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Relinquished PL465/PL465B Status Report

The PL465 and PL465B licence blocks were relinquished on February 28, 2011. The licence terms stipulated that when areas are relinquished, the Licensee shall submit a status report to the Petroleum Directorate. This status report summarizes the collected data and technical studies completed over the PL465/PL465B licence term. The report also provides a brief overview of the remaining prospectivity of the PL465/PL465B area.

9 May 2011

1. Key License History

This report summarizes the technical evaluation completed on Norwegian offshore licenses PL465 and PL465B awarded to *Nexen Norge AS* (Operator-*60%)* and *Wintershall Norge AS (40%).* The PL465 license was awarded to the partnership on February 29th, 2008. The following year the PL465B extension was awarded on January 23rd, 2009. The work programs, budgets and license web structure for each of the two licenses were consolidated after the PL465B award. The licenses (PL465, 309 km² and PL465B, 55.5 km²) are located within block 30/03 east of the Huldra field and north of the Veslefrikk field on the eastern flanks of the North Viking Graben (Figure 1).

The license was held on a drill/drop basis 3 year evaluation period, expiring on February 28th, 2011. The initial work obligations within 3 years from award were to a) acquire or collect 3D seismic over the license area, b) conduct relevant geological studies, and c) conclude the drill or drop decision. A new 671 km^2 3D survey (NX0802) was acquired from June through August 2008 (see Figure 1 for outline). This was the primary seismic dataset that was used to evaluate the hydrocarbon potential on the two license blocks. Two extensive geological studies were completed during the three year evaluation period. The first was a reservoir quality assessment of deep Jurassic reservoirs (Mortimer *et al*, 2010). The second study was commissioned to evaluate the fault seal risk which was identified to be a critical risk factor for the primary Votna prospect on the block (Knipe *et al*, 2010). These studies will be addressed in more detail in Section 3.0.

The partnership met on a regular basis to discuss and collaborate on the technical and business aspects of the license blocks. A summary of these meetings and workshops that were held are listed in Table 1.

Table 1. Partnership meeting summary

Number	Date	Meeting Type	General Meeting Summary
1	14/3/2008	MC/EC	Partnership introduction, 3D seismic acquisition, work program recommendations
2	12/12/2008	MC/EC	Seismic acquisition and processing review, License Budgets
3	13/3/2009	MC	PL465-PL465B consolidation, License Web, Insurance
4	26/11/2009	MC/EC	Interpretation review, regional studies reservoir and seal, License Budgets
N/A	18/2/2010	Workshop	Prospect evaluation status
N/A	26/8/2010	Workshop	Prospect evaluation status, completed studies, proposed location
5	2/12/2010	MC/EC	Prospect key risks, Drill Recommendation, License Budgets

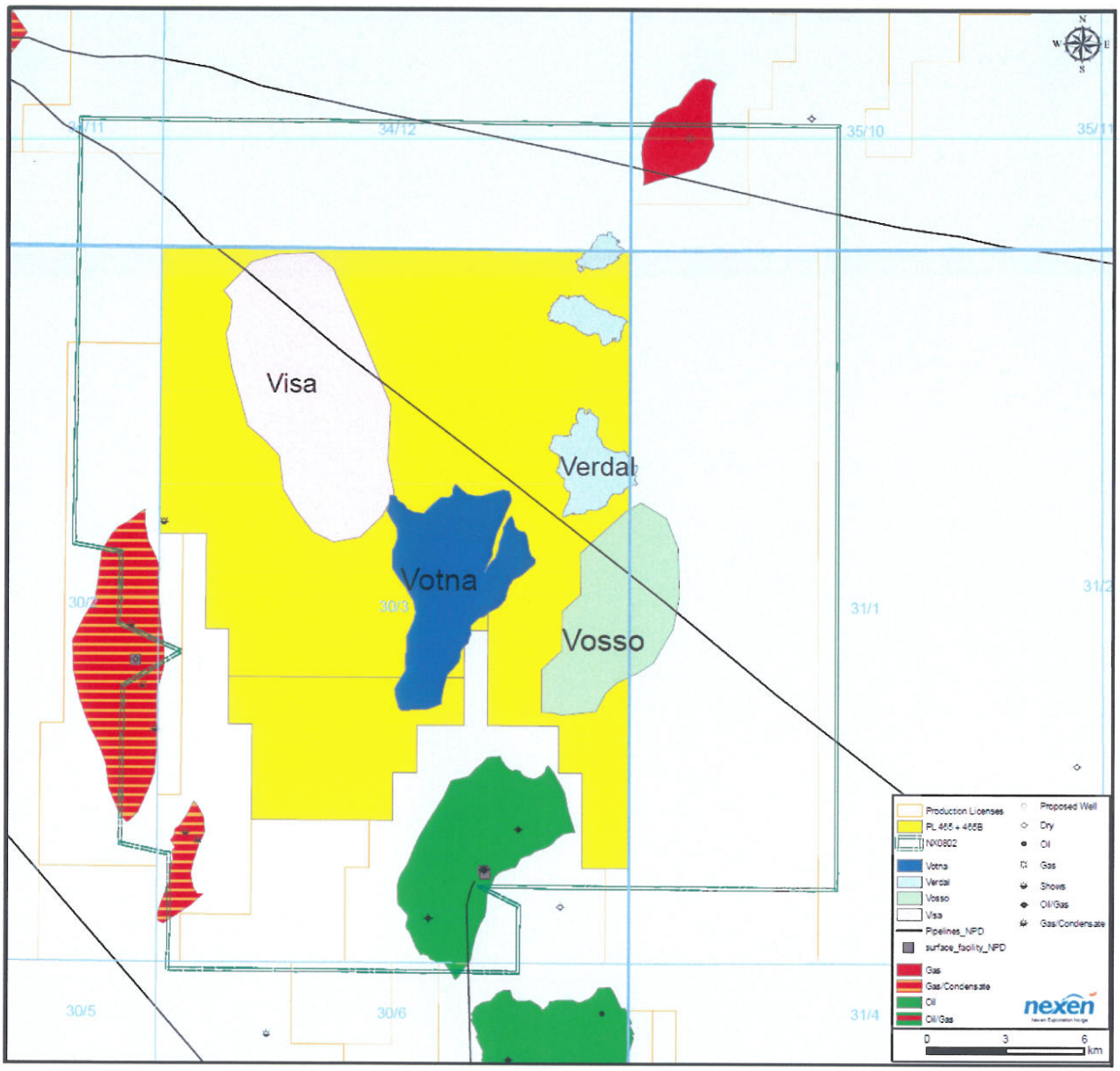

Figure 1: Votna Area base map including block outlines, NX0802 seismic coverage, and prospect and lead outlines

Interpretation of the new 3D seismic cube NX0802, resulted in a single material prospect, named Votna (Figure 1). The Votna prospect is interpreted to contain Middle and Lower Jurassic gas-charged reservoirs in a complex fault bounded trap. Unfortunately, no unanimous drill decision could be reached due to a lack of consensus on the range of potential resource. As a result, the PL465 and PL465B blocks are being relinquished.

2. Database

2.1. Seismic Acquisition and Processing

The primary geophysical control used in the license was the proprietary 3D survey NX0802. The survey covers 671 square kilometers in water depths ranging from 130 to 380m. The primary

target zone was the Middle Jurassic Brent Group section located near 3.5 seconds. Secondary targets were also identified in the Upper Jurassic Sognefjord Formation (3.0 seconds) and Lower Jurassic Cook and Statfjord Formations (3.7-3.8 seconds). The survey was acquired by the Geco Triton vessel between June and August 2008 and subsequently processed by WesternGeco in Stavanger (Egeli, 2009).

2.2. Seismic Interpretation

Detailed seismic interpretation was tied to four key wells, 35/10-2T2, 30/3-2R, 30/3-7A, and 30/3-7B (Figure 2). The following twelve stratigraphic horizons were interpreted in time from Triassic to present day over the combined block areas (Table 2). The horizon files are available upon request.

Table 2. Interpreted Horizon picks over PL465

Horizon Pick	Group	Age
Seabed	Nordland	Recent
Balder Fm.	Rogaland	Early Eocene
Jorsalfare Fm	Shetland	Maastrichtian
Tryggvason Fm.	Shetland	Turonian
Rodby Fm.	Cromer Knoll	Albian
Agat Fm.	Cromer Knoll	Albian
Base Cretaceous / Draupne Fm.	Viking	Volgian
Heather Fm.	Viking	Oxfordian
Top Reservoir	Brent	Bajocian
Cook Fm.	Dunlin	Pliensbachian
Statfjord Fm.	Banks	Hettangian
Lunde	Hegre	Rhaetian

3. Review of Geological Framework

3.1. Structural Setting

The Votna prospect is a mid-level downthrown Middle Jurassic terrace located on the eastern flank of the North Viking Graben. There is a dominate SW-NE structural trend in the area which parallels the regional trend of the North Viking Graben. Two large down to the west normal

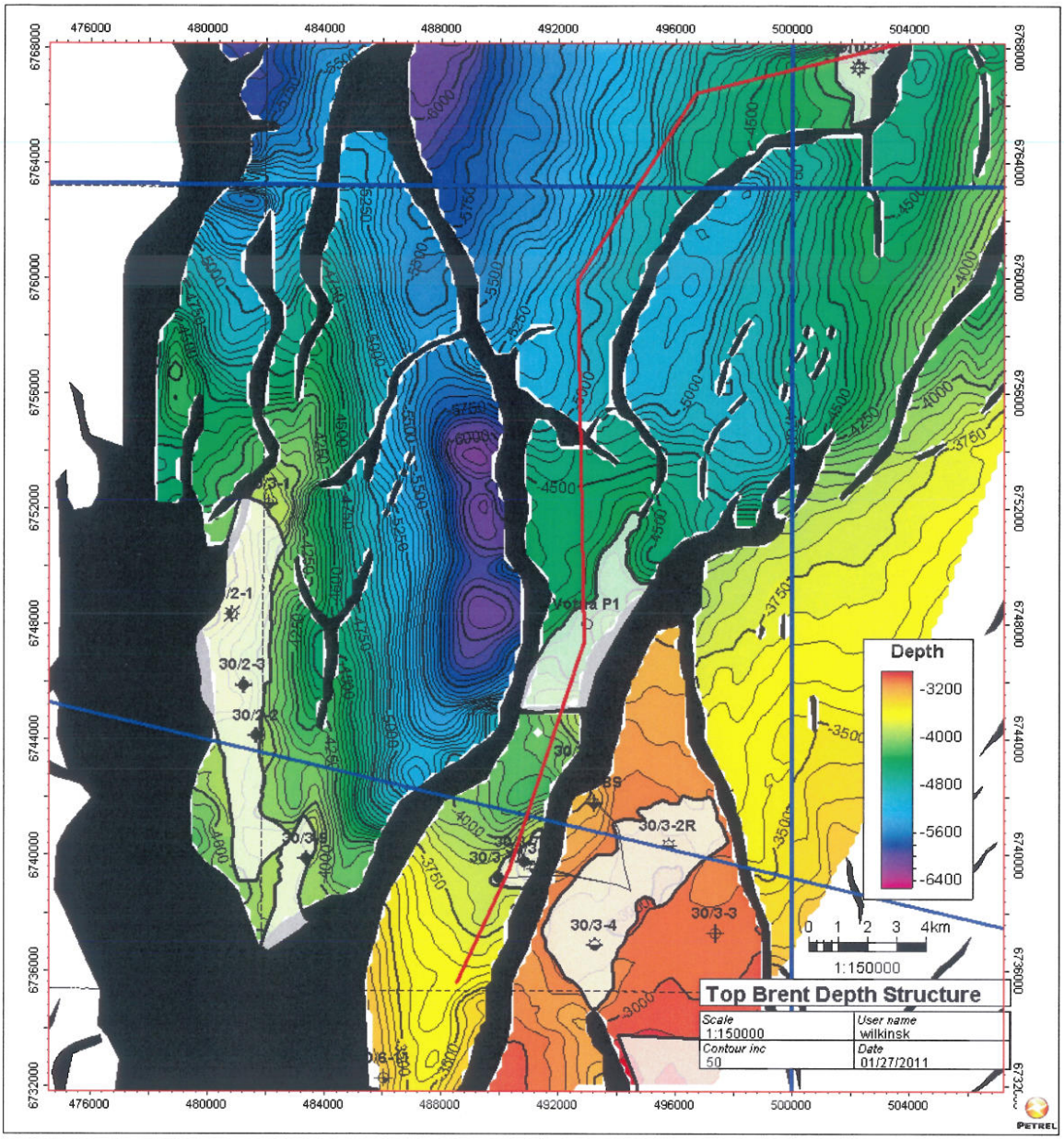

Figure 2 – Votna Area top Brent Depth Structure (Blue Section Line: Figure 3; Red Section Line: Figure 4)

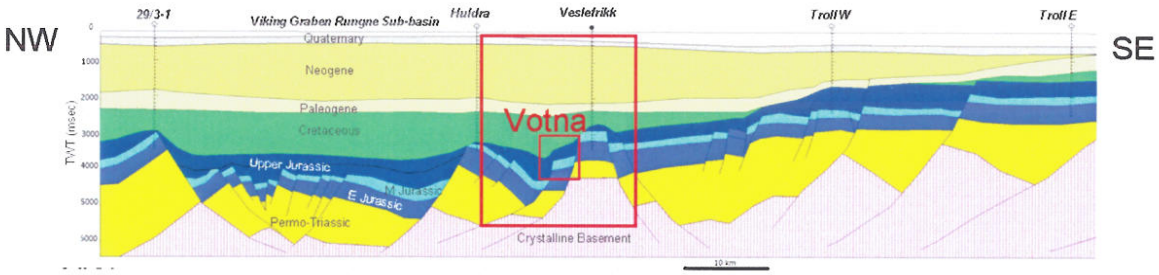

Figure 3 - Geological setting of Brent Trap at Votna. See Blue line of section Figure 2

faults separate the Votna prospect from the Huldra (12km west) and Veslefrikk (10km southeast) producing fields (Figure 2 and Figure 3). A smaller west-east down to the north and

strike-slip cross fault links the two larger normal faults and forms the critical updip fault trap (Figure 2 and Figure 4).

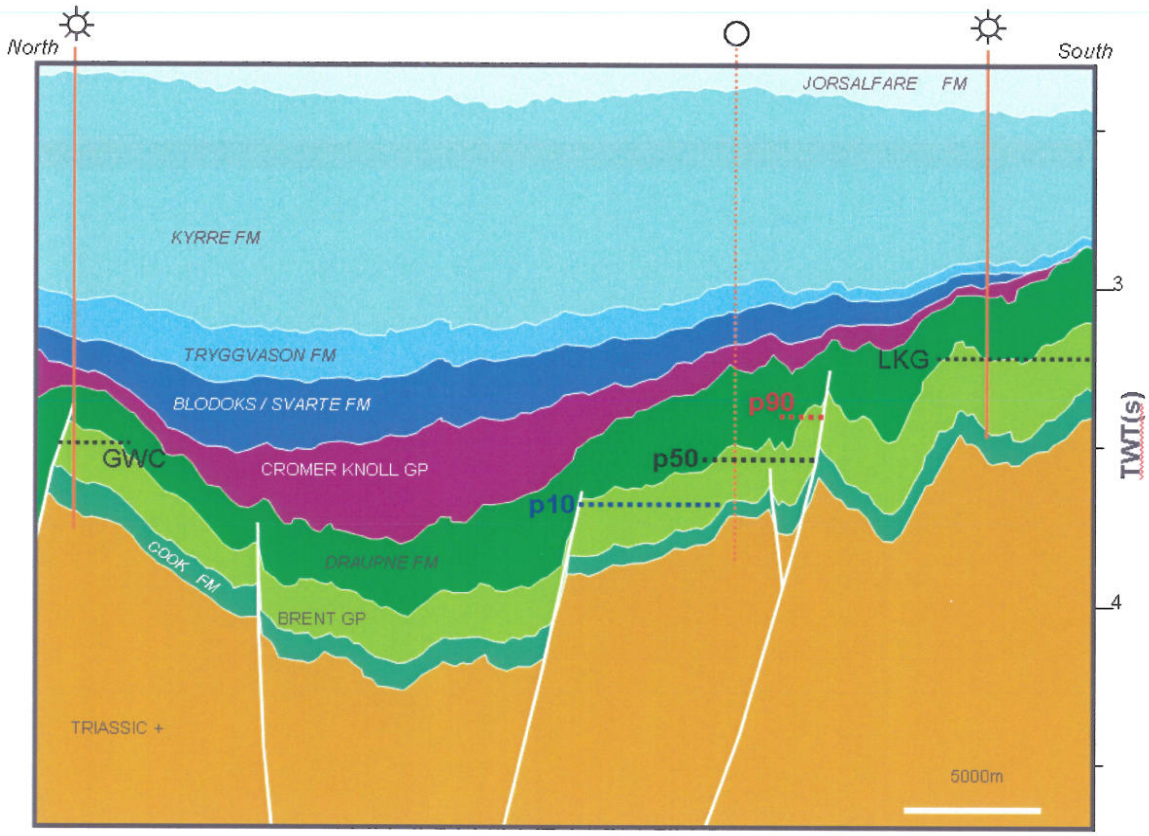

Figure 4 – Votna Area geoseismic section. See red line of section Figure 2.

3.2. Reservoir

An external reservoir study was commissioned to look at the reservoir quality in deep reservoirs (>4000m) in wells adjacent to the PL465/PL465B license blocks (Mortimer *et al*, 2010). Five main Triassic through Jurassic age stratigraphic units (Lunde Fm, Statfjord Fm, Dunlin Gp, Brent Gp, and Viking Gp.) were studied in detail from 11 cored wells (approximately 750m of core). For each of the stratigraphic units, an analysis and integration of a) stratigraphy and sedimentology, b) petrography and diagenesis, and c) reservoir quality trends and prediction were completed.

The primary reservoir intervals in the PL465 area are the Middle Jurassic Brent Group and Drake sand member (roughly equivalent with the Oseberg Formation). These units were deposited during a northward progradation and subsequent retreat of a major wave dominated delta during Aalenian to Bajocian time. A variety of facies types were observed including higher energy fluvial and tidal channels, shoreface and tidal bar deposits to lower energy lagoonal, lacustrine and tidal flats. Secondary reservoir targets were also identified in the Dunlin Units 3 and 4 (Cook equivalent) and the Statfjord Formation. Within the license block area, very little

reservoir potential was found to be present in the Lunde Formation, lower part of the Dunlin Formation, and Heather and Draupne Formations.

Detailed petrographic work, including XRD, SEM, cathodoluminescence, and fluid inclusion analysis were performed to assess the depositional and diagenetic history of the area. Based on this work, the composition of the Brent Group sediments is generally classified as a quartz arenite to sublithic arenite. Primary depositional reservoir quality is strongly facies dependent. As one might expect, the higher energy facies are coarser grained, have better sorting, and better preserved porosity and permeability. The lower energy facies are finer grained, poorly sorted and have a higher percentage of ductile grains. The overall reservoir quality has been significantly influenced by secondary processes. Authigenic cements and clays were observed including quartz overgrowths, carbonates, illite, kaolinite, and grain coating chlorite. In the case of chlorites, there is a significant positive impact for porosity preservation at depth as chlorites inhibit quartz overgrowth cementation.

3.3. Fault Seal

A comprehensive fault seal study was completed by Knipe *et al*, 2010 to address the critical fault seal risk on the primary Votna prospect. The main objective of this work was to determine the sealing potential of critical faults bounding the Votna prospect. Technical work that was completed during the study included an assessment of a) fault geometries, continuity and juxtaposition, b) calculation of clay smear and shale gouge ratios, and c) a microstructural and petrophysical characterisation of faulted core samples from 30/3-7S. The 30/3-7S well is an important well as there are whole core samples captured in the fault zone that separates the Veslefrikk field and the area south of the critical trapping fault in the Votna prospect. Significant observations and conclusions of this work are:

- Shale gouge was determined to be a more critical factor than shale smear. Based on offsetting well data, the most likely shale gouge ratio (SGR) within the critical fault rocks was estimated to be 25%.
- 30/3-7S core revealed small faults and deformation bands that contain protocataclasites and phyllosilicate smears. This provides significant evidence that cataclastic deformation processes have operated along one of the main faults bounding the Votna prospect.
- A predictive function was calculated using samples from 30/3-7S as well as additional analogue Rock Deformation Research and Nexen fault data. Assuming a 25% SGR, the low, mid and high case sealing capacity estimates were determined to be 136m, 220m, and 438m, respectively.

- The calculated sealing capacity estimates are dependant on a) the mapped fault geometry, b) stratigraphic assumptions used to calculate SGR, c) trapping is only related to capillary processes and d) assuming no column height modification due to hydrodynamics or hydrocarbon charge rate.

4. Prospect Update

4.1. Votna Prospect

The Votna prospect is the principal material prospect that was evaluated on both licenses. The primary prospect reservoir is interpreted to be the Middle Jurassic Brent Group deltaic deposits. The crest of the Brent reservoir depth in the Votna prospect is predicted to be at -4030m TVD subsea (Figure 5). Predicted temperatures and pressures of 150°C (300° F) and 10000psi (690 bar) are just entering the HPHT category. The Votna prospect was calculated to have a 36% chance of geological success. A detailed prospect data sheet including technical reserves (no commercial truncation) is provided in Table 3. A summary of the main risk elements are as follows:

Containment (Seal): The Votna prospect is defined by two large normal faults and one Brent on Brent up-dip cross fault. The presence and seal of this smaller up-dip fault is the critical risk element for the Votna prospect.

Source and Migration: Mature organic rich shale of the Draupne and Heather Formations are present in a large fetch area to the north of the Votna prospect. Current temperature and structure estimates suggest the primary Draupne source rock is currently within the gas window. Present day migration into Brent reservoir carrier bed would be achieved via downdip source-reservoir fault juxtaposition.

Reservoir presence: The Votna prospect lies between Brent Group producing fields to the west (Huldra) and south (Veslefrikk) and a smaller Brent discovery in 35/10-2 to the north. Extensive well data from each of these areas suggest there is a high chance of a thick Brent reservoir sequence to be present in the Votna prospect area. Key offset correlation wells are 35/10-2T2, 30/3-2R, and 30/3-7B.

Trap: The large normal faults that separate Votna from the Huldra and Veslefrikk fields are characterized by up to 1200m of throw at the Brent level. These large throw faults easily define the Votna prospect to the west and east as a mid-level downthrown terrace (Figure 6). The key cross fault to the south of the well location has 50-150m of throw across the Brent section. Several lines of section through this fault zone illustrate bed dip reversal, multiple fault planes, and clear displacement along Brent and Cook horizons (Figure 7).

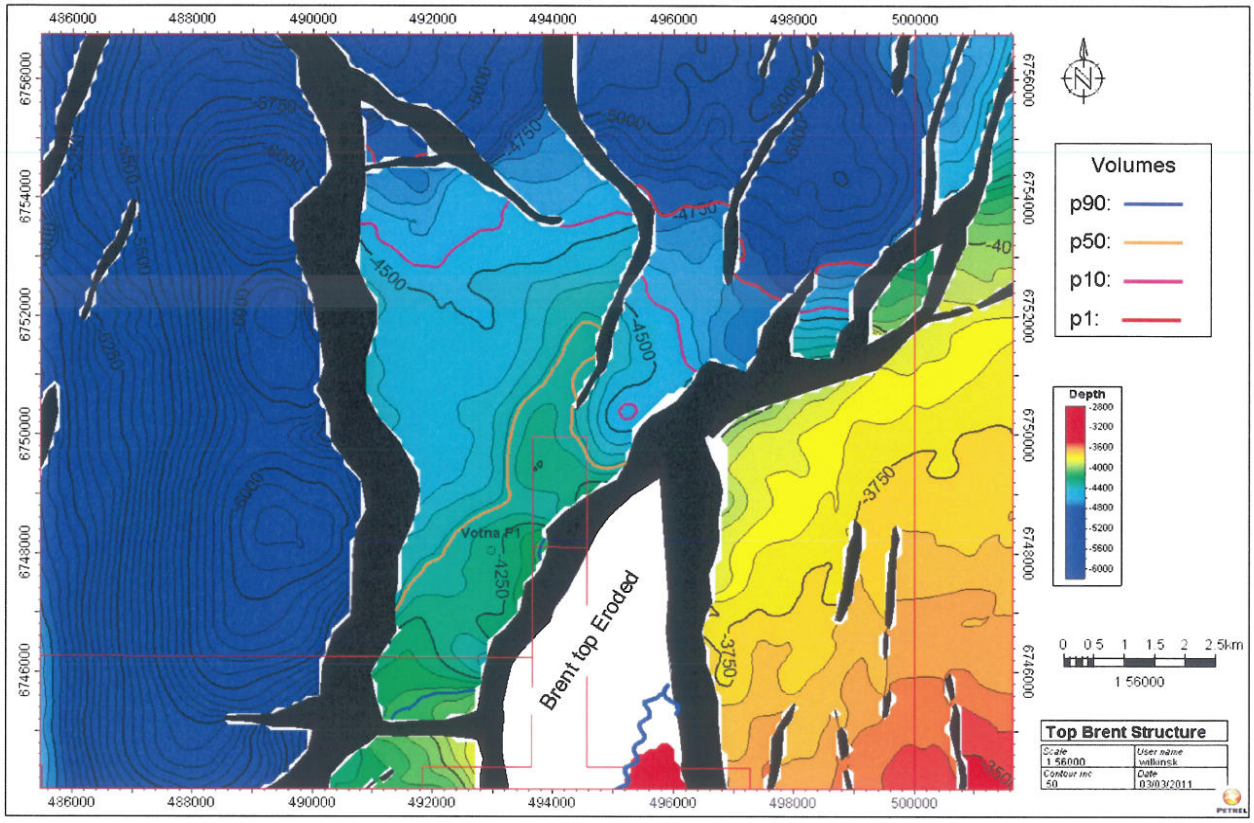

Figure 5 – Votna Propsect map. Top reservoir Brent Group depth structure.

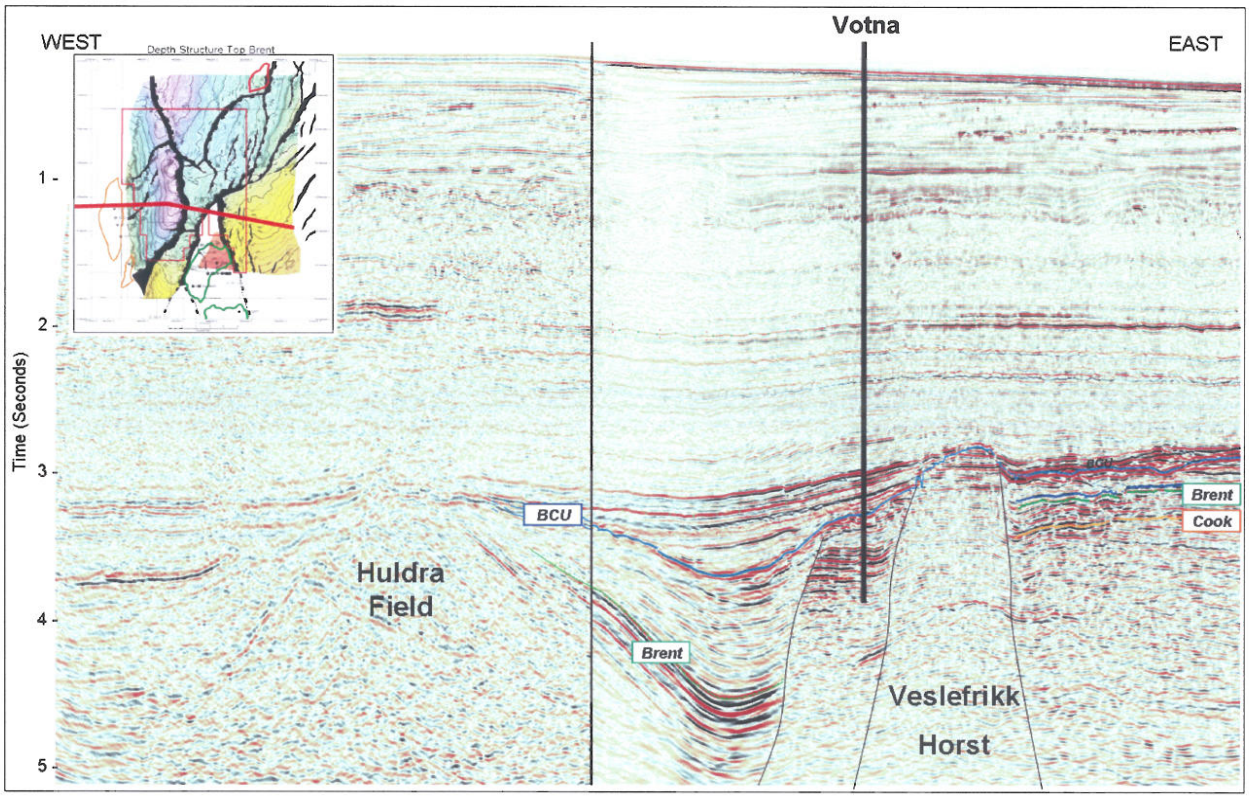

Figure 6 –Regional west-east prospect seismic line illustrating relationship to offsetting Huldra and Veslefrikk fields.

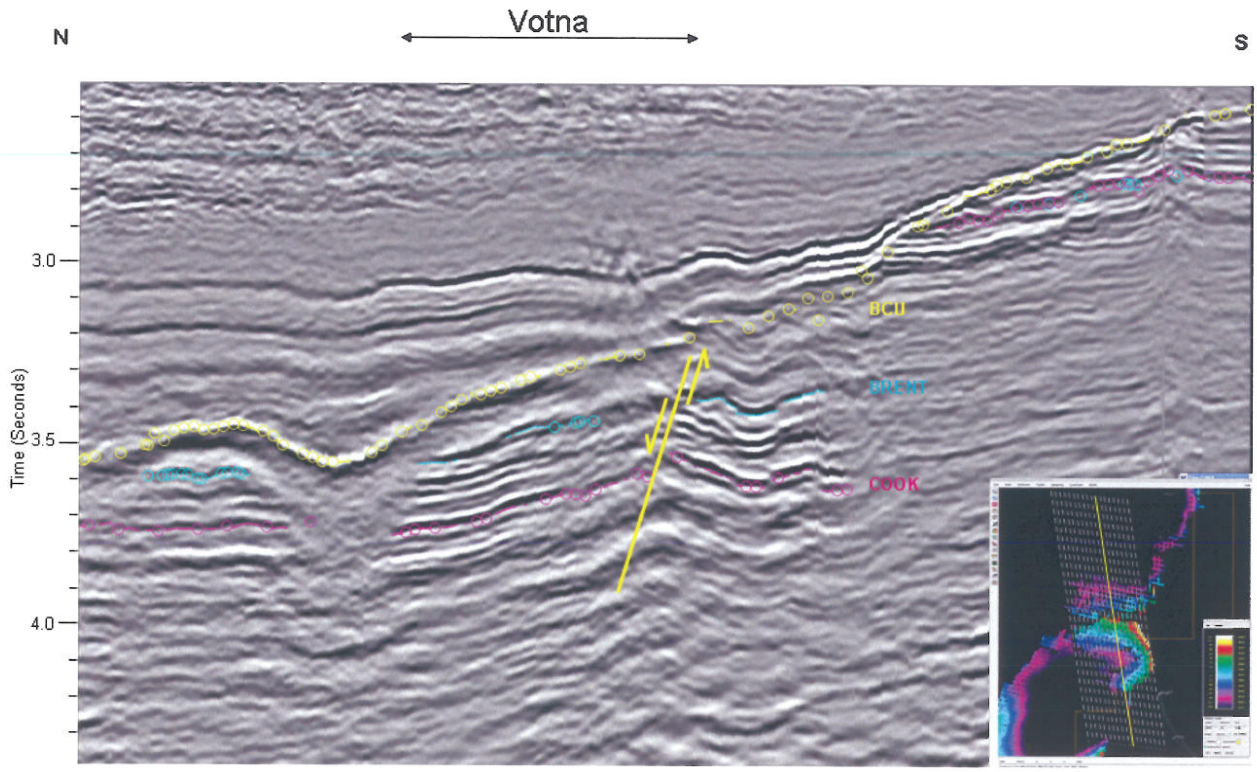

Figure 7 – Detailed north-south Votna prospect seismic line.

4.2. Vossa, Visa and Verdal Leads:

The Vossa and Visa leads are two Upper Jurassic deep marine turbidite features that have been identified. These prospects were believed to be Oxfordian age sands sourced from adjacent Middle Jurassic horst block highs. These leads were based an analog Upper Jurassic turbidite discovery in 35/11-13 approximately 50km northeast of PL465. Two Upper Jurassic seismic thick intervals were initially identified within the block (Figure 1). The Verdal lead was identified as a Lower Cretaceous aged feature which was thought to likely be deep marine sediments reworked from Jurassic reservoir facies on the Troll platform. Follow-up mapping using the new seismic volume suggests that these leads were part of a series of smaller scale mass wasting fault blocks. The potential hydrocarbon volume was deemed to be insufficient while the geological risk of these leads was thought to be too high.

5. Conclusions

A significant amount of technical work has been completed over the initial work term to mature one of several leads into a drill ready prospect. From the current evaluation it was concluded that a fault seal containment critical risk remains for the primary Middle Jurassic prospect on the PL465/PL465B blocks. The blocks are being relinquished at this time due to uncertainty and a lack of consensus on the potential resource.

Table 3. Prospect data summary

Block	Prospect name		Discovery/Prosp/Lead		Prosp ID (or New!)	NPD approved?
PL465	Votna		Prospect		*NPD will insert data*	*NPD will insert data*
Play (name /new)	Structural element		Company/ reported by / Ref. doc.			Year
NPD will insert data	Cross Fault		Nexen Exploration Norge AS			2011
Oil/Gas case	**Resources IN PLACE**					
Gas	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3				0.529	11.96	29.46
Gas 10^9 Sm^3	1.13	24.30	59.43			
	Resources RECOVERABLE					
	Main phase			Ass. phase		
	Low	Base	High	Low	Base	High
Oil 10^6 Sm^3				0.30	6.96	17.34
Gas 10^9 Sm^3	0.64	14.15	34.77			
	Which fractiles are used as:		Low:	p90	High:	p10
Type of trap	**Water depth (m)**		**Reservoir Chrono (from - to)**		**Reservoir Litho (from - to)**	
Down faulted block	201		Aalenian-Bajocian		Brent Group, Sandstone	
Source Rock, Chrono	**Source Rock, Litho**		**Seal, Chrono**		**Seal, Litho**	
Upper Jurassic	Draupne Fm, Shale		Upper Jurassic		Draupne Fm, Shale	
Seismic database (2D/3D):	3D NX0802					
Probability of discovery:						
Technical (oil+gas case)	0.36			Prob for oil/gas case		
Probability (fraction):	Reservoir (P1)	Trap (P2)		Charge (P3)		Retention (P4)
	0.9	0.8		1.0		0.5
Parametres:	Low	Base		High		Comments
Depth to top of prospect (m)	4221	4121		4021		
Area of closure (km^2)	0.50	9.2		27.7		
Reservoir thickness (m)		225				
HC column in prospect (m)	100	305		520		
Gross rock vol. (10^9 m^3)	0.08	2.27		5.74		
Net / Gross (fraction)	0.21	0.32		0.43		
Porosity (fraction)	12	16		19		
Water Saturation (fraction)						
Bg. (<1)	0.0030	0.0034		0.0038		
Bo. (>1)						
GOR, free gas (Sm^3 /Sm^3)	2968	2043		1504		
GOR, oil (Sm^3 /Sm^3)						
Recovery factor, main phase	0.49	0.56		0.64		
Recovery factor, ass. phase						
Temperature, top res (deg C):	150	Pressure, top res (bar) :		690		

6. References

Egeli, J., 2009: Data Processing Report for Nexen, Area: Norway, Votna, Block 30/3,4 & 6, 31/1 & 4, WG Contract Number: BZ62, WesternGeco AS

Knipe, R.J., Phillips, G., Bradbury, P.W., 2010: Votna Prospect Fault Seal Study. Phase 3: Sample Characterisation, Rock Deformation Research Report 9729, August 2010.

Mortimer, E.G., Lucas, P.M., Rich, B., 2010: Reservoir Quality Assessment for Deep Jurassic Reservoirs Around Licence Areas PL462S, PL508S and PL465, and NOCS Blocks 29/3, 30/1, 34/10 and 35/10, Fugro Robertson Limited Report 9772: May 2010.