PL493 Licence Relinquishment Report

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1 Summary and Conclusion

PL493, awarded 23rd January 2009, was situated on the Cod Terrace along the north east margin of the Central Graben in the North Sea covering part of block 1/3. The main play in the PL493 license was the Pre-Cretaceous, with an Upper Jurassic source, Triassic Skagerrak Fm fluvial sandstone reservoir and Jurassic shales as the primary seal. The main prospect of interest to ConocoPhillips at the time of award was the Vendehals 3-way fault closure.

This report summarises the work done in 2009-2011, after the license was awarded and subsequent to drilling the 7/11-12S Peking Duck well in the license PL301CS in block 7/11 to the west. The main elements of updates on the license have been interpretation of 3D long offset seismic, pressure and seal analysis, revised volumetric calculations and risking of the Vendehals prospect. The final update to the evaluation was done during 2011, after drilling of the Peking Duck well.

The recent Peking Duck well 7/11-12S drilled by ConocoPhillips for PL301CS penetrated the Triassic Skagerrak Formation, and whilst it found indications of hydrocarbons (gas) it did not enconter reservoir quality rocks.

The Peking Duck Prospect lies to the west of the PL493 Vendehals prospect and has similar gross trap geometry and expected reservoir properties. These two prospects are intimately linked as they form part of a large, well defined Triassic pod and thus share some of the same risks. Further evaluation of the Vendehals structure was required in the light of this result. ConocoPhillips was not prepared to commit to a well within the PL493 acreage at that time and therefore decided to fully relinquish the license.

2 Key License History

The application for this license was submitted in 2008 (ConocoPhillips 2008) and the license was awarded on January 23rd 2009.
The initial work obligation was to reprocess 400km^2 3D seismic.
Within 90 days before 2 years after award decide whether to drill an exploration well to test the Triassic or to relinquish the license.
Within 90 days before 4 years after award conclude on the path forward for development, else relinquish the license.
Within 6 years from award deliver a PDO else relinquish the license.

The initial work obligations regarding 3D seismic were completed.

An application for an extension of the two year drill-drop deadline was sent to the Ministry and copied to the NPD on 3rd September 2010, in order to allow for incorporation of important and essential well data from the planned 7/11-12S Peking Duck well in the adjacent PL301CS license.

Approval of this request was granted by the Ministry in a letter dated 29th September 2010 and the new deadline for a drill/drop decision was set to 90 days prior to 23rd January 2012.

The decision was taken in October 2011 by ConocoPhillips to fully relinquish the license.

3 Database

3.1 Well database

No wells have been drilled within the PL493 license area. With the exception of the 7/11-12S well there have been no other additions to the well database presented in the ConocoPhillips 2008 Application document for part block 1/3.

3.2 Seismic data

The main 3D seismic volume for the interpretation of the PL493 area has been the CGGVeritas long offset surveys VGCNS04, 05 and 06. Also although not over the PL493 area the more recent PGS Megamerge Plus data set to the west and the infill VGCNS data over block 2/1 to the east were purchased by ConocoPhillips. Post stack processing of the volumes was carried out resulting in phased matched data to provide a full coverage of a semi-regional area, from block 7/11 in the northwest to block 2/2 in the southeast, such that consistent interpretation could be made both from the east and west sides of Vendehals including the tie to the Peking Duck well.

4 Geological Framework

The geological framework section summarises the changes in understanding of the Triassic Pre-Cretaceous Play system from that presented in the license application. These changes are due primarily to the results from the 7/11-12S Peking Duck well in 2011. The stratigraphic and tectonic history of the Central Graben sets the regional context for the Triassic Play and further details can be found in the 2008 APA Application document.

The Triassic Play of the Norwegian Central Graben comprises the Skagerrak Formation Joanne and Judy Members, fluvial dominated reservoir sands sourced by oil and gas expelled from Upper Jurassic organic-rich shales of the Mandal and Farsund Formation. The shales of the Upper Jurassic and Lower Cretaceous form an effective top seal and in many cases side seal. Another element in the play is the presence of Permian Zechstein salt which is key in the structural and depositional history of the area. One main prospect, Vendehals, has been identified within the PL493 area.

Drilling of the 7/11-12S Peking Duck well in 2011 provided important and essential information regarding reservoir presence/quality and pressure (relevant to seal and containment) pertinent to the Vendehals prospect. Specific elements of the play that have changed since the license was awarded are discussed in the following sections.

4.1 Triassic Reservoirs

The Triassic reservoir target in the PL493 area was described in detail in the 2008 Application.

The reservoirs of the Joanne and Judy Sandstone Members of the Skagerrak Formation as seen in the J-Block fields in the UK were prognosed as the reservoirs in PL493.

The Peking Duck well found Lower Skagerrak sandstones, but the facies encountered were fine grained assumed overbank deposits and the better reservoir channel facies were not encountered. There was also a higher degree of diagenesis than expected so that reservoir quality was significantly poorer than prognosed. Being so close to the Vendehals structure in PL493 it would suggest that, unless the seismic correlation could show otherwise, reservoir now has a higher risk. There is a part of the northern area of the Vendehals structure that has thicker preserved Skagerrak Formation, with untested reservoir potential, but this is only over a limited portion of the block in closure.

4.2 Seal and Containment

In the 2008 Application document there was a discussion on pore pressure and top seal containment. A maximum overpressure of 6180 psi (426 bars) was assumed and lower overpressure scenarios were also envisioned with 5075 psi (350 bars) and a minimum of 3480 psi (240 bars) which corresponds to the overpressure in the Gyda Field. This resulted in a P10-P50-P90 column height distribution of 240-600-800 metres.

The overpressures in the offset wells are shown in Figure 4.1. With the overpressures interpreteded in the Peking Duck well, similar to those seen in the 1/3-8 offset well, it is more likely that the pore pressure in Vendehals is high, and likely higher than the high case previously used, with overpressure estimates of 7200-7500 psi (497-517 bars). If this is the case, assuming top seal hydrofracture

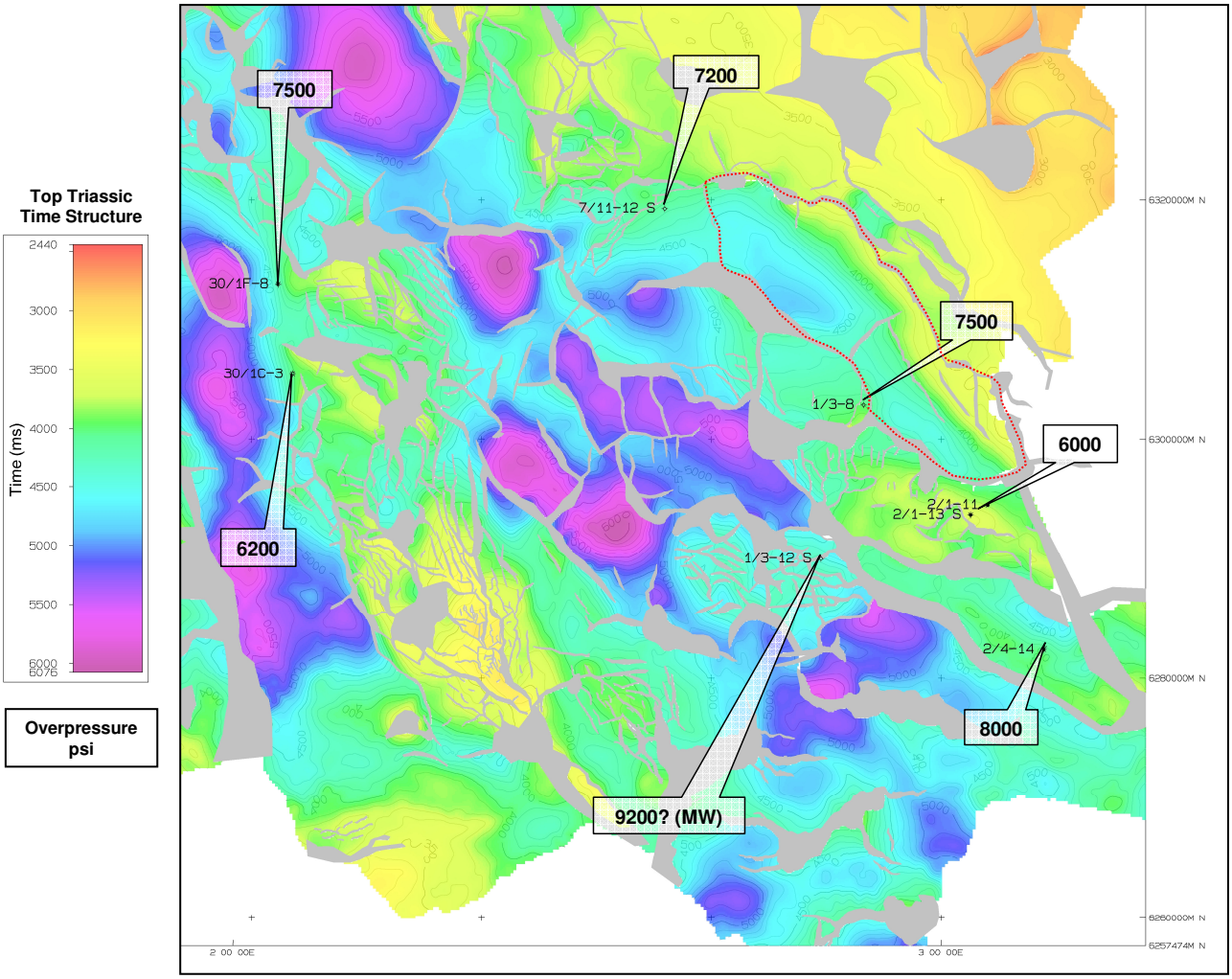

Figure 4.1 Overpressure seen in key offset wells. *Estimated approximate overpressure values displayed on a Top Triassic TWT structure map. These are from both Jurassic and Triassic reservoir sections. The outline of the Vendehals Triassic pod is marked by the red dotted outline.*

mechanism as the limiting process, then the top seal is likely compromised as illustrated in the pressure-depth plot shown in Figure 4.2. Top seal could be intact, but with limited hydrocarbon column heights, if the pressure regime is similar to that of the 2/1-11 well where an overpressure of 6000psi (414 bars) is observed. However it is very difficult to delineate pressure cell boundaries to this level of detail. There is a possibility that a trap could seal at Vendehals and reduced column height ranges of 60-233-471 metres (P10-P50-P90) are used in the current prospect evaluation. There remains a significant risk of top seal failure (Pseal=0.3) .

Seal along the main eastern flanking fault has been evaluated and not regarded as a critical risk.

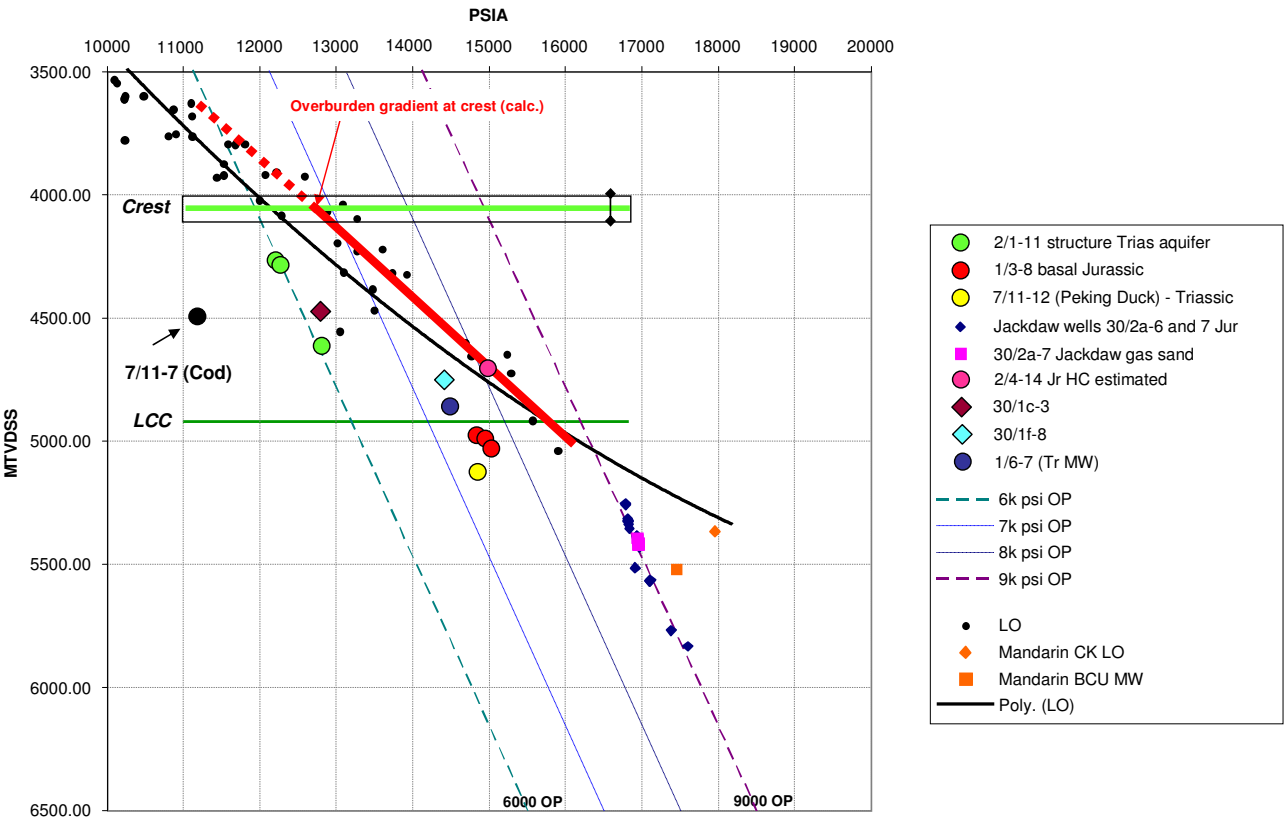

Figure 4.2 Pressure depth plot for the Vendehals Prospect. *Showing pressures from key offset wells and diagonal lines indicating lines of equal overpressure (6000-9000psi). The depth to the crest and that of the lowest closing contours are shown by green horizontal lines.*

4.3 Mapping updates

Since the award of the license there have been several phases of interpretation over the PL493 area with specific focus on the thickness of the Skagerrak Formation, the seal across the updip bounding fault to the east against the Ula-Gyda collapse graben and against salt to the north. The latest mapping was completed at the time of the Peking Duck well in 2011. Also uncertainties in the depth conversion have also been addressed which is critical when estimating the uncertainty in the depth to the crest of the structure and the impact that that has on top seal containment.

A key change in the maps is that a fault that defined the southern margin of the Vendehals trap is no longer thought to have enough offset to seal in this area. Therefore it is anticipated that the structure covers at least 4 production licenses from block 7/12 in the north to 2/1 in the south (Figure 5.1).

5 Prospect Updates

The Vendehals prospect definition and risk have been re-evaluated following the results of Peking Duck and changes from the definition in the 2008 application document are outlined in the following sections.

5.1 Reservoir

The quantity and quality of the expected reservoir has been modified in the latest evaluation as compared to that described in the 2008 APA application (ConocoPhillips 2008). This is due to the observations from the Peking Duck well and from further in-house effective stress-reservoir quality prediction modelling. The input ranges of reservoir properties are summarised in Table 5.1.

5.2 Trap

The definition of the Vendehals structure has changed from that included in the 2008 Application document. The SW-NE trending fault that defined the southern limit of the structure in the application document is no longer expected to seal and the structure now extends further to the south (Figure 5.1). It is now located approximately in the centre of the latest defined trap cases. A NNE trending fault at the northwest end of structure defines the most likely case. There is a low confidence in the existence fault and uncertainty regarding it's length. However this fault is not critical as there is a saddle point against the salt closing the structure off from the Peking Duck structure to the west. The volumetric distribution is weighted towards the high side (more likely to have a large container). The minimum, most likely and maximum spill points for trap cases are defined as follows:

- Min: Defined by shallowest fault juxtaposition of Skagerrak with porous J60 sands, spill at 4240m TVDss. *(note: fault seal included in spillpoint distribution to allow direct use of top-seal containment model).*
- Mode: spill at tip of NNE trending fault along west side of structure as mapped, spill at 4900m TVDss.
- Max: Saddle between Peking Duck and Vendehals culminations. Requires seal against salt diapir. Assumed low probability of occurring, spill at 5400m TVDss.

The trap is mapped with confidence. The relationship of the Triassic in Vendehals foot wall structure against Jurassic J60 sands in the hanging wall to the west is not expected to be an issue, although carried in the minimum case as a possibility. The Jurassic sands, as seen in the Tambar Field, appear to most likely pinch out before reaching the fault.

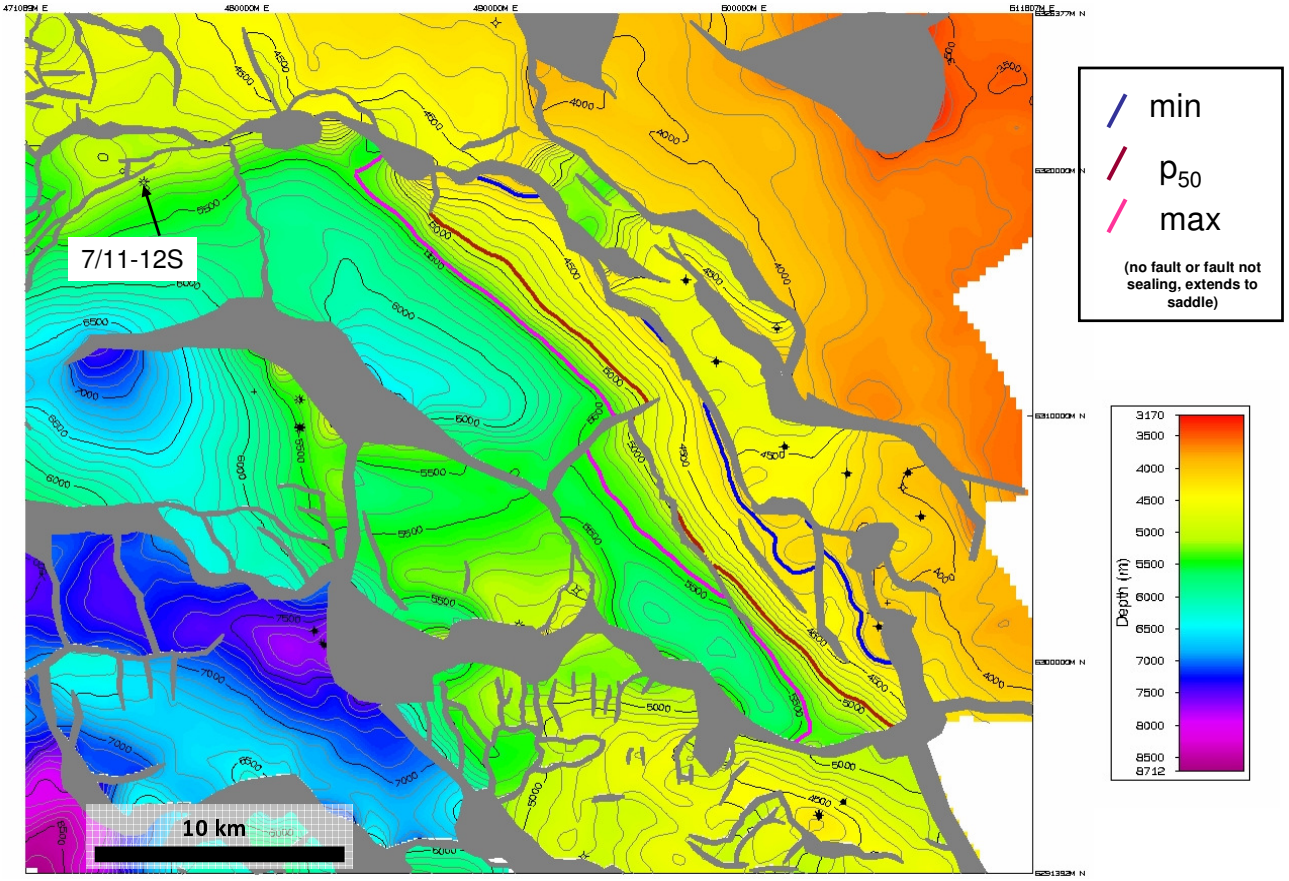

Figure 5.1 Vendehals Prospect as defined on the Top Triassic depth structure map. *The Minimum, most likely and maximum trap areas are defined by the coloured polygons. Contour interal: 100 metres*

5.3 Volumetrics and Risking

The volumes for the Vendhals prospect are summarised in Table 5.1. Although the prospect has changed shape, the volumes are of a similar magnitude. The main controlling factor on the volumes is the column height distribution, being determined from the top seal containment. Note the current prospect spreads over 3-4 seperate licences and the gross volumetrics have been presented and not net to PL493.

The risk for the Vendehals Prospect has increased, from Ps=33% in the application to Ps=14%, with the main change being in the seal/containment risk.

Table 5.1 Summary of Vendehals Prospect Information. (NPD form)

Block	Prospect name		Discovery/Prosp/Lead		Prosp ID (or New!	NPD approved?
1/3, 7/12, 2/1	Vendehals		Prospect		*NPD will insert data*	*NPD will insert data*
Play (name / new)	Structural element		Company/ reported by / Ref. doc.			Year
NPD will insert data	Central Trough		ConocoPhillips			2012
Oil/Gas case	**Resources IN PLACE**					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3				0,25	21,8	130,5
Gas 10^9 Sm^3	0,21	15,3	96,1			
	Resources RECOVERABLE					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3				0,08	6,2	42,4
Gas 10^9 Sm^3	0,14	10,1	63,5			
	Which fractiles are used as:		Low:	P90	High:	P10
Type of trap	Water depth (m)		Reservoir Chrono (from - to)		Reservoir Litho (from - to)	
3-way fault	70		Triassic (Anisian-Carnian)		Skagerrak Formation	
Source Rock, Chrono	Source Rock, Litho		Seal, Chrono		Seal, Litho	
Late Jurassic	Mandal/Farsund Formations		L. Jurassic / E. Cretaceous		Tyne/Cromer Knoll Groups	
Seismic database (2D/3D):	Veritas VGCNS04,05,06					
Probability of discovery:						
Technical (oil+gas case)	0,14		Prob for oil/gas case			
Probability (fraction):	Reservoir (P1)	Trap (P2)	Charge (P3)	Retention (P4)		
	0,75	0,9	0,7	0,3		
Parametres:	Low	Base	High	Comments		
Depth to top of prospect (m)	4050	4050	4050			
Area of closure (km^2)	0,75	13,2	31,4			
Reservoir thickness (m)	19	80	211			
HC column in prospect (m)	67	235	503			
Gross rock vol. (10^9 m^3)	7559	20664	33261			
Net / Gross (fraction)	0,3	0,45	0,6			
Porosity (fraction)	0,11	0,15	0,18			
Water Saturation (fraction)	0,31	0,25	0,18			
Bg. (<1)	0,963	0,934	0,926			
Bo. (>1)						
GOR, free gas (Sm^3 /Sm^3)	1122	735	579			
GOR, oil (Sm^3 /Sm^3)						
Recovery factor, main phase	0,55	0,65	0,8			
Recovery factor, ass. phase	0,25	0,3	0,5			
Temperature, top res (deg C) :	170	Pressure, top res (bar) :		965		

For NPD use:

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

6 References

ConocoPhillips (2008) *Awards in Predefined areas 2008, Application for part block 1/3*