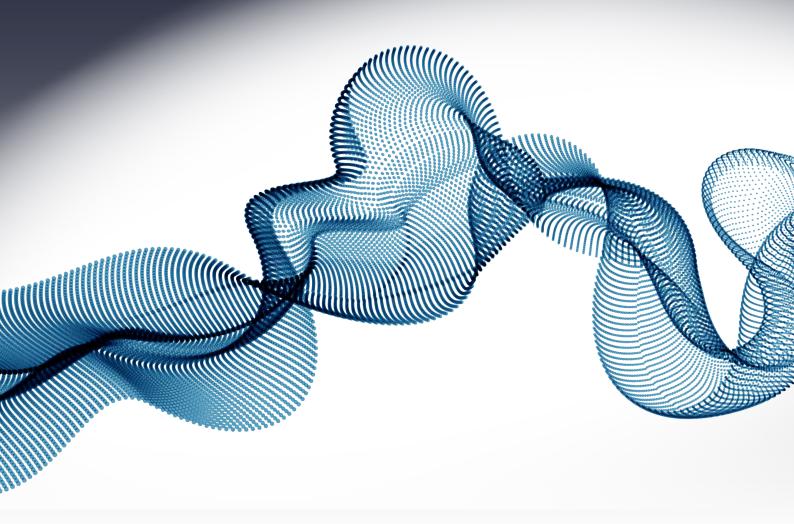


# PL 1117

Block 6406/6 and 6407/4 Relinquishment Report











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# 1 History of the production licence

Production licence 1117 (PL 1117) was awarded 19.02 2021 through APA2020/TFO2020 covering  $151 \text{km}^2$  and consists partly of the blocks 6406/6 and 6407/4 in the Gimsan Basin, around 22 km south of the Tyrihans Field and approximately 29 km west of the Mikkel Field (<u>Fig. 1.1</u>). The current partnership consists of OKEA ASA as operator with 50% WI and with Vår Energi ASA and Pandion AS as partner with respectively 30% and 20% WI.

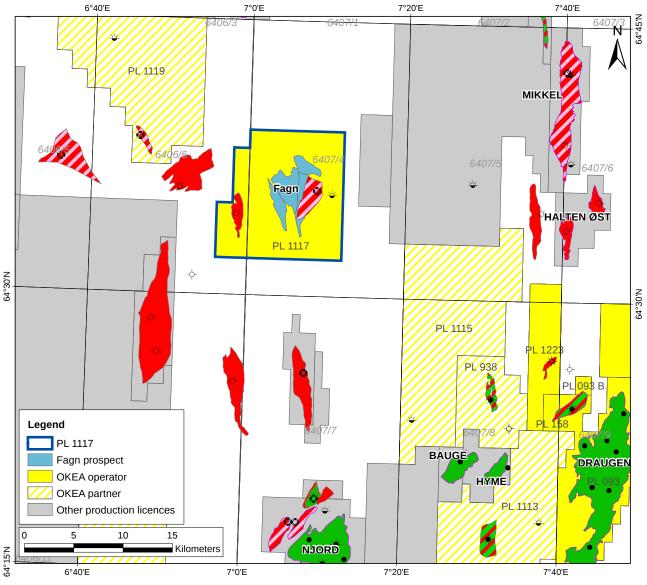


Fig. 1.1 License overview map

The main target applied for in APA2020 is the Fagn prospect, which is a structural trap with a stratigraphic component and the key risk has been identified to be retention. The work programme is shown in  $\underline{\text{Table 1.1}}$ . It has been applied for adjustment of the DoD deadline twice and approved twice by the Authorities, first from 19.02 2023 to 19.08 2023 and the second time to 19.02 2024. The work programme has been fulfilled with the G&G studies described in section 3.



Table 1.1 PL1117 work programme

Work obligation	Decision	Expiry date
Study of geology and geophysics		
Reprocessing of 3D seismic		
	Decision to drill	19.02.2024
Drill exploration well		
	(BoK) Decision to concretise	19.02.2025
Conceptual studies		
	(BoV) Decision to continue	19.02.2027
(PDO) Prepare plan for development		
	(PDO) Submit plan for development	19.02.2028
	Decision to enter extension period	19.02.2028

## Overview of meetings held

The overview of the different meetings held for PL1117 including a core-workshop, are listed in <u>Table 1.2</u>.

Table 1.2 Overview of meetings held in PL1117

Date	MC meeting #	EC meeting #	Work meeting#	Description
21.04.2021	Х	Х		ECMC meeting #1
21.09 2021			Х	EC Technical Work meeting (TWM)
29.09 2021			Х	EC TWM
03.11 2021	Х			MC meeting
02.12 2021			Х	Core workshop
12.01 2022			Х	EC TWM
26.01 2022			Х	EC TWM
15.02 2022		Х		EC meeting
28.04 2022			Х	EC TWM
06.07 2022	Х			MC meeting
30.11 2022	Х	Х		ECMC meeting
06.07 2023		Х		EC meeting
12.07 2023			Х	EC TWM
15.08 2023			Х	EC TWM
21.11.2023	X	Х		ECMC meeting

# Reason for relinquishment

During the licence period, the Fagn prospect was matured to a drillable candidate through full prospect evaluation based on new interpretation on Gather Conditioned seismic, G&G studies and tech-ec in 2022. Since the well would be a HPHT well and OKEA was not qualified as HPHT operator, it required a change in operatorship. Not being able to recruit a new partner to become operator, then PL1117 was forced to a drop decision.



## 2 Database overviews

### 2.1 Seismic database

The seismic database is listed in  $\underline{\text{Table 2.1}}$ , and the outlines of the listed seismic surveys are shown in  $\underline{\text{Fig. 2.1}}$ 

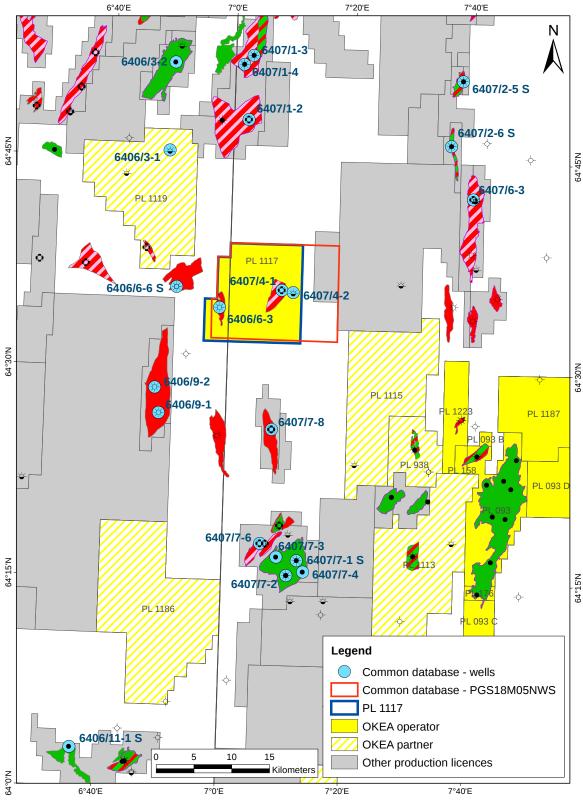


Fig. 2.1 PL1117 Database map



Only the PGS18M05NWS dataset covering the licence area (206  $\rm km^2$ ) is included in the approved PL1117 Common database.

Table 2.1 Seismic database

Survey	NPDID	Status	Version	Products
PGS18M05NWS	7900, 7993,	Multiclient data,	Original PGS data	Full stack, All offset stacks,
	8054, 8183	not public		gathers, velocity volumes
				(twt and depth)
PGS18M05NWS-			Gather Conditioning	KPSDM_Final_Gathcon_Time_Ful-
_Geoprovider_			by GeoProvider	I_Stack_Final (UNear, Mid, Far,
GatherCond				Ufar and UUfar also available)

## 2.2 Well database

Key wells for the prospect evaluation and additional wells used in special studies, are shown in  $\underline{\text{Fig. 2.1}}$  and listed in  $\underline{\text{Table 2.2}}$ .

Table 2.2 Well database

Well	Completion year	NPDID	Content
6406/3-1	1984	108	gas shows
6406/3-2	1986	863	oil
6406/6-3	2013	7156	gas
6406/6-6 S	2018	8550	gas
6406/9-1	2005	4927	gas
6406/9-2	2007	5454	gas
6406/11-1 S	1991	1539	oil
6407/1-2	1983	61	gas/ cond.
6407/1-3	1984	29	oil/ gas
6407/1-4	1996	2796	oil/ gas
6407/2-5 S	2009	6151	oil/ gas
6407/2-6 S	2010	6351	oil/ gas
6407/4-1	1985	490	gas/ cond.
6407/4-2	2011	6557	shows
6407/6-3	1987	1024	gas/ cond.
6407/7-1 S	1986	474	oil/ gas
6407/7-2	1987	1017	oil/ gas
6407/7-3	1988	1229	oil
6407/7-4	1989	1360	oil
6407/7-6	2000	4172	gas/ cond.
6407/7-8	2008	5844	gas/ cond.



# 3 Results of geological and geophysical studies

As part of the work commitment, the following special studies have been performed:

#### Gather conditioning reprocessing

The PGS18M05NWS survey is covering a large regional area, but multiple issues in the dataset, poor amplitude consistency at reservoir level and poor AVO alignment for seismic inversion, made it necessary with a gather conditioning reprocessing of the PGS18M05NWS as defined in the Common Database. The aim for the reprocessing was to increase vertical solution, achieve a significant decrease of multiple energy interference, AVO optimisation and improve the amplitude consistency.

## Petrophyscial analysis and interpretation of key wells

Petrophysical analyses and interpretation were conducted on 9 wells. The petrophysical analyses were input for the geomodelling, seismic reservoir characterisation and seismic Inversion study and the volume estimate.

#### Seismic Reservoir Characterisation

A seismic reservoir characterisation study was performed in order to develop a good understanding of the rock physics and the seismic signature characteristics of the primary and secondary reservoir targets. The results of the study has contributed in de-risking of the Fagn prospect.

#### **Regional Structural Geology**

The purpose of the regional structural geology study was to get a better understanding of the nature of the prospect and the fragmentation of the anticline. The result of the study contributed to the de-risking of the prospect.

### Fault-Seal analysis

A fault-seal study was initiated in order to examine the sealing capacity of 10 faults bounding the prospect. Fault seal was analysed using two standard techniques, Shale Gauge Ration (SGR) and Shale Smear Factor (SSF). The stratigraphy and VShale data from 6407/4-1 was used in the seal analysis. Other wells given input to the study were 6406/6-3 and 6407/6-6 S. The result has been input to the petroleum system modelling.

## Semi-regional mudgas study

The purpose of the semi-regional mudgas study, was to verify charge in the Tilje Formation and to verify the intra-Tilje seal. The results form the study was input to the petroleum system modelling.

#### Petroleum system modelling

A semi-regional petroleum system model using Zetaware Trinity & Genesis was built and tested several migration scenarios. The results contributed to volume estimation and de-risking of the Fagn prospect.

#### Geo-model

A geo-model was built in Petrel for the whole Jurassic section with the purpose to QC the GRV and the reservoir properties to be used as input for the volumetrics.



# 4 Prospect update report

#### The Fagn prospect\_

The main target in PL1117, the Fagn prospect, is a structural trap with a stratigraphic component, where the main target is the Early Jurassic Lower Tilje Formation depositional sequence as detected by the mud-gas analysis study in well 6407/4-1, and proven in the wells 6407/7-8 and 6407/9-1 (Fig. 4.1). Additional Early -Middle Jurassic proven reservoirs, Tofte, Ile and Garn formations, are considered to be upside potential of the Fagn prospect. Tilje shales represents the top seal, while the Late Jurassic Spekk Formation is the top seal for the Garn upside potential.

The Late Triassic- Early Jurassic Åre Formation is the main source rock in the area, while the Late Jurassic Spekk Formation and Middle Jurassic Melke Formation can be considered as an additional "top level" source rock for the Garn Formation. Top Lower Tilje reservoir depth map is shown in Fig. 4.2.

Resource volume estimation for the Fagn prospect has been performed using a probabilistic Monte-Carlo simulation in the REP software. Reservoir and fluid parameters together with volumes estimates for the different Fagn Lower Tilje segments are shown in Fig. 4.3, Fig. 4.4, Fig. 4.5 and Fig. 4.6.

<u>Fig. 4.7</u>, shows the resource potential and the probability of discovery from the application summary, while <u>Fig. 4.8</u> shows the updated resource potential for the different segments of the Fagn prospect for the main reservoir interval.

<u>Table 4.1</u>, shows the updated risking of the different segments in Fagn after the full prospect evaluation.

Table 4.1 Fagn risking overview performed 2022

Risk Elements	Main	Central	West	North
Trap	1.0	1.0	1.0	1.0
Reservoir	0.9	0.8	0.8	0.8
Charge	0.8	0.8	0.8	0.8
Retention	0.7	0.7	0.6	0.4
POSg (%)	50 %	45 %	38 %	26 %



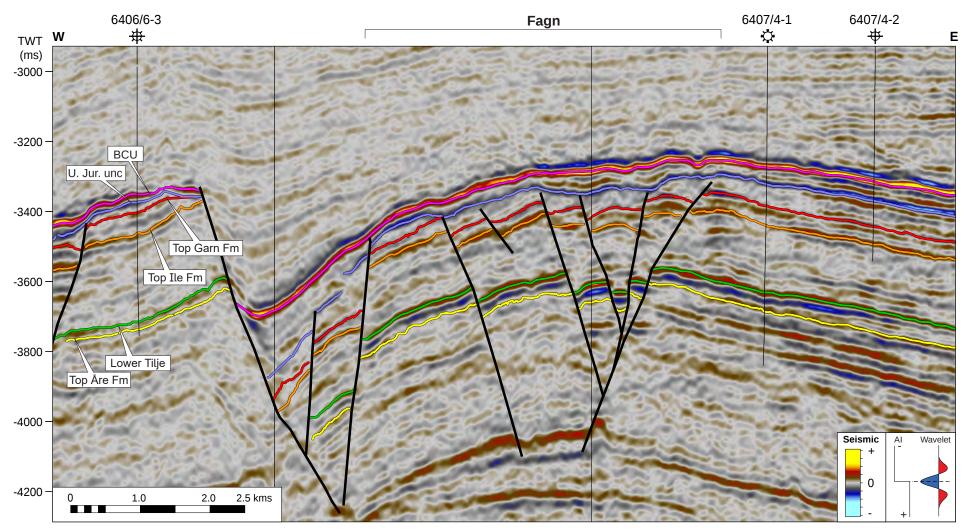


Fig. 4.1 PL1117 Fagn prospect
Arbitrary seismic line in a west to east direction from 6406/6-3 Mjøsa discovery crossing over the Fagn prospect, 6407/4-1 Spinell Sør discovery and the 6407/4-2 well.



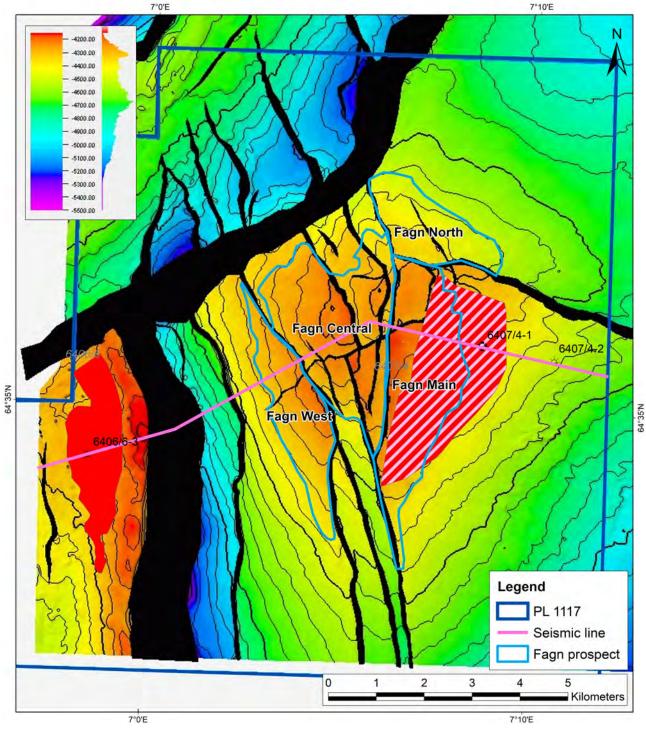


Fig. 4.2 Top Lower Tilje reservoir depth map
The light blue outlines show the different outline of the different Fagn segments; Main, Central, West and North.
CI=30 m.



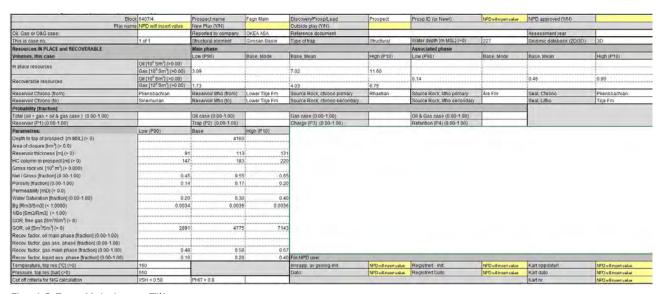


Fig. 4.3 Fagn Main Lower Tilje segment

The table is showing reservoir and fluid parameters, in-place and recoverable volumes for the Lower Tilje reservoir interval.

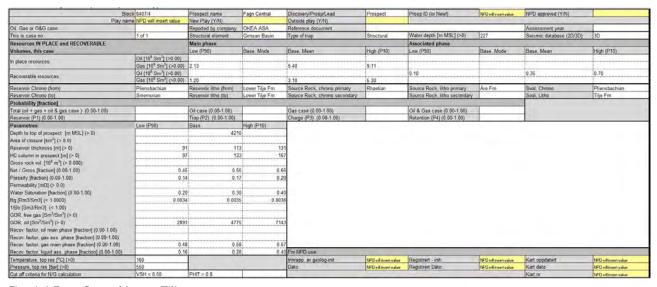


Fig. 4.4 Fagn Central Lower Tilje segment

The table is showing reservoir and fluid parameters, in-place and recoverable volumes for the Lower Tilje reservoir interval.



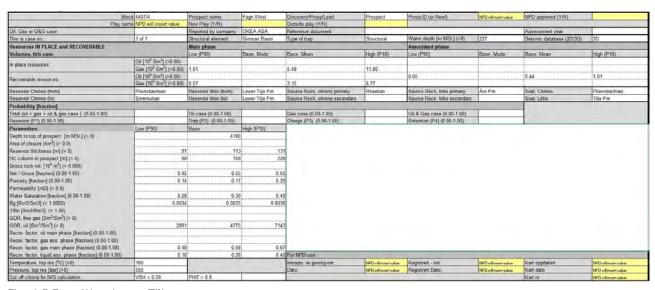


Fig. 4.5 Fagn West Lower Tilje segment

The table is showing reservoir and fluid parameters, in-place and recoverable volumes for the Lower Tilje reservoir interval.

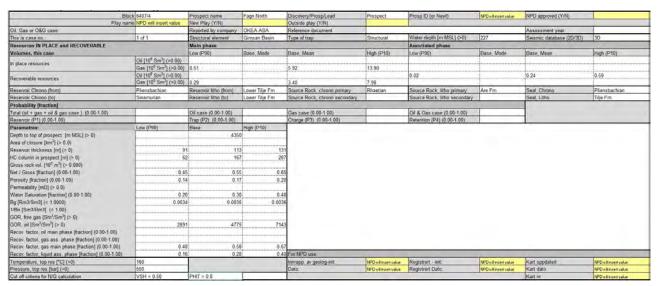


Fig. 4.6 Fagn North Lower Tilje segment

The table is showing reservoir and fluid parameters, in-place and recoverable volumes for the Lower Tilje reservoir interval.

Discovery/ D/ Case   Oil/		64	100000000000000000000000000000000000000		Unrisked recoverable resources <sup>4</sup>						Resources in	Reservoir		Nearest relevant infrastructure 8	
			Oil [10 <sup>8</sup> Sm (>0.00)	1 <sup>3</sup> ]	Gas [10 <sup>9</sup> Sm³] (>0.00)			Probability of discovery <sup>5</sup> (0.00 - 1.00)	acreage applied for [%] <sup>8</sup>	Litho-/ Chrono- stratigraphic level	Reservoir depth	Name	Km		
		3	Low (P90)	Base (Mean)	High (P10)	Low (P90)	Base (Mean)	High (P10)		(0.0 - 100.0)	7	[m MSL] (>0)	MSL	(>0)	
Fagn Main	Р	Gas	0,28	2,39	5,59	1,35	4,29	7,76	0,38	100,0	Tilje Fm/Lower Jurassic	4175	Tyrihans Field	17	
Fagn North	Р	Gas	0,20	1,52	3,52	1,04	2,73	4,82	0,19	100,0	Tilje Fm/Lower Jurassic	4365	Tyrihans Field	17	
Fagn Central	P	Gas	0,21	1,64	3,78	1,13	2,96	4,94	0,16	100,0	Tilje Fm/Lower Jurassic	4260	Tyrihans Field	17	
Fagn West	Р	Gas	0,10	0,79	1,83	0,53	1,41	2,53	0,24	100,0	Tilje Fm/Lower Jurassic	4200	Tyrihans Field	17	
Spinell Sør	D	Gas	0,40	1,20	2,00	0,70	1,90	3,30	1,00	100,0	Garn Fm/Middle Jurassic	3740	Tyrihans Field	17	
Mjøsa	D	Gas	0,13	0,80	1,77	0,86	1,45	2,39	1,00	100,0	Garn Fm/Middle Jurassic	3730	Tyrihans Field	22	

Fig. 4.7 Resource potential summary from 2020

Overview of the resource potential and risks regarding the structures applied for in the APA2020. The table also shows volumes for the Spinell and Mjøsa discoveries.



Discovery/ D/ (Oil Prospect/ Lead P/ Gas	-	Case	Unrisked recoverable resources <sup>4</sup>							Resources in	Reservoir		Nearest relevant infrastructure <sup>8</sup>	
	P/ Gas/	(	Oil [10 <sup>6</sup> Sm <sup>3</sup> (>0,00)	]	G	Gas [10 <sup>9</sup> Sm (>0,00)	3]	Probability of discovery <sup>5</sup> (0,00 - 1,00)	acreage applied for [%] <sup>6</sup>	Litho-/ Chrono- stratigraphic level	Reservoir depth	Name	Km	
		3	Low (P90)	Base (Mean)	High (P10)	Low (P90)	Base (Mean)	High (P10)	(-)	(0,0 - 100,0)	7	[m MSL] (>0)	ridino	(>0)
Fagn Main	Р	Gas	0.14	0.46	0.90	1.73	4.03	6.75	0.50	100.0	Lower Tilje Fm/ Lower Jurassic	4180	Tyrihans Field	17
Fagn North	Р	Gas	0.02	0.24	0.59	0.29	3.40	7.98	0.26	100.0	Lower Tilje Fm/ Lower Jurassic	4350	Tyrihans Field	17
Fagn Central	Р	Gas	0.10	0.35	0.70	1.20	3.10	5.30	0.45	100.0	Lower Tilje Fm/ Lower Jurassic	4210	Tyrihans Field	17
Fagn West	Р	Gas	0.05	0.44	1.01	0.57	3.15	6.77	0.38	100.0	Lower Tilje Fm/ Lower Jurassic	4200	Tyrihans Field	17
Spinell Sør	D	Gas	0.40	1.20	2.00	0.70	1.90	3.30	1.00	100.0	Garn Fm/ Middle Jurassic	3740	Tyrihans Field	17
Mjøsa	D	Gas	0.13	0.80	1.77	0.86	1.45	2.39	1.00	100.0	Garn Fm/ Middle Jurassic	3730	Tyrihans Field	22

Fig. 4.8 Updated resource potential and risk performed 2022

Overview of the resource potential and risking based on the geological and geophysical evaluation. The volumes for the Spinell and Mjøsa discoveries listed in the table are the same as listed in table 4.1



## 5 Technical assessment

The business concept considered for the Fagn prospect, is a tie-back to Tyrihans, approximately 21 km North of Fagn, with a 4x slot template and a production pipeline Tyrihans-Åsgard.

## 6 Conclusion

The work programme for PL1117 have been fulfilled by the performed geological and geophysical studies.

OKEA ASA as the operator for PL1117 planned to propose to drill an exploration well to the partnership, targeting the main reservoir interval in the Fagn prospect. Being a HPHT well, it was necessary with a HPHT qualified operator. Unfortunately, OKEA ASA has been unsuccessful getting a new partner and operator into the licence in time for the DoD deadline. The PL1117 partnership agreed to drop the licence at the DoD decision gate.

