PL 823 Licence Relinquishment Report

Reference is made to the notification on license decision to NPD dated 03.12.2018, regarding the drop decision in production licence 823.

This report outlines the key license history, the database, prospects and the technical evaluation of the production license 823 (PL823) and fulfills the requirement by the NPD for a license status report within 3 months of relinquishment.

Table of Contents

1 Key licence history

PL823 is located within block 25/2 in the central part of the South Viking Graben, east of the Frigg Field. PL823 was awarded through the APA 2015 with the Miranda prospect as the main and only prospect. During the license period, the prospect has been firmed up through a seismic reprocessing with the ST16M09 as the outcome, and subsequent G&G evaluation and tec-ec in 2017. A one year extension of the license terms were applied for in December 2017 and granted by OED 19th April 2018.

The distribution of PL823 shares is:

- Equinor Energy AS, Operator 60 %
- Suncor Energy Norge AS 40 %

License area has been evaluated on all relevant seismic surveys. The Miranda prospect comprise three anticlinal four-way closures; Miranda North, Central and South. The reservoir model for Miranda is the Paleocene Hermod Fm, deposited as part of an extensive fan delta system. Screening of the Brent Group no potential within PL823.

Work program – Phase 1

Work obligations and Decisions	Expiry date	Status
Reprocessing 3D seismic data		Approved
Decision to drill or relinquish	05.02.2019	Drop decision

The following Management and Exploration committee meetings have been held in the license:

- EC/MC meeting - 06.04.2016
- EC/MC meeting - 26.10.2016
- EC/MC meeting - 13.12.2017
- EC/MC meeting - 20.06.2018
- EC/MC meeting - 21.11.2018

In addition, the following work meeting has been arranged in the license:

- EC work meeting – 05.09.2017
- EC work meeting – 09.03.2017
- EC work meeting – 18.10.2017

2 Database

As a part of the license obligations a new 3D seismic reprocessing was initiated based upon the MC3D-NVG survey. The reprocessing was completed in August 2017 and named ST16M09. ST16M09 is the basis for all further seismic interpretation in the license.

Key wells are 25/1-2, 25/1-3, 25/2-1, 25/2-2, 25/2-4, 25/2-7, 25/2-8, 25/2-10 S, 25/2-12, 25/3-1.

3 Review of geological framework

The application securing the PL823 in 2015 focused on the Paleocene Hermod Fm, located next to several discoveries within the Frigg Fm and Brent Gp.

The main risk for the Paleocene play in the area is trap seal, as the stratigraphic sequence from Palocene age and into the Eocene age, most likely lacks an effective cap rock. Upwards migration through the Paleocene stratigraphy will then bypass the Paleocene and accumulate in the Eocene (i.e. Frigg field, Frigg Øst etc).

The Miranda prospect was worked up by studying all the available well and seismic data. The results of the studies improved understanding of the opportunities and provided support for volumetric input parameters and risk assessment.

In detail, the studies/work completed for PL823 were the following

- Reprocessing with focus on the Paleocene/Tertiary
- Mapping of Miranda on reprocessed 3D data (ST16M09)
- Well-tie of key wells
- AVO/LFP studies
- Gas chimney study
- Geochemical study
- Balder seal capacity
- Prospect Evaluation
- Miranda propect volume calculations and risk estimation
- Miranda prospect technical economical evaluation

4 Prospect update

Initial reservoir model for Miranda is the Paleocene Hermod Fm, deposited as part of an extensive fan delta system throughout the area. The Miranda prospect comprise 3 anticline closures. No risk is connected to reservoir presence.

Main risk is considered to be seal, as the cap rock in the Sele Formation is regarded as weak. Pressure studies in the area shows communication between the reservoir unit (Hermod Fm) and Frigg Formation. In addition, injectites of Hermod Fm into the overburden (Frigg Fm) might connect up with Sele Fm, and create leakage points. In general, Hermod Fm and Frigg Fm are in pressure communication in the area. This indicates connection between the two systems and is negative for the seal concept for Miranda. For the Miranda prospect the probability for a working trap mechanism is set to 0.25 for all three segments.

Upward fracture migration from the jurassic strata through the Cretaceous and Tertiary, is the model for hydrocarbons to enter the known discoveries within the Eocene Frigg Formation in the area. This is also the model for the Miranda prospect. However, as fill spill within the Palocene is not likely to occur, the prospect is in the need for local fractures within the prospect area in order to have a working migration model. Gas chimney studies gives some support for this model, giving a migration probability of 0.6 for all segments.

Table 1 gives an overview volumes and risk for the Miranda prospect. The aggregated volume/risk case has no dependency on migration and a weak dependancy on trap seal.

Table 1 Volumes and risk for the Miranda prospect.

Segment	Pg	Recoverable MSm^3 OE		
		P90	**Mean**	P10
Miranda North	0.15	2.1	**7.6**	14.8
Miranda Central	0.15	1.5	**5.3**	10.2
Miranda South	0.15	1.6	**6.8**	13.3
Miranda Aggregated	0.32	2.2	**9.1**	18.2

5 Technical evaluations

A business case based on a new field development for a discovery in Miranda has was performed in 2017. The Miranda prospect could be tied into a future platform in the area and depending on the number of segment discoveries, it could be developed with a subsea template or a unmanned wellhead platform.

6 Conclusions

The work programme for PL823 has been fulfilled. The prospect Miranda has been evaluated within the specified time frame and geological and geophysical studies have been completed. After a full evaluation the license recommends to drop the licence due to the very low probabilities for finding hydrocarbons. The PL823 Management Committee has therefore decided to allow the license to expire on 5th of February 2019.

Kind regards
Tom Dreyer
PL823 MC Chairman
Equinor Energy AS

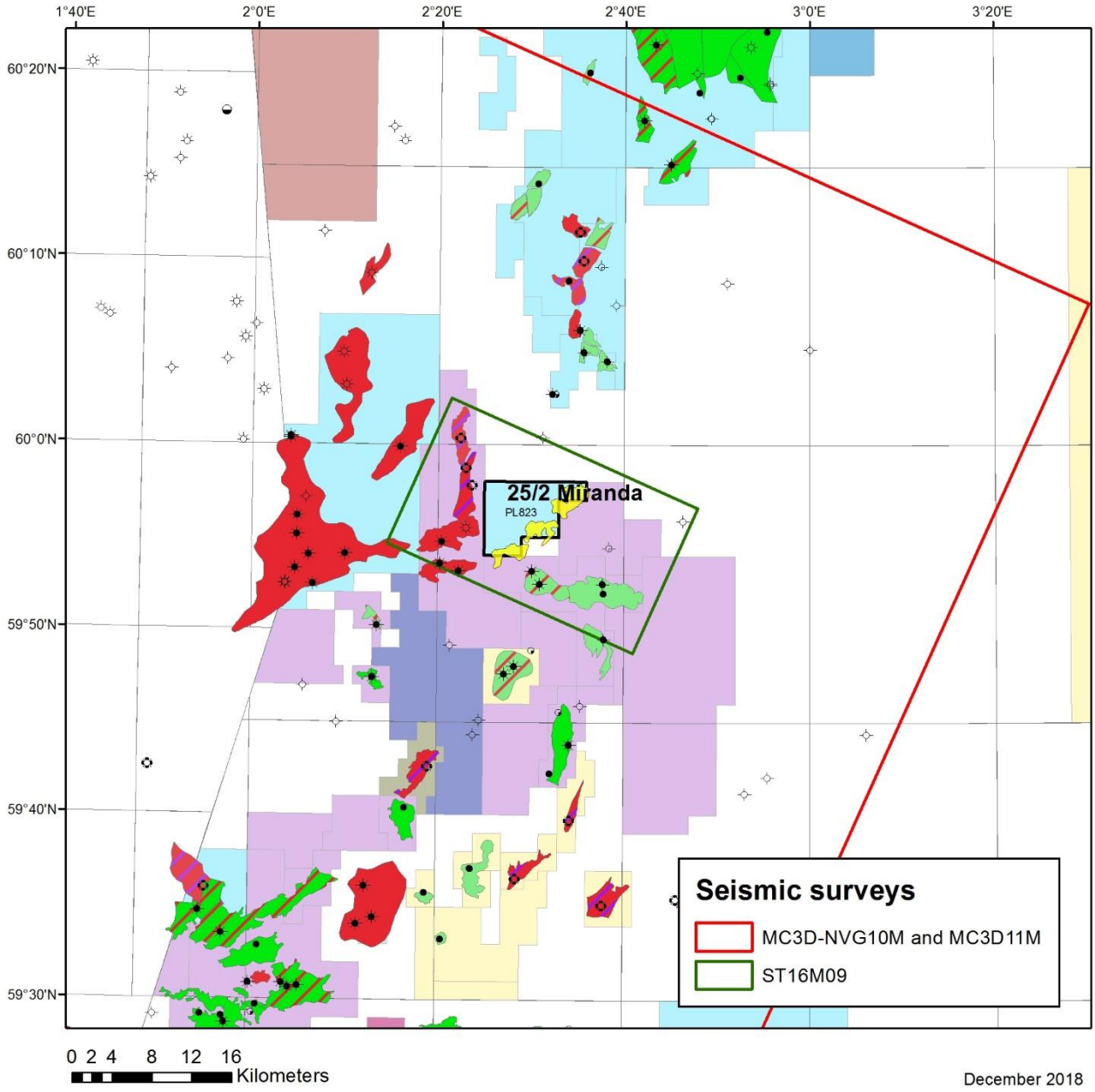

Figure 1. License overview map with discoveries, wells, prospect outline (yellow polygon), seismic surveys and PL823 license area (black outline).

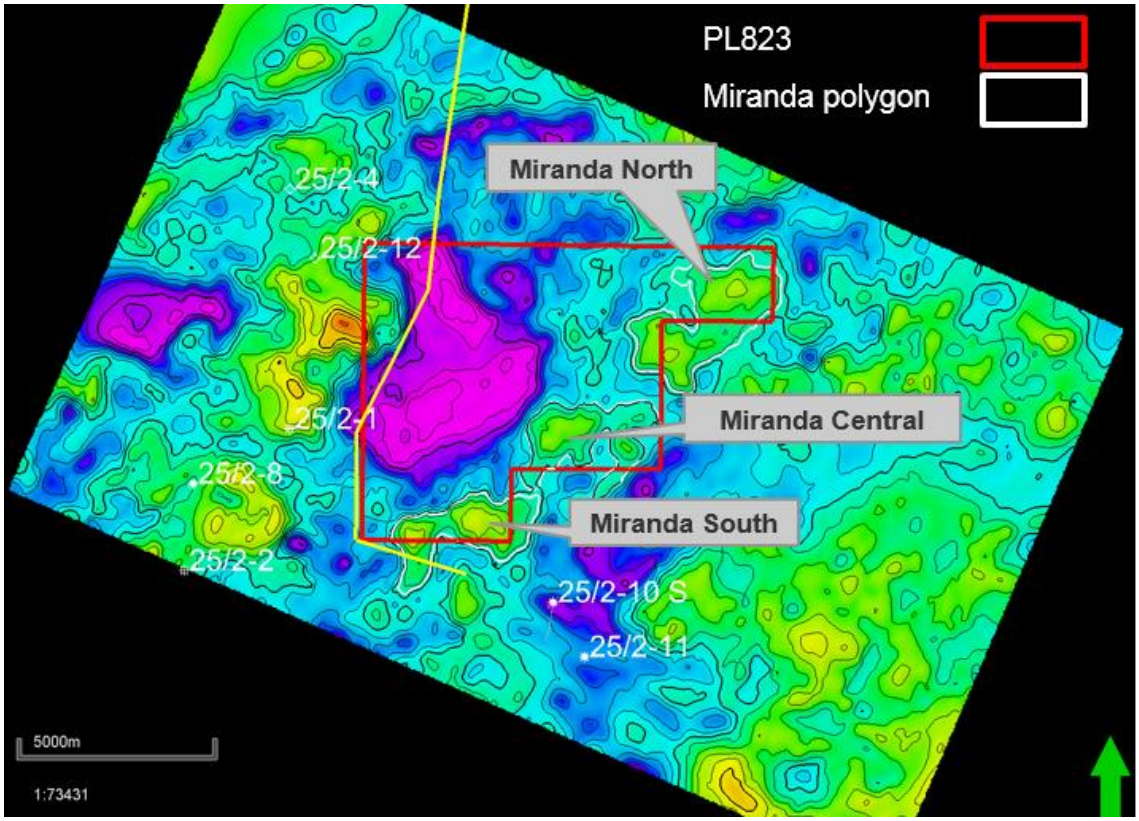

Figure 2 Top Sele structural map with Miranda prospect polygon (White),license boundary (Red) and key wells.

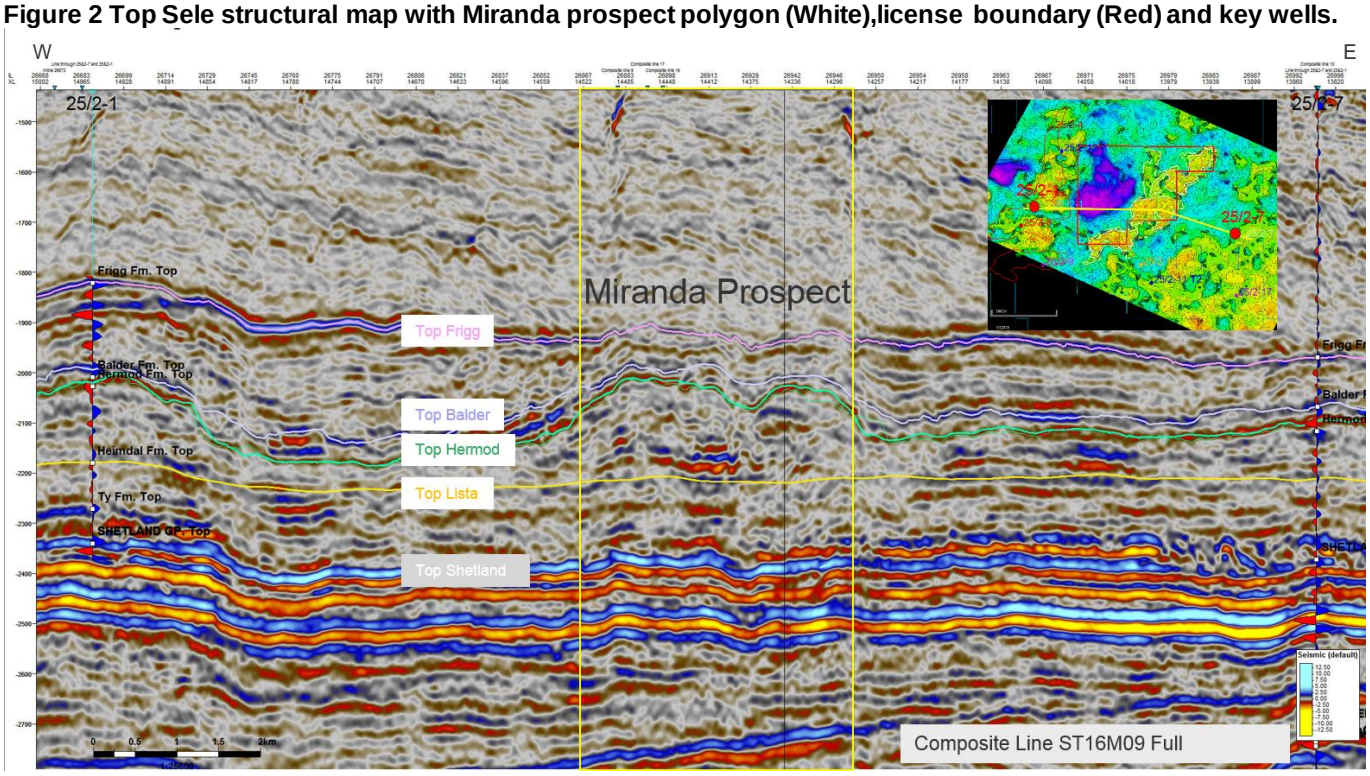

Figure 3 Composite line through Miranda Central prospect with key seismic horizons.