

Exploration watch

Porcupine Basin - focus of major interest

The underexplored Porcupine Basin offshore Ireland attracted 80% of the applications in the recent 2015 Atlantic Margin Irish licensing round, and for the first time saw a significant number of awards going to major companies including ExxonMobil, Statoil, Nexen and BP. The area has become a focus of attention most recently as a result of Statoil's 300-600mmbbl Bay du Nord discovery in the analogous Flemish Pass Basin offshore Canada, but is also the result of earlier work by a number of independent companies that kicked off a round of data acquisition and saw a marked increase in 3D seismic surveys in 2013. As a result, companies such as Antrim Energy, Europa Oil & Gas, Petrel Resources and Providence Resources hold assets surrounded by major-held licences and are well-positioned to benefit in the ongoing farm-out processes.

Exploration success in analogous Flemish Pass

Interest in the Porcupine Basin was initially renewed as a result of the Cretaceous discoveries offshore West Africa, but the discovery of world-class resources in the analogous Flemish Pass Basin offshore eastern Canada has intensified the industry focus on the area. It is significant that a number of licence options awarded in Phase 1 of the 2015 licensing round went to major companies with large interests in the Flemish Pass Basin, especially ExxonMobil and Statoil, which bid together as partners and secured the largest award of six licence options.

Independents instrumental in generating interest

Independent companies have played a large part in looking at the Porcupine Basin in a fresh light and attracting investment to the area. Providence Resources was the earliest entrant to the basin in 2004 and successfully attracted Cairn Energy to its Spanish Point field and ExxonMobil to Dunquin, while the 2013 drilling of Dunquin North demonstrated the presence of oil in the southern part of the basin. Europa Oil & Gas and Antrim Energy farmed out to Kosmos Energy, which then acquired substantial 3D seismic data that has been critical in increasing the understanding of the basin. Petrel Resources farmed down to Woodside Energy and is now carried through to one exploration well on each of its licences.

Key events in 2016

The second phase of the 2015 licensing round is due to be announced in May 2016, while a number of 3D seismic surveys by Providence, Woodside and Statoil are scheduled to take place over the summer months. The earliest drilling in the basin is likely to be an appraisal well in Spanish Point in 2017/18.

27 April 2016

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Antrim Energy

Europa Oil & Gas

Petrel Resources

Providence Resources

EXPLORATION WATCH

A periodic look ahead from our in-house petroleum engineer, Elaine Reynolds, focusing on interesting exploration activities with significant potential impact on E&P equities.

Porcupine Basin: Attracting major interest

The Porcupine Basin is a large underexplored area located around 200km west of Ireland. Drilling began here in 1977, but, despite some early discoveries at Burren, Connemara and Spanish Point, commercial success has so far remained elusive. Interest has been renewed in the region as part of the broader interest in the Atlantic Margin, initially following on from the successful drilling of the Cretaceous stratigraphic structures offshore West Africa. A number of independent companies entered the area in the 2011 Atlantic Margin Licensing round, including Antrim Energy, Europa Oil & Gas and Petrel Resources, and joined existing operators such as Providence Resources. The strategy of these companies looked to be paying off with the 2013 entry of larger companies Cairn Energy, Woodside Energy and Kosmos Energy through farm-ins, while the 2013 discovery of up to 600mboe in Statoil's Jurassic Bay du Nord discovery in the analogous Flemish Pass Basin offshore Canada has further focused attention on the region. The latest licensing round in 2015 received a record number of 43 applications from 17 companies, with 80% of applications for the Porcupine Basin. A significant number of the Phase 1 stage of the 2015 awards went to majors also involved in the Flemish Pass Basin: ExxonMobil, Statoil, CNOOC/Nexen and BP.

Exhibit 1: Porcupine Basin licence map



Source: Providence Resources

Still frontier territory

The Porcupine Basin covers 60,000km² off the west coast of Ireland, with the southern basin alone covering an area similar to that of the Central North Sea. The region is underexplored, with 31 wells drilled since 1977, and only one well drilled since 2001. Early exploration wells targeted tilted fault block structures in an attempt to recreate the successes of the North Sea and these wells were mainly concentrated in the northern part of the basin, constrained by the technical capability of the time to drilling in water depths of less than 500m. The southern basin has remained a frontier area, as water depths between 1,000m and 2,500m prevented drilling here until ExxonMobil drilled the Dunquin North prospect in 2013 in 1,500m of water. Seismic data was also entirely limited to 2D, making the identification and evaluation of any stratigraphic traps more challenging.

Discoveries were, however, made at Burren, Connemara and Spanish Point (Exhibit 2), with reservoir, trap, source and hydrocarbons all found. None of these have been proven commercial to date, although Cairn is planning to drill an appraisal well at Spanish Point in 2017/18.

Exhibit 2: North Porcupine and Flemish Pass discoveries

	Operator	Date	Well	WD	Results
North Porcupine					
Burren	Phillips	1978	35/8-1	430m	733bopd, 34° API oil, 66mmbbl
Connemara	BP	1979	26/28-1	374m	5,589bopd 32-38° API oil, 172mmbbl
Spanish Point	Phillips	1981	35/8-2	422m	1,000bopd and 5mmscf/d, 200mmbbl
Flemish Pass					
Mizzen	Statoil	2009	O-16	1,100m	100-200mmbbl, 22° API oil
Bay du Nord	Statoil	2013	C-78	1,100m	300-600mmbbl, 34° API oil
Harpoon	Statoil	2013	O-85	1,100m	Under evaluation

Source: Europa Oil & Gas, Edison Investment Research

Increased industry interest since 2011

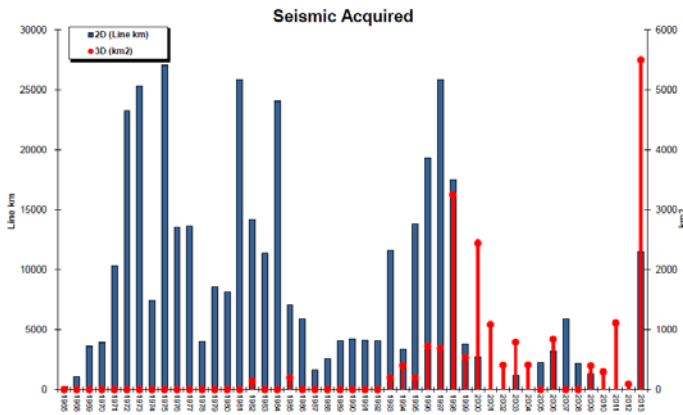
The 2011 Atlantic Margin Licensing Round relaxed the terms necessary for companies to become operators along the lines of the successful Promote Licences in the North Sea, allowing junior companies to participate in a more meaningful way. This attracted a number of new independent companies to the region including Antrim, Europa and Petrel. These companies needed to attract partners to help fund data acquisition and drilling activities and so 2013 saw a number of farm-ins that brought larger companies into the region. Kosmos Energy farmed into both the Antrim and Europa acreage, Woodside Energy farmed into the Petrel and Bluestack licences and acquired Two Seas' interest in LO 11/10, and Cairn Energy farmed in to Chrysaor and Sosina, becoming operator of the Spanish Point and Burren discoveries. Recent successes with Cretaceous stratigraphic plays offshore West Africa had prompted the industry to look again at all areas of the Atlantic Margin, including the Porcupine Basin. In particular the involvement of Kosmos, a company that focuses on Cretaceous age stratigraphic traps, caught the attention of the industry even though Kosmos subsequently pulled out in 2015.

2013 also saw the drilling of the Dunquin North prospect by Exxon. This was the first well in the basin since 2001, and the first in the Southern Porcupine Basin. The well targeted a Middle Cretaceous carbonate platform and encountered 250m of water-wet reservoir; however, post-well analysis indicated the presence of 44m of residual oil column. Although all previous wells drilled in the basin had had oil and gas shows, there had been an industry perception that the southern part of the basin was more likely to be gas prone. Dunquin demonstrated the existence of oil across the basin.

The influx of companies into the basin also saw a marked pickup in 3D seismic acquisition (Exhibit 3 and 4) during 2013. Of the 5,500km² acquired offshore Ireland that year, just under 3,000km² was taken in the Porcupine Basin by Kosmos. The basin now benefits from good 3D seismic coverage,

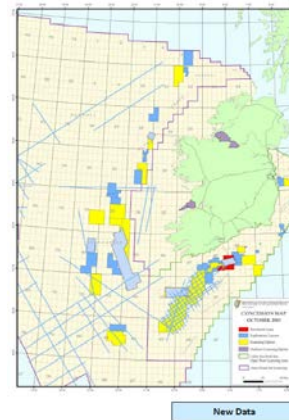
together with the availability of ultra-deepwater rigs capable of drilling in over 3,500m of water, and 1,000m water depth now considered routine.

Exhibit 3: Seismic acquisition history



Source: Department of Communications, Energy and Resources

Exhibit 4: 2013 3D seismic (in pale blue)

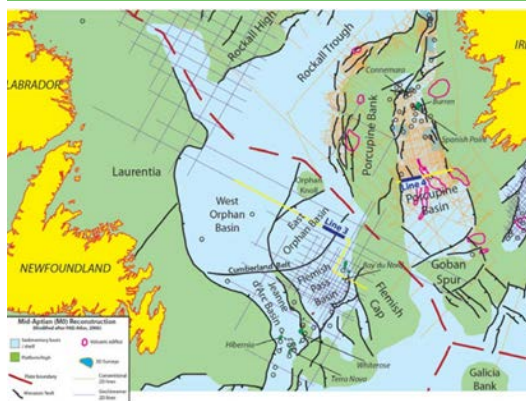


Source: Department of Communications, Energy and Resources

Bay du Nord discovery attracts majors to 2015 round

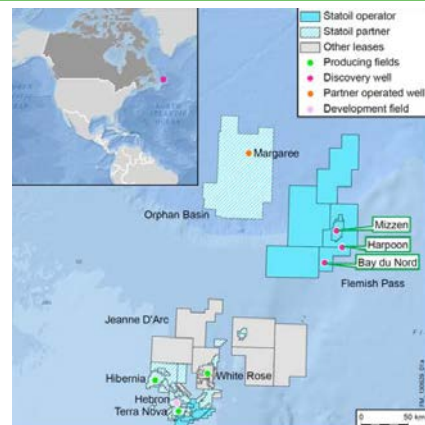
It was Statoil's Bay du Nord discovery in the Flemish Pass Basin in 2013 that really caught the attention of industry, since the Southern Porcupine Basin was connected to the offshore Newfoundland Canada basins prior to the North Atlantic break up (Exhibit 5). Statoil has made three discoveries here since 2009, however the play-opening Mizzen well found heavy 22° API oil. Bay du Nord encountered 34° API oil in excellent-quality Jurassic reservoir and is the largest discovery in the region to date, with estimated recoverable resources of 300-600mmbbl. In the Porcupine Basin, industry interest is now equally focused on Jurassic as well as Cretaceous prospects.

Exhibit 5: Plate reconstruction



Source: PGS, 4th Atlantic Margins Conference

Exhibit 6: Flemish Pass discoveries



Source: Statoil

In November 2015, the latest Canadian licence bidding round saw major companies Statoil, ExxonMobil, Shell, CNOOC, BP and Husky bidding just under \$980m in work commitments. This follows on from ExxonMobil's \$599m bid for a single licence in 2014 and demonstrates the huge interest in the Flemish Pass Basin.

Similarly, the 2015 Atlantic Margin Licensing Round was the most successful ever, with 43 applications submitted for 17 licences. The first phase of licence options are awarded to those companies with firm seismic plans and were announced in February 2016. Significantly, a number of companies active in the Flemish Pass Basin were offered licences, including Statoil, ExxonMobil,

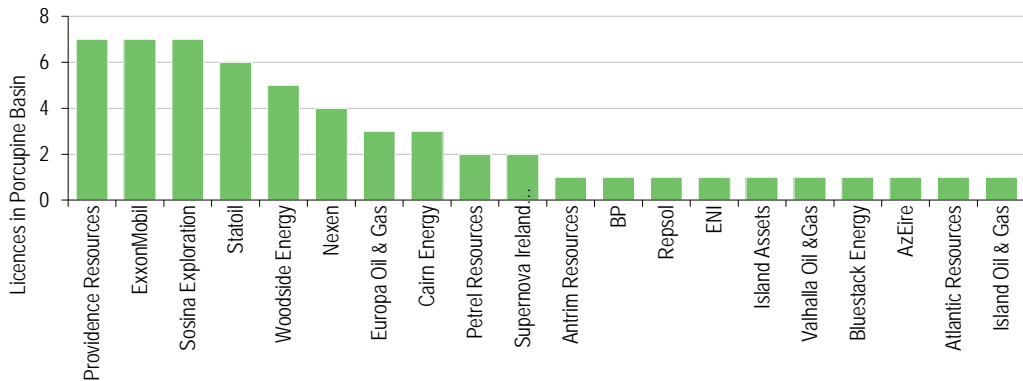
CNOOC (Nexen), ENI, Woodside and BP. Statoil and ExxonMobil, bidding together as 50/50 partners, secured the greatest number of licensing options, with six in total: two operated by ExxonMobil and four by Statoil.

As a result of these awards a number of seismic surveys are expected to be carried out during the seismic window of June and July in 2016, with Statoil, Woodside and Providence having indicated that they are planning seismic surveys this year. The second phase of awards is due to be announced in May 2016.

Companies with exposure to the Porcupine Basin

Although Phase 1 of the 2015 Atlantic Margin Round has seen a number of major companies entering the basin for the first time, such as Statoil and Nexen, or increasing their positions in the cases of ExxonMobil and Woodside, independent companies are still well represented here. Providence and Sosina hold interests in as many licences as ExxonMobil, while Cairn, Europa and Petrel all hold more licences than BP, ENI and Repsol.

Exhibit 7: Licence position (including Licence options)



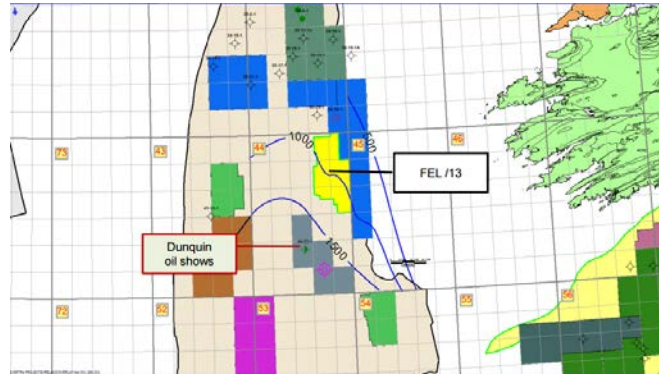
Source: Department of Communications, Energy and Resources, Edison Investment Research

This balance may shift further when the Phase 2 results are announced in May this year, however this interest from larger companies is a positive development for those independents currently seeking to secure farm-out deals. Here we look in more detail at three independents currently looking to farm out, Antrim, Europa and Providence, together with Petrel, which has farmed down both its licences to Woodside.

Antrim: Farm-out required

Antrim is a Canadian oil and gas exploration company with assets in the UK North Sea and offshore Ireland. The company holds 100% WI in FEL 1/13 in the Southern Porcupine Basin and known as the Skellig block, to the north of Dunquin and immediately to the west of Petrel's FEL 4/14. In 2013, Kosmos farmed into the licence with 75% WI and became operator in exchange for carrying the full costs of a 3D seismic programme and re-imbursment of a portion of Antrim's past exploration costs.

Exhibit 8: Antrim licence map



Source: Antrim Energy

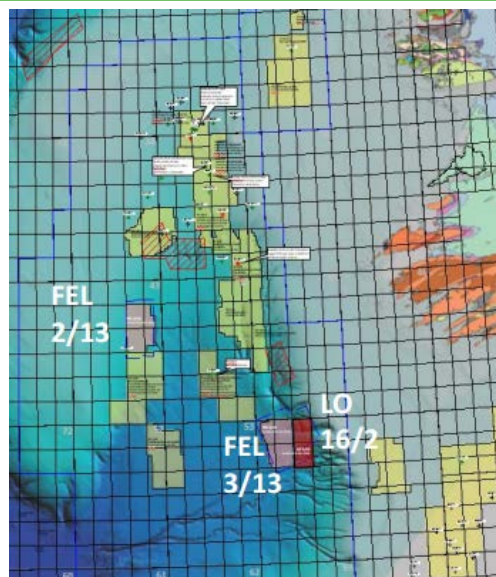
Kosmos acquired 1,050km² of 3D seismic in 2013 and prepared a prospect inventory before pulling out of the licence as of November 2015. The inventory reinforced Antrim’s original interpretation from 2D seismic and highlighted two Jurassic tilted fault blocks and a Cretaceous fan. An independent assessment of the licence, carried out by McDaniel in 2014, estimated gross prospective resources for 17 leads in Skellig at 247mmboe, of which 165mmboe is gas.

The initial three-year term for FEL 1/13 is due to expire in July 2016, and Antrim has requested a two-year extension to this deadline. The company is also looking to secure a new farm-in partner with a view to being able to make a well commitment at the end of this revised exploration term.

Europa: Looking to farm out

Europa holds a 100% interest in two exploration licences, FEL 3/13 and FEL 2/13, and was also awarded 100% of one licensing option, LO 16/2, which adjoins the eastern boundary of FEL 3/13, in February 2016. Its assets are all adjacent to licences held by larger operators including ExxonMobil, Woodside and ENI.

Exhibit 9: Europa licence map



Source: Europa Oil & Gas

In April 2013, the company farmed out 85% of FEL 2/13 and FEL 3/13 to Kosmos. Although Kosmos subsequently pulled out in September 2015, Europa benefited from the fully funded acquisition and processing of 1,500km² of 3D seismic across both licences. Analysis has identified a number of prospects across all the assets, covering both Cretaceous and Jurassic targets. In FEL

3/13, three Cretaceous fans, Wilde, Beckett and Shaw, have been identified and independently assessed by ERC Equipoise in May 2015 to contain combined gross best prospective resources of 861mmboe. Of these, Wilde currently looks the most promising, with the highest chance of success (CoS) at 19%. From seismic the prospect appears as a focus of significant sand deposition, believed to be a thick turbidite sand sequence. The company sees reservoir deliverability as the biggest uncertainty for Wilde.

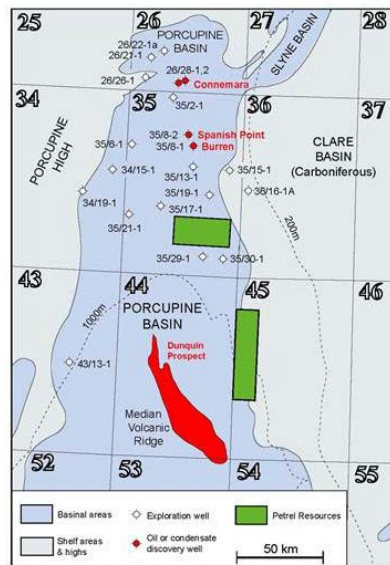
FEL 2/13 contains Cretaceous channel prospects Doyle A and B, together with pre rift (Jurassic) prospects. P50 gross prospective resources for the licence are estimated to be 375mmboe by the company. The Kosmos 3D seismic also covered LO 16/2 where Europa has identified three pre-rift prospects with combined gross mean unrisked prospective resources of 895mmboe. The company is working to mature these prospects and plans to deliver a CPR later in 2016.

Europa is currently focused on securing a farm-in partner for these assets and reports good interest from major and mid-cap companies since the data room opened in January 2016.

Petrel: Carried through to exploration wells

Petrel entered the basin in 2011 and was awarded two licensing options, which were converted to Frontier Exploration licences (FEL) 3/14 and FEL 4/14 covering 1,050km² and sitting in 600-800m water. It now holds 15% of these licences, having farmed out to Woodside Petroleum in 2013. The company is now substantially carried through 3D seismic to one well on each FEL.

Exhibit 10: Petrel licence map



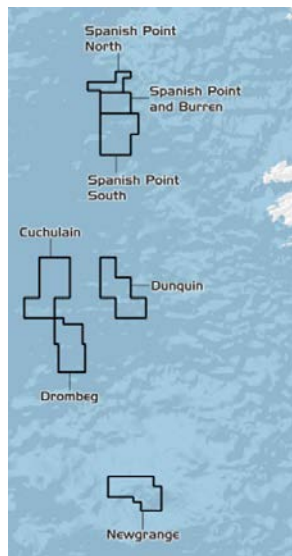
Source: Petrel Resources

A number of leads were identified by Petrel from 2D seismic and independently assessed by Senergy prior to the farm-out as containing best estimate gross prospective resources of 366mmbl. A 3D survey is being planned to be carried out across FEL 3/14 during the summer 2016 seismic window with a view to de-risking the portfolio and taking the expected chance of success from current levels of around 10% to c 20%. The key risk is seal. Woodside is expected to take around a year to process the seismic data, however a well could be drilled as early as 2017 if it is possible to take advantage of lower rig rates. With the industry focusing on Jurassic and Cretaceous reservoirs, we expect that any well would target these plays. Petrel has also bid on three further licence options in the 2015 Atlantic Margin round and will find out if it has been successful in May 2016.

Providence: An extensive portfolio

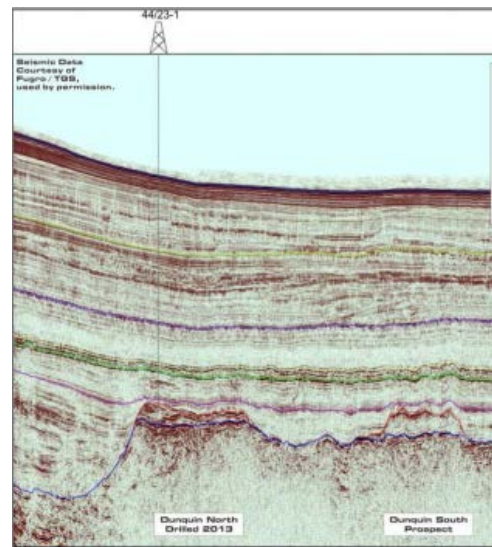
Providence was the first company to hold a licence in the Porcupine Basin in 2004 and has subsequently built up a portfolio of seven licences across the basin. The licences cover both the northern and southern parts of the basin and the company has successfully brought partners into the area, with ExxonMobil farming into Dunquin in 2006, and Cairn becoming operator of Spanish Point in 2013.

Exhibit 11: Providence licence map



Source: Providence Resources

Exhibit 12: Dunquin seismic



Source: Providence Resources

Northern Porcupine Basin

Spanish Point: Appraisal well in 2017/18

Providence holds a 58% WI in FEL 2/04 and FEL 4/08 containing the Spanish Point gas condensate field, and in FEL 1/14 immediately to the south of Spanish Point, which contains the Ruadhan prospect. Spanish Point was discovered by the 35/8-2 well drilled in 1981 by Phillips, which encountered a series of stacked Upper Jurassic reservoirs and was tested at 1,000bopd and 5mmscf. The well was analysed as being significantly damaged, and updated modelling indicates that an undamaged well could have a flow potential of around 10,700boepd.

Cairn farmed into Spanish Point in 2013 and now holds 38% WI and operatorship of FEL 2/04, FEL 4/08 and FEL 1/14. Under the terms of the farm-in, Cairn will fund 63.33% of future exploration and appraisal wells for up to two wells subject to a cap. For Providence, this applies to the interest it acquired from former partner Chrysaor in 2015 and the company estimates this will result in a cost exposure of 43% for its 58% stake. Providence also launched a farm-out process for FEL 2/04 and FEL 4/08 in October 2015 and the company has stated it is looking to divest 32%, leaving it with a WI of 26%.

Cairn estimates that Spanish Point contains up to 337mmboe of contingent and prospective resources and an appraisal well is currently being planned for 2017, subject to government approval. The operator also acquired c 900km² of 3D seismic across FEL 1/14 and covering Ruadhan in 2014 and this is currently being evaluated.

Southern Porcupine Basin

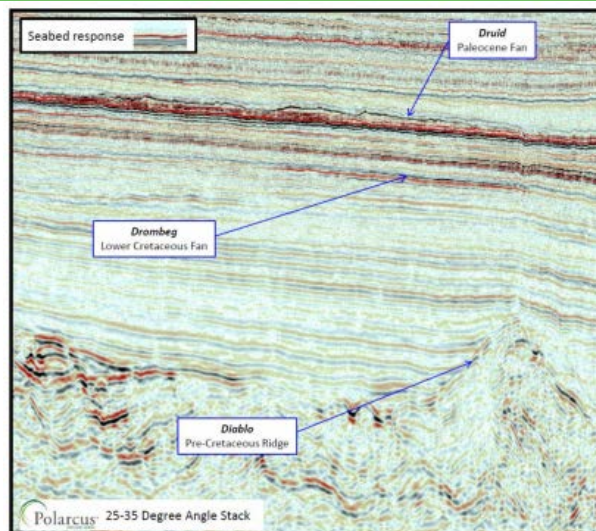
Dunquin: Oil established in southern basin

Providence holds 20% WI in FEL 3/04, which contains two isolated Cretaceous carbonate platforms, Dunquin North and Dunquin South. In 2013, operator ExxonMobil drilled the 44/23-1 well in 1,500m water and to a total depth of 5,000m to evaluate Dunquin North. The well encountered c 250m of over-pressured porous carbonate reservoir that was found to be water bearing. However, post well analysis established the presence of a 44m residual oil column, demonstrating the presence of oil in the southern basin. Dunquin South is a similar structure to Dunquin North and ExxonMobil estimates that it contains mean recoverable prospective resources of just under 1.4bnboe. Dunquin North was drilled on 2D seismic, so Providence believes that a 3D seismic survey is required to assess the risk of a breached seal being present in Dunquin South as was established in Dunquin North. Subject to the results of such a potential survey, Providence would expect to farm down further to fund the drilling of an exploration well.

Druid/Drombeg: Update points to 5.1bnbbl prospective resources

Providence also holds 80% WI and is operator of FEL 2/14 containing Drombeg and Druid, and FEL 6/14 containing Newgrange. In September 2015, Providence entered into an agreement with Schlumberger to carry out further studies focusing on Druid, Drombeg, Dunquin South and Newgrange, and the company provided a technical update on the initial results of this project for Druid and Drombeg in April 2016, with estimated mean unrisks prospective resources of 3.18bnbbl for Druid and 1.915bnbbl for Drombeg. The prospects sit in around 2,250m of water and could be targeted by a single exploration well, which the company estimates can be drilled for \$85m. This would be significantly less than the \$200m Dunquin North well, which was drilled to a similar depth in 2013, and reflects the reduction in capital costs being seen in the industry in the current low oil price environment.

Exhibit 13: Druid/Drombeg 3D seismic



Source: Providence Resources

Both prospects are stacked deepwater fan systems located up-dip from a potential fluid escape feature in the underlying Diablo Ridge. Both also have AVO anomalies present on seismic and appear to have a trap mechanism and intact seal. Druid consists of two Paleocene fans estimated to contain mean unrisks prospective resources of 0.984bnbbl and 2.196bnbbl respectively. The study has indicated the potential presence of high porosity sands in Druid up to 85m thick. Drombeg is a Lower Cretaceous deepwater fan sitting around 1,000m below Druid and also evaluated by the study to contain high porosity sands up to 45m thick.

In March 2016 a farm-out process was launched through Schlumberger for Drombeg/Druid.

Newgrange is a gas prospect in the Goban Spur, located on the southern flank of the Southern Porcupine Basin. 2D seismic has identified a Cretaceous target with a significant structural closure of 1,800km², 1,000km² of which sits within FEL 6/14 and has a P50 recoverable resource estimate of 1.126bnboe. Providence is planning to acquire a 1,200km² 3D seismic survey across the structure during the summer of 2016.

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