# PL1003 and PL1003 B Status report at lapse

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# 1 History

PL1003 was awarded 01.03.2019 as part of APA 2018 to OKEA ASA as operator (60%) and Wellesley Petroleum AS (40%) as partner. The initial work obligations and periods are shown in Table 1.1.

In APA 2019, the PL1003 licensees applied for a licence extension towards the north-east. PL1003 B was granted 14.02.2020 with the same licence interests and work program as PL1003. The location of both licences is show in Fig. 1.1.

The evaluation of the area has focussed on the Mistral North and South prospects identified in the APA 2018 application. The results of this work and comparison to the assessment included in the 2018 application are presented in this report.

**Overview of meetings held**

2019-04-15-EC-MC Licence Kick-off Meeting

2019-10-20-EC-MC PL1003 Meeting

2019-12-13-EC-MC Mistral North and South Volume and Risk Workshop

**Grounds for lapse**

Based on the subsurface evaluation described in this document, the Operator put forward a recommendation to drill one exploration well on Mistral. However, the partner could not support that. As a consequence, the licenses have lapsed.

*Table 1.1 Work program*

| Work obligations | Decision | Expiry date |
|---|---|---|
| Reprocessing of 3D seismic | | |
| Acquire 3D seismic | | |
| | Decision to drill | 01.03.2020 |
| Drill exploration well | | |
| | (BoK) Decision to concretize | 01.03.2022 |
| Conceptual studies | | |
| | (BoV) Decision to drill | 01.03.2024 |
| (PDO) Prepare plan for development | | |
| | (PDO) Submit plan for development | 01.03.2025 |
| | Decision to enter extension period | 01.03.2025 |

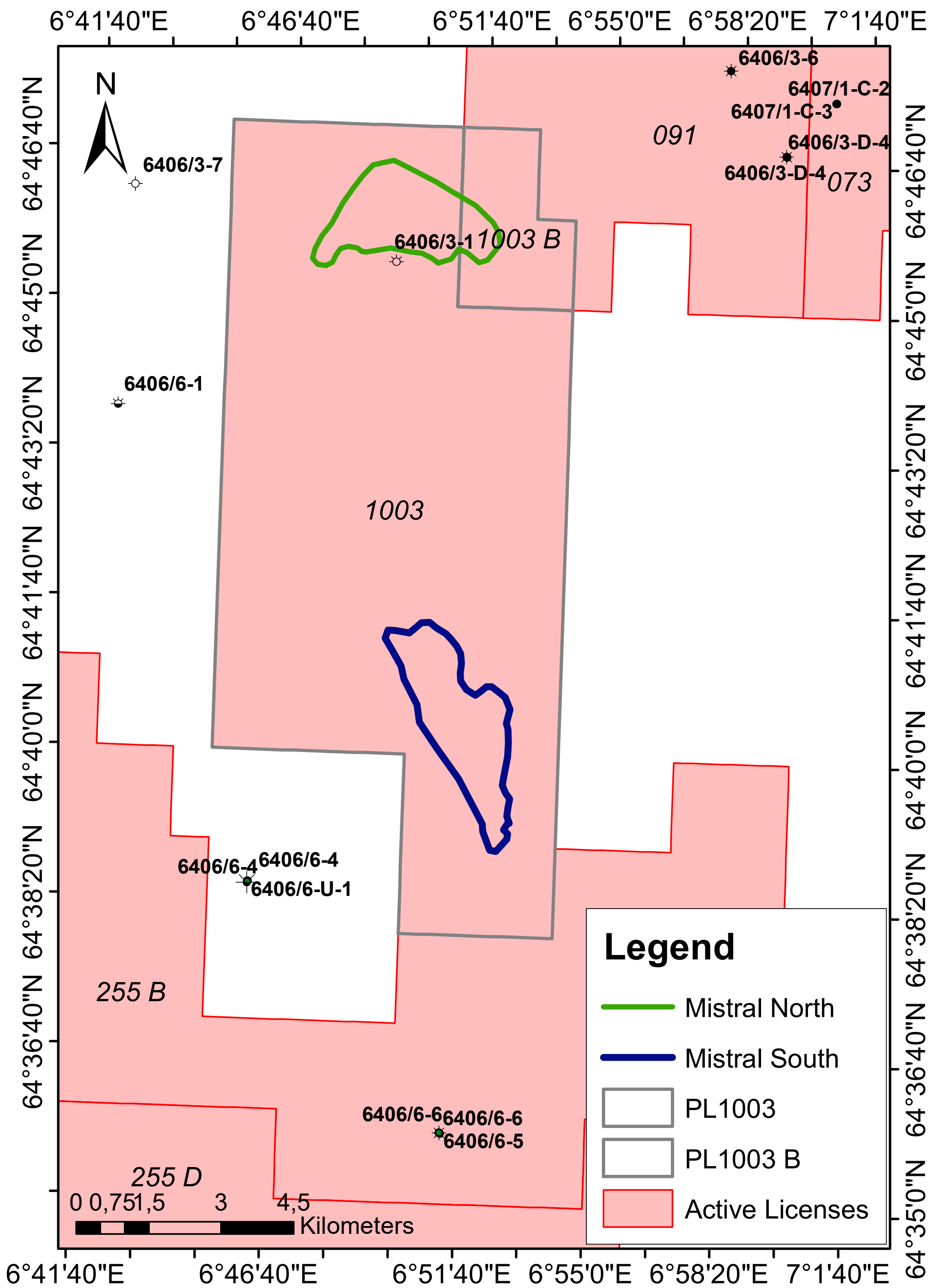


*Fig. 1.1 PL1003, PL1003 B and Mistral prospect outlines*

# 2 Database

### Seismic database

The seismic database is listed in Table 2.1 and the outline of the key seismic survey (PGS18M05NWS) is shown in Fig. 2.1.

With reference to the committed work program, 285 $km^2$ of the PGS18M05NWS multi-client geostreamer seismic data were licensed in March 2019. This included a new PSDM processing of the data which was released by PGS in May 2019. The multi-client seismic has undergone further pre-stack conditioning and was used for rock physics studies, velocity modelling, and seismic interpretation. A series of additional angles stacks in addition to those stated in Table 2.1 were generated through studies conducted by Sharp Reflections AS and DownUnder Geosolutions Ltd (DUG). The publicly available ST04M07 has been used for regional interpretation as input to basin modelling and regional studies. This 3D seismic dataset is a regional compilation of merged datasets of different vintages and qualities.

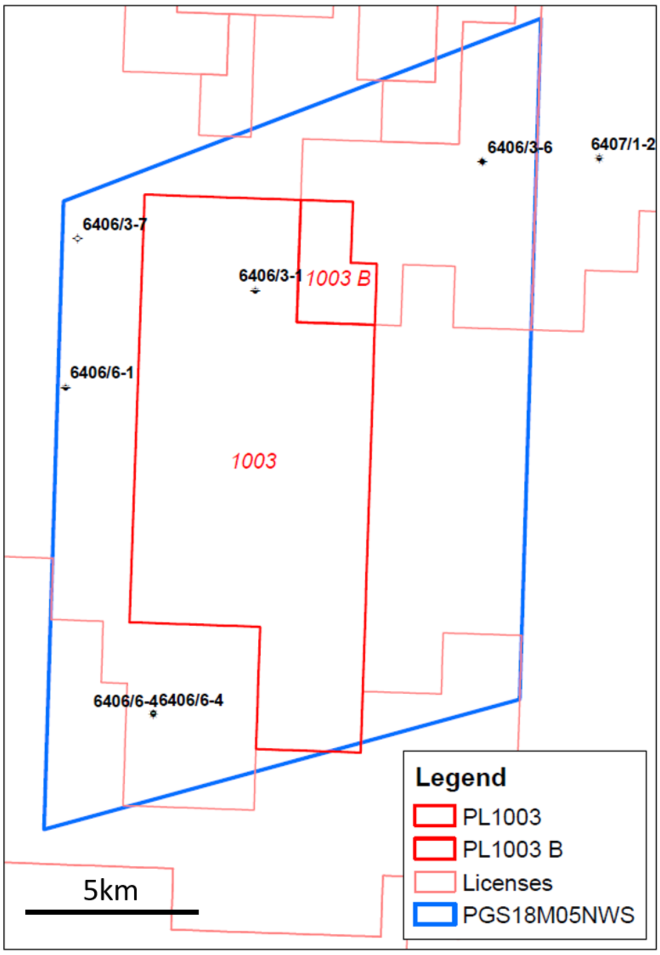


*Fig. 2.1 PGS18M05NWS outline*

*Table 2.1*

| Seismic survey | 2D/3D | Deliverables |
|---|---|---|
| PGS18M05NWS | 3D | • PSDM Full Stack (6-34)<br>• PSDM Angle Stacks (6-18, 18-28, 28-36, 36-42)<br>• Velocity data<br>• Pre-stack gathers<br>• Processing report |
| ST04M07 | 3D | Full stack (regional merge of various public seismic surveys) |

**Well database**

The well database is shown in Fig. 2.2 and listed in table Table 2.2. Key wells include main results in Table 2.2. All wells used in this licence work are publicly available.

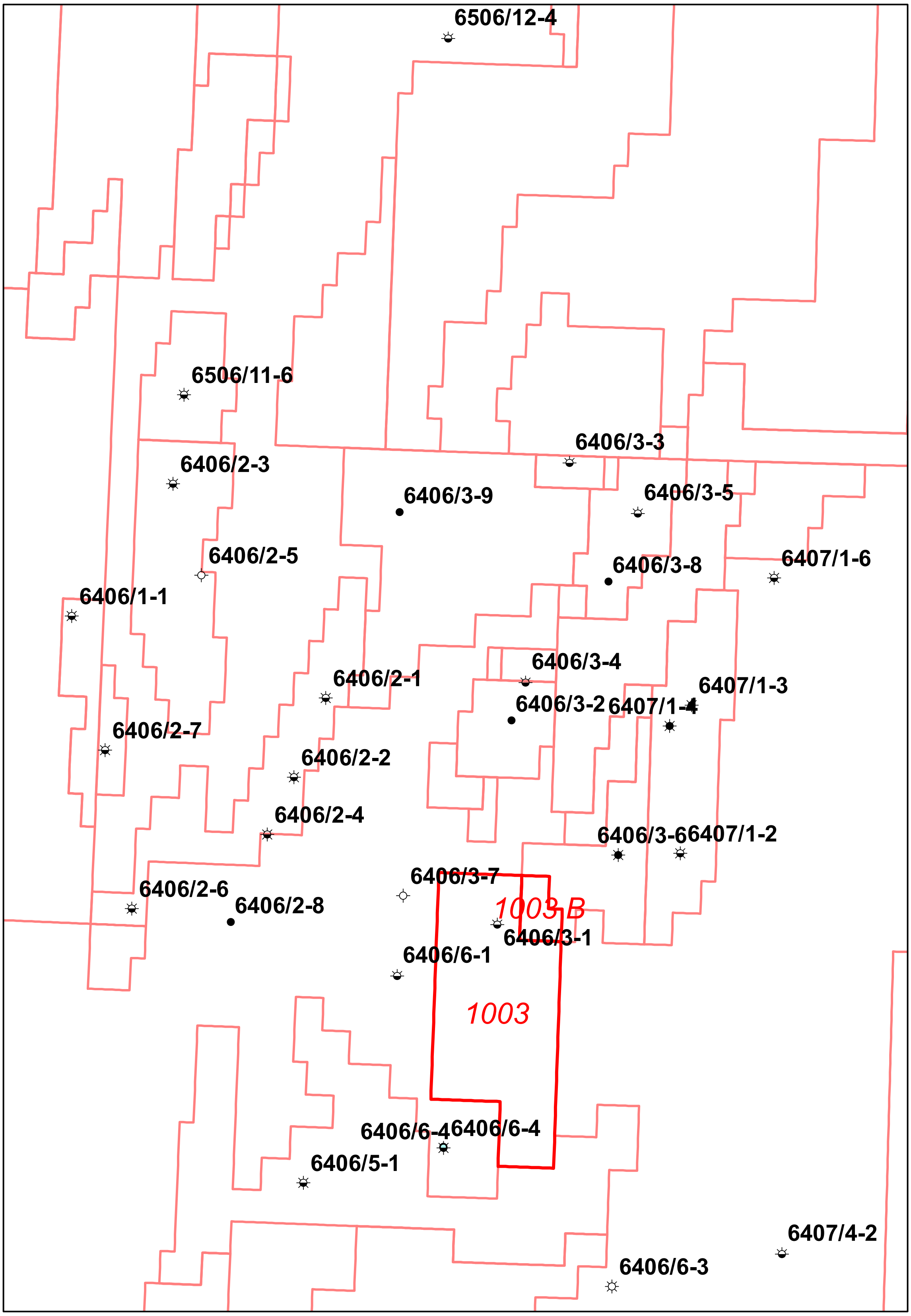


*Fig. 2.2 Well database*

*Table 2.2*

| Well | Result | Integrated modelling and simulation study | Velocity modelling | Rock Physics study | Seismic data conditioning |
|---|---|---|---|---|---|
| 6406/1-1 | | X | | | |
| 6406/2-1 | | X | | | |
| 6406/2-2 | | X | | | |
| 6406/2-3 | | X | | | |
| 6406/2-4 SR | | X | | | |
| 6406/2-5 | | X | | | |
| 6406/2-6 | | X | | | |
| 6406/2-7 | | X | | | |
| 6406/2-8 | | X | | | |
| 6406/3-1 | Hydrocarbon bearing Middle Jurassic sandstone was encountered at 3782 m, but a drill stem test proved only low concentration of gas in a water phase. Shows were seen chiefly as wet gas/condensate between 2405 - 2585 m and as wet to extremely wet gas at 3665 - 3785 m. Good shows of wet or marginally wet gas were associated with the coals within the Early Jurassic and Triassic | X | X | X | X |
| 6406/3-2 | | X | | | |
| 6406/3-3 | | X | | | |
| 6406/3-4 | | X | | | |
| 6406/3-5 | | X | | | |
| 6406/3-6 | Hydrocarbons were found in the Garn Formation with an oil-water contact at 3683 m TVD MSL, and in the upper part of the Ile Formation with an oil-water contact at 3825 m TVD MSL. Good shows were recorded in the Garn and Ile Formations down to 3840 m. | X | X | X | |
| 6406/3-7 | Dry well | X | X | X | X |
| 6406/3-8 | | X | | | |
| 6406/3-9 | | X | | | |
| 6406/5-1 | | X | | | |
| 6406/6-1 | HC shows in thin early Cretaceous sandstone beds. Weak oil shows in Ile and Tofte sandstone. | X | X | X | |
| 6406/6-3 | | X | | | |
| 6406/6-4 | Junk well. | X | X | X | |
| 6406/6-4 S | Replacement for 6406/6-4. 25 m gas/condensate down to HC/water contact at 4031. shows were recorded all through Garn and Ile Fms. | X | X | X | X |
| 6407/1-2 | | X | | | |
| 6407/1-3 | | X | | | |
| 6407/1-4 | | X | | | |
| 6407/1-6 S | | X | | | |
| 6407/4-2 | | X | | | |
| 6506/11-6 | | X | | | |
| 6506/12-4 | | X | | | |

# 3 Results from geological and geophysical studies

The special studies carried out by the licence group are listed in Table 3.1 and further described below.

*Table 3.1 Studies*

| Study | Delivery Date | Company |
|---|---|---|
| Velocity Modelling | May 2019 | Estimages Norge AS |
| Seismic Data Conditioning | May 2019 | Sharp Reflections AS and DownUnder Geosolutions Ltd (Dug) |
| Rock Physics and Fluid Prediction | June 2019 | DUG |
| Petrophysical Evaluation | 2019 | DUG |
| Integrated Modelling and Simulation | End of Q3 2019 | Explocrowd AS |

**Petrophysical evaluation**

The focus of the study conducted by DownUnder GeoSolutions Ltd. (DUG) has been to evaluate rock properties and fluid content in 6406/3-1 and several offset wells surrounding the Mistral structure. Petrophysical logs combined with RFT pressure observations (and supported by DST results) demonstrate that the Garn Fm. in 6406/3-1 consists of high quality sandstones containing residual gas at relatively high levels of approximately 20 to 40 % Sg (Fig. 3.1). The distribution of residual gas is comparable with similar residual zones observed in surrounding discovery wells, which in addition show mobile gas columns sitting above. This signature of mobile above residual gas is indicative of deeper paleocontacts and suggests the discoveries in the area represent partially blown traps, thus supporting the concept of higher (movable) gas saturations at Mistral North updip of the well.

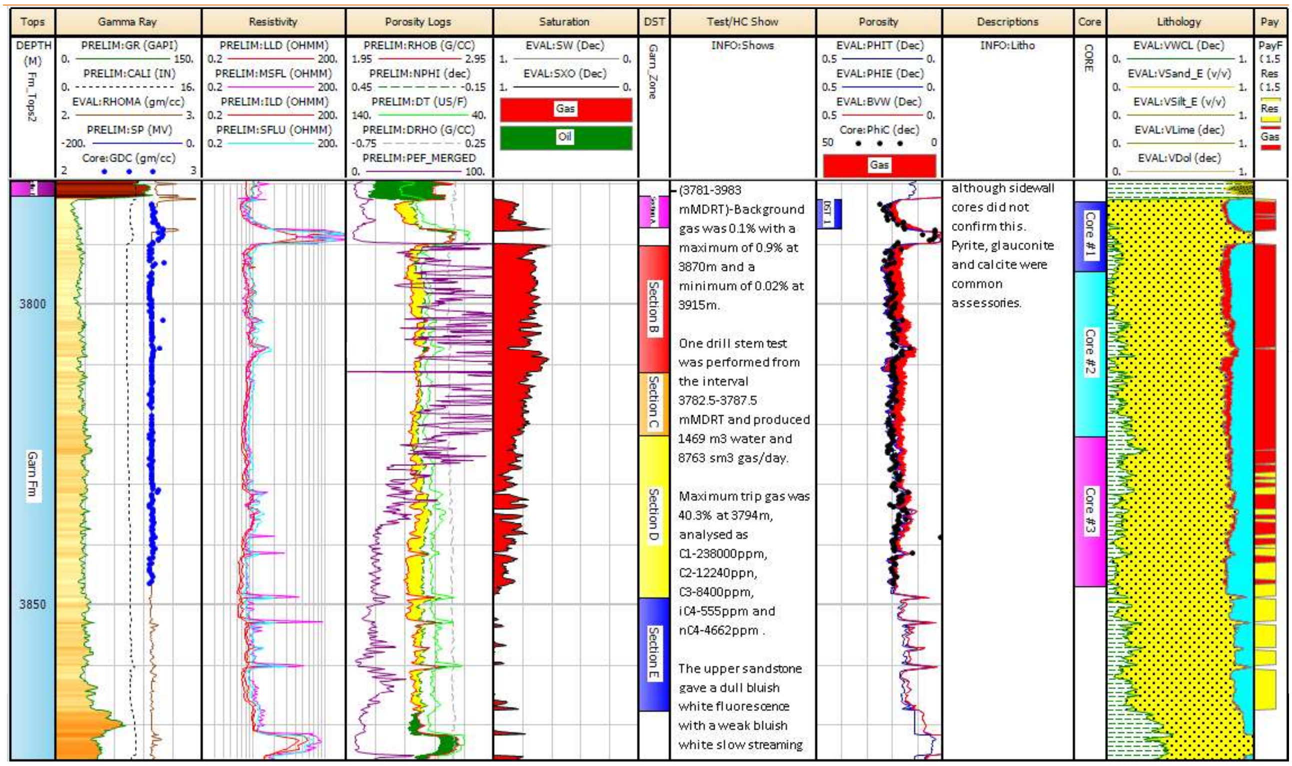


*Fig. 3.1 Petrophysical interpretation of 6406/3-1*

*Note relatively high residual gas values up to 40% and calcite cemented zone 5m below Top Garn*

**Velocity modelling/depth conversion study**

A 3D velocity model has been built by Estimages AS for time-to-depth conversion. The model is the result of a 3D horizon driven geostatistical calibration of seismic velocities to the well time-depth functions. The geostatistical model is used to simulate hundreds of equiprobable surfaces in order to define the depth uncertainty envelope of the key surfaces. Depth uncertainty is low at Mistral North due to well control and increases up to +/-40m at Mistral South.

**Seismic data conditioning**

Gather conditioning work was carried out by DownUnder GeoSolutions Ltd (DUG) and Sharp Reflections AS on the PGS18M05 final pre-stack depth migration gathers in the time domain. The objective was to improve the seismic data quality, with particular focus on the Mistral North and South prospects. Residual moveout correction and Radon demultiple were key stages in the conditioning workflow.

**Rock Physics studies**

A comprehensive rock physics study has been carried out by DUG on five wells (6406/3-6, 3-1, 3-7, 6-1 and 6-4S), these are listed in Table 2.2 and shown in Fig. 2.2. Utilising available petrophysical and geological information, the five wells have been analysed for elastic rock properties, the range in which is best described by a suite of reservoir and non-reservoir lithologies. Each lithology was initially picked according to stratigraphy (formation). Then for a given lithology, picks with similar elastic properties were grouped together to form a combined trend. All reservoir trends have been normalised to a reference brine case through the application of Gassmann fluid substitution. Consequently, three reservoir and six non-reservoir end-member lithologies have been identified and trended in this study.

A quantitative interpretation study was carried out by DUG Seismic QI over a 285km² area centred on the Mistral horst. The project employed stochastic AVA prestack inversion and depth dependent rock physics to produce probability volumes for lithology and fluid volumes. The main objective of the project was to predict fluid type in the Garn sandstone reservoir within the Mistral horst in both the Mistral North and South prospects. The input to the inversion consisted of five PGS18M05 angle stacks from 0-50 degrees at 10-degree intervals.

The QI project demonstrates that in the area it is possible to discriminate clearly between brine and gas at the middle-Jurassic level on the licensed seismic data. Distinguishing between high saturation and low saturation residual gas is more challenging. Generally, the study predicts correctly the presence or absence of hydrocarbons in the calibration wells. But it characterizes known high saturation discoveries as low saturations, i.e. it seemingly underestimates hydrocarbon presence. For Mistral North, potential increases in gas saturation are observed updip of 6406/3-1 and a similar increase is seen at Mistral South (Fig. 3.2 and Fig. 3.3), however due to the aforementioned challenge in assessing gas saturation and general noise in the dataset, interpretation is subjective.

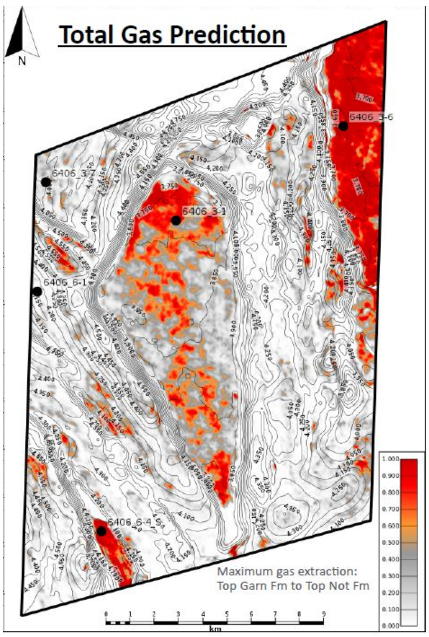


*Fig. 3.2 Total Gas Probability*
*Map showing the probability for gas from the seismic inversion. Garn to Top Not. Note the excellent calibration to the offset wells and the strong signature at Mistral North and South*

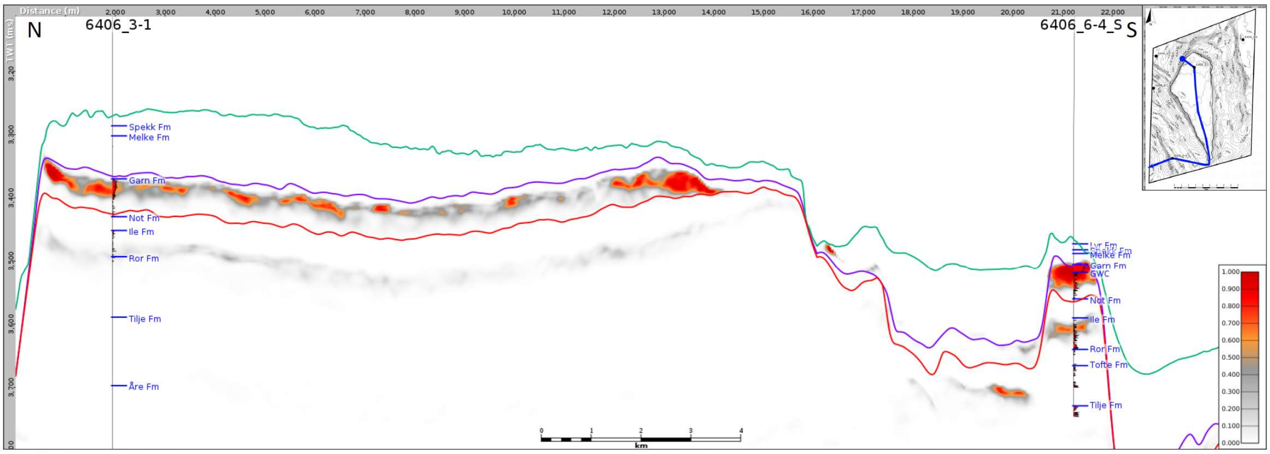


*Fig. 3.3 Total Gas Probability along Mistral horst*

*Note the weak gas probability signature in central low of structure, with increasing probability at the structural highs of Mistral North (immediately updip of 6406/3-1) and Mistral South*

**Integrated modelling and simulation study**

The objective of this study performed by Explocrowd AS was to combine detailed observations from the 6406/3-1 well (logs, core and DST) and combine with regional geological/geophysical studies in order to deliver an integrated prospect evaluation of Mistral North and South and a reservoir simulation model to determine potential drainage strategies. Deliverables include;

- Petrophysical evaluation
- Core study (6406/3-1 and offset wells)
- DST modelling and reservoir simulation
- Seismic interpretation (prospect specific and semi-regional)
- A description of the tectonostratigraphic evolution of the area
- Geopressure analysis to assess the seal strength (sub-contracted to Global GeoPressure Advice, GPA)
- Petroleum analysis to determine likely charge scenarios (sub-contracted to Torena AS)

Key outcomes of the integrated study;

- DST modelling demonstrates that the observed test response is a result of the calcite below being a barrier over a relatively short (approximately 100m) distance (Fig. 3.4). It cannot be used to de-risk the presence of mobile gas updip of the well. This was a possible concept proposed in the APA 2018 application and was used to assume a GWC in close proximity to the well. The well test has been used to constrain a simulation model, which demonstrates that Mistral North and South could be drained using a single gas producer in each, draining via depletion with high recovery rates

- The Petroleum systems analysis study describes the likely source and charging scenarios. Three source rocks of the Spekk, Melke and Åre formations are proven mature in the region and based on the work performed here are also considered mature on and around the Mistral structure. Fig. 7.1 shows an example of the maturity modelling performed (for the Åre Fm.). Three fetch area scenarios were considered for the study (Fig. 7.2). Of these, Scenarios 2 and 3 are considered the more realistic and assume local migration from the source rocks described above. Model 2 allows cross-fault migration from Spekk and Melke from the grabens surrounding the Mistral structure in addition to vertical migration from Åre. Model 3 represents a case where migration is limited to within the structure itself from only the Åre and Melke (Spekk is excluded due to unlikely juxtaposition with the Garn). Based on these scenarios, an approximation of potential migrated volumes has been calculated. The migrated volumes are sufficient to fill the upper end of the resource ranges presented in 4 Prospect update report.

- Geopressure analysis of the semi-regional (Upper Jurassic) top seal, suggests sufficient membrane seal integrity to hold significantly larger columns than observed in discoveries in the area. This is based on a calibrated approach that uses overburden, shale and reservoir pressures combined with fracture strength as inputs. The top seal at Mistral North is modelled to have sufficient integrity to hold a significantly larger column than the 60m required to fill to the 6406/3-1 location (potential column heights of several hundred meters have are estimated). If the trap has failed, faults or thief sands are the likely cause. Of these two, faults at top reservoir (which extend into the overburden) are considered the primary cause of leakage, due to the observed gas response on seismic associated with these faults at shallower levels (4 Prospect update report). This is the risk to the prospect as described in 4 Prospect update report.

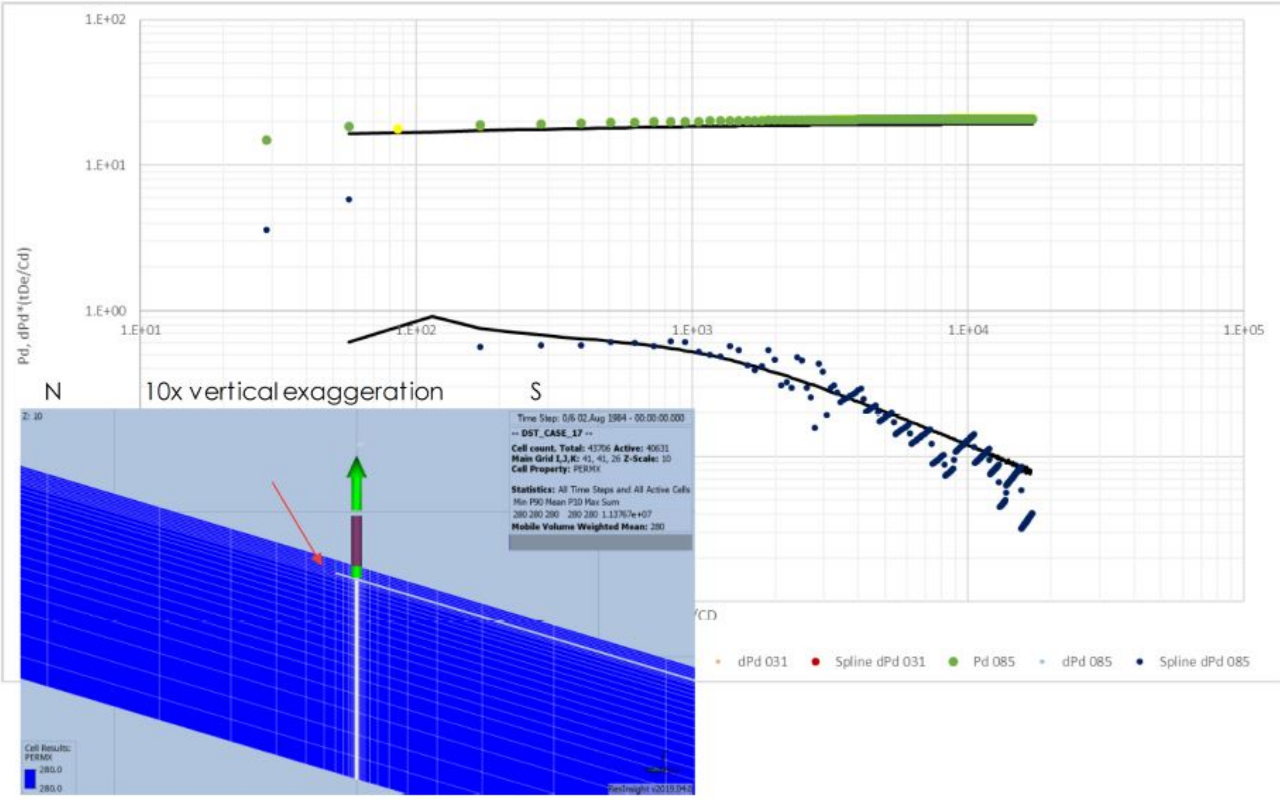


*Fig. 3.4 DST simulation. Calcite barrier below the well*

*A realisation where the calcite layer is a barrier that stops about 100 m away from the well.This case provides the best match of the many modelled scenarios*

# 4 Prospect update report

The Mistral North and South gas/condensate prospects (Fig. 4.1) consist of high quality shallow marine Garn Fm. sandstones contained within fault bound structural highs at either end of the prominent Mistral horst, a Jurassic structural saddle with a low in the central area (Fig. 4.2 and Fig. 4.3). The Mistral horst has been tested previously by the 6406/3-1 well drilled in 1984 towards the northern area of the structure. Relatively high levels of residual gas are observed within the Garn Fm., and these are considered indicative of a previous hydrocarbon fill that has leaked off to some extent. Mistral North is a potential accumulation updip of this well, and the Mistral South prospect represents a potentially filled-to-spill accumulation in the untested southern end of the structure. The key elements to the prospects in terms of Trap, Seal, Reservoir and Charge and their associated risk are described below.

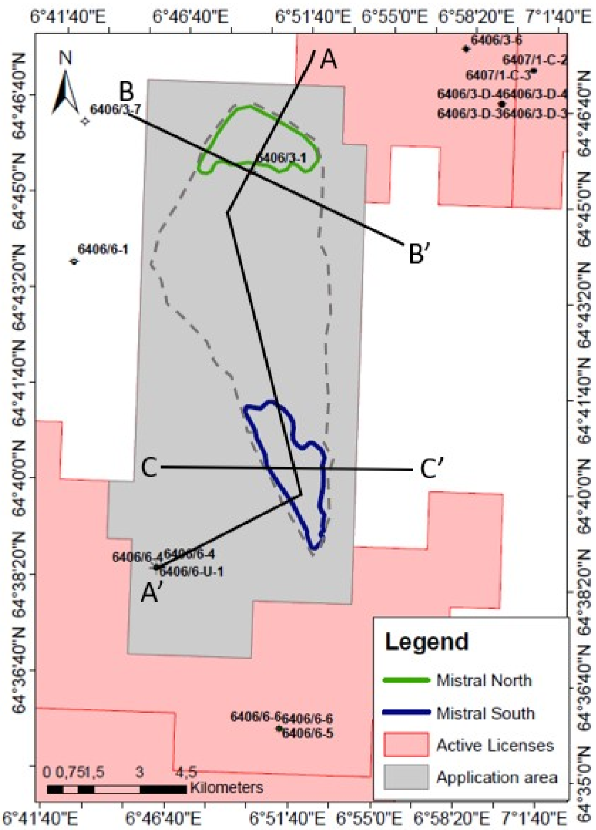


*Fig. 4.1 Mistral North and South prospect locations*

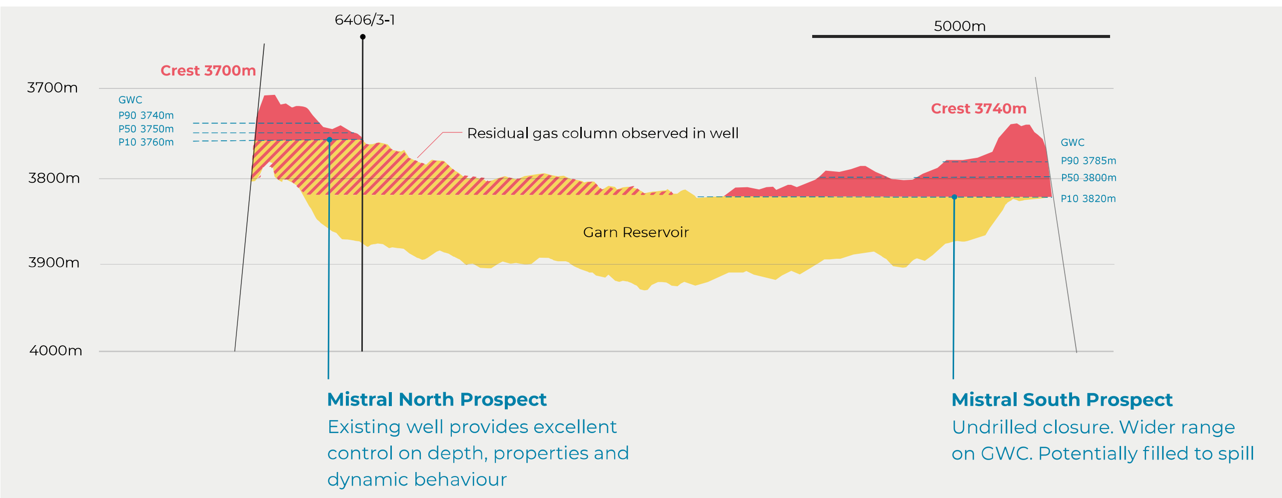


*Fig. 4.2 Geosection through Mistral North and South prospects*

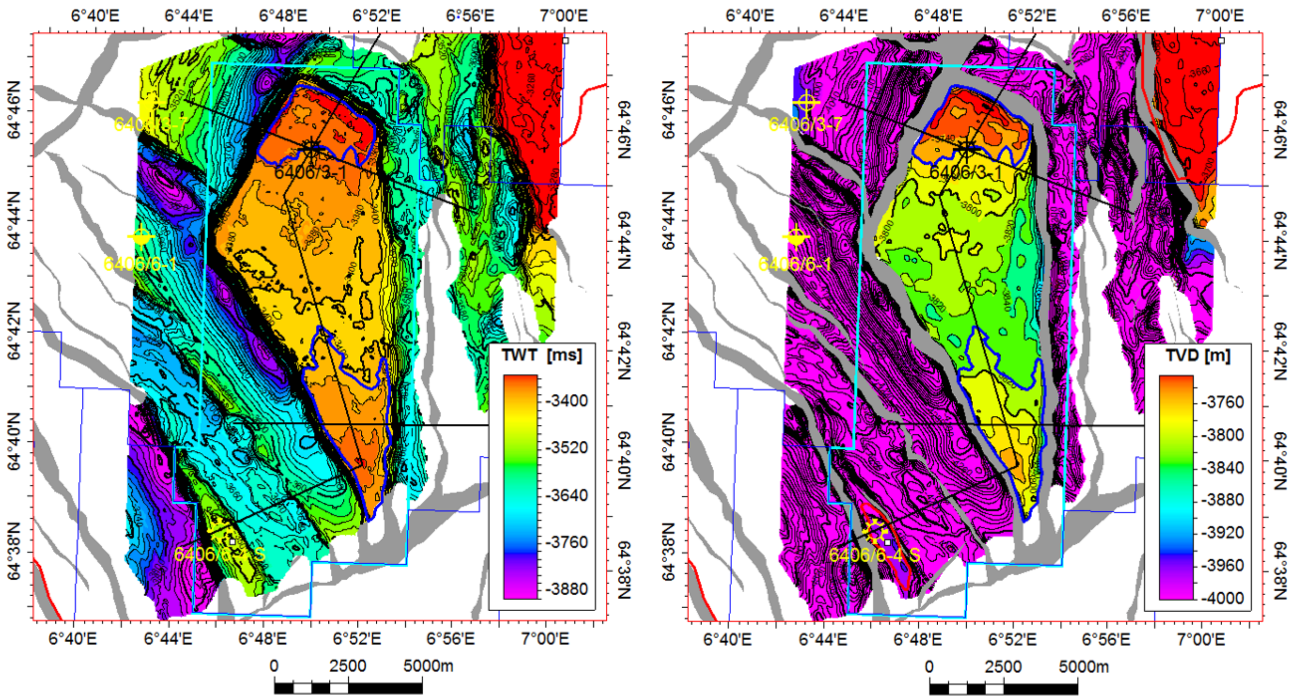


*Fig. 4.3 Top Garn TWT and Depth maps*

### Trap

The fault bound Mistral horst structure is well imaged on the PGS18M05NWS dataset, which provides significantly improved fault definition compared to previous datasets and enables mapping of the Top Garn reservoir and other key surfaces and faults across the entire structure (Fig. 4.4). Robust well ties have been established on the structure and for surrounding offset wells and the TWT surfaces are picked with high confidence. As described in 3 Results from geological and geophysical studies, a geostatistical calibration of seismic velocities to the well time-depth functions has been performed for depth conversion (and depth uncertainty estimation) of these surfaces. The TWT and Depth maps for Top Garn are shown in Fig. 4.3.

### Seal

The proposed top seal for both prospects is the Upper Jurassic sequence containing the shales of the Spekk and Melke Fms. The Geopressure study indicates that significantly larger column heights than the 60m limit imposed on Mistral North by 6406/3-1 are possible.

Lateral seal is dependent on faults having sealing capacity. Some degree of fault seal capacity present-day is reasonable to suggest given the various overpressure compartments maintained across the area (Fig. 7.3).

Partial leakage appears to have taken place vertically via faults at Mistral North based on mapped seismic gas anomalies (Fig. 4.5) and their spatial relationship to reactivated Jurassic faults mapped at shallower levels. The amount of leakage and the potential for a retained column is assumed to be related to threshold pressure, but insufficient data are available to calibrate this and predict potential column heights. Consequently, column height (GWC) distribution is the main uncertainty for both prospects, and a scenario where the accumulation has leaked of entirely is considered the key risk.

The concept of a partially retained column at Mistral North updip of 6406/3-1 is supported by the analogous discoveries in the area documented in the Petrophysical study including 6406/6-4 S Tvillingen Sør and 6406/5-1 Presidenten. These discoveries demonstrate live gas columns sitting on top of zones with relatively high levels of residual gas. In addition, the results of the seismic inversion, whilst challenging to interpret, potentially indicate increasing gas saturation immediately updip of the 6406/3-1 well (Fig. 3.2).

The leakage risk is considered to be smaller for Mistal South. The mapped faults do not appear have been reactivated to such a late stage as those at Mistral North, follow a single directional trend and there are no clear seismic anomalies associated with the faults in the overburden. The seismic inversion also points towards potentially increasing gas saturation within Mistral South.

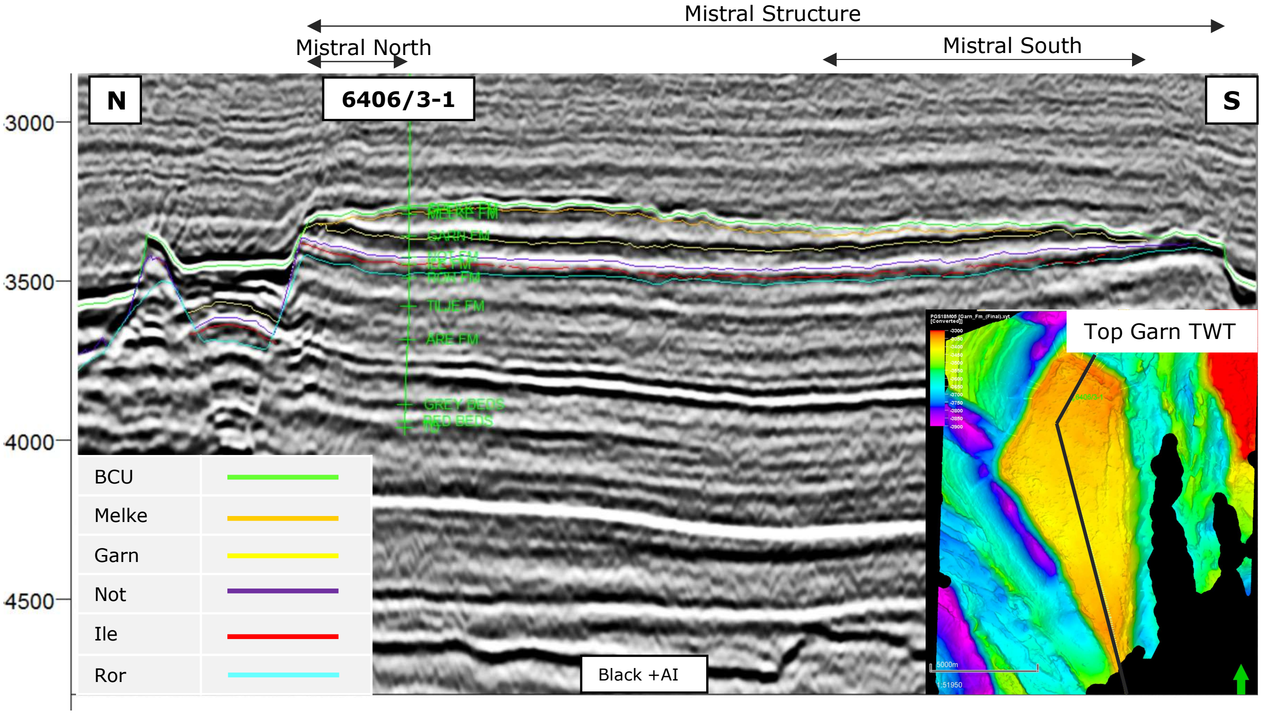


*Fig. 4.4 N-S trending seismic through Mistral North and South A-A'*
*PGS18M05NWS_KPSDM_FINAL_FULL_6-34_STACK_TIME. Bounding faults and key surfaces are mapped across the structure with high confidence. Thinning of Upper Jurassic observed towards southern area.*

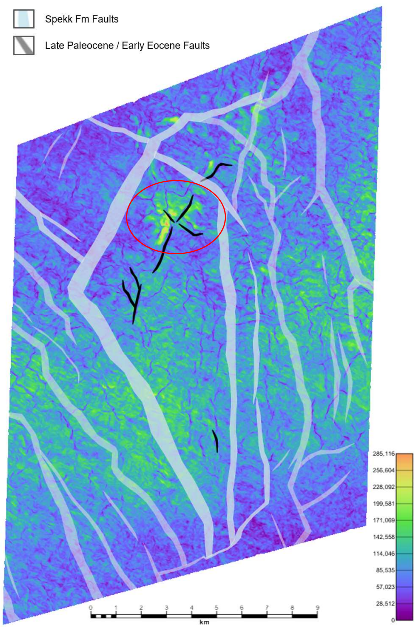


*Fig. 4.5 Potential gas in overburden from seismic RMS map at Late Paleocene. Black polygons show faults at the Late Paleocene. Grey Polygons show fault distribution at reservoir level. Note the high amplitude anomaly showing potential gas where faults cross perpendicular to each other over Mistral North*

**Reservoir**

Garn Fm. of reservoir quality is present on the Mistral horst in 6406/3-1 and in the offset wells evaluated. Gross thickness ranges from 50 - 140mTVT and it is generally observed as a blocky, good-reservoir sandstone (Fig. 7.4). In 6406/3-1, about 120m of Middle Jurassic Garn sand were encountered, of which the upper 86m are considered to be the reservoir unit as the interval below that becomes more shaley and of poorer reservoir quality (Fig. 3.1). Based on the Petrophysical study, the reservoir interval is broken up into 5 units and the log responses show high net:gross over 90% and porosity around 20%. Core permeability ranges from 250 to 500mD and (based on the DST calibrated simulation model constructed) good flow rates and ultimate recovery of gas is expected.

**Source and migration**

The basin modelling study indicates that the Mistral structure is in a favourable position with respect to charge and that multiple source rocks are available to provide hydrocarbons to the structure (including the Spekk, Melke and Åre Fms.). This is supported by the petrophysical analysis 6406/3-1, where the relatively high levels of residual gas point towards a paleocolumn and an earlier presence of a high saturation accumulation at the well location. There is uncertainty with regards to the relative contribution of the Spekk & Melke source rocks versus Åre, with implications for the wetness of the gas. This uncertainty is captured in the modelled fluid parameters.

**Volumetric Assessment**

Volumetric calculations for the Mistral North and South Prospects were performed based on probabilistic Monte-Carlo simulations. The basis for the input parameters and uncertainty ranges used is described below. A summary of the input values is shown in Table 4.1.

**Gross Rock Volume**

For both Mistral North and South, GRV is calculated based on the mapped Top Garn depth surface confidently mapped on 6406/6-1 and depth converted based on the Estimages geostatistical model. For Mistral North, a constant reservoir thickness of 86m is assumed, since significant variations are unlikely over the relatively limited areal extent of the prospect and any changes are unlikely to take base reservoir shallower than the P10 GWC. For Mistral South, a thickness uncertainty range of 80 to 100m is applied such that there is overlap between thickness and GWC uncertainty.

**HC Contacts**

For Mistral North, the P10 GWC is set at 3760mTVD, where the 6406/3-1 well penetrates the Top Garn 60m downflank from the apex of the closure. It is set as P10 rather than max to allow for depth/well positioning uncertainty and because the Sg levels in the upper part of Garn are bordering on those associated with a live column. The P90 and P50 column heights are set to 40m and 50m respectively. This is recognised as a relatively tight range, but was selected in order to limit the cases to those considered representative of reasonable volume outcomes. To accommodate the skew the risk factor applied to Seal was increased.

For Mistral South, the P10 case was set to the structural spill and the P90 represents the area with the most robust Total Gas Probability response on the seismic inversion, with P50 symmetrical between the two.

**Net to Gross, Porosity (Ø) and Water Saturation (Sw)**

Ranges are defined based on the Petrophyscial study and are representative of the variations observed between the different zones established within the 6406/3-1 Garn reservoir unit and the offset wells.

**Gas Condensate Ratio (GCR) and Formation Volume Factor (1/Bg)**

Based on geochemical analysis included in the Basin Modelling included in the Integrated Modelling Study, using a series of regionally calibration methods used in the study. There is uncertainty around the relative contribution of the Spekk and Melke Fm. source rocks versus the Åre Fm., and the characteristics of the gas that will migrate from the Åre in terms of wetness. The ranges GCR used are based on the reported gas properties from a range of fields and discoveries in the region, including the dry gas at the Linnorm discovery and the wetter gas at the nearby Tyrihans field.

**Recovery Factor (Rf)**

Recovery factors have been estimated based on the constructed simulation model, which is calibrated to the DST in 6406/3-1. Due to the good quality Garn reservoir and the absence of barriers observed in the test, relatively high recovery is achieved. The 60 to 75% range derived from the simulation model fits well with the recovery factor trend of high performing gas fields on the NCS, which tend to share the good reservoir properties and pressure support assumed at Mistral North and South.

*Table 4.1 Mistral North and South reservoir and fluid parameters*

| Parameters | Fraction | Distribution | P90 | P50 | P10 | Mean |
|---|---|---|---|---|---|---|
| GWC Mistral North | m | Beta | 3740 | 3750 | 3760 | 3750 |
| Thickness Mistral North | m | Constant | 86 | 86 | 86 | 86 |
| GWC Mistral South | m | Beta | 3815 | 3830 | 3845 | 3830 |
| Thickness Mistral South | m | Beta | 80 | 90 | 100 | 90 |
| **NTG** | **%** | **Beta** | **90** | **93** | **95** | **93** |
| **Porosity** | **%** | **Beta** | **13** | **15** | **17** | **15** |
| **Sw** | **%** | **Beta** | **20** | **25** | **30** | **25** |
| **Wet gas FVF (1/Bg)** | **vol/vol** | **Beta** | **344** | **357** | **370** | **357** |
| **Cond/gas ratio** | **M3/mm.m3** | **Log norm** | **103** | **351** | **1200** | **566** |
| **Wet gas rec. fac.** | **%** | **Beta** | **50** | **62.5** | **75** | **70** |

**Risk**

The risk evaluations for Mistral North and Mistral South are listed in Table 4.2. As shown, the key risk for both is on seal (retention). Due to the uncertainty regarding interpretation of the seismic inversion response, DHI adjustment is neutral.

Risk is set to 1 for Trap, Reservoir and Charge. This is because the prospects are clearly defined structures on good quality seismic, with proven reservoir quality and strong indications of a residual hydrocarbon fill (which can be attributed to the multiple mature source rocks proven in the area at neighbouring fields and discoveries).

Seal is considered the key risk element. The risking represents the probability of encountering a gas column less than the assigned P90 value. Mistral North is risked at 0.3. Mistral South is risked at 0.4 due to the deeper apex (North may have breached first), less prevalent faulting and absence of clear gas anomalies on seismic, Mistral South is assigned a lower risk of 0.4.

*Table 4.2 Mistral North and Mistral South risking*

| Prospect | Trap | Seal | Charge | Reservoir | Total Gcos |
|---|---|---|---|---|---|
| Mistral North | 1 | 0.3 | 1 | 1 | 0.3 |
| Mistral South | 1 | 0.4 | 1 | 1 | 0.4 |

In summary, all data is included in the resource tables for the Mistral North South prospects in Fig. 7.5 and Fig. 7.6.

**Comparison of updated prospect evaluation with APA 2018 assessment**

The updated recoverable volume estimates and risk factors for Mistral North and South are shown in Table 4.3, along with a comparison to the values included in the APA 2018 application.

*Table 4.3 Mistral North and South Volume and Risk comparison*

*APA 2018 assessment versus 2020 update at time of licenses lapse.*

| | **Unrisked recoverable volumes MSm3 o.e** | | | | | | **Risk** | |
|---|---|---|---|---|---|---|---|---|
| | APA 2018 | | | 2020 Update | | | APA 2018 | 2020 Update |
| | P90 | Base (Mode) | P10 | P90 | Base (Mode) | P10 | | |
| **Mistral North** | 4 | 13 | 21 | 1,1 | 2,9 | 7,2 | 1 | 0.3 |
| **Mistal South** | 4 | 12 | 31 | 1 | 3 | 8 | 0,54 | 0,4 |

The recoverable volume estimates show a significant decrease for both Mistral North and South in the updated assessment relative to APA 2018 of around 70 to 80%. The reasons for the decrease are;

- The updated seismic mapping and depth conversion resulted in a deeper Top Garn (reduced GRV)
- No weight being put on the concept of the DST showing a nearby GWC in the update has reduced the positive skew applied to GWC. This combined with the deeper top reservoir results in significantly reduced base case HC columns
- Lower base case estimates on recovery factor in the update
- Increase in the GCR range has reduced the base case oil equivalent volume

An increase in risk has been applied to Mistral North from 1 (discovery) to 0.3. Due to the updated petrophysical interpretation and DST modelling, there is no longer considered to be any convincing indications of a live gas column proven by the 6406/3-1 well. The updated risk value balances the observations that the structure has leaked, but retains a partial column based on analogues and seismic indications. The relatively high risking applied is to accommodate what is viewed as a positive skew in GWC distribution.

Despite the adjustments that have been applied, the Operator of PL1003/B still considers the prospects to be commercially robust.

# 5 Technical evaluation

The most likely development solution in the event of a commercial discovery at Mistral North and/or Mistral South is shown in Fig. 5.1. The proximity of the Tyrihans field provides an access point to the Haltenbanken export system, via the Tyrihans flowline to Kristin, onward to Åsgard and Kårstø. A subsea tieback from Mistral North to the Tyrihans D-template is approximately 8 km. Ullage in the export system governs timing of first gas.

Mistral South is connected to Mistral North through a 12 km daisy-chain subsea tie-in. Reservoir simulation results indicate that both Mistral North and South can be produced via depletion drive by placing a single, crestal producer in each.

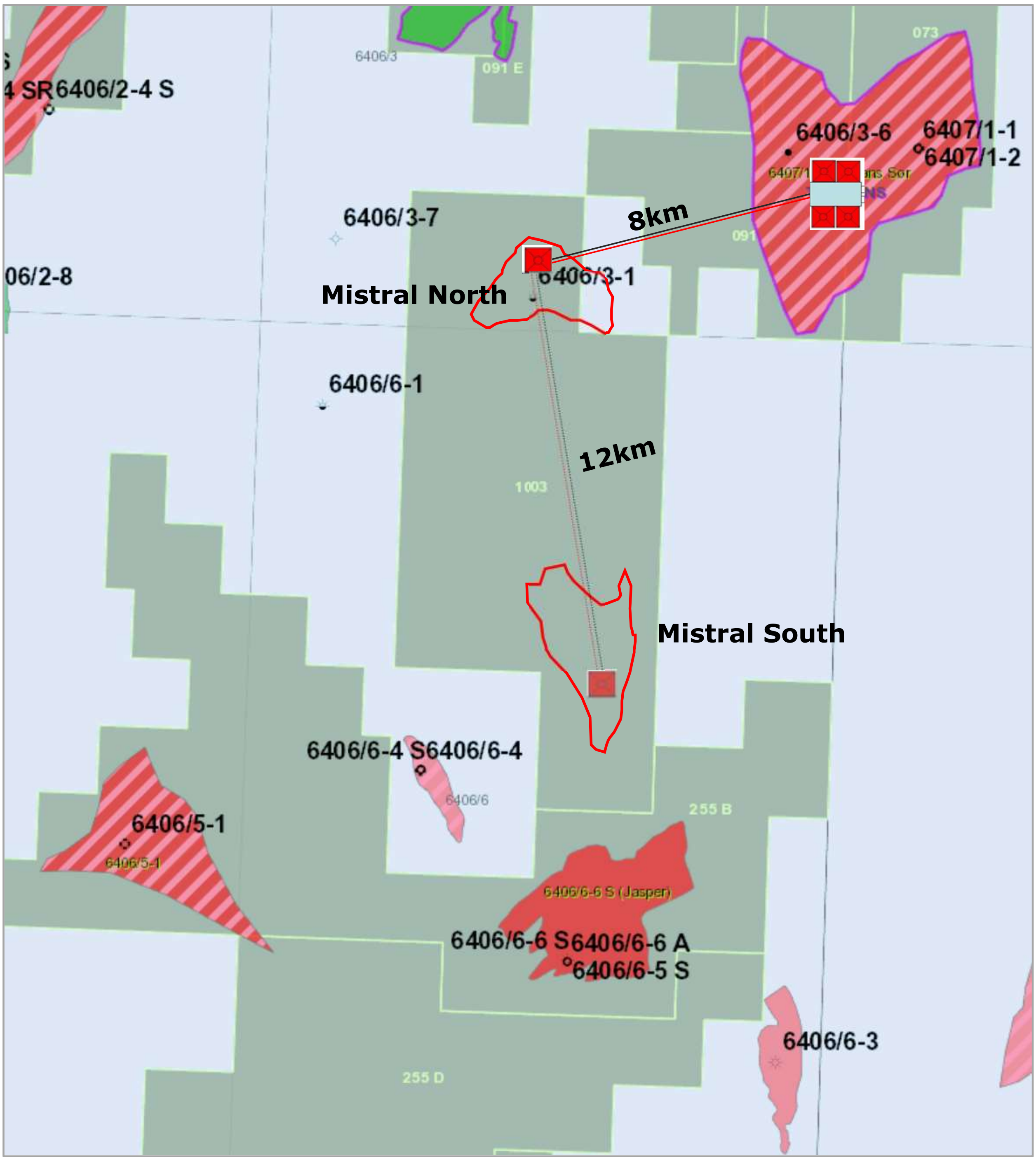


*Fig. 5.1 Mistral North Standalone Case*

# 6 Conclusion

Based on the subsurface evaluation described in this document, the Operator put forward a recommendation to drill one exploration well on Mistral. However, the partner could not support that. As a consequence, the licenses lapse.

# 7 Appendix

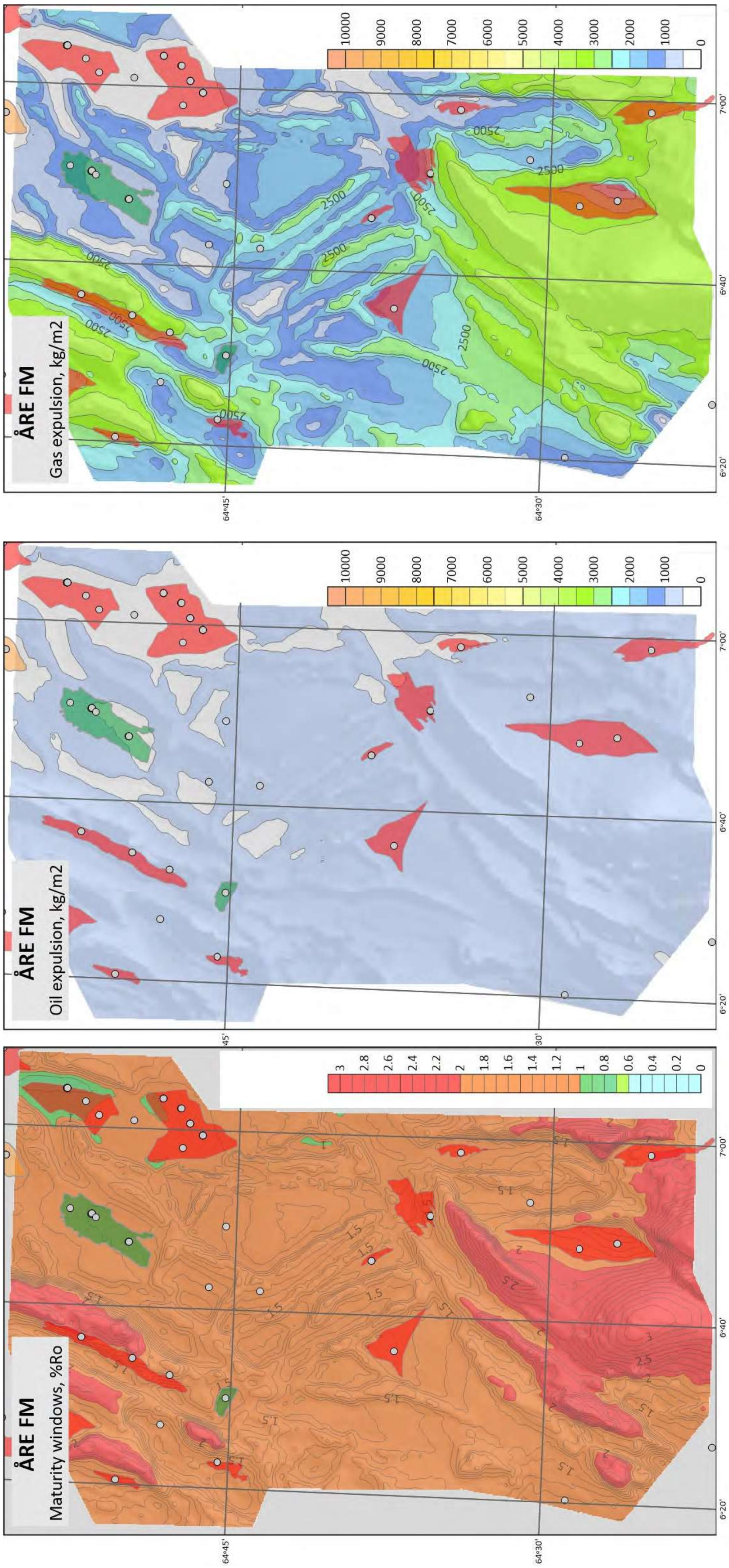


*Fig. 7.1 Åre maturity and expulsion*
*Maturity windows are calculated for the middle of the formations, while oil and gas expulsion are expressed in kg/m2, i.e. taking into account source rock thickness.*

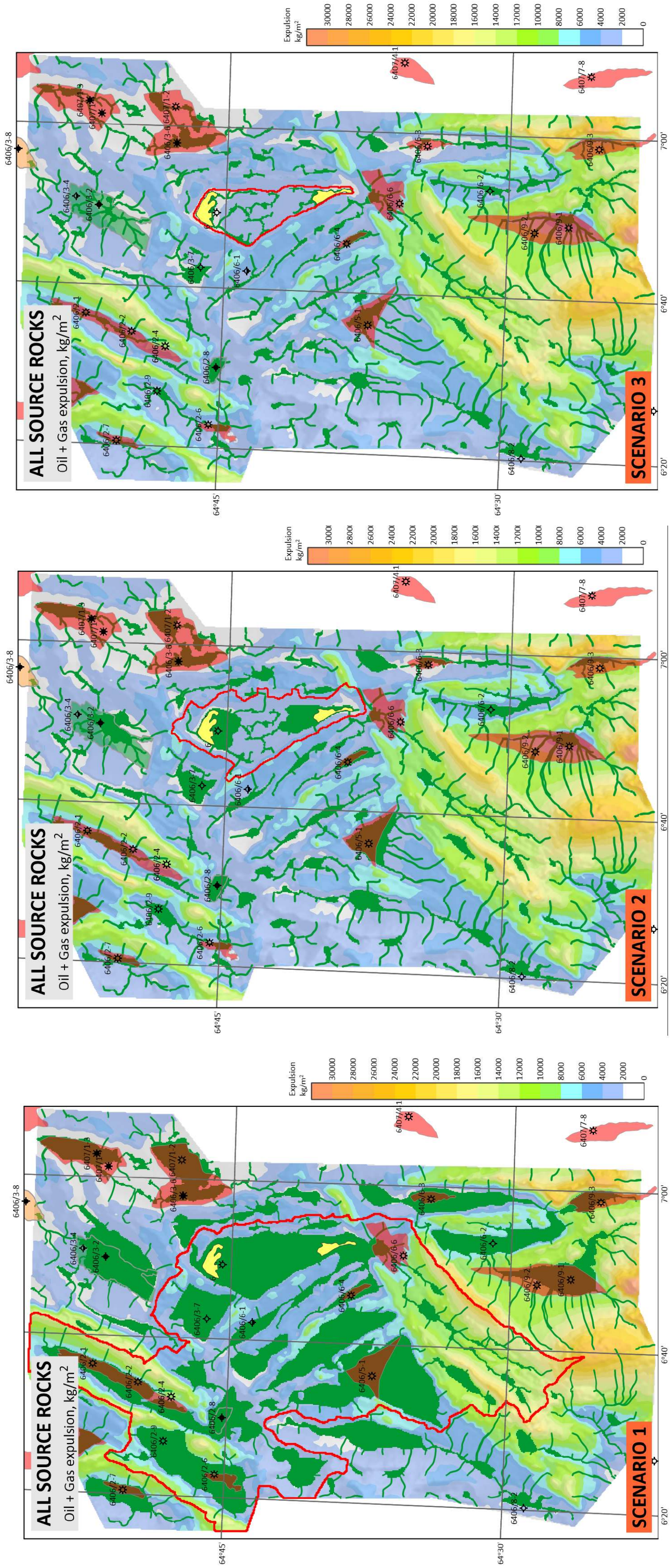


*Fig. 7.2 Catchment area scenarios used to define expulsion/migration potential*

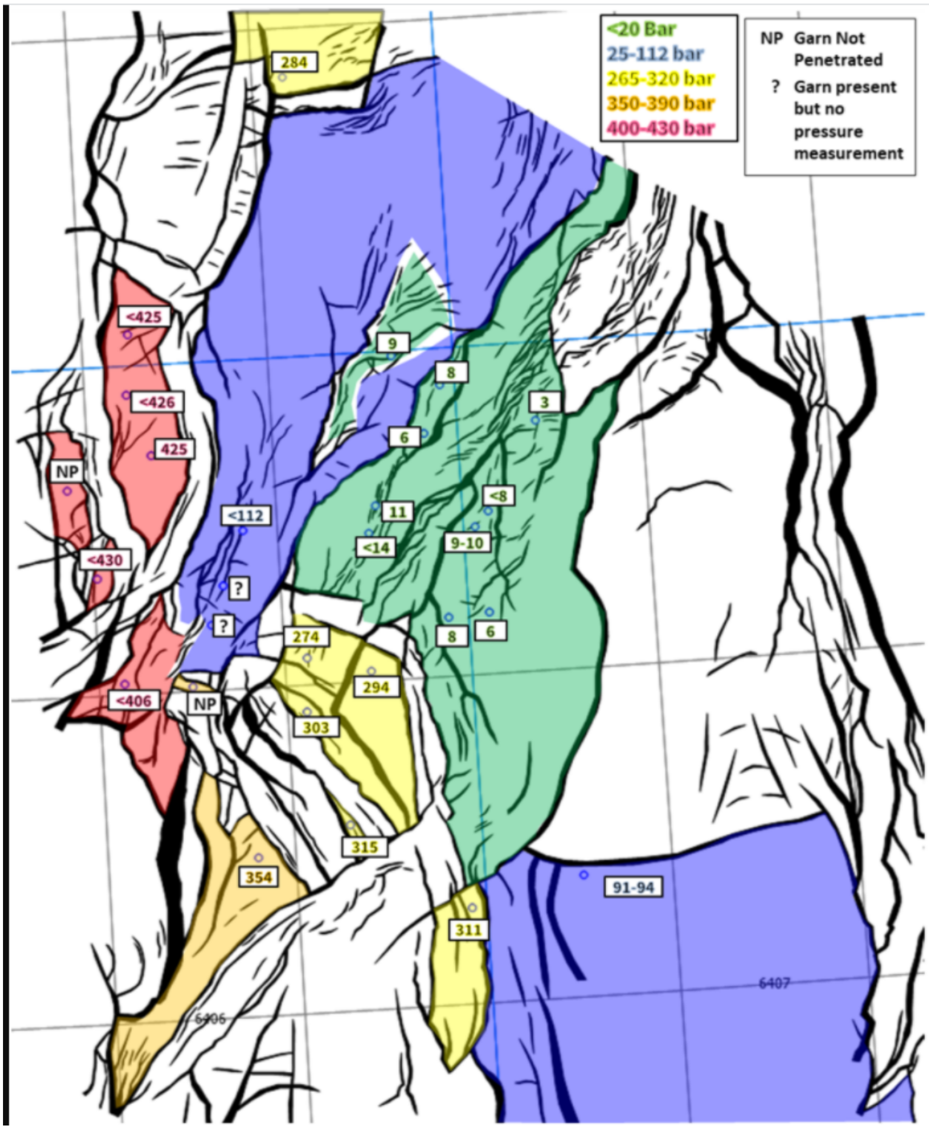


*Fig. 7.3 Garn Fm. overpressure compartments*
*Values show degree of water overpressure in the Garn Fm, with regions of similar pressure shaded. Proposed compartments are assumed to be related to the mapped regional fault framework.*

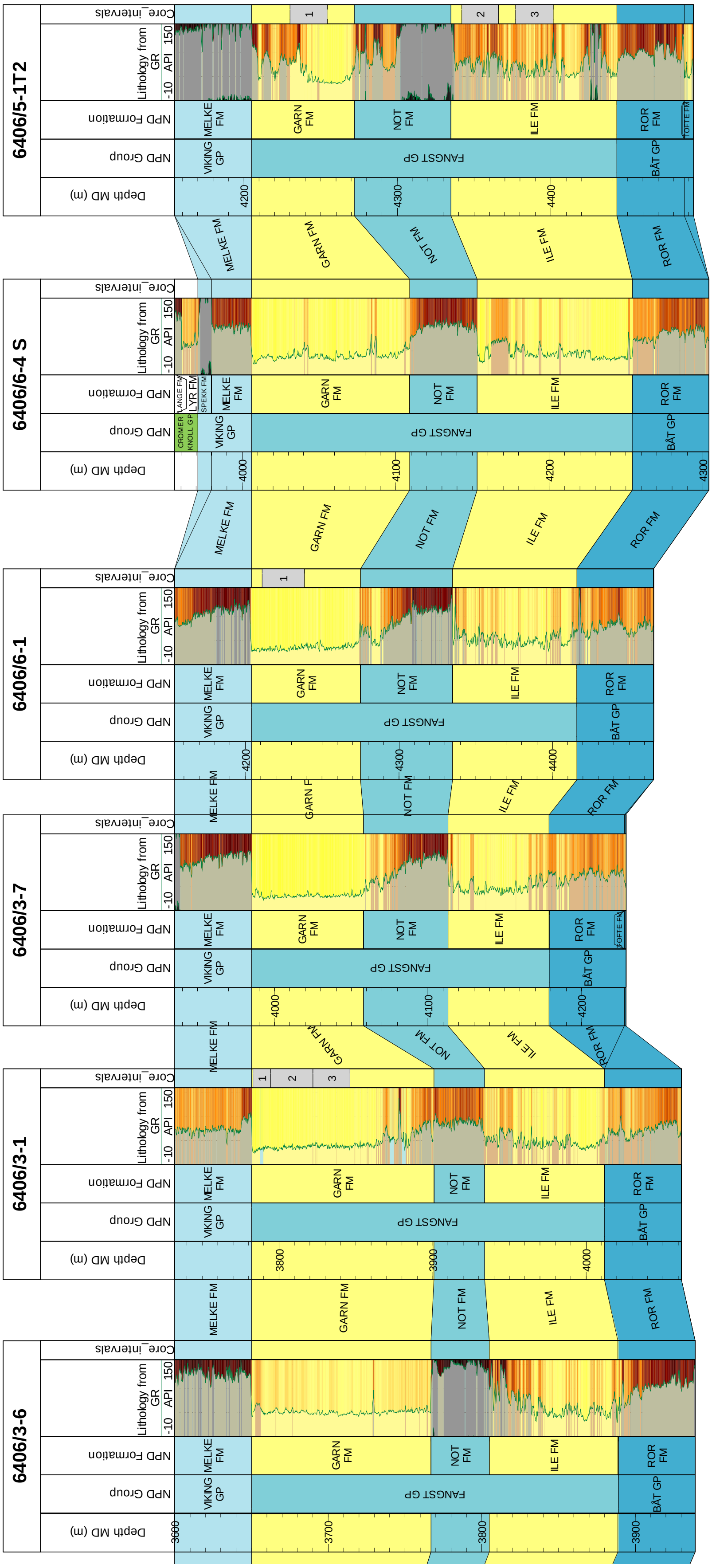


*Fig. 7.4 Fangst Gp. correlation panel*

*See fig. 2.2 for well locations*

**Table 4: Discovery and Prospect data (Enclose map)**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Block | 6406/3 | Prospect name | Mistral North | 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) | No | | | | |
| Oil, Gas or O&G case: | Gas | Reported by company | OKEA | Reference document | | | | Assessment year | |
| This is case no.: | 1 of 1 | Structural element | Structural | Type of trap | Structural | Water depth [m MSL] (>0) | 255 | 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) | 1,87 | 3,41 | 3,59 | 5,59 | | | | |
| Recoverable resources | Oil [$10^6$ $Sm^3$] (>0.00) | | | | | 0,17 | 0,74 | 1,32 | 3,05 |
| | Gas [$10^9$ $Sm^3$] (>0.00) | 0,94 | 2,13 | 2,37 | 4,17 | | | | |
| Reservoir Chrono (from) | Bajocian | Reservoir litho (from) | Garn Fm | Source Rock, chrono primary | Hettangian-Sinemu | Source Rock, litho primary | Åre Fm | Seal, Chrono | Melke Fm |
| Reservoir Chrono (to) | Bathonian | Reservoir litho (to) | Garn Fm | Source Rock, chrono secondary | Kimmeridgian- Titho | Source Rock, litho secondary | Melke Fm and Spekk | Seal, Litho | Oxfordian |
| **Probability [fraction]** | | | | | | | | | |
| Total (oil + gas + oil & gas case ) (0.00-1.00) | 0,30 | Oil case (0.00-1.00) | | Gas case (0.00-1.00) | 1,00 | Oil & Gas case (0.00-1.00) | | | |
| Reservoir (P1) (0.00-1.00) | 1,00 | Trap (P2) (0.00-1.00) | 1,00 | Charge (P3) (0.00-1.00) | 1,00 | Retention (P4) (0.00-1.00) | 0,30 | | |
| **Parametres:** | Low (P90) | Base | High (P10) | *The wettability of the gas depend son the charge scenario. Charge form Melke Fm and Spekk Fm relative to the primary charge from Åre Fm would impact the wettness of the gas. This uncertainty is captured in the modelled fluid parameters. The recoverable associated phase is produced from in-place gas volumes at surface pressure/temperature.* | | | | | |
| Depth to top of prospect [m MSL] (> 0) | 3700 | 3700 | 3700 | | | | | | |
| Area of closure [$km^2$] (> 0.0) | 2,3 | 3,7 | 5,2 | | | | | | |
| Reservoir thickness [m] (> 0) | 86 | 86 | 86 | | | | | | |
| HC column in prospect [m] (> 0) | 40 | 50 | 60 | | | | | | |
| Gross rock vol. [$10^9$ $m^3$] (> 0.000) | 0,050 | 0,090 | 0,150 | | | | | | |
| Net / Gross [fraction] (0.00-1.00) | 0,90 | 0,93 | 0,95 | | | | | | |
| Porosity [fraction] (0.00-1.00) | 0,13 | 0,15 | 0,17 | | | | | | |
| Permeability [mD] (> 0.0) | | | | | | | | | |
| Water Saturation [fraction] (0.00-1.00) | 0,30 | 0,25 | 0,20 | | | | | | |
| Bg [Rm3/Sm3] (< 1.0000) | 0,0029 | 0,0028 | 0,0027 | | | | | | |
| 1/Bo [Sm3/Rm3] (< 1.00) | | | | | | | | | |
| GOR, free gas [$Sm^3/Sm^3$] (> 0) | 9708 | 1798 | 833 | | | | | | |
| 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) | 0,50 | 0,63 | 0,75 | | | | | | |
| Recov. factor, liquid ass. phase [fraction] (0.00-1.00) | | | | For NPD use: | | | | | |
| Temperature, top res [°C] (>0) | 140 | | | 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) | 670 | | | 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. 7.5 Prospect data for the Mistral North Prospect (NPD table 4)*

**Table 4: Discovery and Prospect data (Enclose map)**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Block | 6406/6 | Prospect name | Mistral South | 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) | No | | | | |
| Oil, Gas or O&G case: | Gas | Reported by company | OKEA | Reference document | | | | Assessment year | |
| This is case no.: | 1 of 1 | Structural element | Structural | Type of trap | Structural | Water depth [m MSL] (>0) | 250 | 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) | 1,65 | 4,41 | 5,07 | 9,49 | | | | |
| Recoverable resources | Oil [$10^6$ $Sm^3$] (>0.00) | | | | | 0,18 | 0,22 | 1,91 | 4,59 |
| | Gas [$10^9$ $Sm^3$] (>0.00) | 0,83 | 2,75 | 3,44 | 7,11 | | | | |
| Reservoir Chrono (from) | Bajocian | Reservoir litho (from) | Garn Fm | Source Rock, chrono primary | Hettangian-Sinemu | Source Rock, litho primary | Åre Fm | Seal, Chrono | Melke Fm |
| Reservoir Chrono (to) | Bathonian | Reservoir litho (to) | Garn Fm | Source Rock, chrono secondary | Kimmeridgian- Titho | Source Rock, litho secondary | Melke Fm and Spekk | Seal, Litho | Oxfordian |
| **Probability [fraction]** | | | | | | | | | |
| Total (oil + gas + oil & gas case ) (0.00-1.00) | 0,40 | Oil case (0.00-1.00) | | Gas case (0.00-1.00) | 1,00 | Oil & Gas case (0.00-1.00) | | | |
| Reservoir (P1) (0.00-1.00) | 1,00 | Trap (P2) (0.00-1.00) | 1,00 | Charge (P3) (0.00-1.00) | 1,00 | Retention (P4) (0.00-1.00) | 0,40 | | |
| **Parametres:** | Low (P90) | Base | High (P10) | *The wettability of the gas depends on the charge scenario. Charge form Melke Fm and Spekk Fm together relative to charge from Åre Fm would impactt he wetness of the gas. This uncertainty is captured in the modelled fluid parameters. The recoverable associated phase is produced from in-place gas volumes at surface pressure/temperature.* | | | | | |
| Depth to top of prospect [m MSL] (> 0) | 3740 | 3740 | 3740 | | | | | | |
| Area of closure [$km^2$] (> 0.0) | 3,5 | 6,4 | 8,9 | | | | | | |
| Reservoir thickness [m] (> 0) | 80 | 90 | 100 | | | | | | |
| HC column in prospect [m] (> 0) | 45 | 60 | 80 | | | | | | |
| Gross rock vol. [$10^9$ $m^3$] (> 0.000) | 0,050 | 0,120 | 0,250 | | | | | | |
| Net / Gross [fraction] (0.00-1.00) | 0,90 | 0,93 | 0,95 | | | | | | |
| Porosity [fraction] (0.00-1.00) | 0,13 | 0,15 | 0,17 | | | | | | |
| Permeability [mD] (> 0.0) | | | | | | | | | |
| Water Saturation [fraction] (0.00-1.00) | 0,30 | 0,25 | 0,20 | | | | | | |
| Bg [Rm3/Sm3] (< 1.0000) | 0,0029 | 0,0028 | 0,0027 | | | | | | |
| 1/Bo [Sm3/Rm3] (< 1.00) | | | | | | | | | |
| GOR, free gas [$Sm^3/Sm^3$] (> 0) | 9708 | 1798 | 833 | | | | | | |
| 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) | 0,50 | 0,63 | 0,75 | | | | | | |
| Recov. factor, liquid ass. phase [fraction] (0.00-1.00) | | | | For NPD use: | | | | | |
| Temperature, top res [°C] (>0) | 140 | | | 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) | 670 | | | 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. 7.6 Prospect data for the Mistral South Prospect (NPD table 4)*