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Licence Relinquishment Report PL 574

Reference is made to the letter sent to MPE dated 02.02.2016, regarding the expiry of the production licence 574.

This report outlines the key license history, database, prospects and technical evaluation of production license 574 (PL574) and fulfills the requirement by the NPD for a license status report within 3 months of relinquishment.

1 Key licence history

Production license 574 is located in the Viking Graben in Blocks 30/10, 30/7, and a small part of 29/9 (Figure 1). The license was awarded to Statoil Petroleum AS (60%) and Total E&P AS (40%) on 4th February 2011 as a part of the 2010 APA round. Total E&P license shares were farmed down to Det Norske Oljeselskap ASA on 30th September 2013. The distribution of PL574 license shares since then and at the time of relinquishment is:

- Statoil Petroleum AS, Operator 60 %
- Total E&P Norge 30 %
- Det Norske Oljeselskap ASA 10 %

The PL574 partnership applied for, and was granted, 2 extensions to the DoD decision deadline over the license period. The first 2 year extension was applied for in December 2012 and granted February 2013. This request for extension was to allow additional time to complete seismic reprocessing in the area and develop a sound economic case for drilling. In part, the potential for economy was linked to the ongoing maturation and possible drilling of the Nautilus prospect, located in the nearby PL190 license and an adjacent area applied for in the 2012 APA, awarded as PL190B. The well results from the neighboring license would be important in reducing the risk uncertainty of the Nemo and Nedland prospects identified in PL574, and, in the case of success, be the basis for a common economic development of all resources.

The second extension to the DoD deadline was applied for December of 2014 and granted March 2015. The primary justification behind this extension was to allow more time to finish reprocessing of seismic data to derisk the drilling of the Nautilus structure located in the adjacent PL190 and PL190B licenses. In addition, the license had also initiated studies for the reevaluation of the petrophysical interpretation of nearby key wells and a sedimentological study to increase understanding of reservoir quality in the area necessary to risk reservoir presence and producibility as accurately as possible.

The work program for Phase 1 has been fulfilled. The basic seismic obligations of the work program were met through the PSTM reprocessing of a multi-dataset merge – ST13M05. This work was completed in August of 2013. Additional reprocessing of ST13M05 using a PSDM migration approach was agreed upon in the license and

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undertaken and completed in October 2014. This was followed by additional in-house testing of PSDM algorithms that was concluded March 2015.

The original APA application in 2010 that led to the PL574 license focused on the Nemo prospect with a possible upside from the Nedland lead. During the work program of Phase 1 the Nemo prospect was re-evaluated on the newly reprocessed 3D seismic and the Nedland lead was matured into a prospect. The seismic data support a reasonably low risk related to trap geometry for the Nemo and Nedland prospects. The results of the geological and geophysical studies, however, indicate a high risk for reservoir presence and producibility. An additional project was undertaken to rescreen the Cretaceous and Tertiary stratigraphic intervals, however no leads were identified.

In light of the high risk associated with Nemo and Nedland prospects, and no new leads identified, the partnership took the decision to drop the license on 4th February 2016. Furthermore, the partnership unanimously decided to relinquish all license acreage.

Work program – Phase 1

Work obligations and Decisions	Initial expiry date	Updated expiry date
Procure 3D seismic data	04.02.2013	04.02.2016
Study of geology and geophysics	04.02.2013	04.02.2016
Decision to drill or relinquish	04.02.2013	04.02.2016

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

- EC meeting - 21.01.2016
- EC/MC meeting - 23.11.2015
- EC/MC meeting - 05.06.2015
- EC meeting - 13.02.2015
- EC/MC meeting - 27.11.2014
- EC/MC meeting - 28.05.2014
- EC meeting - 06.03.2014
- EC meeting - 12.12.2013
- EC/MC meeting - 26.11.2013
- EC meeting - 30.08.2013
- MC meeting - 27.06.2013
- EC/MC meeting - 05.12.2012
- MC meeting - 10.05.2012
- MC meeting - 21.06.2011

2 Database

The PL574 common seismic database consists of several 3D datasets (shown in Figure 1): MC3D-NVG05, and ST13M05 (PSTM and PSDM). ST13M05 is a merge of 3 datasets: NVG05, NH9304, and NH9802. PSTM reprocessing of these data occurred in 2012/2013 and was followed by PSDM reprocessing in 2013/2014.

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Following this, additional testing of PSDM algorithms resulted in two additional datasets, ST13M05Z15_BEAM and ST13M05Z15_KMIG, Beam and Kirchhoff migrations respectively. This work was performed as part of the license work obligations. The reprocessed volumes were the basis for the technical reevaluation of the Nemo and Nedland prospects. The seismic database also includes 2D lines: NVGT-88, SG8714, SG8965, SH8202, SH8401, SH9203, and ST9008.

Key wells within the license are 30/7-3, 30/7-7, 30/10-6, and 30/10-7 (Figure 1).

3 Review of geological framework

Since the license application in 2010, no new wells have been drilled in the license. The regional geological understanding since the APA 2010 application has not changed. The studies performed in Phase 1 of the work program concentrated on maturation of the Nemo prospect and maturation of the Nedland lead to prospect. The results of the studies improved understanding of the prospects and provided support for volumetric input parameters and risk assessment.

In detail, the studies completed for PL574 were the following:

- PSTM reprocessing of 3D seismic – ST13M05
- K-PSDM reprocessing of 3D seismic – ST13M05Z15
- In-house reprocessing and comparison of Beam and Kirchhoff PSDM migrations:
 - ST13M05Z15_BEAM
 - ST13M05Z15_KMIG
- Depth conversion study based on ST13M05 PSTM reprocessed 3D seismic dataset
- Remapping of Nemo and Nedland prospects on reprocessed PSTM and PSDM data
- Updated volume calculations based on new mapping and revised fluid and reservoir parameters
- Reevaluated biostratigraphy for well 30/7-7 with new results
- Petrophysical re-evaluation of wells 30/10-6 and 30/7-7
- Gas chimney study
- 30/10-6 DST re-evaluation
- Screening of Paleogene and Neogene prospectivity

For the Nemo and Nedland prospects the following studies were performed:

- Refined prospect mapping on ST13M05
- Volume calculations and risk estimation

4 Prospect update

Nemo prospect:

The Nemo prospect is situated in the Viking Graben in an Upper Jurassic sandstone reservoir that was post-depositionally faulted and tilted (Figures 2 & 3). The reservoir interval is the Brent Group, specifically the Tarbert Formation. The rotated fault block is expected to form a four-way closure. The seal is provided by Draupne Formation shales.

The Middle Jurassic play has been proven in the local area by the two wells drilled into the Brent Group, wells 30/10-6 and 30/7-7 (Figure 1). Well 30/10-6 found a 466 m Tarbert Formation package, hydrocarbons were identified and proven by drill stem testing (DST). The well was evaluated as a non-commercial and the discovery was given the name Arronax. A fluid sample was taken from a DST in the well. This indicated a GDT of 4720 m defined by the deepest extent of the DST. Fluid samples of dry gas were found proving the structure can hold hydrocarbons.

Well 30/7-7 found a 75 m reservoir package originally interpreted to be Cook Formation. Updated biostratigraphy has proven the reservoir interval to be part of the Brent Group. The reservoir is interpreted as Tarbert Formation. Petrophysical interpretation of 30/7-7 identified a hydrocarbon bearing zone between 4723 m and 4886 m, and gas bubbles were extracted during production testing. Both wells found tight formations within the Tarbert Formation with DST's demonstrating <0.1 mD permeability in all tests.

Reprocessing of 3D seismic dataset ST13M05, reinterpretation and updated depth conversion of the Nemo prospect led to a revision of the in-place volume estimates during the license period. The update in resources estimates for Nemo is summarized in Table 1. The mean estimate of in-place resources decreased approximately 20% from 25.2 MSm³ o.e. to 19.8 2 MSm³ o.e. This has a minor impact on the total economic evaluation of the prospect.

The expected pressure and temperature is estimated at 968 bar and 160°C. Wells 30/10-6 and 30/7-7 were both cemented tight due to diagenetic illite which forms at temperatures higher than 130°C. Illitization of kaolin typically affects reservoirs of the HP/HT category leading to an overall porosity and permeability reduction; microporosity is often left as the dominating type. Following this, further work undertaken during the license period focused on the petrophysical re-evaluation of wells 30/10-6 and 30/10-7 with the objective of better quantifying the reservoir risk. Unfortunately, with the available information, this resulted in a further downgrade of probable reservoir quality for Nemo and Nedland. There was the possibility during the license period that the drilling of a nearby prospect, Nautilus, located in adjacent licenses PL190 and PL190B, might provide information that might derisk the Nemo prospect. Unfortunately, this information was not acquired at the time of the PL574 Drill or Drop deadline.

Key risks for the Nemo prospect were, and remain, the combination of reservoir presence (0,3) and producibility (0,6). A re-evaluation of nearby wells resulted in an increase in these risks and no new information became available during the license period that might provide counter indications. The chance of success for the Nemo prospect has been downgraded since the APA 2010 application and is currently estimated at 0,12 (Table 2).

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The Nedland prospect was matured from lead during the PL574 license period and lies to the east of the Nemo prospect across two major faults (Figures 1 & 2). It is analogous to the Nemo prospect in terms of play concept, including: targeted reservoir and depth, trap type and seal, and anticipated reservoir properties. It has potential resource volumes of a similar magnitude as Nemo with mean in-place resources of 14.2 MSm³ o.e. (Table 1). It has a slightly higher risk than Nemo with respect to reservoir presence at 0,15 probability compared to Nemo's 0,30 probability (Table 2). This results in a total Pg risk for the Nedland prospect of 0,06 making it less attractive than Nemo. Nedland is a high risk prospect but provides a significant upside if Nemo and Nautilus can be proven.

Technical evaluations

No new technical economical evaluations have been performed during the license period. The baseline success case has been that a Nemo/Nedland development would consist of a subsea satellite tied back to the Oseberg Delta platform for processing and export. The Oseberg Delta platform is part of the Oseberg field center and is located approximately 30 km northwest of the prospects.

5 Conclusions

The work program for Phase 1 for PL574 has been fulfilled: a multi-survey seismic merge was created and reprocessed and relevant geological and geophysical studies have been performed. The results of the geological and geophysical studies and the technical evaluation led to a non-economic volume potential for the Nemo and Nedland prospects in the license area. The license partnership took the decision to drop on 4th February 2016. In addition, the decision was taken to relinquish all PL574 effective from 5th February 2016.

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6 FIGURES

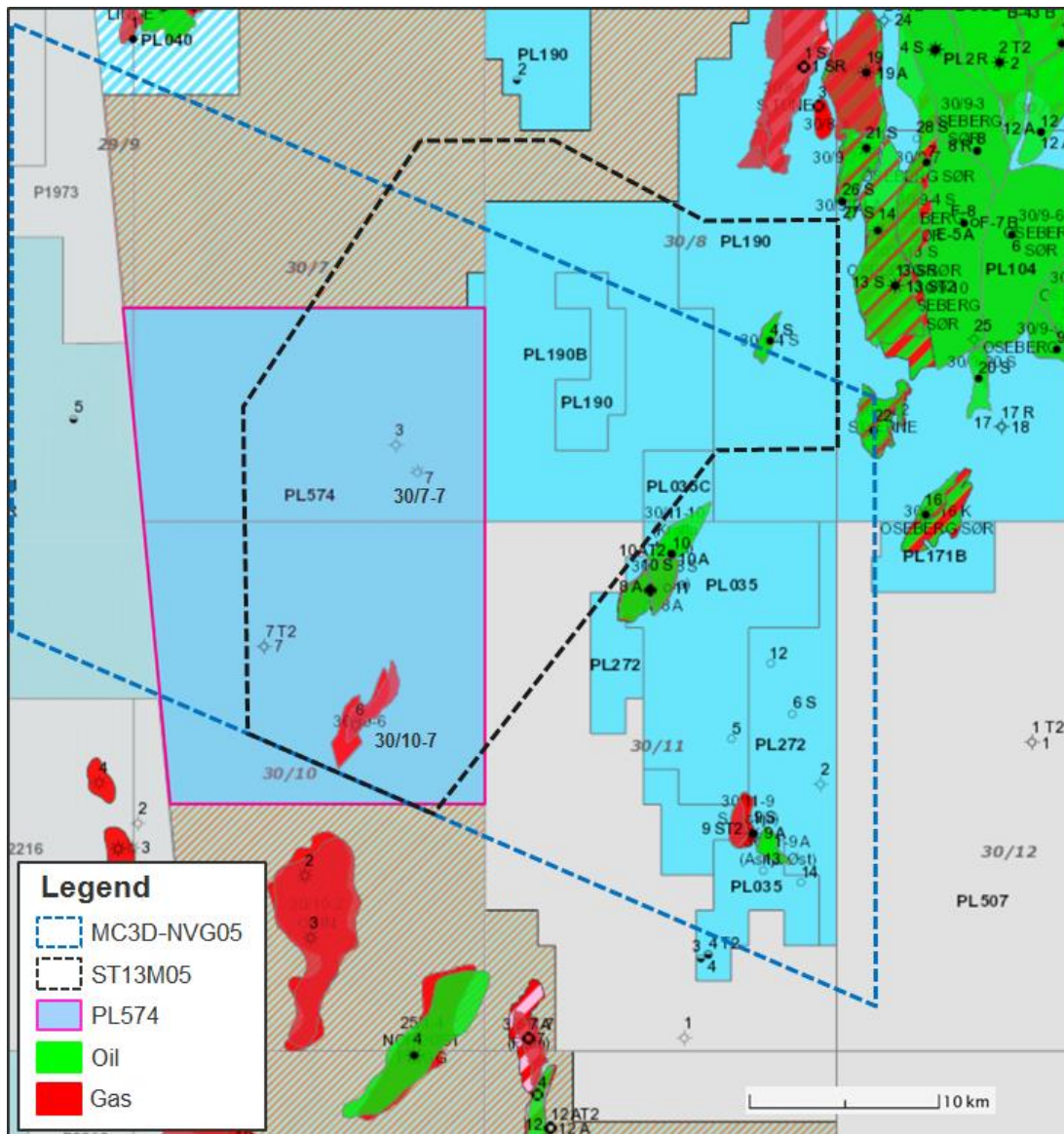


Figure 1 License overview map with discoveries, key wells, prospects (yellow outlines), seismic surveys and PL574 area (magenta outline). Statoil operated licenses in blue.

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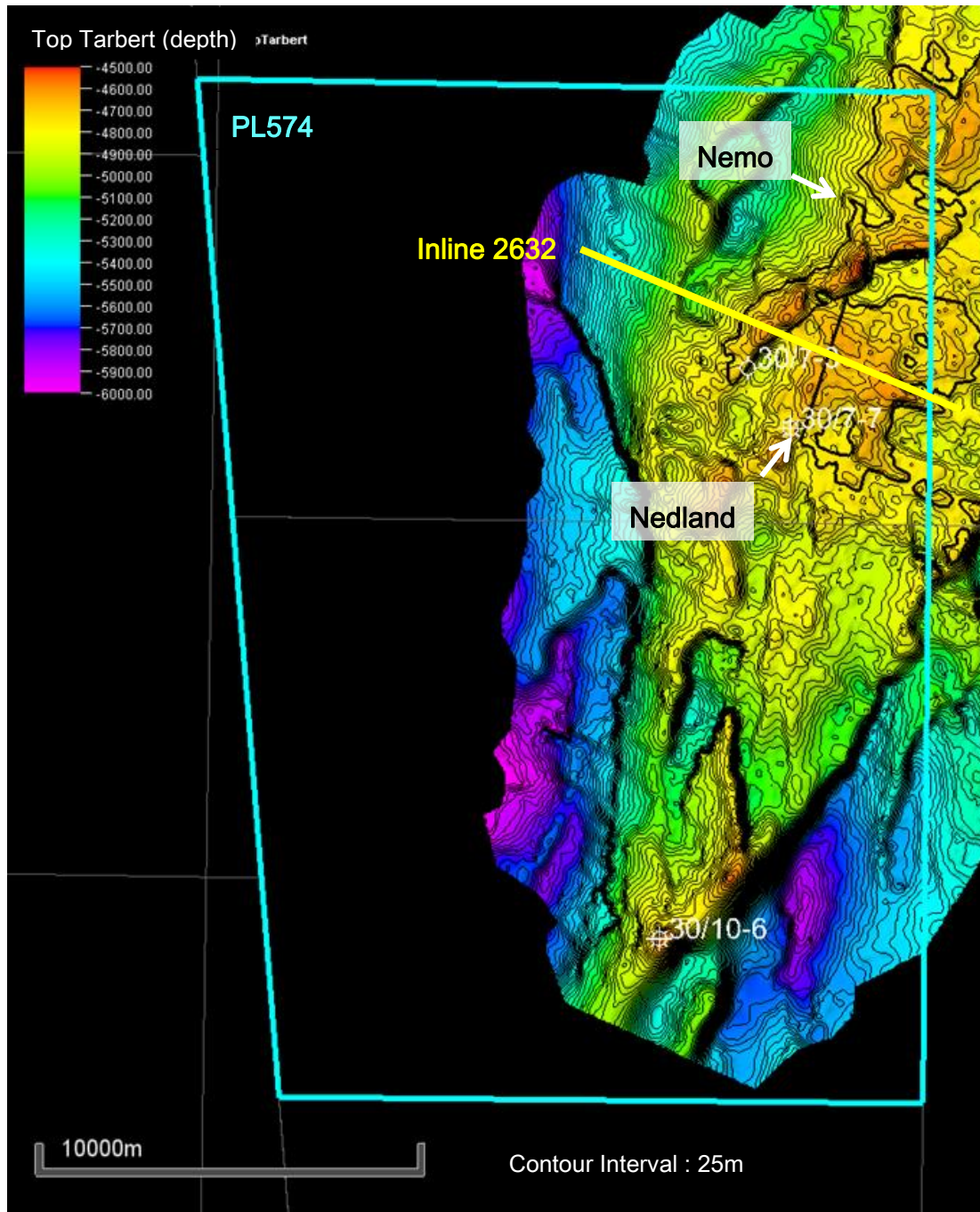


Figure 2 Depth structure map of Top Tarbert reservoir for Nemo and Nedland prospects based on reprocessed PSTM seismic survey ST13M05.

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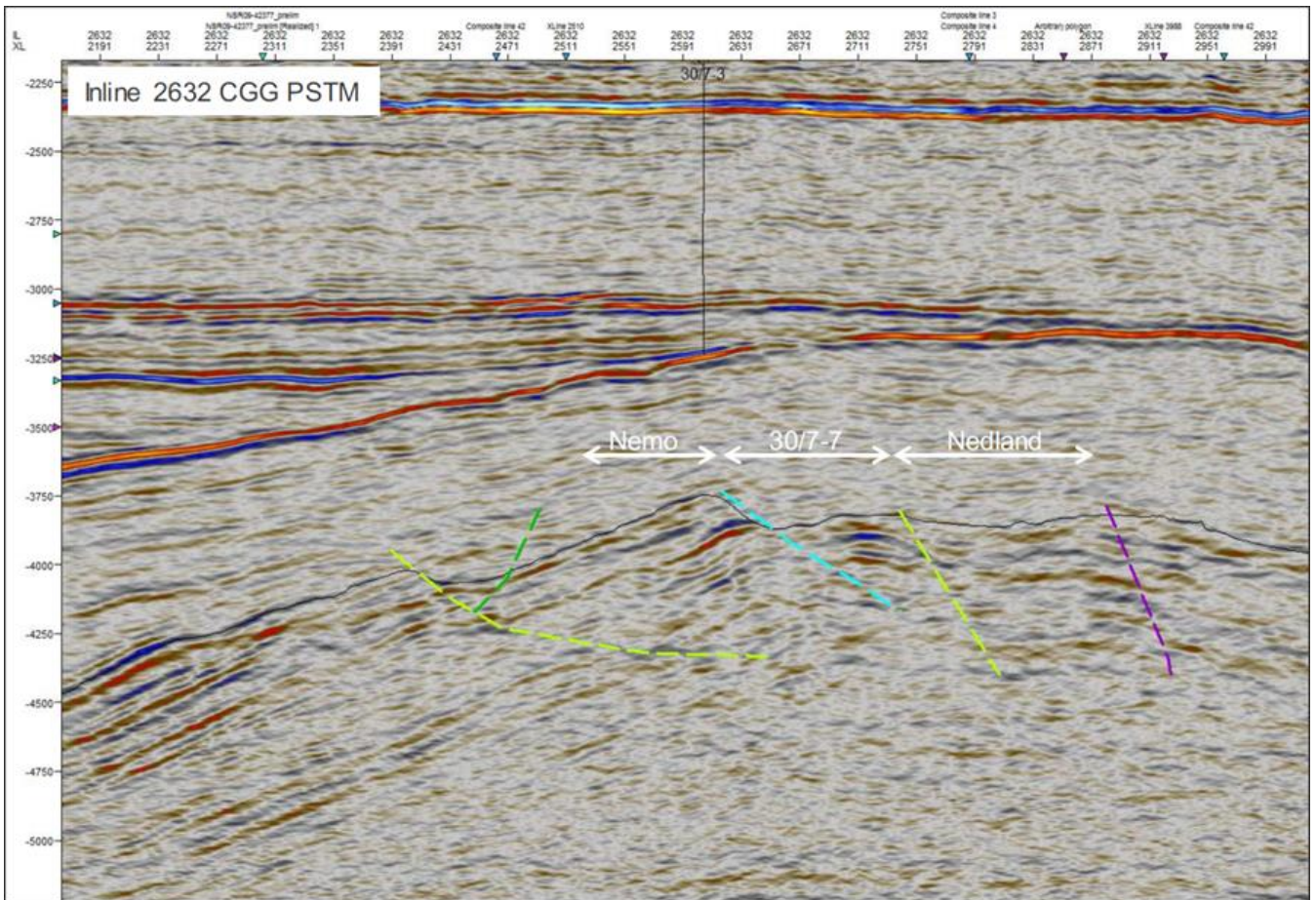


Figure 3 Nemo and Nedland prospects as seen in seismic Inline 2632 shown in Figure 2.

Prospect	Version	Unrisked in-place resources						
		Condensate 10 ⁶ Sm ³			Gas 10 ⁹ Sm ³			Total o.e. 10 ⁶ Sm ³
		P90	Mean	P10	P90	Mean	P10	Mean
Nemo	APA 2010	1,12	4,27	8,66	5,7	20,9	42,2	25.2
Nemo	2015 Update	0,03	1,88	5,46	1,9	17,9	44,0	19,8
Nedland	2015 Update	0,01	1,26	3,84	0,6	12,9	35,6	14.2

Table 1 Resources for Nemo and Nedland prospects for the expected gas case. The information updated during the license period is shown in **bold**.

Risk elements	APA 2010	2016 update
Trap geometry	0,72	0,8
Trap seal		0,8
Reservoir presence	0,27	0,3
Producability		0,6
Source Presence	1,0	1,0
Source Migration	1,0	1,0
Pg %	0,19	0,12

Table 2. Overview of Nemo risking for APA 2010 and 2015 evaluation. Updated risk numbers are marked in **bold**.

Risk elements	APA 2010	2016 update
Trap geometry	N/A	0,8
Trap seal	N/A	0,8
Reservoir presence	N/A	0,15
Producability	N/A	0,6
Source Presence	N/A	1,0
Source Migration	N/A	1,0
Pg %	N/A	0,06

Table 3 Overview of Nedland risking for 2015 evaluation. Updated risk numbers are marked in **bold**.