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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 2D variant.

Seismic mapping of the NCS began in 1962, and a total of 6 100 816 km had been shot by the end of 1999. Of this, 2 587 767 km was collected above 62°N since surveying began there in 1969.

The NPD, oil companies and survey contractors shot 640 866 km of seismic lines in 1999, including 678 856 km of 3D seismic.

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.

Figure 13.2 provides an overview of the number of exploration wells completed off Norway from 1966 to 1999.

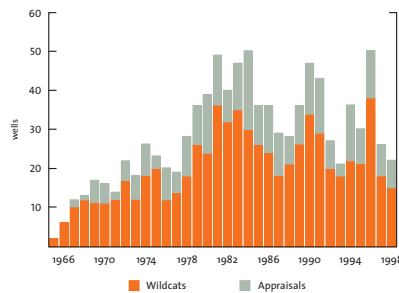


Figure 13.2 Exploration drilling on the Norwegian continental shelf. Exploration wells completed per year 1966-1999 (Source: Norwegian Petroleum Directorate)

During 1999, 28 exploration wells – 18 wildcat and 10 appraisal – were completed or temporarily abandoned on the NCS.

These included 15 (eight wildcat and seven appraisal) in the North Sea and 13 (10 wildcat and three appraisal) in the Norwegian Sea. There was no drilling in the Barents Sea. Operators for the wells completed in 1999 were Statoil nine, Norsk Hydro one, Saga eight, BP Amoco three, Esso three, Shell two and Phillips one. A total of 967 exploration wells had been completed or temporarily abandoned off Norway at 31 December 1999.

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 30-35 wildcat and appraisal wells will probably be spudded off Norway in 2000. In the event, that would represent some increase from 1999. Four wells are planned in the Norwegian sector of the Barents Sea during the summer of 2000, the first in these waters since 1994.

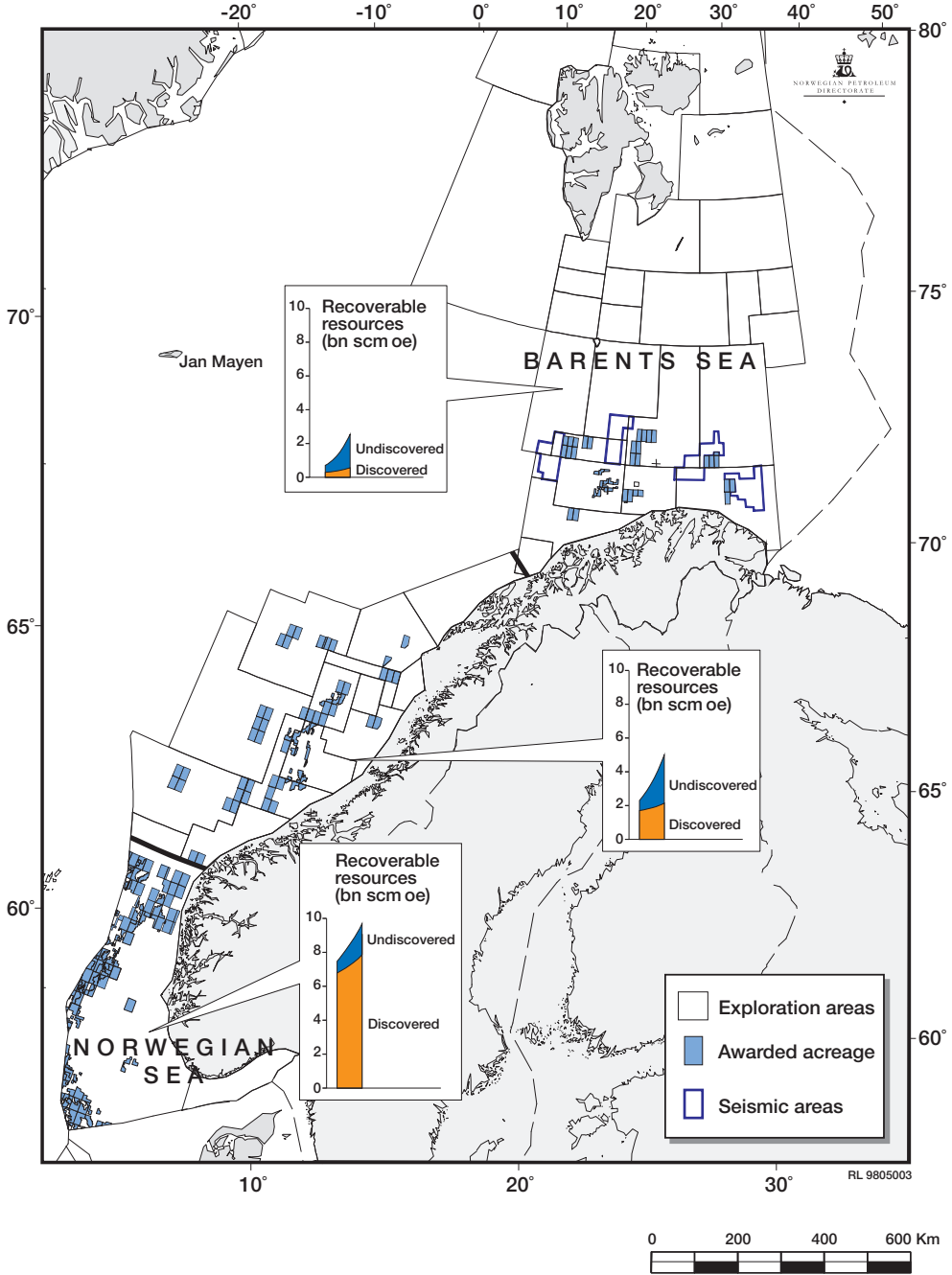


Figure 13.1 Exploration status (Source: Norwegian Petroleum Directorate)

DISCOVERIES

Petroleum was discovered in five of the 28 exploration wells drilled in 1999. Two of the five were in the North Sea, and three in the Norwegian Sea. As operator for well 6305/3-3, Statoil found gas on the Dønna Terrace north of the Skarv oil and gas discovery made by BP Amoco in the Norwegian Sea in 1998. Statoil's discovery contains 15-20 bn scm oe. Saga operated well 6406/2-7, which found gas and condensate south-west of Kristin. Although some uncertainty persists about the size of this discovery, some 40-50 million scm of oil and 40-50 bn scm of gas are thought to be proven. Shell also made a small find near Draugen.

In the North Sea, two small oil discoveries were made close to existing infrastructure. Statoil operated well 9/2-9S, and this find has already been brought on stream with the aid of installations on Yme. The 2/7-31 discovery, made by Phillips, lies near Ekofisk.

Table 13.1 lists the five exploration wells categorised as discoveries in 1999. Preliminary estimates indicate that new finds in 1999 totalled 45-60 mill scm of oil and 55-80 bn scm of gas.

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 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.

Twelve production licences were awarded in the North Sea during 1999. The principal purpose of these awards is to find additional resources close to existing fields and infrastructure.

Table 13.1 Discoveries made in 1999 (Source: Norwegian Petroleum Directorate)

Well	Licence	Operator	Hydro-carbon type	Recoverable oil/condensate resources (mill scm)	Recoverable gas resources (bn scm)
9/2-9S	114	Statoil	Oil	<1	
2/7-31	018	Phillips	Oil and gas	2-6	2-5
6406/2-7	199	Saga	Oil and condensate	40-50	40-55
6507/3-3	159	Statoil	Gas	0.6	15.5
6407/9-9	093	Shell	Oil	0.5	1.6

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.

Great interest is focused on exploring new areas of the Norwegian Sea. Some of this acreage, in the Møre and Vøring Basins, involves water depths down towards 1 500 metres.

Seven production licences were awarded in the basin during the 15th offshore licensing round in 1996. In 1998, four wells were drilled in this area. Three were dry and the fourth yielded a large gas discovery in the southern part of the Ormen Lange dome.

Operations will also be pursued in new exploration areas of the north-eastern Norwegian Sea, although activity in these areas must pay special attention to environmental considerations and fishery interests. Whatever the results from these new deepwater exploration areas, work is expected to continue in established acreage on the Halten Bank.

Saga drilled a dry well on the Gjallar Ridge during 1999 in the greatest water depth for such an operation off Norway so far – 1 352 metres.

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 15th offshore licensing round in 1995-96.

With applications received at 31 January 2000, the 16th offshore licensing round will be an important element in long-term resource management on the NCS. It will contribute to enhanced predictability and provide commercial opportunities for the industry. That will also contribute to increased exploration and could give rise to new field developments in the rather longer term. This will even out the level of activity and help to secure employment in the industry.

When putting blocks in the Norwegian Sea on

offer in the 16th round, the government has sought to strike a balance between deepwater areas and the rather shallower Halten and Dønna Terraces. Assessing the development of proven resources in licensed acreage by comparison with new exploration areas has been particularly important. Exploration operations in the Vøring and Møre Basins present the companies with major challenges. These relate particularly to deep waters and unknown geology. The acreage on offer in the 16th round covers 48 full or part blocks.

To ensure a good balance between fishing and environmental concerns on the one hand and petroleum operations on the other, the authorities have imposed exploration restrictions in these waters. These are specified in the offer document. Plans call for 16th-round production licences to be awarded before Easter 2000.

Barent 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. Licences were awarded for seven areas of the Barents Sea in May 1997. The Barents Sea project was initiated as a response to the special features of this area in exploration terms. White Paper No 26 (1993-94) established a new framework for operations there.

This project will give oil companies the opportunity to survey larger areas than have traditionally been available before deciding whether to drill. The government has laid the basis for seismic surveys over wide areas, which will later be narrowed down if drilling is found to be appropriate. That will permit thorough and cost-efficient reconnaissance over parts of the Barents Sea. Companies operating in this area must take special account of environmental considerations and fishery interests.

Four or five exploration wells are planned in the Barents Sea during the summer of 2000, which will be the first in these waters since 1994.

