REPORT

Neptune Energy Norge AS

PL1053 Status Report - Licence Surrender

12.03. 2021

Project name / Contract number	Function	Classification	Document Ref.	Version
Click here to enter text.	Exploration	Internal	1443052	1

Document Title

PL1053 Status Report - Licence Surrender

To: postboks@npd.no.

Reference is made to notification (NEP-2021-4) via SMIL dated 25.01.2021 regarding the drop decision of Production Licence 1053. This report gives a summary of the PL 1053 licence which was surrendered after the partnership reached a unanimous decision to drop the licence at the Drill or Drop deadline 14.02.2021.

Table of Contents

Lists of Figures and Tables:

1. Key licence history

Production licence 1053 is located in the Sogn graben and Marflo Spur in the North Sea and consist of parts of the Blocks 35/4, 35/5, 35/7 and 35/8 with a total area of 295.571 km2. (Fig.1)

PL1053 was awarded to Neptune Energy Norge AS on the 14.02.2020 (TFO2019) with licence partner Wellesley Petroleum AS and the partnership has remained unchanged during the licence period.

- Neptune Energy Norge AS 60% (Operator)
- Wellesley Petroleum AS 40%

The original licence commitments were to perform G&G studies & evaluations and to reach a drill or drop decision within 1 year of award by 14.02.2021. If a drill decision was made, the following deadlines were valid: BOK by 14.02.2023, BOV by 14.02.2025 and the PDO/initial licence expiry date was 14.02.2026.

No extensions to the licence deadlines have been applied for. The short timeframe for the initial deadline was due to the expectation that the evaluations done on the Ursa Major prospect for the APA application had reached a near drill ready stage.

After re-evaluations, the partnership reached a unanimous decision to surrender the licence at the drill or drop deadline 14.02.2021 based on the conclusion that PL 1053 does not contain identified prospects with an acceptable combination of volume, risk, and commercial potential that can justify drilling an exploration well.

1.1 Licence Meetings

Two combined Exploration Committee and Management Committee meetings have been held as well as one Exploration Committee Work meeting.

Table 1 Licence Meetings

Date	Licence Meetings
26.03.20	EC/MC Meeting #1
11.06.20	Exploration Work Meeting – CRAM test reprocessing and G&G evaluations
26.11.20	EC/MC Meeting #2

2. Database

A common licence database was established consisting of 18 offset wells drilled to Jurassic or deeper and two 3D seismic surveys.

The BG0806 base survey and the highly improved reprocessing version BG0806R13 PSDM that was acquired in an east - west direction and a selected area of the newer regional CGG17M01 PSTM broadband survey that was acquired in a north - south direction.

Both BG0806R13 PSDM and CGG17M01 PSTM are of good quality but the shooting direction likely influences the imaging of the faults according to their orientation, making BG0806R13 better suited to image the dominantly north-south oriented fault network. For the final fault interpretation of the Ursa Major prospect, the Near offset stack of BG0806R13 PSDM was evaluated as having the best imaging.

The seismic and well database is illustrated in Figure1 (prospect outlines are at the time of application) and seismic surveys are listed in Table 2 and the well database in Table 3.

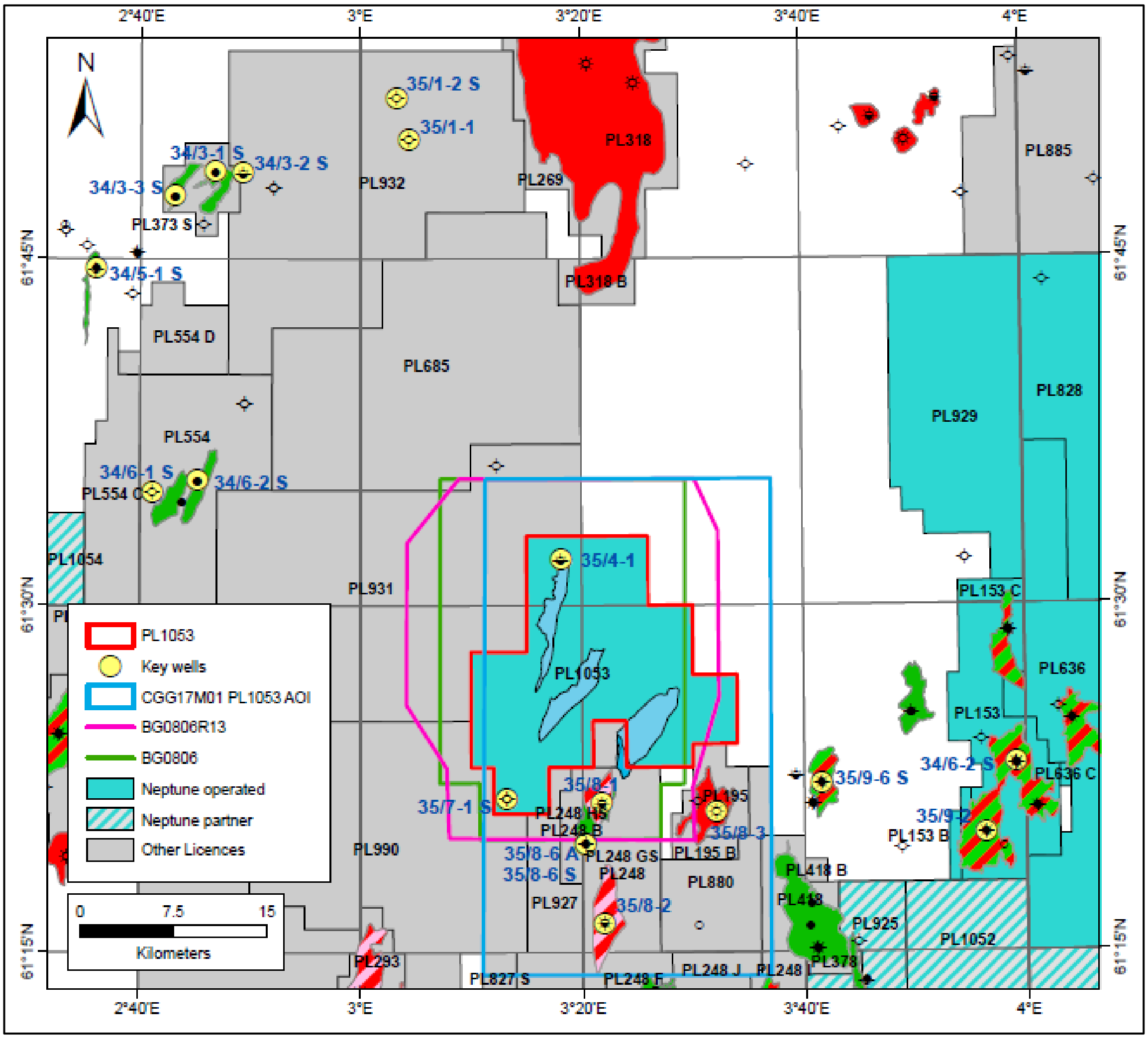

Figure 1 Map showing PL1053 location and 3D seismic and wells database

Table 2 Seismic database

Geophysical survey	NPD ID	Type of Survey	Market availability	Area km2	Comments
CGG17M01	Merge of 7984; 8128; 8179; 8194-8196; 8252; 8332	3D seismic	Multi-client	916.5 (PL1053 AOI)	CGG North Viking Graben. BroadSeis – BroadSource, Merged PSTM dataset (CGG 14,15,16 vintages)
BG0806R13	4513	3D seismic	Vintage Licence	672	PSDM reprocessed by GDF SUEZ in PL634. Significant improvement in imaging. Overall better seismic quality compared to CGG17M01.
BG0806	4513	3D seismic	Vintage Licence	536	Original data acquired in 2008.

Table 3 Well database

Well Name	NPD ID	Year	Result
34/3-1 S (Knarr)	5811	2008	Oil discovery
34/3-2 S (Jordbær Øst)	6249	2009	Shows
34/3-3 S (Jordbær Vest)	6588	2011	Oil discovery
34/5-1 S (Blåbær)	6307	2010	Oil discovery
34/6-1 S (Akkar)	4561	2002	Dry
34/6-2 S (Garantiana)	6971	2012	Oil discovery
35/1-1 (Sturlason)	4541	2002	Dry
35/1-2 S (Soleie)	6427	2010	Dry
35/4-1	2993	1997	Weak shows
35/7-1 S (Apollon)	6599	2011	Dry
35/8-1 (Vega Nord)	205	1981	Gas condensate discovery
35/8-2 (Vega Central)	434	1982	Gas condensate discovery
35/8-3 (Aurora)	1288	1988	Gas discovery
35/8-6 S (Vikafjell)	7916	2016	Dry
35/8-6 A (Robbins)	7941	2016	Oil discovery
35/9-6 S (Titan)	6429	2010	Oil / gas discovery
35/9-1 (Gjøa)	1375	1989	Oil / gas discovery
35/9-2 (Gjøa)	1600	1991	Oil / gas discovery

3. Review of Geological and Geophysical studies

The main prospect defined for the APA 2019 application was Ursa Major, a fault bounded structural trap at Middle Jurassic Brent reservoir level. The prospect is downfaulted c. 600m deeper than the Vega North field and located a few kilometres further north-east. Hydrocarbon charge was considered to be sourced from mature Draupne and Heather source rocks and the hydrocarbon phase was considered gas – condensate similar to the nearby Vega North (35/8-1) and Aurora (35/8-3) discoveries. Top seal is made up of Late Jurassic shales.

Upside potential was identified in two additional rotated structural traps Polaris and Atropos, which are located further northwest at Middle – Early Jurassic Brent/Cook reservoirs.

Since the licence award 14.02.2020, additional data have been analysed and studies have been performed. The main activity has been reinterpretation of 3D seismic data utilising both the vintage BG0806R13 PSDM and the newer CGG17M01 (HORDA NVG - broadband PSTM) surveys including several offset cubes. The fault linkage and sealing capacity of faults were addressed via a structural study.
Figure 2 shows a Top Brent structural depth map Illustrating the structural setting and the redefined Ursa Major prospect and Atropos and Polaris rotated fault blocks.

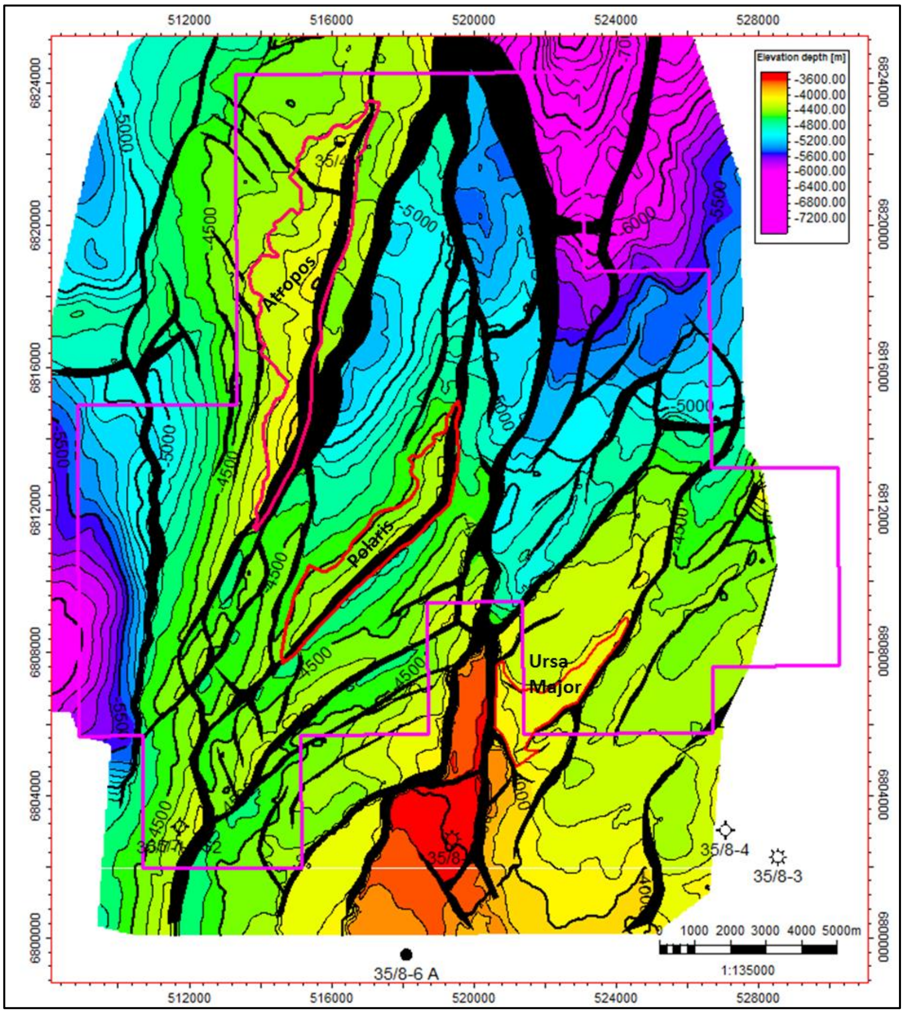

Figure 2 Top Brent depth map, C.I. 50m (maximum prospect outlines in red)

<u>3D Seismic data</u>
The evaluation for the APA application was primarily based on the 3D BG0806R13 full offset cube with support from CGG17M01 for the regional context.

During the licenses work a comparison of the available datasets was performed and concluded that the BG0806R13 PSDM overall had the best detailed imaging, probably due to a shooting direction at near 90 degrees to the prevailing fault trends and a detailed processing focus on the Jurassic section. CGG17M01 is also of good quality but overall has somewhat lower resolution and poorer imaging of key faults probably due to the shooting direction parallel to the main fault trends (Figure 2).

In order to address seismic imaging further, a feasibility test reprocessing of BG0806R13 using CRAM migration was performed. This showed potential for achieving further improvements and better resolution and as a result of this a dual azimuth reprocessing combining both the BG0806R13 and CGG17M01 surveys with two different shooting directions was proposed to the licence. This was however rejected due to the initial work by the licence partners already then indicated significantly reduced volume potential in the Ursa Major prospect and the cost and time implications of such a reprocessing project.

For the final detailed interpretation of faults and surfaces the Near offset cube of BG0806R13 PSDM was seen as providing the best resolution and imaging. The new interpretation led to some important revisions compared to the interpretation performed prior to the APA application.

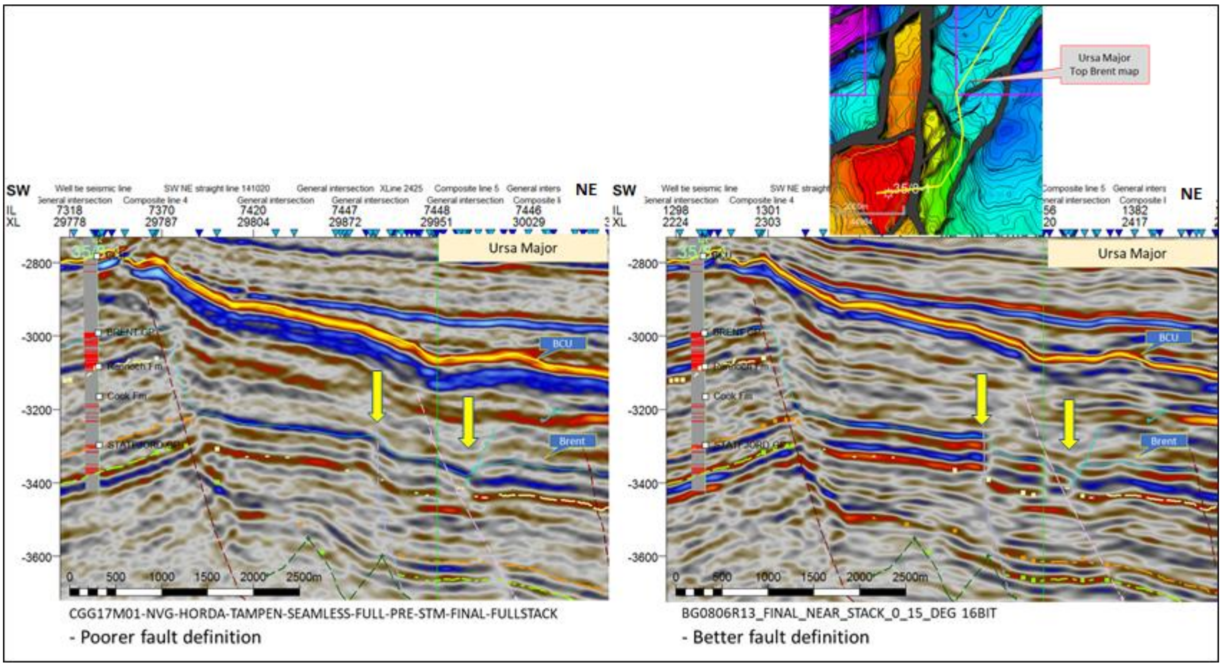

Figure 3 Seismic imaging examples

Geological Studies

A structural study with Badley Geoscience was conducted based on a supplied fault network, surfaces and seismic data. The output was a QC of the faults, displacement analysis and refinements of a key set of bounding faults as well as fault seal capacity based on the lithology of the nearby well 35/8-1. Juxtaposition analysis and shale smear analysis, SGR (shale gouge ratio) was calculated and then converted to maximum hydrocarbon column height. Based on these assumptions, the estimated <u>maximum</u> column height for the Ursa Major bounding faults with moderate to low throw (30-40m throw) were in the order of 80-100m for an oil case and considerably less (~20 - 50m) for the expected gas case due to the increased buoyancy pressure of gas.

4. Prospect update

The main focus during the licence period has been on re-evaluating the Ursa Major prospect at Brent reservoir level. Seismic reinterpretation utilising both newer 3D broadband seismic and vintage seismic and incorporating findings of the structural study led to a revised fault pattern and trap definition. Figure 4 illustrates the initial and revised fault interpretation at Top Brent in the up-dip area of Ursa Major. As the right panel illustrates, the SW-NE oriented fault (F1) at the southern up-dip boundary of Ursa Major terminates towards SW and opens up a spill route towards south that can only trap a small hydrocarbon column via a low relief graben delineated by another small fault (F2) that terminates towards NE. Additional faults further south are also interpreted to be open and forms a pathway for leakage. Figure 5 shows an arbitrary seismic line that attempts to avoid all faults and illustrates the small closure at Ursa Major and the spill route.

Due to challenging seismic imaging in an area where several faults converge, it is still uncertain if the potentially trap forming small fault (F2) actually links up towards the SW and has the capacity to hold a moderate gas column due to clay smear along the fault plane with low offset throw and with Brent juxtaposed Brent at either side of the fault.

The remapped fault geometry resulted in a large reduction in the hydrocarbon column height and trap size and consequently greatly reduced volume potential. Figure 6 shows a comparison of the new revised maximum column height and trap area (stippled orange polygon) versus the previously evaluated maximum prospect polygon in red and the most likely prospect polygon at the time of application in yellow. A small local closure along the SW-NE oriented bounding fault is indicated by a white stippled polygon. A large part of the revised maximum prospect outline is located outside PL1053. Since Ursa Major is located c. 600-700m deeper than Vega north and slightly further north, the reservoir quality and development of Brent reservoir is expected to be lower than in 35/8-1. The revised volume calculation for Ursa Major prospect was performed using the new maps and the same input parameters as for the 2019 APA application document. For Ursa Major the parameters and volumes are presented in Table 4 (NPD table 5). Only 41 % of the mean recoverable volumes (1.13 *10e9 Sm3 gas and 0.56 *10e6 Sm3 liquids) are within PL1053 and the remainder up-dip part is in PL248/248B.

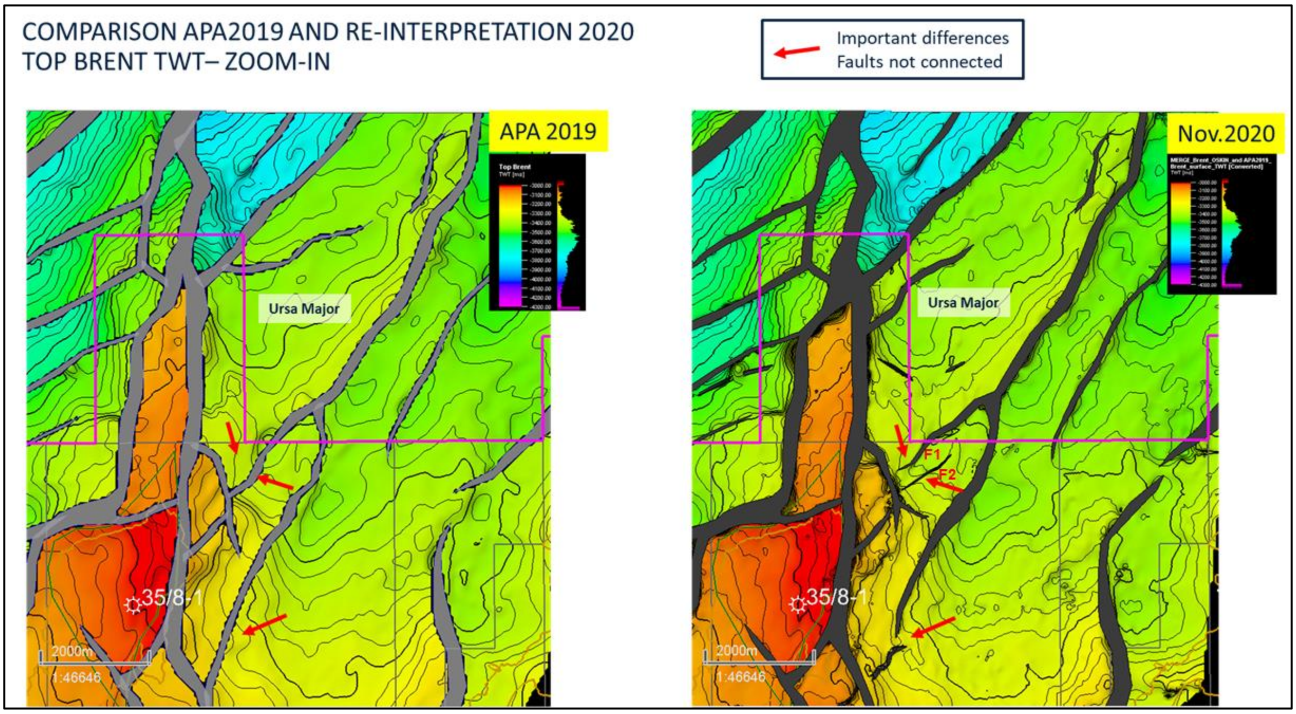

Figure 4 Top Brent structure maps comparison

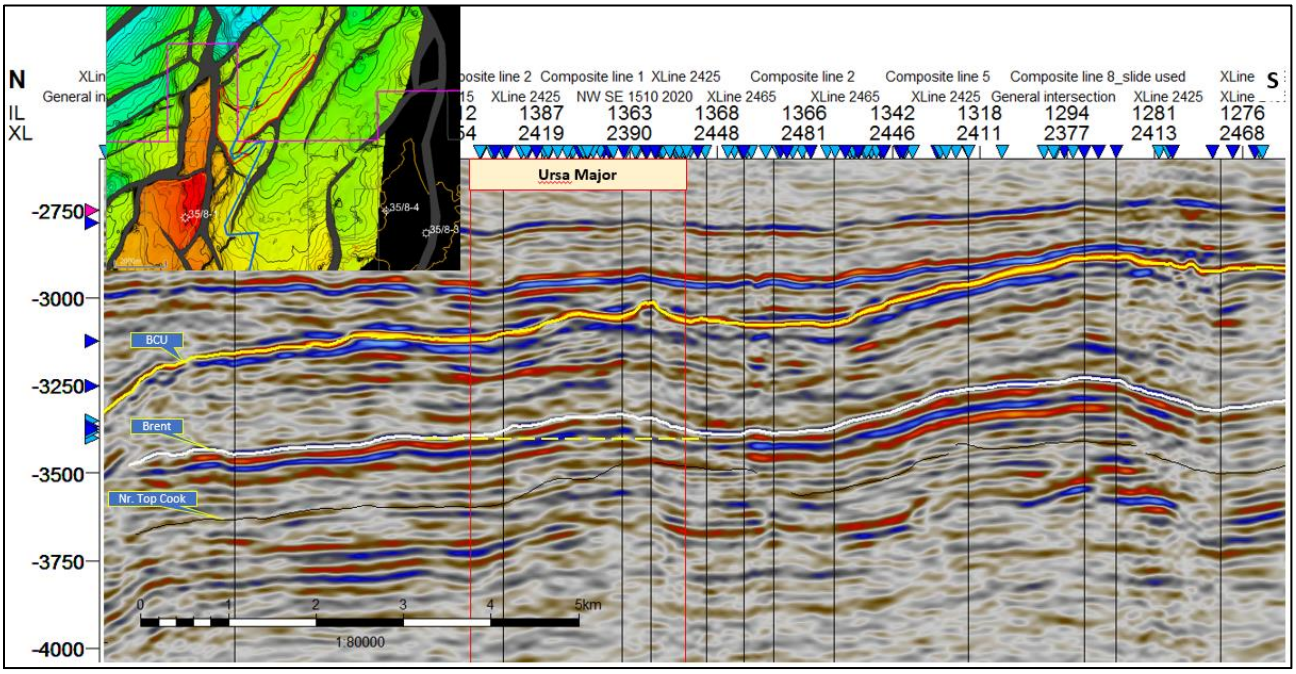

Figure 5 Arbitrary seismic line (TWT) through Ursa Major illustrating a small closure

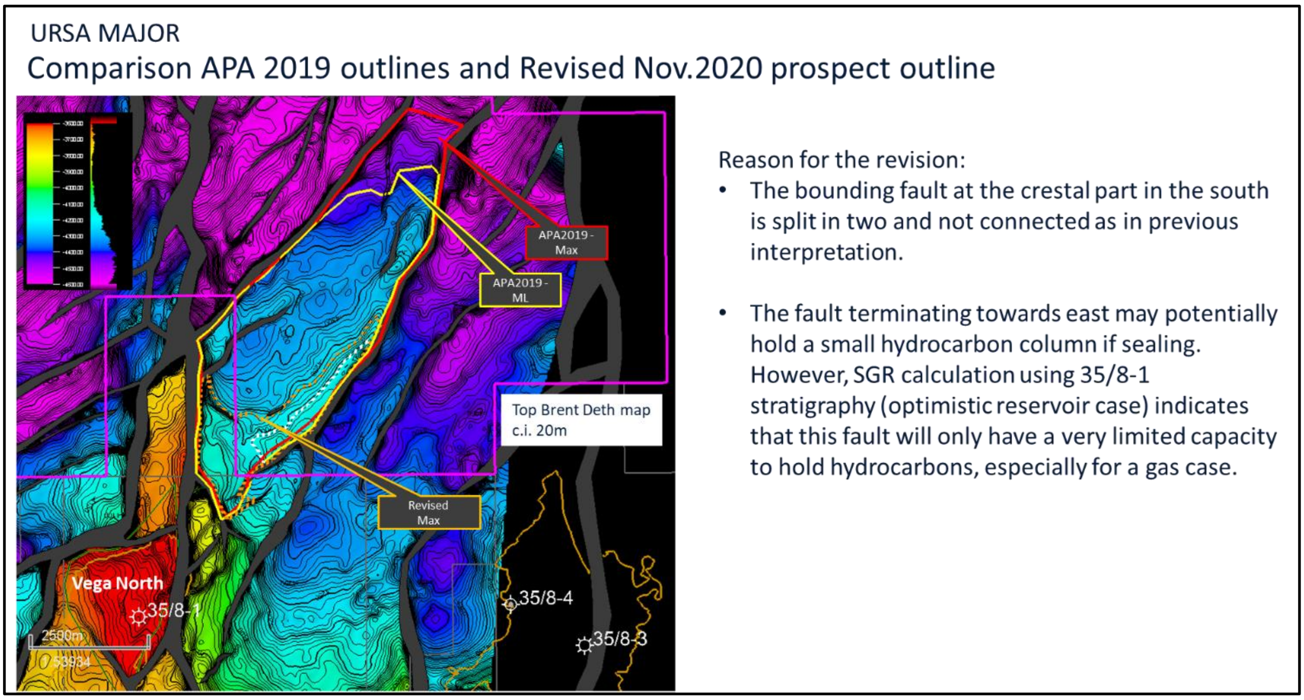

Figure 6 Ursa Major prospect, comparison of the APA 2019 outline and revised outline

Table 4 Ursa Major prospect table (NPD table 5)

Table 5: Prospect data (Enclose map)									
Block	35/4, 35/5, 35/7, 35/8	Prospect name	Ursa Major	Discovery/Prosp/Lead	Prospect	Prosp ID (or New!)	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	Neptune Energy	Reference document	PL1053 Status report for surrender of licence			Assessment year	2020
This is case no.:		Structural element	Marflo Spur	Type of trap	Structural	Water depth [m MSL] (>0)	375	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)								
	Gas [10^9 Sm^3] (>0.00)	1.09	1.65	1.81	2.62	0.63	0.96	1.19	1.86
Recoverable resources	Oil [10^6 Sm^3] (>0.00)								
	Gas [10^9 Sm^3] (>0.00)	0.67	0.97	1.13	1.66	0.29	0.46	0.56	0.90
Reservoir Chrono (from)	Middle Jurassic	Reservoir litho (from)	Brent Group	Source Rock, chrono primary	Upper Jurssic	Source Rock, litho primary	Draupne Formation	Seal, Chrono	Upper Jurassic
Reservoir Chrono (to)	Middle Jurassic	Reservoir litho (to)	Brent Group	Source Rock, chrono secondary	Upper Jurssic	Source Rock, litho secondary	Heather Formation	Seal, Litho	Draupne Formation
Probability [fraction]									
Total (oil + gas + oil & gas case) (0.00-1.00)	0.16	Oil case (0.00-1.00)		Gas case (0.00-1.00)		Oil & Gas case (0.00-1.00)			
Reservoir (P1) (0.00-1.00)	0.70	Trap (P2) (0.00-1.00)	0.70	Charge (P3) (0.00-1.00)	0.80	Retention (P4) (0.00-1.00)	0.40		
Parametres:	Low (P90)	Base	High (P10)	*Comments: This volume case is for the entire structure of Ursa Major. The structure stretches from PL1053 and into PL248. The Mean and P50 recoverable total volumes volume present in PL1053 is approximately 41% of the volume presented in this table.*					
Depth to top of prospect [m MSL] (> 0)		4070							
Area of closure [km^2] (> 0.0)	2.4	3.2	3.7						
Reservoir thickness [m] (> 0)	24	39	55						
HC column in prospect [m] (> 0)	85	95	105						
Gross rock vol. [10^9 m^3] (> 0.000)	0.089	0.135	0.184						
Net / Gross [fraction] (0.00-1.00)	0.55	0.70	0.80						
Porosity [fraction] (0.00-1.00)	0.13	0.15	0.18						
Permeability [mD] (> 0.0)									
Water Saturation [fraction] (0.00-1.00)	0.30	0.40	0.50						
Bg [Rm3/Sm3] (< 1.0000)	0.0030	0.0031	0.0032						
1/Bo [Sm3/Rm3] (< 1.00)									
GOR, free gas [Sm^3/Sm^3] (> 0)	1149	1524	2137						
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)	0.55	0.62	0.70						
Recov. factor, liquid ass. phase [fraction] (0.00-1.00)	0.40	0.47	0.55	For NPD use:					
Temperature, top res [°C] (>0)	148			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)	665			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.Vsh > 0.40	2.Porosity < 0.10	3.					Kart nr	NPD will insert value

4.1 Additional prospectivity

Since the main work focus was on evaluating Ursa Major, less evaluations of the additional prospectivity was performed. The structural traps of Atropos and Polaris are illustrated by Figure 7. Reservoir development and quality of the Brent Group is a key risk in the northern part of PL1053 and documented by the very shale prone Brent in well 35/4-1. Seismic spectral decomposition images at Top Brent, indicates that the Brent delta is rapidly shaling out just north of Ursa Major such that at least the northern half of Polaris and areas further northwards are likely to have a poor Brent reservoir development.

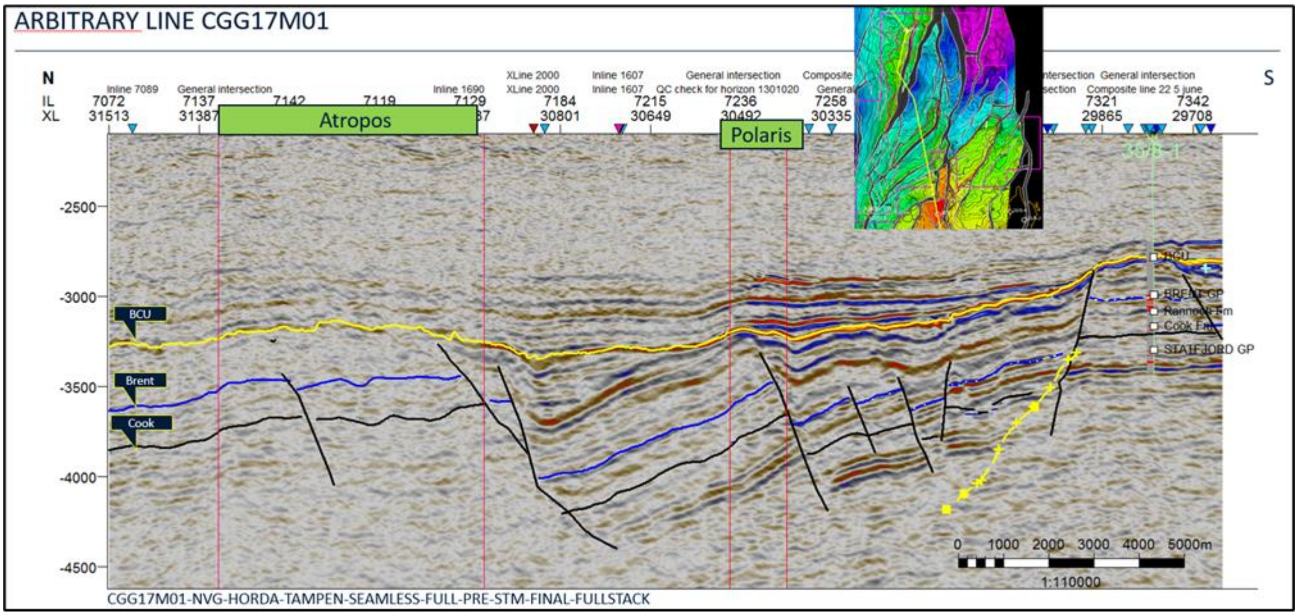

Figure 7 Seismic section (TWT) illustrating Atropos and Polaris structures.

Polaris:
This structural trap has been evaluated at both Brent Group and Cook Formation level. The Brent reservoir development is now interpreted to decrease rapidly in the northern half of the prospect, increasing the risk on Brent reservoir presence and quality. No new volume calculation has been performed since the APA application. The Cook Fm reservoir is high risk with complex migration path and is deeply buried and predictions of reservoir quality preserving Chlorite coating is difficult to assess.

Atropos:
This structural trap was only evaluated at Cook reservoir level due to the poor dry Brent reservoir encountered in 35/4-1 at the northern tip of the structural closure. The seismic quality deteriorates in this area on both seismic surveys. At the prospect location, the Cook Fm is deeply buried and predictions of reservoir quality preserving Chlorite coating is difficult to assess. No new prospect evaluation has been performed since the APA application.

Upper Jurassic reservoirs:

The Upper Jurassic prospectivity in the licence was not fully assessed due to the limited time frame. Late Jurassic reservoirs with hydrocarbons have been encountered in the vicinity, e.g. 35/8-3, 35/8-6A, and 35/9-6S and the possible development of the Aurora discovery (35/8-3) may help unlock additional potential in the region.

5. Technical evaluations

Due to the small in-place volumes of Ursa Major after the re-evaluations, no new technical evaluations have been performed since the application for the APA 2019 application and subsequent award.

Production cases for the Ursa Major prospect presented in the APA application were production by natural depletion of a Brent gas-condensate reservoir by the use one subsea template tied back to the Vega field which is c. 5 km away or alternatively a 30 km direct tieback to the Gjøa platform in a larger upside case.

6. Conclusions

The work programme for PL1053 has been fulfilled by the performed G&G studies. The revised interpretation and fault seal study has led to a significant reduction in the volume potential of the Ursa Major prospect and somewhat increased the risk.
The two secondary prospects were not assigned reduced risk and were also not considered drillable candidates. Additional late Jurassic reservoirs may have potential in the area but were not the focus of the licence evaluations.
The licence partners unanimously concluded on a drop decision based on small volumes combined with a significant risk on fault seal and reservoir quality and the licence was surrendered at the Drill or Drop decision gate 14.02.2021.