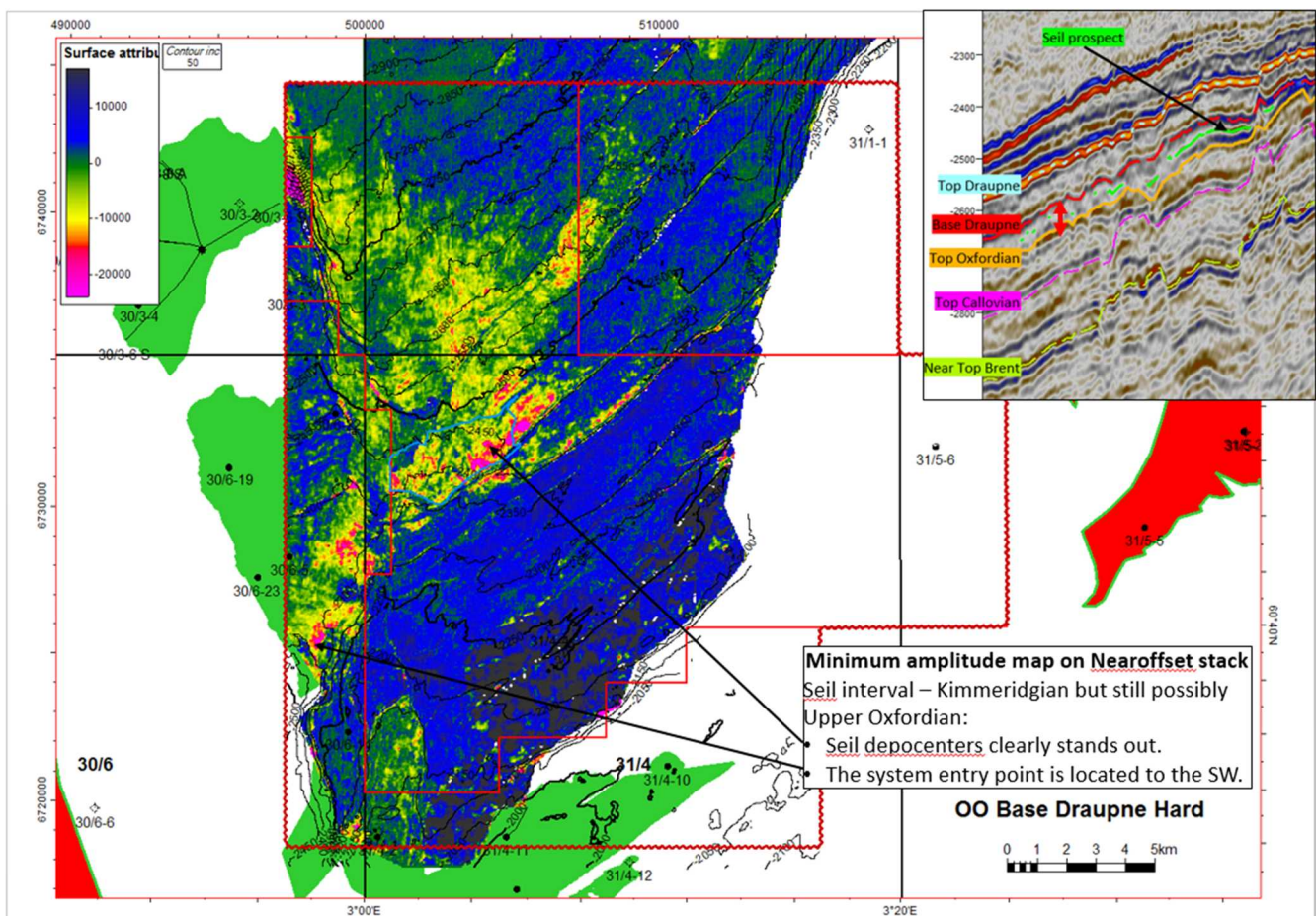


# PL877 licence Full Relinquishment Status Report NPD



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### 1. History of the Production licence

Licence PL877, consisting of part block 30/3 and 31/1, -4, and -5 in the Norwegian North Sea, is located between Oseberg East to the west and Troll Field to the East in ~280m water depth (Figure 1). Licence area is 327 km<sup>2</sup>. Licence partners are Capricorn Norge (Op) 60% and Wintershall Norge 40%.

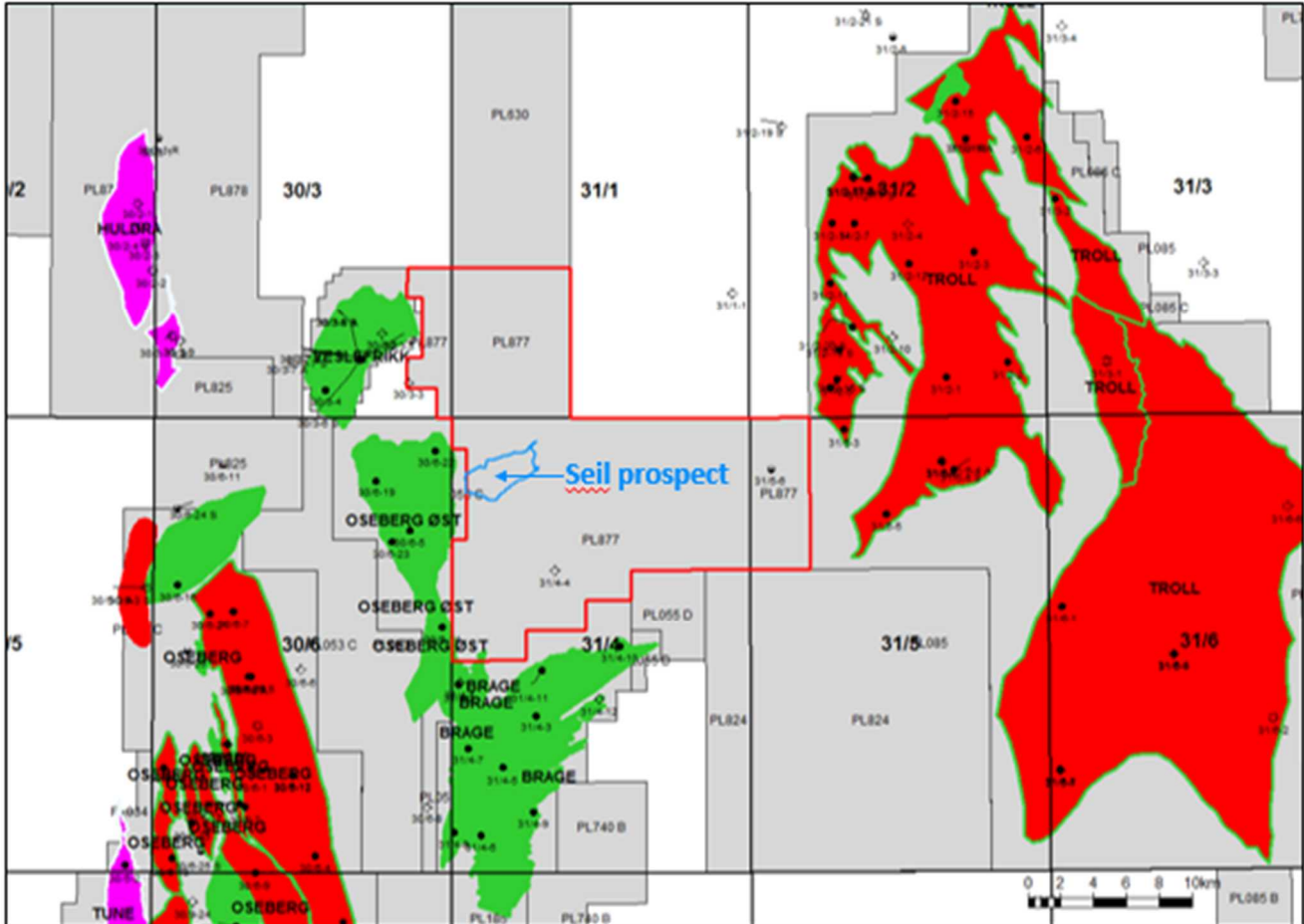


Figure 1 : PL877 Seil - licence location map with APA 2016 Seil prospect outline

Capricorn Norge applied for the licence in the 2016 APA round, and the licence was awarded February 10<sup>th</sup> 2017. The Drill and Drop decision was February 10<sup>th</sup> 2019. Capricorn has fulfilled the work program for the licence. The licence work commitment is shown in Table 1 below.

Period	Phase	Duration (Year)	Work program	Decision at milestone
Initial	1	2	Acquire and/or reprocess 3D seismic	Drill or Drop
	2	2	Drill exploration well	Concretize (BoK) or Drop
	3	2	Concretize Conceptual studies	Continuation (BoV) or Drop
	4	1	Prepare development plan	Submit PDO or Drop
	Sum	7	Extension period (years)	20

Table 2 : Licence commitments and timeline.

The partnership in the licence remained the same from the license award until the end of the exploration phase: Capricorn Norge (Op) 60% working interest and Wintershall Norge 40%. Table 2 summarizes the licence activity during the first phase.

Meeting Title	Date	Description
ECMC Meeting#1	16/03/2017	Establishment of the licence; review of the prospectivity; common database; work programme; 2017 budget
ECMC Meeting#2	28/11/2017	Status of Geological work to support sand presence in Seil. Updated seismic interpretation applying the CGG Broadseis data. 2018 budget and work programme
EC Core Workshop	06/04/2018	Workshop to assess the reservoir potential of the Seil prospect
ECMC Meeting#3	25/06/2018	Status and results, Way forward, 2019 work programme and budget
ECMC Meeting#4	29/11/2018	Final ECMC Meeting with Drill or Drop recommendation: volumes and chance of success

**Table 2: License activities during the first phase.**

Following the last ECMC Meeting (November 29<sup>th</sup> 2018), the JV partners decided to relinquish PL877 based on the following points:

1. Seil, the main prospect carried by the license partnership, could not be matured to a drillable prospect because the license work decreased the prospect volumes and increased the risk
  - a. The up-dip part of the Seil prospect was found to be located outside the license, leaving only about 20-25 mmboe (mean) out of a total 85 mmboe (mean) within the PL877 licence area.
  - b. The combined Trap/Seal risk has increased due to a more complex trap mechanism, relying on juxtaposition seal against a number of faults. Apex of the trap is located outside PL877. Seismic amplitude character studies indicate that the portion of the trap contained in PL877 does not contain hydrocarbons.
  - c. The Reservoir presence and quality risk has increased slightly because of the updated understanding of depositional environment acquired through the license work program.
2. A number of other leads and prospects have been screened and evaluated, but all classified as marginal and risky. None of these was seen as robust enough to support a drill decision.

## 6. Database overviews

### Seismic data

Prospectivity mapping for the original APA 2016 application was carried out on publically available seismic which did not provide a continuous 3D coverage of the area. As part of the work programme associated to the first phase, the PL877 joint venture agreed to acquire the modern CGG Horda broadband 3D dataset (CGG17M01) to be used as the common database for the licence. This dataset has regional coverage and is of superior quality compared to the publically available data. Table 3 summarizes the seismic released data used for the application work and the CGG Horda broadband data acquired for the PL877 licence. Figure 2 shows the outline of the portion of CGG17M01 forming the seismic database for the license.

Survey Name		Type Data: 2D/3D/CSEM	Acq year	Proc Year	Public/Multiclient	NPDID
NH9801		3D seismic	1998	1998	Public	3924
ST13M03 merge of:	MN9201	3D seismic	1992	2013	Public	3517
	ST9303	3D seismic	1993			3627
	NH9401	3D seismic	1994			3674
CGG17M01 merge of:	CGG14003	3D seismic	2014	2017	Multiclient	7984
	CGG15004	3D seismic	2015			8195
	CGG15005	3D seismic	2015			8196

**Table 3: List of seismic data used in the application.**

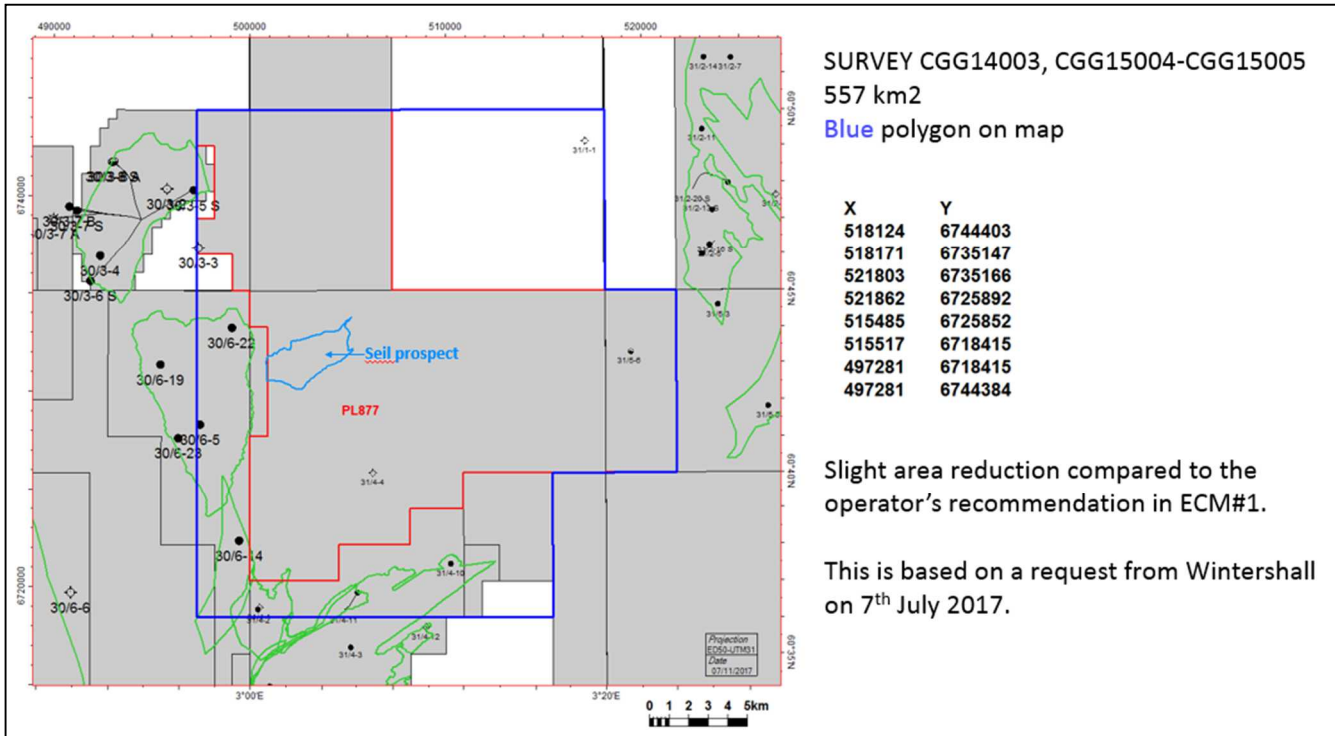


Figure 2: PL877 seismic database

Well data

Table 4 shows the approved common well database used for the technical evaluation in PL877.

Well Name	Year	TD (depth m TVDSS), Formation, Age	Status
30/3-2R	1981	Hegre Gp	Released
30/3-3	1983	Statfjord Gp	Released
30/6-8	1982	Statfjord Gp	Released
30/6-14	1988	Statfjord Gp	Released
30/6-22	1988	Statfjord Gp	Released
31/1-1	2008	Statfjord Gp	Released
31/3-3	1984	Statfjord Gp	Released
31/4-2	1979	Hegre Gp	Released
31/4-3	1980	Rotliegend Gp	Released
31/4-5	1981	Hegre Gp	Released
31/4-10	1995	Heather Fm	Released
31/4-11	2000	Statfjord Gp	Released
31/4-12	2005	Fensfjord Fm	Released
31/5-6	2000	Drake Fm	Released
35/11-13	2005	Heather Fm	Released
35/11-14	2006	Heather Fm	Released
35/11-20B	2006	Early Jurassic	Released
35/9-7	2012	Brent Gp	Released
35/9-8	2013	Brent Gp	Released
35/11-18	2015	Cook Fm	Released
35/11-18A	2015	Cook Fm	Released

Table 4: PL877 well database.

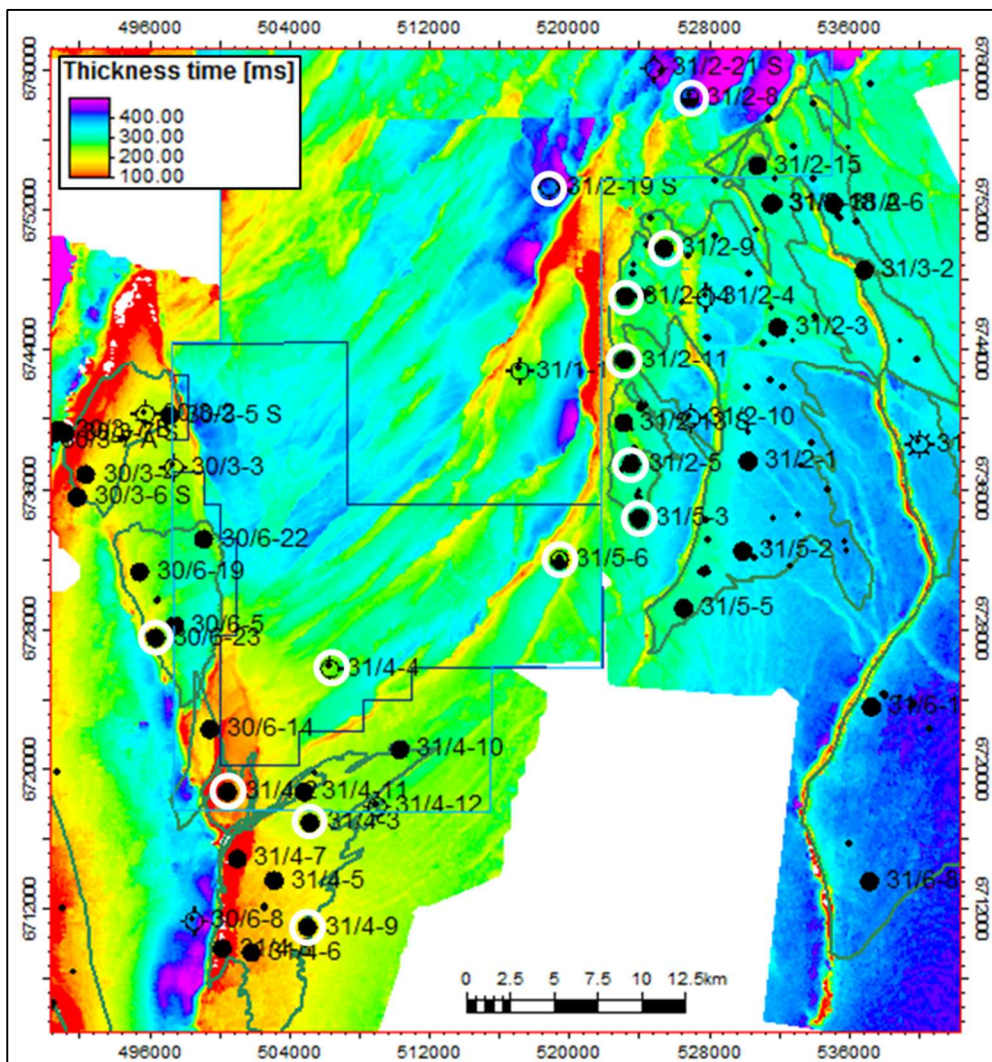


## 7. Results from geological and geophysical studies

The PL877 licence has fulfilled the work obligations including the G&G work. The work includes several geological and geophysical studies with the objective to de-risk the key uncertainties and risks of the Seil prospect. The details of the work and the key findings are described below.

### Development of a seismic stratigraphic model to de-risk sand presence in the Seil area, downdip of the Brage/Troll shallow marine platform.

Reservoir presence in the Late Jurassic of in the Seil prospect area is not convincingly proven in nearby wells north and West of the Brage and Troll Fields. A key part of the derisking of reservoir presence for Seil was to build a detailed sequence stratigraphic model for the Upper Jurassic succession based on biostratigraphic data and seismic isopach trends. A biostratigraphic and sequence stratigraphic study focussing on the Upper Jurassic was purchased from Geolink. Figure 3 shows the wells with purchased Geolink biostratigraphy located mainly on the Troll, Brage, and Oseberg East highs.



**Figure 3: Map showing the wells with Geolink biostratigraphy (circled in white), used for the Seil depositional model. The background map shows the time thickness of the Viking Gr. The outline of PL877 is marked in blue line.**

The robust stratigraphic framework established through the Geolink database was used to re-map key seismic events on the CGG Horda broadband dataset in order to identify major unconformities and establish isopach trends that could in turn aide in establishing robust reservoir models.

The key seismic events mapped were (see Figure 4):

Near Top Brent Gr.

Intra-Heather Fm. J46mfs (top of the Callovian) equal to near top Fensfjord Fm.

Intra-Heather Fm. J56mfs (top of the Oxfordian) equal to near top Sognefjord Fm.

Base Draupne Fm.

Top Draupne Fm.

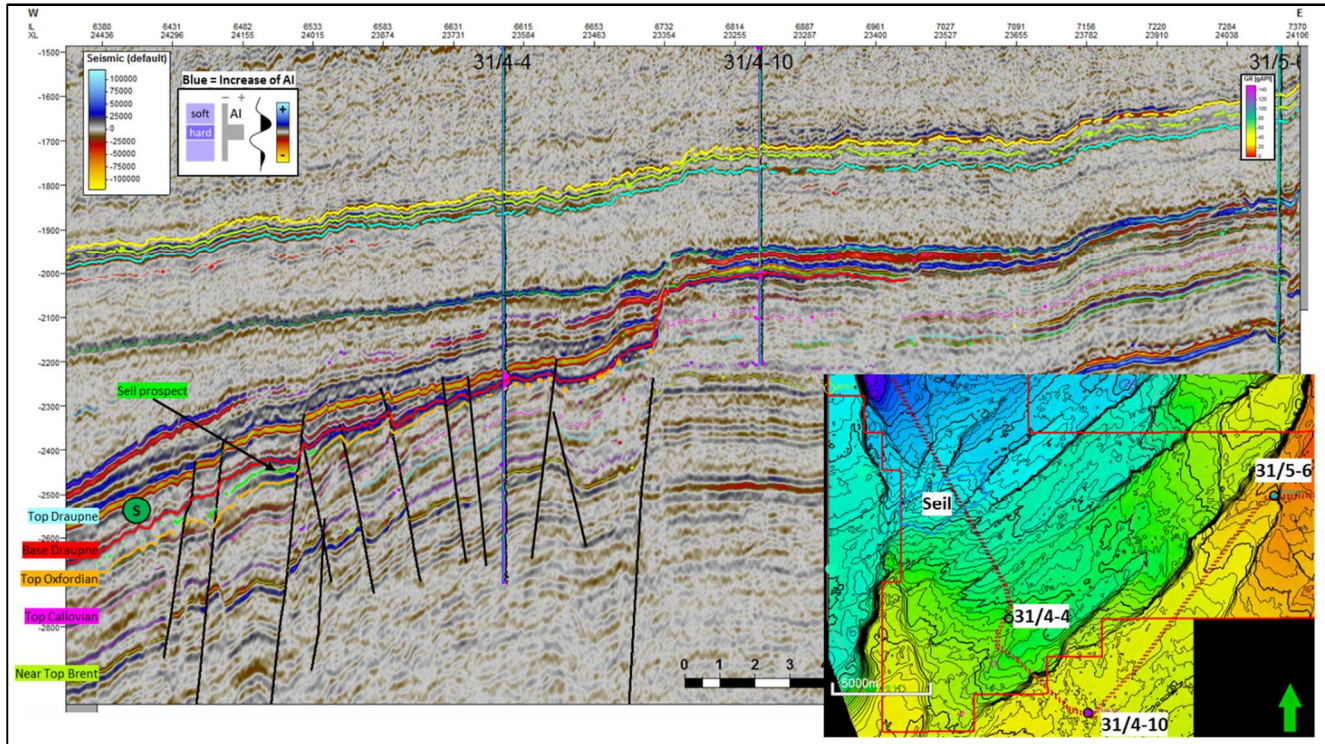


Figure 4: CGG Horda full stack random line through the Seil prospect to some key tie wells.

## De-risking of reservoir presence through rock physics modelling and seismic attribute characterisation.

The seismic imaging of reservoir distribution and nature of the fluid fill was approached through frequency blending techniques, seismic forward modelling and EEI inversion.

The GeoTeric spectral decomposition tool was used to identify "Sandy" geometries and patterns which could further decrease the sand presence risk (Figure 5). Isopach and frequency blending maps of the stratigraphic level of Seil indicates that sandstone could be present in a series of syn-rift basins extending from the Oseberg East block and into PL877.

The Operator's experience with the CGG Horda broadband survey has shown that the quality of the available angle stacks can be improved by conditioning of the Pre stack gathers in PreStack Pro. The seismic inversion work was somewhat disadvantaged by the scarcity of wells with measured Vs in the PL877 area (the closest well with Vs is 31/1-1 => very shaly Heather Fm. section) and by the lack of wells with well-developed Upper Jurassic sands in the near vicinity. The inversion study therefore leaned on Capricorn's general experience with Upper Jurassic turbidite sandstones in the Fram V and Byrding Field areas, where a relative inversion using a Chi angle of 25° is optimal to highlight hydrocarbon bearing sands. The generated Chi-25 Cube clearly shows that the Seil anomaly shifts westwards, and that the remapped Seil apex area is located in the Oseberg East production license. This work concludes that there is a high likelihood that the apex of Seil may contain a hydrocarbon column but that there is a much lower chance that this column extends downdip into the PL877 part of Seil (Figure 6).



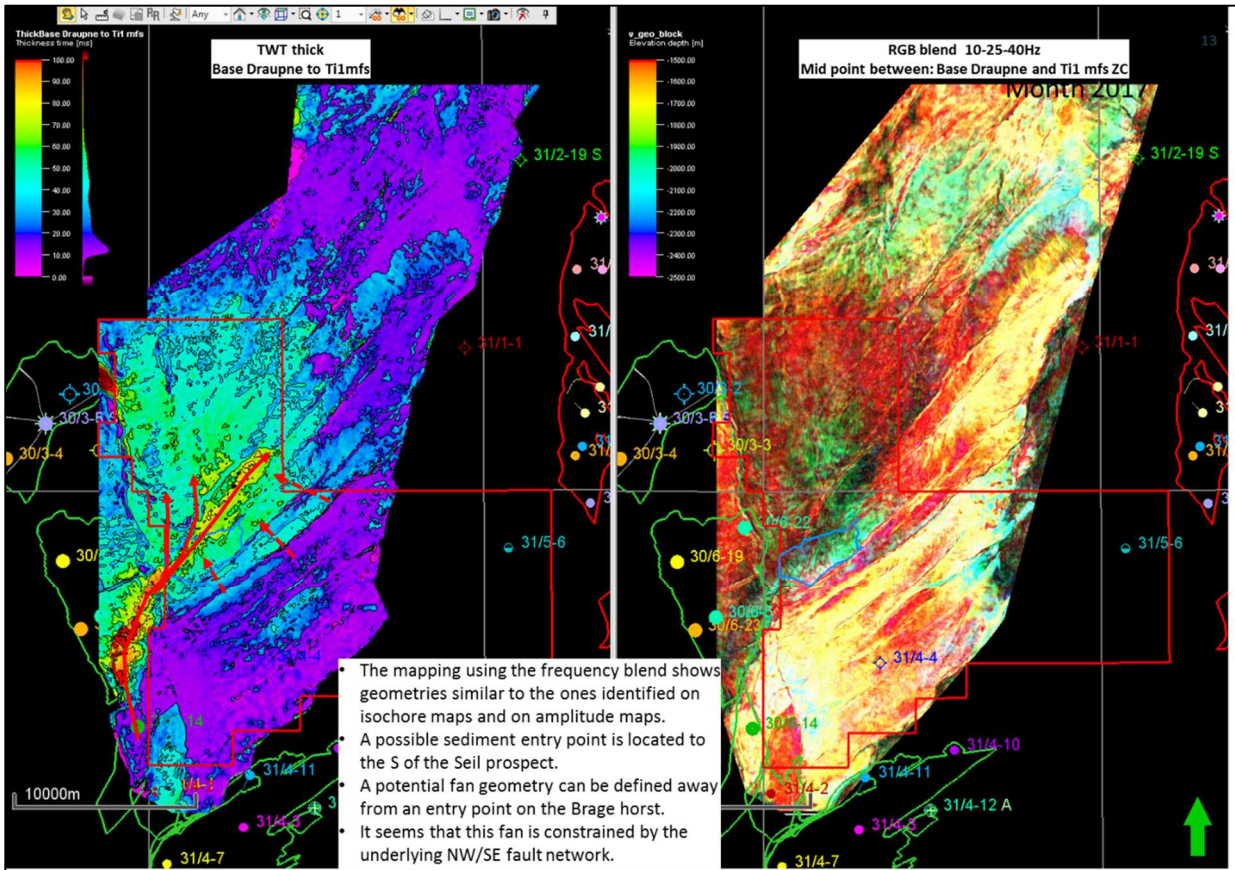


Figure 5: TWT isochore and frequency blending map of the upper part of the Heather Fm. (Intra-Heather Fm. J56 to Base Draupne Fm.).

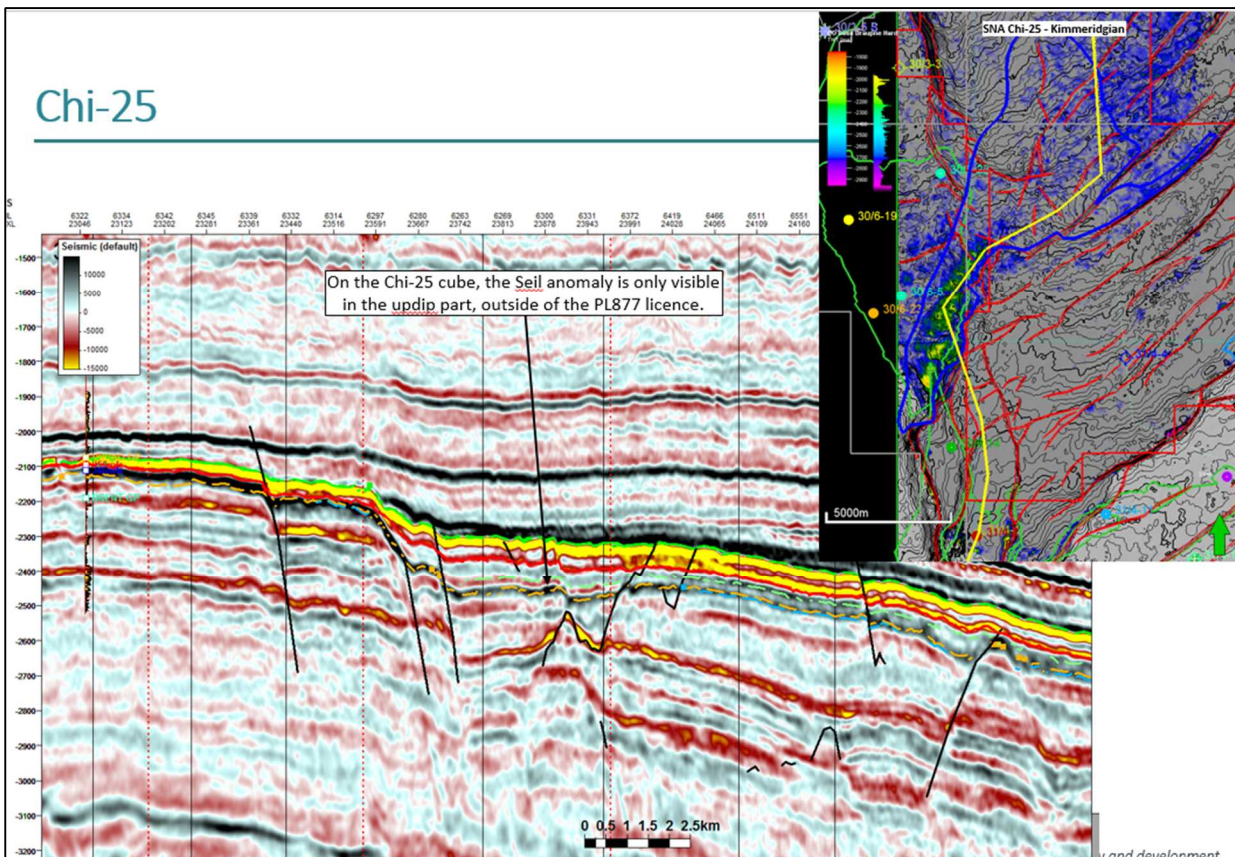


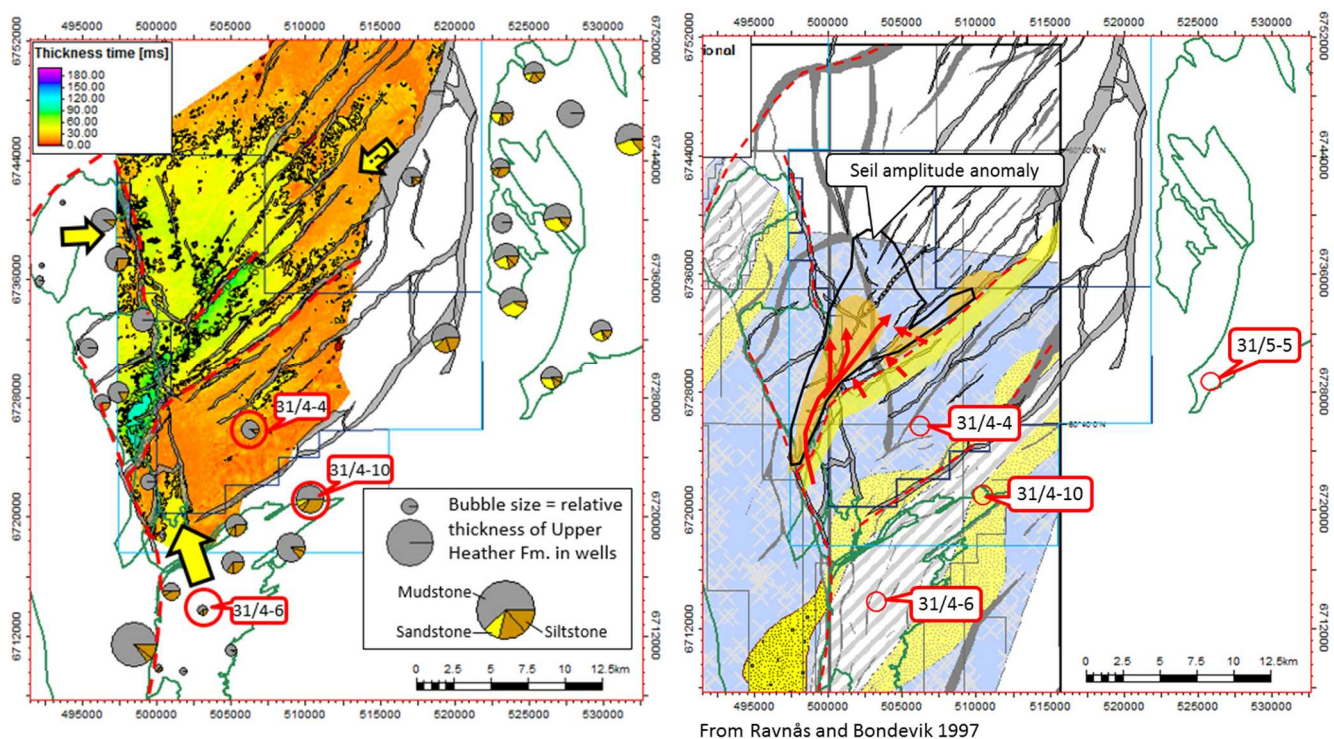
Figure 6: A random line through Seil on the relative inversion Chi-25 cube.



## De-risking of reservoir quality through a sedimentological study of depositional systems in the PL877 region

The objective of the in-house study was to produce a depositional model to support presence of sandstone presence at the Seil stratigraphic level. The study builds on the detailed seismic interpretation, biostratigraphic correlation and identification of time gaps in the wells (see section 3.1), and comparison to published tectonostratigraphic models for the Oseberg, Brage and Troll Fields. Isopach trends clearly shows the complex structural control on Late Jurassic depositional systems and thus supports published studies of fx Ravnås and Bondevik (1997).

The thickness distribution of the Seil seismic envelope indicates a tectonic re-orientation in the Kimmeridgian to more the NE-SW striking subsidence patterns compared to those controlling deposition in the Callovian and Oxfordian Fensfjord and Sognefjord Fm. deltaic cycles (Figure 7, left picture). This implies that possible source areas for any reservoir to be deposited in Seil were most likely located on the Brage Horst or in the southern Oseberg area. Fensfjord – Sognefjord Fm.



**Figure 7.** Left picture shows the Latest Oxfordian – Kimmeridgian TWT isopach trends and the thickness and lithology of the same succession in wells. Key active faults are shown with dotted red lines. Right picture shows the position of shallow-marine and density flow systems in Seil deposition time.

Shoreface systems were likely fed from the Troll platform and prograded South and Southwest during times of relative quiescence in the Callovian and Oxfordian. Kimmeridgian ‘upcycling’ events along NW-trending fault relief of the Brage area are suggested by the presence of erosion surfaces with associated hiati in key wells in the Brage area (red circles in Figure 7). Kimmeridgian shoreface deposits with reasonable reservoir parameters is present in well 31/4-10 but the time-equivalent interval is missing in 31/4-4; the well closest to Seil. Reservoir development in Seil is therefore interpreted to result from a short-lived shoreface progradation to the fault-controlled basin edge north of 31/4-4 and associated slope – density flow deposits (Figure 7, right picture). The relatively short-lived nature of the bypass in the Brage area and the limited access to sandstone for reworking during this event suggests that Seil could be constrained on available reservoir development.

### 8. Prospect update report

The main prospect identified in the application (APA 2016 licensing round) was the Seil Prospect. It was mapped on the released 3D seismic data (ST13M03) as a 3-way dip closure at the Intra Heather middle Jurassic Stratigraphic level (Figure 8). The prospect relied on fault seal up-dip towards the south. The Seil reservoir was turbidites, which potentially could be sourced from the Troll platform. The source rock expected for the Seil prospect was the Draupne Fm. organic-rich shales located on the Flatfisk Slope north of the Veslefrikk Field. In addition, Heather Fm. shale is also a mature source in the area. The top seal is provided by Upper Jurassic shales of the Heather and/or Draupne formations.

Table 5 show the input parameters for calculation of reserves and Figure 8 shows the key prospect information with maps and sections at the application stage. The Seil prospect had a recoverable volume range of P90: 5 – Mean: 80,6 – P10: 215 mmboe. The key prospect risks was Reservoir presence and Seal. Overall Chance of Success was 26% (Figure 8), with Reservoir (60%), Seal (60%), Trapping (80%) and Migration (90%).

Effective reservoir Thickness (m)	10	25	40
Porosity	0.17	0.19	0.22
Oil Column Height	60	230	400
Oil saturation	0.75	0.80	0.85
1/FVF (Bo)	0.79	0.80	0.89
Oil Recovery factor	0.3	0.4	0.5

Table 5: Seil prospect volumes assessment at the start of PL877 licence

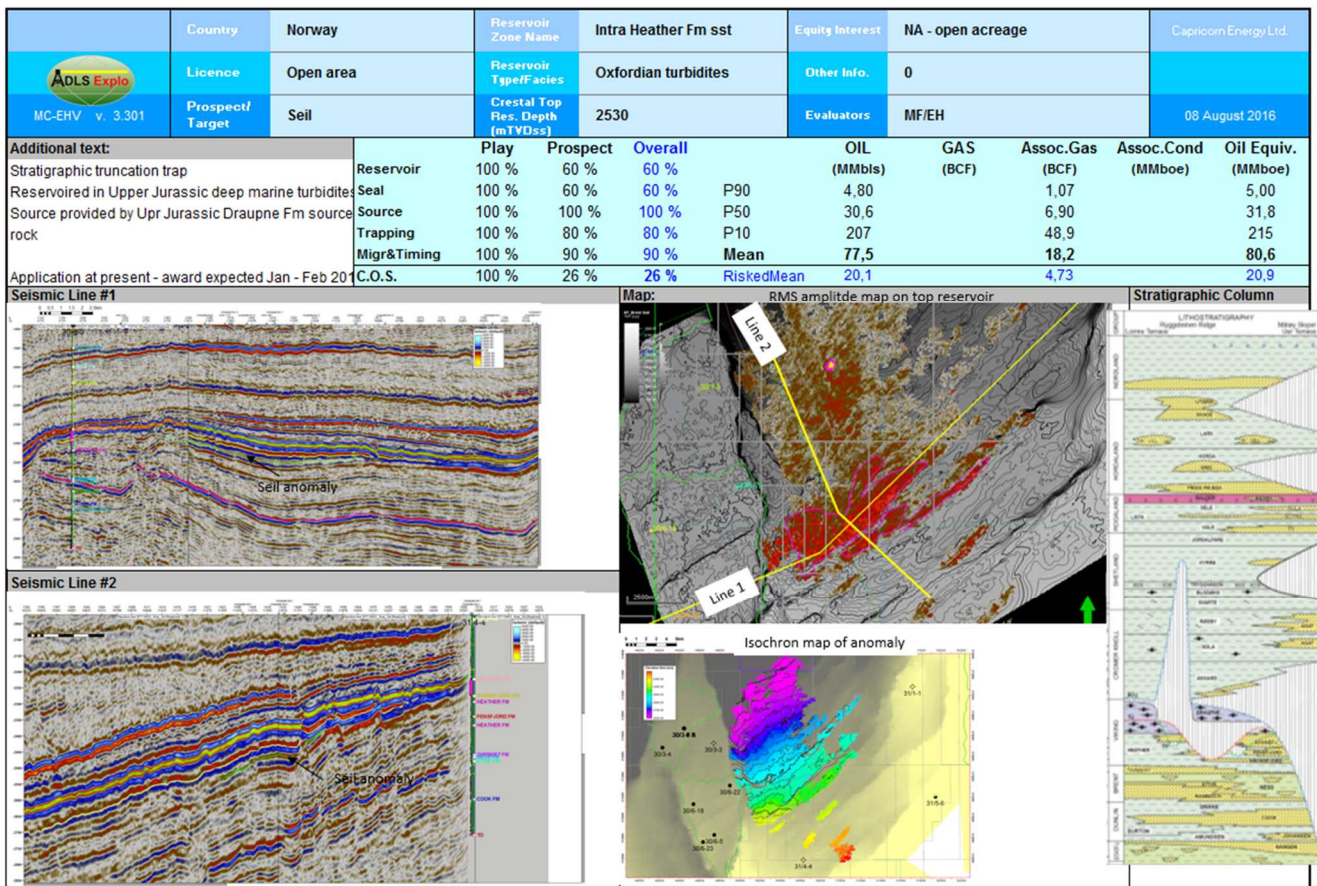
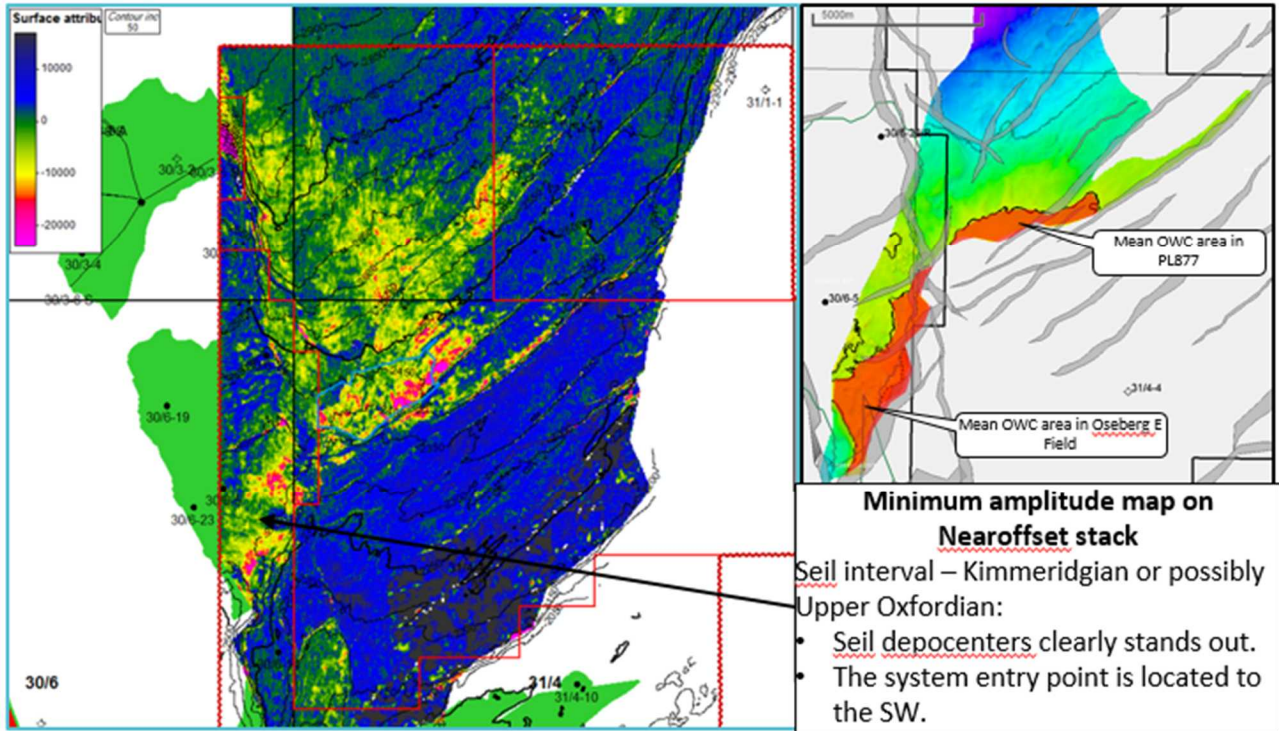


Figure 8: Seil prospect assessment at the start of PL877 licence



It was recognized at time of the APA 2016 application that the publicly available seismic 3D database would not be of the quality necessary to de-risk the Seil prospect further, and the CGG Horda broadband 3D data was acquired as part of the PL877 license obligations. The Seil prospect was seen to extend further West than previously assumed when re-mapped on the new continuous coverage superior quality dataset described in sections 3.1 and 3.2. This meant that the updated Seil prospect apex shifted towards Southwest, into the Oseberg East licence, as illustrated in Figure 8 and additionally in Figures 5 and 6. As a result, a large part of the potential HC column would be located outside PL877, leaving only a small proportion of volumes trapped in



PL877.

**Figure 9: The final Seil trap configuration. The majority of potentially recoverable volumes in the Most Likely column scenario is located west of PL877, in the Oseberg East Field.**

The Final assessment of the Seil Prospect, summarised in Figure 10, has a range of recoverable volumes of P90: 17 - Mean: 85 - P10: 257 mmboe. The geological probability of success has been greatly reduced from 26% to 9,5% for volumes contained in PL877, as a result of the trap apex moving out of the license and the necessity for additional sealing elements for trapping volumes in PL877.

 MC-EHV v. 4.07	Country	Norway	Reservoir Zone Name	Intra Heather Fm sst	Equity Interest	60%	Capricorn Energy Ltd.			
	Licence	PL877	Reservoir Type/Facies	Kimmeridgian shoreface or density flows	Additional Info.	APA 2016 Application				
	Prospect/Target	Seil prospect	Crestal Top Res. Depth (mTVDss)	2300m	Evaluators	RB/EH	17 august yyyy			
Additional text:	Stratigraphic Truncation/pinchout Trap Reservoired in Upper Jurassic deep marine turbidites of likely Kimmeridgian age possibly Late Oxfordian Source provided by Jurassic Draupen Fm hot clay Post Exit RAR Update									
			Play	Prospect	Overall	OIL (MMbls)	GAS (BCF)	Assoc.Gas (BCF)	Assoc.Cond (MMboe)	Oil Equiv. (MMboe)
	Reservoir		50 %	50 %						
	Seal		30 %	30 %	P90	1,03		0,226		1,07
	Source		100 %	100 %	P50	16,6		3,78		17,3
	Trapping		70 %	70 %	P10	248		57,8		257
	Migr&Timing		90 %	90 %	Mean	81,5		19,2		84,7
	C.O.S.		9 %	9 %	RiskedMean	7,7		1,8		8,0

**Figure 10: Final Seil prospect assessment (Final Volume and risks)**

**Trap:** Complex juxtaposition/stratigraphic trap - Remapping of the seismic event on license 3D seismic has significantly changed the outline of the prospect. Prospect apex is now outside PL877.

**Seal:** The updip part of the Seil prospect now relies on juxtaposition seal against the Brage Horst, which is thought to have considerably increased the chance of thief sands across the fault. In the PL877 area, the trap additionally requires seal against intra-Heather Fm. silt and mudstones along the southern edge of the



prospect. The juxtaposed interval in up dip well 31/4-4 shows some porosity in silty intervals which are not resolved on the seismic. The license work has thus increased the seal risk from 60% to 30%.

Reservoir: The Seil reservoir is most likely of latest Oxfordian to Kimmeridgian age and sourced from reworking of older shoreface deposits in the Brage area. Kimmeridgian sandstone encountered in wells in the likely source area is of limited quantity and somewhat moderate quality; hence, the quality of the re-deposited sand in the Seil area could be even worse. Seil is a poorly calibrated seismic anomaly (no nearby well). Sandstone presence is supported by amplitude/inversion work, but the response is weak in comparison with the typical Q35 Oxfordian turbidites. Presence of sandstone in Seil is thought to be possible but the quality and quantity, is questionable, which is why the final risk has increased from 60% to 50%.

Source/migration: Source (Draupne and Heather formations) and migration into the Seil area is proven, and therefore this risk element has not been a focus for the license work, leaving it unchanged at 90%.

## Leads evaluation

Several leads at different stratigraphic levels were identified during the screening process in PL877. The three main leads have been evaluated as part of the G&G work programme in the licence and are described below. Figures 11-13 shows the lead concepts through seismic sections and amplitude maps.

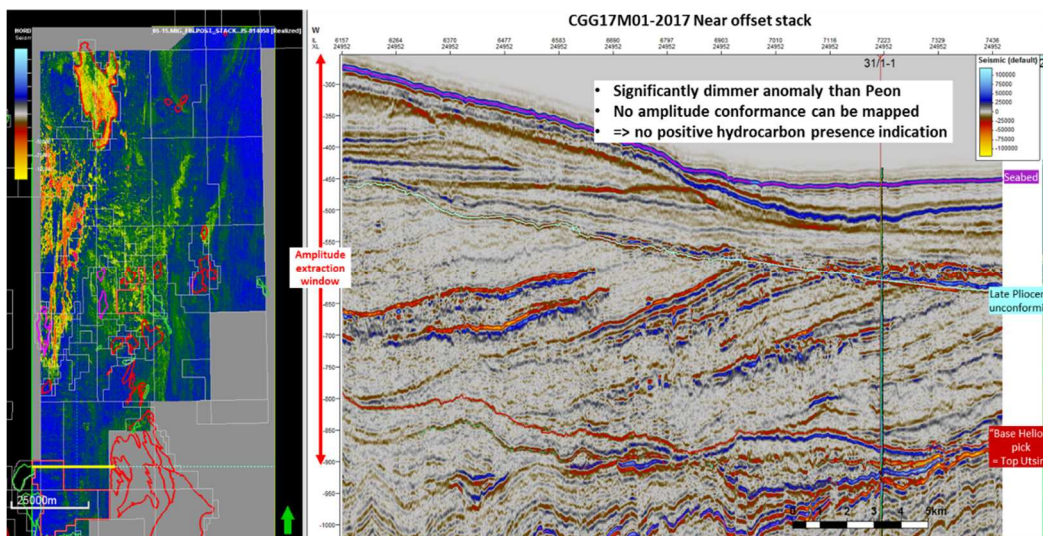


Figure 11: Helios Lead concept

Helios Lead (Figure 11). This was the main Wintershall lead/prospect at the time of application. The lead is identified as a series of stratigraphically trapped, offset stacked basin floor fans in the Pliocene prograding shelf complex. The lead charge model is dry, biogenic gas from Neogene shales in analogy with the Peon discovery. The top of the reservoirs has a soft seismic response, captured in amplitude extractions of the stratigraphic envelope between the Top Utsira Fm. and the Late Pliocene unconformity, however, the response is much dimmer than the Peon dry gas discovery or similar basin floor fan successions located further to the north. The Licence agreed that the observed seismic response does not support presence of hydrocarbons in the Helios lead.

Fyr Lead (Figure 12). The Fyr lead is an amplitude supported structural lead at Top Hordaland Gr./Top Utsira Fm. The original concept was the reservoir was Utsira Fm. sandstones but a later re-interpretation suggests that the closure is at top Hordaland Gr. and that any reservoir within the closure is likely to be clastic injectites. The topseal is provided by overlying Pliocene shales. However, if the later interpretation is correct the 'sidesal' is likely to be Utsira Fm. sandstones and thus there is not likely to be a trap. Seismic imaging below top reservoir is sub-optimal because of the lack of focus on this target during processing and due to intense clastic intrusion. The amplitude anomaly is relatively dim compared to the Peon gas discovery and it is

interpreted as related to facies changes. Given these observations, Capricorn Norge did not see any potential at this level and recommend not to pursue this lead.

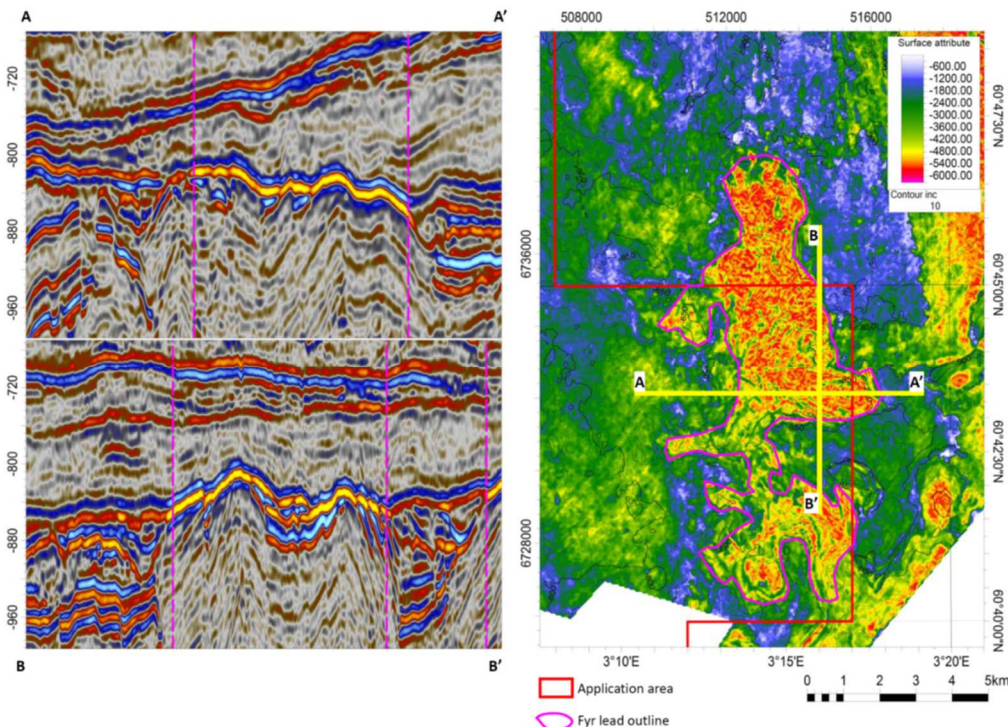
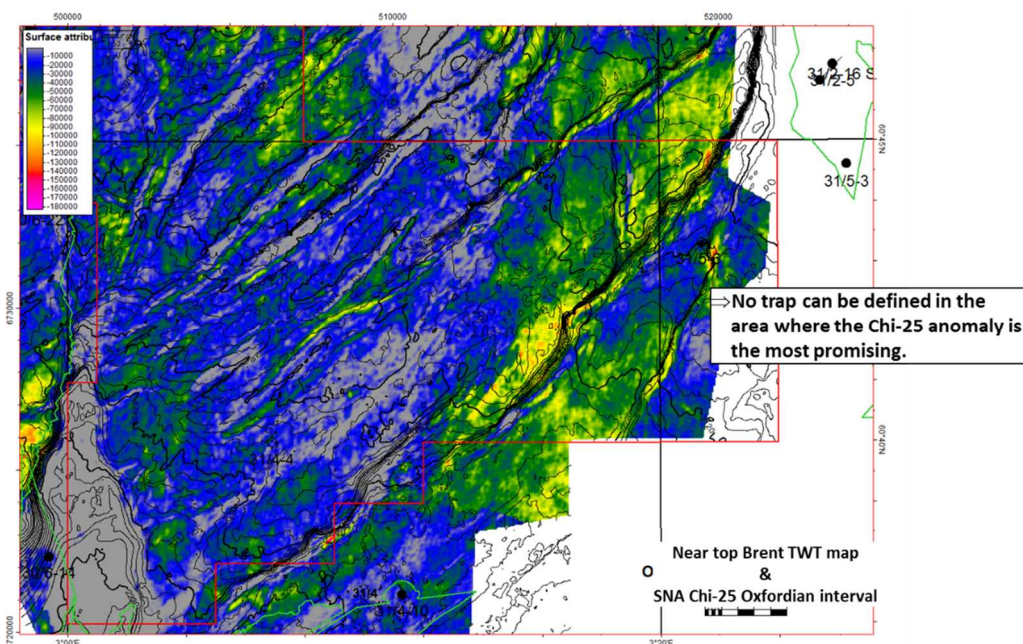


Figure 12: Fyr Lead concept

Ox Lead (Figure 13). The Ox lead is a hanging wall trap with reservoir in Upper Jurassic shallow marine deposits of Oxfordian Sognefjord Fm. age and sourced by the Draupne Fm. The lead is defined by a bright anomaly terminating against a bounding fault. A small (7 km<sup>2</sup>) hanging wall closure has been mapped against a SW/NE trending fault. The key risk is the lack of direct migration pathway identified; the Ox lead is most likely in a hydrocarbon migration shadow. An additional risk is that the reservoir is juxtaposed against Callovian / Fensfjord Fm. sandy lithologies across the updip sealing fault, thus jeopardizing the trap. Therefore, it has not



been possible to mature the Ox lead to a prospect with an acceptable risk.

**Figure 13: Ox Lead concept**

## 9. Technical evaluation and Conclusion

With the completion of the work programme utilizing the acquired CGG Horda broadband data in PL877 it is clear that the view of the Seil prospect has changed significantly since APA 2016. The updip part of the prospect, now located outside PL877 was originally not recognized in the APA 2016 application due to the lack of continuous 3D data coverage. The recognition of this extension changed the view of seal and trap configuration with increased risk of juxtaposition to porous strata along faults along Oseberg East and north of the 31/4-4 well. It also implied that only in cases of a large hydrocarbon column could there be volumes trapped with PL877 acreage.

The Seil reservoir is likely to be of Kimmeridgian age and located in a fault-controlled paleo depo-centre. The sediments were most likely sourced from a lowstand shoreline and potential associated slope fans along the Brage block. The seismic response expected through forward modelling and compared to relative inversions indicate that Seil could contain reservoir but that any hydrocarbon-filled reservoir is most likely located outside the PL877.

Both potentially recoverable reserves and risk for Seil has changed in a negative direction resulting in lower volumes and higher risk. The Seil prospect is therefore falling short and the PL877 License partners no longer regard it as a drillable prospect. None of the additional prospects and leads in the license has been possible to mature, and hence the Licence partners has agreed to relinquish the licence.