Relinquishment Report

Licence P1633
(Blocks 211/11b & 16b)
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1. **Licence Information**

| Licence Number: | P1633 |
| Licence Round:  | 25th  |
| Licence Type:   | Traditional |
| Blocks:         | 211/11b & 16b |

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2. **Licence Synopsis**

Licence P1633 was awarded to MPX North Sea Limited (65% and operator) and Wintershall E & P Limited (35%) in the 25th Licensing Round on 12th February 2009.

P1633 (blocks 211/11b and 16b) is located in the East Shetland Basin and is surrounded by significant Jurassic oil fields including Magnus, Tern, Eider and Otter. At the time of the award the main prospect identified was Lucius, a Middle Jurassic combination upthrown/downthrown trap with the Brent Sands as the reservoir. In addition, a number of other prospects and leads were identified in the Middle Jurassic (Apemantus, Ventidius) and Upper Jurassic (Timon, Titus, Timandra and Hostilius) as shown in Figure 1.

![Figure 1. P1633 Location Map. Highlights nearby fields and shows prospects and leads.](image-url)
Throughout the history of the licence, from award to relinquishment, there have been numerous changes in licensees. These are detailed in Table 1 below together with other significant events relating to the licence:

<table>
<thead>
<tr>
<th>Date</th>
<th>Licence Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2010</td>
<td>MPX divested 35% of its interest to Sorgenia E &amp; P (UK) Ltd.</td>
</tr>
<tr>
<td>January 2011</td>
<td>Agora Oil &amp; Gas (UK) Limited acquired 15% of MPX's interest through an acreage swap and a further 20% of Sorgenia's equity through farm-in.</td>
</tr>
<tr>
<td>June 2011</td>
<td>Wintershall farmed out 18% of its licence interest to TAQA Bratani Limited.</td>
</tr>
<tr>
<td>June 2011</td>
<td>DECC agreed to change firm commitment well on Lucius to drill the Timon Prospect (Magnus Sands objective) to a depth of 3200m or 30m below the top Heather Formation.</td>
</tr>
<tr>
<td>February 2012</td>
<td>Agora farmed out 10% interest to Valiant.</td>
</tr>
<tr>
<td>February 2013</td>
<td>Initial term of licence extended by 6 months to 11th August 2013 due to delays in drilling the Timon well.</td>
</tr>
<tr>
<td>March 2013</td>
<td>Timon well 211/11b-7RE P &amp; A dry hole having drilled to a TD of 10,723 ft. Well commitment on the licence fulfilled.</td>
</tr>
<tr>
<td>April 2013</td>
<td>Sorgenia sold its 15% interest to Dyas Exploration UK Ltd. Ithaca bought Valiant and later withdrew from licence with their 10% taken up by remaining licensees pro rata.</td>
</tr>
<tr>
<td>August 2013</td>
<td>50% mandatory relinquishment took place and licence entered into second term with an expiry date of 11th February 2017. TAQA acquired 100% equity in four sections in 211/16b on the Tern-Eider Ridge and deepens well 210/25a-11 to test the Fairlie prospect.</td>
</tr>
<tr>
<td>March 2014</td>
<td>Wintershall E &amp; P sold equity to MOL growest (II) Ltd and Dyas withdrew from licence with interest taken up by remaining partners.</td>
</tr>
<tr>
<td>February 2015</td>
<td>Voluntary partial relinquishment reduced licence area to 86km² retaining the Brent prospects of Lucius, Apemantus and Ventidius.</td>
</tr>
<tr>
<td>August 2015</td>
<td>Company re-structuring resulted in MPX changing name to Zennor North Sea Limited.</td>
</tr>
<tr>
<td>October 2015</td>
<td>MOL (22.66%), Agora (33.34%), TAQA (24%) each withdrew from the licence and Zennor became 100% equity holder.</td>
</tr>
<tr>
<td>February 2016</td>
<td>Voluntary relinquishment of P1633 in its entirety.</td>
</tr>
</tbody>
</table>

Table 1. P1633 Licence History.

### 3. Work Programme Summary

#### Firm Commitment

The original firm commitments on the licence were as follows:
- re-process 400km² 3D seismic data
- drill one well to 3500m to evaluate the Brent Formation on the Lucius Prospect

#### Work Undertaken – seismic re-processing

308km² of the 2008 re-processed Western Geophysical WG 210 & 211 multi-client 3D seismic data (including full stack, angle stacks and gathers) was purchased and when compared to the original processed dataset, showed a significant improvement in Jurassic fault definition. This resulted in greater confidence in fault correlation and mapping of the primary Brent reservoir target. In 2010, further re-processing of the 308km² Western Geophysical 3D was
completed by Geotrace applying their BE® (Bandwidth Extension) processing sequence. This improved resolution within the Upper Jurassic which was taken one step further by seismic inversion work completed by Senergy, enabling individual fan bodies to be identified. Comparison seismic lines are shown in Figure 2 and demonstrate these improvements in data quality. These separate phases of re-processing fulfilled the seismic element of the work programme.

![Figure 2. Seismic Data Comparisons. Western Geophysical WG210 & 211 3D: original 1997 processing compared to re-processed WG 2008 and GeotraceBE® 2010.](image)

**Work Undertaken - Drilling**

Although the original well commitment had been to drill the Lucius Prospect, new entrants to the licence heralded a change in exploration focus from the Middle Jurassic to the Upper Jurassic. In June 2011, DECC agreed to transfer the firm commitment well from the Lucius
Prospect (Middle Jurassic Brent Sand target) to the Timon Prospect (Upper Jurassic Magnus Sand target) with a corresponding change in commitment depth to 3200m or 30m below the top Heather Formation.

Pre-drill Timon was a stratigraphic trap and mapped out as a WNW-ESE oriented high amplitude seismic anomaly within the Upper Jurassic. Thin sand stringers in the Upper Jurassic had been encountered in well 211/11b-5 located just to the north but outside the seismic anomaly and it was expected that these sands would be better developed within the body of the anomaly. Seismic inversion work carried out by Senergy had enabled detailed interpretation of units in the Upper Jurassic Kimmeridge Clay Formation and identified what was thought to be two potential sand packages or fans of Magnus Sandstone age separated by a regional seal. Being encased in mature Kimmeridge Clay the prospect was perceived to have low source or migration risk. The nearby Magnus Field in adjacent block 211/12 provided an analogue for the Timon prospect as did the more recent Upper Jurassic discoveries of Cladh an and Tybalt. The Magnus Sands, if present, were expected to be of good quality. The key risks associated with the prospect were reservoir presence and up-dip pinchout of the sands. Pre-drill mid case reserves were 60mmbls with a range of 40-400mmbls.

The WilHunter rig spudded 211/11b-7 on the Timon prospect on 4th May 2012 but due to technical issues was suspended on 17th May 2012 at a depth of 3,219ft. The John Shaw rig re-entered the well (designated 211/11b-7RE) on 10th February 2013 and reached a TD of 10,787ft (3287m) in the Heather Formation on 25th February 2013, thereby fulfilling the well commitment on the initial term of the licence.

The composite log for 211/11b-7RE is shown in Figure 3 and demonstrates that the objective interval in the Kimmeridge Clay Formation consisted of claystone with only a few poor porosity sandstone intervals with no shows. The absence of any viable reservoirs was confirmed by MDT samples; formation pressures were attempted at 22 points but all proved to be tight.

Figure 3. 211/11b-7RE Composite Log. Target Upper Jurassic Kimmeridge Clay Formation.
The Base Magnus amplitude and Al maps over Timon and the other Upper Jurassic prospects are shown in Figure 4. The seismic traverses tie to well 211/11a-7RE and clearly demonstrate that although the Base Magnus seismic event corresponds to the bottom of the silty interval containing the thin sand stringers in the well, the observed increase in amplitude amplitudes do not relate to any significant development of sand.

Figure 4. Timon Prospect Summary.
Magnus amplitude and AI maps and seismic traverses.
4. Database

The well penetrations relevant to the P1633 licence are listed in Table 2 below.

<table>
<thead>
<tr>
<th>Well Number</th>
<th>Operator</th>
<th>Year</th>
<th>Penetration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>211/11-1</td>
<td>ARCO</td>
<td>1974</td>
<td>TD Triassic at 11,200 ft.</td>
<td>P&amp;A Dry. Oil shows in the Middle Jurassic and tested 4,646 bbl w/d.</td>
</tr>
<tr>
<td>211/11-2</td>
<td>Shell</td>
<td>1976</td>
<td>TD Triassic at 10,555 ft.</td>
<td>P&amp;A Dry. No shows and tight Middle Jurassic reservoir.</td>
</tr>
<tr>
<td>211/16-3</td>
<td>Shell</td>
<td>1977</td>
<td>TD Dunlin Group at 12,010 ft.</td>
<td>P&amp;A Dry. Minor gas shows in the Jurassic.</td>
</tr>
<tr>
<td>211/16-4</td>
<td>Shell</td>
<td>1978</td>
<td>TD Triassic at 9,560 ft.</td>
<td>P&amp;A Oil. Eider Appraisal</td>
</tr>
<tr>
<td>211/16a-5</td>
<td>Shell</td>
<td>1979</td>
<td>TD Triassic at 9,783 ft.</td>
<td>P&amp;A Dry. Eider Appraisal.</td>
</tr>
<tr>
<td>211/16a-6</td>
<td>Shell</td>
<td>1983</td>
<td>TD Lower Jurassic at 9,705 ft.</td>
<td>P&amp;A Oil. Eider Appraisal.</td>
</tr>
<tr>
<td>211/11a-3</td>
<td>ARCO</td>
<td>1984</td>
<td>TD Triassic at 12,000 ft.</td>
<td>P&amp;A Dry. Oil shows in the Middle Jurassic and tested 35.1º API oil at low rates.</td>
</tr>
<tr>
<td>211/11a-5</td>
<td>Mobil</td>
<td>1989</td>
<td>TD Heather Formation at 10,695 ft.</td>
<td>P&amp;A Dry. No shows.</td>
</tr>
<tr>
<td>211/11a-6</td>
<td>Mobil</td>
<td>1990</td>
<td>TD Triassic at 8,594 ft.</td>
<td>P&amp;A Dry. Gas shows in Jurassic and Triassic. No logs and fish in hole.</td>
</tr>
<tr>
<td>211/16b-7</td>
<td>Mobil</td>
<td>1991</td>
<td>TD Dunlin Group at 11,442 ft.</td>
<td>P&amp;A. Oil and gas shows in the Middle Jurassic. No core and no test</td>
</tr>
<tr>
<td>211/11b-7,7RE</td>
<td>MPX</td>
<td>2013</td>
<td>TD Heather Formation at 10,787 ft.</td>
<td>P&amp;A Dry. Thin sand stringers in Upper Jurassic but no shows</td>
</tr>
</tbody>
</table>

Table 2: Key Wells used in P1633 Evaluation.

The seismic data utilised in the evaluation of licence P1633 is summarised in Figure 3. At the time of the licence award MPX had some 340km² of original processed 1997 Western Geophysical multi-client 3D data over the blocks 211/11b and 16b and upon award 308km² of the 2008 re-processed version of this dataset was purchased. Further re-processing of this Western Geophysical 3D data was carried out by Geotrace and Senergy and has already been discussed in section 3 of this report.

Additional seismic data was used to generate a sub-regional interpretation and place the licenced blocks into a more regional context in relation to surrounding producing fields and allowed for seismic ties to be made to relevant wells outside the blocks. This included the released 3D data over Otter and Magnus Fields, the Fugro Terracube 3D plus some 2D lines extending into the Magnus Trough.
5. **Prospectivity Update**

Blocks 211/11b and 16b are located at the northern edge of the East Shetland Basin and lie between the Otter Field (Middle Jurassic Brent Sands) to the west, the Tern and Eider Fields (Middle Jurassic Brent Sands) to the south and the Magnus Field (Upper Jurassic Magnus Sands) to the east.

The licence application included two Middle Jurassic Brent prospects (Lucius, Apemantus) and four Upper Jurassic leads (Timon, Titus, Timandra and Hostilius) as shown in Figure 1. The technical evaluation completed through the duration of the licence focussed on refining the definition of these prospects and leads. One additional Brent prospect called Ventidius was identified as a result of detailed analysis of well 211/11a-3.

**Revised Mapping**

On award, interpretation and mapping of the re-processed 3D seismic data was undertaken with particular focus on fault definition and delineation within the Jurassic. Structurally the blocks are dominated by the Magnus Trough to the north, bounded by the major SW-NE trending “End of the World” fault and the Tern-Eider Ridge to the south, bounded by the SW-NE trending “Pobie” fault. In the half graben set up between these two major faults, three
distinct fault trends have been mapped; a SW-NE trend, a SSW-NNE trend and a NNW-SSE trend, all of which are clearly visible at Top Brent Time map in Figure 6.

Figure 6. Blocks 211/11b and 16b Top Brent Time Map.

In addition to fully evaluating the Middle Jurassic prospectivity, detailed mapping within the Upper Jurassic and the seismic inversion work undertaken refined the definition of the Magnus Sand prospects. Timon was deemed to be the best showing strong analogies to both the Magnus and Cladhan Fields and the decision was made to drill the Timon prospect in 2012.

However, the results of the Timon well 211/11b-7RE, severely downgraded the other Upper Jurassic seismic amplitude anomaly prospects (Titus, Timandra and Hostilius). Thus, the focus of exploration interest on the licence returned to the Brent prospects, namely Lucius, Ventidius and Apemantus, all of which were retained when the 50% mandatory relinquishment took place in August 2013.

**Lucius**

The Lucius prospect is a large N-S oriented faulted Brent structure straddling blocks 211/11b and 16b (Figure 7). Lucius is a complex feature being in part both an upthrown and downthrown trap. In the north, Lucius is a hanging wall trap with the Brent reservoir juxtaposing
Triassic across a NNE-SSW trending fault with cross-fault seal provided by Triassic shales and siltstones and clay smear generated along the fault plane. In the south Lucius is an upthrown tilted fault block with the Brent reservoir juxtaposing and sealed by Heather Formation shales across the NNW-SSE trending down to the west fault. In the central area where Lucius transitions from an upthrown to a downthrown trap, the Brent reservoir section juxtaposes a narrow horst where Brent is absent.

Well 211/16b-7, drilled in the southern and deepest part of Lucius, encountered oil shows in the Brent sands. A comparison of cuttings from 211/16b-7 to cuttings from proven oil bearing and proven water bearing Brent reservoirs in the area, led Zennor to conclude that there is a high likelihood that the well is oil bearing with an ODT of 11,028ft tvdss and a probable FWL of 11,150ft tvdss. Detailed petrophysical analysis of this well adds credence to this interpretation. The depths of both the ODT and FWL are beyond the limit of the local fault-bounded closure, thereby indicating the possibility of a much larger trap extending northwards.

The key risk for the Lucius prospect is trap integrity particularly fault geometries north of well 211/11-2 where Lucius transitions from a footwall trap to a hangingwall trap.

Figure 7. Lucius Prospect Top Brent Depth Map.
Ventidius

Ventidius is a Middle Jurassic tilted fault block which straddles blocks 211/11b and 211/11a. Well 211/11a-3, located on the south-eastern flank of Ventidius was tested and recovered 35° API oil along with water in a relatively poor quality Brent reservoir. The Ventidius closure is bounded to the west by a N-South trending fault down-throwing the Brent section to the west and is dip closed to the south and east. To the north, the Ventidius structure lies on the hanging wall of a NW-SE trending fault which juxtaposes the Brent against the Triassic.
Cormorant in the footwall. The presence of oil in well 211/11a-3 and the absence of hydrocarbons in well 211/11-1 to the north of this fault demonstrates that down-faulted Brent traps are working in the area.

Petrophysical analysis of well 211/11a-3 (Figure 9) indicates the Upper Brent (Ness and Etive) have high oil saturations whereas the Rannoch is effectively non-reservoir. The underlying Broom is clearly wet. The presence of shows in the well down to the base of the Etive at 11,385ft MD covering the lower DST zone that tested only water is suggestive of a breached trap. However, the presence of live oil recovered from the tested interval indicates that a column still exists in the Ventidius. The test results along with the core data from the well show the reservoir is poor with low permeabilities. This is as expected for the Brent reservoir at depths greater than 11,000ft due to the presence of diagenetic illite. 211/11a-3 well is interpreted to have tested a low permeability transition zone of a previously breached trap which has subsequently been refilled, leaving an accumulation updip of the current well. The crest of the Ventidius structure has been mapped some 600ft updip of 211/11a-3 where reservoir quality, notably the permeability, would improve markedly as a consequence of oil emplaced in the reservoir impeding the growth of the diagenetic illite.

![Figure 9. Ventidius Discovery Summary.](image-url)

Top Brent Depth Map, Seismic Traverse and well 211/11a-3 CPI.
Apemantus

The Apemantus Lead is a complex down-faulted Brent trap in the footwall of the major SW-NE trending “End of the World” fault. To the west and east Apemantus is bounded by normal faults. Cross fault seal represents the key risk particularly as all three fault sets must seal. The “End of the World” fault on the northern margin of the structure juxtaposes Lower Cretaceous marls and mudstones against the Brent reservoir providing a high probability of seal. The hangingwall juxtapositions on the west and eastern bounding faults are higher risk with Brent against potential sands in the Triassic Cormorant Formation, but shale smear associated with the Dunlin shales could mitigate this risk.

Nearby wells, 211/11-1 and 211/11-6 penetrated the Brent reservoir. The reservoir is at a mean depth of about 9,700 ft tvdss in the north (P50 area) with the upside closure extending down to 11,150ft tvdss.

Figure 10. Apemantus Lead Summary. Top Brent Depth Map and Seismic Traverse.

6. Further Technical Work Undertaken

Following the initial interpretation and mapping of the 2008 reprocessed Western Geophysical 3D, MPX commissioned RDR at Leeds University to carry out a fault correlation and fault seal study with the objective of validating the Jurassic fault interpretation and assessing the potential for fault seal in the downthrown areas of the Lucius prospect. The RDR study concluded there was a high confidence for a hydrocarbon accumulation down to a spill point of 9,750ft tvdss. An upside reserve case was also possible with a closure down to 11,150ft tvdss but would require true fault seal and clay smear across faults bounding the prospect where there was Brent-Brent juxtaposition.
Rock physics on all relevant wells was carried out with a focus on seismic definition of Brent and Magnus Sand reservoirs. Frequency decomposition of the 3D seismic data was carried out to define the potential Magnus Sands bodies within the Upper Jurassic and also to confirm the faulting at the Middle Jurassic Brent.

A hydrocarbon charge and migration model demonstrated that the peak oil generation occurred in the deepest part of 211/11 to the east of Lucius. The oil in the Otter field, updip and to the west of Lucius, has been generated from an immature source. If the faults bounding Lucius were not sealing then mature oil should have migrated through to Otter, which is not the case.

A geochemical study completed in 2015 on five wells in the area (211/16b-7, 211/11-1, 211/11a-3, 211/12-8 and Otter well 210/15-2) looked at fluid inclusions to determine proximity of pay and timing of migration. The conclusions from this study demonstrated there had been two major phases of oil emplacement. In relation to the Lucius prospect well 211/16b-7 exhibits live oil stain throughout the Brent and in addition there are rare proximity to pay indicators inferring a nearby hydrocarbon accumulation. In relation to the Ventidius prospect, this study showed that well 211/11a-3 also has strong indications of live oil shows in the Brent and nearby pay.

7. **Reserves and Risk Summary**

Table 3 below summarises the resources and risks for the remaining prospects/leads on block 211/11b and 211/16b.

<table>
<thead>
<tr>
<th>Name</th>
<th>Prospect Lead or Discovery</th>
<th>Stratigraphic Level</th>
<th>Unrisked Recoverable Resource (MMbbls)</th>
<th>Geological Chance of Success</th>
<th>Risked P50 MMbbls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>low</td>
<td>Mid</td>
<td>High</td>
</tr>
<tr>
<td>Lucius</td>
<td>Prospect</td>
<td>Middle Jurassic</td>
<td>8</td>
<td>20</td>
<td>289</td>
</tr>
<tr>
<td>Ventidius</td>
<td>Discovery</td>
<td>Middle Jurassic</td>
<td>1</td>
<td>6</td>
<td>26</td>
</tr>
<tr>
<td>Apemantus</td>
<td>Lead</td>
<td>Middle Jurassic</td>
<td>4</td>
<td>38</td>
<td>374</td>
</tr>
</tbody>
</table>

Table 3. Summary of Remaining Reserves and Risks.

8. **Conclusions**

The absence of Upper Jurassic Magnus age sands in the Timon well 211/11b-7RE severely downgraded other Magnus Sand prospects identified at the time of the award.

The main remaining prospect in blocks 211/11b and 16b is Lucius. However, the detailed technical work on fault configuration and seal completed in 2015 did not reduce the perceived traps risks associated with this complex down-faulted Brent prospect. Although the prospect represents considerable upside potential, the most likely case reserves proved only marginally economic under the prevailing oil price. This, together with unsuccessful attempts to farm-out the Lucius led to the surrender of the licence in its entirety in February 2016.

9. **Clearance**

Zennor Pathway Limited hereby gives consent to OGA to publish this document. All third party ownership rights have been considered and appropriately cleared for publication purposes. In particular Western Geophysical have consented to publication of images of their seismic data.