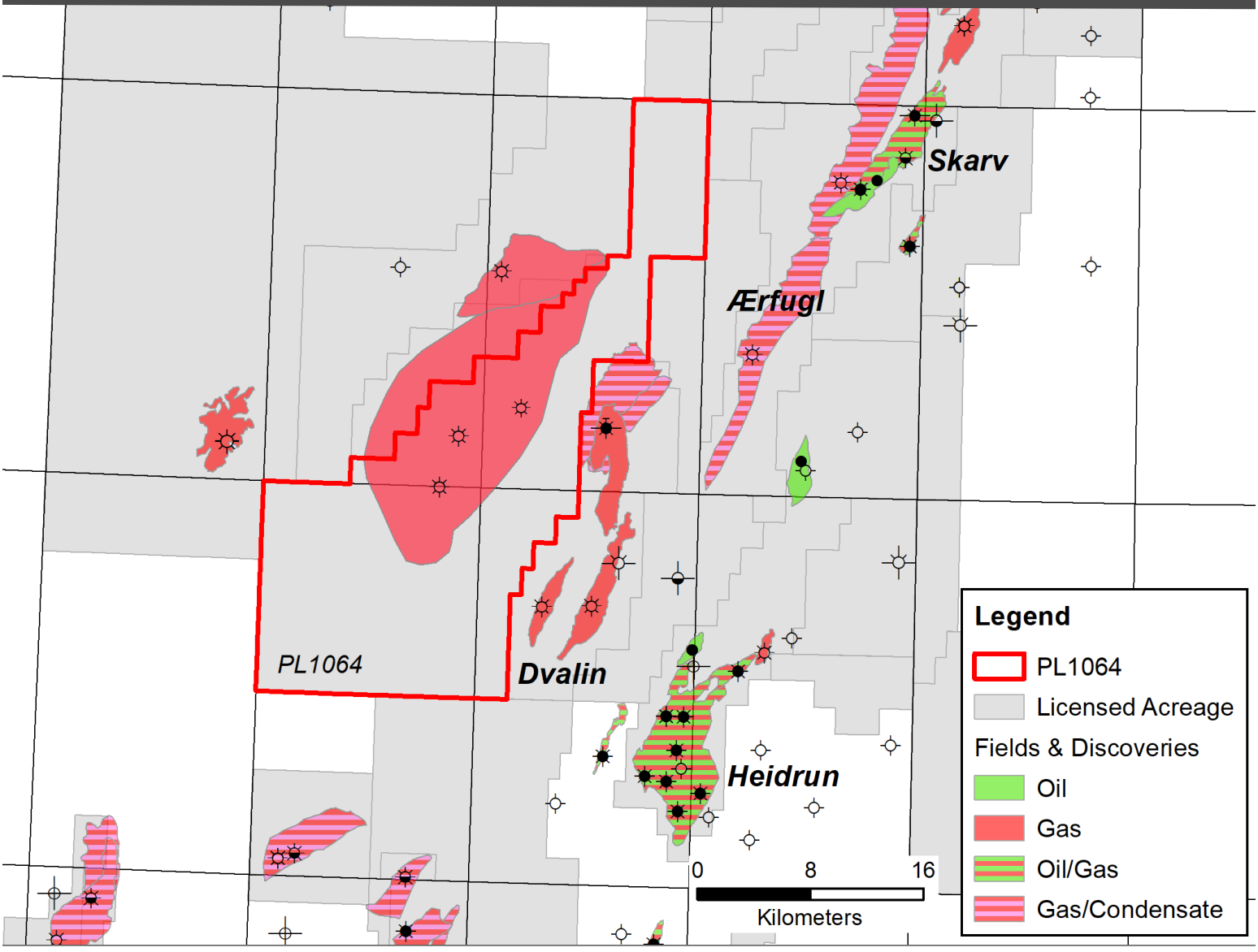
PL1064
Status Report



ConocoPhillips PGNiG | UPSTREAM NORWAY AkerBP equinor

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1 License History

Production license 1064 consists of parts of blocks 6507/4, 6507/7, 6506/6 & 6506/9 in the Norwegian Sea, located west and south-west of the Skarv field and north-west of the Heidrun field (Fig. 1.1). The license was awarded 14th February 2020 with a one firm well work obligation to ConcocPhillips as the Operator and the partners listed in Table 1.1 . Original license deadlines, and extended deadlines approved in December 2020, are shown in Table 1.2.

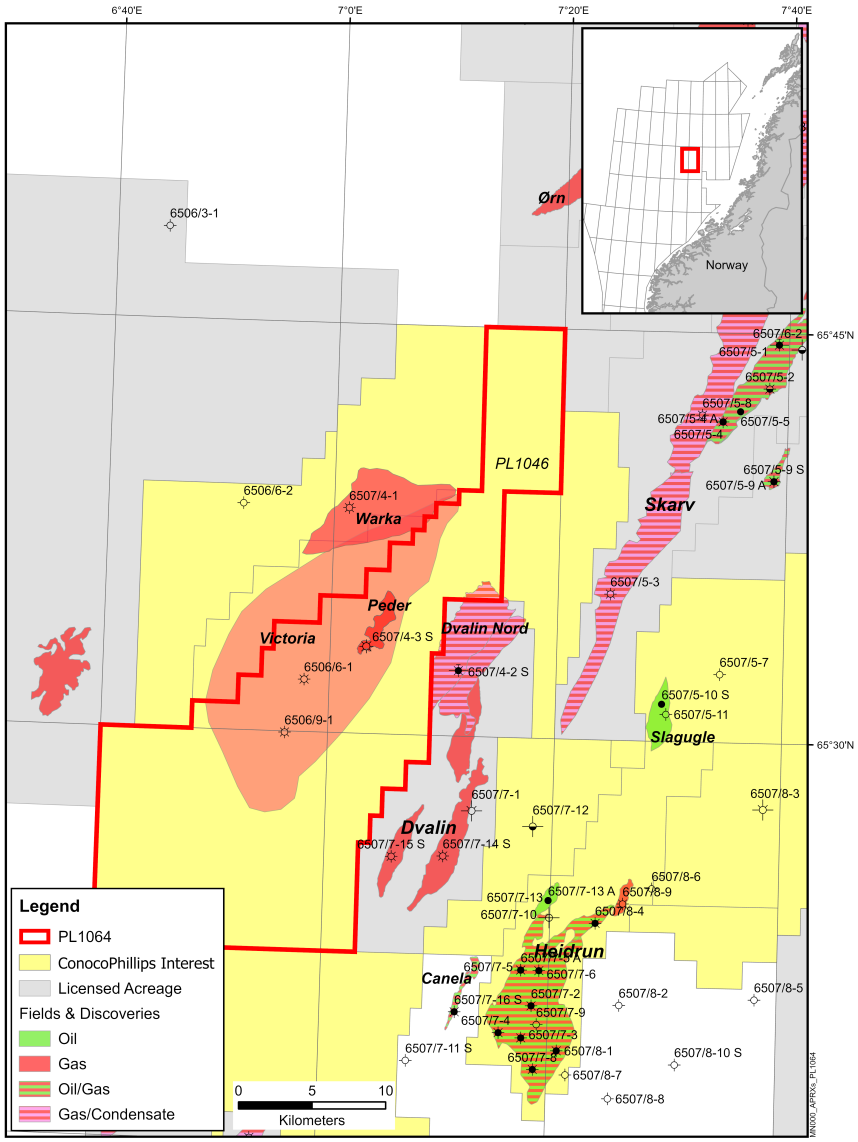

Fig. 1.1 PL 1064 location map.

Table 1.1 PL 1064 partnership

PL 1064 Partnership			
Company	**Role**	**At award**	**From 2021**
ConocoPhillips Skandinavia AS	Operator	40%	40%
PGNiG Upstream Norway AS	Partner	30%	30%
Aker BP ASA	Partner	30%	20%
Equinor Energy AS	Partner		10%

Table 1.2 PL 1064 deadlines

PL 1064 original deadlines and extension approved in December 2020			
Work obligation	**Decision**	**Original deadline**	**Extended deadline**
Drill firm well	(BoK) Decision to concretize	14.02.2022	14.02.2023
Conceptual studies	(BoV) Decision to continue	14.02.2024	14.02.2025
(PDO) Prepare plan for development	(PDO) Submit plan for development	14.02.2025	14.02.2026

The license drilled the 6507/4-3S Peder well from 28.04.2022 to 13.06.2022. The well was classified as a minor gas discovery with calculated in-place volumes between 0.21 and 0.39 x 10^6 Sm^3 OE (P90-P10). The technically recoverable volume is predicted to range from 0.06 to 0.13 Sm^3 OE and is not of commercial interest.

The work obligation is fulfilled and the license group has decided to surrender the acreage. The remaining leads in the Cretaceous play are all small and not considered viable candidates for a second exploration well and the deep Jurassic Victoria discovery has not been of interest to the PL 1064 partnership (Section 4 Prospect Updates).

A total of 19 meetings were held in the license, including EC work meetings and ECMC meetings (Table 1.3).

Table 1.3 PL 1064 license meetings

Meeting	Purpose	Date
ECMC #1	Startup meeting	18.03.2020
EC Work Meeting	Well location discussion	17.04.2020
MC #2	Budget for site survey	03.06.2020
ECMC #3	Year end status and 2021 wp & budget proposal	18.11.2020
ECMC #4	Well planning update and 2022 preliminary budget	26.05.2021
EC Work Meeting	Well location discussion	24.06.2021
ECMC #5	Well planning update and preliminary well cost	30.08.2021
EC Work Meeting	Well design workshop	01.09.2021
EC Work Meeting	Coring and DST workshop	10.11.2021
EC Work Meeting	Mini DST knowledge share	30.11.2021
ECMC #6	Year end status and 2022 wp & budget proposal	09.12.2021
EC Work Meeting	VSP recommendation	20.01.2022
EC Work Meeting	Drill Well on Paper	17.02.2022
EC Work Meeting	Well path and data acquisition plan	24.02.2022
EC Work Meeting	Peder well - operational update #1	02.06.2022
EC Work Meeting	Peder well - operational update #2	09.06.2022
ECMC #7	Preliminary post well study results, budget status and preliminary 2023 budget	30.06.2022
EC Work Meeting	Post well evaluation update	20.10.2022
ECMC #8	Post well study summary, remaining inventory and 2023 budget proposal	14.12.2022

2 Database

2.1 Seismic Database

The PL1064 common seismic database is shown in Fig. 2.1 and listed in Table 2.1 . The primary dataset used for the interpretation is a ConocoPhillips conditioned version of the PGS16909NWS depth migration (PGS16909NWS_COP_R19). The intra K56 top reservoir interpretation was primarily done on far (30-40 degrees), ultra far (40-50 degrees) and extended far (20-50 degrees) angle volumes due to the class II and IIp AVO response at top reservoir level.

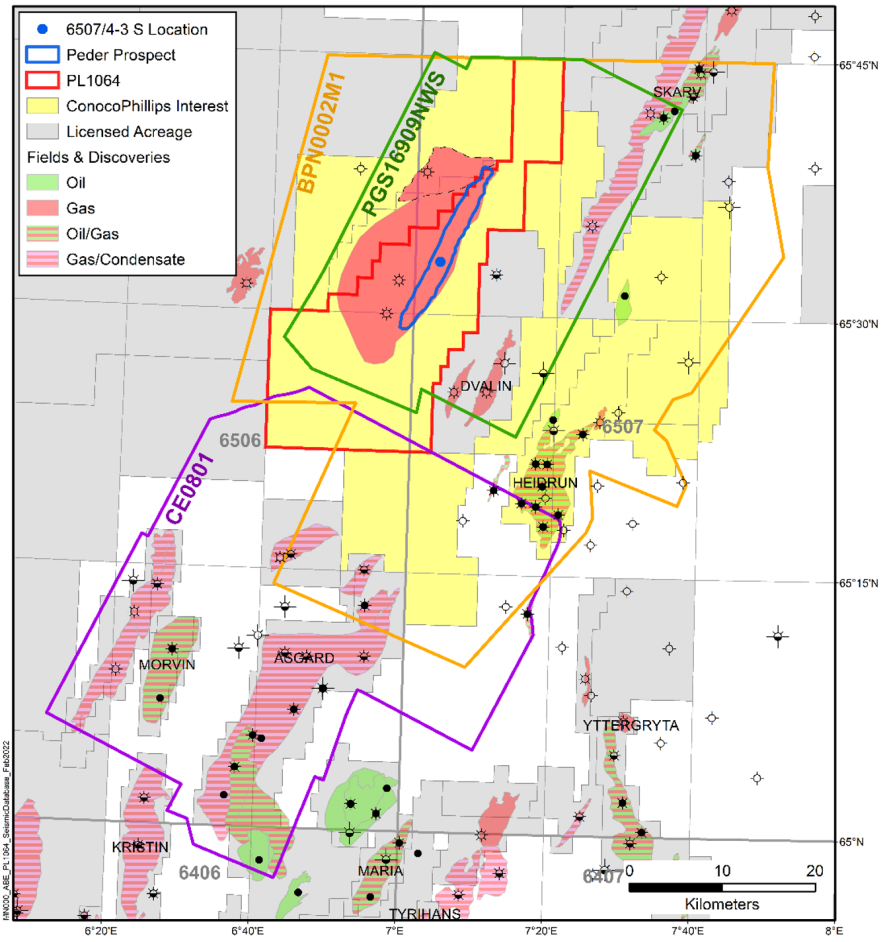

Fig. 2.1 Seismic database.

Table 2.1 Seismic surveys used for license evaluation.

Survey Name	NPDID	Original data	Year	Market availability	Comments
MC3D-HVG2011	7379	Unique	2011	Yes, PGS multi-client	3D broadband geostreamer acquisition. Time migration. Used for PGS16909NWS merge.
MC3D-HCG2012	7616	Unique	2013	Yes, PGS multi-client	3D broadband geostreamer acquisition. Time migration. Used for PGS16909NWS merge.
PGS16909NWS	None	HVG2011, HVG2012, HVG2013 and PGS14002	2018	Yes, PGS multi-client	Regional 3D depth migration and merge of four PGS broadband surveys.
PGS16909NWS_COP_R19	None	PGS16909NWS	2019	No, in-house ConocoPhillips	ConocoPhillips in-house conditioning designed for improved quality of the Cretaceous.
BPN0002M1	None	Numerous released surveys	2002	Released	Part of supergrid merge included in db. Released full stack data for regional well ties.
CE0801	4516	Unique	2008	Released	Released full stack data for regional well ties

2.2 Well database

The common well database for PL 1064 is included in Table 2.2.

Table 2.2 Common well database

Well	NPDID	Name	Water depth m	Year	TDm MD RKB	Fm at TD	Operator	Status	Content	Availability
6506/11-1	1216		246	1988	4679	Åre	Det norske	Gas shows	Gas shows in Lysing/E-Lange/Fangst	Public
6506/11-10	8317	Hades/iris	342	2018	4536	Early Jurassic	OMV	Discovery	Gas/cond in E.Cret/M.Jurassic	Public
6506/11-2	1754	Lange	297	1991	4813	Åre	Statoil	Discovery	Oil/gas in Lange/Ile/Tilje	Public
6506/11-3	1973		328	1992	4350	Not	Det norske	Shows	Oil/gas shows in Lysing & Lange	Public
6506/11-4 S	2736	Smørbukk app.	303	1996	5110	Åre	Statoil	Oil	Oil/gas in Fangst/Båt	Public
6506/11-7	3322	Morvin	356	2001	4977.5	Åre	StatoilHydro	Discovery	Oil/gas in Jurassic	Public
6506/11-8	5295	Morvin	380	2006	4990	Tilje	Statoil ASA	Appraisal	Oil in Jurassic	Public
6506/12-12 S	6144	Åsgard	301	2009	5508	Åre	StatoilHydro	Discovery	Oil/gas in Cromer Knoll & Jurassic	Public
6506/12-3	458	Smørbukk Sør	301	1985	4360	Tilje	Det norske	Discovery	Oil/gas in Lysing/Fangst/Tilje	Public
6506/3-1	4344	Harran-Grong	341	2001	3667	Lange	Chevron	Dry		Public
6506/6-1	4122	Victoria	434	2000	5491	Åre	Mobil	Discovery	Gas in Jurassic	Public
6506/6-2	6960	Albert	408	2013	3366	Early Cretaceous	Maersk Oil	Dry		Public
6506/9-1	5980	Victoria	416	2009	5664	Åre	Total	Appraisal	Gas in Jurassic	Public
6506/9-2 S	6332	Fogelberg	281	2010	4805	Early Jurassic	Centrica	Discovery	Gas/cond in Jurassic	Public
6506/9-3	7207	Smørbukk Nord	302	2013	4692	Åre	Statoil	Discovery	Gas/cond in Lange/Jurassic	Public
6507/2-1	911		381	1986	4477	Åre	Norsk Hydro	Shows	Oil shows in Lysing/Lange/Fangst/Båt	Public
6507/2-2	1840	Marulk	384	1992	3958	Åre	Norsk Hydro	Discovery	Gas/cond in Lysing & Lange	Public
6507/2-3	2299		355	1994	3972	Spekk	Norsk Hydro	Oil shows	Oil shows in Cretaceous	Public
6507/2-4	5685	Marulk	365	2008	3600	Lyr	Eni	Discovery	Gas/cond in Lysing & Lange	Public
6507/5-1	3683	Skarv	323	1998	4224	Åre	Amoco	Discovery	Oil/Gas/cond in Lange/Fangst/Båt	Public
6507/5-2	3756	Skarv	347	1999	3897	Åre	Amoco	Discovery	Gas/cond in Garn	Public
6507/5-3	4059	Ærfugl	417	2000	3000	Lange	BP Amoco	Discovery	Gas in Late Cretaceous	Public
6507/5-4	4209	Skarv	421	2001	3812	Åre	BP Amoco	Discovery	Oil/gas in Lange & Jurassic	Public
6507/5-5	4428	Skarv	375	2002	3948	Åre	BP Amoco	Discovery	Oil in Garn	Public
6507/5-8	8379	Skarv	408	2018	3690	Early Cretaceous	Aker BP	Discovery	Gas in Late Cretaceous	Public
6507/6-2	1520		315	1991	4354	Åre	Saga	Oil shows	Oil shows in Lysing	Public
6507/7-1	138		367	1984	4825	Tilje	Conoco	Gas shows	Gas shows in Jurassic	Public
6507/7-12	3812		333	1999	3976	Spekk	Conoco	Oil shows	Oil shows in Lange	Public
6507/7-14 S	6367	Dvalin	344	2010	4534	Tilje	RWE Dea	Discovery	Gas in Fangst Gp	Public
6507/7-15 S	6730	Dvalin	399	2012	4567	Early Jurassic	RWE Dea	Discovery	Gas in Middle Jurassic	Public
6607/12-2 S	6642	Alve North	369	2011	4404	Early Jurassic	Total	Discovery	Oil/gas in Lange & Jurassic	Public
6607/12-3	7039		363	2012	4306	Åre	Statoil	Discovery	Gas in Lange/Ile/Åre	Public
6608/10-12	5949	Skuld	383	2008	2180	Red Beds	StatoilHydro	Discovery	Oil in Lysing & Åre	Public
6608/10-17 S	8065	Cape Vulture	375	2017	3323	Early Cretaceous	Statoil	Discovery	Oil/gas in Cretaceous	Public
6507/4-1	9110	Warka	400	2020	4985	Early Cretaceous	ConocoPhillips	Discovery	Gas in Cretaceous	Public
6507/4-2 S	9251	Dvalin Nord	450	2021	4485	Early Jurassic	Wintershall DEA	Discovery	Gas/Oil in Cretaceous, Gas in Jurassic	
6506/5-1 S	8961	Nidhogg	409	2020	3225	Early Cretaceous	Aker BP	Discovery	Gas in Cretaceous	Public

3 Summary of Geological and Geophysical studies

The license was awarded with a firm well obligation and the operator immedately started well planning upon award. Therefore, limited studies were undertaken in the pre-drill phase. A biostratigraphic study of the Dvalin North well was the only study completed in the pre-drill phase, with the objective to provide a more robust stratigraphic framework for application in the drilling of the upcoming Peder well. This study was done by Petrostrat Ltd. in 2022 and comprised new analyses of cutting samples by PetroStrat over the interval from 2850 m to 3830 m (Petrostrat, 2022). It also included a review and integration of microfossil and palynological data produced by APT in 2021 over the interval from 2510 m to 4000 m. ConocoPhillips had recently traded this well and it was one of the closest analogs with a discovery in the K56 Lange Formation, situated only ~6 km to the east of Peder well location.

The chronostratigraphic framework provided by Petrostrat from Santonian to Cenomanian was more refined than the previous interpretation by APT (2021). Microfossil recovery in the Lange formations were very impoverished, however palynology recovery was good in the new analyses. A lot of reworked taxa were idenfied, that APT had interpreted as in situ. The study led to a more refined stratigraphic breakdown which were more consistent with offset wells.

The license drilled the 6507/4-3S Peder well from 28.04.2022 to 13.06.2022. The 6507/4-3S Peder well was located just inside a subtle 4-way dip closure, but a stratigraphic trap was needed to fill the entire pre-drill prospect that was defined by a strong far angle amplitude anomaly. The well found only a thin gas layer with 0.5 meter net pay at the top of the reservoir, and within the pre-defined small 4-way-dip closure. The remaining part of the reservoir interval was water wet with hydrocarbon shows and low permeability. This outcome suggest lack of an effective stratigraphic trap, but potential presence of a larger trap in the past. The mapped amplitude was the response from a low saturation gas sandstone. The well was classified as a minor gas discovery, but the outcome was pre-drill risked as a failure case and recognized as an amplitude pitfall.

A post drill volume assessment was made for the small 4-way-dip closure proven by the well, outlined in purple on Fig. 3.1. The calculated in-place P90 to P10 gas volumes are between 0.21 and 0.39 x 10^6 Sm^3 OE. The technically recoverable volume is predicted to range from 0.06 to 0.13 x 10^6 Sm^3 OE.

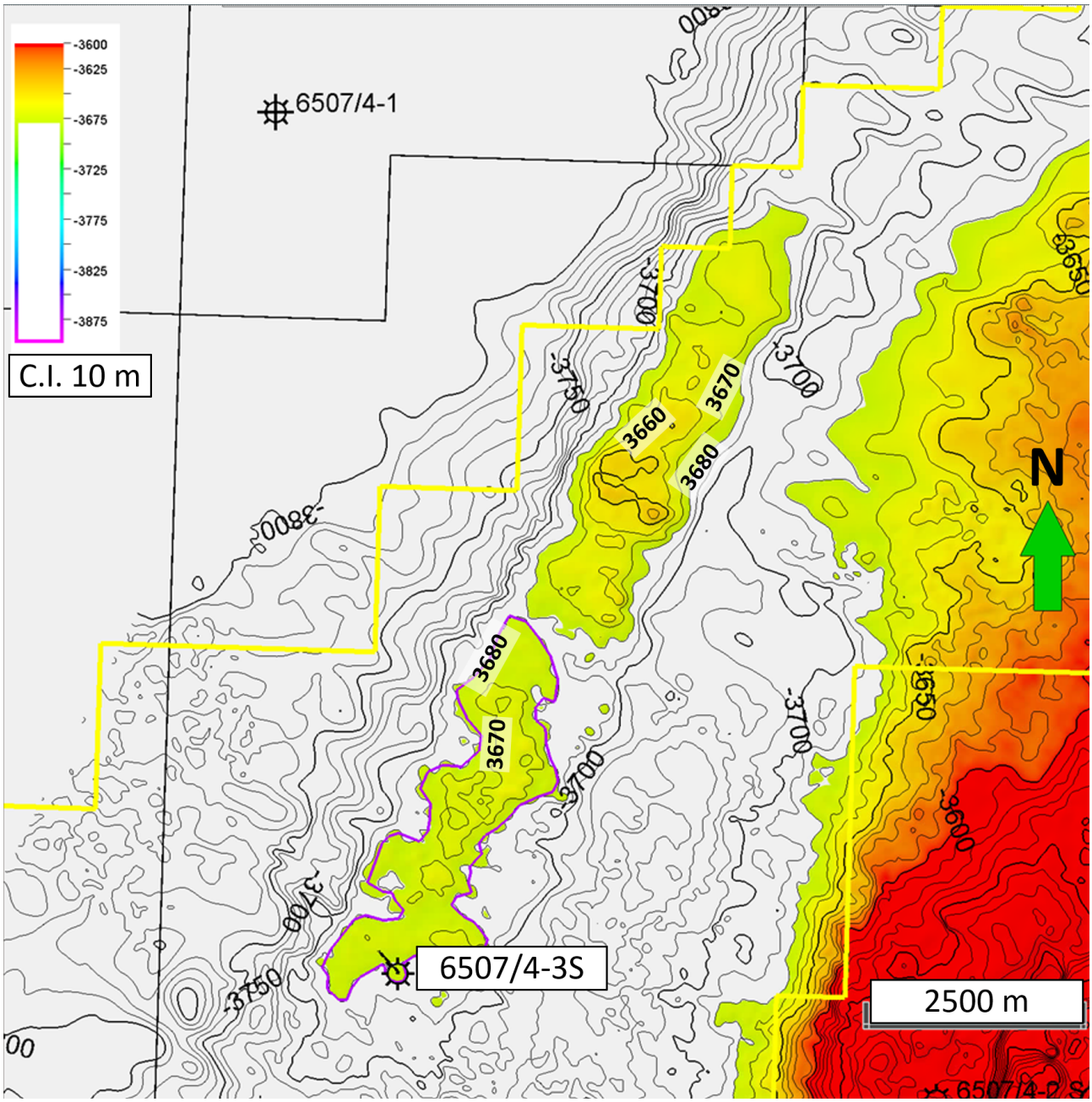

Fig. 3.1 Top reservoir depth map

The 6507/4-3S well found a 55 m gross sandstone interval with moderate total porosity but poor effective porosity, low permeability and mainly low saturation gas. The disappointing well outcome resulted in downgraded volume estimates and increased risks on the remaining Cretaceous leads (Section 4 Prospect Updates). The 6507/4-3S Peder well specific studies are documented in the 6507/4-3S Final Well Report (ConocoPhillips, 2022) and the 6507/4-3S Peder Discovery Evaluation Report (ConocoPhillips, 2023).

4 Prospect Updates

4.1 Cretaceous Leads

The PL 1064 license was awarded with one driving prospect that was tested and condemned by the 6507/4-3S Peder well. A number of additional Cretaceous leads and ideas were recognized at the time of the APA application, these were all secondary to the Peder prospect and considered as follow-up opportunities in case of a successful first exploration well. The lead inventory was re-evaluated in a post-drill assessment and the resulting volumes and risk ranges are summarized in Table 4.1 . The remaining leads in the Cretaceous play are all small and not considered viable candidates for a second exploration well and therefore have not been worked up to prospect status and are only briefly described below. The outlines of Cretaceous leads, the Victoria discovery and downgraded ideas are included in Fig. 4.1.

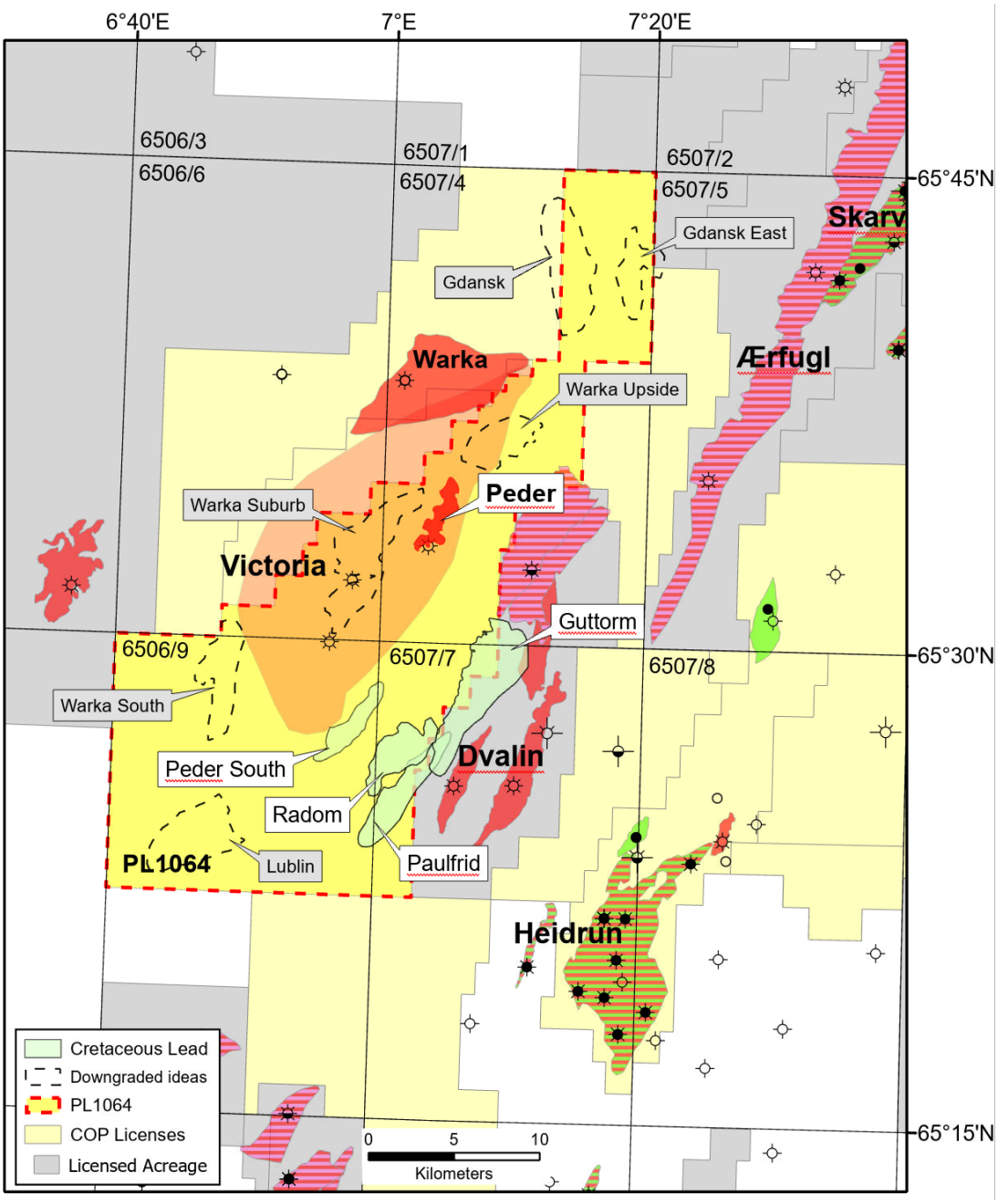

Fig. 4.1 Remaining lead inventory in PL 1064.

Table 4.1 PL 1064 lead inventory, volume and risk

Lead	Reservoir sequence	Depth to crest (m)	Recoverable resources (x10^6 Sm^{3}OE)				% in PL1064	Ps
			P90	P50	Mean	P10		
Guttorm	K54	3600	1.5	2.3	2.4	3.5	26	0.15-0.20
Paulfrid	K52	3940	1.0	1.4	1.5	2.1	79	0.15-0.20
Peder South	K56	3750	0.2	0.4	0.5	0.9	100	0.10-0.15
Radom	K56	3680	0.6	0.9	0.9	1.3	98	0.10-0.15

K54 Guttorm Lead

The best defined remaining Cretaceous opportunity in PL 1064 is the Guttorm lead (Fig. 4.2 and Table 4.1). It has a 26% chance of success and only the downdip part is located in the license. Guttorm is defined as an amplitude lead where a class II/IIp AVO response is interpreted to be consistent with the modelled response from a gas filled sandstone. Reservoir is interpreted to be of Cenomanian age (K54). The trap is stratigraphic with the crest mapped at 3600 m in the north-east. The amplitude shut-off and potential gas-water-contact is mapped at approximately 3800 m, implying about 200 m column height and volumes as listed in Table 4.1.

Key risks are reservoir quality and retention as the amplitude could represent poor quality reservoir and possibly a partly leaked column with low saturation gas.

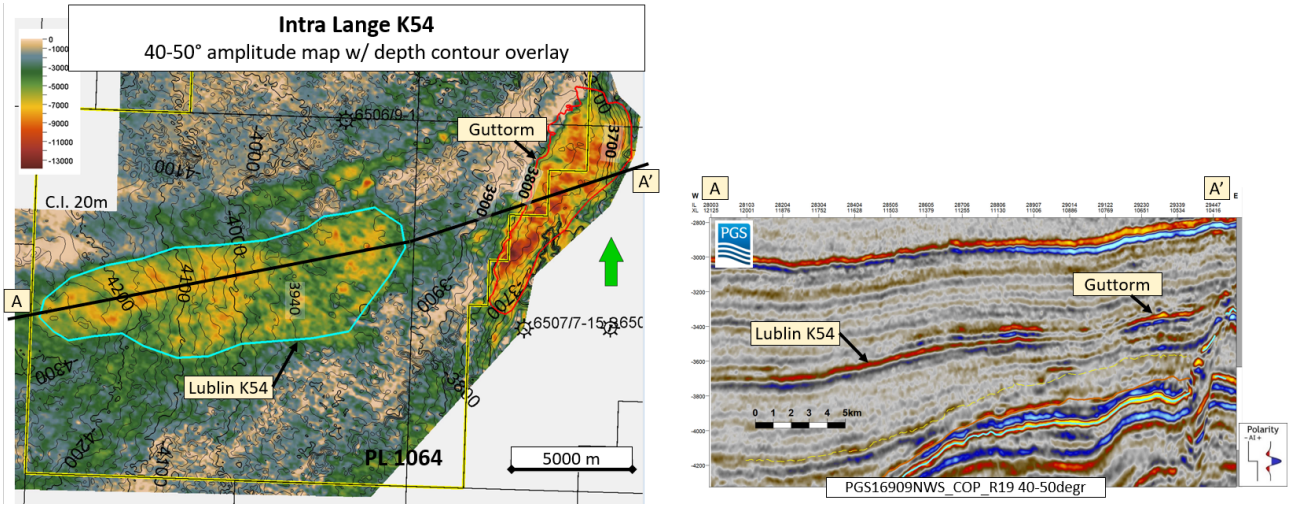

Fig. 4.2 Seismic line and map over Guttorm lead and downgraded Lublin K54 idea. Left: Ultra far angle amplitude map at intra Lange K54 level with depth contour overlay. High far angle amplitudes in the Guttorm lead is interpreted as the response from a possible gas sandstone reservoir. The lower amplitudes at the Lublin location is more likely to be a lithology effect. Right: ultra far seismic section illustrating Guttorm and Lublin K54.

K52 Paulfrid Lead

Paulfrid is a slightly deeper lead located due west of the 6507/7-15S well (Fig. 4.3). This lead is mapped in the Cenomanian K52 sequence, also as a trough-peak (soft over hard) response with a class II/IIp AVO anomaly. The crest is mapped at 3940 m and is situated in PL 211, while the best part of the amplitude and 79% of the lead is located in PL 1064 (Fig. 4.3). This is an untested reservoir level that is not directly downgraded by the 6507/4-3S Peder well result, but the size is modest (Table 4.1) and the lead is therefore not an attractive exploration target.

K56 Radom and Peder South Leads

Peder South and Radom are remaining leads identified at the same reservoir level as the minor Peder discovery. They are both stratigraphic traps defined by class II/IIp AVO anomalies and easily mapped on far angle seismic data (Fig. 4.4). The Lublin K56 idea (Fig. 4.4) was not defined as a lead as it is challenging to define a trap updip towards Peder South. The K56 leads are small and also considered to be relatively high risk (Table 4.1), as a result of disappointing results in the 6507/4-3S Peder well. Reservoir quality is the key risk combined with high chance of finding only low saturation gas.

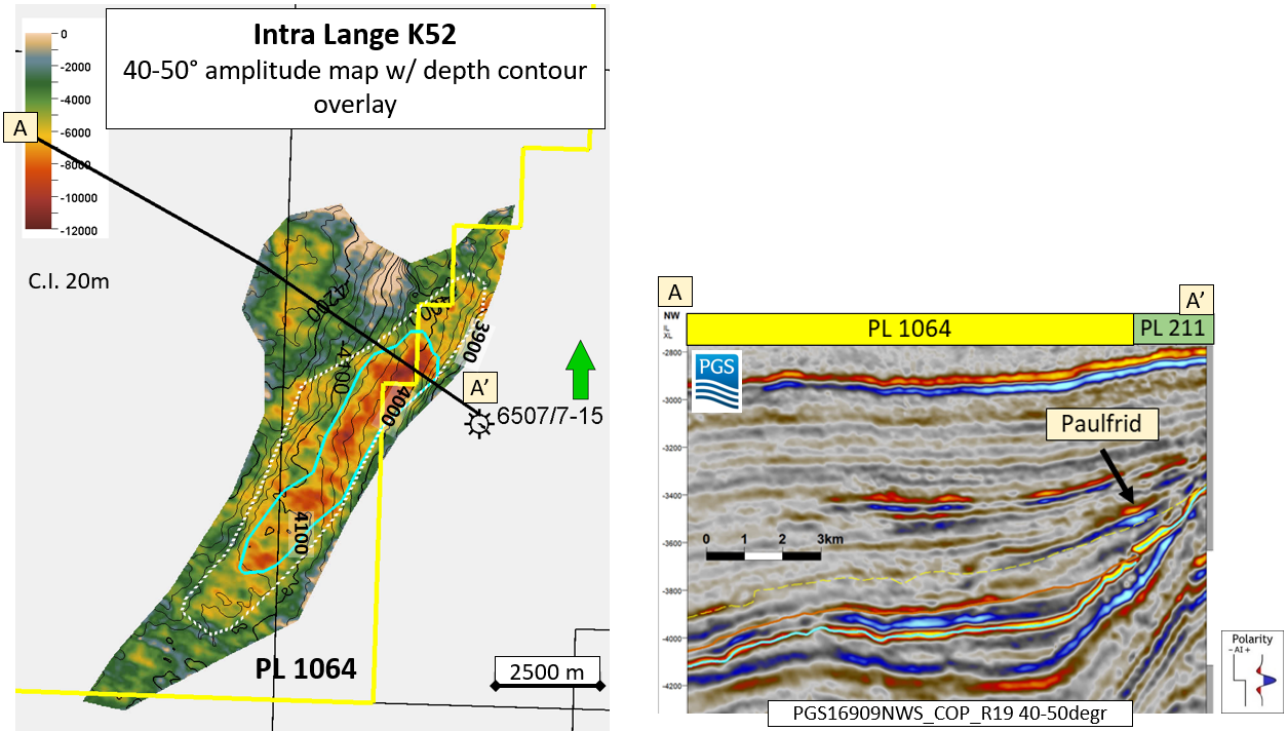

Fig. 4.3 Seismic line and map illustrating Paulfrid lead. Left: Ultra far angle amplitude map at intra Lange K52 level with depth contour overlay. High far angle amplitudes in the Paulfrid lead is interpreted as the response from a possible gas sandstone reservoir. Right: ultra far seismic section illustrating trough-peak response used to define the Paulfrid lead.

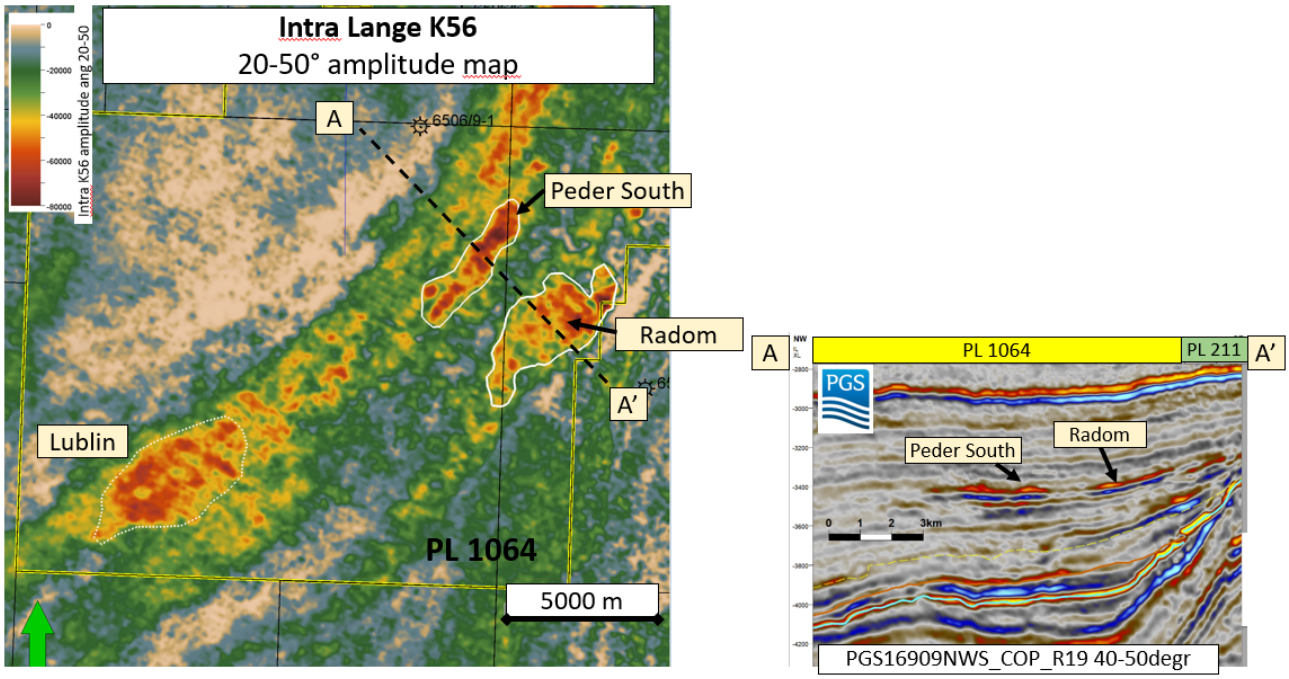

Fig. 4.4 Seismic line and map illustrating Peder South and Radom leads. Left: Extended far angle (20-50 degr) amplitude map at intra Lange K56 level. High far angle amplitudes in the Peder South and Radom leads are interpreted as the response from a possible gas sandstone reservoir. The K56 Lublin was not defined as a lead as it is challenging to define a trap between Lublin and Peder South. There is a significant chance that the amplitudes represent low saturation gas in poor reservoir or non-reservoir rocks.
Right: ultra far seismic section illustrating Peder South and Radom far amplitude response.

4.2 Victoria Discovery

Victoria is a 137 km^2 faulted 4-way-dip closure (red outline in Fig. 4.5). Depth to crest is 4820 m at Top Garn Formation level, and the structure spills to the south at 5550 m (Fig. 4.5).

The Victoria structure is divided into three main segments by two south-west to north-east oriented graben features (Fig. 4.5). The crestal part of the western segment, and the entire central and eastern segments are located inside the PL 1064 license. The 6506/6-1 and 6506/9-1 Victoria wells were both drilled in the central segment, leaving the other two segments untested. The 6507/4-3S Peder well was located above Victoria, but had only a Cretaceous target and drilled to a total depth of 3914 mTVDSS, about 1200 m shallower than the crest of the Jurassic reservoir in the eastern segment.

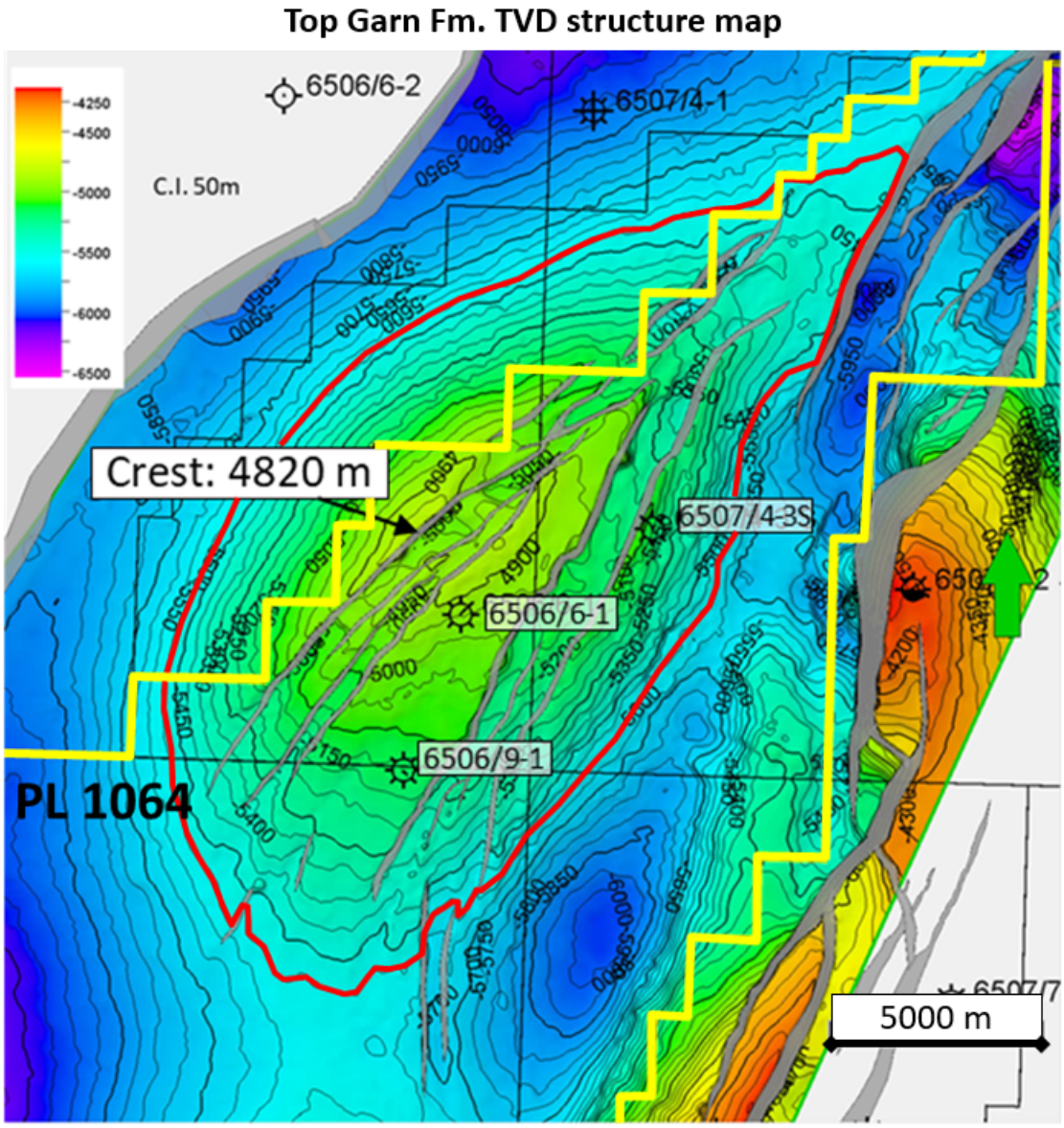

Fig. 4.5 Top Garn Formation depth structure map.

The two Victoria wells found significant thickness of sandstone in both Garn, Ile, Tilje and Åre formations (Fig. 4.6 and Table 4.2), but the reservoir quality is generally poor (Table 4.2). The Tilje Formation is volumetrically most significant with 16 and 23 m net pay in the two control wells (when pay is defined as Vsh<40%, Por>10% and Sw<60%). Calculated gas in-place volumes in Tilje Fm. range from 39 to 71 GSm^3 (P90 to P10) with a mean of 54 GSm^3. About 73% of the volumes are located within PL 1064.

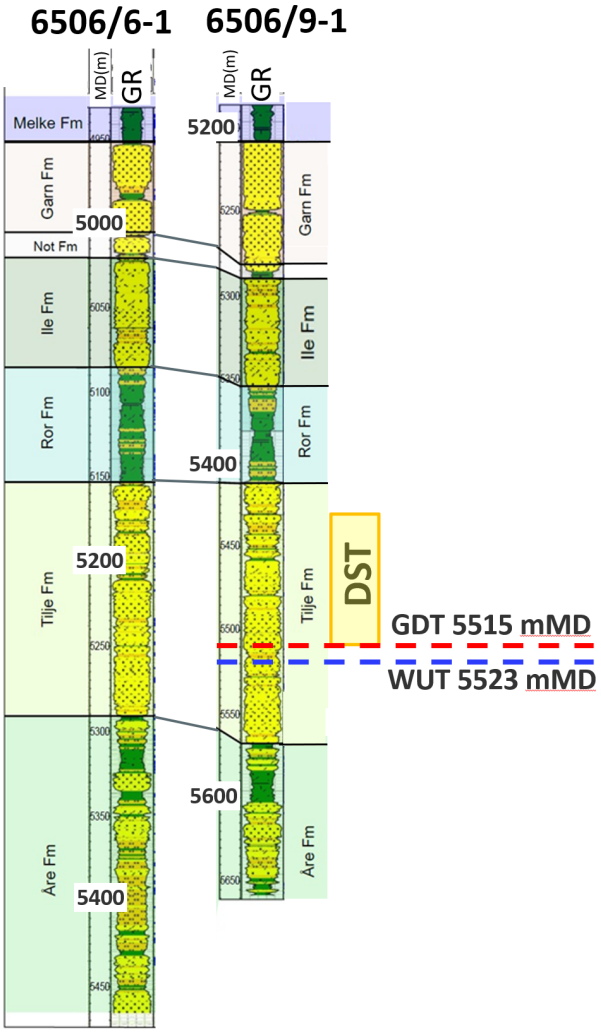

Fig. 4.6 Victoria wells. Gamma ray logs from 6506/6-1 and 6506/9-1 illustrating penetrated Jurassic sandstone intervals. The perforated interval in the 9-1 DST is shown in yellow and interpreted gas-down-to and water-up-to in the Tilje Fm. are shown with red and blue dashed lines.

Table 4.2 Petrohysical summary table for Jurassic reservoirs in the Victoria discovery. Cutoffs used for pay calculation: Vsh<0.4, Sw<0.6 and PORE>0.10

Formation	Well	Gross Formation Thickness (m)	Pay (m)	Average V_{shale} (m^3/m^3)	Average POR (m^3/m^3)	Average S_w (m^3/m^3)
Garn	6506/9-1	73,4	2,6	0,11	0,106	0,45
	6506/6-1	63,0	0,0	0,09		
Ile	6506/9-1	64,0	2,0	0,14	0,153	0,49
	6506/6-1	63,8	5,6	0,17	0,172	0,157
Tilje	6506/9-1	156,7	16,1	0,17	0,124	0,502
	6506/6-1	135,3	22,8	0,15	0,133	0,29
Åre	6506/9-1	91,9	1,4	0,19	0,1	0,33
	6506/6-1	185,2	4,9	0,20	0,127	0,176

The poro-perm measurements from core in the Tilje Formation are plotted in Fig. 4.7, illustrating generally low permeability but also some better intervals that contribute to pay. The petrophysical cut-offs for pay calculation remains one of the significant uncertainties for the volume calculation, and Fig. 4.7 shows that a 10% cut-off (0.1 mD proxy) for gas pay calculation could be on the optimistic side for Tilje Formation in the Victoria discovery. Despite the low permeability, a successful DST was carried out in the 6506/9-1 Victoria Appraisal well, but the gas rates were disappointing and there were no traces of condensate (Fig. 4.8). The gas contained 11% CO_2 and 30 ppm H_2S (Total E&P Norge, 2010).

The gas impurities, reservoir depth, low permeability and HPHT conditions results in an expensive appraisal and development program, uncertain reservoir productivity and challenged economic metrics. Further work to reduce risk and improve project economics were not prioritized by the PL 1064 partnership.

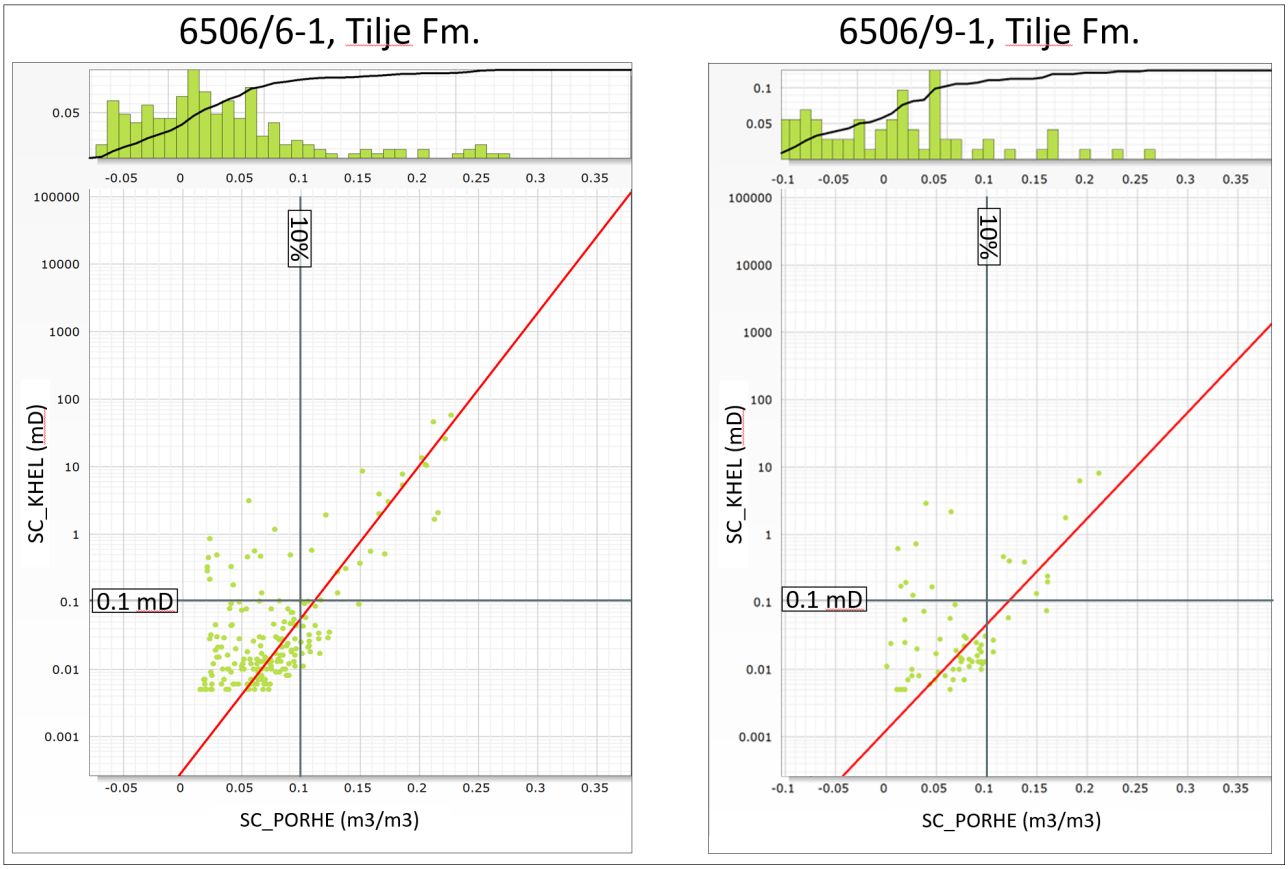

Fig. 4.7 Core poro-perm data from Tilje Fm. in Victoria wells.

PERFORATIONS				
Top	Base	Top TVDSS	Base TVDSS	Comment
5431	5515	5388.01	5471.93	

DST									
Nb	Type	Depth	Gas Flow (K Sm3/d)	Water Rate (S m3/d)	Cond (Sm3/d)	Choke (1/64")	BHP (bar)	DD (bar)	WHP (bar)
1	Cased Hole	5431 - 5515 m	170	15-20	0	16	400	415	269

Fig. 4.8 6506/9-1 DST summary table. From Final Geological Well Report, July 2010, Total E&P Norge AS.

5 Technical Evaluations

Development solutions have not been studied as the discovered resources in Peder are insignificant, and remaining Cretaceous leads are considered too small and high risk to be worked up to prospect status. The Victoria discovery was not taken through a technical and economic evaluation due to the challenges discussed in Section 4.2 Victoria Discovery.

6 Conclusions

The license drilled the 6507/4-3S Peder well from 28.04.2022 to 13.06.2022. The well was classified as a minor gas discovery with calculated in-place volumes between 0.21 and 0.39 x 10^6 Sm^3 OE (P90-P10). The technically recoverable volume is predicted to range from 0.06 to 0.13 x 10^6 Sm^3 OE and is not of commercial interest.

The work obligation is fulfilled and the license group has decided to surrender the acreage. The remaining leads in the Cretaceous play are all small and not considered viable candidates for a second exploration well (Section 4 Prospect Updates). The Jurassic Victoria discovery has not been a focus for PL 1064 as the license was awarded with a firm well on the Cretaceous Peder prospect, and no specified Jurassic work obligation. Victoria has large in-place volumes, of which about 73% is located in PL 1064. The reservoir quality is however poor, the CO_2 content in the gas is high, the reservoir is deep and at HPHT conditions. This is all leading to an expensive appraisal and development program associated with risk and challenged economic metrics that are considered negative and did not meet our threshold for further investigations.

7 References

ConocoPhillips (2022): 6507/4-3 S Peder Final Well Report Geology.

ConocoPhillips (2023): 6507/4-3S Peder Discovery Evaluation Report.

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