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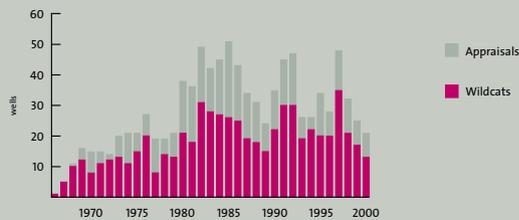


Figure 13.1 Exploration wells completed per year.  
(Source: Norwegian Petroleum Directorate)

Exploration operations seek to identify new commercial petroleum resources and to help maintain a stable and steady level of activity. They thereby lay the basis for future development, production and state revenues.

The area of the NCS which could prove to contain oil and gas is almost three times the size of mainland Norway. Offshore areas currently opened for exploration represent about 60 per cent of the total continental shelf, and roughly nine per cent of this acreage is covered by production licences.

Across such a large area, the basis for exploration will naturally differ in terms of resource potential, established infrastructure and environmental challenges.

### SEISMIC SURVEYS

Seismic surveys aim to acquire geological data by mapping subterranean strata. Sound waves transmitted through the Earth's crust are reflected back to surface vessels and allow a picture to be formed of rock formations deep underground.

Data collected in this way are categorised as two-dimensional (2D) and three-dimensional (3D), with the latter providing a more detailed – but also more expensive – picture than the former.

Seismic mapping of the NCS began in 1962, and a total of 6 419 231 km had been shot by the end of 2000. Of this, 2 906 182 km was collected above

62°N since surveying began there in 1969.

The NPD, oil companies and survey contractors shot 419 494 km of seismic lines in 2000.

### EXPLORATION DRILLING

Exploration drilling embraces wildcat and appraisal wells. A wildcat is the first well on a prospect, while an appraisal is drilled to determine the extent and scope of a discovery.

During 2000, 21 exploration wells – 13 wildcat and eight appraisal – were completed or temporarily abandoned on the NCS. These included 13 (seven wildcat and six appraisal) in the North Sea, five (three wildcat and two appraisal) in the Norwegian Sea and three wildcats in the Barents Sea. Operators for the wells completed in 2000 were Statoil seven, Norsk Hydro seven, Agip three, BP Amoco two, Saga one and Mobil one. A total of 985 exploration wells had been completed or temporarily abandoned off Norway at 31 December 2000.

The future level of exploration will be determined by a number of factors, with the expected development in oil prices, licence awards and discoveries leading to appraisal drilling as the most important. Most new wells are likely to be spudded in the North Sea, but operations in the Norwegian Sea will also be significant. About 25 wildcat and appraisal wells will probably be spudded off Norway in 2001.

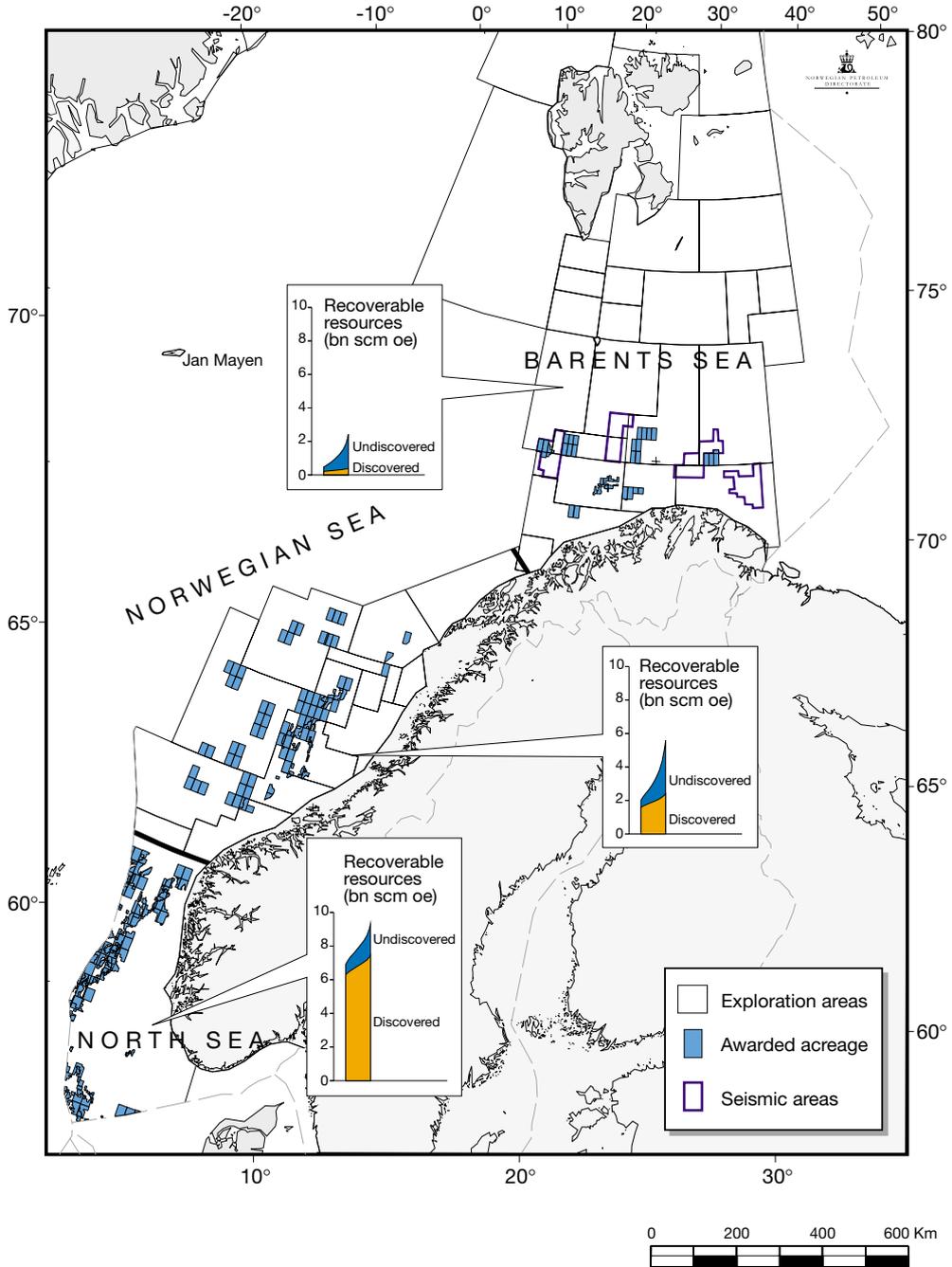


Figure 13.2 Exploration status. (Source: Norwegian Petroleum Directorate)

## DISCOVERIES

Petroleum was discovered in nine of the 18 exploration wells drilled in 2000. Two of the nine were in the Barents Sea, five in the Norwegian Sea and two in the North Sea.

The exploration wells drilled in the Barents Sea during 2000 were the first in these waters since 1994. Two finds were made, of which the most interesting was Norsk Agip's 7122/7-1 oil discovery north-west of Hammerfest. The same company found gas in its 7019/1-1 well north of Tromsø, but a very high carbon dioxide content means that this discovery is unlikely to be developed.

In the Norwegian Sea, Statoil made two oil finds in Jurassic sands – 6608/10-6 and 6608/11-2 – north-east of the Norne field. These two discoveries have not been finally delineated. The 6608/10-6 find is under consideration for development through a tie-in to Norne.

Two gas discoveries were made further south, on the Dønna Terrace. BP found gas in Cretaceous rocks with well 6507/5-3. This find will probably form part of the Skarv development. West of Skarv, ExxonMobil proved gas in Jurassic sands with well 6506/6-1. The discovery could be substantial, but further analysis and appraisal wells will be

needed to reach a final determination of volumes.

Norsk Hydro made an oil discovery on the north-western flank of Njord with well 6407/7-6. This find is considered interesting, and a tie-in with Njord A is envisaged to help increase production from that platform.

The resource estimate of 315 billion scm gas in Ormen Lange was confirmed by Norsk Hydro's 6305/8-1 appraisal well. A thin oil zone was also proven, which is encouraging for prospects of proving oil in deepwater areas of the Norwegian Sea. Stock tank oil originally in place is put at one-seven million scm, but these resources are probably not commercially recoverable.

Two modest discoveries were made in the North Sea. Norsk Hydro found oil in Jurassic sands with well 34/4-10 north-west of Snorre, while Statoil proved gas and condensate in Jurassic sands in the C prospect south of Huldra

## FUTURE EXPLORATION

The authorities have aimed in recent years to encourage the discovery of additional oil resources in order to counter an anticipated decline in

Table 13.1 Exploration operations on the NCS in 2000. (Source: Norwegian Petroleum Directorate)

Well	Operator	Hydrocarbon type	Oil/condensate mill scm	Gas mill scm
30/3-9	Statoil	Gas/condensate		1<
34/4-10	Norsk Hydro	Oil	1-2	
6407/7-6	Norsk Hydro	Oil	1-3	
6506/6-1	Exxon Mobil	Gas		5-100 ?
6507/5-3	BP	Gas		20-40
6608/10-6	Statoil	Oil	10-20	
6608/11-2	Statoil	Oil	3-12	
7122/7-1	Norsk Agip	Oil	14-17	
7019/1-1	Norsk Agip	Gas		1-2 (lean gas)

oil production over the next decade. Work has concentrated on finding resources near existing infrastructure and on testing new exploration models.

Substantial undiscovered resources are thought to remain on the NCS. Future activity will be pursued both in established exploration regions of the North Sea and in areas which present new challenges, such as geological understanding of and technological solutions for deepwater parts of the Norwegian Sea.

Exploration strategy and operations must reflect the special challenges faced in each area of the NCS, which will determine how the work is pursued. Priorities between and within these areas could vary from one licensing round to another.

#### **North Sea**

The North Sea is the best-explored part of the NCS. Geological understanding is good over much of the area. A leading challenge in these waters is to map resources close to existing and planned infrastructure. Even small discoveries may show good profitability if rational use is made of these facilities.

The North Sea will probably be a core region for future exploration, which could also be extended to less well-known parts of the area.

Forty full or partial blocks were put on offer in the North Sea 2000 round during September. Awards are planned in the first quarter of 2001.

#### **Norwegian Sea**

Development of new fields and thorough exploration have matured parts of the Norwegian Sea as a petroleum province in recent years. Several discoveries made in this period are expected to increase interest in drilling this part of the continental shelf.

New production licences have been awarded approximately every other year in the Norwegian

Sea over the past decade. The most recent allocation took place in the 16th offshore licensing round in the spring of 2000 and covered 14 licences. In making these awards, the government sought to strike a balance between deepwater areas and the rather shallower Halten and Dønna Terraces.

The 16th round will contribute to increased exploration activity and could lead in the rather longer term to new field developments. This evens out the level of activity and helps to safeguard employment in the industry.

Exploration work will also be pursued on new acreage in the north-eastern Norwegian Sea, although activity in these waters must take account of special environmental and fisheries considerations. Regardless of exploration results on the new deepwater acreage, continued activity is expected in established exploration areas of the Halten Bank.

The first exploration wells on the 16th round awards will be spudded in the second half of 2001.

Plans call for the 17th licensing round on the NCS to be announced in the fourth quarter of 2001, covering acreage in the Norwegian Sea. Awards could be made in the second quarter of 2002.

#### **Barents Sea**

Petroleum operations in the Barents Sea face major challenges. Terms for working in this region have been modified with a view to encouraging continued exploration.

Three exploration wells were drilled in the Barents Sea during 2000, the first in these waters since 1994. Hydrocarbons were proven in two of the wells, while one was dry.

Plans call for two wells to be drilled in the Barents Sea during 2001. One of these will test a structure south-east of Snøhvit, which is thought to contain oil. The other was in progress at 31 December to test new exploration models in the North Cape Basin.