



# PremierOil

## PL565 Relinquishment Report

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## TABLE OF CONTENTS

1.0	License History .....	3
2.0	Database .....	3
3.0	Review of geological framework .....	4
4.0	Prospect Update .....	6
5.0	Technical Evaluations .....	9
6.0	Conclusions .....	9
7.0	References .....	9

## 1.0 LICENSE HISTORY

PL565 was awarded to Dana Petroleum Norway ASA (40%) and Nexen Exploration Norge AS ('Nexen') (Op, 60%) in February 2011 with a seismic reprocessing work program and a drill-or-drop decision after two years. Premier Oil Norge AS ('Premier') acquired Nexen's interest and operatorship January 31, 2012. A six months license extension was granted in February 2013 and the drill or drop decision date was extended until August 4, 2013. During the licence period five combined EC/MC meetings were held.

Following an evaluation of the prospectivity in the license acreage the partnership concluded that no prospect of sufficient volumetric potential to warrant drilling was present and it was decided to drop the license at the license anniversary.

## 2.0 DATABASE

The seismic data set utilised in the evaluation leading up to the licence application was the PGS Megamerge. In order to improve the seismic imaging of the prospective intervals a contract was entered into with Fugro Robertson (GeoSpec) to license 400km<sup>2</sup> of TerraCube<sup>PSTM</sup> reprocessed and merged PSTM 3D data covering PL565 in its entirety (Figure 1). All prospectivity evaluations performed by the partnership was carried out on this data set. The seismic data quality was only mildly improved by the reprocessing (Figure 2).

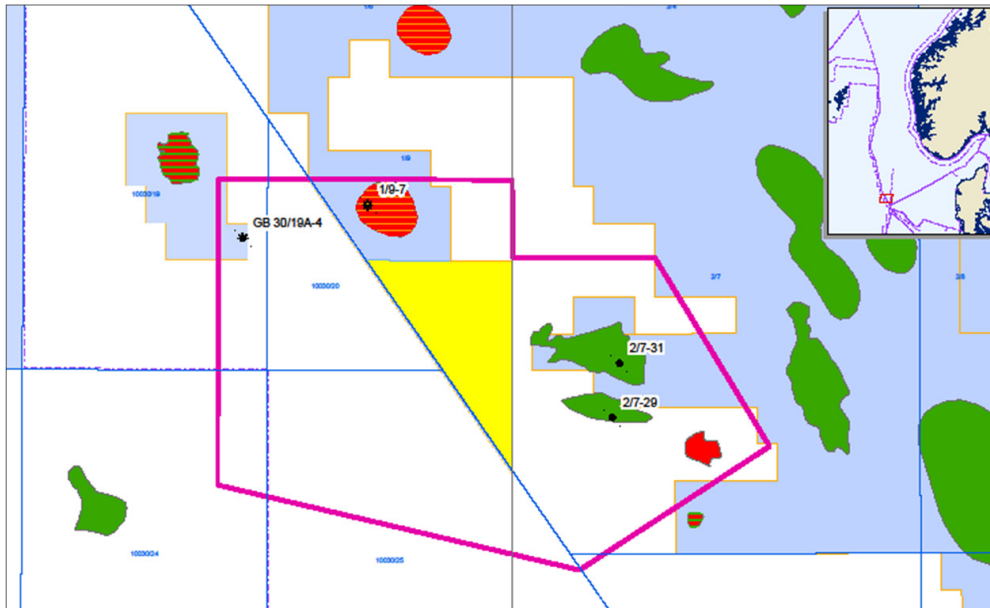


Figure 1. PL565 location in yellow and the extent of the reprocessed 3D seismic data set licensed by the partnership outlined in pink.

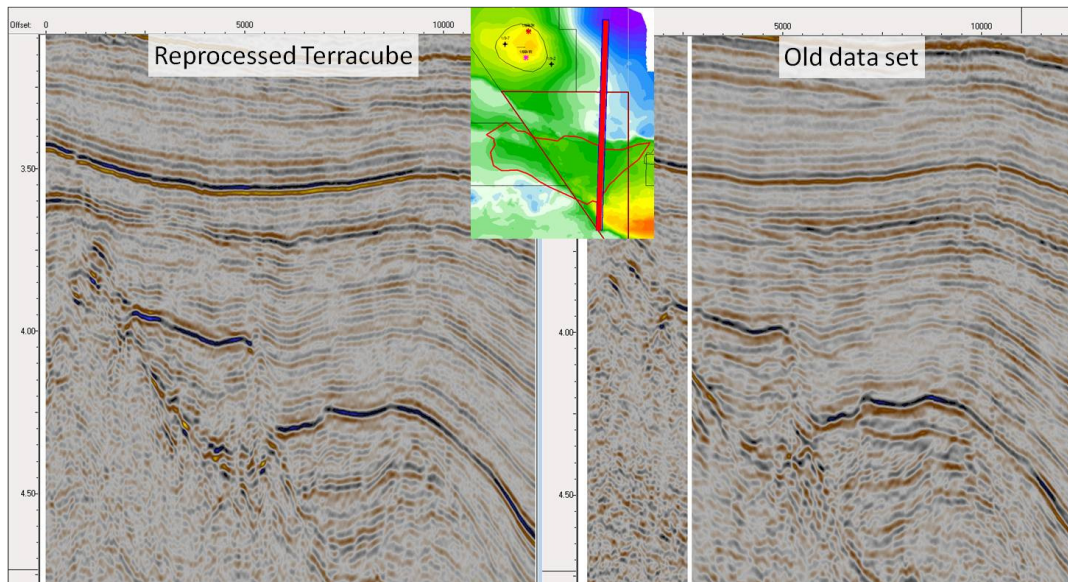


Figure 2. Comparison of data quality between reprocessed data set (left) and input data (right). Imaging improvement is clear but not drastic.

### 3.0 REVIEW OF GEOLOGICAL FRAMEWORK

The PL565 partnership has performed two major studies as part of the prospectivity evaluation.

A biostratigraphic evaluation of thirteen selected wells in the late Jurassic fairway in the grater block 1/9 area (Figure 3) was carried out by Ichron Ltd. The interval studied ranged from Mandal Formation through to Farsund, Eldfisk, Haugesund and Ula Formations of the Tyne Group. The main interval of interest corresponds to sand prone intervals of variable age within the Late Jurassic historically assigned to the Ula Formation. The primary objective of the project was to provide a fully quantitative palynological evaluation of the studied intervals and to quantify the succession in terms of the Partington sequence stratigraphic scheme of the North Sea (Partington et al., 1993).

The database for the study was variable in quality with the effects of high thermal maturity and depositional facies on kerogens resulting in often poorly preserved and darkened *in situ* palynomorph assemblages. This was compounded by poor ditch cuttings quality in some wells where assemblages are dominated by drilling additive or cavings. The subsequent dilution of already impoverished floras leads to few age diagnostic taxa being recorded. Despite these limitations the study improved the understanding of the stratigraphic evolution of the license area.

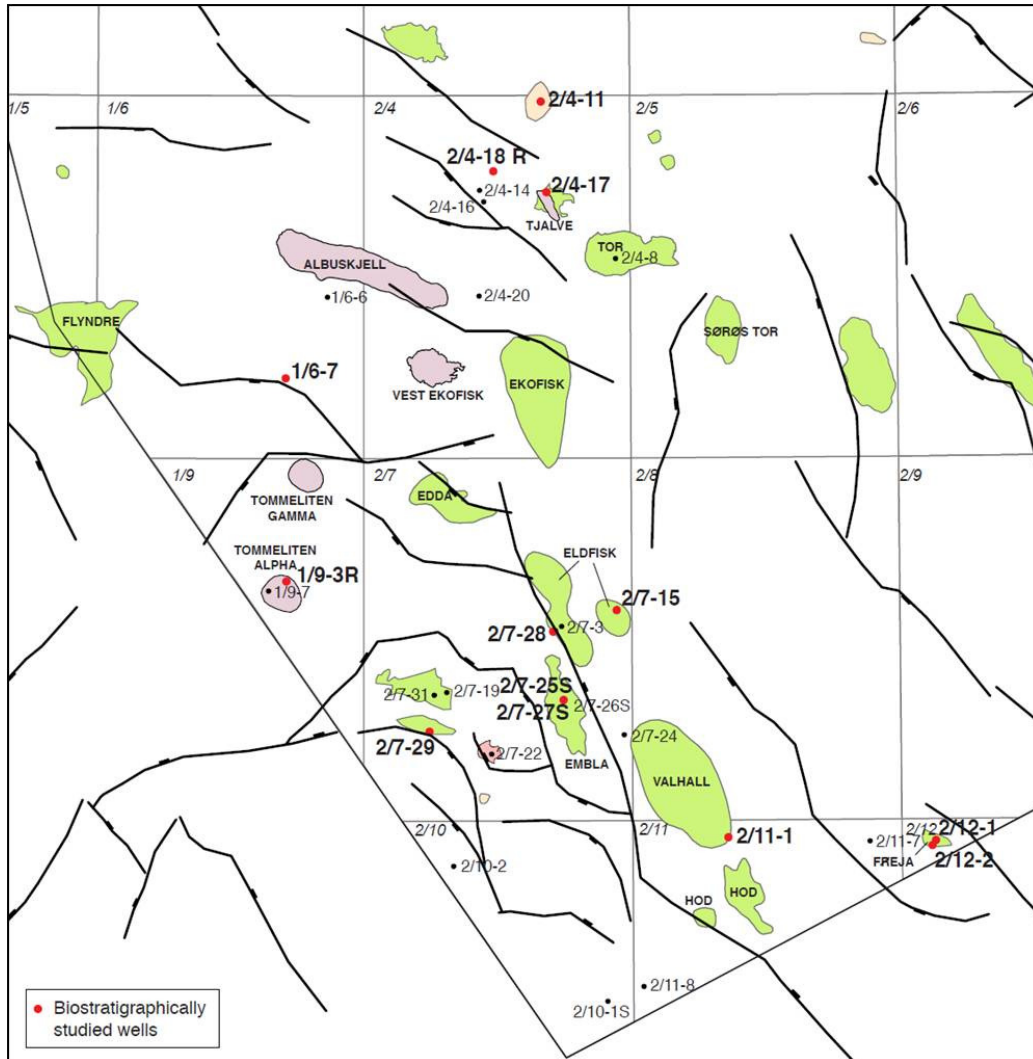


Figure 3. Study well location map with distribution of main fields and discoveries in the area.

An integrated study with core descriptions and petrography incorporating the aforementioned work was also commissioned from Ichron Ltd. The scope of the study was to understand the distribution through time of Upper Jurassic reservoir sandstones in the area of interest and also their reservoir quality. A total of 396m of core from 12 wells was included in the study. This was further complemented by 17 wells where no core data was present.

Three main play-types were identified in the area:

- Shallow marine shoreface, (including the main Ula trend, plus an older shoreline system to the south that is broadly equivalent to the Heno Fm. barrier shoreline system in the Danish sector)
- A deep marine gravity flow fairway/fairways
- A shelf sand system not attached to a coeval shoreface (i.e. Eldfisk, Haugesund and Farsund Formations)

As part of the deliverables of the study a set of paleogeographic maps were produced. Unfortunately these show that the only interval predicted to have high net sand presence within PL565 are J62 shoreline deposits.

The petrophysical part of the study concluded that Upper Jurassic sands have limited reservoir quality at depth as compaction and diagenesis have degraded reservoir quality. It is noted however, that this could be offset by overpressure contributing to porosity preservation as seen in for example well 2/12-1.

#### 4.0 PROSPECT UPDATE

The prospect was initially described by Nexen as an Upper Jurassic HPHT fault-dependant 3-way dip closure with an area of closure of 24 sq.km (Figure 4). Increased thickness of Upper Jurassic sediments within the prospect area was interpreted as an indication of sand presence. Gross recoverable gas resources were estimated to be 290 bcf (717 bcf upside) with a probability of geological success of 20%.

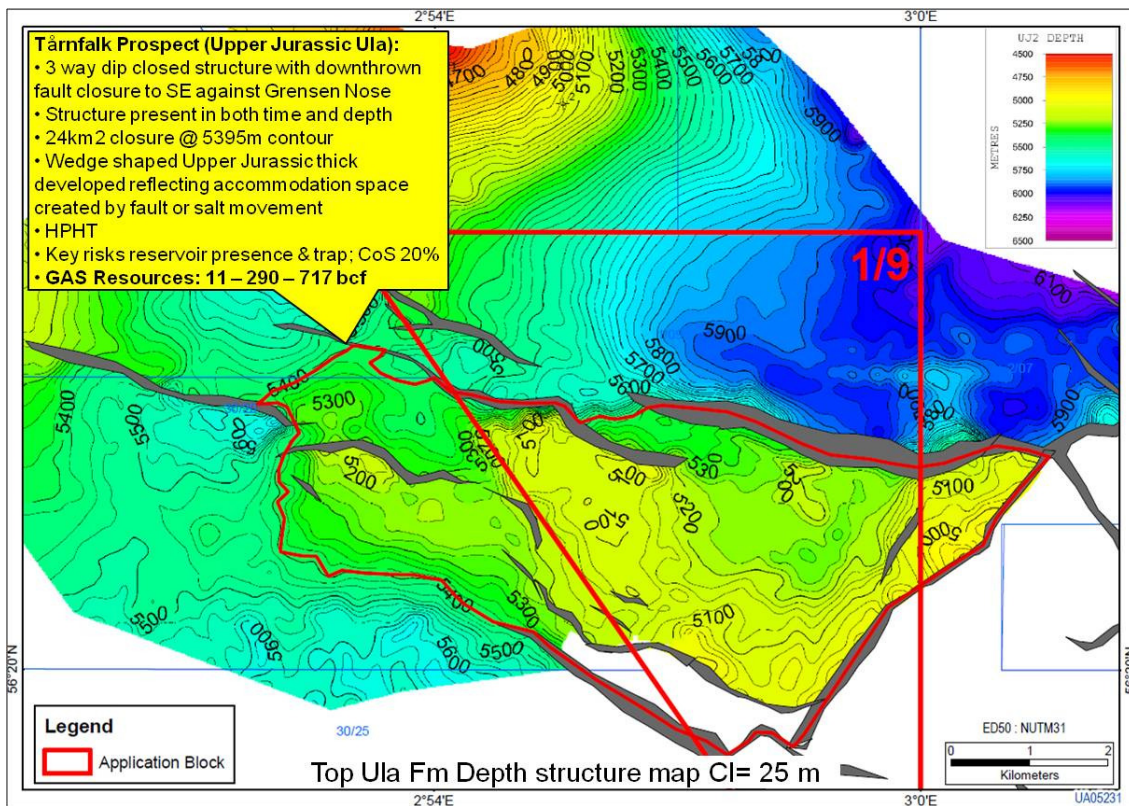


Figure 4, Original Map and summary of the Tårnfalk Prospect

The seismic reprocessing was aimed at improving the low quality of the available data. The results were rather disappointing even though imaging improved somewhat. Following interpretation of the new dataset it became evident that the licence area is segmented and consists of several fault compartments rather than one prospect. As illustrated in Figure 5 only the two smallest segments are fully within PL565 acreage.

No new well data became available during the evaluation to influence the prospectivity assessment.

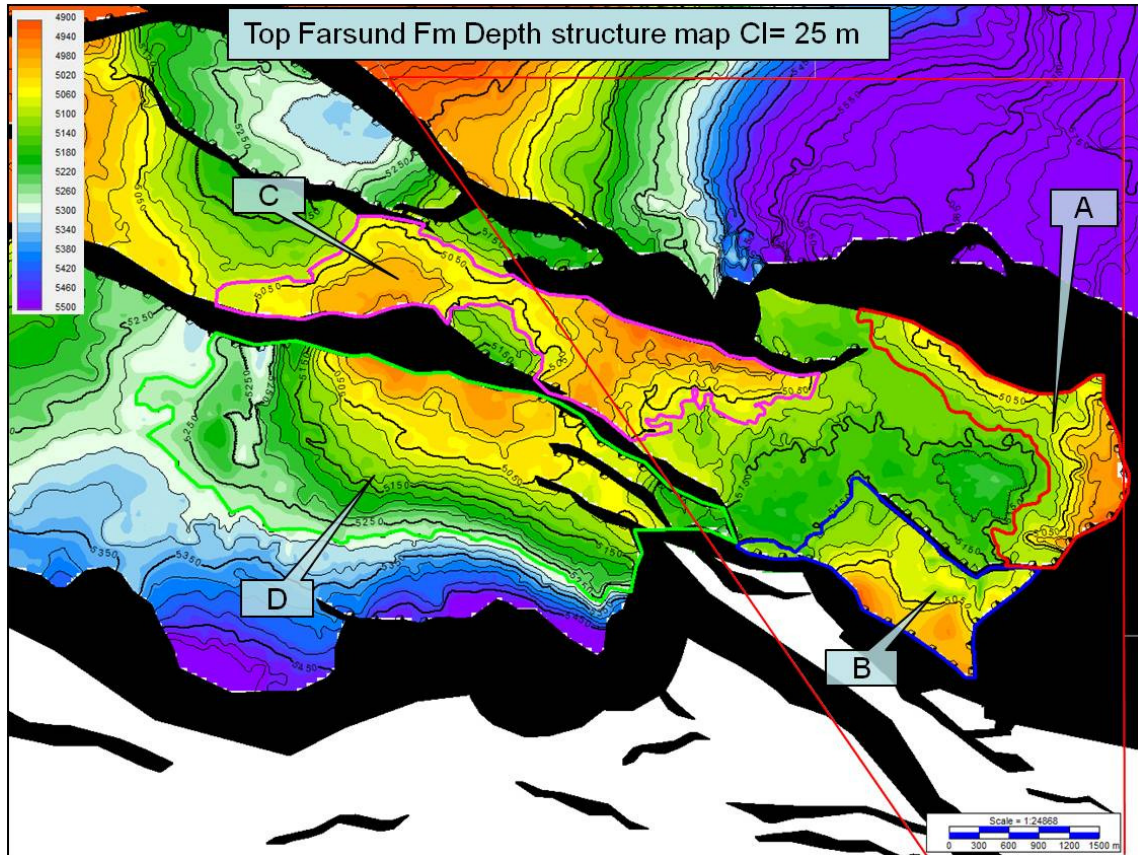


Figure 5, Image of PL565 area (red polygon) at top reservoir level with mapped lead outlines (A-D). Leads A and D are within PL565, C is about 40% in-block and D is almost 100% out-of-block. Lead outlines are maximum structural closing contours.

As illustrated by Figure 6 the Jurassic sedimentary package thickens relative to that encountered by well 2/7-29. However, the seismic mapping carried out by the partnership clearly demonstrates that this is due to thickening of the mud-prone Mandal Formation rather than Farsund Formation which is where sands could potentially be present. The Farsund Formation in the area of Tårnfalk is actually somewhat thinner than that encountered by the well to the east. The risk on reservoir presence is increased relative to the one used in the license application as a consequence of these observations. Furthermore, reservoir effectiveness also poses a significant risk as the petrophysical study concludes that compaction and diagenetic processes have degraded reservoir quality unless partially preserved by overpressure.

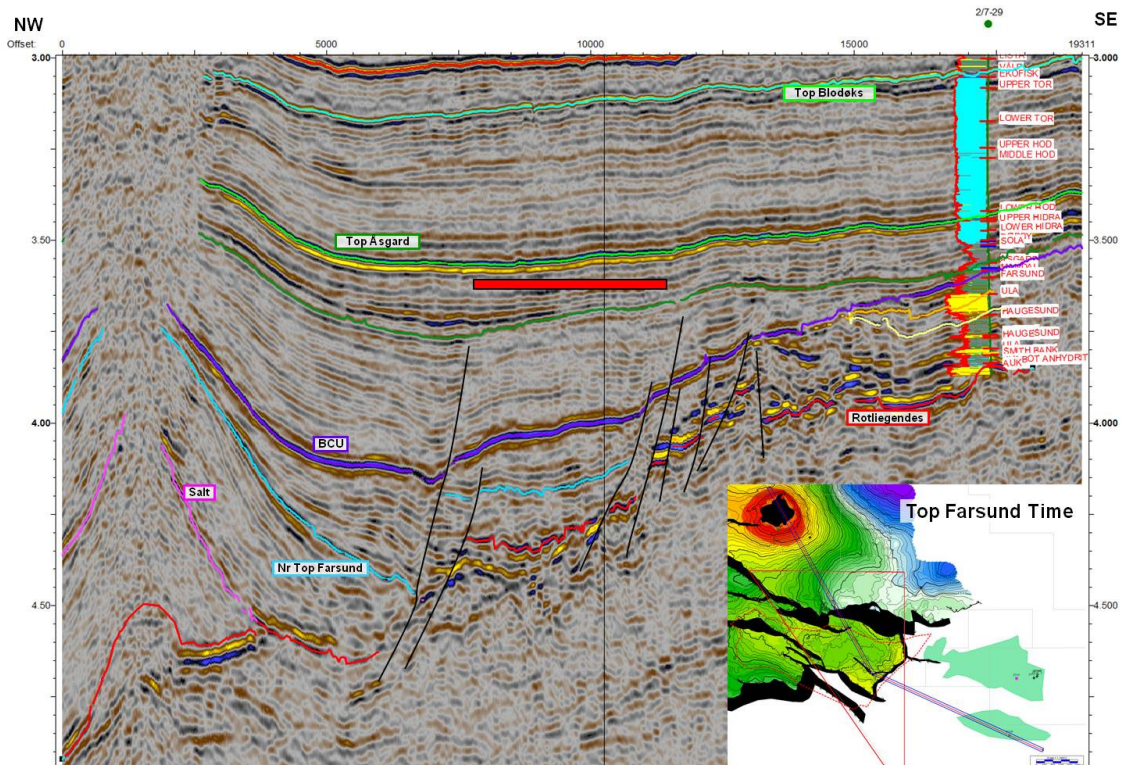


Figure 6, Seismic line from well 2/7-29 through the Tårnfalk area (identified by red rectangle) and towards the diapir to the NW. Note that no Jurassic sands were encountered by well 1/9-7 which was drilled on the western flank of the displayed diapir.

The key points with regard to the identified prospectivity are:

- Structural 3-way dip closures with top reservoir at ~5000m depth
- Fault seal required
- Source rock locally mature
- Reservoir presence high risk
- Reservoir quality uncertain
- Estimated Ph 0.16
- HPHT, 190 deg C and 14000 psi pressure expected at top reservoir

The prospective volumes of the leads are very limited as seen in the table below. The total gross mean for leads fully or partially within PL565 is only 48 bcf, with an upside of 97 bcf. This represents a significant adjustment down relative to the estimated 290bcf of reserves estimated at the time of application.



Tårnfalk A+B					Tårnfalk C (50% out-of-block)				
	Gross GIP	Gross Resource	Premier Net GIP	Premier Net Resource		Gross GIP	Gross Resource	Premier Net GIP	Premier Net Resource
P90 (bcf)	11	7	5	3	P90 (bcf)	6	3	2	1
P50 (bcf)	42	25	22	13	P50 (bcf)	28	14	8	4
P10 (bcf)	93	56	54	32	P10 (bcf)	72	41	21	12
Mean (bcf)	48	29	26	16	Mean (bcf)	34	19	10	5

*'Premier net GIP and resource for Tårnfalk C are on-block estimates*

## 5.0 TECHNICAL EVALUATIONS

Due to the limited potential of the opportunity a full economic evaluation has not been carried out.

A rule of thumb breakeven economic threshold for Norway is around 20mmboe=110 bcf @ \$85/bbl and 35mmboe=193 bcf @ \$65/bbl for a sub-sea tie-back. This would be valid for normally pressured accumulations at +/- 3500 meters depth. As Tårnfalk is expected to be at more than 5000 meters depth with HPHT conditions these approximations are considered to be optimistic. As a consequence Tårnfalk is considered to be uneconomic in most scenarios. Probability for geological success is estimated to be 16% with reservoir presence being the critical risk element. The estimated probability for economic success (@ \$65) is <5%.

## 6.0 CONCLUSIONS

The technical evaluation of PL565 has increased our understanding of the prospectivity in the license area. Detailed seismic interpretation of a new data set has led to the conclusion that the Tårnfalk prospect is more complex than previously expected. Structural segmentation due to faulting means that what was initially believed to be one structural closure is indeed split into several smaller closures with limited resource potential. As a consequence these have been downgraded to lead status.

Furthermore, geological studies related to reservoir distribution and quality has led to slightly increased geological risk.

Based on the evaluation briefly presented herein the partnership concluded that no drillable prospect was present within the license acreage and it was decided to drop the license in its entirety at the drill or drop deadline.

## 7.0 REFERENCES

Partington, M.A.P., Copestake, P., Mitchener, B.C. & Underhill, J.R., 1993. Biostratigraphic correlation of genetic stratigraphic sequences in the Jurassic – lowermost Cretaceous (Hettangian – Ryazanian) of the North Sea and adjacent areas. *In*: Parker, J.R., (ed.): Petroleum Geology of Northwest Europe: Proceedings of the 4th Conference: 371-386.