

Europa Oil & Gas

The Jurassic and Cretaceous Petroleum System of the East Flank of the Porcupine Basin: Implications for Prospectivity in Licences FEL 1/17 and FEL 3/13

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Kübler-Ross Grief Cycle



Introduction

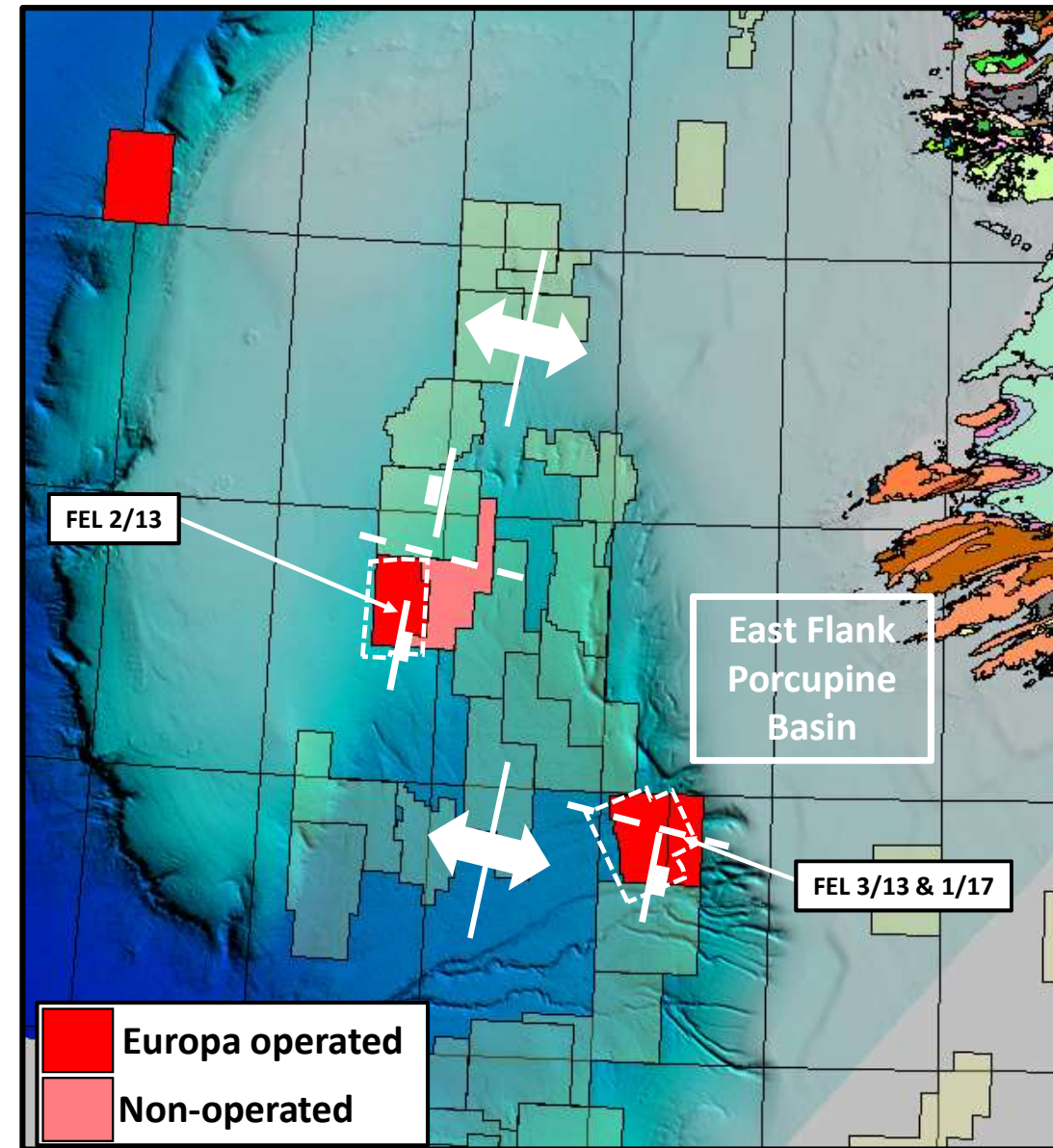
- FEL 1/17, 523 km² , since 2017
- FEL 3/13, 780 km², since 2013
- 1548 km² 3D acquired 2013
- Reprocessed to PSDM in 2018

Europa has been working the South Porcupine since 2011.

Since then the industry has acquired ~35,000 km² of 3D and drilled three exploration wells.

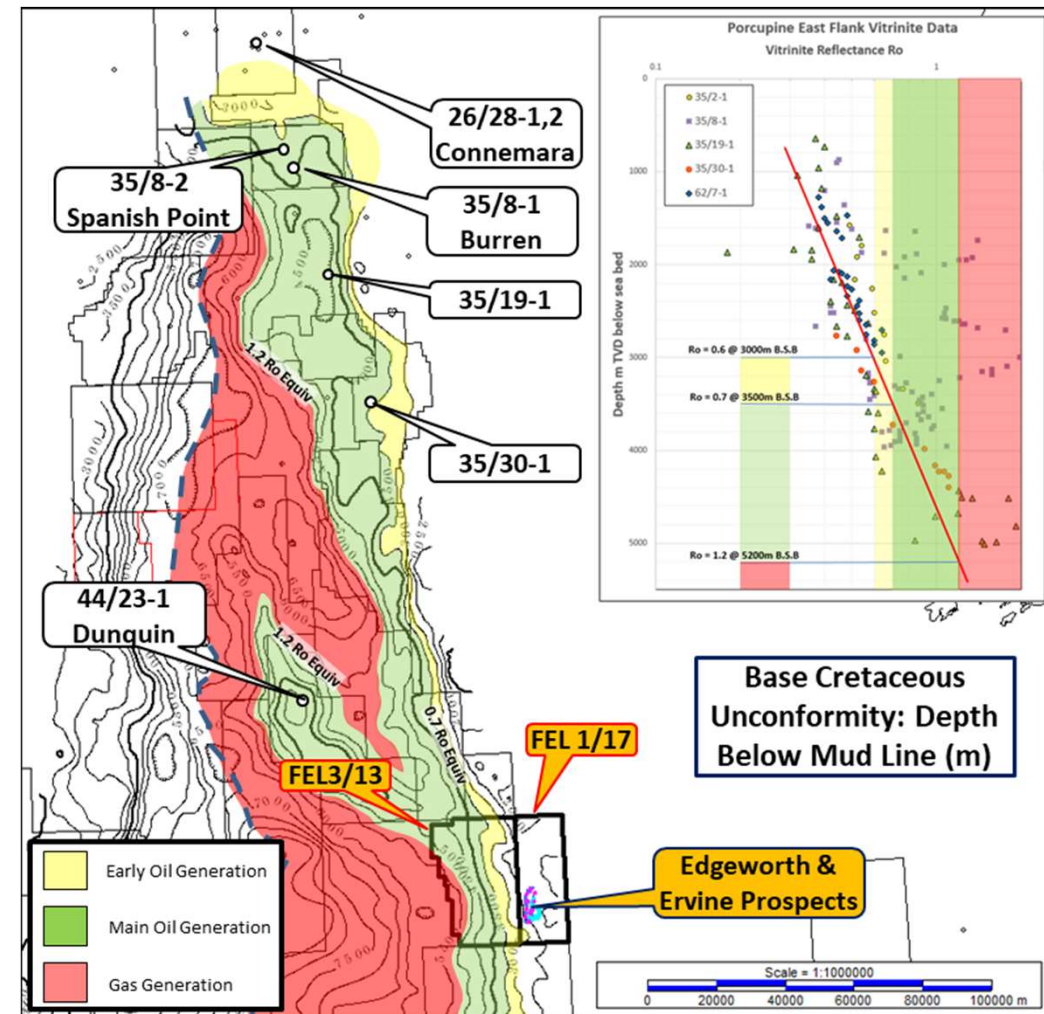
PIP funded Beicip-Franlab geochem and Merlin stratigraphy reports

This presentation is our 2019 synthesis and re-evaluation of the east flank of the South Porcupine Basin



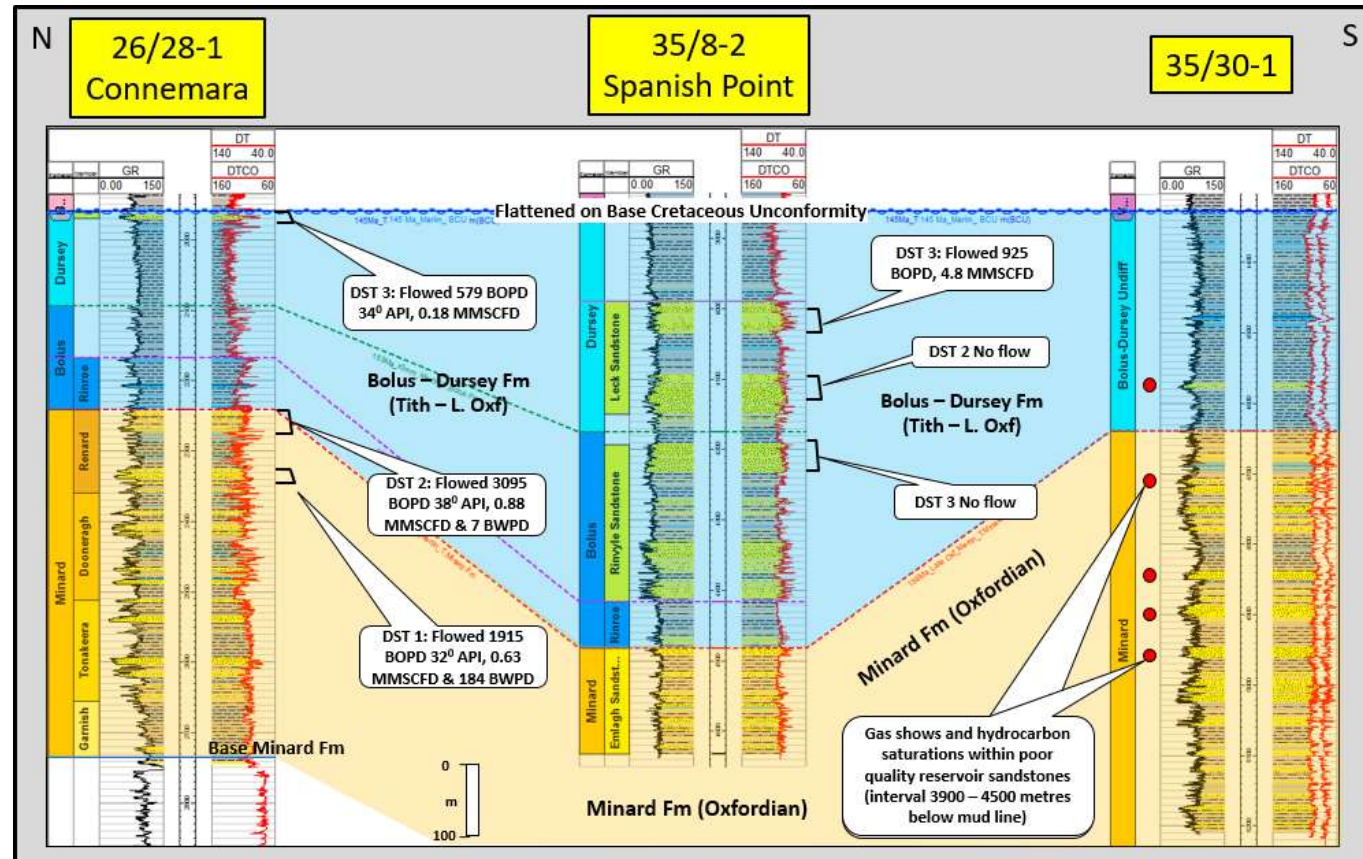
Proven Source and Effective Charge Mechanisms

- Multiple source rock intervals identified within the Tithonian, Kimmeridgian and Oxfordian.
- Effective oil charge demonstrated in Connemara 26/28-1,2, Spanish Point 35/8-2, Burren 35/8-1 and Dunquin 44/23-1 (breached).
- Gas saturations recognized in tight Upper Jurassic sandstones in 35/30-1.
- Oil generation window defined along eastern flank of Porcupine Basin
 - 0.6 Ro Equiv @ 3000m below mud line (early oil)
 - 0.7 Ro Equiv @ 3500m below mud line (main oil)
- Area of mature Upper Jurassic source rock defined within FEL 3/13



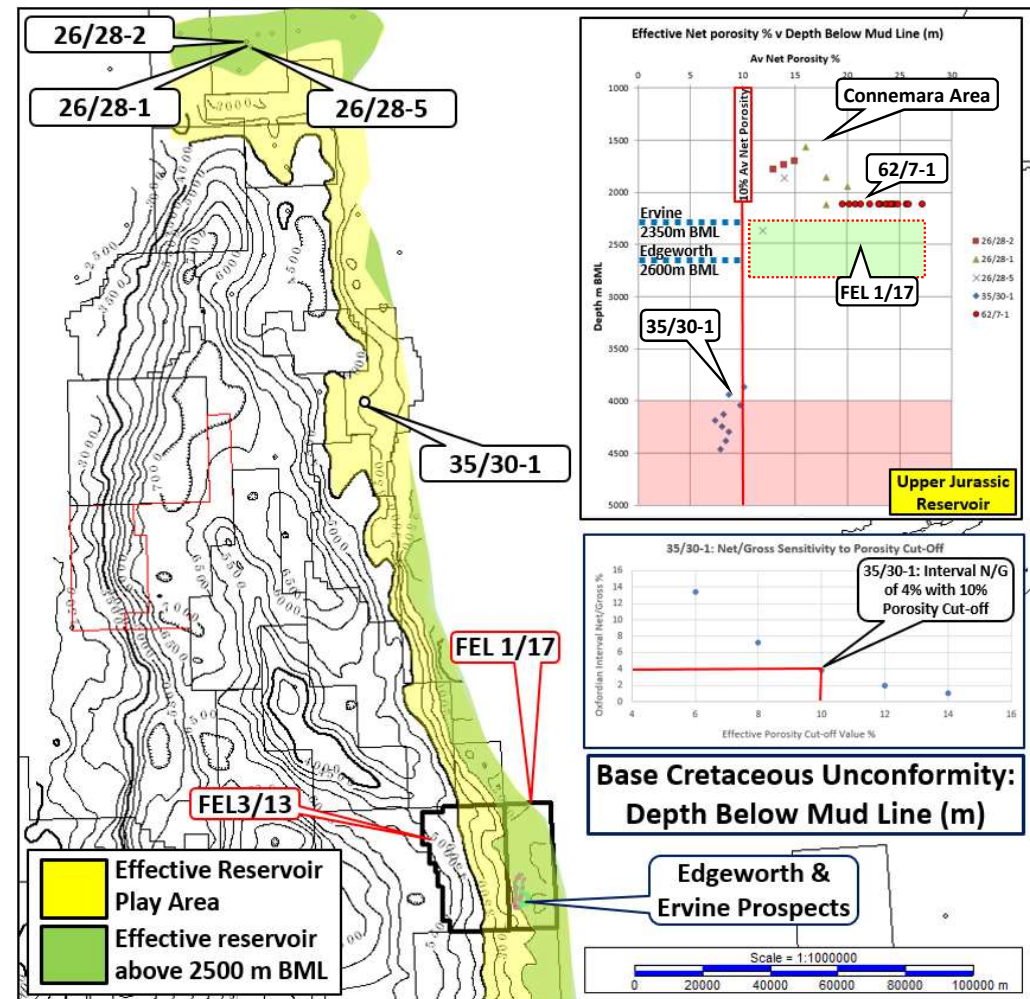
Upper Jurassic Stratigraphy and Tests

- Proven charge access to Upper Jurassic succession along eastern and northern flank of Porcupine Basin.
- Effective reservoir development recognized at multiple levels within the Upper Jurassic
 - Tithonian (Connemara DST3, Spanish Point DST 3)
 - Early Kimmeridgian – Oxfordian (Connemara DSTs 1 and 2)
- Connemara 26/28-1 combined rate of 5589 BOPD from 3 DSTs



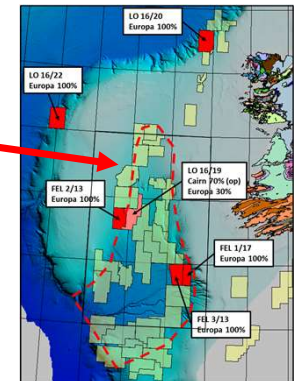
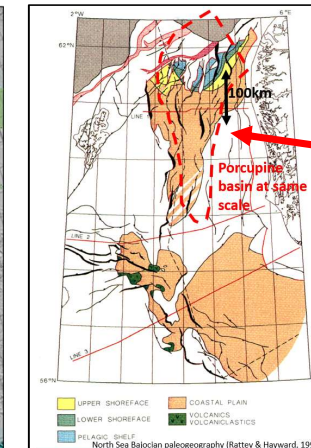
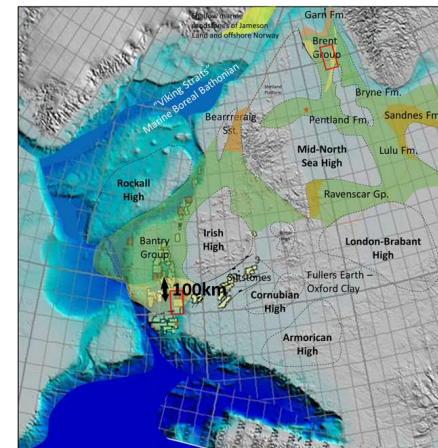
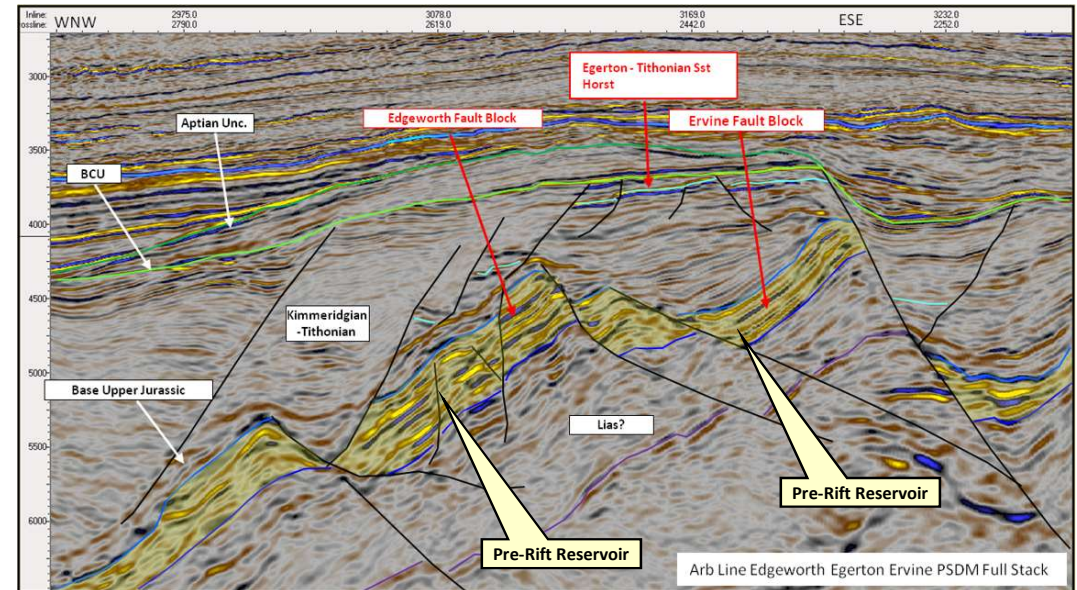
Jurassic Reservoir Fairway

- Jurassic reservoir play outline defined at BCU < 4000m BML
- Limits of Jurassic reservoir play for effective reservoir defined by marginal net reservoir development in the 35/30-1 Oxfordian interval 3800 – 4500m BML (BCU @ 3600m BML)
- Upper Jurassic Av. Net Porosity range 12 – 20% in Connemara area at 1500 – 2400m BML.
- Upper Jurassic (?Galley Fm) Sst in 62/7-1 (120 kms S of FEL 1/17 & 3/13) – core porosity range 19 - 27% at 2116 – 2122 m BML
- Effective reservoir development expected in FEL 1/17 at Jurassic level based on depth of burial criteria



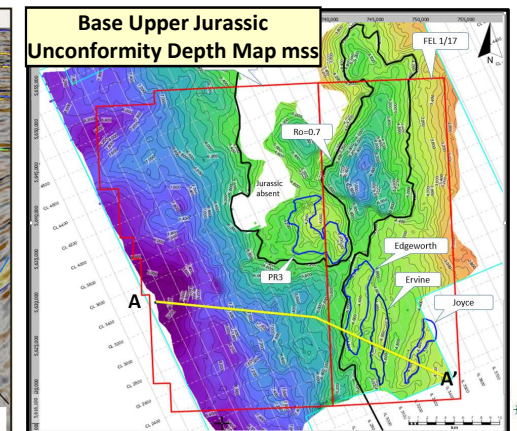
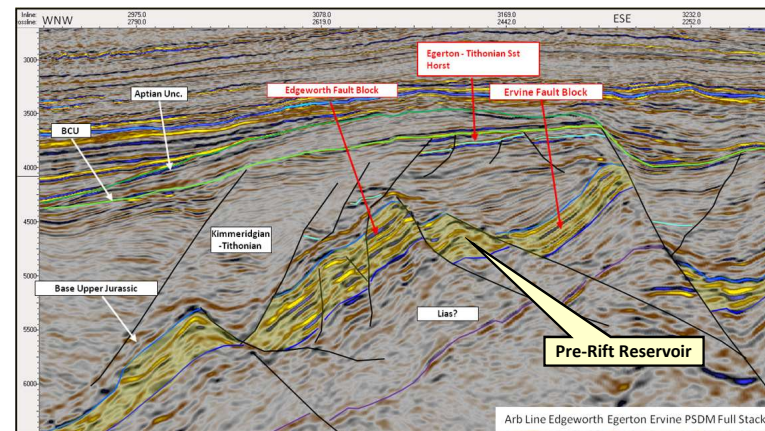
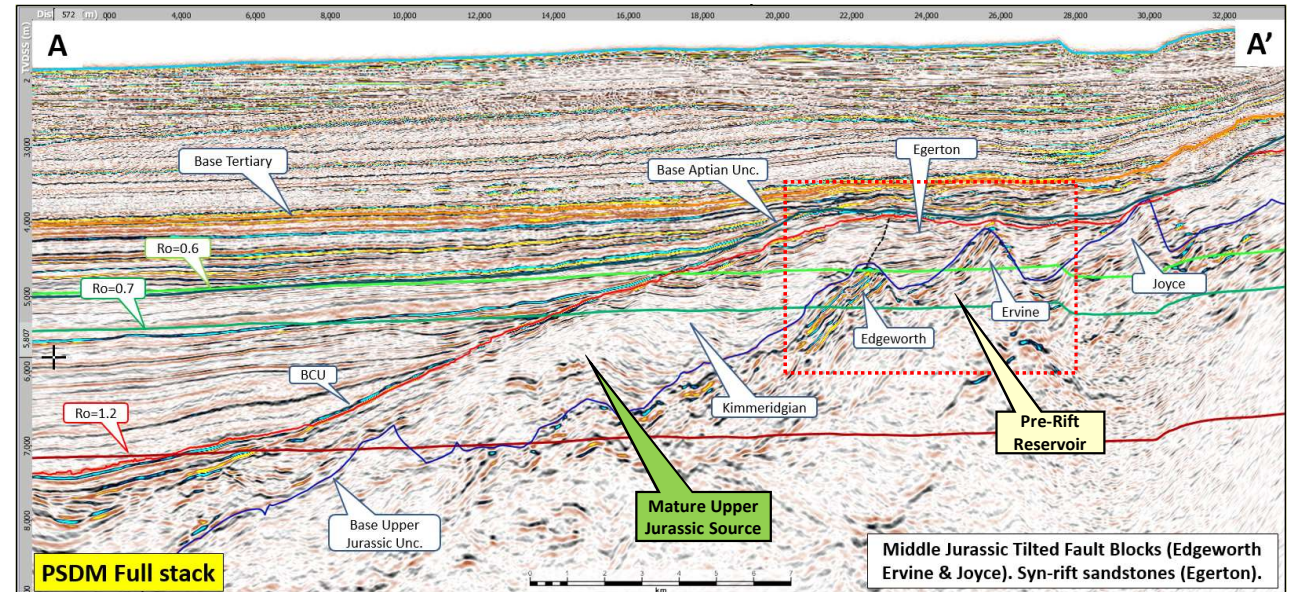
Jurassic Pre - Rift Reservoir

- In FEL 1/17 & FEL 3/13, a seismically-defined interval below Base Upper Jurassic U/C has been mapped which exhibits:-
 - A distinct seismic facies character
 - Continuity across the Edgeworth & Ervine prospect areas.
 - A thickness of between 300 – 500m
- This interval is thought to represent a potential Pre-Rift (?Middle Jurassic) gross reservoir interval, which has not been penetrated along the Eastern Porcupine Basin Margin.
- The presence of similar Middle Jurassic depositional and reservoir play systems can be demonstrated regionally.
- The scale and extent of this undrilled Pre-Rift play along the east flank of the basin may potentially be comparable to the Brent Province



Jurassic Prospects

- Well-defined tilted fault block structures.
- Pre-Rift (?Middle Jurassic) untested play potential recognized in Porcupine Basin east flank setting.
- FEL 1/17 Edgeworth and Ervine Prospects have crestal culminations at 2600m BML and 2350m BML respectively.
 - Effective reservoir expected given prospect burial depths.
- Charge access from mature Upper Jurassic source rocks directly down-dip of prospects.
- Significant resource potential.



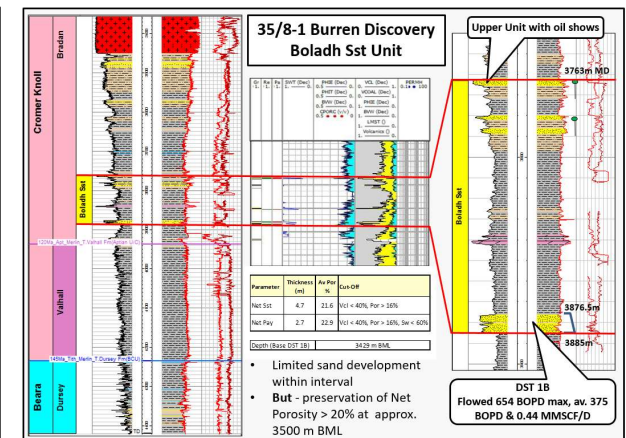
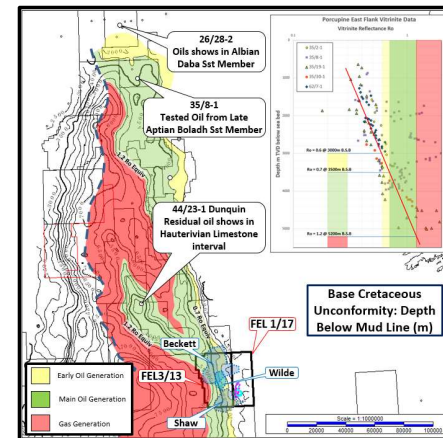
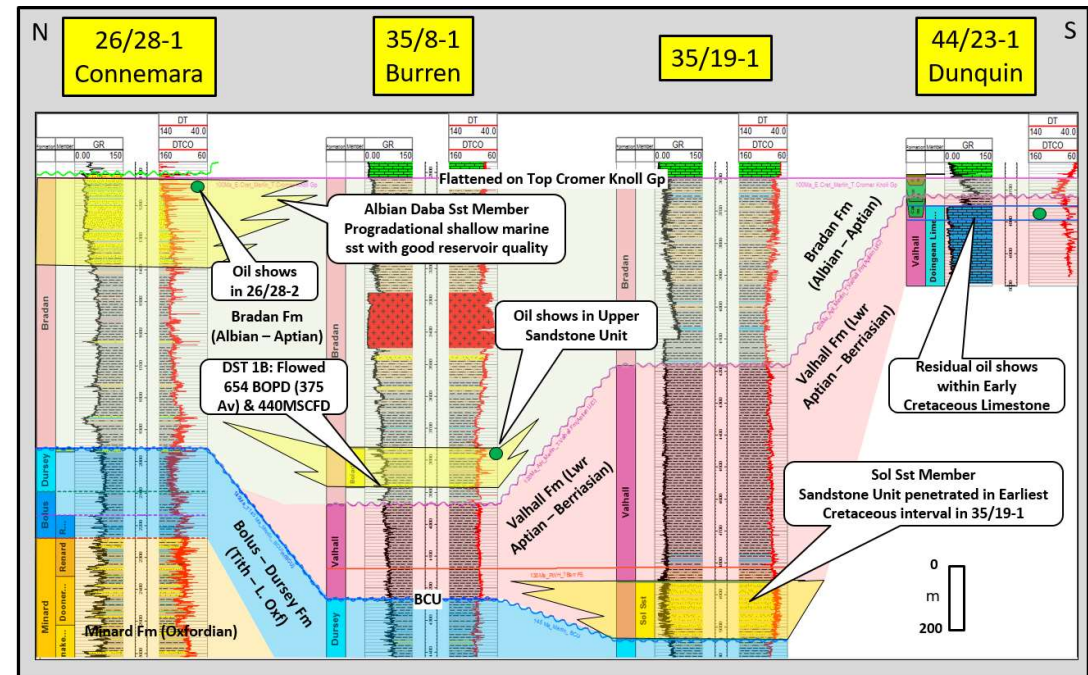
| Licence | Prospect | Play | Gross Prospective Resources mmmboe* | | | |
|----------|-----------|----------|-------------------------------------|------|------|------|
| | | | Un-risked | | | |
| | | | Low | Best | High | Mean |
| FEL 1/17 | Ervine | Pre-rift | 63 | 159 | 363 | 192 |
| FEL 1/17 | Edgeworth | Pre-rift | 49 | 156 | 476 | 225 |
| FEL 1/17 | Egerton | Syn-rift | 59 | 148 | 301 | 167 |

*million barrels of oil equivalent.

Cretaceous Play Configuration

Charge Access

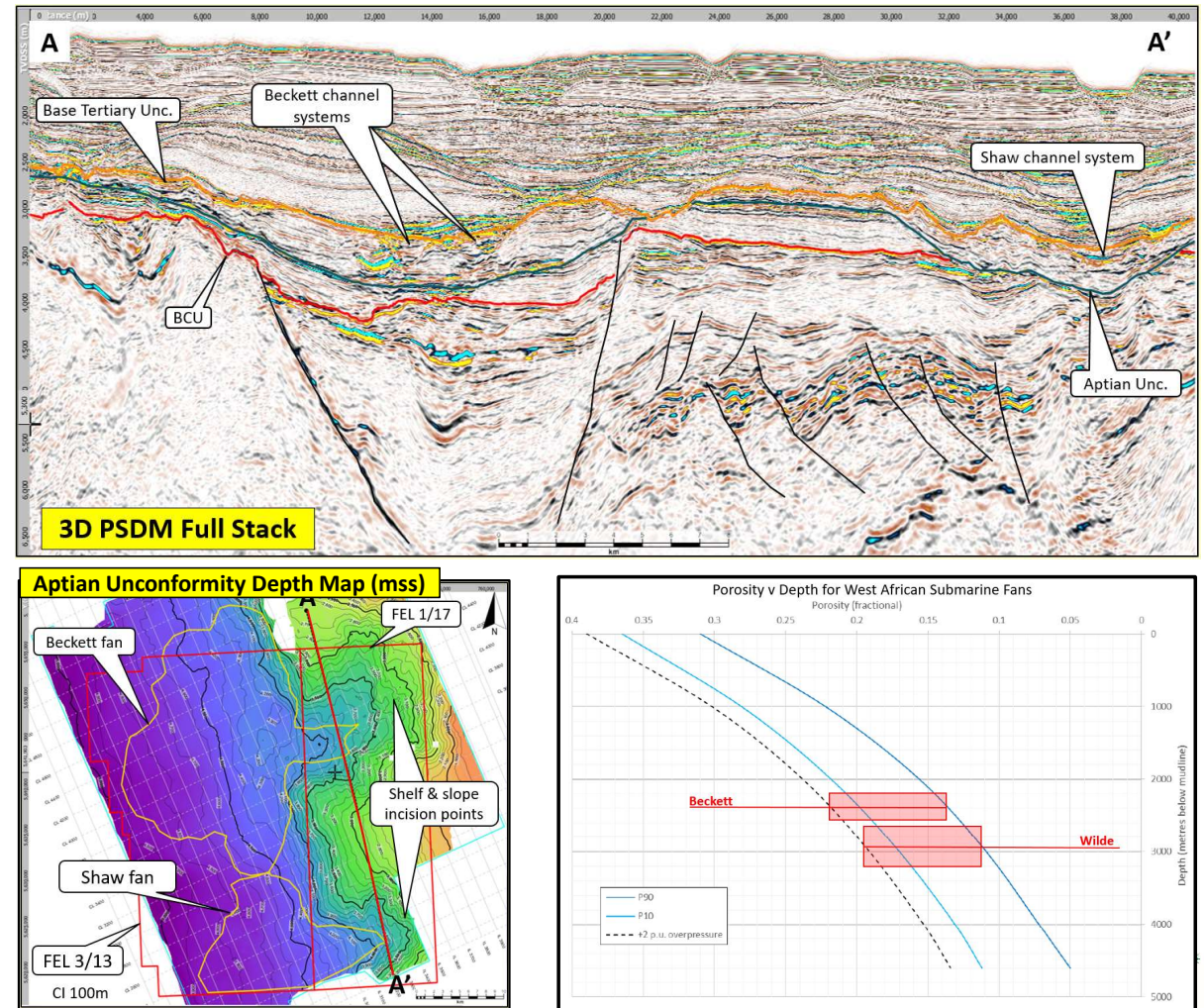
- Oil test within Late Aptian Sst in 35/8-1 Burren Discovery:-
 - Oil typed to Kimmeridgian source rock in 35/8-2 using GC-MS biomarker ratios (Beicip-Franlab 2017)
- Presence of oil shows within Albian shelfal sandstones in Connemara (26/28-2).
- Residual oil shows in Early Cretaceous limestones in 44/23-1 (Dunquin).
- Potential reservoir intervals recognized at multiple levels within the Early Cretaceous stratigraphy.



Cretaceous Play Configuration

Reservoir Development

- Interpretation of 3D seismic over the Cretaceous interval in FEL 1/17 & 3/13 identifies:-
 - Significant shelf/slope incision.
 - Long-lived sediment entry points
 - Development of constrained submarine fan geometries at base of slope
 - Wilde, Beckett and Shaw Prospects.
- Preservation of effective reservoir expected given prospect burial depths.



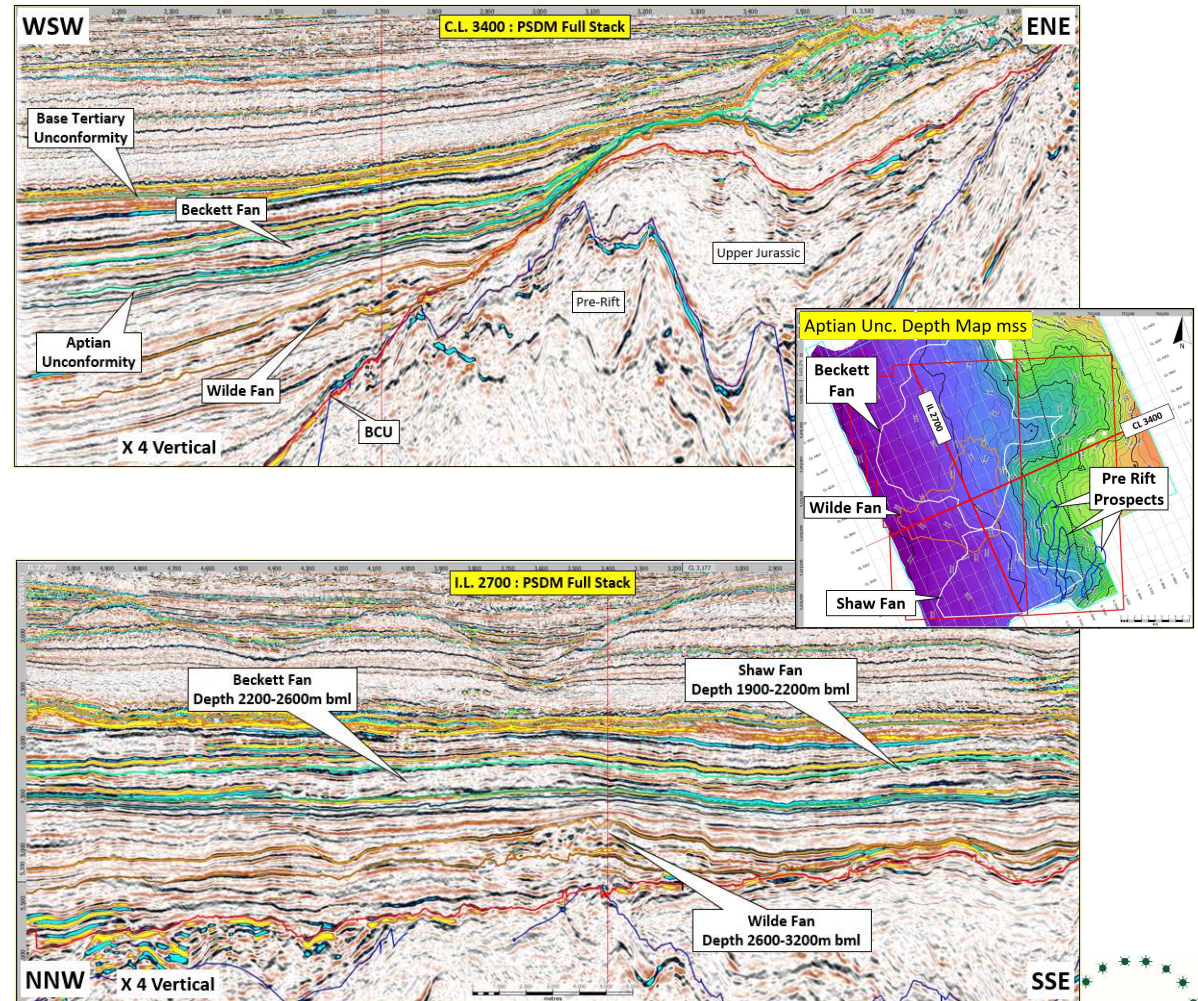
Cretaceous Prospects

- Wilde, Beckett and Shaw Fans developed at the base of a sharp, well-defined shelf-slope break.
- Fan geometries and onlap edges clearly define stratigraphic trapping geometries.
- All prospects can be charged by direct vertical migration from underlying mature Upper Jurassic source rocks.
- Beckett and Shaw Prospects situated 1900 – 2600m BML, Wilde Prospect @ 2600 – 3200m BML – effective reservoir development expected.
- Significant resource potential identified

| Licence | Prospect | Play | Gross Prospective Resources mmbœ* | | | |
|----------|----------|----------------------|-----------------------------------|------|------|------|
| | | | Un-risked | | | |
| | | | Low | Best | High | Mean |
| FEL 3/13 | Beckett | mid-Cretaceous Fan | 111 | 758 | 4229 | 1719 |
| FEL 3/13 | Shaw* | mid-Cretaceous Fan | 20 | 196 | 1726 | 747 |
| FEL 3/13 | Wilde | Early Cretaceous Fan | 45 | 241 | 1082 | 462 |

*million barrels of oil equivalent.

*prospect extends outside licence, volumes are on-licence



Summary

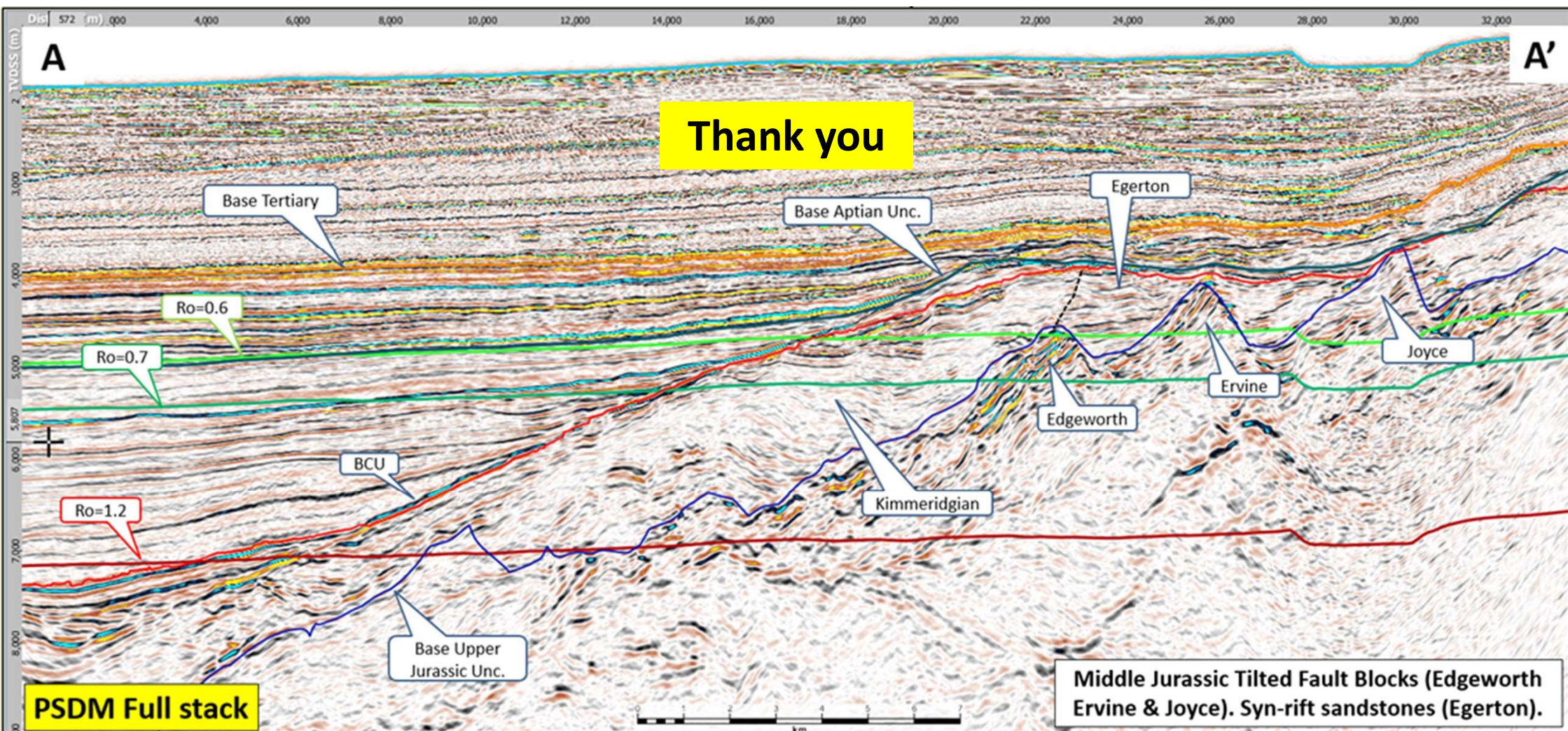
East Porcupine Basin Petroleum System

- Presence of Upper Jurassic mature source rocks demonstrated by regional well data
- Charge access to Jurassic and Cretaceous reservoirs demonstrated by regional well data
- Jurassic Prospects with significant resource potential mapped in FEL 1/17
 - Seismically well-defined tilted fault block structures
 - Located directly updip of mature Upper Jurassic source rock interval
 - Occur at burial depths where effective reservoir development is likely
 - Pre-Rift Jurassic reservoir identified with play-opening potential
- Cretaceous Prospects with significant resource potential mapped in FEL 3/13
 - Stratigraphic traps with seismically well-defined updip onlap edges, fan geometries and associated canyon systems
 - Located directly above mature Jurassic source, and charged by direct vertical migration
 - Occur at burial depths where effective reservoir development is likely

Conclusions

- South Porcupine is ~50,000 km² and with just four wells is underexplored, east flank is undrilled
- Frontier basin but oil, gas and condensate flowed to surface👍, proven source rocks👍, proven reservoir👍
- We need a thick interval of good quality reservoir, connected to mature effective source rock in a valid trap. Commercial threshold 200 mmbo and 5000 bopd per production well.
- Our east flank prospects in FEL 1/17 and 3/13 meet these criteria 👍
- South Porcupine deepwater drilling performance is excellent. No train wrecks, ahead of schedule, no safety incidents, no environmental incidents, no showstoppers. FEL 3/13 and 1/17 drill cost is \$37 million @ \$300k per day rig rate excluding mob and demob 👍
- Harsh environment FPSO production already proven at Foinaven-Schiehallion and Skarv-Idun. Deepwater harsh environment FPSO being pioneered right now at Bay du Nord and Rosebank. Exploration, development and production operations are all “doable” 👍
- We are seeking farm-in partners for FEL 1/17 and FEL 3/13, visit us at stand 21 to discuss further





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