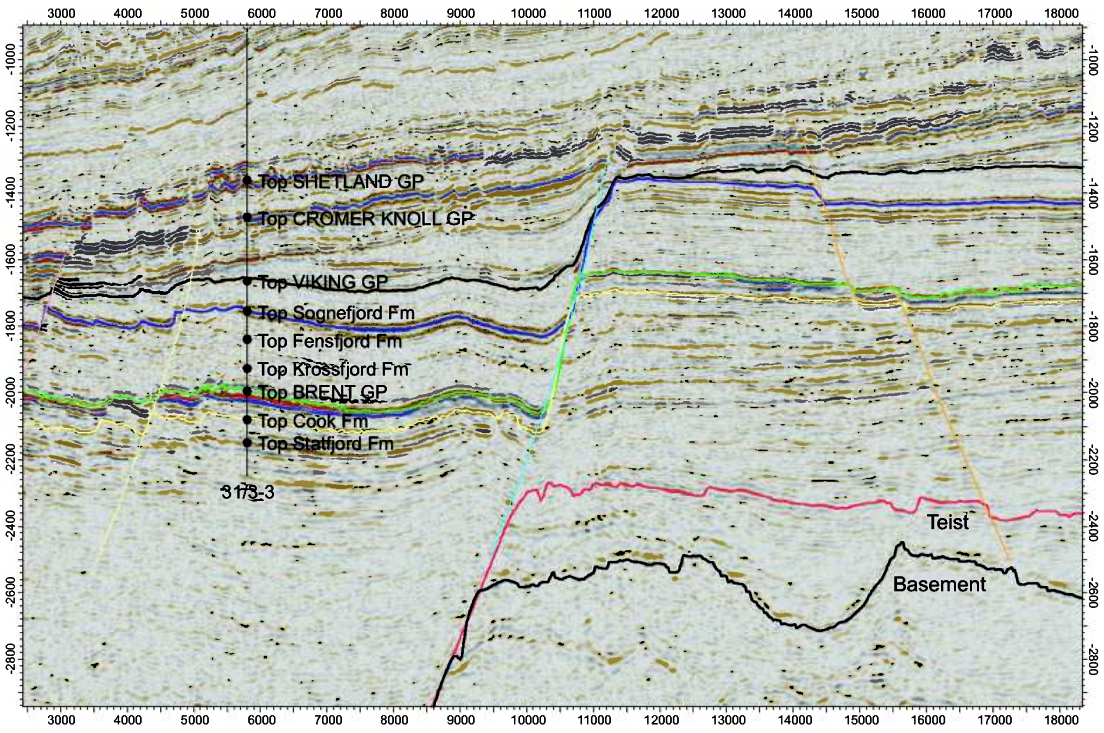

Fig. 3.1 Seismic cross section with interpretation

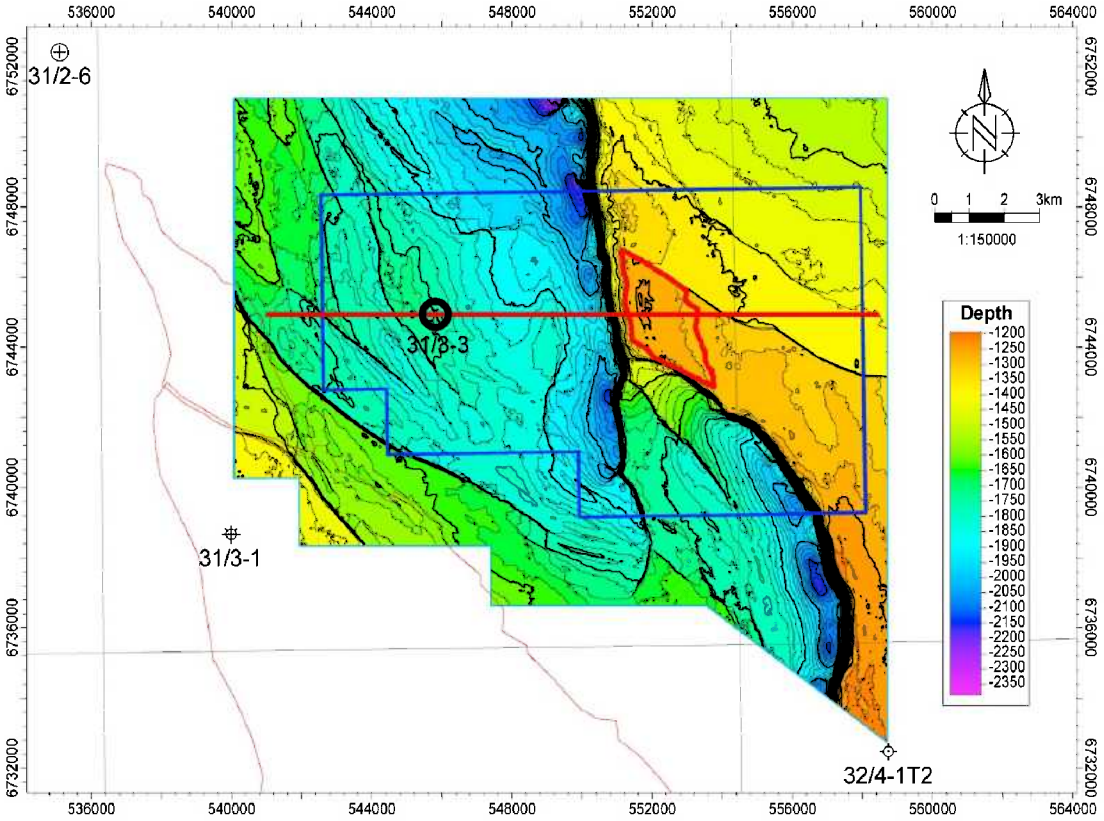

Fig. 3.2 Top Sognefjord time surface. Red line: location of profile in previous figure

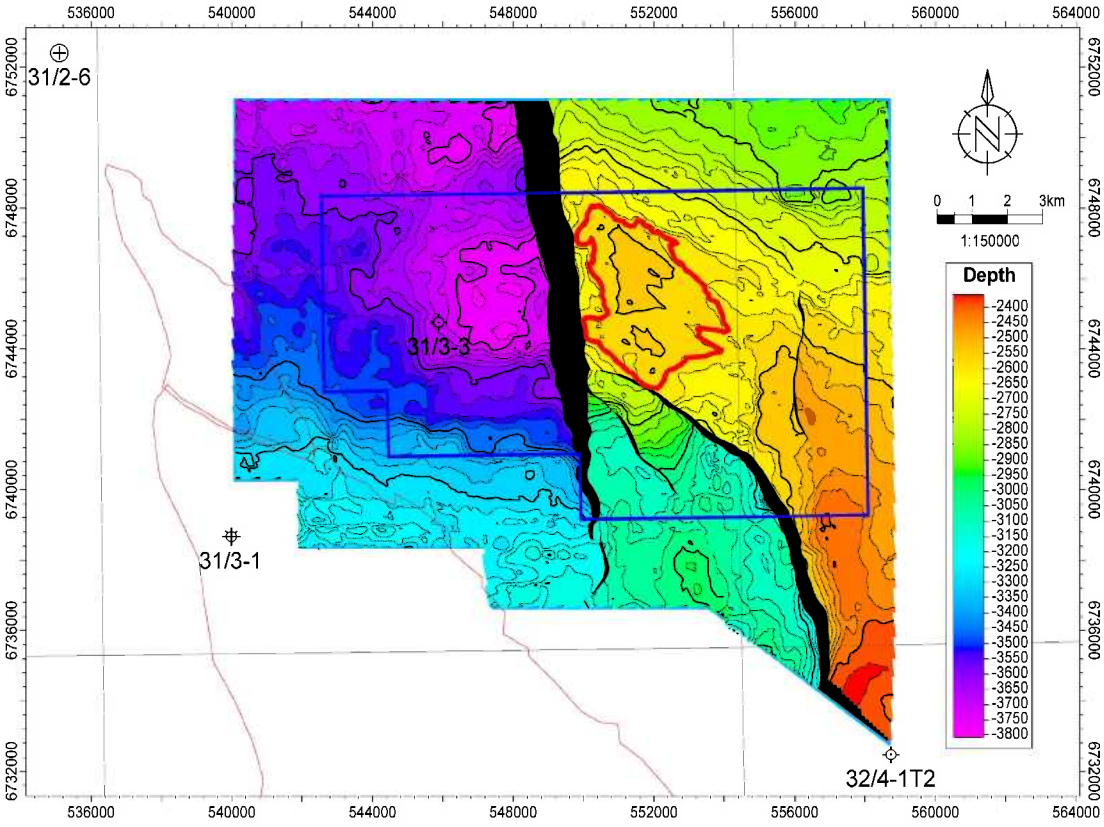

Fig. 3.3 Teist (Anisian) time surface

In order to depth convert the time surfaces, a velocity model was generated based on check shot data from wells 31/3-1, 31/3-3 and 32/4-1T2, combined with stacking velocities from the 3D seismic processing. The resulting depth surfaces are considered to be of high quality.

Reservoir/geological model

A 3D geological model was constructed using the Petrel software package. Input to the geological model was the time interpreted horizons and faults. The time framework model was subsequently depth converted. Isochore maps based on well tops and distribution of petrophysical parameters from CPI logs were constructed from relevant wells. Fluid contacts were established to match the structural spill points.

Separate reservoir models for the Jurassic and Triassic levels were constructed. The Jurassic reservoir model includes the Viking Group (Top Heather C, Top Fensfjord Fm, Top Krossfjord Fm, Top Heather A), the Brent Group (Top Ness Fm, Top Rannoch Fm, Top Oseberg Fm), and the Dunlin Group (Top Drake Fm, Top Burton Fm). Fig. 3.4 displays an east-west profile through the Jurassic part of the Volans structure.

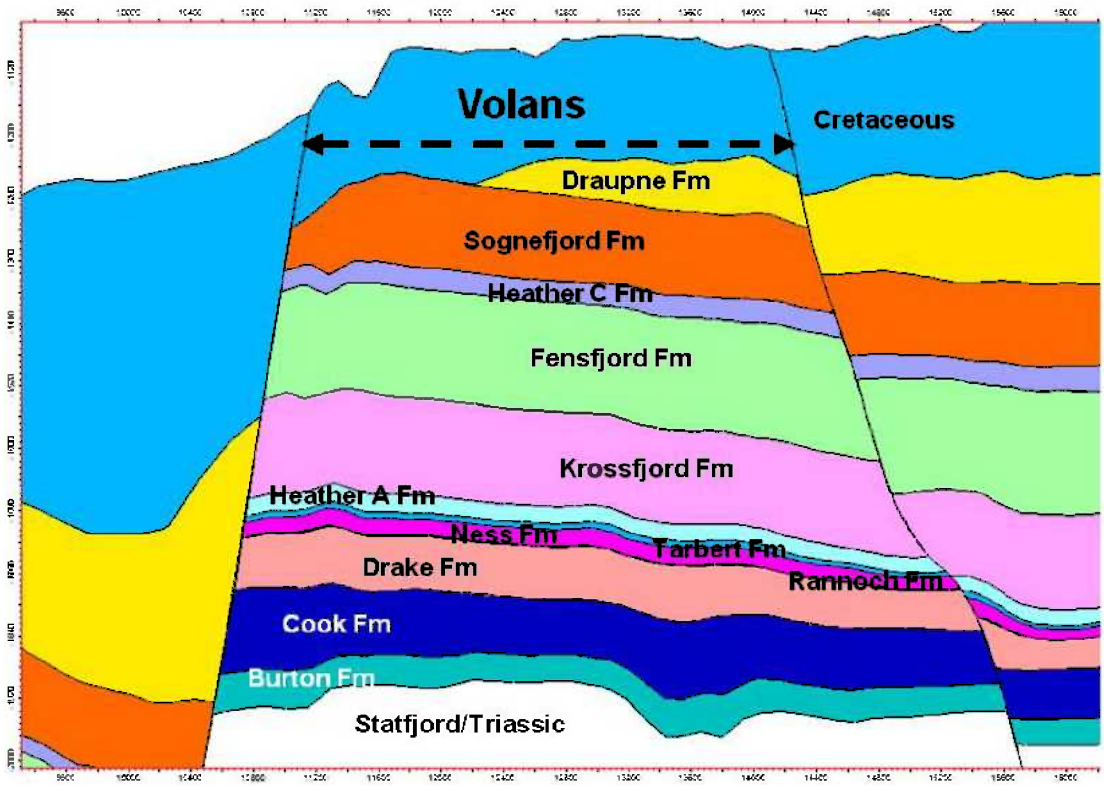

Fig. 3.4 Jurassic geological model - EW profile

The Triassic reservoir model includes the Lunde Formation (Rhaetian, Norian, Carnian), the Lomvi Formation (Ladinian), and the Teist Formation (Ladinian, Anisian, Olenekian). Fig. 3.5 displays an east-west profile through the Triassic part of the Volans structure.

Porosity and net to gross values were distributed in the 3D models. Deterministic and stochastic models were generated for both the Jurassic and Triassic reservoir intervals. Fig. 3.6 shows the deterministic porosity distribution for the Jurassic reservoir model, while Fig. 3.7 shows the stochastic porosity distribution for the Triassic reservoir model.

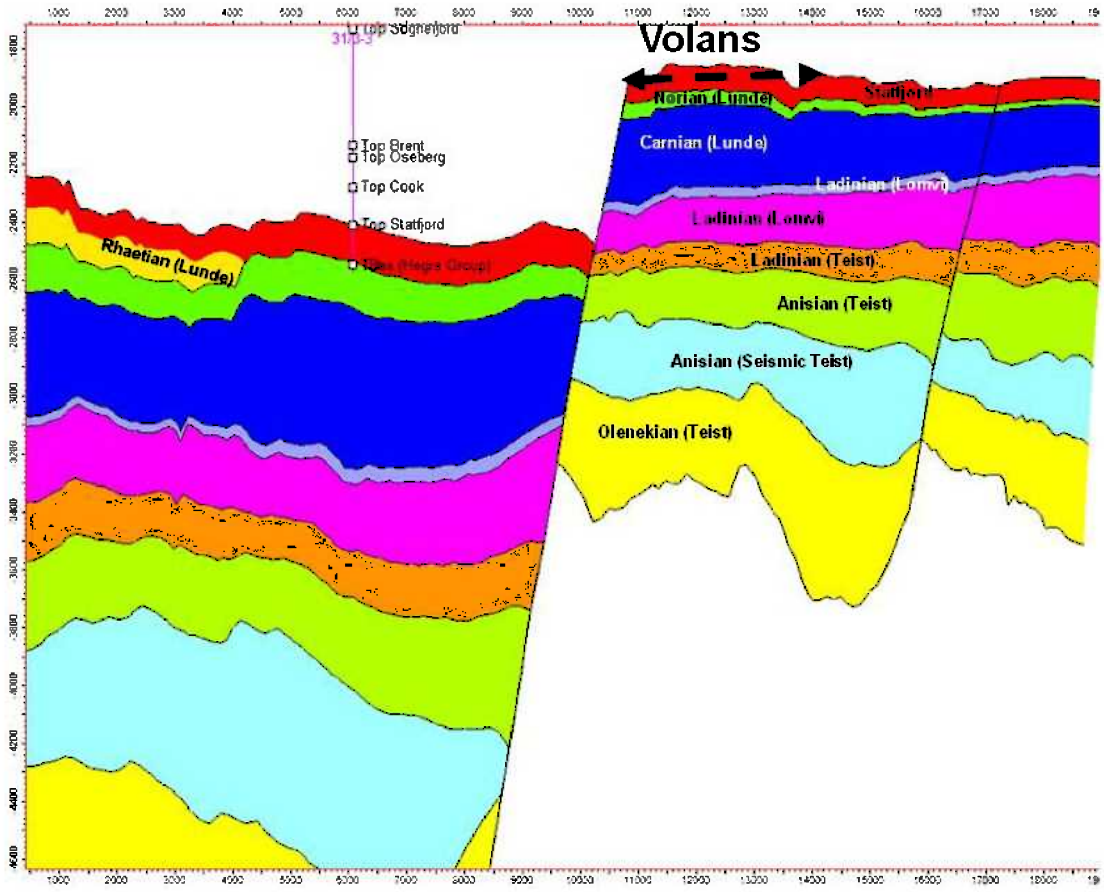

Fig. 3.5 Triassic geological model - EW profile

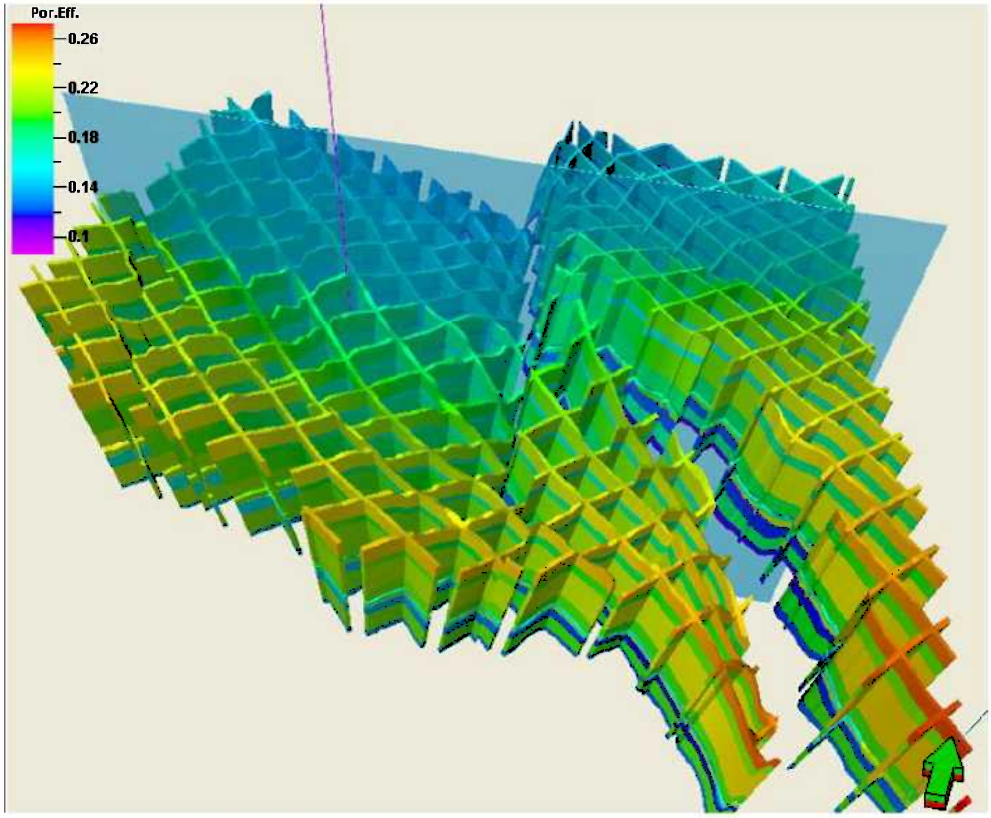

Fig. 3.6 3D deterministic porosity model for Jurassic

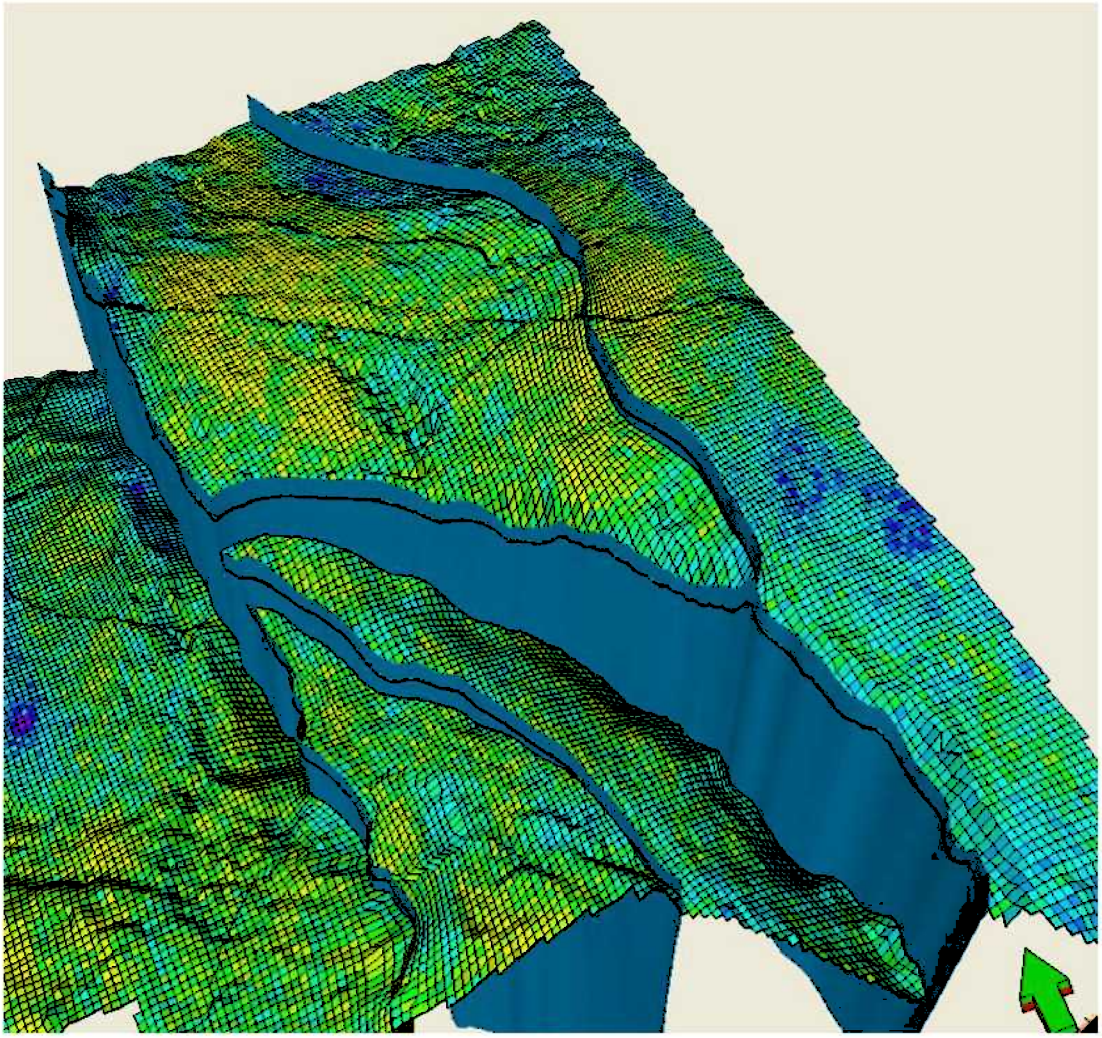

Fig. 3.7 3D stochastic porosity model for Triassic

The reservoir models were used to calculate in-place hydrocarbon volumes for the different potential reservoir levels. The summary of volume calculations are given in Section 4.3 Prospect volumes.

Shallow potential:
The hydrocarbon potential of shallow levels in the license was also evaluated. This was related to an amplitude anomaly at the boundary between the Hordaland and Nordland groups. Data analyses of well 31/3-3 was considered important for the assessment of a potential reservoir at this stratigraphic level. See Fig. 3.8.

The evaluation concluded with a poor to fair potential for reservoir presence, confined to a vague trap definition with a considerable risk on depth conversion, and gas as the hydrocarbon phase. The total POS was estimated to 0,12. This risk, combined with a low volume estimate, terminated further work on this lead.

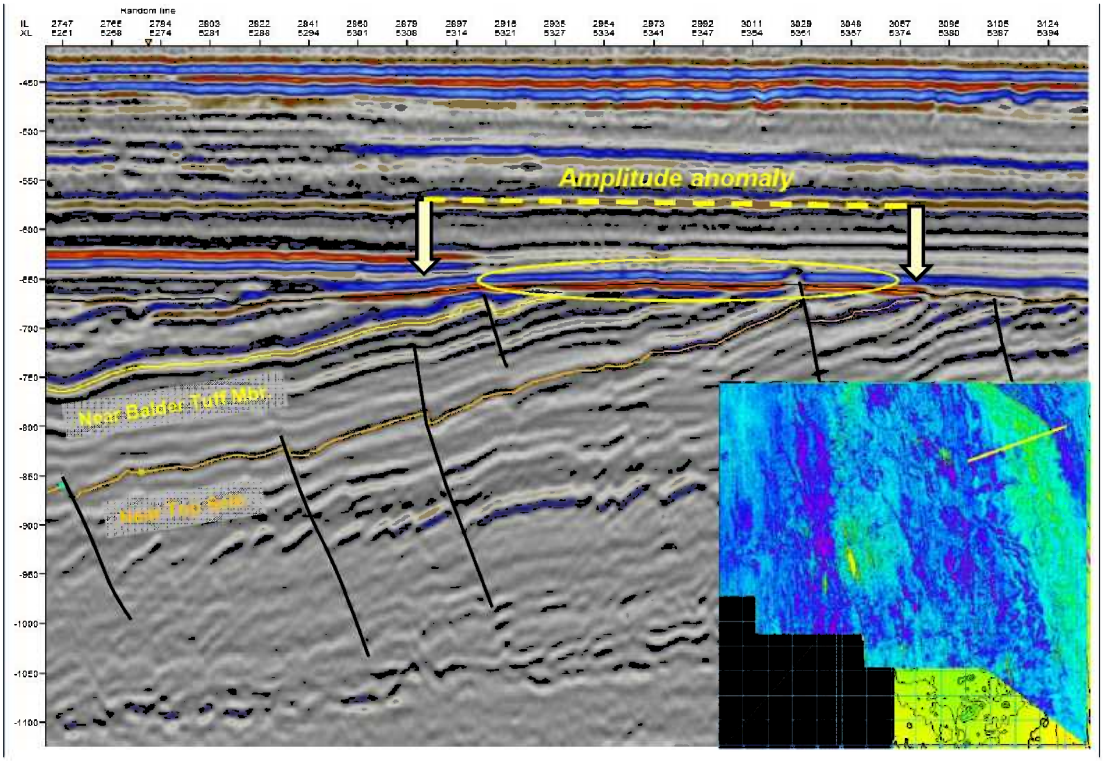

Fig. 3.8 Shallow potential

3.2 Special studies

Sequence- and biostratigraphic study (Geolink)
The study by Geolink was performed in two phases. The objective for the first phase was to analyse the palaeogeography for the Jurassic on the Horda Platform area, and to construct facies maps of certain stratigraphic levels. The study integrated wireline logs with biostratigraphic data, which were tied to seismic interpretations. Available data from NPD, DISKOS as well as the literature were used to construct the facies maps. Phase two of the Geolink study was performed on the Triassic succession with the same focus as phase one.

Results from the Geolink study were used as input to the reservoir models. The study gave a better understanding of the sequence stratigraphic development on a sub regional scale in the Horda Platform, and improved confidence in the reservoir zonation.

Hydrocarbon migration study (SINTEF)
The hydrocarbon modelling was carried out by SINTEF Petroleum Research in two phases (2009 initial and 2010 local update). Phase one focussed on the regional geological framework and basin development (maturation modelling, charge potential). Phase two focussed on the migration patterns based on more detailed maps from the new 3D seismic survey.

A petroleum system model was established with three potential source rocks within two formations: Draupne and Heather (2 levels). Carrier beds were introduced within the Brent, Dunlin and Hegre groups. The hydrocarbon kitchen areas for PL464 were considered in the Sogn Graben, Magne and Mode sub basins.

The study suggested that migration from north (Sogn Graben) is deflected by traps in the Gjøa area and tends to spill towards east (north of the PL464 area). A migration route from west, which enables filling of the Troll field, gives a spill route south of PL464, thus bypassing the Volans structure. From the work it is concluded that Volans is located in a migration shadow.

Fluid substitution study (AGR)
Log curves and synthetic seismic gathers for wells 31/3-3 and 32/4-1T2 were generated, corresponding to various fluids in the potential reservoir zones. The subsequent analysis concluded that Jurassic prospects with hydrocarbons should be evident from the seismic data (gathers, stacks and inversion products). In a potentially deeper target (Triassic), a minor discrimination is evident in the modelled log curves between water and gas. However, no such observations are evident in the Jurassic or Triassic targets of Volans.

Inversion products (Internal study)
Pre-stack seismic inversion products were generated for Jurassic and Triassic targets seperately. The results supported the lithology interpretation, however no indications of fluid discriminators are observed across Volans.

CSEM feasibility study (EMGS)
The CSEM 3D feasibility study by EMGS suggested that commercial and non-commercial volumes in the Jurassic sequence are difficult to distinguish. The Teist formation prospect is regarded too deep for an EM investigation. The main conclusion is that a CSEM acquisition will not contribute to a further derisking of Volans.

4 Prospect update

4.1 Prospectivity applied for

PL464 is located northeast of the Troll Field (1.1 License owners). The license was awarded in February 2008, based on an application related to APA 2007. The application focussed on a lower to middle Jurassic prospect named Tangsprell (later renamed to Volans).

The Tangsprell prospect was mapped as a structural 4-way trap defined by faults and stratigraphic dip. Potential reservoir layers were anticipated within the Brent Group and Cook Formation. Good quality Brent and Cook sands are found in nearby wells. Main risk was considered to be the hydrocarbon charge, as filling of the prospect depends on long distance migration. Uncertainties in the structural interpretation was due to that mapping had been based on 2D seismic only. The total POS was estimated to 18%.

The proposed work program in the application was focussing on the main risks (reservoir definition and hydrocarbon charge). This included to acquire an EM survey (1st year) and a 3D seismic survey (3rd year). This was changed in the license award to a 3D seismic survey (2nd year).

4.2 Prospect update

The technical work performed for PL464 in the period from the license award until today has been described in Section 3 Review of geological framework. The volume estimates and risk assessements from this work are described in sections 4.3 Prospect volumes and 4.4 Prospect probabilities, respectively.

The acquisition of a new 3D seismic survey has resulted in an improved structural definition of the Volans prospect, compared to the previous interpretation that was based on 2D seismic data. The high quality seismic survey further expanded the potential reservoir intervals of Volans to include closures within the Viking group (Sognefjord, Krossfjord, Fensfjord formations) and the Triassic Hegre Group.

Additional knowledge about the depositional environment and facies development of potential reservoir rocks was obtained through the sequence- and biostratigraphy study by Geolink. This greatly improved the confidence in reservoir zonation at most stratigraphic levels.

Conclusions from the source and migration studies conducted by SINTEF include that Volans most probably is located in a migration shadow and that the hydrocarbon phase most likely will be gas. Furthermore, well 32/4-1T2, which is located on the same structural high south of the spill point from Volans, was dry.

From a CSEM feasibility study by EMGS it was concluded that an EM survey would not derisk Volans any further.

The technical evaluations for PL464 have concluded that the volume potential of Volans is too small to be regarded as commercial. Also, the possibility of finding hydrocarbons is assessed as minor. From these conclusions, the Management Committee does not recommend to drill a well in PL464.

4.3 Prospect volumes

The base case oil in place resources from the APA 2007 application within the Brent and Cook reservoir levels were 13,7*10^{6}Sm^3 and 16,7*10^{6}Sm^3, respectively.

Based on the work described in Section 3 Review of geological framework, updated volumes have been calculated. See Table 4.1 (*- no recovery factor for Teist has been calculated). Since the basin modelling study of SINTEF indicates gas as the most likely hydrocarbon phase, only the gas volumes are reported below. The Sognefjord Formation (Viking Group) and the Teist Formation (Hegre Group) have been added to the volume potential compared to the APA 2007 application.

Table 4.1: Prospect Volumes (Base case)

Reservoir level	Gas in place (10^{9}Sm^3)	Recoverables (10^{9}Sm^3)	APA 2007 - Oil in place (10^{6}Sm^3)
Sognefjord Fm	1.6	1	-
Brent Gp	2.4	1.5	13.7
Cook Fm	3.4	2.2	16.7
Teist Fm	11	*	-
Total	18.4		

Table 4.2: Volume parameters (Base case)

Parameters/reservoir level	Sognefjord	Brent	Cook	Teist
GRV (10^{9}m^3)	0.1	0.2	0.2	1
NTG	0.55	0.38	0.57	0.54
Porosity	0.24	0.21	0.19	0.14
So	0.7	0.7	0.7	0.7
Bg	190	207	210	208
Recovery factor	0.65	0.65	0.65	*

Fig. 4.1, Fig. 4.2, Fig. 4.3, Fig. 4.4 shows Table 1 (NPD format) and the summary of the prospect data and volumes for the different reservoir levels.

Block	Prospect name		Discovery/Prosp/Lead		Prosp ID (or New!)	NPD approved?
31/3, 32/1	Volans-Sognefjord				*NPD will insert data*	*NPD will insert data*
Play (name / new)	Structural element		Company/ reported by / Ref. doc.			Year
NPD will insert data	Bjørgvin Arch		Dana Petroleum Norway			
Oil/Gas case	**Resources IN PLACE**					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3						
Gas 10^9 Sm^3	0,9	1,6	2,3			
	Resources RECOVERABLE					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3						
Gas 10^9 Sm^3	0,6	1	1,5			
	Which fractiles are used as:		Low:	P90	High:	P10
Type of trap	Water depth (m)		Reservoir Chrono (from - to)		Reservoir Litho (from - to)	
tructural, tilted fault bloc	332		Jurassic		Sognefjord	
Source Rock, Chrono	Source Rock, Litho		Seal, Chrono		Seal, Litho	
Upper Jurassic	Draupne/Heather fms		Upper Jurassic		Draupne/Heather fms	
Seismic database (2D/3D):						
Probability of discovery:						
Technical (oil+gas case)	0,08			Prob for oil/gas case		
Probability (fraction):	Reservoir (P1)	Trap (P2)	Charge (P3)	Retention (P4)		
	1	0,8	0,1	1		
Parametres:	Low	Base	High	Comments		
Depth to top of prospect (m)		1250				
Area of closure (km^2)		5				
Reservoir thickness (m)						
HC column in prospect (m)		35				
Gross rock vol. (10^9 m^3)		0,1				
Net / Gross (fraction)	0,21	0,55	0,69			
Porosity (fraction)	0,13	0,24	0,3			
Water Saturation (fraction)		0,7				
Bg. (<1)		190				
Bo. (>1)						
GOR, free gas (Sm^3 /Sm^3)						
GOR, oil (Sm^3 /Sm^3)						
Recovery factor, main phase		0,65				
Recovery factor, ass. phase						
Temperature, top res (deg C) :	55	Pressure, top res (bar) :		170		

Fig. 4.1 Prospect data for Volans Sognefjord.

Block	Prospect name	Discovery/Prosp/Lead	Prosp ID (or New!)	NPD approved?
31/3, 32/1	Volans-Brent		*NPD will insert data*	*NPD will insert data*
Play (name / new)	Structural element	Company/ reported by / Ref. doc.		Year
NPD will insert data	Bjørgvin Arch	Dana Petroleum Norway		

Oil/Gas case	**Resources IN PLACE**					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3						
Gas 10^9 Sm^3	1,6	2,4	3,2			
	Resources RECOVERABLE					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3						
Gas 10^9 Sm^3	1	1,5	2,1			
	Which fractiles are used as:		Low:	P90	High:	P50

Type of trap	Water depth (m)	Reservoir Chrono (from - to)	Reservoir Litho (from - to)
tructural, tilted fault bloc	332	Middle Jurassic	Ness Fm
Source Rock, Chrono	Source Rock, Litho	Seal, Chrono	Seal, Litho
Upper Jurassic	Draupne/Heather fms	Upper Jurassic	Draupne/Heather fms

Seismic database (2D/3D):				
Probability of discovery:				
Technical (oil+gas case)	0,06		Prob for oil/gas case	
Probability (fraction):	Reservoir (P1)	Trap (P2)	Charge (P3)	Retention (P4)
	1	1	0,25	1

Parametres:	Low	Base	High	Comments
Depth to top of prospect (m)		1650		
Area of closure (km^2)		9,3		
Reservoir thickness (m)				
HC column in prospect (m)		65		
Gross rock vol. (10^9 m^3)		0,2		
Net / Gross (fraction)	0,18	0,38	0,59	
Porosity (fraction)	0,17	0,21	0,23	
Water Saturation (fraction)		0,7		
Bg. (<1)		190		
Bo. (>1)				
GOR, free gas (Sm^3 /Sm^3)				
GOR, oil (Sm^3 /Sm^3)				
Recovery factor, main phase		0,65		
Recovery factor, ass. phase				
Temperature, top res (deg C) :	55	Pressure, top res (bar) :		170

Fig. 4.2 Prospect data for Volans Brent.

Block	Prospect name	Discovery/Prosp/Lead	Prosp ID (or New!)	NPD approved?
31/3, 32/1	Volans-Cook		*NPD will insert data*	*NPD will insert data*
Play (name / new)	Structural element	Company/ reported by / Ref. doc.		Year
NPD will insert data	Bjørgvin Arch	Dana Petroleum Norway		

Oil/Gas case	**Resources IN PLACE**					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3						
Gas 10^9 Sm^3	1,9	3,4	5			
	Resources RECOVERABLE					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3						
Gas 10^9 Sm^3	1,2	2,2	3,2			
	Which fractiles are used as:		Low:	P90	High:	P10

Type of trap	Water depth (m)	Reservoir Chrono (from - to)	Reservoir Litho (from - to)
Structural,tilted fault bloc	332	Lower Jurassic	Cook Fm
Source Rock, Chrono	Source Rock, Litho	Seal, Chrono	Seal, Litho
Upper Jurassic	Draupne/Heather fms	Lower Jurassic	Drake Fm

Seismic database (2D/3D):				
Probability of discovery:				
Technical (oil+gas case)	0,1		Prob for oil/gas case	
Probability (fraction):	Reservoir (P1)	Trap (P2)	Charge (P3)	Retention (P4)
	1	1	0,25	1

Parametres:	Low	Base	High	Comments
Depth to top of prospect (m)		1775		
Area of closure (km^2)		9,3		
Reservoir thickness (m)				
HC column in prospect (m)		30		
Gross rock vol. (10^9 m^3)		0,2		
Net / Gross (fraction)	0,13	0,57	1	
Porosity (fraction)	0,16	0,19	0,22	
Water Saturation (fraction)		0,3		
Bg. (<1)		210		
Bo. (>1)				
GOR, free gas (Sm^3 /Sm^3)				
GOR, oil (Sm^3 /Sm^3)				
Recovery factor, main phase		0,65		
Recovery factor, ass. phase				
Temperature, top res (deg C) :	58	Pressure, top res (bar) :		178

Fig. 4.3 Prospect data for Volans Cook.

Block	Prospect name	Discovery/Prosp/Lead	Prosp ID (or New!)	NPD approved?
31/3, 32/1	Volans-Teist		*NPD will insert data*	*NPD will insert data*
Play (name / new)	Structural element	Company/ reported by / Ref. doc.		Year
NPD will insert data	Bjørgvin Arch	Dana Petroleum Norway		

Oil/Gas case	**Resources IN PLACE**					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3						
Gas 10^9 Sm^3		11				
	Resources RECOVERABLE					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3						
Gas 10^9 Sm^3						
	Which fractiles are used as:		Low:	P90	High:	P10

Type of trap	Water depth (m)	Reservoir Chrono (from - to)	Reservoir Litho (from - to)
Structural,tilted fault bloc	332	Lower Triassic, Teist	Anisan
Source Rock, Chrono	Source Rock, Litho	Seal, Chrono	Seal, Litho
Upper Jurassic	Draupne/Heather fms	Middle Triassic, Lomvi?	Ladinian??

Seismic database (2D/3D):					
Probability of discovery:					
Technical (oil+gas case)	0,04		Prob for oil/gas case		50/50
Probability (fraction):	Reservoir (P1)	Trap (P2)	Charge (P3)	Retention (P4)	
	0,7	0,6	0,1	1	

Parametres:	Low	Base	High	Comments
Depth to top of prospect (m)		2680		
Area of closure (km^2)		19		
Reservoir thickness (m)				
HC column in prospect (m)		50		
Gross rock vol. (10^9 m^3)		1		
Net / Gross (fraction)		0,54		
Porosity (fraction)		0,14		
Water Saturation (fraction)		0,3		
Bg. (<1)		208		
Bo. (>1)				
GOR, free gas (Sm^3 /Sm^3)				
GOR, oil (Sm^3 /Sm^3)				
Recovery factor, main phase				
Recovery factor, ass. phase				
Temperature, top res (deg C) :		Pressure, top res (bar) :		

Fig. 4.4 Prospect data for Volans Teist.

4.4 Prospect probabilities

Based on the work performed as described in Section 3 Review of geological framework the following risk assessements have been done.

Table 4.3: Prospect risk

		Viking Gp	Brent Gp	Dunlin Gp	Hegre Gp
P1	Trap presence	1.0	1.0	1.0	1.0
	Trap quality	0.8	1.0	1.0	0.6
P2	Reservoir presence	1.0	0.7	1.0	1.0
	Reservoir quality	1.0	0.9	1.0	0.7
P3	Hydrocarbon source	1.0	1.0	1.0	1.0
	Migration	0.1	0.1	0.1	0.1
P4	Retention	1.0	1.0	1.0	1.0
Total risk		**0.08**	**0.06**	**0.1**	**0.04**

Viking Group: Sognefjord Formation
P1: Trap presence & Trap quality (0,8)
Well defined structural closure (high quality 3D).
Trap quality includes some risk due to the possibility of Cretaceous thief-sands above the Top Sognefjord reservoir.

P2: Reservoir presence & Reservoir quality (1.0)
Expect good reservoir sands in prospect based on correlation with nearby (and relevant) wells.

P3: Hydrocarbon source & Migration (0.1)
Migration study suggest very low potential for hydrocarbon charge.

P4: Retention (1.0)
No leak indications from seismic.

Total risk: 0.08

Brent Group: Ness Formation
P1: Trap presence & Trap quality (1.0)
Well defined structural closure (high quality 3D).
Presence og thief-sands above Top Ness is excluded (shales of the Fensfjord Fm).

P2: Reservoir presence & Reservoir quality (1.0)
Expect good reservoir sands in prospect based on correlation with nearby (and relevant) wells.

P3: Hydrocarbon source & Migration (0.1)
Migration study suggest very low potential for hydrocarbon charge.

P4: Retention (1.0)
No leak indications from seismic.

Total risk: 0.06

Dunlin Group: Cook Formation
P1: Trap presence & Trap quality (1.0)
Well defined structural closure (high quality 3D).
Very low probability of thief-sands in overlying shales of the Drake Fm.

P2: Reservoir presence & Reservoir quality (1.0)
Expect good reservoir sands in prospect based on correlation with nearby (and relevant) wells.

P3: Hydrocarbon source & Migration (0.1)
Migration study suggest very low potential for hydrocarbon charge.

P4: Retention (1.0)
No leak indications from seismic.

Total risk: 0.10

Hegre Group: Teist Formation
P1: Trap presence & Trap quality (0.6)
Well defined structural closure (high quality 3D).
Moderate probability of thief-sands in the overlying units of the Hegre Group.

P2: Reservoir presence & Reservoir quality (0.7)
Teist Fm. sandstones are present in all relevant wells penetrating the Triassic succession.
Sandstones are predicted to exhibit moderate reservoir quality.

P3: Hydrocarbon source & Migration (0.1)
Migration study suggest very low potential for hydrocarbon charge.

P4: Retention (1.0)
No leak indications from seismic.

Total risk: 0.04

5 Technical evaluations

No technical evaluations have been performed regarding a possible development of the Volans prospect in PL464.

6 Conclusions

Results from the studies conducted during the first initial phase of the work program as described in this report, have led the partnership to judge that there are no commercial accumulations of hydrocarbons within PL464. Consequently, the license is relinquished.