Relinquishment Report PL976

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1 License history

PL976 was awarded 1st March 2019 as part af APA2018. Licence was awarded to Lundin (50% & Operator), Repsol (30%) and Petoro (20%). ONE-Dyas entered the licence August 2021, taking 10% of Lundin's share, then Pandion took One-Dyas share July 2022. AkerBP took Repsol's share November 2023.

Licence was awarded with a 7-year initial term subdivided into following elements:

- 2 years to Drill or Drop - by 1st March 2021
- 2 further years to drill and conclude BoK 1st March 2023
- 2 further years to prepare concept studies by 1st March 2025
- 1 further year to prepare PDO by 1st March 2026

PL976 Licence sought a 1-year extension of BoK in early 2023 (to 1st March 2024) in order to mature the Little Wally prospect to drill/drop status

Key activities through the licence period included the following:

- Licence unanimously supported a positive drill decision December 2019, to drill the Dovregubben prospect. Mid Jurassic Vestland Gp primary target, with secondary objectives to investigate reservoir potential of Permian and Palaeozoic sections.
  - The well was drilled 16 Sept - 23 Oct 2021. The well was dry, having encountered Vestland Gp reservoir. No effective reservoir encountered in Permian or Palaeozoic sections
- Licence reprocessed LO1101 3D seismic dataset to PSTM with WesternGeco from July 2019 to April 2020 (creating the LO1101LNR19 dataset). Target-section focussed on improving imaging of pre Cretaceous to basement, with main objectives to improve multiple suppression and denoise, and widen bandwidth
- Licence unanimously supported dropping the licence at BoK deadline early in 2024, on the basis of technical work which revealed that the Little Wally prospect was too high risk to warrant drilling

Meetings in the licence have been held as follows:

Table 1.1 PL976 Licence Meeting Schedule

Meeting Committee(s)	Date
ECMC#1	3rd April 2019
ECMC#2	25th October 2019
Expl work meeting	4th February 2020
ECMC#3	22nd October 2020
ECMC#4	25th June 2021
ECMC#5	24th November 2021
ECMC#6	25th November 2022
Expl work meeting	5th December 2023
ECMC#7	7th December 2023

2 Database

2.1 Seismic data

The principal 3D seismic survey used in the evaluation of the PL976 Licence is the LO1101 3D survey. Its extent is illustrated in Fig. 2.1

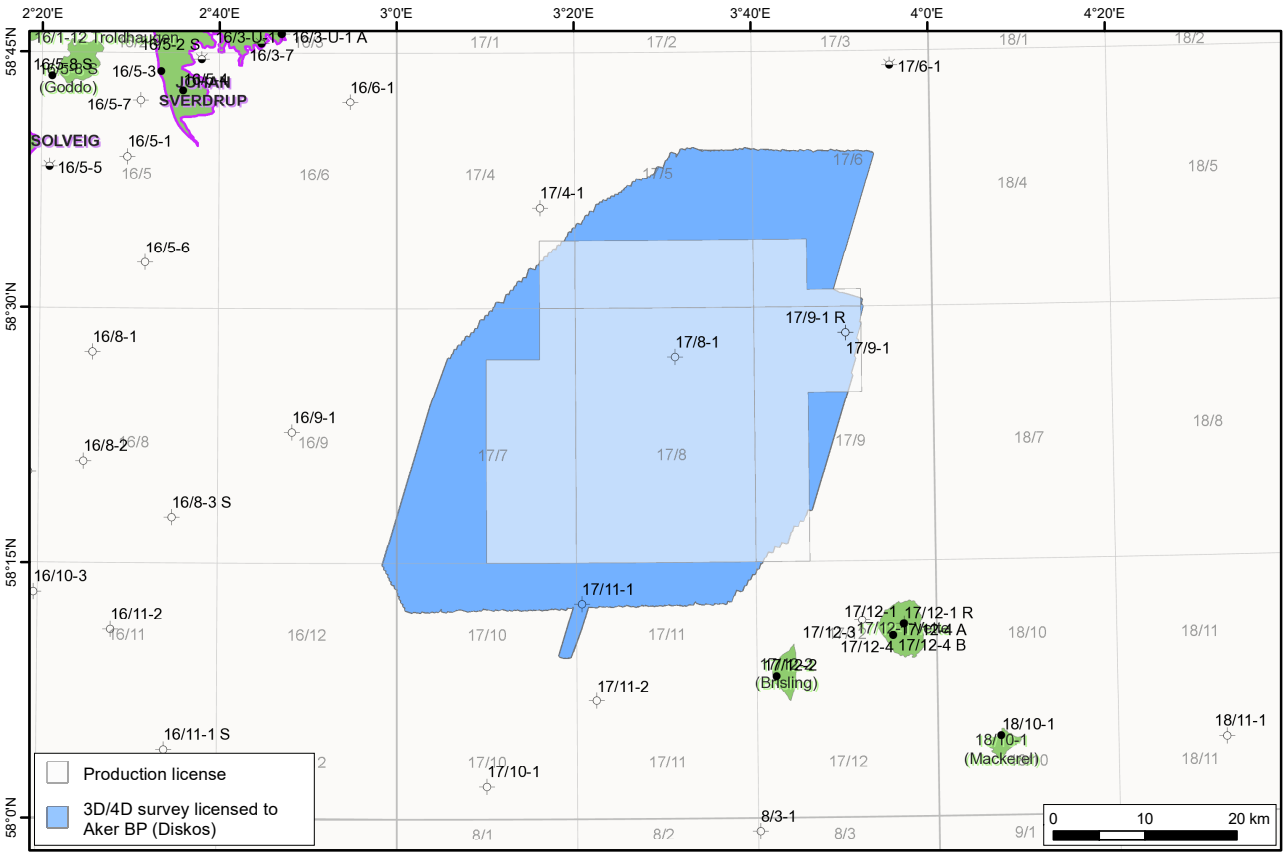

Fig. 2.1 PL976 Seismic and Well Database *Showing extent of LO1101 seismic survey and wells nin the vicinity of PL976*

LO1101 was acquired in 2011 for PL503 (Lotos Op); Acquisition by Dolphin Geophysical and originally processed by Geokinetics in UK. The original data image was rather good and provided a huge uplift over pre-existing 2D seismic imaging across the Sele High. The original dataset was enhanced by post-stack re-imaging in-house in Lundin and these data were shared with PL976 Partners.

PL976 reprocessed the LO1101 in 2019/20 with WesternGeco in Stavanger (to PSTM), with ambitions to tighten the spatial sampling, improve denoise, widen the bandwidth and improve multiple attenuation. This reprocessing created the LO1101LNR19 seismic dataset

Adjacent 3D surveys TA0703, ST0611 and MC3D-EGB2005 plus 2D surveys were also for regional context and tie the numerous wells that sit outside the LO1101 footprint. These adjacent 3D surveys were not part of the common DB in the PL976 licence.

Table 2.1 PL976 Seismic Database

Seismic Suvery Name	Underlying Survey	NPDID	Survey Type

LO1101LNR19	LO1101	7394	3D

2.2 Well Data

There is good well control to constrain evaluation of the PL976 licence around the Sele High area as illustrated on Fig. 2.1. Despite many wells being from the early pioneering days of North-Sea exploration, they still provide valuable data points for stratigraphy, seismic ties and well planning.

Table 2.2 Key Wells for PL976

Wellname	NPDID	Year
16/9-1	151	1968
17/4-1	154	1968
17/9-1,R	337, 515	1973,74
17/11-1	906	1968
17/12-2	340	1973
17/12-4, 4A, 4B	6137, 6178, 6211	2009
17/8-1	9384	2021

3 Geological and geophysical studies

Improvement of the seismic image and analysis of the seismic data across the region formed the main focus of study through the licence period.

WesternGeco reprocessed the LO1101 seismic dataset in 2019, as discussed in 2.1 Seismic data

Focus of the seismic interpretation contained the following elements:

- Mapping and imaging the key unconformities and sequences to understand the palaeogeography and depositional environment of the Middle Jurassic Sandnes Fm, which was the primary target of the Dovregubben prospect and 17/8-1 well
- Licence also studied the Permian and the subcropping Palaeozoic sequences ahead of the 17/8-1 well, in order to establish secondary objectives for that well - which were to investigate facies and reservoir potential of the Permian section and also to establish age and facies of the subcropping Palaeozoic
- Following the 17/8-1 well result, the focus of investigation in the licence turned to the Pre Permian Palaeozoic section, where the Little Wally prospect was identified. It was analysis of this prospect that led to licence extension (2023) but ultimately concluded that the licence be dropped without drilling this feature. The assessment of the Little Wally prospect is described in 4 Prospect update

4 Prospect update

The main focus for seeking the licence at application was the Dovregubben prospect, which envisaged middle Jurassic Sandnes Fm reservoir charged by Tau Fm source rocks in Ling Graben to the north. The prospect was drilled in 2021 by the PL976 licence by well 17/8-1. This encountered mid Jurassic reservoir as prognosed, but contained no hydrocarbon. Lack of effective charge is deemed to be most likely reason for failure.

Secondary prospectivity in the licence at time of application identified prospectivity in Zechstein, possibly Rotliegend and Carboniferous sequences, which formed traps at the same location where 17/8-1 drilled. The 17/8-1 well result encountered no reservoir properties in Zechstein, no Rotliegend section and no effective reservoir in the pre Permian section (the age of which was not conclusively established). As such, all of these plays were downgraded from further attention in the licence.

The Little Wally prospect was identified during the licence period. It is a well-imaged stratigraphic trap formed as a series of mixed impedance seismic events subcrop to an intra Palaeozoic unconformity. Well imaged faults sub-divide the prospect into several structural segments. The success-case play model envisages the target section to be mid Carboniferous play, incorporating interbedded reservoir sandstones and coals - equivalent to the Firth Coals units on the UKCS. Seismic and geosection sketch of the success scenario are shown in Fig. 4.1

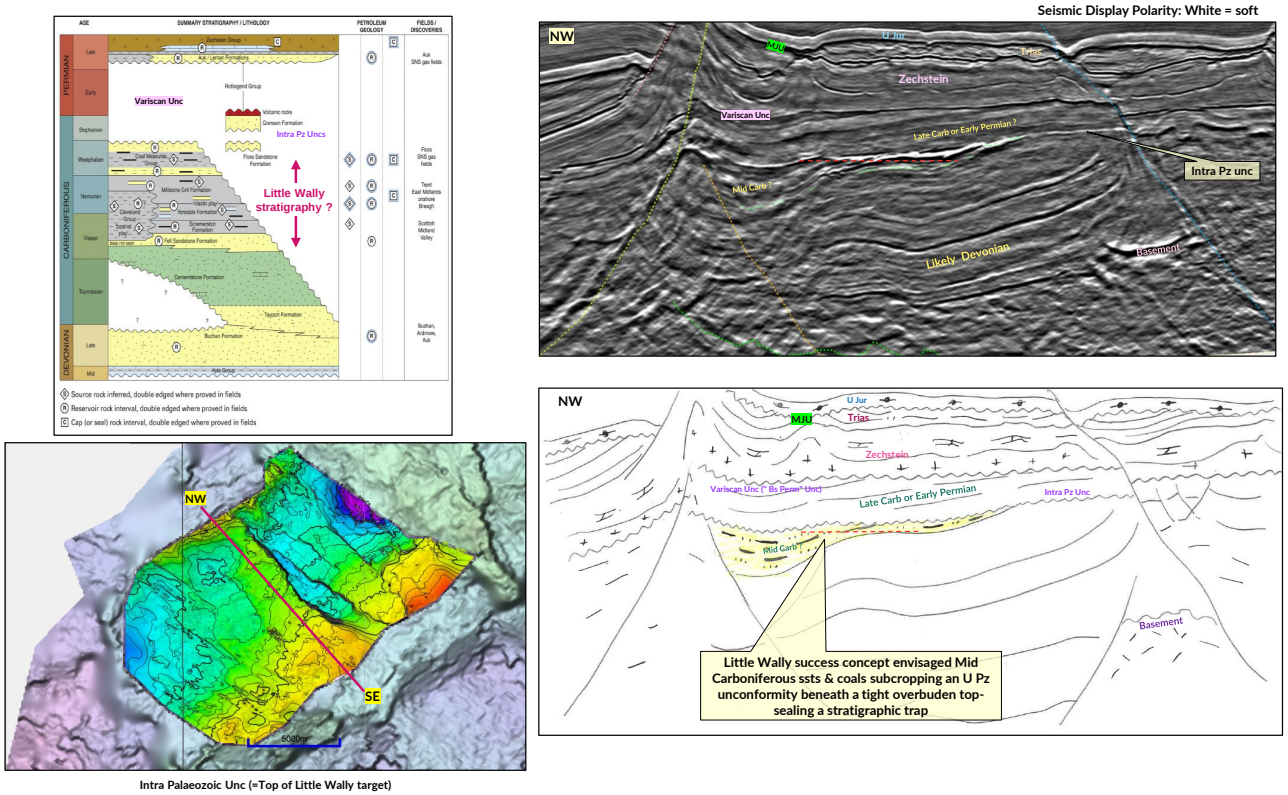

Fig. 4.1 Success-scenario concept for Little Wally

Fig. 4.2 illustrates the form of the structure at the top of the Little Wally trap, along with the amplitude distribution of the soft impedance response (white) at that same unconformity surface.

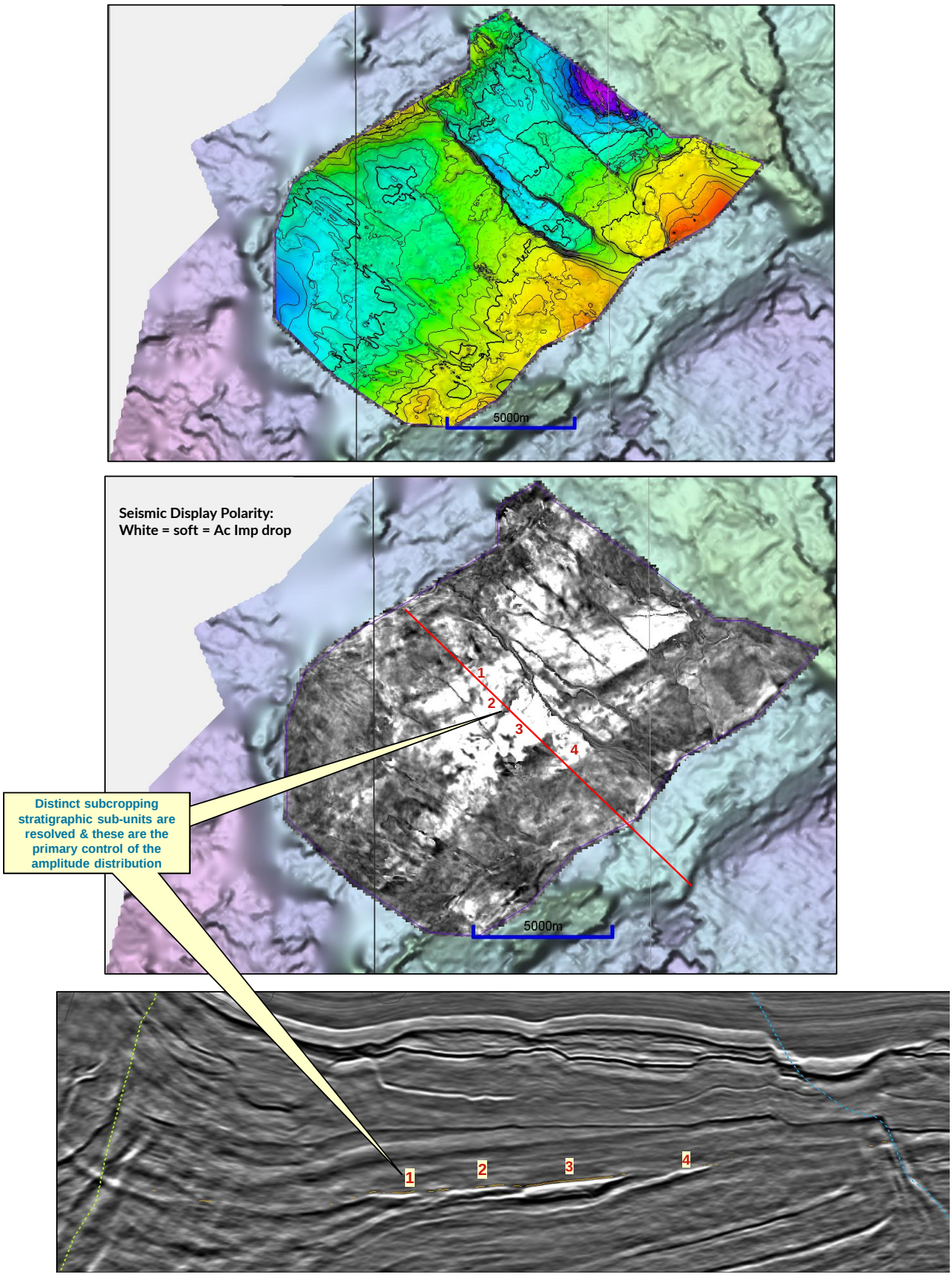

Fig. 4.2 Little Wally- Structure map and Amplitude distribution

Analysis of the seismic geometries within the prospect, in context with other observations across the Sele High, led the licence group to conclude that the target section in the prospect is probably dominated by volcanics; As such, the chance of effective reservoir and source-rocks in the target-section / play in the vicinity of the prospect is assessed to be very low. Consequently, the licence agreed unanimously to drop the licence rather than drill Little Wally.

Table below documents the assessment and parameterisation of the Little Wally prospect resources volumes and Chance of Success to find gas in a Mid Carboniferous reservoir target section scenario.

Table 4.1 Prospect Parameterisation - Little Wally

Table 4: Discovery and Prospect data (Enclose map)									
Block 17/7		Prospect name	Little Wally	Discovery/Prosp/Lead	Prospect	Prosp ID (or Newl)	NPD will insert value	NPD approved (Y/N)	
Play name	NPD will insert value	New Play (Y/N)		Outside play (Y/N)					
Oil, Gas or O&G case:	Gas	Reported by company	Aker BP	Reference document	PL976 Relinquishment report			Assessment year	2023
This is case no.:	1 of 1	Structural element	Sele High	Type of trap	Stratigraphic	Water depth [m MSL] (>0)	110	Seismic database (2D/3D)	3D
Resources IN PLACE and RECOVERABLE		**Main phase**				**Associated phase**			
Volumes, this case		Low (P90)	Base, Mode	Base, Mean	High (P10)	Low (P90)	Base, Mode	Base, Mean	High (P10)
In place resources	Oil [10^6 Sm^3] (>0.00)					0.04	0.18	0.25	0.56
	Gas [10^9 Sm^3] (>0.00)	4.40	18.60	23.70	49.00				
Recoverable resources	Oil [10^6 Sm^3] (>0.00)					0.02	0.10	0.13	0.31
	Gas [10^9 Sm^3] (>0.00)	2.80	11.80	15.40	32.20				
Reservoir Chrono (from)	Mid Carboniferous	Reservoir litho (from)	Sandstone	Source Rock, chrono primary	Mid Carboniferous	Source Rock, litho primary		Seal, Chrono	Early Permian
Reservoir Chrono (to)		Reservoir litho (to)	Fell Sst Equiv	Source Rock, chrono secondary	Forth Coals Equiv	Source Rock, litho secondary		Seal, Litho	Karl Fm
Probability [fraction]									
Total (oil + gas + oil & gas case) (0.00-1.00)		Oil case (0.00-1.00)		Gas case (0.00-1.00)	0.08	Oil & Gas case (0.00-1.00)			
Reservoir (P1) (0.00-1.00)	0.29	Trap (P2) (0.00-1.00)	0.80	Charge (P3) (0.00-1.00)	0.28	Retention (P4) (0.00-1.00)	1.00		
Parametres:	Low (P90)	Base	High (P10)	*GRV Note: These are summed deterministic GRV from Segment 1 + Segment 2 for low-mid-high contact scenarios (ie they are not P90-P10 inputs). Condensate Yield : 3.7-5.3-10.1 SM3/MSm3. Total of 8% Probability reflects amalgamation of 2 segments; each with a COS of 6.5%, and each with a slight (7%) independant chance of working if the first fails: 29% reservoir chance = 60% play chance x 48% prospect chance. 28% Charge Chance combines 50% Play chance x 56% prospect chance*					
Depth to top of prospect [m MSL] (> 0)		3700							
Area of closure [km^2] (> 0.0)	2.5	8.0	25.0						
Reservoir thickness [m] (> 0)	100	200	300						
HC column in prospect [m] (> 0)	100	350	500						
Gross rock vol. [10^9 m^3] (> 0.000)	70.000	1848.000	6750.000						
Net / Gross [fraction] (0.00-1.00)	0.30	0.40	0.60						
Porosity [fraction] (0.00-1.00)	0.09	0.14	0.19						
Permeability [mD] (> 0.0)	0.1	10.0	100.0						
Water Saturation [fraction] (0.00-1.00)	0.60	0.50	0.35						
Bg [Rm3/Sm3] (< 1.0000)	0.0033	0.0029	0.0027						
1/Bo [Sm3/Rm3] (< 1.00)									
GOR, free gas [Sm^3/Sm^3] (> 0)									
GOR, oil [Sm^3/Sm^3] (> 0)									
Recov. factor, oil main phase [fraction] (0.00-1.00)									
Recov. factor, gas ass. phase [fraction] (0.00-1.00)									
Recov. factor, gas main phase [fraction] (0.00-1.00)	0.57	0.64	0.70						
Recov. factor, liquid ass. phase [fraction] (0.00-1.00)	0.47	0.54	0.60	For NPD use:					
Temperature, top res [°C] (>0)	122			Innrapp. av geolog-init:	NPD will insert value	Registrert - init:	NPD will insert value	Kart oppdatert	NPD will insert value
Pressure, top res [bar] (>0)	375			Dato:	NPD will insert value	Registrert Dato:	NPD will insert value	Kart dato	NPD will insert value
Cut off criteria for N/G calculation	1.	2.	3.					Kart nr	NPD will insert value

5 Technical evaluation

No detailed Technical-Econominc evaluation was performed on the Little Wally prospect, as it and PL976 were dropped due to high subsurface risk (low chance of success) before technical and economic studies were needed

6 Conclusion

As discussed in 4 Prospect update, the results of the 17/8-1 exploration well (dry) coupled with subsurface studies on the Palaeozoic plays fails to identify sufficiently attractive prospectivity in the PL976 licence to justify drilling another well on the licence.

Consequently, PL976 Licence Partners unanimously agree to relinquish the licence in early 2024.

7 References