Second Icelandic Licensing Round - Jan Mayen Offshore Exploration:
A Status Update

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The North-Dreki Licensing Area

Location Reference

- North-Dreki is part of the Jan Mayen Micro-Continent (JMMC) with indications and evidence of continental strata and suitable structures.

- Similarities to licensing areas on- and offshore East-Greenland and offshore Norway, which has a proven hydrocarbon provinces, with analogues, e.g. Møre and Vøring basins.
Second Icelandic Licensing Round

**Northern Dreki Area**

- Licensing Round was opened on the 3rd of October 2011
- Application deadline is on the 2nd of April 2012
- Norway (Petoro) has right to participate up to 25% in licenses granted within the Jan Mayen Agreement Area
2D Seismic reflection data surveys over the Jan Mayen Area

**Commercial Surveys**

- WI-JMR-08 (2008)
- ICE-02 (2002) TGS
- IS-JMR-01 (2001)

**NPD-NEA Surveys**

- J-79 (1979)
- JM-85 (1985)
- JM-88 (1988)

2009 CGG Veritas, reprocessed part of the IS-JMS-01 data

2011 Spectrum acquired data set

2012 IS-JMR-01 (2001) data set becomes public

2009 Spectrum commercial survey, reprocessed JM-85 & JM-88 data

NPD Infill 2D JMR Survey 2011-2012 confidential

APPEX2012, London, 6th – 8th March
Magnetic Surveys

*after Laurent Gernigon, 2011, NGU*

Collaboration project
NGU, NPD & NEA -
Preliminary outline of the aeromagnetic survey

**JAS-11**

in the western Norwegian Sea (green frame) planned for 2012.
Borehole & Seafloor Samples around the Jan Mayen Area

- DSDP: 5 wells during Leg 38 in 1974
- ODP: 1 well during Leg 151 in 1993
- ODP: 2 wells during Leg 162 in 1995

Cores provide density and velocity measurements to enable a depth–seismic tie (TWT) to confirm the Top Eocene marker for 3 wells on the Ridge.

- Seafloor Sampling (Core, Dredge & ROV grab samples)
  - NEA & NPD 2010
  - NPD 2011
  - VBPR 2011

Gravity coring and dredge sampling on steep ridge flank, VBPR & TGS in summer 2011 over the North-Dreki area.
Tectonic History of the JMMC

Collage based on results of recent research publications and observations at the JMMC

Data Source Reference List:
Update Key-Section JMR & Conceptual Model of the Jan Mayen Basin

"Jan Mayen Basin":
Possibly sub-basalt basin containing pre- and post-Paleocene with thinning sequences due west and deepening. Possible also being intersected by igneous intrusions, "feed points" of the youngest rifting attempts.

Legend:
- Late Quaternary - Late Oligocene
- Early Oligocene - Paleocene
- Lower Paleocene
- Paleocene - SDR/Volcanics/Basalt
- Volcanic centre Post-Paleocene
- Oligocene - shallow Basalt Intrusions
- Poss. Low Cretaceous
- Poss. Jurassic/Triassic
- Poss. Paleozoic
- Poss. Caledonian Basement
- Oceanic crust

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Conceptual model – seismic data comparison

Northern edge of the Dreki Licensing Area

- Seabed
- Base Pliocene-Pleistocene
- UC Late Oligocene - Miocene
- UC Base Late Oligocene
- Top Eocene
- UC Middle Eocene
- UC Top Paleocene
- Top Paleozoic poss. (or actual Basement ???)
- Top Basement poss. (Crystalline ??? deep reflector)
- Top Mesozoic poss. ???
- Top Jurassic poss. ???
- Intrusive

Data by courtesy of Spectrum

ORKUSTOFNUN
National Energy Authority
Seafloor Sampling in 2011

- Dredge & ROV grab samples
- Samples indicate pre-Tertiary strata (Early Cretaceous to Late Permian – Early Triassic) with sandstone of good quality that can act as a reservoir rock. In addition, it found rocks of an age that act as source rocks in Greenland.
- Detailed analysis are in progress at NPD & UiB
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<td>Oligocene-Miocene (33-22 ma)</td>
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ROV – Dredge Sampling

Nils Rune Sandstå et al., 2012

http://npd.no/no/Publikasjoner/Presentasjoner/Bruk-av-ROV-sommeren-2011-pa-Jan-Mayen-Ryggen/

Copyright: NPD
**Project aim:**

- Recover Tertiary and Mesozoic rocks from the seafloor.
- Improve seismic ties.
- Sedimentologic and geochemical analysis
- Hydrocarbon seep analysis
- Improve the understanding of the Jan Mayen Ridge’s geology and hydrocarbon prospectivity.

[JMRS11 sampling project](http://www.tgsnopec.com/_uk/emails/Projects/2012/02_JanMayen_Sampling_Feb12/Jan_Mayen_Sampling_Feb12-2.html)
Stratigraphy

Sample campaign by NPD & 1000m Pseudo-Well Interpretation by VBPR / TGS

- Samples age ranges from Miocene-Oligocene to Permian-Triassic
- Hard data to substantiate seismic interpretations for Mesozoic basin stratigraphy, lithology and depositional environment of the Jan Mayen Ridge
- Grab sample & core logging, petrography, XRD, SEM, and biostratigraphy

Hagevang et al., 2008
Potential Trap Types

- Tilted anticline closure, above tilted fault block
- Onlap against fault in downthrown fault block, unconformity
- Pinch-out, onlap onto unconformity
- Basin floor fan, Stratigraphic trap
- Onlap against fault in downthrown fault block, unconformity

Seismic image courtesy of Spectrum, 2009

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What do we know?

- Best analogue comparison with East Greenland exploration examples and the central and southern Jan Mayen Ridge with the Møre Basin for the Norwegian side.

- Post Paleocene sedimentary rocks of sufficient thickness and age along the ridge flank areas.

- First evidences of pre-opening sedimentary strata of Paleozoic, Triassic-Jurassic and Cretaceous age – underneath the east flank areas of the ridge.

- Potential reservoir rocks, focus on locally shallow marine to generally marine deposits, especially submarine fans / turbidite deposits for post Paleocene deposits, and from marine and limestone platform to continental deposits for the pre-opening formations.

- Potential traps are present, both structural and stratigraphic.

- Hydrocarbon maturation is probably high close to igneous strata, more gas prone if sufficient source rocks are present and possibly intermediate mature for areas with none-anomalous heat flows.
Thank you very much for your attention!

**Acknowledgements:**
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**The Pre-Rift Unconformity**
*Larsen, H.C. & Saunders, A.D. et al 1998*

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