Relinquishment Report PL 522

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1 Summary of licence history

The PL522 licence (Fig. 1.1) was awarded in 2009, following a licence application in the 20th Licensing Round, to BG Norge (40% and Operator) and licence partners Idemitsu Petroleum Norge AS (20%), Det Norske Oljeselskap AS ((formerly Aker Exploration AS) 20%) and Petoro AS (20%) with an effective date of 15th May 2009.

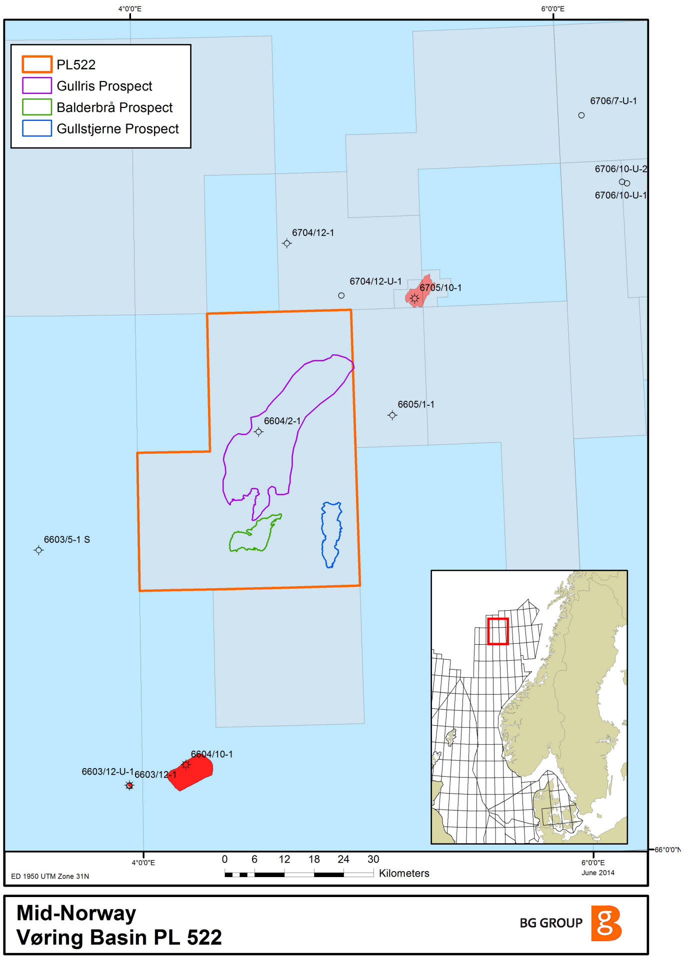

Fig. 1.1 PL522 location map

The initial work program was:

- Acquire a minimum of 1200km^2 of 3D seismic
- Drill or drop (DoD) decision within 3 years
- Drill exploration well within 5 years
- End of Initial Period: 15th May 2015

A 3D seismic survey (BG0904) was acquired on behalf of the licencees by Westerngeco, with acquisition commencing on 27th June 2009 and completed on 22nd August 2009. A total area of 1370km^2 of full-fold 3D seismic data was acquired.

Det Norske Oljeselskap transfered 10% of their equity to Centrica Resources (Norge) AS on 1st January 2011.

The licencees decided to drill exploration well 6604/2-1 in 2011, targetting the Gullris prospect with reservoirs in the Cretaceous Springar formation. The well was spudded on 21st March 2011, and completed on 7th May 2011. The well encountered reservoir sands within the Springar formation, as prognosed, however all target intervals were found to be water-wet.

The voting rules for the licence were three companies and more than 50%. Regular licence meetings were held to discuss the subsurface evaluation, the seismic acquisition & processing, and drilling of the Gullris exploration well.

Due to the failure of the Gullris well, and the relatively small size of the remaining prospects on the licence, the licencees made a unanimous decision to relinquish the licence on 25th July 2014 following the conclusion of an extensive licence work programme.

2 Database

Well database

The licence partnership drilled exploration well 6604/2-1 (Gullris) in 2011. In addition to 6604/2-1, the common well database for PL522 consisted of 11 further wells, as listed in the table below.

Well	Informal Name
6705/10-1	Asterix
6604/2-1	Gullris
6605/1-1	Obelix
6706/11-1	Vema
6707/10-1	Luva
6603/12-1	Gro-1
6604/10-1	Gro-2
6706/12-1	Snefrid Sør
6707/10-2 S	Haklang
6605/8-1	Stetind
6704/12-1	Gjallar
6504/5-1 S	Gemini

Seismic database

The key seismic survey used in the initial evaluation of the PL522 licence was BG0904M. BG0904M is a merge of two underlying surveys BG0904 and SG9604R08. The processing of this survey was completed between September and December 2009 by CGGVeritas. The seismic common database for the licence comprised ten 3D seismic surveys Fig. 2.1, both traded and released, along with a large number of 2D seismic lines. A complete listing of the 3D datasets used in the evaluation of the licence are shown in the table below.

A sub-volume of BG0904 was reprocessed in 2011 utilising a pre-stack depth migration (PSDM) approach, specifically targetted on the Balderbrå prospect area (Fig. 2.1). The objective of the PreSDM was to improve the imaging of the Nise Formation and deeper sedimentary succession beneath a series of pervasive sills within the Campanian interval. The final volume successfully improved the imaging of the sills, enabling more robust interpretations to be made through this interval.

During the period September 2010 to June 2011, the BG0904M and GRE02 surveys were post-stack merged to create a high quality, consistent dataset over the licence which tied in to the closest well penetration at the time, well 6605/1-1 (Obelix). The resultant merged survey is named BG11M02.

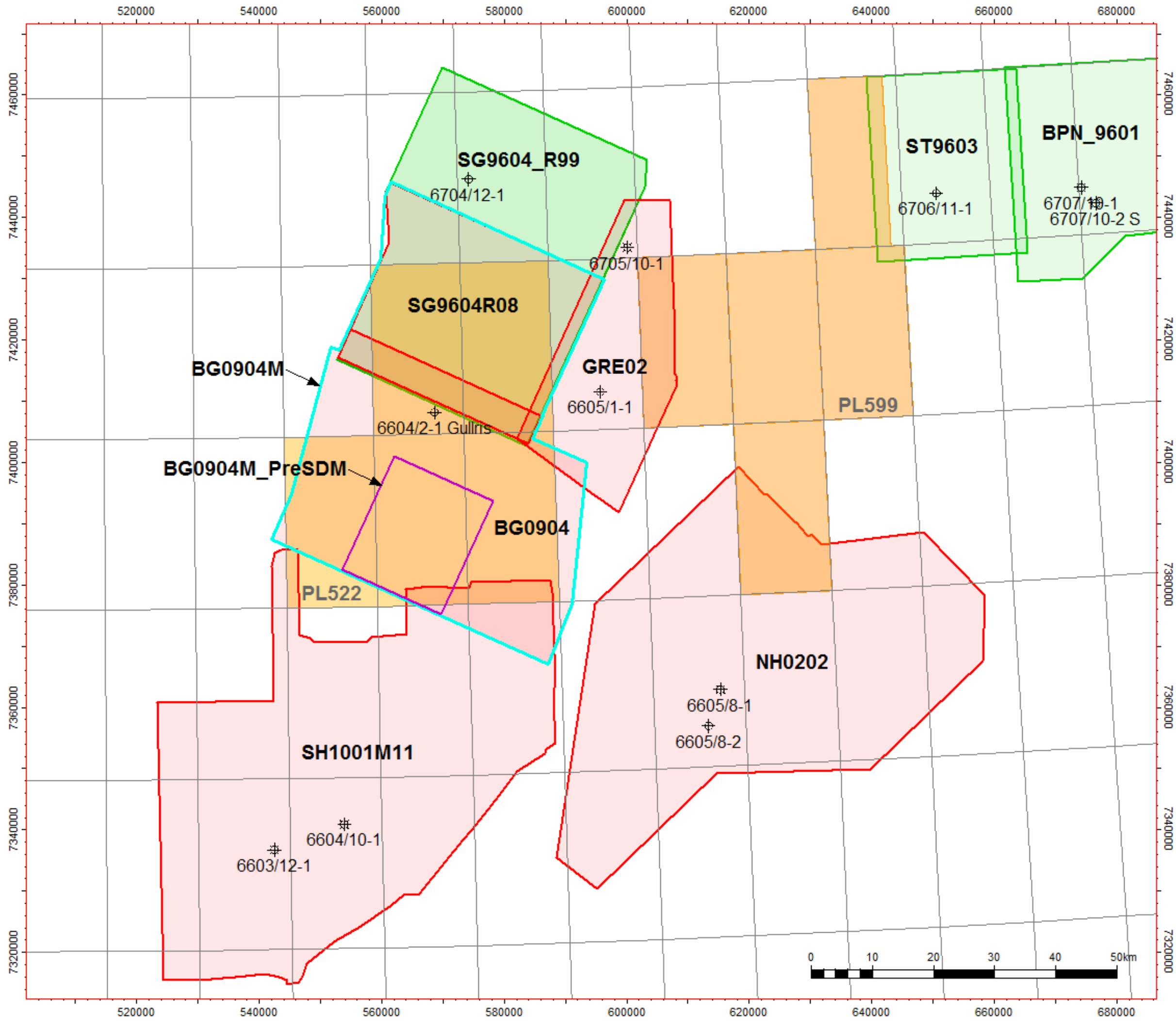

Fig. 2.1 3D seismic common database for PL522

To facilitate improved semi-regional mapping of the Springar fan systems, BG Norge completed a further post-stack merge project; combining surveys SH1001M11 and VBT1 with BG11M02. This survey was named BG12M02 Fig. 2.2. This survey was not included in the licence common database, however was utilised by the Operator to enhance regional understanding of the area and ensure consistency of interpretation with BG Norge's adjacent licence PL599.

Survey Name	Volume Name
bg0904	bg0904 raw_mig
bg0904	bg0904 final_mig
bg0904m	bg0904 PSDM final rtm mig Time
bg0904m	bg0904 PSDM final rtm mig Depth
bg0904m	bg0904 PSDM Kirchhoff Final Far Stack Volume Time
bg0904m	bg0904 PSDM Kirchhoff Final Far Stack Volume Depth
bg0904m	bg0904 PSDM Kirchhoff Final Full Stack Volume Time

bg0904m	bg0904 PSDM Kirchhoff Final Full Stack Volume Depth
bg0904m	bg0904 PSDM Kirchhoff Final Mid Stack Volume Time
bg0904m	bg0904 PSDM Kirchhoff Final Mid Stack Volume Depth
bg0904m	bg0904 PSDM Kirchhoff Final Near Stack Volume Time
bg0904m	bg0904 PSDM Kirchhoff Final Near Stack Volume Depth
bg0904m	bg0904m final_mig 16-24 Deg
bg0904m	bg0904m final_mig 24-32 Deg
bg0904m	bg0904m final_mig 32-40 Deg
bg0904m	bg0904m final_mig 40-48 Deg
bg0904m	bg0904m final_mig 8-16
bg0904m	bg0904m final_mig
bg0904m	bg0904m gradient
bg0904m	bg0904m intercept
bg0904m	bg0904m intercept gradient
bg0904m	bg0904m rms_stk_vel
bg0904m	bg0904m PSI_01_fullvol_Dn
bg0904m	bg0904m PSI_01_fullvol_PoissonsRatio
bg0904m	bg0904m PSI_01_fullvol_VpVs
bg0904m	bg0904m PSI_01_fullvol_Zp
bg11m02	bg11m02 Final Mig
bg11m02	bg11m02 Angle Stack 16-24
bg11m02	bg11m02 Angle Stack 24-32
bg11m02	bg11m02 Angle Stack 32-40
bg11m02	bg11m02 Angle Stack 40-48
bg11m02	bg11m02 Angle Stack 8-16
bg11m02	bg11m02 Ava Gradient
bg11m02	bg11m02 Ava Intercept
bg11m02	bg11m02 Ava Intgrad
bg11m02	bg11m02 Intercept Gradient
bg11m02	bg11m02 Velocity Scaled Interval BGA
bg11m02	bg11m02 Velocity Average BGA Dec 2011
bpn9601_aker	bpn9601_aker final_mig
gre02	gre02 final_mig full offset
nh0202	nh0202 final_mig
sg9604r08	sg9604r08 intercept
sg9604r08	sg9604r08 intercept_gradient
sg9604r08	sg9604r08 final_mig
sg9604r08	sg9604r08 final_mig_8_16
sg9604r08	sg9604r08 final_mig_16_24

sg9604r08	sg9604r08 final_mig_24_32
sg9604r08	sg9604r08 final_mig_32_40
sg9604r08	sg9604r08 final_mig_40_48
sh1001m11	sh1001m11 final_mig full offset
sh1001m11	sh1001m11-prdmck-farmid-t-rzn-rmo_final_mig
sh1001m11	sh1001m11-prdmck-far-t-rzn-rmo_final_mig
sh1001m11	sh1001m11-prdmck-mid-t-rzn-rmo_final_mig
sh1001m11	sh1001m11-prdmck-near-t-rzn-rmo_final_mig
sh1001m11	sh1001m11-prdmck-nearmid-t-rzn-rmo_final_mig
st9603_aker	st9603_aker final_mig
st9604	st9604 final_mig

Fig. 2.2 Extent of BG12M02 survey

3 Review of Geological and Geophysical framework

The subsurface evaluation of the PL522 licence was focussed primarily on the Late Cretaceous Springar Fm, with additional potential identified in the Late Cretaceous Nise Fm. The key changes to the subsurface interpretation were driven by the result of the 2011 Gullris exploration well which encountered good quality sandstones within the Springar Formation, however all reservoir intervals were water-bearing. This had implications for the rock physics model which had been established pre-drill, and therefore for the remaining prospectivity within the licence.

Numerous sub-surface studies have been carried out on the licence. A number of the studies were completed in conjunction with the nearby BG-operated PL599 licence, resulting in a consistent work programme and development of robust subsurface understandng across the two licences. The main conclusions from the key studies are detailed in the following sections.

Reservoir Quality & Gross Depositional Environment Mapping

A comprehensive reservoir quality study, involving detailed petrographic and sedimentological analyses, was undertaken in 2011 to 2012 to evaluate the potential of the Spingar and Nise formations. The database for the study included thin sections, sidewall cores and conventional cores from a total of 11 wells in the area.

Fig. 3.1 and Fig. 3.2 summarise the results of the reservoir quality study for the Springar and Nise formations, respectively. The following main conclusions were drawn from the study:

- Springar Fm: Primary intergranular porosity has been progressively destroyed and replaced by a hybrid network dominated by secondary porosity and microporosity.
- This loss of primary intergranular porosity & creation of a secondary pore system with higher tortuosity and dominated by secondary and microporosity is strongly adverse to permeability as the majority of microporosity is housed within illitic clays.
- Illite diagenesis represents the main mechanism for reservoir degradation within the Springar sandstones and appears ubiquitous. The extent of illitisation is proportional to the amount of detrital clay present.
- Nise Fm: similar detrital composition to Springar Fm, although Nise sandstones tend to be coarser grained.
- There is no evidence of a simple depth-related control on reservoir quality in either Springar or Nise formations.

The results of the reservoir quality study were integrated with regional seismic mapping and attribute analyses to produce GDE maps for the main fan systems within the Springar Formation. Fig. 3.3 and Fig. 3.4 show examples of these maps for the K78.5 (Gro) Fan and K78 (Obelix) Fan.

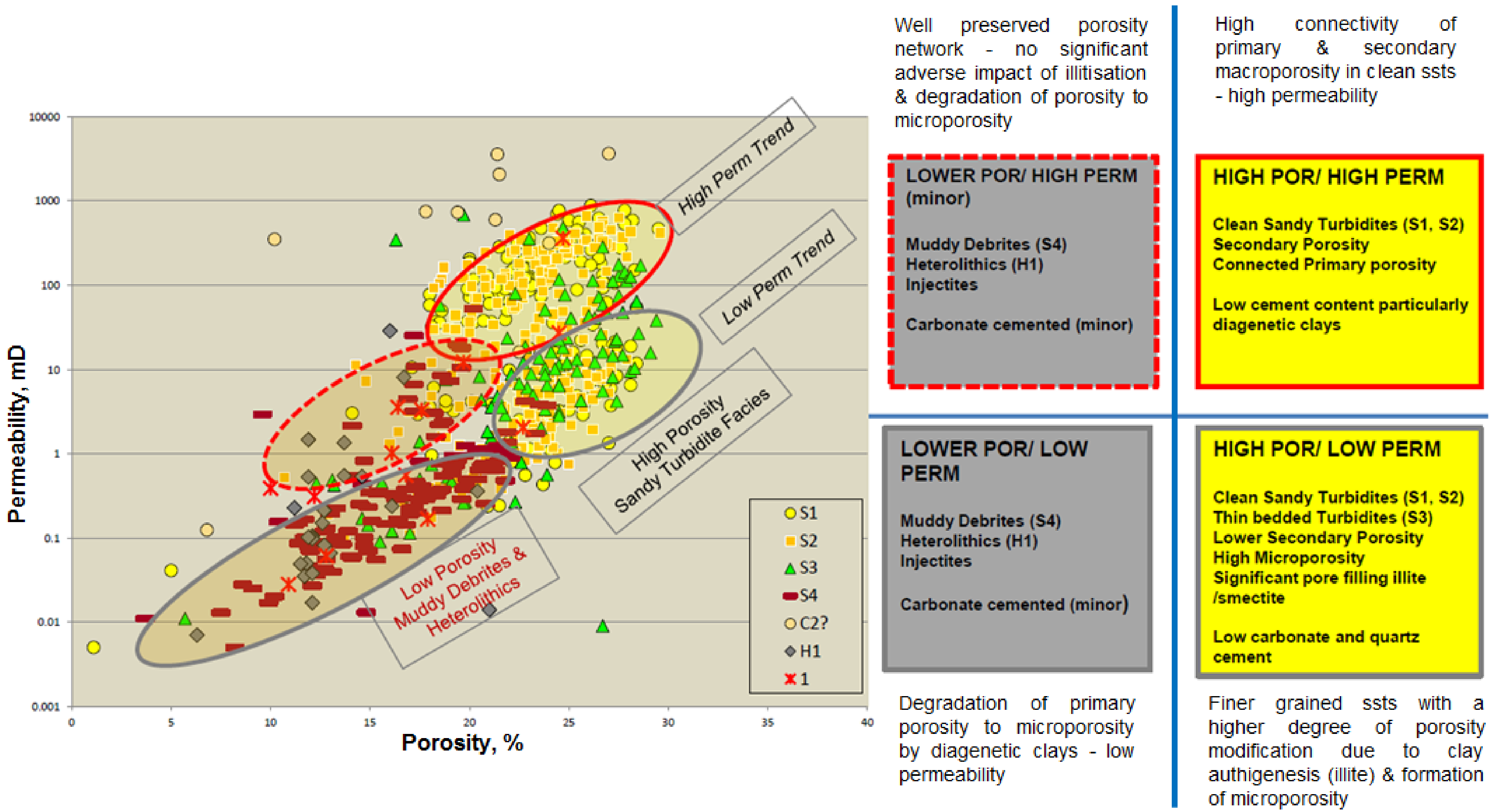

Fig. 3.1 Springar reservoir quality trends by facies. *Facies can be seen to exert a strong control on reservoir quality in all wells and for all sequences/fan systems. The dataset can clearly be subdivided into four quadrants. Cleaner turbidite sandstone facies can be seen to sit on two distinct permeability trends.*

High Porosity/Permeability
Luva / Vema K74.5
Poorly consolidated massive turbidite ssts.
Coarser grain size and low matrix clay content.
Lower susidence rate retards porosity loss by mechanical compaction.
Lowest degree of diagenetic grain alteration & degradation of porosity to microporosity.

Moderate Porosity/Permeability
Vema K72, K68; Luva K71
High levels of compaction due to rapid Late Cretaceous subsidence.
Finer grain size downgrades permeability.
Higher degree of grain alteration & illitisation downgrades permeability.

Low Porosity/Permeability
Vema K72, K68
Muddy depositional facies.
Bioturbation severely degrades permeability with the introduction of biogenic clays which undergo illitisation.

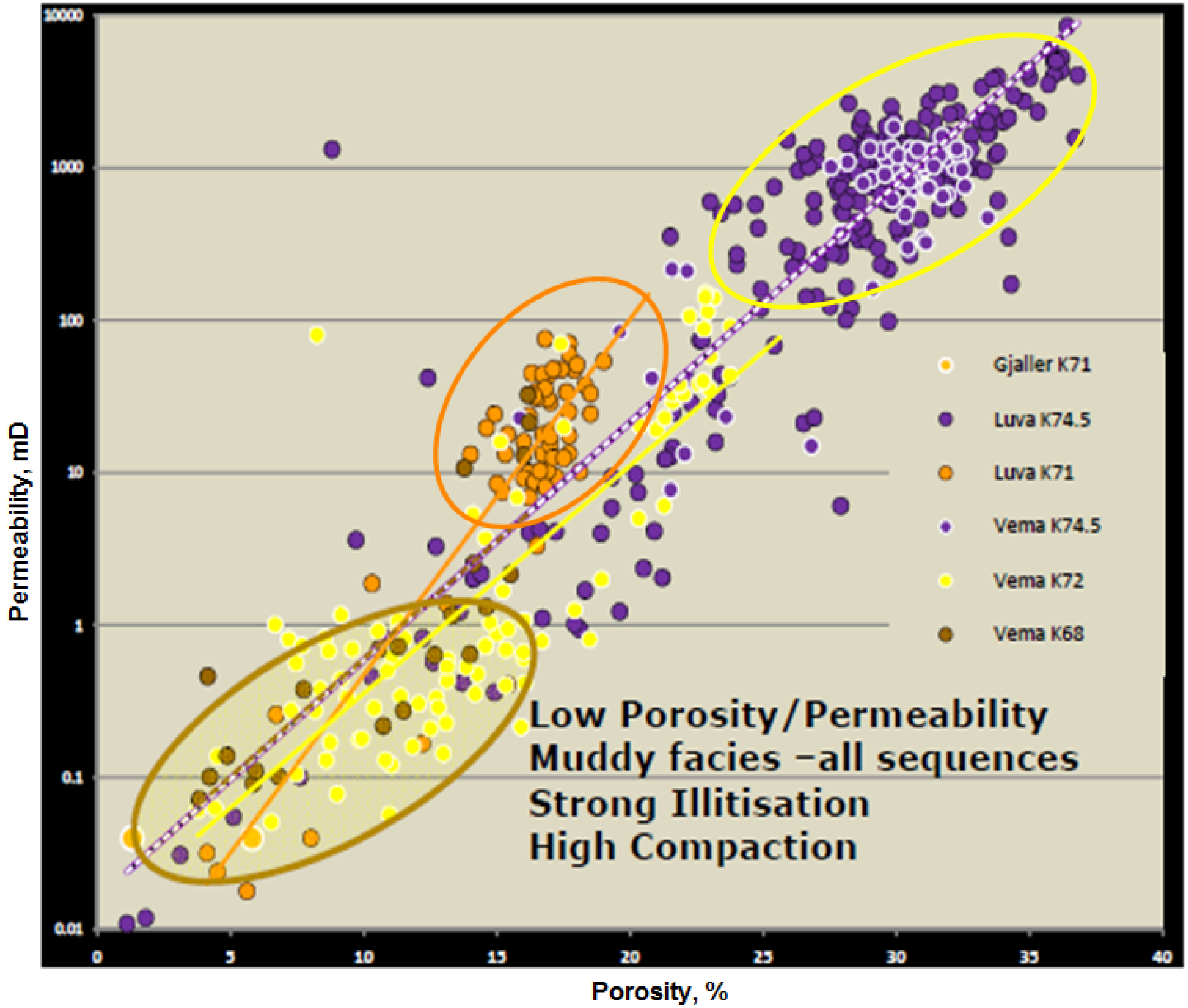

Fig. 3.2 Nise reservoir quality by well. *Nise sandstones exhibit a simple poro-perm relationship. Facies variations (grain size and clay content) exert the primary control on reservoir quality.*

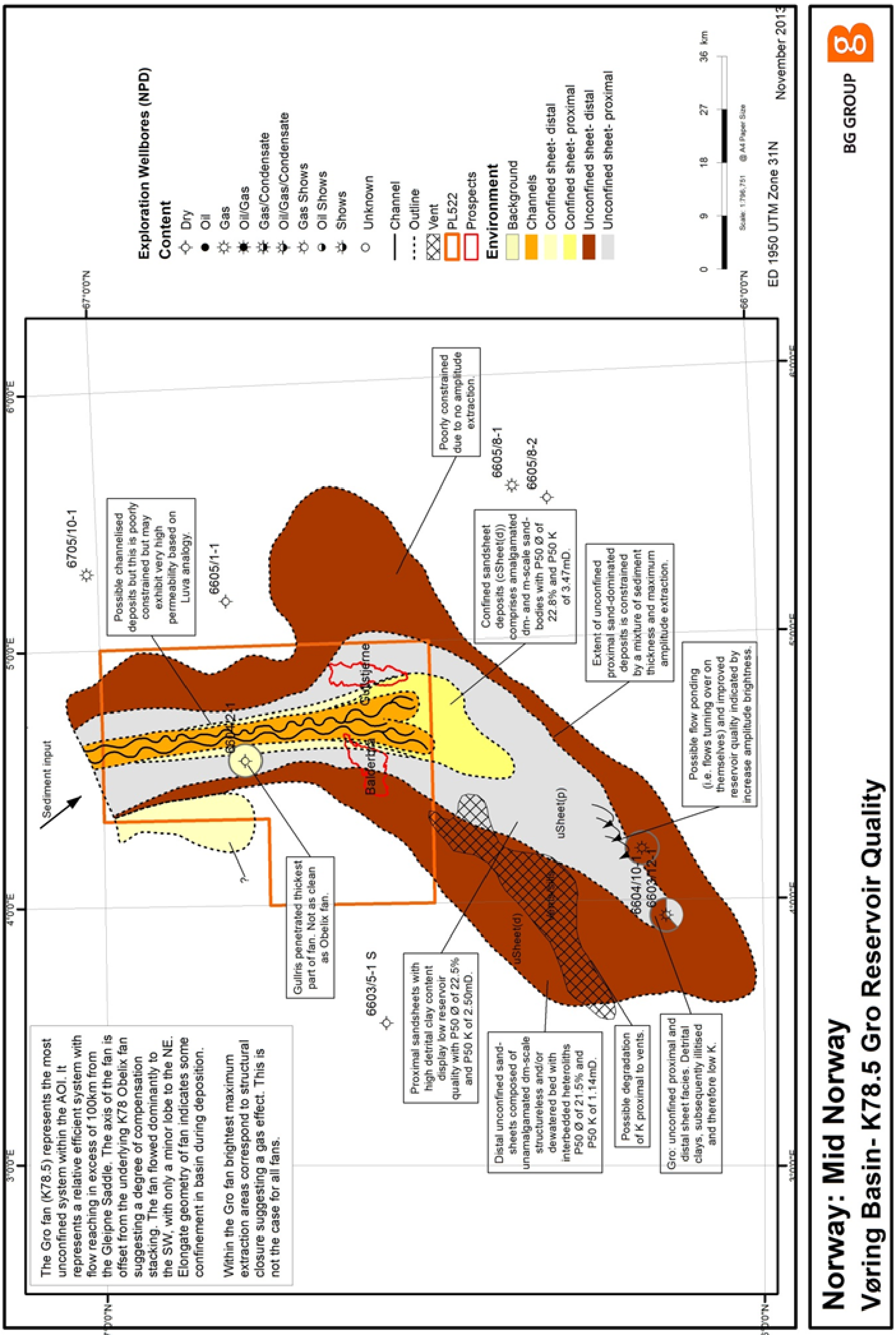

Fig. 3.3 K78.5 Gro Fan GDE Map

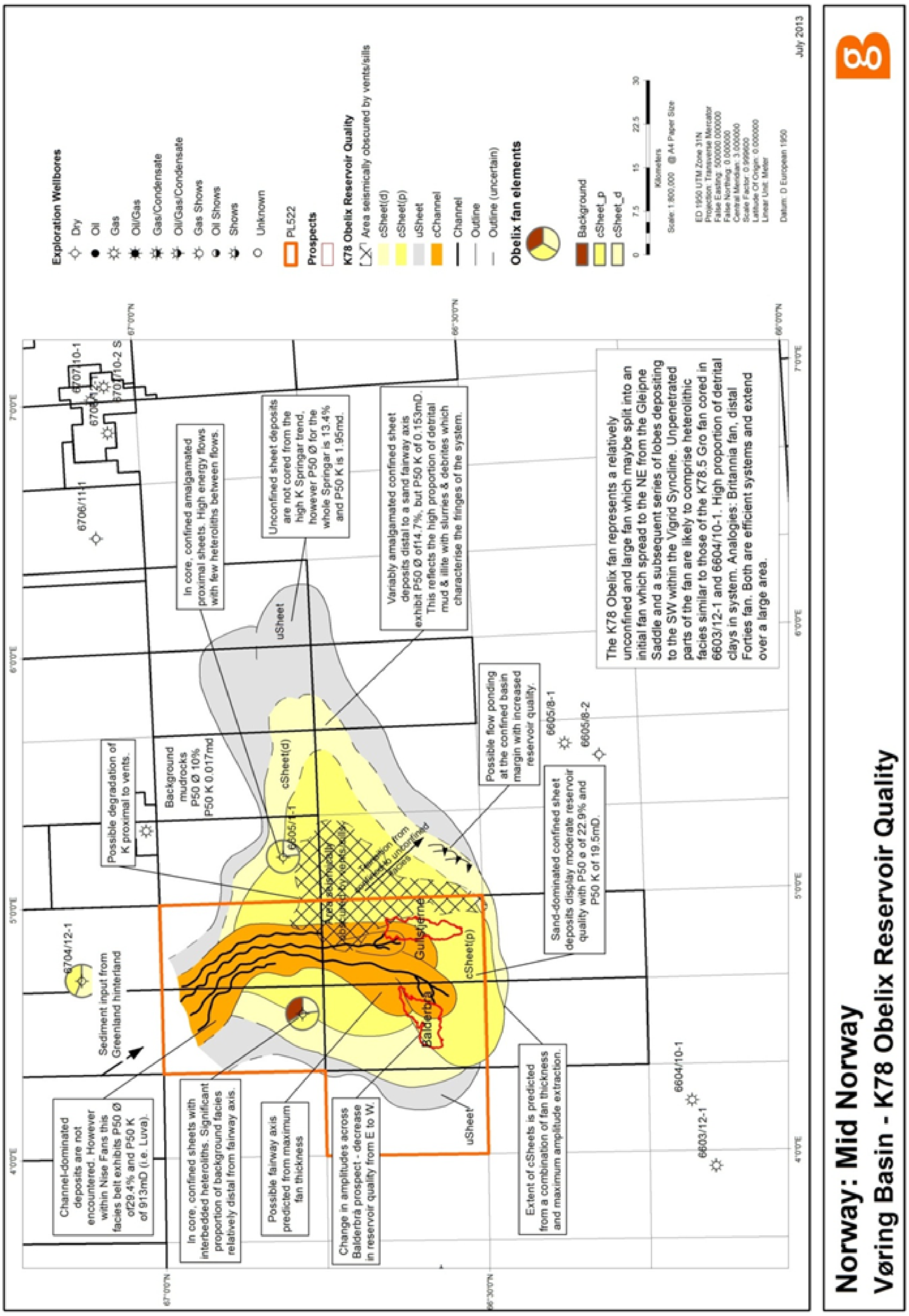

Fig. 3.4 K78 Obelix Fan GDE Map

Geochemistry & Basin Modelling

A series of three semi-regional petroleum systems model were constructed in 2012 to constrain:
1. Source rock maturity & migration within the basin,
2. The impact of intrusives on the source system,
3. Likely charge to the Springar Formation prospects; Balderbrå and Gullstjerne.

The models differed only with respect to the presence and connectivity of the dolerite intrusives. This provided an indication of the extent of the increased maturity due to the presence of the intrusives and also demontrated the impact that the intrusives have on vertical migration of hydrocarbons through the Cretaceous section. The models were built using Petromod, and contained three interpreted source rock intervals; a thick (average 2573m), lean Cenomanian-Turonian source rock (TOC 1.46%, HI 95mg/g.TOC), a Lower Cretaceous source rock (TOC 1.46%, HI 95mg/g.TOC) with similar thickness (average 2396m), and a richer source in the Late Jurassic Spekk Formation (TOC 4%, HI 348mg/g.TOC) which was 40m thick. The AOI for the model covered approximately 13,000km^2.

Key conclusions from the petroleum systems modelling were:
- Regional Heat Flow and burial are the main mechanism of maturation, however localised maturation effects from the Dolerite intrusions are evident
- At present day the Spekk Fm and Early Cretaceous sources are mostly overmature, whilst the Cenomanian-Turonian interval is mostly within the Wet to Dry Gas Window (Fig. 3.5).
- Most of the hydrocarbons have been generated prior to the Dolerite intrusions at 55Ma (Fig. 3.6).
- The Cenomanian-Turonian is the most effective source as it has the shortest vertical migration pathway into the Springar reservoirs.
- The Dolerite intrusions do not form barriers to vertical migration when modelled as discreet bodies, as is the case.
- Balderbrå and Gullstjerne prospects are modelled to be gas charged present day (Fig. 3.7).

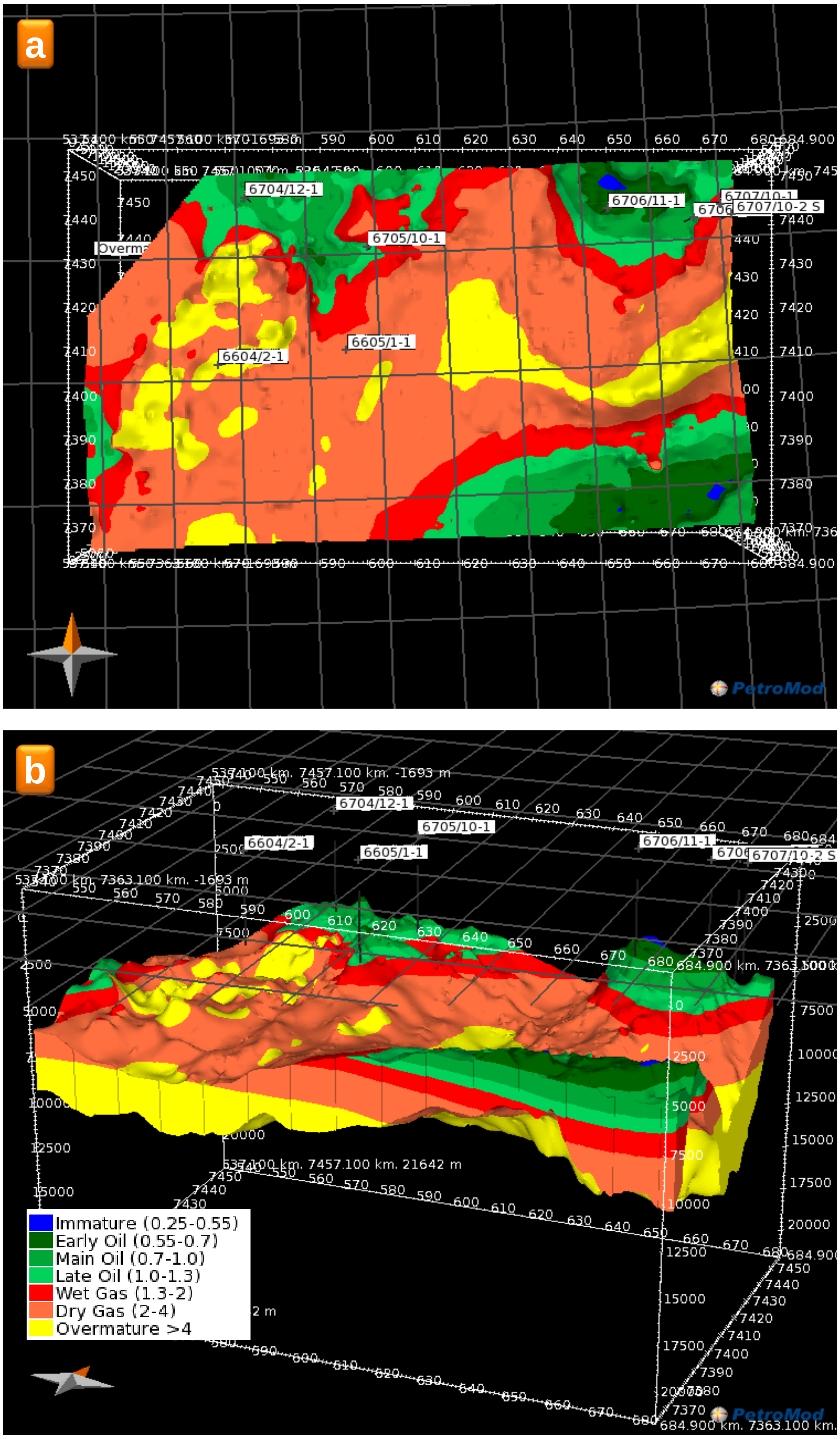

Fig. 3.5 Cenomanian-Turonian source rock: Present day maturity. *(a) Perspective view from above of Cenomanian-Turonian source rock interval within basin model, coloured by present day maturity, corresponding to Model 3 (intrusives present, and vertical migration between intrusive bodies allowed). Majority of model area is within the Wet to Dry Gas window; some areas are overmature. Areas around 6704/12-1 are in the Early to Late Oil windows. Localised maturity effects from the dolerite intrusions at 55Ma have overprinted the regional maturity. (b) 3D perspective view of (a) looking towards the northwest.*

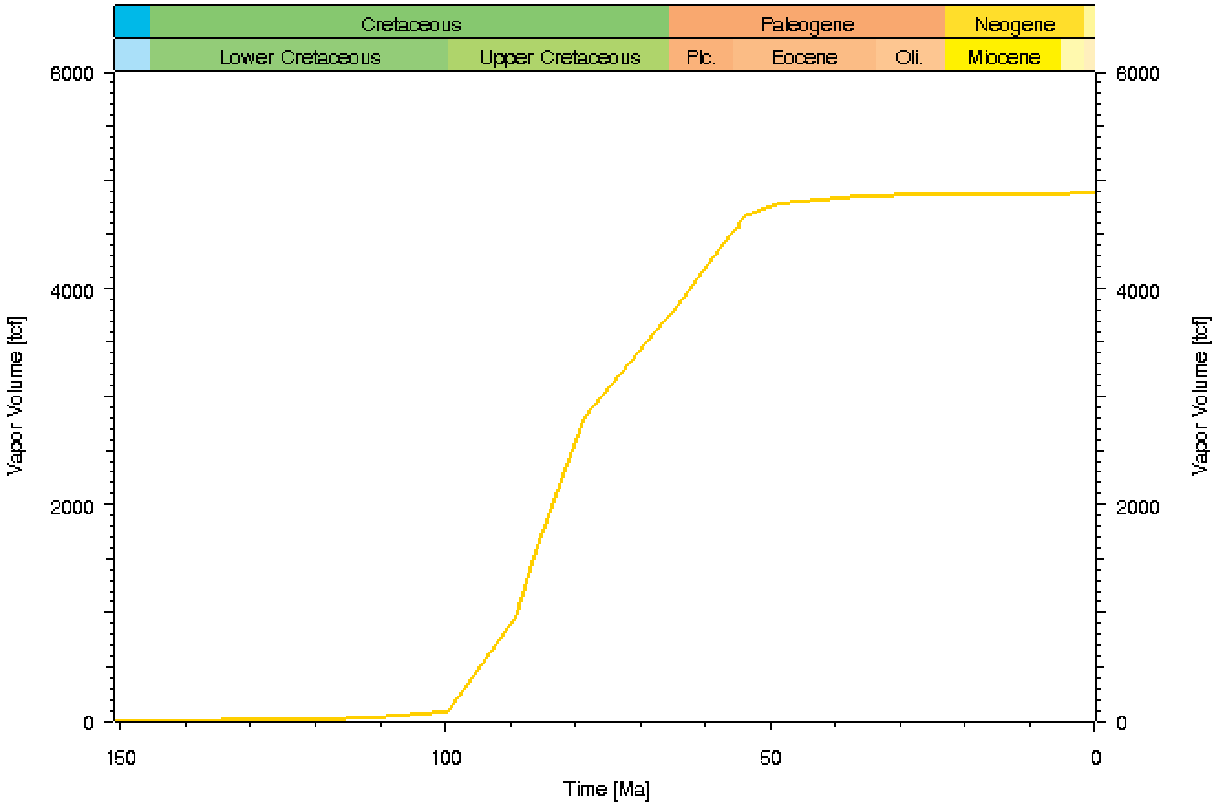

Fig. 3.6 Timing of hydrocarbon generation in the basin. *The onset of major hydrocarbon generation in the basin occurs during the Late Cretaceous at around 90Ma. The majority of hydrocarbons have been expelled by the Early Eocene (55Ma).*

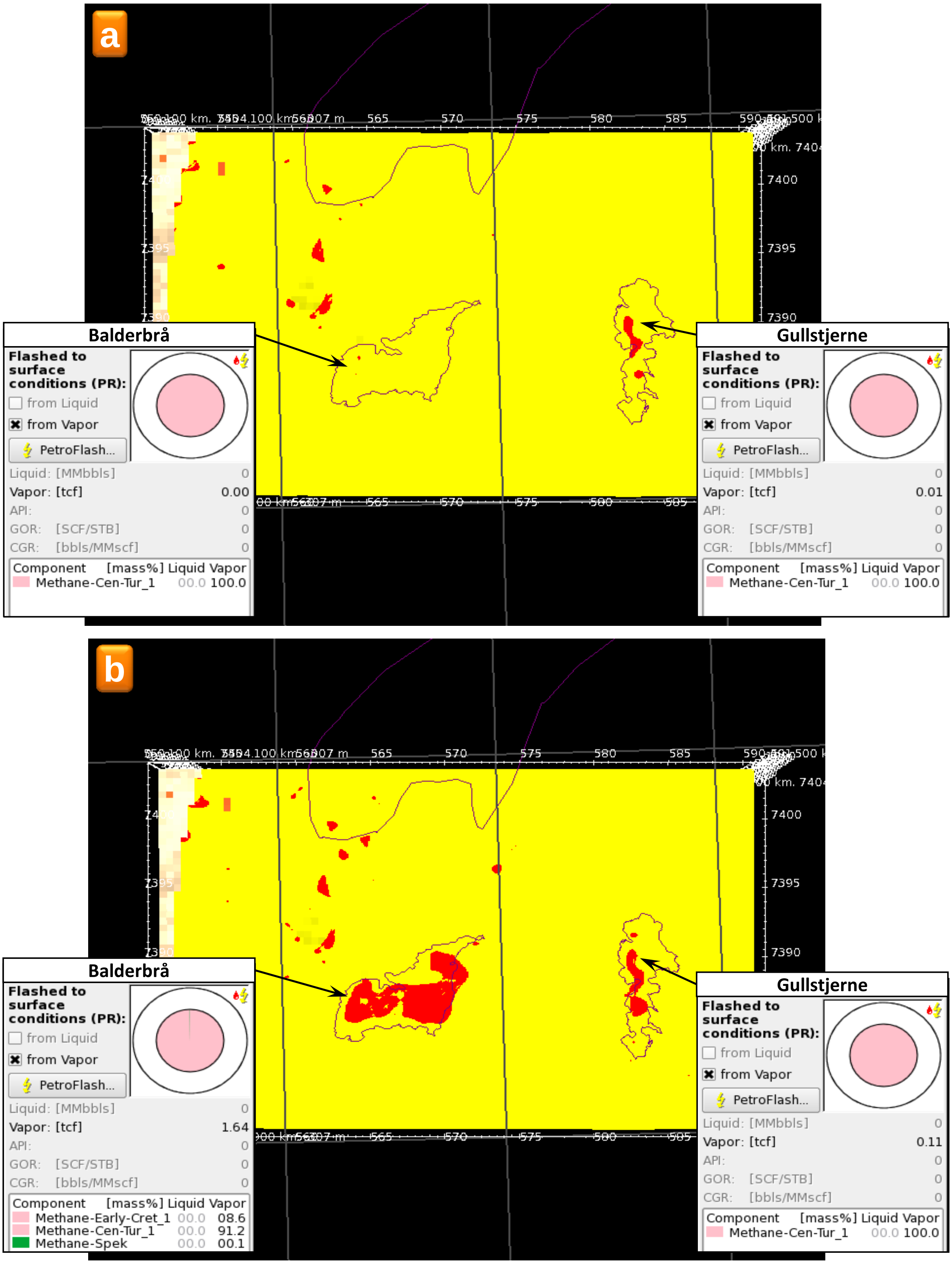

Fig. 3.7 Timing of charging of Springar Formation prospects. *(a) Perspective view from above of Model 3 at 33.9Ma (Top Eocene) corresponding to the onset of charging of Balderbrå and Gullstjerne. Colours denote presence (red) or absence (yellow) of gas accumulations. (b) Perspective view from above of Model 3 at present day. Significant dry gas accumulations are modelled at Balderbrå and Gullstjerne, wiith the primary charge contribution coming from the Cenomanian-Turonian source rock (91.2% at Balderbrå, 100% at Gullstjerne). Remaining charged volumes in Balderbrå are attributed to the Early Cretaceous source rock (8.6%).*

Rock Physics & Seismic Modelling

In 2010, a rock physics study was completed using wells 6704/12-1 (Gjallar), 6705/10-1 (Asterix) and 6605/1-1 (Obelix). A further rock physics and AVO modelling study was completed in 2011, post-Gullris, building on the previous study and incorporating additional wells 6604/2-1 (Gullris), 6603/12-1 (Gro-1) and 6604/10-1 (Gro-2). The primary aim of this study was to assess the impact of the failure at Gullris on the other prospectivity within the licence. Fig. 3.8 summarises the AVO modelling results for the Gullris K88 reservoir. The study concluded that porosity was the primary controlling factor on the AVO behaviour of Springar sandstones, and that gas saturation was a secondary effect. It was therefore possible to generate Class III AVO responses from high porosity water-bearing sandstones. In the case of the Gullris prospect, the observed Class III AVO anomaly which was interpreted, pre-drill, to correspond to gas-bearing sandstone, was in fact caused by an anomalously high impedance shale unit overlying a water-bearing reservoir. The conclusion that a Class III response is not necessarily a hydrocarbon indicator in this area was incorporated into the risking of the remaining prospects.

Seismic forward modelling was carried out in 2012, with specific focus on the Balderbrå prospect in the southern part of PL522. The study aimed to reproduce the observed seismic amplitude response for two reservoir intervals within the Springar Formation at the Balderbrå prospect location. Reservoir porosity, fluid type and saturation were varied in an attempt to model the observed amplitudes across the prospect. The impact of potential tuning effects within the thin reservoir intervals was also investigated and quantified. The conclusions of the study were that the amplitude anomaly at Balderbrå is likely to be caused by a complex, composite effect of lateral facies change across the prospect (and associated porosity degradation), variable levels of tuning and, most importantly, the presence of gas in both reservoir intervals Fig. 3.9.

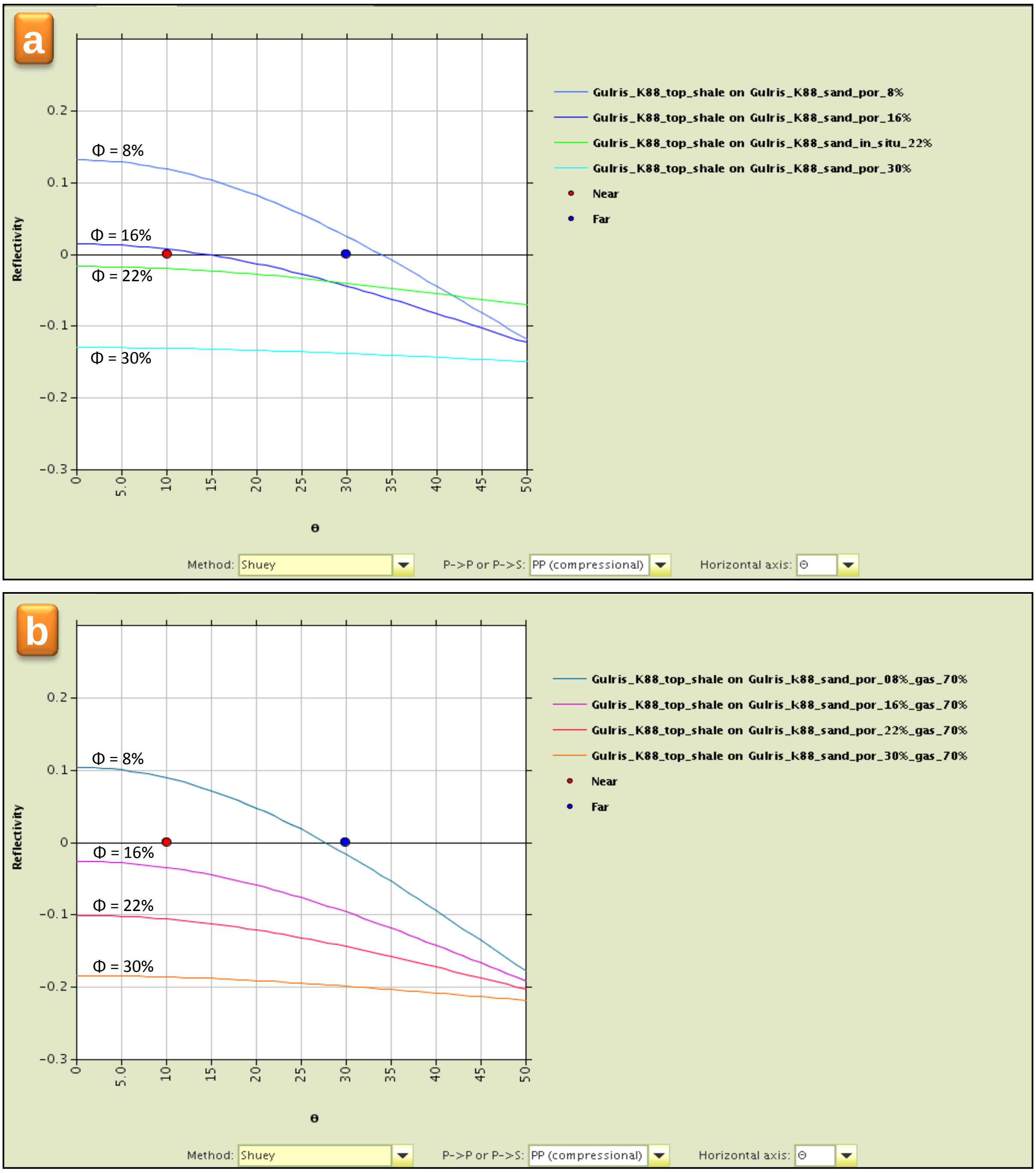

Fig. 3.8 6604/2-1 (Gullris) AVO modelling summary. *Blocky AVO modelling results for the K88 sandstone encountered in the Gullris well. Panel (a) shows the effect of varying porosity on a brine-saturated sandstone, and panel (b) shows the variation for a 70% gas-saturated sandstone.*

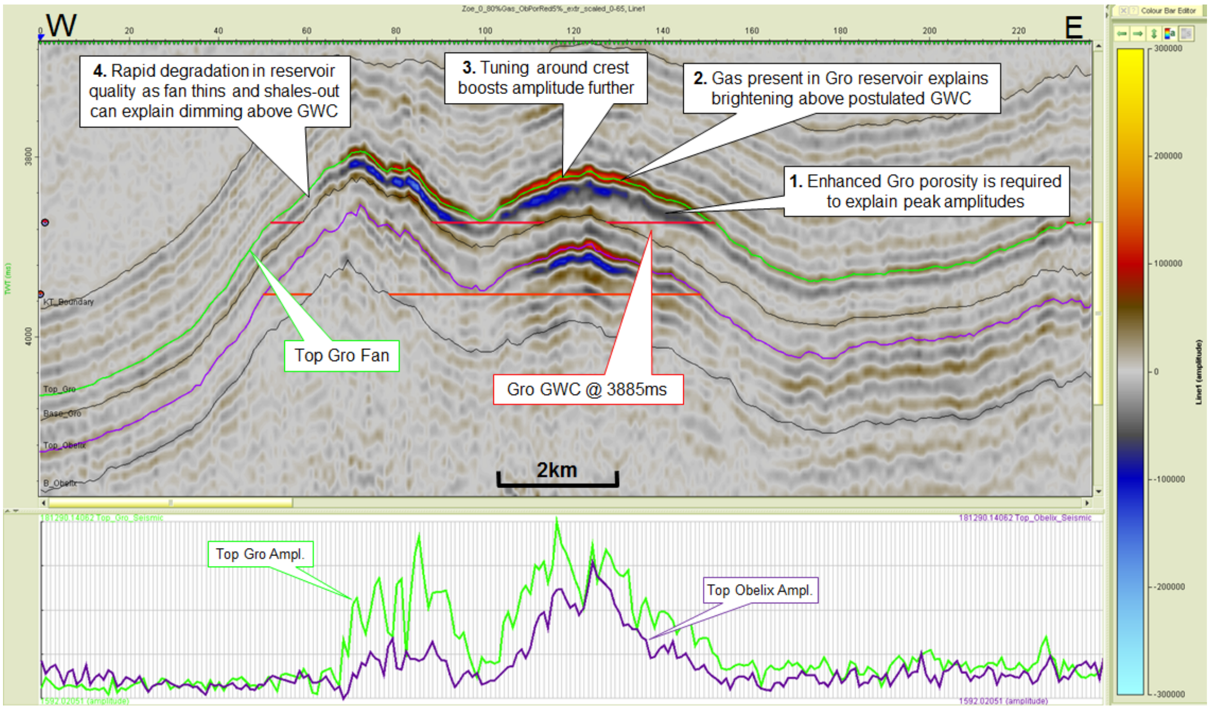

Fig. 3.9 Seismic forward modelling summary for Balderbrå. *Interpretation of amplitude response at Balderbrå prospect, based on results of seismic forward modelling.*

4 Update of Resource Potential

At the time of licence application, the Gullris prospect was the key prospect within the licence. Additional Springar Formation prospects were also identified within the licence; namely Balderbrå and Gullstjerne, and a number of leads were recognised within the Nise Formation (Fig. 4.1). Gullris was interpreted to be a 12Tcf gas prospect with primary reservoir in the upper Springar Formation (Fig. 4.2).

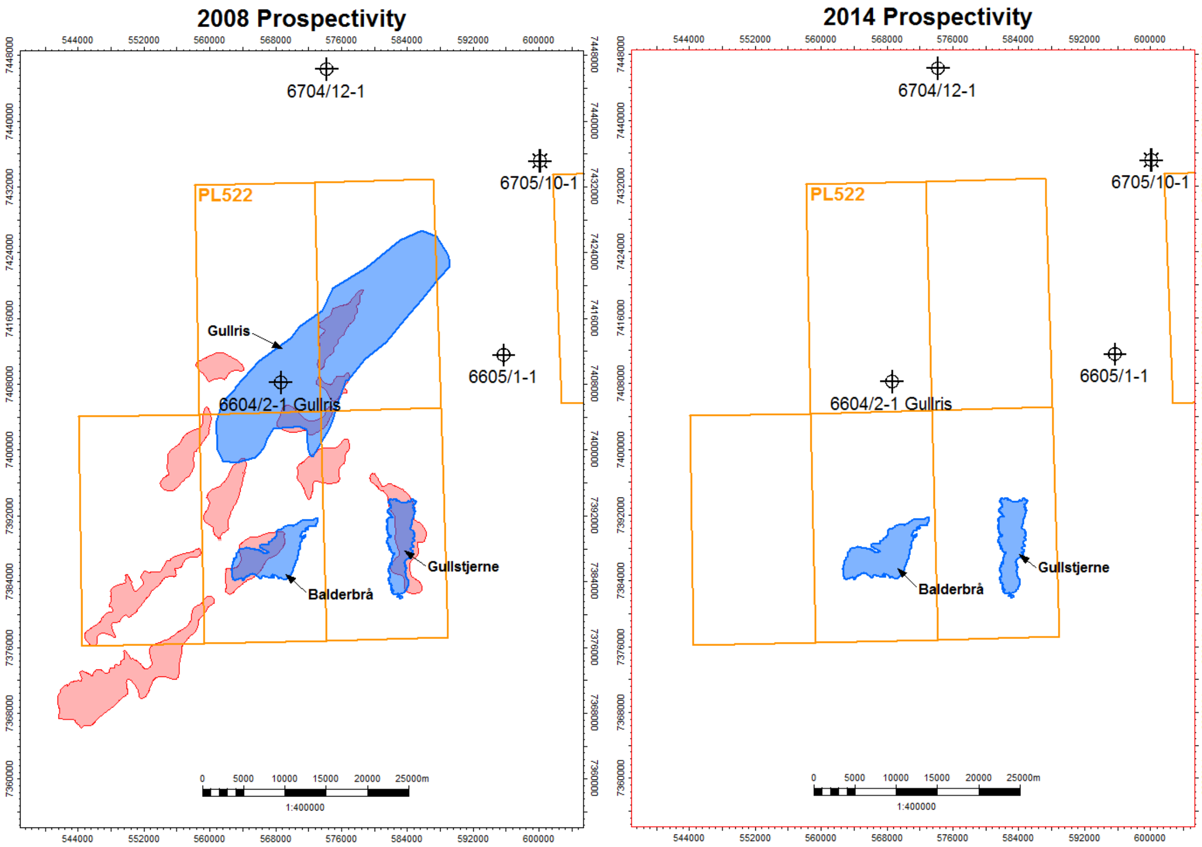

Fig. 4.1 PL522 prospectivity: 2008 vs. 2014. *Springar formation prospects are denoted by blue polygons, whilst red polygons represent potential leads within the Nise formation. The Gullris prospect was drilled in 2011 and was unsuccessful. After completion of the licence work programme two Springar prospects remain. The Nise prospectivity is no longer considered valid due to very high risk on reservoir presence and effectiveness.*

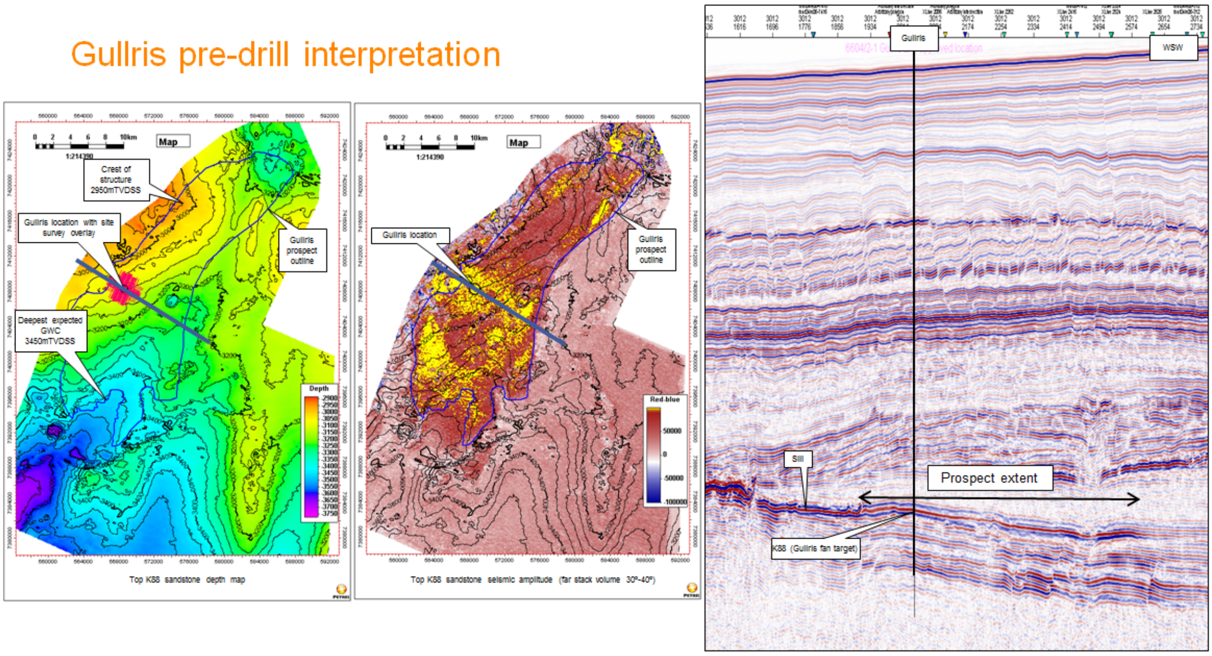

Fig. 4.2 Gullris pre-drill prospect summary

Well Results

The 6604/2-1 Gullris exploration well was spudded on 21st March 2011 using the semi-submersible rig Aker Barents. The primary target of the well was the Upper sand unit in the Cretaceous Springar Formation, with two secondary reservoir targets also considered within the Springar Formation. The well confirmed the prognosed stratigraphy, but the reservoir sands in both the primary and the secondary targets were water-wet. A full suite of LWD and wireline logs were acquired and a total of 62 sidewall cores were taken within the Springar interval. TD was reached at 3551m MD on 22nd April 2011.

The reservoir properties of the Springar Fm reservoirs encountered in the Gullris well are summarised in the table below and in Fig. 4.3. Petrophysical cut-off criteria used to calculate the averages were 15% porosity, 50% shale volume and 85% water saturation.

6604/2-1	Top MD (m)	Base MD (m)	Gross Thickness (m)	Net Sand (m)	NTG	Effective Porosity (%)	Sw (%)
Upper Sand (Gullris Fan)	3111.4	3173.6	62.2	45.2	0.73	22.1	100
Middle Sand (Gro Fan)	3222.8	3269.2	46.4	23.3	0.50	15.2	100
Lower Sand (Obelix Fan)	3374.4	3495.0	120.6	67.3	0.56	18.2	98

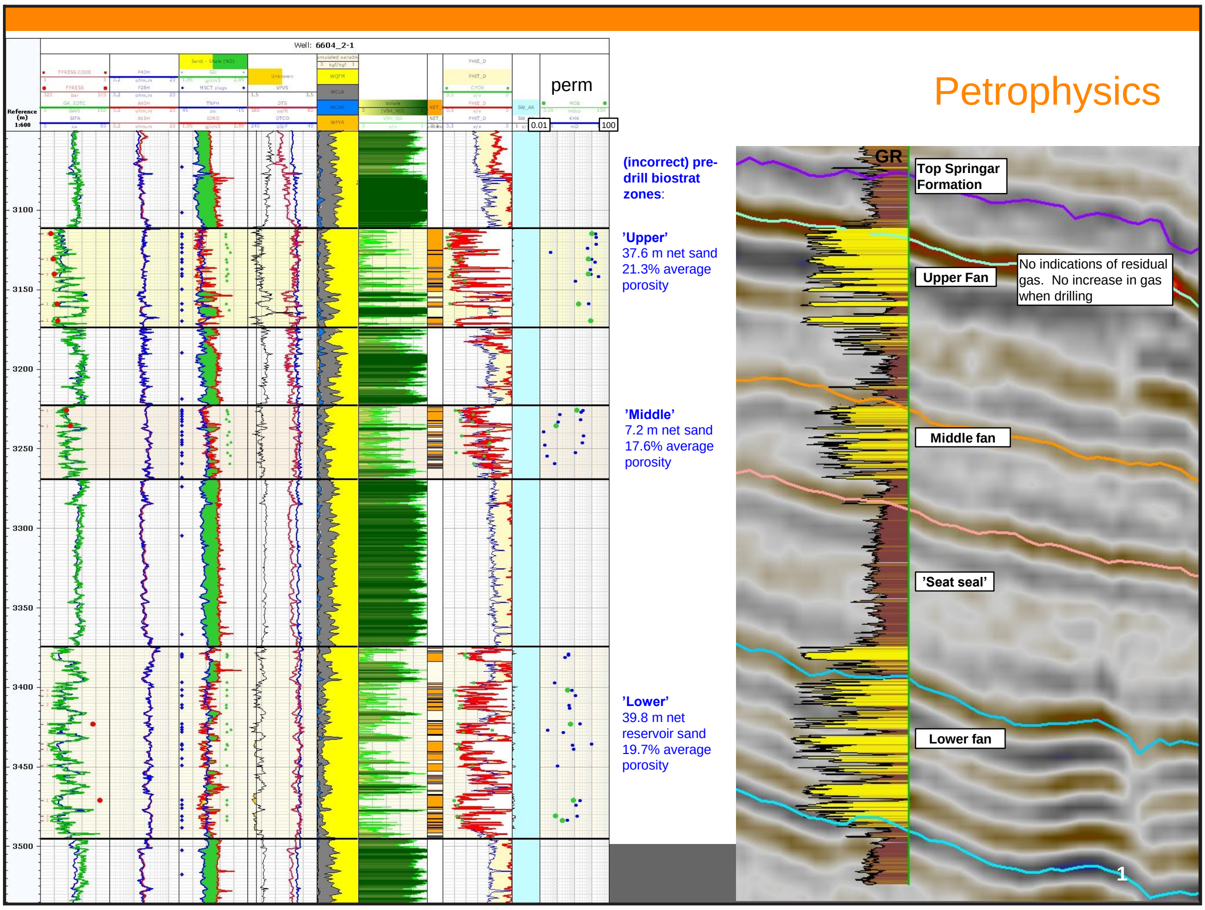

Fig. 4.3 6604/2-1 Gullris summary CPI log and seismic

Remaining Potential

There are two remaining prospects within the licence, Balderbrå (Fig. 4.4) and Gullstjerne (Fig. 4.5).

The Balderbrå prospect has two reservoir segments; the K78.5 (Gro Fan) and K78 (Obelix Fan) intervals within the Springar formation. The prospect is a robust structure, defined by 3-way dip closure and 1-way fault closure to the northwest. There are two structural culminations which fall within the ML and Max cases. In the Min case, the prospect is separated into two accumulations by a structural saddle (Fig. 4.4). The structure is very similar a both Top Gro and Top Obelix levels, and so only the Top Gro depth map is shown here.

Balderbrå exhibits a strong seismic amplitude anomaly with good structural conformance along the eastern dip-closed flank of the prospect. The seismic amplitude response in other areas of the prospect is significantly complicated by a number of factors including lateral facies changes and tuning effects, as discussed in 3 Review of Geological and Geophysical framework. There are indications of a potential flatspot within the Gro reservoir segment which correlates well with the depth at which the observed amplitude dimming occurs.

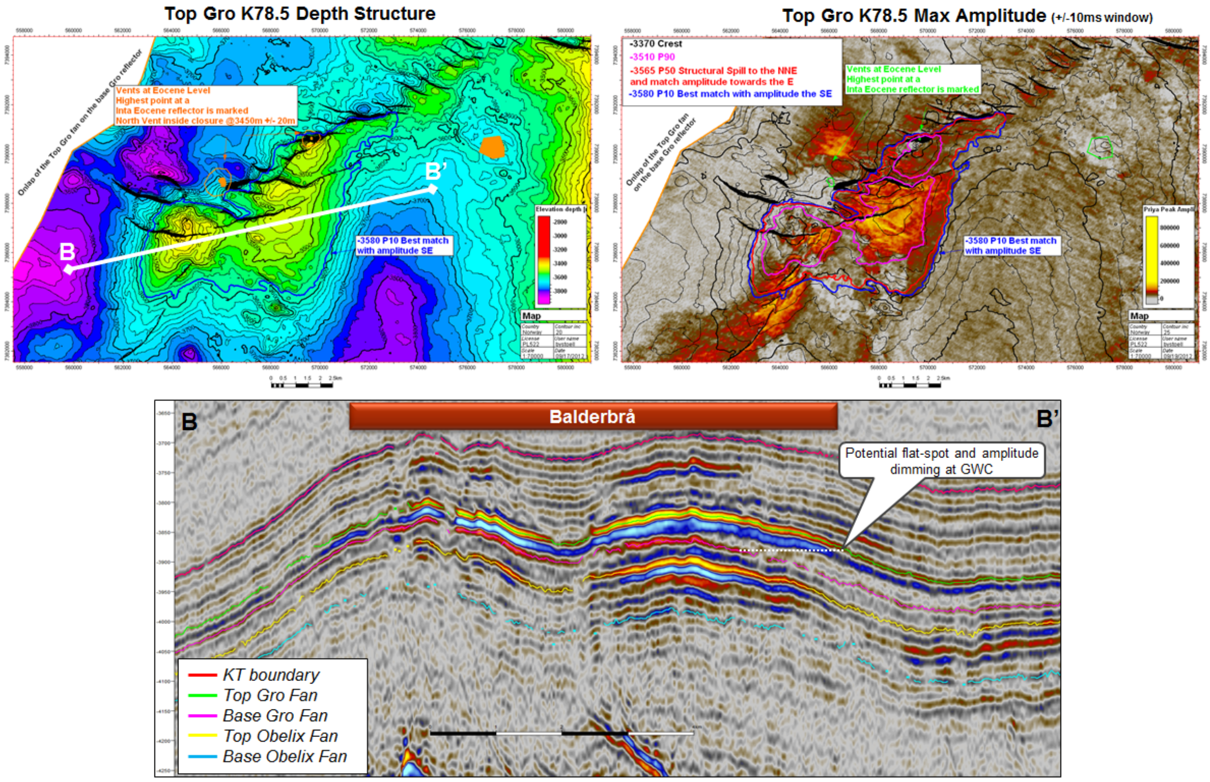

Fig. 4.4 Balderbrå prospect summary

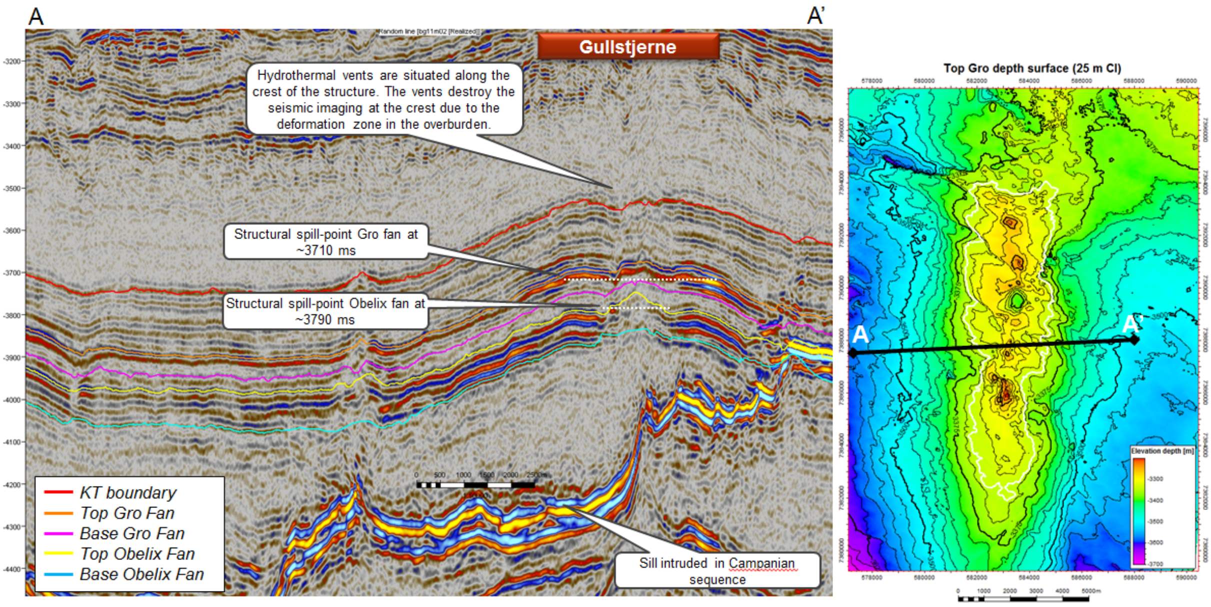

Fig. 4.5 Gullstjerne prospect summary

The reservoir parameters and risking of Balderbrå have been refined and now incorporate the significant improvements in understanding gained from completion of the reservoir quality study, GDE mapping and seismic forward modelling. Balderbrå has an enrolled chance of success (CoS) of 37%, with the critical risk for the prospect interpreted to be related to reservoir effectiveness.

The Gullstjerne prospect has two reservoir segments; the K78.5 (Gro Fan) and K78 (Obelix Fan) intervals within the Springar formation. The prospect is defined by a robust 4-way dip-closed structure, with very similar form at both Top Gro and Top Obelix reservoir levels. The Top Gro depth map can be seen in Fig. 4.5.The spillpoint of the structure is towards the North.

The Late Cretaceous and Palaeogene section is severely affected by hydrothermal venting in the Gullstjerne area, with the vents mainly focussed along the crest of the prospect. This has two major implications for Gullstjerne; firstly, the effectiveness of the trap to withhold hydrocarbons is adversely affected by the vertical disturbances through both the reservoir and top seal. Secondly, the seismic amplitudes are severely masked over the crest of the prospect due to imaging issues related to the complex deformation in the overburden. The seismic amplitude response of the reservoirs in Gullstjerne cannot be reliably analysed and interpreted, which further increases the risk associated with Gullstjerne.

The reservoir parameters and risking of Gullstjerne have also been refined and incorporate the understanding gained from the subsurface work programme. Gullstjerne has an enrolled chance of success (CoS) of 11%, with the critical risk for the prospect interpreted to be related to trap effectiveness.

The table below shows a comparison of the most recent Balderbrå and Gullstjerne volumes & CoS, compared to 2008 licence application estimates. The updated prospect summary sheets are shown in Fig. 4.6 to Fig. 4.11.

Recoverable Resource $10^9 Sm^3$	P90	Mean	P10	CoS
Balderbrå 2008 licence application	6.4	11.4	17.5	0.25
Balderbrå 2014 evaluation	6.0	25.2	47.2	0.37
Gullstjerne 2008 licence applicaion	16.3	40.5	67.3	0.39
Gullstjerne 2014 evaluation	5.5	14.8	23.5	0.11

The potential of the Nise leads identified at the time of application has been thoroughly re-evaluated. Reservoir presence within the Nise Formation is considered to be the critical risk for these leads, given the lack of evidence both in surrounding offset wells and on seismic data for the development of any notable thickness of reservoir-quality sands in the area (Fig. 4.12). Given the modest areal extent of the Nise structures compared with the Springar prospects, and coupled with the very high risk ascribed to reservoir presence, the Nise leads are no longer considered valid.

Table 5: Prospect data (Enclose map)

Block	6604/5	Prospect name	Balderbrå K78.5 (Gr	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)	No	Outside play (Y/N)					
Oil, Gas or O&G case:	Gas	Reported by company	BG Norge	Reference document				Assessment year	2014
This is case no.:		Structural element	Vigrid Syncline	Type of trap	Dip & fault closure	Water depth [m MSL] (>0)	1170	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)	11.40	27.50	30.00	49.90				
Recoverable resources	Oil [10^6 Sm^3] (>0.00)								
	Gas [10^9 Sm^3] (>0.00)	6.80	15.80	19.80	34.70				
Reservoir Chrono (from)	Maastrichtian	Reservoir litho (from)	Springar Fm	Source Rock, chrono primary	Cenomanian-Turon	Source Rock, litho primary	Lange Fm	Seal, Chrono	Maastrichtian
Reservoir Chrono (to)	Maastrichtian	Reservoir litho (to)	Springar Fm	Source Rock, chrono secondary		Source Rock, litho secondary		Seal, Litho	Springar Fm
Probability [fraction]									
Technical (oil + gas + oil & gas case) (0.00-1.00)	0.28	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)	0.50	Trap (P2) (0.00-1.00)	1.00	Charge (P3) (0.00-1.00)	0.80	Retention (P4) (0.00-1.00)	0.70		
Parametres:	Low (P90)	Base	High (P10)	*Segment parameters and volumes for Balderbrå K78.5 (Gro Fan) reservoir segment*					
Depth to top of prospect [m MSL] (> 0)		3370							
Area of closure [km^2] (> 0.0)	16.5	30.0	37.1						
Reservoir thickness [m] (> 0)	70	80	90						
HC column in prospect [m] (> 0)	140	195	210						
Gross rock vol. [10^9 m^3] (> 0.000)	1.899	2.068	2.186						
Net / Gross [fraction] (0.00-1.00)	0.42	0.55	0.68						
Porosity [fraction] (0.00-1.00)	0.18	0.21	0.23						
Permeability [mD] (> 0.0)		50.0							
Water Saturation [fraction] (0.00-1.00)	0.35	0.30	0.25						
Bg [Rm3/Sm3] (< 1.0000)	0.0041	0.0038	0.0035						
1/Bo [Sm3/Rm3] (< 1.00)									
GOR, free gas [Sm^3/Sm^3] (> 0)									
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	0.64	0.73						
Recov. factor, liquid ass. phase [fraction] (0.00-1.00)				For NPD use:					
Temperature, top res [°C] (>0)	105			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)	370			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. Porosity > 0.15	2. Shale volume < 50%	3.					Kart nr	NPD will insert value

Fig. 4.6 Prospect data: Balderbrå K78.5 Gro segment

Table 5: Prospect data (Enclose map)

Block	6604/5	Prospect name	Balderbrå K78 (Obe	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	BG Norge	Reference document	0			Assessment year	2014
This is case no.:		Structural element	Vigrid Syncline	Type of trap	Dip & fault closure	Water depth [m MSL] (>0)	1170	Seismic database (2D/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)								
Recoverable resources	Oil [10^6 Sm^3] (>0.00)								
	Gas [10^9 Sm^3] (>0.00)								
Reservoir Chrono (from)	Maastrichtian	Reservoir litho (from)	Springar Fm	Source Rock, chrono primary	Cenomanian-Turon	Source Rock, litho primary	Lange Fm	Seal, Chrono	Maastrichtian
Reservoir Chrono (to)	Maastrichtian	Reservoir litho (to)	Springar Fm	Source Rock, chrono secondary		Source Rock, litho secondary		Seal, Litho	Springar Fm
Probability [fraction]									
Technical (oil + gas + oil & gas case) (0.00-1.00)	0.28	Oil case (0.00-1.00)	0.00	Gas case (0.00-1.00)	0.00	Oil & Gas case (0.00-1.00)	0.00		
Reservoir (P1) (0.00-1.00)	0.50	Trap (P2) (0.00-1.00)	1.00	Charge (P3) (0.00-1.00)	0.80	Retention (P4) (0.00-1.00)	0.70		
Parametres:	Low (P90)	Base	High (P10)	*Segment parameters and volumes for Balderbrå K78 (Obelix Fan) reservoir segment*					
Depth to top of prospect [m MSL] (> 0)		3560							
Area of closure [km^2] (> 0.0)	2.8	12.0	23.1						
Reservoir thickness [m] (> 0)	128	135	143						
HC column in prospect [m] (> 0)	40	90	165						
Gross rock vol. [10^9 m^3] (> 0.000)	1.597	1.610	1.619						
Net / Gross [fraction] (0.00-1.00)	0.57	0.65	0.73						
Porosity [fraction] (0.00-1.00)	0.20	0.22	0.24						
Permeability [mD] (> 0.0)		50.0							
Water Saturation [fraction] (0.00-1.00)	0.25	0.30	0.35						
Bg [Rm3/Sm3] (< 1.0000)	0.0041	0.0038	0.0035						
1/Bo [Sm3/Rm3] (< 1.00)									
GOR, free gas [Sm^3/Sm^3] (> 0)									
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	0.64	0.73						
Recov. factor, liquid ass. phase [fraction] (0.00-1.00)				For NPD use:					
Temperature, top res [°C] (>0)	105			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)	370			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. Porosity > 0.15	2. Shale volume < 50%	3.					Kart nr	NPD will insert value

Fig. 4.7 Prospect data: Balderbrå K78 Obelix segment

Table 5: Prospect data (Enclose map)

Block	6604/5	Prospect name	Balderbrå Enrolled	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	BG Norge	Reference document	0			Assessment year	2014
This is case no.:		Structural element	Vigrid Syncline	Type of trap	Dip & fault closure	Water depth [m MSL] (>0)	1170	Seismic database (2D/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)	10.80	30.90	40.20	73.40				
Recoverable resources	Oil [10^6 Sm^3] (>0.00)								
	Gas [10^9 Sm^3] (>0.00)	5.99	18.80	25.20	47.20				
Reservoir Chrono (from)	Maastrichtian	Reservoir litho (from)	Springar Fm	Source Rock, chrono primary	Cenomanian-Turon	Source Rock, litho primary	Lange Fm	Seal, Chrono	Maastrichtian
Reservoir Chrono (to)	Maastrichtian	Reservoir litho (to)	Springar Fm	Source Rock, chrono secondary		Source Rock, litho secondary		Seal, Litho	Springar Fm
Probability [fraction]									
Technical (oil + gas + oil & gas case) (0.00-1.00)	0.37	Oil case (0.00-1.00)	0.00	Gas case (0.00-1.00)	0.37	Oil & Gas case (0.00-1.00)	0.00		
Reservoir (P1) (0.00-1.00)		Trap (P2) (0.00-1.00)		Charge (P3) (0.00-1.00)		Retention (P4) (0.00-1.00)			
Parametres:	Low (P90)	Base	High (P10)	*Enrolled prospect volumes consisiting of two separate reservoir segments; K78.5 Gro Fan and K78 Obelix Fan*					
Depth to top of prospect [m MSL] (> 0)									
Area of closure [km^2] (> 0.0)									
Reservoir thickness [m] (> 0)									
HC column in prospect [m] (> 0)									
Gross rock vol. [10^9 m^3] (> 0.000)									
Net / Gross [fraction] (0.00-1.00)									
Porosity [fraction] (0.00-1.00)									
Permeability [mD] (> 0.0)									
Water Saturation [fraction] (0.00-1.00)									
Bg [Rm3/Sm3] (< 1.0000)									
1/Bo [Sm3/Rm3] (< 1.00)									
GOR, free gas [Sm^3/Sm^3] (> 0)									
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	0.64	0.73						
Recov. factor, liquid ass. phase [fraction] (0.00-1.00)				For NPD use:					
Temperature, top res [^oC] (>0)	105			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)	370			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.	2.	3.					Kart nr	NPD will insert value

Fig. 4.8 Prospect data: Balderbrå enrolled

Table 5: Prospect data (Enclose map)

Block	6604/5	Prospect name	Gullstjerne Segment	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)	No	Outside play (Y/N)					
Oil, Gas or O&G case:	Gas	Reported by company	BG Norge	Reference document				Assessment year	2014
This is case no.:		Structural element	Vigrid Syncline	Type of trap	4-way dip closure	Water depth [m MSL] (>0)	1170	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)	11.80	17.30	18.70	26.20				
Recoverable resources	Oil [10^6 Sm^3] (>0.00)								
	Gas [10^9 Sm^3] (>0.00)	6.60	9.99	12.20	18.70				
Reservoir Chrono (from)	Maastrichtian	Reservoir litho (from)	Springar Fm	Source Rock, chrono primary	Cenomanian-Turon	Source Rock, litho primary	Lange Fm	Seal, Chrono	Maastrichtian
Reservoir Chrono (to)	Maastrichtian	Reservoir litho (to)	Springar Fm	Source Rock, chrono secondary		Source Rock, litho secondary		Seal, Litho	Springar Fm
Probability [fraction]									
Technical (oil + gas + oil & gas case) (0.00-1.00)	0.09	Oil case (0.00-1.00)	0.00	Gas case (0.00-1.00)	0.09	Oil & Gas case (0.00-1.00)	0.00		
Reservoir (P1) (0.00-1.00)	0.50	Trap (P2) (0.00-1.00)	1.00	Charge (P3) (0.00-1.00)	0.75	Retention (P4) (0.00-1.00)	0.25		
Parametres:	Low (P90)	Base	High (P10)	*Segment parameters and volumes for Gullstjerne K78.5 (Gro Fan) reservoir segment. Reservoir thickness defined by mapped top and base of reservoir interval (average 80m thickness).*					
Depth to top of prospect [m MSL] (> 0)		3240							
Area of closure [km^2] (> 0.0)	25.2	28.1	30.5						
Reservoir thickness [m] (> 0)		80							
HC column in prospect [m] (> 0)	95	100	105						
Gross rock vol. [10^9 m^3] (> 0.000)	1.145	1.145	1.145						
Net / Gross [fraction] (0.00-1.00)	0.42	0.55	0.68						
Porosity [fraction] (0.00-1.00)	0.18	0.21	0.23						
Permeability [mD] (> 0.0)		50.0							
Water Saturation [fraction] (0.00-1.00)	0.35	0.30	0.25						
Bg [Rm3/Sm3] (< 1.0000)	0.0041	0.0038	0.0035						
1/Bo [Sm3/Rm3] (< 1.00)									
GOR, free gas [Sm^3/Sm^3] (> 0)									
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	0.64	0.73						
Recov. factor, liquid ass. phase [fraction] (0.00-1.00)				For NPD use:					
Temperature, top res [°C] (>0)	105			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)	370			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. Porosity > 0.15	2. Shale volume < 50%	3.					Kart nr	NPD will insert value

Fig. 4.9 Prospect data: Gullstjerne K78.5 Gro segment

Table 5: Prospect data (Enclose map)

Block	6604/5	Prospect name	GullstjerneSegment	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	BG Norge	Reference document	0			Assessment year	2014
This is case no.:		Structural element	Vigrid Syncline	Type of trap	4-way dip closure	Water depth [m MSL] (>0)	1170	Seismic database (2D/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)	5.51	7.84	9.57	14.60				
Recoverable resources	Oil [10^6 Sm^3] (>0.00)								
	Gas [10^9 Sm^3] (>0.00)	2.08	3.33	4.96	8.81				
Reservoir Chrono (from)	Maastrichtian	Reservoir litho (from)	Springar Fm	Source Rock, chrono primary	Cenomanian-Turon	Source Rock, litho primary	Lange Fm	Seal, Chrono	Maastrichtian
Reservoir Chrono (to)	Maastrichtian	Reservoir litho (to)	Springar Fm	Source Rock, chrono secondary	0	Source Rock, litho secondary	0	Seal, Litho	Springar Fm
Probability [fraction]									
Technical (oil + gas + oil & gas case) (0.00-1.00)	0.09	Oil case (0.00-1.00)	0.00	Gas case (0.00-1.00)	0.09	Oil & Gas case (0.00-1.00)	0.00		
Reservoir (P1) (0.00-1.00)	0.50	Trap (P2) (0.00-1.00)	1.00	Charge (P3) (0.00-1.00)	0.75	Retention (P4) (0.00-1.00)	0.25		
Parametres:	Low (P90)	Base	High (P10)	*Segment parameters and volumes for Gullstjerne K78 (Obelix Fan) reservoir segment.*					
Depth to top of prospect [m MSL] (> 0)		3385							
Area of closure [km^2] (> 0.0)	17.9	21.1	24.4						
Reservoir thickness [m] (> 0)	89	104	125						
HC column in prospect [m] (> 0)	75	80	85						
Gross rock vol. [10^9 m^3] (> 0.000)	0.771	0.771	0.771						
Net / Gross [fraction] (0.00-1.00)	0.57	0.65	0.73						
Porosity [fraction] (0.00-1.00)	0.14	0.18	0.22						
Permeability [mD] (> 0.0)		50.0							
Water Saturation [fraction] (0.00-1.00)	0.53	0.44	0.32						
Bg [Rm3/Sm3] (< 1.0000)	0.0041	0.0038	0.0035						
1/Bo [Sm3/Rm3] (< 1.00)									
GOR, free gas [Sm^3/Sm^3] (> 0)									
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	0.64	0.73						
Recov. factor, liquid ass. phase [fraction] (0.00-1.00)				For NPD use:					
Temperature, top res [°C] (>0)	105			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)	370			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. Porosity > 0.15	2. Shale volume < 50%	3.					Kart nr	NPD will insert value

Fig. 4.10 Prospect data: Gullstjerne K78 Obelix segment

Table 5: Prospect data (Enclose map)

Block	6604/5	Prospect name	Gullstjerne Enrolled	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	BG Norge	Reference document	0			Assessment year	2014
This is case no.:		Structural element	Vigrid Syncline	Type of trap	4-way dip closure	Water depth [m MSL] (>0)	1170	Seismic database (2D/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)	10.50	26.50	24.30	35.80				
Recoverable resources	Oil [10^6 Sm^3] (>0.00)								
	Gas [10^9 Sm^3] (>0.00)	5.46	14.30	14.80	23.50				
Reservoir Chrono (from)	Maastrichtian	Reservoir litho (from)	Springar Fm	Source Rock, chrono primary	Cenomanian-Turon	Source Rock, litho primary	Lange Fm	Seal, Chrono	Maastrichtian
Reservoir Chrono (to)	Maastrichtian	Reservoir litho (to)	Springar Fm	Source Rock, chrono secondary	0	Source Rock, litho secondary	0	Seal, Litho	Springar Fm
Probability [fraction]									
Technical (oil + gas + oil & gas case) (0.00-1.00)	0.11	Oil case (0.00-1.00)	0.00	Gas case (0.00-1.00)	0.11	Oil & Gas case (0.00-1.00)	0.00		
Reservoir (P1) (0.00-1.00)		Trap (P2) (0.00-1.00)		Charge (P3) (0.00-1.00)		Retention (P4) (0.00-1.00)			
Parametres:	Low (P90)	Base	High (P10)	*Enrolled prospect volumes consisting of two separate reservoir segments; K78.5 Gro Fan and K78 Obelix Fan*					
Depth to top of prospect [m MSL] (> 0)									
Area of closure [km^2] (> 0.0)									
Reservoir thickness [m] (> 0)									
HC column in prospect [m] (> 0)									
Gross rock vol. [10^9 m^3] (> 0.000)									
Net / Gross [fraction] (0.00-1.00)									
Porosity [fraction] (0.00-1.00)									
Permeability [mD] (> 0.0)									
Water Saturation [fraction] (0.00-1.00)									
Bg [Rm3/Sm3] (< 1.0000)									
1/Bo [Sm3/Rm3] (< 1.00)									
GOR, free gas [Sm^3/Sm^3] (> 0)									
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)									
Recov. factor, liquid ass. phase [fraction] (0.00-1.00)				For NPD use:					
Temperature, top res [°C] (>0)	105			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)	370			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.	2.	3.					Kart nr	NPD will insert value

Fig. 4.11 Prospect data: Gullstjerne enrolled

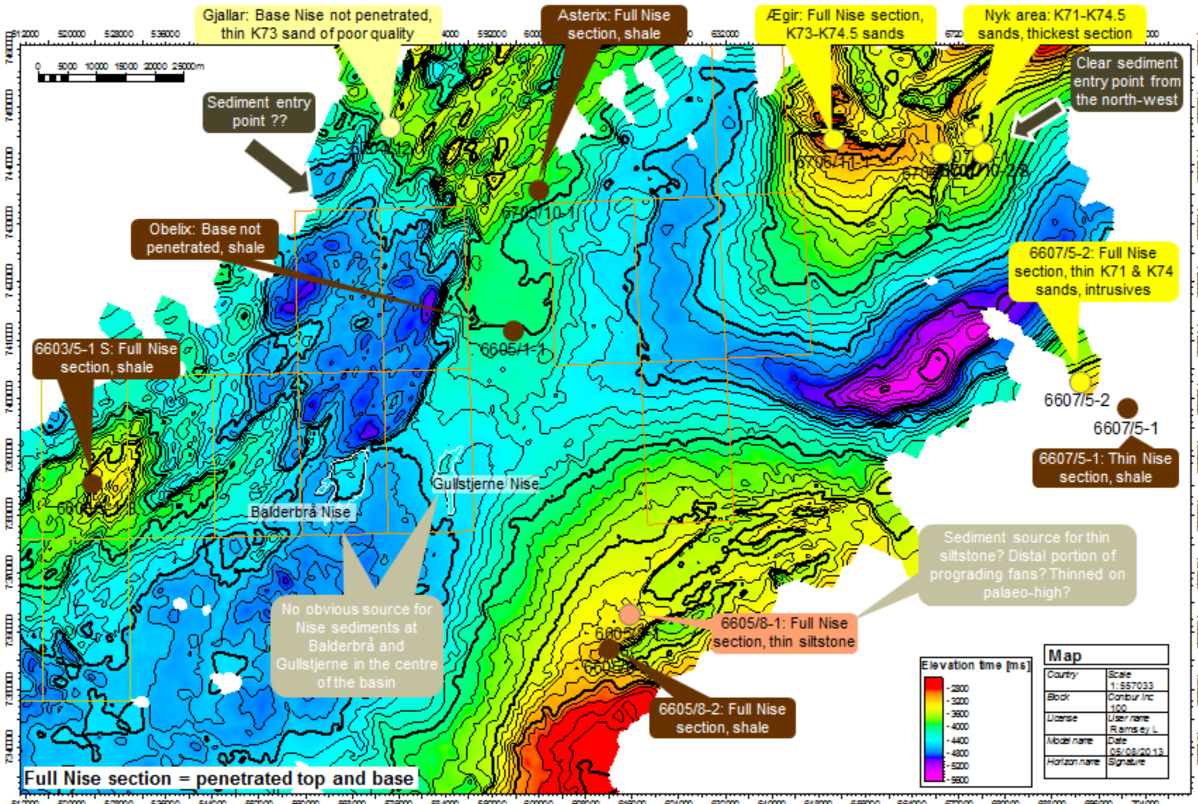

Fig. 4.12 Nise formation: Evidence for reservoir development in PL522 area. *Wells surrounding the licence have encountered very little in the way of sand within the Nise formation. The good quality, thick Nise sandstones observed in the Nyk High area are interpreted to be sourced from the north-west. Seismic mapping indicates a significant thinning of the Nise interval towards the east, into the licence area, and seismic character suggests that the Nise interval in PL522 is likely to comprise poorer quality sedimentary facies to those seen further west. Structure map shown is Top Nise TWT.*

5 Technical Evaluations

The joint development concept for Balderbrå and Gullstjerne is shown in Fig. 5.1. Four gas producers are drilled in each of the structures in the Mid volume case (as is shown in Fig. 5.1).

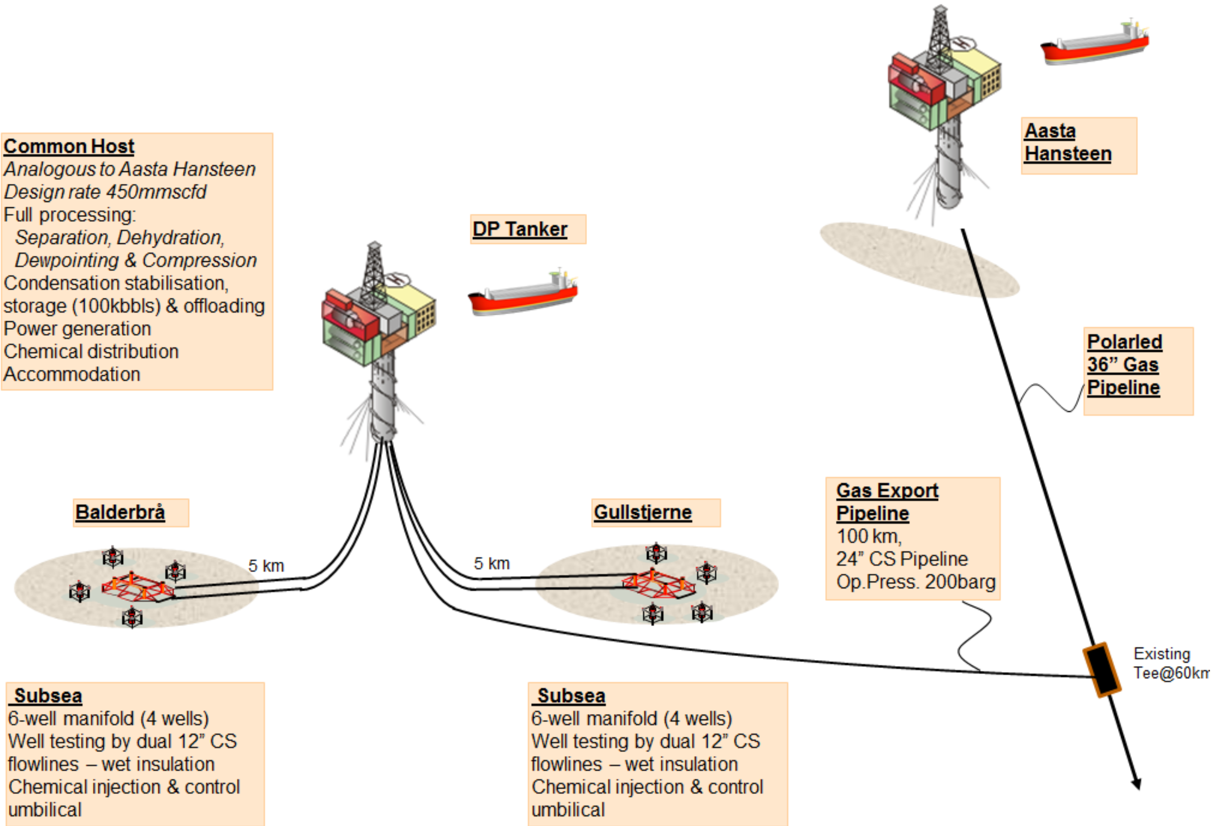

Fig. 5.1 PL522 development concept. *Assuming a joint development of Balderbrå and Gullstjerne*

The development concept involves the subsea tie-back of both Balderbrå and Gullstjerne to a common processing host, analogous to the Aasta Hansteen concept, with gas export via a 100km subsea pipeline tying in to the Polarled pipeline.

6 Conclusions

The PL522 partnership have decided to relinquish the licence following an extensive licence work programme which included:

- The acquisition of 3D seismic volume BG0904
- The drilling of exploration well 6604/2-1 and subsequent post-well analysis
- The merge of seismic volume BG11M02
- The PreSDM processing of a subvolume of BG0904

The two remaining prospects within the licence are Balderbrå and Gullstjerne. Both prospects are defined by robust structural closures. The critical risk identified for Balderbrå is reservoir effectiveness, and for Gullstjerne it is trap effectiveness.

All work commitments in the licence have been fulfilled and through extensive sub-surface studies the partnership has concluded that the remaining prospectivity is not economically viable. Based on these assumptions the licence group unanimously agreed to relinquish the licence.