NEPTUNE ENERGY

REPORT

Project name / Contract number	Classification	Document Ref.	Version
PL 786	Unclassified	1219999	2

Document Title

PL 786 Status Report - Licence Surrender

Reference is made to our letter to MPE dated 06.02.2019 (Saksnr. 2019/258) regarding the surrender of Production Licence 786. This report gives a summary of the PL 786 licence which was surrendered after the partnership reached a unanimous decision to drop the licence at the Drill or Drop deadline 06.02.2018.

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1. Key licence history

Production License 786 (PL 786) is located in the Northern North Sea on the Uer Terrace between the Northern Viking Graben and the Horda Platform, bounded eastwards by the Oygarden Fault Complex. It consists of parts of blocks 35/12, 36/10, 31/3 and 32/1. The total area is about 731.67 km².

PL 786 was awarded to GDF SUEZ E&P (now Neptune Energy Norge AS, "Neptune") on the 6th of February 2015 together with one license partner. The partnership changed during the license period, Pandion Energy AS took over from Tullow Oil Norge AS (Table 1).

Company	Status	06.02.2015	22.06.2017
Neptune Energy Norge AS	Operator	50 %	50 %
TULLOW Oil Norge AS	Partner	50 %	0 %
PANDION Energy AS	Partner	0%	50%

Table 1: Change of licence shares

The original license commitment were to acquire or purchase 3D seismic and perform an EM feasibility study on prospective leads to reach a Drill-or-Drop Decision by 6th of February 2018. If a positive drill decision would have been taken, an exploration well had to be drilled by 6th of February 2020. Initial license expiry date is 6th of February 2023.
All commitments were fulfilled during the initial exploration period, and no areal extension was applied to this license.

In January 2018, following the recent availability of the CGG17M01 PSTM Horda survey, the license partnership asked the authorities for a one-year extension in order to deepen the analysis of the northern part of PL 786 license which was only covered by sparse 2D seismic data. NPD approved this extension until 6th of February 2019.

After the following one-year evaluation, the license partnership reached the common decision to relinquish the license at the new Drill-or-Drop deadline of February 6th, 2019. Decision was based on the non-acceptable combination of risks (charge, reservoir presence and seal issues), volumes and commercial potential that should justify an exploration well (see next pages for detailed conclusions regarding prospectivity).

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1.1 Licence Meetings

Seven combined Exploration Committee (EC) and Management Committee (MC) meetings have been held, as well as three additional Exploration Work Meetings (Table 2).

Date	License work meetings
29.09.2017	Workshop: Petroleum systems & wells post-mortem
23.01.2018	Workshop: AVO & migration study
24.01.2019	Workshop: Injectites & relative acoustic impedance cube review

Date	License meetings
12.05.2015	EC/MC Meeting #1
18.11.2015	EC/MC Meeting #2
06.06.2016	EC/MC Meeting #3
10.11.2016	EC/MC Meeting #4
21.06.2017	EC/MC Meeting #5
22.11.2017	EC/MC Meeting #6
21.11.2018	EC/MC Meeting #7

Table 2: Licence work- and ECMC meetings

2. Database

2.1 Seismic data

A common licence database was established and expanded during the evaluation. At the time of award, two 3D seismic cubes were available, SG9603M01 and WIN12001. The EN17M01 3D seismic cube has been reprocessed and merged in 2017 with two migration methods (Kirchhoff and Beam), in accordance with license commitments. 2D seismic data was available too: RV0801 and NVGTI-92 (Tables 3).

During the one-year extension period, the partnership added the CGG17M01 (PSTM version, full and offset stacks) covering the northern part of the license into the common seismic database.

Geophysical survey	NPD ID	Type of survey	Market availability	Comments
SG9603MR99	n/a	3D seismic	License	Merged of MN9201 & SG9603
WIN12001	7602	3D seismic	License	430 km^2
EN17M01	8507	3D seismic	License	533 km^2
CGG17M01	8179/8128	3D seismic	Multiclient	200 km^2 covering North PL 786
RV0801	4593	2D seismic	License	2351 km
NVGTI-92	3544/3545	2D seismic	License	Regional seismic. 10 NW-SE lines with three crossing license

Table 3: Well and seismic data set

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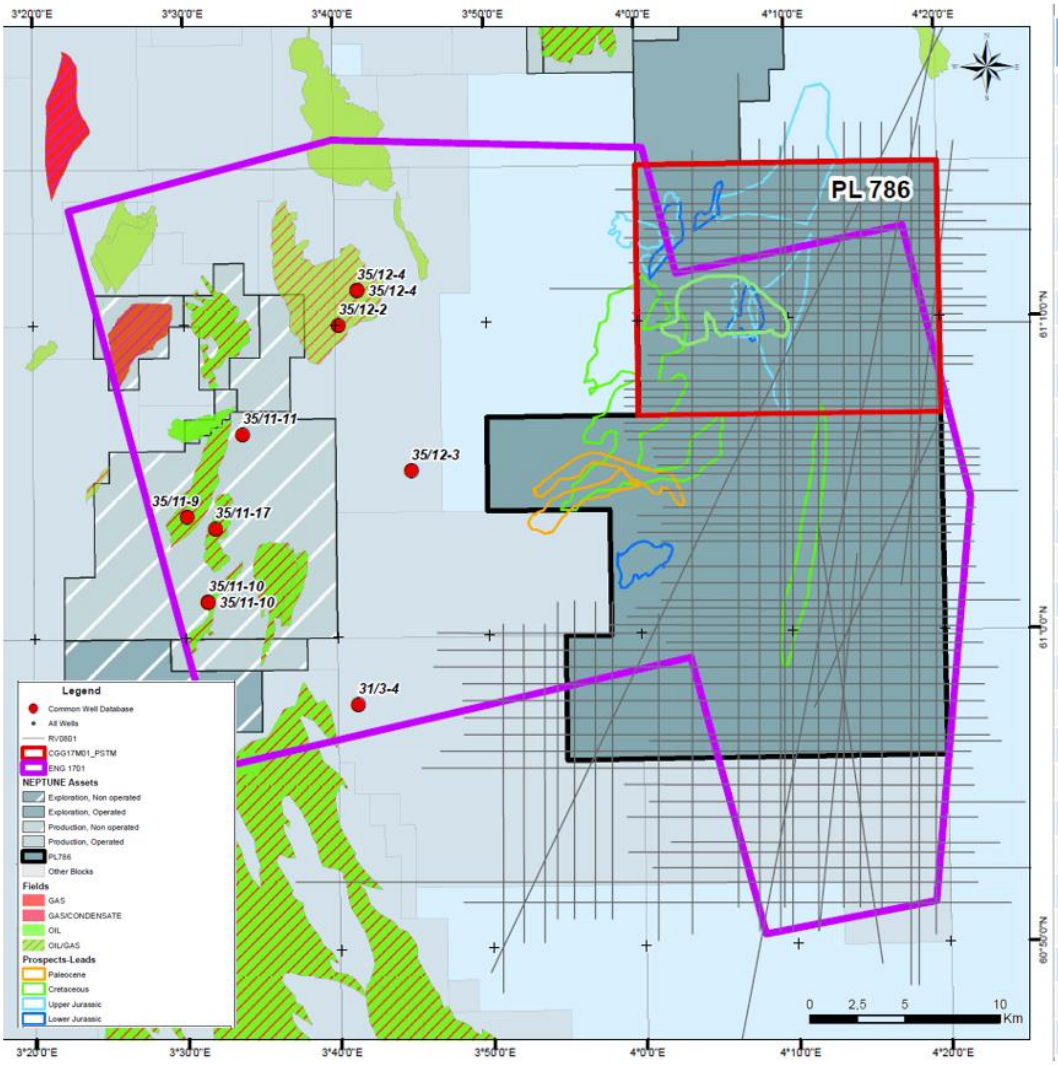
2.2 Well data



Wells
35/10-1
35/11-1
35/11-3S
35/11-4
35/11-7
35/11-8S
35/11-9
35/11-10
35/11-10 A
35/11-11
35/11-17
35/12-1
35/12-2
35/12-3
35/12-4 S
35/12-4 A
35/12-5S
31/2-15
31/2-18A
31/3-4
36/7-1
36/7-2
35/9-1
35/9-3T2
35/9-9
35/9-B-1-H-T3
35/12-5S

Table 4: List of offset wells in the common database and location of wells and seismic data

3. Review of geological and geophysical studies

APA 2014 round evaluation allowed to identify several exploration targets located in different plays within the licence: Jurassic, Cretaceous and Palaeocene. This analysis was mainly ran on the SG9603MR99 3D seismic survey.

Since award, new data have been available and interpreted (reprocessed cubes EN17M01 & CGG17M01) and new studies have been performed. Main purpose was to derisk the three identified plays and, thanks to the surrounding wells and enhanced seismic data quality, to try to mature exploration prospects. The operator evaluated the entire remaining exploration potential evaluation within the licence with new seismic

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interpretation, EM and AVO studies. Additionally, a structural restoration study from Brent (Jurassic) to Quaternary and a migration study were performed with depth maps ranging from Jurassic to Palaeocene. In addition, a biodegradation study with surrounding well data was performed due to the limited depth of some prospective Palaeocene targets.

Remaining exploration potential: Palaeocene Play

During APA 2014 round evaluation, the main prospectivity was identified in the Palaeocene Play. The targets were identified with the help of amplitude anomalies visible on SG9603MR99 3D seismic cube and apparently deposited as sand strings roughly W-E trending and dipping towards the west.

The play is proven in the area by the 35/11-17 well, located roughly 15 km west of PL 786 boundary. This well encountered 11 m of hydrocarbons (HC) in the Sotra Member of the Lista Formation, trapped in a small four-way dip closure. The potential trapping mechanism seemed to be stratigraphically, related to gravity flows interbedding sandstone, claystones and siltstones. They deposited at the edge of large base-of-slope- to proximal basin-floor fan system, sourced from the eastern basin margin. New seismic interpretation was done on the reprocessed EN17M01 cube and the Amplitude Versus Offset (AVO) study was performed to discriminate HC presence in sand bodies and its relation to amplitude content. There, over the main Palaeocene targets, AVO is showing a two times brightening from Near to Far.

It is worth to note that the previously identified reservoir sections (seismic anomalies) appear on reprocessed seismic far more discontinuous, defined by fuzzy, chaotic and low frequency content facies. The AVO study, matched with well 35/12-3S showed that a very limited AVO effect is recognizable when reservoirs are HC filled (fluid substitution).

Consequently the new analysis allowed to better identify and evaluate the Palaeocene Play key risks:

1. Trap presence/effectiveness: High risk. No four-way closures have been detected, except the small one drilled by the 35/11-17 well. All seismic reflectors rise monotonously upwards, towards the east, and are abruptly eroded by the Base Quaternary Unconformity. No closure nor pinch-out are visible at 35/12-3S dry well location. In theory, stratigraphic trapping seems to be the only possible mechanism, but no effective pinch out, wedging or other potential closure are visible throughout the whole area.

2. Source rock presence/effectiveness: Medium/high risk. Jurassic Draupne source rock is immature in the PL 786 area. Effective source rock is located far away to the west and to the north. Consequently long migration pathways are necessary to charge potential traps within the licence.

3. HC charge/migration: Medium/high risk. Due to immature Jurassic source rock in the PL 786 area vertical migration from deeper shaly levels is unlikely (Figure 1). Main regional HC kitchen is roughly located far away from PL 786, to the west and to the north. Long migration looks necessary, but it appears difficult due to carriers beds, discontinuous and with limited lateral extent (<1–5 km).

4. Reservoir presence/effectiveness: Low risk. Locally stacked sandstone layers build significant reservoir thickness (as in the 35/12-3S well). On the other hand, the lateral continuity of reservoir sections as

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well as their effectiveness remain an issue (main amplitude anomalies within the Palaeocene interval are often related to tight, cemented sandstones levels).

5. **Seal/retention:** Low to high risk. Top seal seems to represent a low risk, thanks to Paleogene shales presence. On the contrary, lateral seal can be a high risk, due to uncertain shaling out of sandstones and lack of visible pinch-outs along the identified seismic amplitude anomalies. In addition, the potential reservoir segments are eroded by the Base Quaternary Unconformity, due to a major uplift event. Retention can be also an issue due to very shallow "targets" location and relevant insufficient seal thickness.

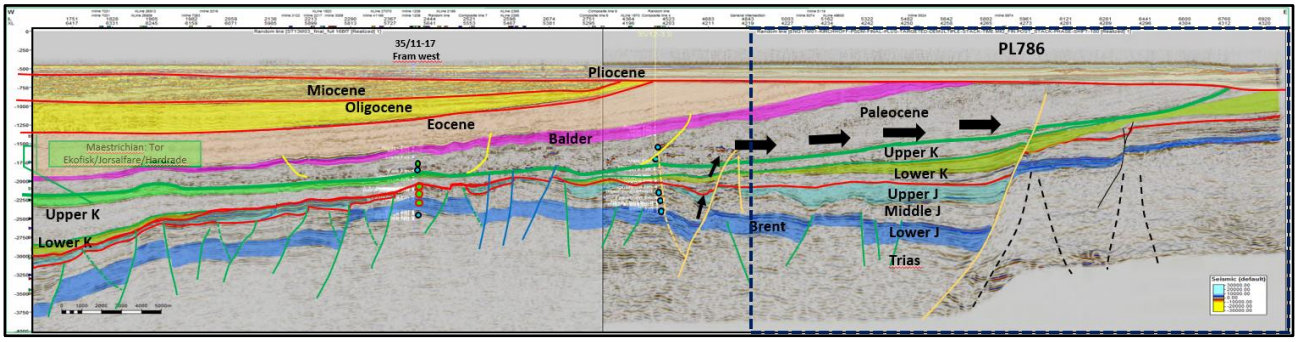
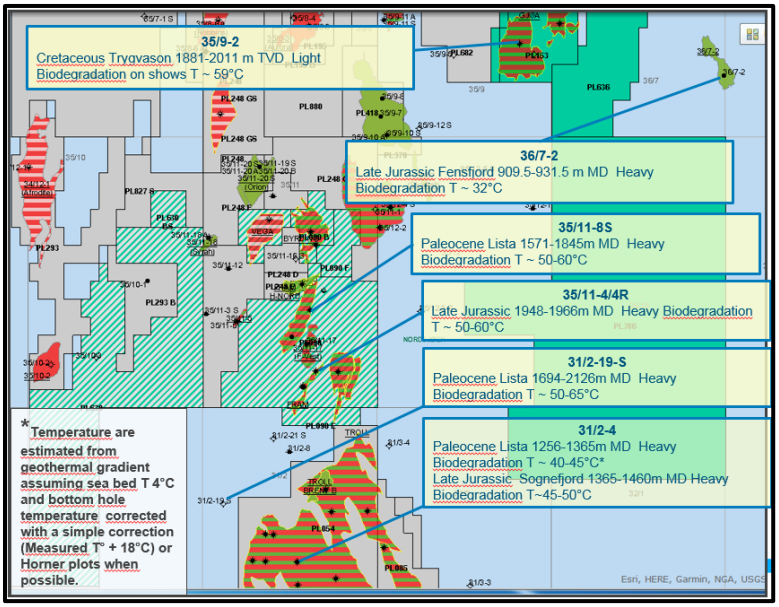


Figure 1: Possible migration pathways through faults on Fram area.



Moreover, the Palaeocene exploration potential is very shallow (between 0 and 1000 m), so biodegradation risk had to be taken into account. Indeed, few wells surrounding PL 786 (Figure 2) have some biodegradation evidences into Palaeocene, Cretaceous and Jurassic reservoirs.

Figure 2: Biodegradation key wells analysis

Remaining exploration potential: Cretaceous Play

The exploration potential was evaluated as well for the Cretaceous Play, even driven by the good results related to the Agat sandstones to the north. The results of a thorough seismic- and well-data analysis describe the key risks of the Cretaceous Play:

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1. Trap presence/effectiveness: Very high risk. No effective four-way closures identified. All seismic reflectors are rising up towards the east. Consequently, the potential trapping mechanism is stratigraphic, but no pinch-outs have been detected.

2. Source Rock presence/effectiveness: Medium/high risk. Jurassic Draupne source rock is immature in the PL 786 area. Effective source rock kitchen is located far away to the west and to the north. Consequently long migration pathways are necessary to charge potential traps within the licence.

3. HC charge/migration: Medium/high risk. Due to immature Jurassic source rock in the PL 786 area vertical migration from deeper shaly levels is unlikely (Figure 1). Long migration pathways from external HC kitchens is necessary, but it looks difficult due to scarcity of other reservoir intervals juxtaposed to the Cretaceous.

4. Reservoir presence/effectiveness: High risk. Operator performed a sub-regional interpretation focussed on potential Cretaceous reservoirs between the Fram- (west), the Gjøa- (north) and the PL 786 area. This study allowed to confirm that no significant sandstones deposits at Cretaceous level are present in the PL 786 licence. Moreover, the wells around PL 786 drilled Cretaceous sequences almost completely shaly.

5. Seal/retention: Low risk. Most of the wells drilled thick top seal in the Cretaceous. The only risk should concern the Upper Cretaceous interval, if Palaeocene sand layers are present (thief sands).

Remaining exploration potential: Jurassic Play

Despite the fact that in the neighbouring Fram area the Jurassic Play is very prolific, this play was primarily considered as the less promising among the three, due to the very high risk related to HC migration in the PL 786 area, The Jurassic was however emphasized during the one-year extension phase, where the Proxima Prospect has been evaluated as the main prospect. A full exploration analysis was performed for this level as well. The main results and exploration risks are reported as following:

1. Trap presence/effectiveness: Low risk. Presence of several effective four-way closures around PL 786.

2. Source Rock presence/effectiveness: Medium/high risk. Jurassic Draupne source rock is immature in the PL 786 area. Effective source rock kitchen is located far away to the west and to the north. Consequently long migration pathways are necessary to charge potential traps within the licence.

3. HC charge/migration: Very high risk. Due to immature Jurassic source rock in the PL 786 area, HC have to come from the west and the north. This is the main risk due to deflection of HC pathways related to Jurassic fault blocks morphology: Faulted/tilted blocks dip towards the east, making migration nearly impossible. Migration pathways converge to the west and the south, towards Fram- and Troll areas (Figure 3). Two four-way structures were drilled dry (35\12-5S & 35\12-1) very close to PL 786.

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4. **Reservoir presence/effectiveness**: Low risk. Sub-regional interpretation from Fram area (west) and Gjøa (north) highlighted Jurassic in the area. All the surrounding wells found sands in the Jurassic.

5. **Seal/retention:** Low to medium risk. In most of the wells, thick shales are present as top seal for Heather reservoirs (Draupne), but Heather sandstones might act as thief sands for the Brent Formation reservoirs.

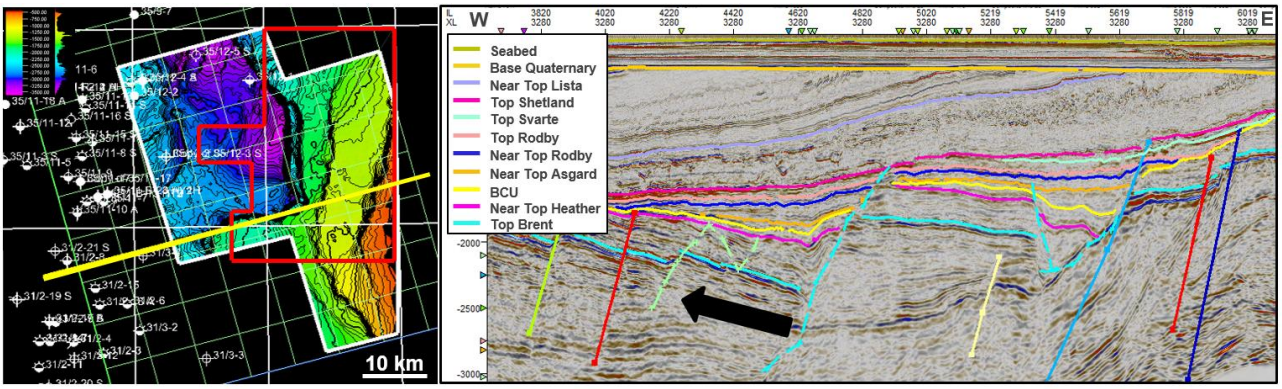

Figure 3: Migration pathways for Jurassic reservoirs

Summarizing, the three plays, Jurassic, Cretaceous and Paleocene appear very risky for different reasons detailed in the following Table (Table 5):

Petroleum system elements		Jurassic	Lower Cretaceous	Upper Cretaceous		Paleocene
			Kyrre	Agat	Åsgard	
1. Reservoir	Presence	OK	uncertain	No	No	OK
	Quality	Good	Good when deposited (Northern part: Cara)	/	/	Good
2. Source Rock	Presence	OK	OK			OK
	Maturity	Mature Westward and Northwestward, immature on PL786				
3. Migration	Timing	Good	Good			Good
	Efficiency	PL786 in migration shadow	Oil shows in 35/11-5, most probably from Jurassic play => **need of effective long distance migration** to charge traps in PL786 (high risk)	/	/	Oil shows on Fram, most probably from Jurassic play => **need of effective long distance migration** to charge traps in PL786 (high risk)
4. Trap	Type	Structural	Stratigraphic	/	/	Stratigraphic
5. Seal	Presence	OK	OK	/	/	Scarcity of shale
	Effectiveness	Good	Good (thick top shale)	/	/	Presence of faults, scarcity of shale

Table 5: Risk factors concerning different plays on PL 786
(Red: Very high risk, Orange: High risk, Yellow: Medium, Green: Low risk)

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In addition, an extensive ElectroMagnetics (EM) feasibility study was performed over all the defined prospective targets. Conclusions are that EM can help de-risking both, Palaeocene and Cretaceous targets, but cannot increase the geological POS sufficiently to make the targets attractive, due to the high risk of false positive, described by the presence of cemented reservoirs proven in the neighbouring wells.

In addition, EM acquisition over the key PL 786 prospective targets is unlikely to give reliable results, due to the presence of two major pipelines crossing the PL 786 license over tops of main prospective targets.

4. Prospect update

At the time of award (in 2014), two leads were identified in the Palaeocene Play (named Casio and Persei), one target identified in the Cretaceous Play (named Arcturus) and two potential targets in the Jurassic Play (Rigel and Proxima). The updated evaluation of all these targets is summarized in the following prospectivity map (Figure 3).

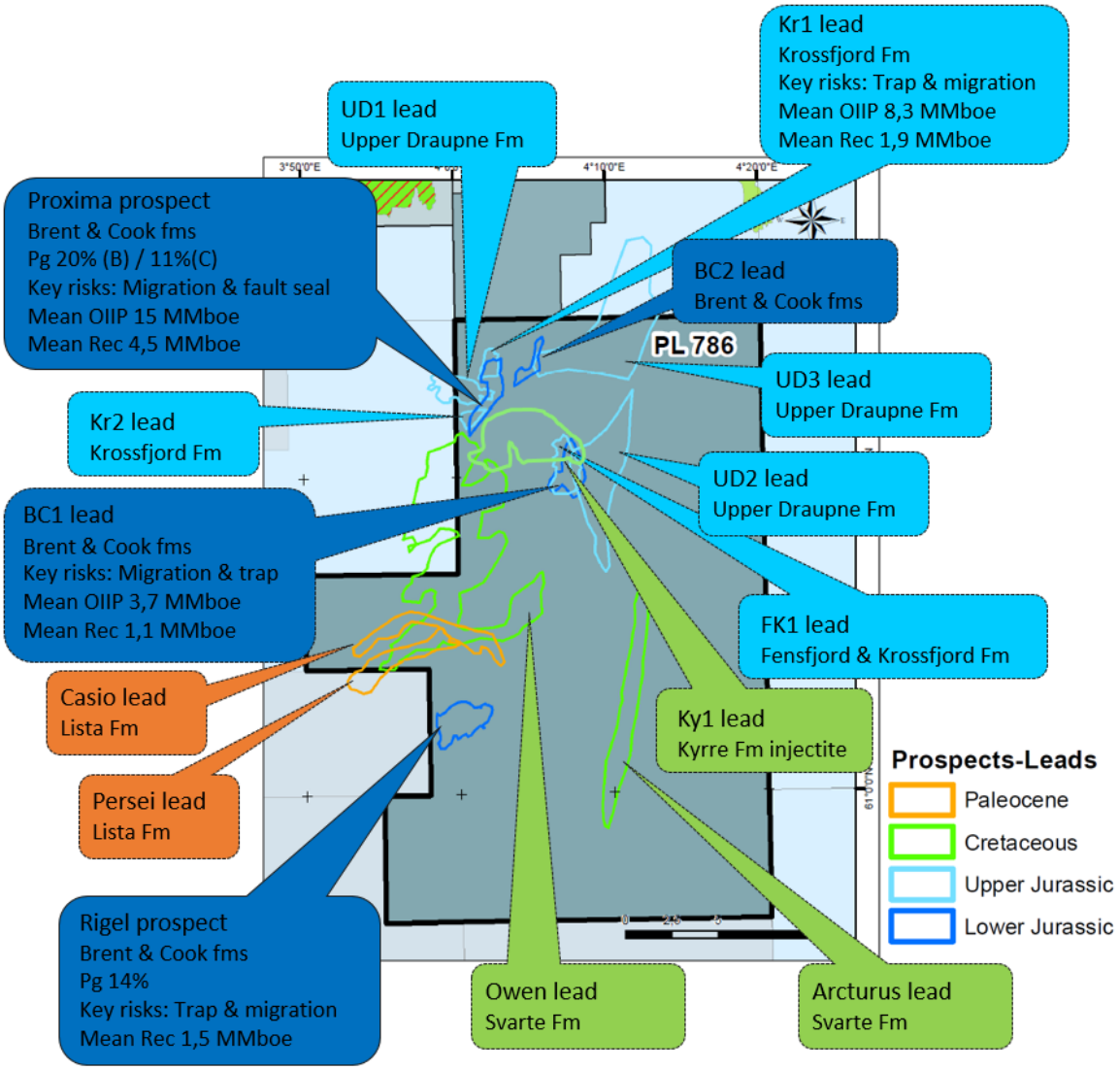

Figure 3: Prospectivity summary.

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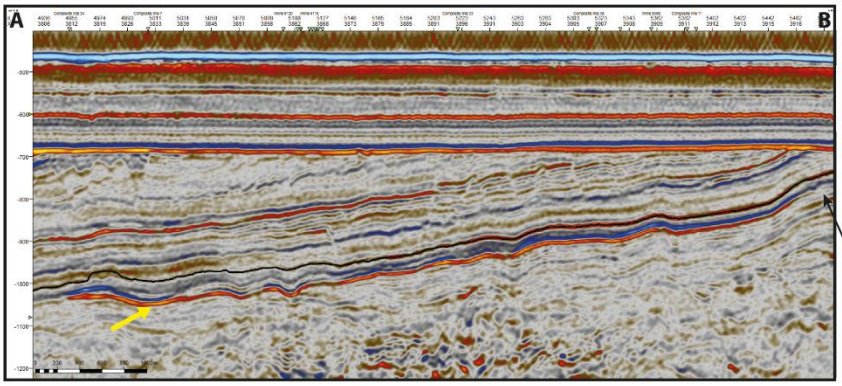
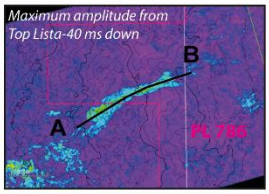
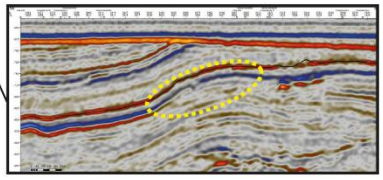
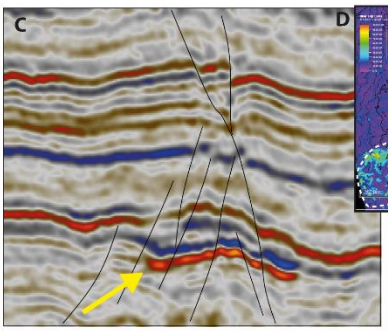
PALEOCENE LEADS: PERSEI

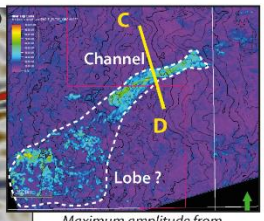




Stratigraphic trap well defined to the West but high risk to the eastern up-dip part







Maximum amplitude from Top Lista-40 ms down

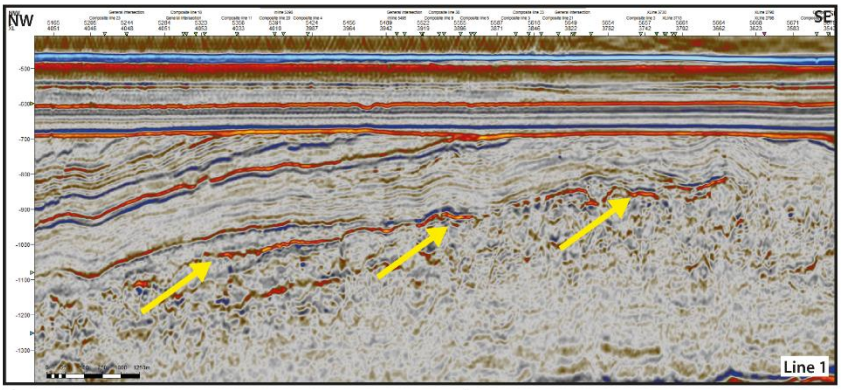
Paleocene lead is fractured => risk of leaking

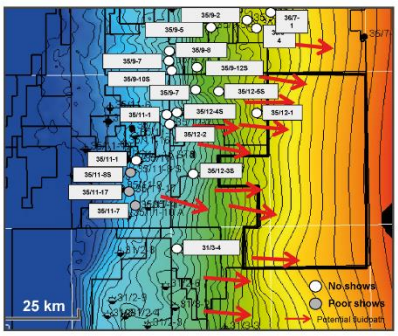
Reservoir	0.5	AVO effect not inline with HC filled sand presence
Trap type	0.5	No clear robust closure to the East
Top seal/Retention	0.5	Fractures => risk of leaking
Source Rock	1	Mature NW & N
Charge/migration	0.4	Weak possibility to charge from Fram Area =>long distance migration

Probability of geological success: 5%

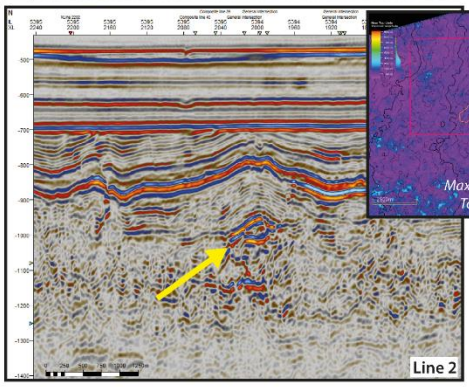
PALEOCENE LEADS: CASIO

Volumetrics recoverable: Mode: 8.3 MSm3 oe





Poor shows are visible on Fram area
No show between Fram area and PL786
=> Long distance migration issue
=> Presence of carrier beds in shaly Cretaceous ?



Seismic facies is very noisy
Amplitude is very hard to follow and to define from a structural point of view

Reservoir	0.5	Discontinuous amplitude bodies AVO effect not inline with HC filled sand presence
Trap type	0.4	Closure hard to define with amplitude map
Top seal/Retention	0.4	Presence of sand bodies => risk of leaking
Source Rock	1	Mature NW & N
Charge/migration	0.4	Weak possibility to charge from Fram Area =>long distance migration

Probability of geological success: 3.2%

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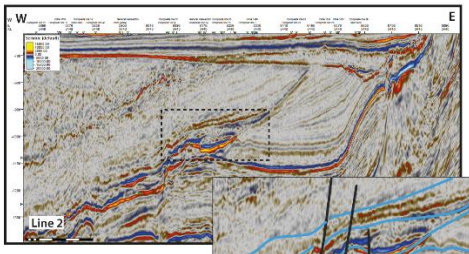
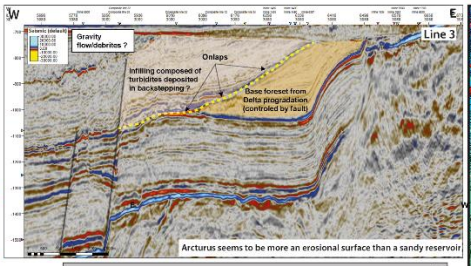
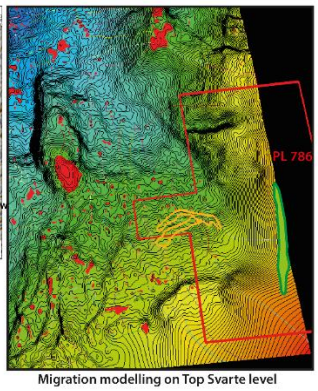
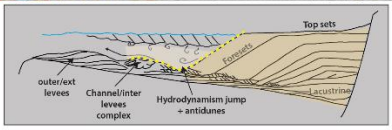
CRETACEOUS LEAD: ARCTURUS

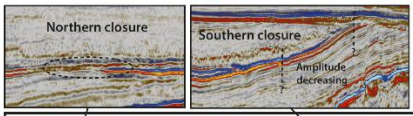






Migration modelling on Top Svarte level

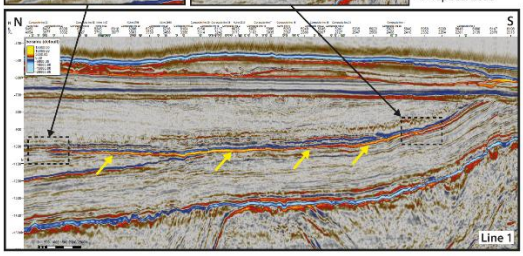


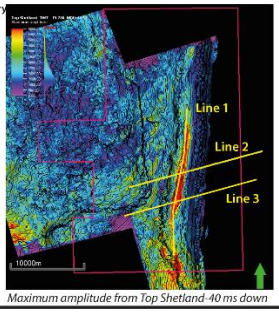


2 possibilities for the Southern closure:

- Amplitudes decreasing

-Against Base Quaternary unconformity
=> Top seal issue





Maximum amplitude from Top Shetland-40 ms down

Most of hydrocarbons are deflected towards "Fram area"
Very few migration pathways are possible according to structural point of view

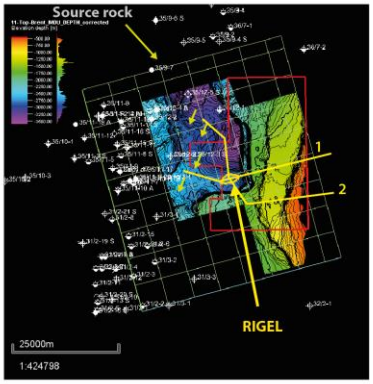
Most of Cretaceous formations are shaly so carriers beds are not easily recognizable if they are present

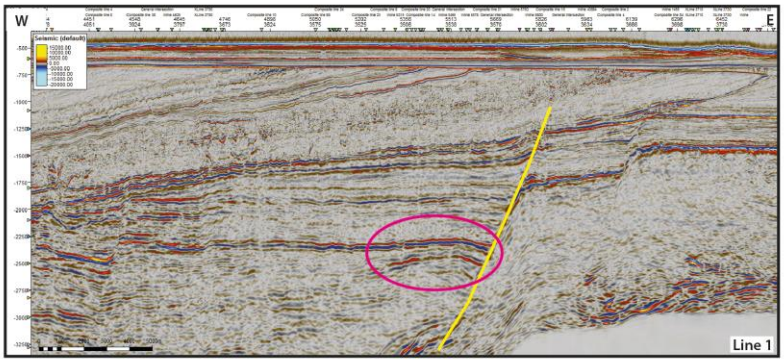
Reservoir	0.4	No sand in the closest wells
Trap type	0.6	Well defined to the North but not to the South
Top seal/Retention	0.4	Fractures => risk of leaking
Source Rock	1	Mature NW & N
Charge/migration	0.4	Weak possibility to charge from Fram Area => long distance migration

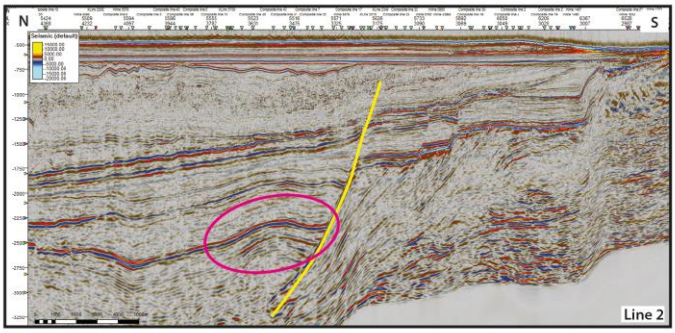
Probability of geological success: 4%

JURRASIC LEAD: RIGEL

Volumetrics recoverable: P90: 1 MSm3 oe Mean: 1.5 MSm3 oe P10: 2 MSm3 oe







Reservoir	1	Present
Trap type	1	Well defined: 4-way dip
Top seal/Retention	0.7	Sand bodies into Heather Formation => risk of leaking
Source Rock	1	Mature NW & N
Charge/migration	0.2	License is in migration shadow

Probability of geological success: 14%

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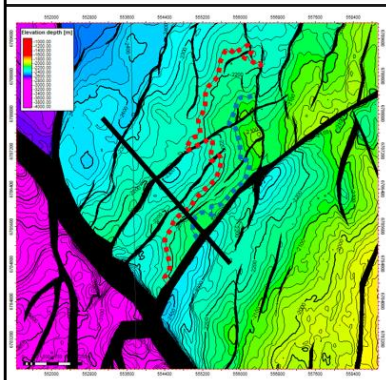
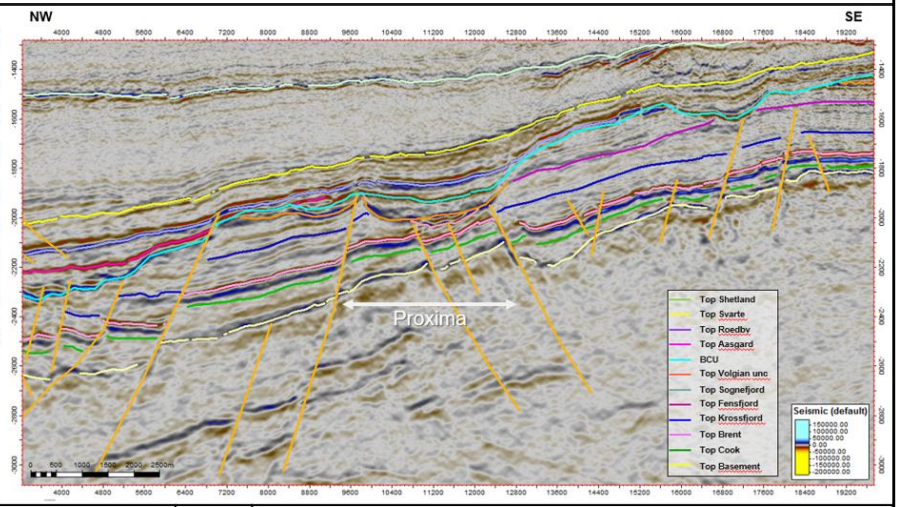
JURASSIC PROSPECT: PROXIMA Volumetrics recoverables (MSm^{3}oe) : P90: 0,27 - Mean: 0,76 - P10: 1,6





Probability of geological success: 13,4% for Brent

Risk factor	Value	Remarq
Effective Reservoir	70	Ness Fm most probably present in Proxima, with suspicion of Coal presence mixed with sandstones
Closure	80	Robust tructure, both present in time and depth maps
Charge Migration	40	At risk - Migration possible from Gjøa field Issue for migration if Proxima North Fault is sealing
Local Seal / Retention	60	Fault seal at risk, even throw seems sufficient enough to provide sealing capacity

5. Technical evaluations

As neither effective petroleum system, nor reliable prospects were identified within PL 786, no development concept was set up PL 786 prospects.

6. Conclusions

After performing detailed remaining exploration potential studies over PL 786 and fulfilling the work program for both, the initial exploration- and the one-year extension phases, the partnership concluded that no additional economic targets were identified in PL 786 following the APA 2014 evaluations. The identified leads have been downgraded in terms of geological POS and the volumetric estimates remain similar to the APA 2014 estimations, being non-economic.

Within the Jurassic Play, the key exploration targets are the Proxima Prospect and the Rigel Lead. For the later, the geological POS has been downgraded from 40 to 14 % due to high risk in charge and migration. For both structures, the volumes remain low and non-economic.

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Within the Cretaceous Play, the main target was the Arcturus Lead. The geological POS has been re-evaluated with 4 %, with key risks evaluated in charge efficiency, reservoir presence and -quality, as well as in seal. The volumes remain low and non-economic.

Regarding the Palaeocene prospectivity, the main target was the Persei Lead. The geological POS has been re-evaluated with 5 % and key risks in charge efficiency, trap, seal and reservoir presence. The volumes remain low and non-economic.

Based on these results, the partnership concluded that PL 786 does not contain prospects with an acceptable combination of risk, volume and commercial potential that can justify to drill an exploration well.

The partnership decided to surrender the licence at the Drill-or-Drop decision gate on 06.02.2019.

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