



## PL 409 Relinquishment Report

January 2014

## Contents

|    |   |    |
|----|---|----|
| 1. | Summary and Conclusion .....                    | 3  |
| 2. | Introduction.....                               | 3  |
| 3. | License award .....                             | 4  |
| 4. | Completed work program and special studies..... | 5  |
| 5. | Pre Drill Prospectivity evaluation .....        | 6  |
| 6. | 16/7-9 well results .....                       | 10 |
| 7. | Post drill prospectivity evaluation .....       | 12 |

## 1. Summary and Conclusion

The seismic interpretation of the LN09M02 survey in PL 409 resulted in a prospect portfolio consisting of two prospect; Norall (B) and Havik (D), and three leads; Hauge (C), Kviljo (A) and Huseby (E). In December 2010/January 2011 the exploration well was 16/7-9 drilled at the Norall prospect. The well was dry and downgraded chance of success for the Kviljo lead, and the Havik prospect was downgraded to a lead due to increased risk for migration failure. In February 2012 the southern part of the license was relinquished. The new license area contained three leads; Hauge, Havik and Huseby. The northern part was kept awaiting the result of the drilling of the Biotitt prospect in the license PI544 to the north of PI409. The Well 16/4-6 on the Biotitt prospect was dry and did not upgrade the remaining leads in PL 409. Therefore, the decision to relinquish the license has been made by the partnership on 11<sup>th</sup> November 2013.

## 2. Introduction

PL 409 originally comprised 402 km<sup>2</sup> of block 16/7. The block is situated in the transition between the SW flank of the Utsira High and the Ling graben (Fig. 1).

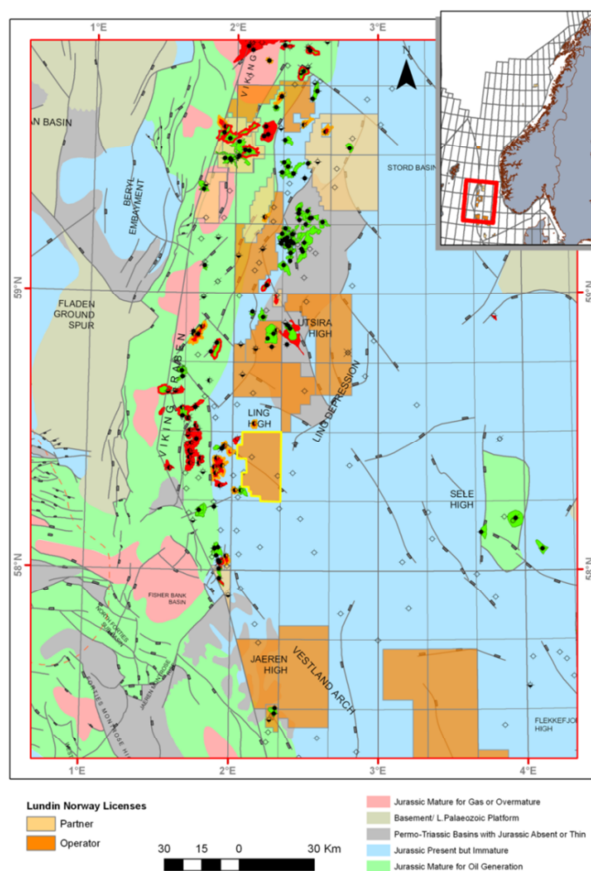


Figure 1: Original license location (in yellow) and main structural elements.

### 3. License award

PL409 was awarded as part of APA 2006 on 16<sup>th</sup> February 2007, with a 5 years initial license period 100% to Lundin Norway AS.

In 2009 Lundin farmed down their 100% share of the license to Bayerngas (20%) and Statoil (10%).

The APA application contained one prospect (D) and four leads (A, B, C and E). The defined prospect, D, was a four-way dip closure related to a salt collapse structure with expected Upper Jurassic sandstone reservoir. It was partly covered by 3D. The leads, A, B and C were thought to have Jurassic reservoir and the E lead Permian Rotliegendes Group reservoir.

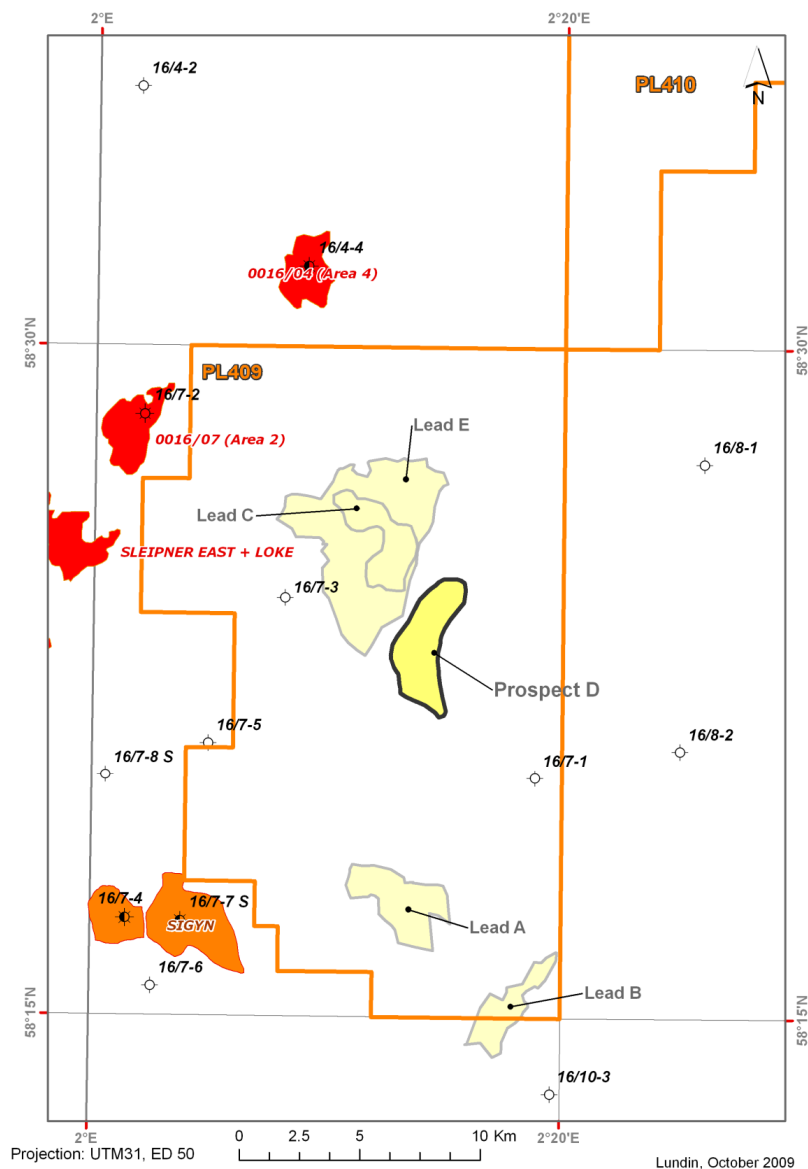


Figure 2: Prospect portfolio from APA 2006

#### 4. Completed work program and special studies

The work commitment comprised of a firm well and acquire 150 km<sup>2</sup> 3D seismic within awarded acreage. A drill-or-drop decision was to be made within 4 years of award.

The seismic work commitment was fulfilled in 2007 by acquisition of approx. 111 km<sup>2</sup> in the area, LN0703. A smaller 3d coverage area was approved as existing 3D was present. The survey LN0703 was merged with other surveys to a greater 3d data set into LN09M02 in 2009 (Fig. 3). LN09M02 comprised several 3D surveys covering the Utsira High.

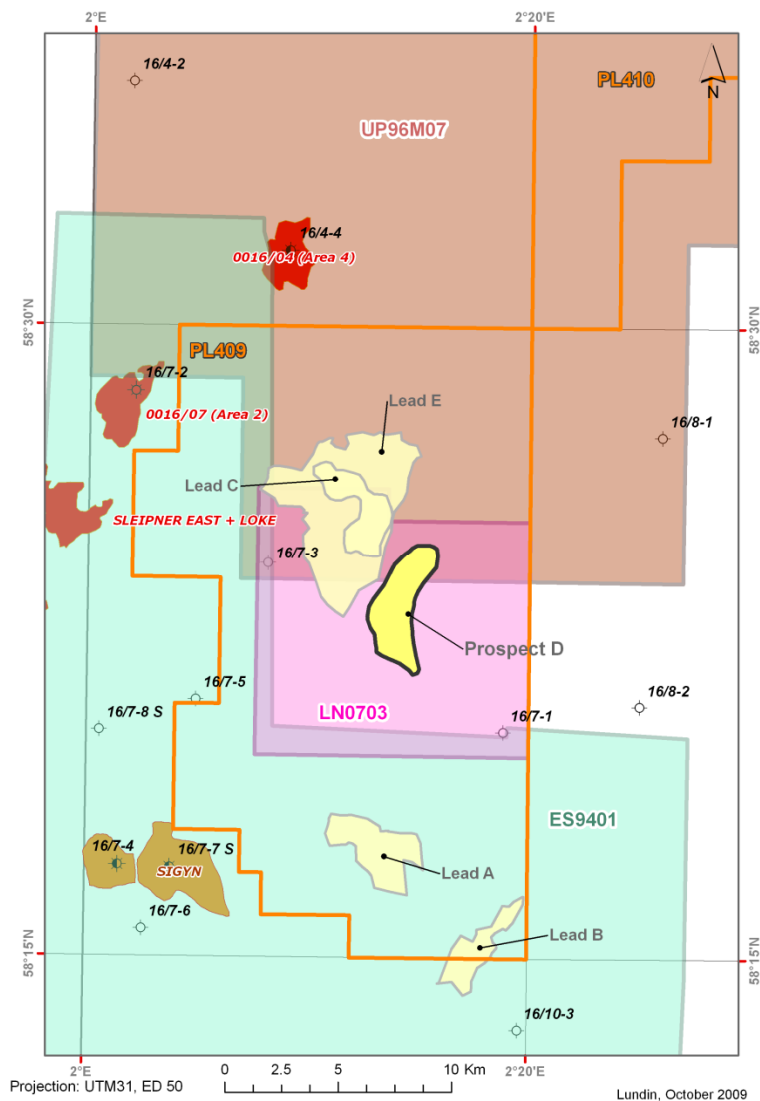


Figure 3: LN0703 3D seismic coverage in pink, ES9401 and UP96 in turquoise and brown respectively

In addition to the work commitment, special studies have been performed, including:

- H-mult processing (to remove multiples below and parallel to the strong BCU reflector)
- basin modeling

### 5. Pre Drill Prospectivity evaluation

The reinterpretation of the prospectivity was carried out on the LN09M02 and the prospect and leads was renamed. The resulting prospects and leads are shown in Fig 3 with a ranking in Table 1. Migration is the main risk for the prospectivity in the license.

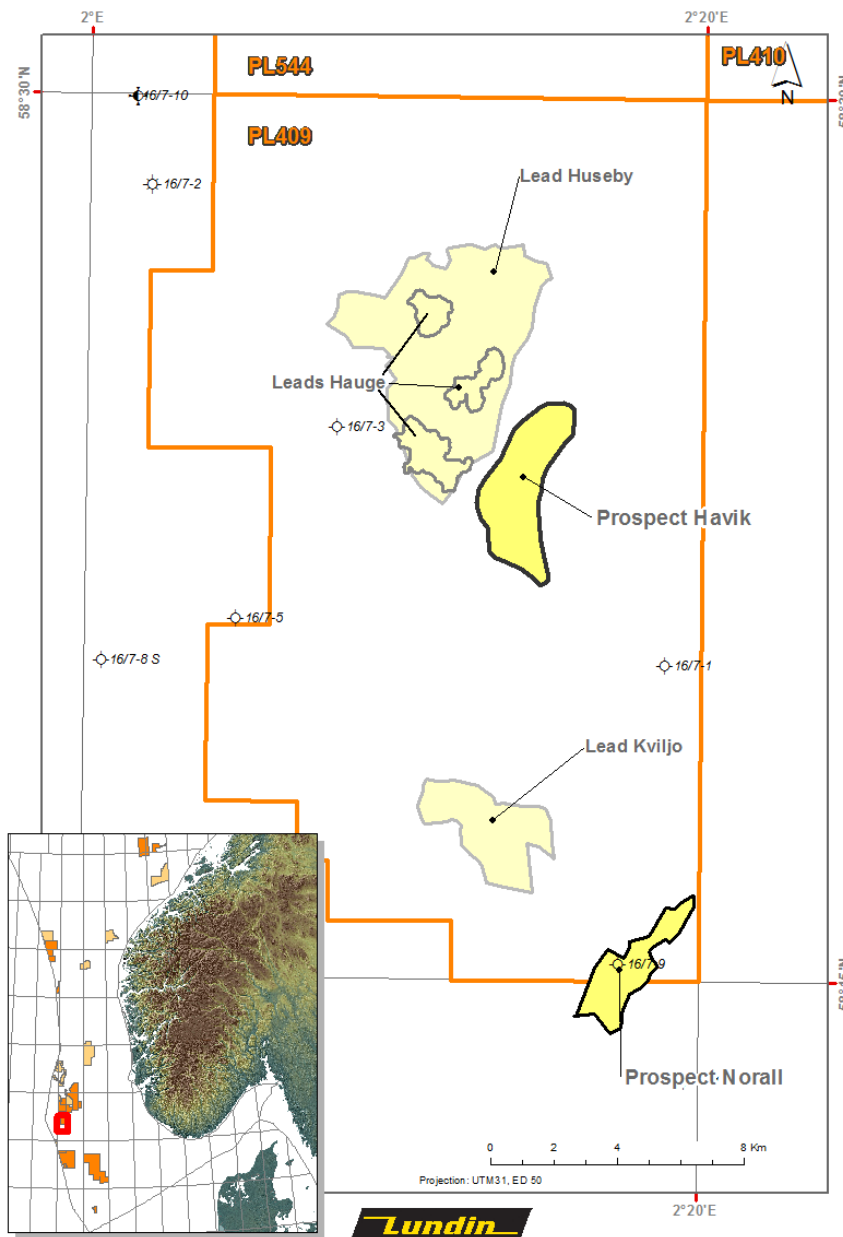


Figure 4. Prospect portfolio after interpretation of LN09M02

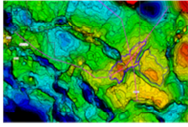
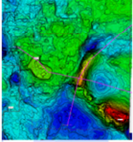
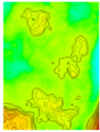
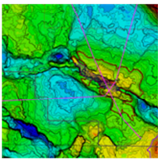
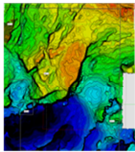
|  | STOOIP<br>(MSm <sup>3</sup> ) | GIIP<br>(GSm <sup>3</sup> ) | Resources<br>(MSm <sup>3</sup> ) | POS  | Risking   |
|--|-------------------------------|-----------------------------|----------------------------------|------|---|
| Norall (B)<br>  | 8.6 (Mean)                    | 6.0 (Mean)                  | 5.7 (Mean)                       | 36%  | Pres 0.9<br>Pcharge 0.5<br>Ptrap 1.0<br>Prentention 0.8 |
| Havik (D)<br>   | 18.7 (Mean)                   | 13.1 (Mean)                 | 12.4 (Mean)                      | 17%  | Pres 0.8<br>Pcharge 0.3<br>Ptrap 1.0<br>Prentention 0.7 |
| Hauge (C)<br>   | 23.7                          |                             | 9.5                              | 14%  | Pres 0.8<br>Pcharge 0.3<br>Ptrap 1.0<br>Prentention 0.6 |
| Kviljo (A)<br>  | 11.1                          | 7.8                         | 10.5                             | 11%  | Pres 0.7<br>Pcharge 0.3<br>Ptrap 0.9<br>Prentention 0.6 |
| Huseby (E)<br> |                               | 29                          | 20                               | <10% | Pres 0.3<br>Pcharge 0.3<br>Ptrap 1.0<br>Prentention 0.6 |

Table 1. Pre drill prospects and leads with volumes and risking

### The Norall prospect (former B lead)

This structure is a 4-way dip closure (Figure 5) and the structure is related to an inverted intra pod area with expected Upper Jurassic and Triassic sand (Figure 6 and 7). Part of the structure area extends into block 16/10. Migration could occur from either spillover from the Sigyn field and/or Kviljo structure or charge from local basins.

### Havik prospect (former D prospect)

This structure is a four-way dip closure related to a salt dome with expected Upper Jurassic sandstone reservoir. A steep structure which loose volume with depth. Long distance migration is more likely than migration from a local basin.

### Hauge lead (C lead)

This lead's extent can be mapped as three small separate 4 way dip closures or one larger. It is a low relief structure that is sensitive to the Base Cretaceous mapping. The reservoir is thought to be of upper Jurassic age and migration thought to occur from Viking graben.

### Kviljo lead (A lead)

This is a 4-way dip closure with a crestal faulted graben running thorough with faults which could leak. The structure is dependent on local migration.

The most likely reservoir is Upper Jurassic Hugin overlapping Skagerak formation.

### **Huseby lead (E lead)**

This is a large 4 way dip closure with assumed thick Rotliegendes sediments over Devonian and or Carboniferous sediments . The structure is partly underlying the Hauge (C) lead. The preserved Rotliegendes sequence beneath Zechstein can be different from the poor reservoir facies drilled in well 16/7-3. The source rock potential is depending on the presence of lacustrine source rocks in Devonian or Carboniferous. Due to deep burial gas is most likely. The Huseby lead covers an area of 18 km<sup>2</sup>.

The decision to drill the Norall prospect was made late January 2009. Main target was the Jurassic/Triassic sediments in the prospect (Figure 5, 6 and 7)

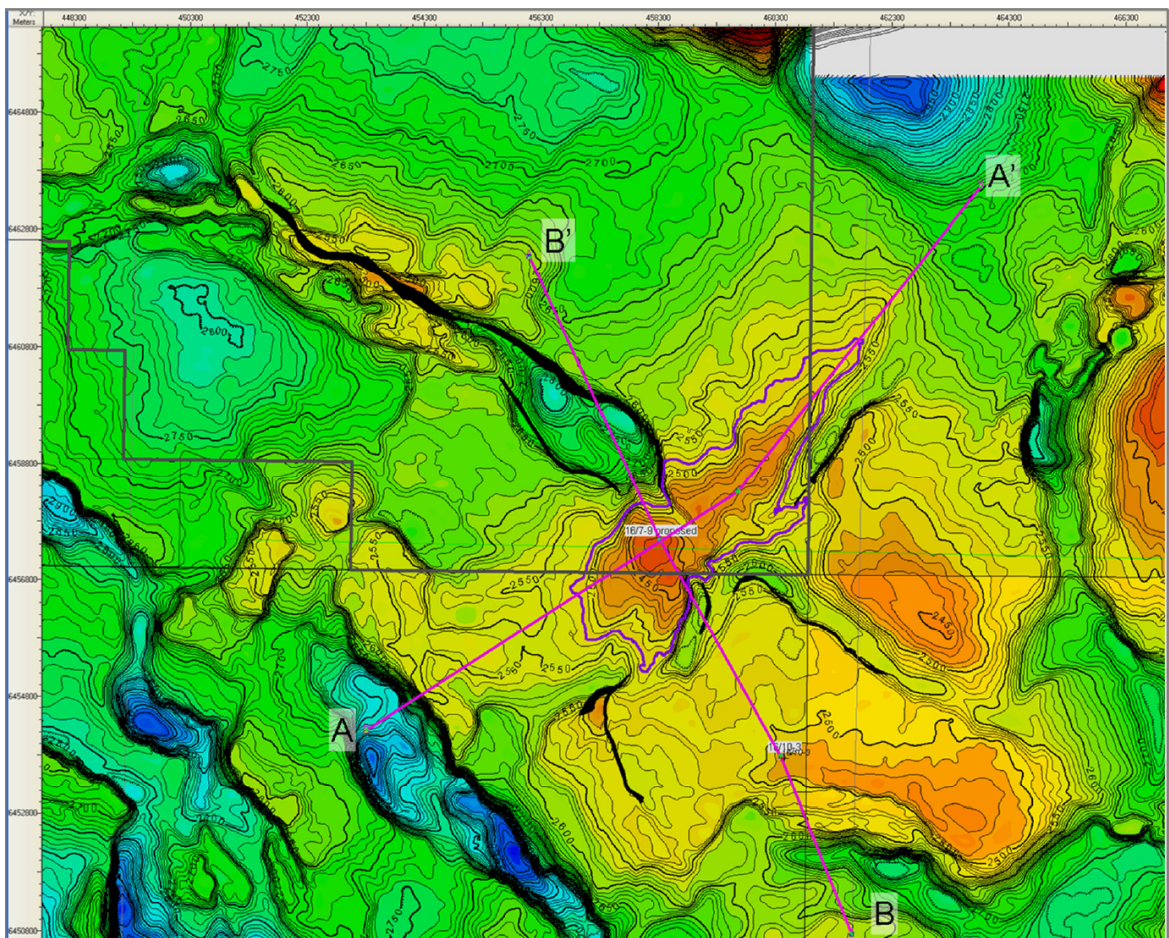


Figure 5. Well 18&7-9, Top reservoir depth map showing the location of seismic lines A-A' and B-B'.

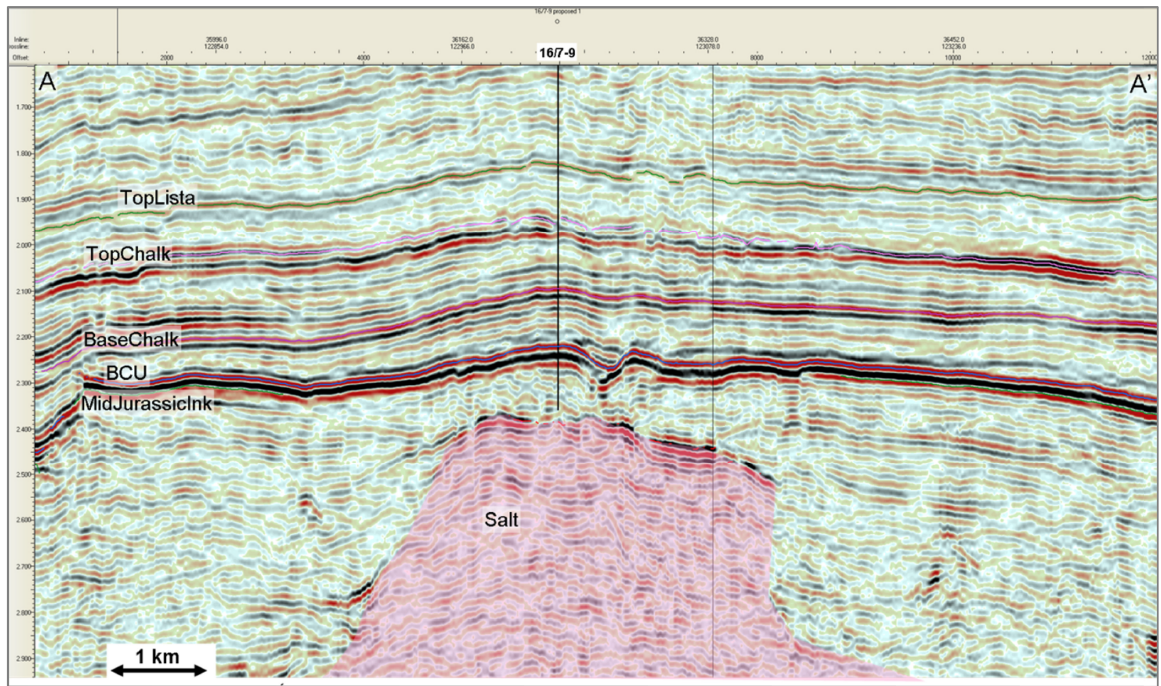


Figure 6. Seismic cross section A-A' through the Norall prospect. Line location shown in Fig. 5.

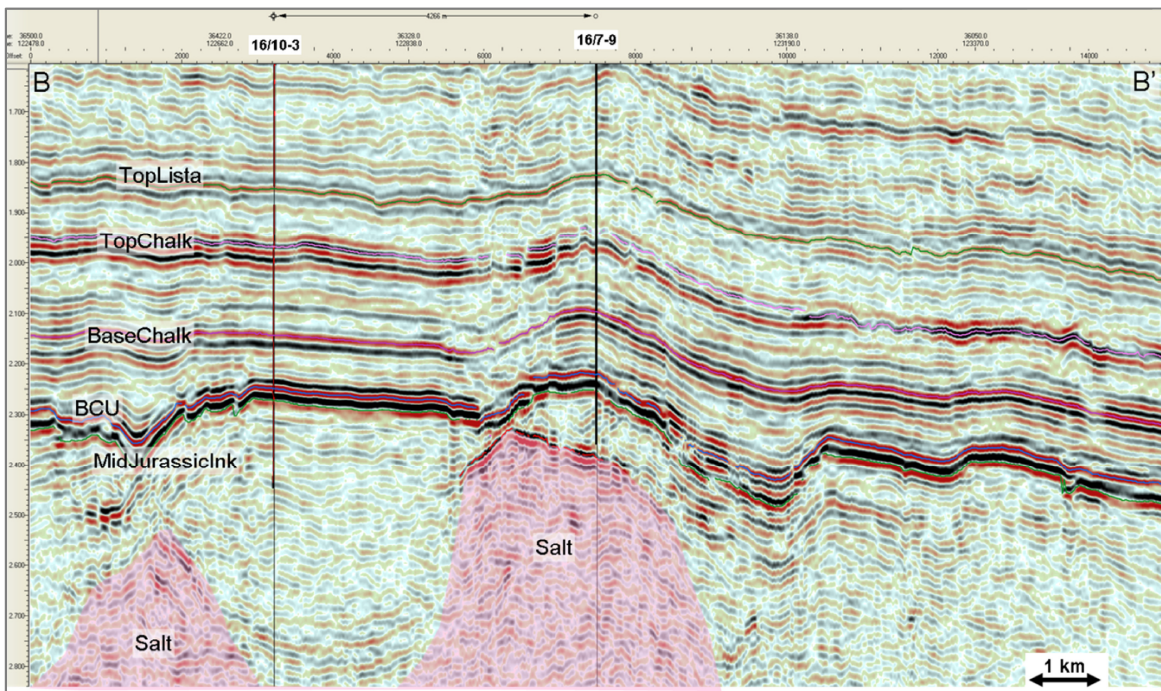


Figure 7. Seismic cross section B-B' through the Norall prospect. Line location shown in Fig. 5.

## **6. 16/7-9 well results**

The well was drilled into a 15 m thick Jurassic and 38 m Triassic sandstone, but was water bearing.

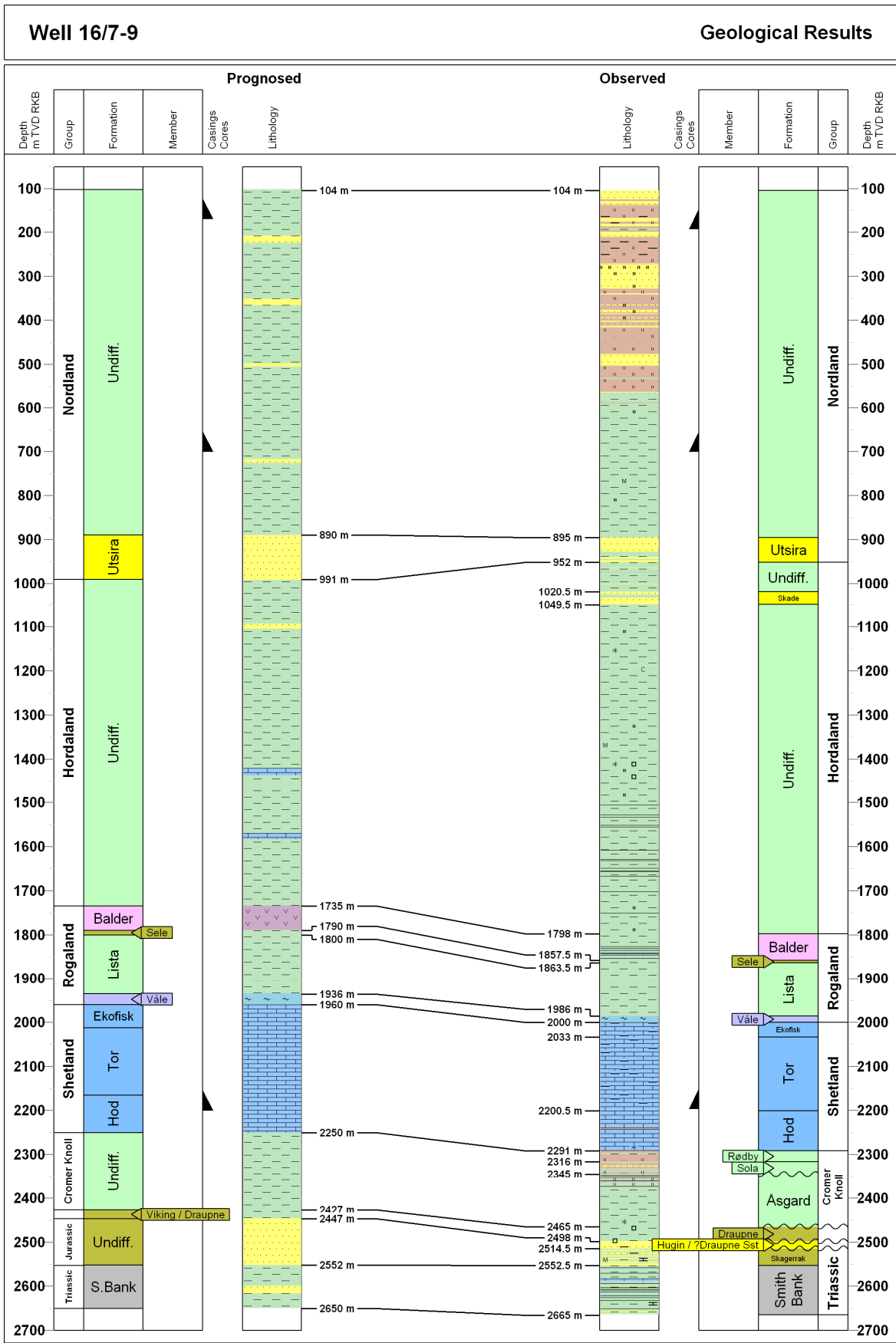
The well was drilled as a vertical well at the following location:

|                                    |                        |  |
|------------------------------------|------------------------|--|
| X: 458345.90 m East                | Y: 6457451.50 m North  | (ED-1950 International Ellipsoid UTM Zone 31, CM 03° East) |
| Lat: 58° 15' 17.49" N              | Long: 02° 17' 25.01" E |  |
| Line intersection:<br>(3D LN09M02) | xline: 123020          | Inline: 36228  |

The well was spudded on December 5th 2010 and operations were completed January 4th 2011 (~35 days on drilling operations).

The well was dry. Effective migration was considered the main risk for the prospect.

The prognosis vs. observed lithology and formation tops is shown in figure 8.



Gravitas template v2.03 [20101018] - AJC Document date 17.03.2011

Figure 8: Well 16/7-9 prognosis vs actual (depth and geology)

### 7. Post well 16/7-9 and 16/4-7 prospectivity evaluation

After the drilling of the Norall prospect the probability of charge decreased for the Havik prospect and Kviljo lead (Tab. 2). The partnership decided to relinquish the southern part of the License. The new license area from February 2012 is shown in figure 9.

The chance of success for the Hauge lead was unchanged, and is therefore ranked on top after drilling well 16/7-9. The areal extent and hence also volumes calculations for this lead is uncertain as the BCU interpretation is uncertain in the area. The Hauge lead was in a similar setting as the Biotitt prospect in the license PL544 to the north and could be upgraded if this well was positive. The well 16/4-7 on the Biotitt prospect was drilled late summer 2013 and was dry, hence no upgrade at the prospectivity in the P1409 license and a relinquishment of the license was agreed upon in the partnership in November 2013.

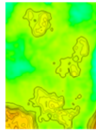
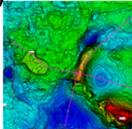
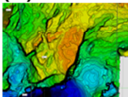
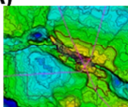
|  | STOOIP<br>(MSm <sup>3</sup> ) | GIIP<br>(GSm <sup>3</sup> ) | Resources<br>(MSm <sup>3</sup> ) | POS<br>Pre<br>Drill | Pre Drill<br>Risking  | Post Drill<br>Risking | POS<br>Post Drill |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
|--|-------------------------------|-----------------------------|----------------------------------|---------------------|---|-----------------------|-------------------|---------|-----|-------|-----|------------|-----|---|------|-----|---------|-----|-------|-----|------------|-----|-----|
| Hauge (C)   | 23.7                          |                             | 9.5                              | 14%                 | <table border="1"> <tr><td>Pres</td><td>0.8</td></tr> <tr><td>Pcharge</td><td>0.3</td></tr> <tr><td>Ptrap</td><td>1.0</td></tr> <tr><td>Pretention</td><td>0.6</td></tr> </table> | Pres                  | 0.8               | Pcharge | 0.3 | Ptrap | 1.0 | Pretention | 0.6 | <table border="1"> <tr><td>Pres</td><td>0.8</td></tr> <tr><td>Pcharge</td><td>0.3</td></tr> <tr><td>Ptrap</td><td>1.0</td></tr> <tr><td>Pretention</td><td>0.6</td></tr> </table> | Pres | 0.8 | Pcharge | 0.3 | Ptrap | 1.0 | Pretention | 0.6 | 14% |
| Pres   | 0.8                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pcharge  | 0.3                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Ptrap  | 1.0                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pretention   | 0.6                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pres   | 0.8                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pcharge  | 0.3                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Ptrap  | 1.0                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pretention   | 0.6                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Havik (D)   | 18.7<br>(Mean)                | 13.1<br>(Mean)              | 12.4 (Mean)                      | 17%                 | <table border="1"> <tr><td>Pres</td><td>0.8</td></tr> <tr><td>Pcharge</td><td>0.3</td></tr> <tr><td>Ptrap</td><td>1.0</td></tr> <tr><td>Pretention</td><td>0.7</td></tr> </table> | Pres                  | 0.8               | Pcharge | 0.3 | Ptrap | 1.0 | Pretention | 0.7 | <table border="1"> <tr><td>Pres</td><td>0.8</td></tr> <tr><td>Pcharge</td><td>0.2</td></tr> <tr><td>Ptrap</td><td>1.0</td></tr> <tr><td>Pretention</td><td>0.7</td></tr> </table> | Pres | 0.8 | Pcharge | 0.2 | Ptrap | 1.0 | Pretention | 0.7 | 11% |
| Pres   | 0.8                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pcharge  | 0.3                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Ptrap  | 1.0                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pretention   | 0.7                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pres   | 0.8                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pcharge  | 0.2                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Ptrap  | 1.0                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pretention   | 0.7                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Huseby (E)  |                               | 29                          | 20                               | 8%                  | <table border="1"> <tr><td>Pres</td><td>0.3</td></tr> <tr><td>Pcharge</td><td>0.3</td></tr> <tr><td>Ptrap</td><td>1.0</td></tr> <tr><td>Pretention</td><td>0.9</td></tr> </table> | Pres                  | 0.3               | Pcharge | 0.3 | Ptrap | 1.0 | Pretention | 0.9 | <table border="1"> <tr><td>Pres</td><td>0.3</td></tr> <tr><td>Pcharge</td><td>0.3</td></tr> <tr><td>Ptrap</td><td>1.0</td></tr> <tr><td>Pretention</td><td>0.9</td></tr> </table> | Pres | 0.3 | Pcharge | 0.3 | Ptrap | 1.0 | Pretention | 0.9 | 8%  |
| Pres   | 0.3                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pcharge  | 0.3                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Ptrap  | 1.0                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pretention   | 0.9                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pres   | 0.3                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pcharge  | 0.3                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Ptrap  | 1.0                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pretention   | 0.9                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Kviljo (A)  | 11.1                          | 7.8                         | 10.5                             | 11%                 | <table border="1"> <tr><td>Pres</td><td>0.7</td></tr> <tr><td>Pcharge</td><td>0.3</td></tr> <tr><td>Ptrap</td><td>0.9</td></tr> <tr><td>Pretention</td><td>0.6</td></tr> </table> | Pres                  | 0.7               | Pcharge | 0.3 | Ptrap | 0.9 | Pretention | 0.6 | <table border="1"> <tr><td>Pres</td><td>0.7</td></tr> <tr><td>Pcharge</td><td>0.1</td></tr> <tr><td>Ptrap</td><td>0.9</td></tr> <tr><td>Pretention</td><td>0.6</td></tr> </table> | Pres | 0.7 | Pcharge | 0.1 | Ptrap | 0.9 | Pretention | 0.6 | 4%  |
| Pres   | 0.7                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pcharge  | 0.3                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Ptrap  | 0.9                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pretention   | 0.6                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pres   | 0.7                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pcharge  | 0.1                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Ptrap  | 0.9                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |
| Pretention   | 0.6                           |                             |                                  |                     |   |                       |                   |         |     |       |     |            |     |   |      |     |         |     |       |     |            |     |     |

Table 2. Pre and Post drill ranking of remaining prospects and leads after drilling of the Norall prospect.

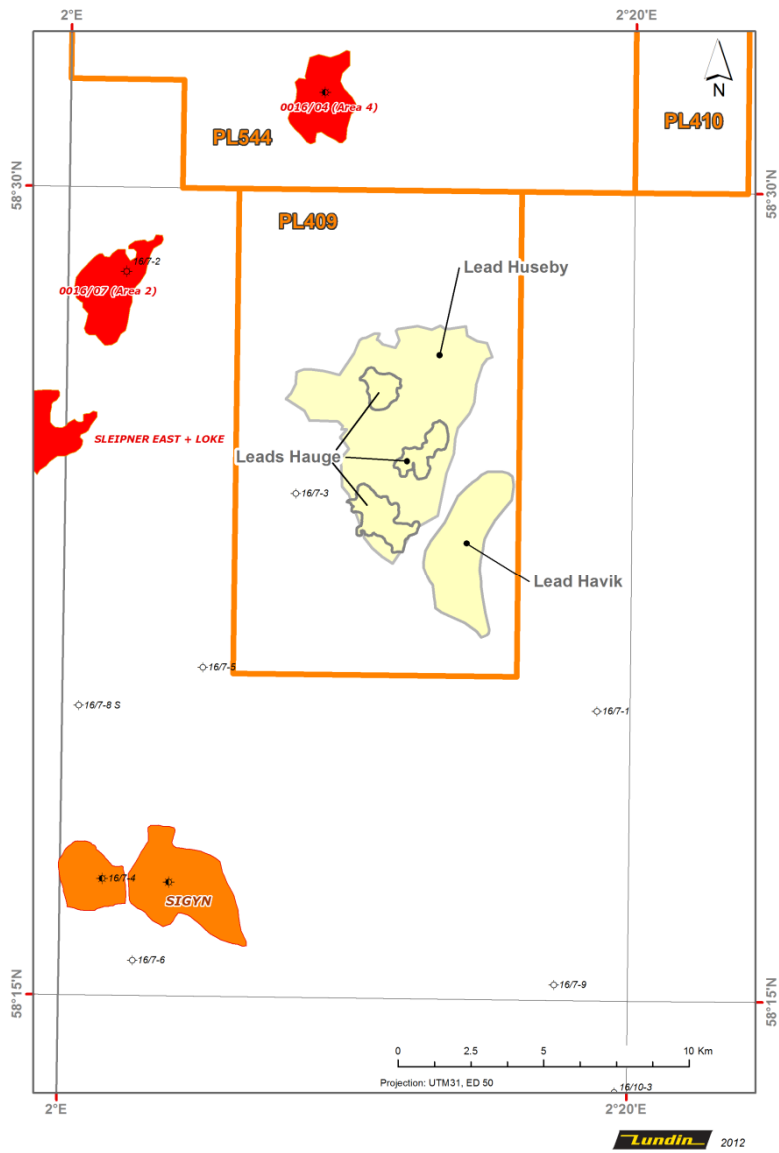


Figure 9. The new license area with leads after relinquishment in Feb2012.