RELINQUISHMENT REPORT

Licences P1743 & P1744
Blocks 47/10c & 48/6d

BP Exploration Operating Company Ltd.

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1 Licence Information

- Licence Number: P1743 & P1744
- Licence Round: 26th Licence Round Award
- Licence Award Date: 10 Jan 2011
- Licence Holders: BP (90%), Perenco (10%)
- Licence Type: Traditional Seaward Production Licence
- Block Numbers: 47/10e & 48/6d

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2 Licence Synopsis

Licence Status
The P1743 and 1744 licences in the Southern North Sea (SNS) were acquired as drill or drop licences in the UKCS 26th Licensing Round as part of an application focused on unlocking new Paleozoic play fairways. The licences are located immediately west of the West Sole field (Figure 1). The licence operator was BP Exploration Operating Company Ltd. ("BP"), with Perenco UK Ltd. ("Perenco") as a partner holding a 10% interest. A work programme consisting of pre-stacked depth migration (PreSDM) of existing 3D seismic volumes was proposed to better image Paleozoic structures at depth. The rationale for the work programme was to inform a drill or drop decision, to be taken within four years of the licence award.

Figure 1. Location map for P1743 (Block 47/10e) & P1744 (Block 48/6d) licences

Paleozoic prospectivity in the Southern North Sea is driven by the presence of Variscan and Mesozoic structures. Whilst there have been noticeable uplifts in seismic data quality, the seismic imaging of such structures within the licence areas was insufficient to progress opportunities. The imaging of the Paleozoic in the P1744 licence area in particular remains
characterised by multiple energy. It is believed that seismic data quality in the broader area of interest is also hampered by the proximity of large salt structures and the Dowsing fault zone located southwest of the West Sole structure (Figure 2). The Dowsing fault zone contributes both structural and stratigraphic uncertainty to interpretations within the licence areas.

It is this partnership’s view that the licences addressed by this report do not offer an optimal location to test Paleozoic prospectivity. As a result, BP and its partners cannot support the drilling of a well in the licence areas during the initial licence term.

Figure 2. Expanded post-reprocessing section through the P1744 licence, Dowsing Fault Zone and surrounding salt structures
3 WORK PROGRAMME SUMMARY

The work programme agreed at the time of licence award had the following aims:

- To define Paleozoic structure and determine the resource base of any Paleozoic prospectivity
- Define the optimum location to test Paleozoic prospectivity

The work programmes agreed as part of the terms of the initial awards are given below.

Firm commitments (P1743)
- The Licensee shall reprocess 9 km$^2$ of 3D seismic data to PreSDM

Drill-or-drop commitment (P1743)
- The Licensee shall either:
  a) Drill one well to evaluate Paleozoic prospectivity, or;
  b) Elect to allow the licence to automatically cease and determine pursuant to Clause 3

Firm commitments (P1744)
- The Licensee shall reprocess 25 km$^2$ of 3D seismic data to PreSDM

Drill-or-drop commitment (P1744)
- The Licensee shall either:
  a) Drill one well to evaluate Paleozoic prospectivity, or;
  b) Elect to allow the licence to automatically cease and determine pursuant to Clause 3

Work Programme Undertaken

The 3D seismic data reprocessing to PreSDM detailed in the firm commitments above have been executed in the initial licence term as part of a broader seismic data reprocessing workflow of ca. 4,500 km$^2$ of merged 3D seismic data. No new seismic data acquisition has taken place as part of this licence evaluation.

Broadly, the reprocessed seismic data demonstrate an uplift in image quality. The reprocessed volumes provide better continuity of Paleozoic reflectivity and better imaging of deep events (Figure 3, Figure 4). The data is also cleaner, contains higher frequencies and exhibits less noise. However, there are notable exceptions in the broader area (Figure 2) where the reprocessing has failed to deliver the upside necessary for target development. Data quality is particularly poor close to the Dowsing fault zone and around larger salt structures.
Figure 3. Pre- and post-processing sections across the P1743 licence

Figure 4. Pre- and post-processing sections across the P1744 licence
4 DATABASE

Seismic Database
In evaluating prospectivity within the licence area, BP has utilised available 3D seismic data covering the licence and surrounding areas. Surveys have been merged and reprocessed to PreSDM as part of the firm work programme commitments agreed as part of the licence awards.

<table>
<thead>
<tr>
<th>Survey Name</th>
<th>Area</th>
<th>Acquisition Year</th>
<th>Company, Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rose (BG923F0001)</td>
<td>211 km²</td>
<td>1992</td>
<td>BG-PreSDM</td>
</tr>
<tr>
<td>47/10 (BP943F0002)</td>
<td>230 km²</td>
<td>1994</td>
<td>BP VG spec-PreSDM</td>
</tr>
<tr>
<td>Hyde (BP853F0003)</td>
<td>197 km²</td>
<td>1985</td>
<td>BP-PreSDM</td>
</tr>
</tbody>
</table>

Table 1. 3D seismic surveys utilised in evaluating licence prospectivity

Figure 5. Seismic database of key 2D lines and 3D volumes used in evaluating the licences. Green shading colours represent licences in which BP has an interest.

The areas covered by the merged and reprocessed 3D seismic surveys are given in Table 1 and illustrated in Figure 5. Also indicated are the locations of a number of 2D lines used as part of this evaluation. The merged West Sole Catchment Area (WSCA) dataset was formed by combining and wavelet matching the above pre-existing 3D surveys at the stack stage in 2000. The seismic was originally acquired and processed to optimally image the
Rotliegendes. The quality of the acquired datasets is variable, reflecting the various vintages of acquisition and processing techniques that went into the merge. Seismic quality is particularly poor in close proximity to fault zones and areas with complex overburden. In these areas it is not possible to map internal Paleozoic structure, although picking the Base Permian Unconformity (BPU) is possible. Some surrounding areas have reasonable data quality, particularly where some of the Westphalian is preserved. This is due to the presence of coals in the Westphalian which show up as strong seismic reflectors. The WSCA seismic datasets have been reprocessed using the latest demultiple and pre-stack imaging techniques such as control beam migration, reverse time migration and Kirchhoff. PreSDM reprocessing of the final merged and reprocessed dataset was delivered in Q3 2012.

Wells Database
All relevant wells in the licence area and surrounding areas of interest have been utilised in the evaluation of the licence area. A summary is given in Table 2. The well locations are shown in Figure 6.

Table 2. Wells database utilised in evaluating licence prospectivity

<table>
<thead>
<tr>
<th>Well</th>
<th>Year</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>47/10-1</td>
<td>1985</td>
<td>Helvellyn field discovery well. Drilled 290 m of Carboniferous Namurian sediments. Tested Carboniferous which flowed 1.4 MMscf/d post stimulation.</td>
</tr>
<tr>
<td>47/10-2</td>
<td>1987</td>
<td>Objectives were the Rotliegend and Carboniferous in a structural trap. Rotliegend was water-bearing. Drilled 346 m of Namurian.</td>
</tr>
<tr>
<td>47/10-3</td>
<td>1987</td>
<td>Well was drilled to investigate the hydrocarbon potential of the Bunter Sandstone in an abutment trap on the SW flank of a NE-SW trending salt induced anticline. Well was side-tracked at 2,184 m after the BHA was lost in the hole. Encountered 204 m of overpressured salt water bearing Bunter sandstone with no hydrocarbon shows.</td>
</tr>
<tr>
<td>47/10-4</td>
<td>1989</td>
<td>Well was drilled as an exploration well, and was P&amp;A as a dry well. The well TD’d in Zechstein salt.</td>
</tr>
<tr>
<td>47/10-5</td>
<td>1990</td>
<td>Objectives were the Rotliegend and Carboniferous in a structural trap. Rotliegend was water-bearing. Drilled 203 m of Carboniferous. Tested Carboniferous – no flow.</td>
</tr>
<tr>
<td>47/10-6</td>
<td>1998</td>
<td>This well was deviated due to shipping lanes to target a prospect in BG’s block 47/15b. The objective was to test the Rotliegend. Gas was encountered in the Rotliegend Formation and was tested (see table).</td>
</tr>
<tr>
<td>47/10-7</td>
<td>2002</td>
<td>This well was classed as an appraisal well. As the well was successful it was side-tracked for development (see 47/10-7Z).</td>
</tr>
<tr>
<td>47/10-7Z</td>
<td>2003</td>
<td>This sidetrack was a horizontal hole which extended approximately 1,800 feet in the gas bearing Rotliegend and Carboniferous sands at approximately 9,000 feet. The well tested gas at a rate of 60MMscf/d, which was constrained by the testing equipment.</td>
</tr>
<tr>
<td>47/10-8</td>
<td>2005</td>
<td>This well was drilled by Newfield Exploration Company on the Rotliegend Newark prospect. Well 47/10-8 was drilled by ADTI as a turnkey project. The well was part of a farm-in deal whereby Newfield will paid 100% of the well costs and acquired a 65% interest in the block. Well P&amp;A as a gas discovery.</td>
</tr>
<tr>
<td>48/6-5</td>
<td>1967</td>
<td>Tested the west flank of the West Sole Rotliegend. Drilled 100 m of Westphalian A sediments.</td>
</tr>
<tr>
<td>48/6-10</td>
<td>1967</td>
<td>Tested the west flank of the West Sole Rotliegend. Drilled 29 m of Westphalian A sediments.</td>
</tr>
</tbody>
</table>
Figure 6  Wells database used in evaluating the licences. Green shading colours represent licences in which BP has an interest.
5 PROSPECTIVITY UPDATE

The original licence application proposed a broader area to the west of the West Sole field and looked at prospectivity in the Paleozoic within the Sole Pit Inversion.

![Depth structure map](image)

**Figure 7. Top Carboniferous (Base Permian Unconformity) depth structure map for the licence areas**

Whilst PreSDM reprocessing has produced significant uplifts in data quality, it has not unlocked any additional Paleozoic prospectivity in the licence areas. A Top Carboniferous depth structure map across the licence areas is given in Figure 7. NW trending structures are apparent in the seismic data, most of which have been tested in the area surrounding these licenses. Block 48/6d may contain a small four-way closure in the Rotliegendes. The structure in block 47/10e does not close and instead rises continuously into the adjacent block 48/6a. As such, BP and its partner were unable to map sufficient Paleozoic prospectivity in these licenses to warrant the drilling of an exploration well. Interpreted time and depth sections across the licences are given in Figure 8 & Figure 9.
Figure 8. Interpreted time and depth sections across the P1743 licence.

Figure 9. Interpreted time and depth sections across the P1744 licence.
6 FURTHER TECHNICAL WORK UNDERTAKEN

Along with the seismic work, BP and its partner reviewed the petrophysics, reservoir quality, reservoir presence and structural evolution of the licence area. These studies in addition to the seismic work described above failed to provide sufficient prospectivity.

Completed and ongoing studies in the wider area of interest include a review of all biostratigraphic data in licenced areas and biostratigraphic infill of 34 wells, 3D well correlation of all Paleozoic penetrations, petrophysical review of 65 wells, 2D regional seismic line backstripping, construction of fine scale gross depositional environment maps and depositional models, various petroleum system studies, core fracture logging of all existing core in the area of interest, a review of all drill stem tests, a review of all RFT data, a quantification of Paleozoic in situ stress orientation, basin-wide common risk segment mapping, a review of mud loss events in intervals of interest, establishing a ditch gas database and construction of various databases used for petroleum system models, discrete fracture network modelling and well performance predictions.

Additionally, the following geotechnical studies are either ongoing or have been completed:

- Distinguishing classes of sediments of similar rock quality (aka rock typing) through the integration of core and petrophysical data. This has included core and thin section analyses, and a description of the major factors affecting rock quality. Also associated with this has been a description of reservoir diagenesis and controlling factors.
- Review of existing SCAL analyses of Paleozoic rocks. Establishment of views on relative permeability behaviour and capillary pressures of various rock types. Comparison of these descriptions with BP’s global database of analogous reservoirs. For this project BP has also been sponsoring a petrophysical joint industry project (JIP) run by Leeds University (PI: Dr. Quentin Fischer).
- Establish the in situ stress magnitude in intervals of interest in BP and partner operated areas. A current review of stress orientations in Paleozoic intervals suggest coupling of stresses. A review of the magnitudes, depths, and locations of modern earthquakes in the area of interest commissioned by BP (executed by the BGS) demonstrated links between shallow earthquakes and regions of critically-stressed crust.

7 RESOURCE & RISK SUMMARY

As discussed in previous sections, there are currently no prospects or leads in the Paleozoic in these licence areas.

8 CONCLUSIONS

The P1743 and 1744 licences in the SNS were acquired in the UKCS 26th Licencing Round as part of an application focused on unlocking new Paleozoic play fairways. A work programme consisting of reprocessing of existing 3D seismic volumes to PreSDM was conducted to better image Paleozoic structures at depth. Whilst there have been noticeable uplifts in seismic data quality, the seismic imaging of such structures within the licence areas was insufficient to progress opportunities. BP and its partner do not view any Paleozoic prospectivity in the licence areas at this time. As a result, BP and its partner cannot support the drilling of an exploration well in the licence areas during the initial licence term.
9 CLEARANCE

DECC is free to publish the Report and all third party ownership rights (on any contained data and/or interpretations) have been considered and appropriately cleared for publication purposes.

10 MAPS & FIGURES

All maps and figures associated with this relinquishment document are presented within earlier sections.