13 Exploration operations

Seismic surveys

Exploration drilling

New discoveries

Future exploration

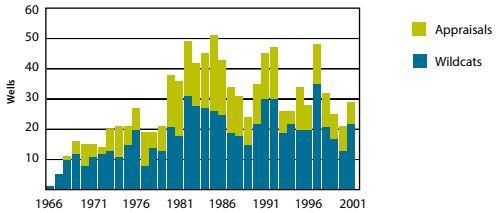

Figure 13.1 Exploration wells completed per year.
(Source: NPD)

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

About 60 per cent of the NCS has been opened for exploration, 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 acquire data which provide information about the sub-surface rocks. 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 falls into several categories. The commonest are two-dimensional (2D) and three-dimensional (3D), with the latter involving more extensive, and also expensive, data gathering than the former.

Seismic mapping of the NCS began in 1962, and a total of 7 282 433 km had been shot by the end of 2001. Of this, 3 468 677 km was collected above 62°N since surveying began there in 1969. The NPD, oil companies and survey contractors shot 748 911 km of seismic lines in 2001.

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 2001, 29 exploration wells – 22 wildcat and seven appraisal – were completed or temporarily abandoned on the NCS. These included 14 (12 wildcat and two appraisal) in the North Sea, 10 (six wildcat and four appraisal) in the Norwegian Sea and five (four wildcat and one appraisal) in the Barents Sea. Operators for the wells completed in 2001 were Statoil 12, Norsk Hydro nine, BP two, Conoco two, Saga one, Esso one, Chevron one and Agip one.

A total of 1 015 exploration wells had been completed or temporarily abandoned off Norway at 31 December 2001.

The future level of exploration will be determined by a number of factors, with oil price expectations, the scope of licence awards and discoveries leading to appraisal drilling as the most important.

New discoveries

Petroleum was discovered in 12 of the exploration wells drilled in 2001. Seven of these were in the North Sea, four in the Norwegian Sea and one in the Barents Sea.

The overall increase in resources from explora-

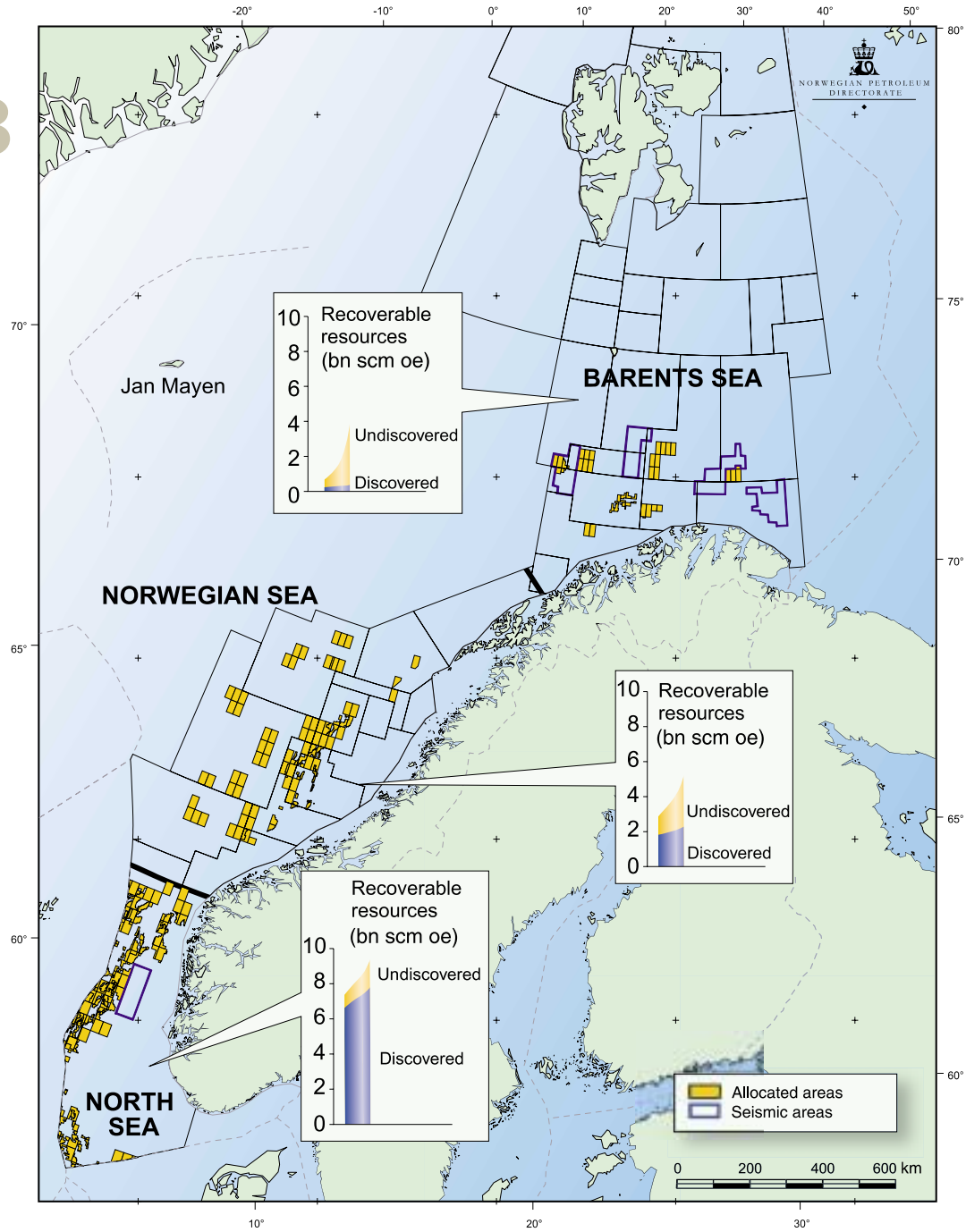

Figure 13.2 Exploration status. *(Source: NPD)*

tion operations in 2001 is estimated at 33-38 mill scm oil and 15-22 bn scm gas. Oil resources proven by exploration are on a par with 2000. Since most of the oil discoveries were made close to existing infrastructure, a number of them could be profitable even though they are small by comparison with fields in production today. Gas resources proven by exploration in 2001 were smaller than expected, and below the volume of gas produced during the year.

All discoveries in the North Sea during 2001 were made in Jurassic rocks, with most of them found close to existing fields in the Tampen and Oseberg areas.

Norsk Hydro made two oil finds in the Tampen area – 34/7-31 (Borg North) just to the north of Tordis and 34/8-12 south of Visund. Both are considered promising for future utilisation of planned and existing infrastructure in the area. They also give grounds for optimism over additional finds in the area.

The 34/7-31 discovery already forms part of a planned development of the central area between Vigdis, Statfjord East and Tordis. A possible development of the 34/8-12 discovery between Visund and Gullfaks can only be considered after further exploration in the area.

Statoil made two small oil and condensate discoveries in the Tampen area, both of them close to Gullfaks. One of these, 34/10-44 (Rimfaks Lunde), represents an exploration model which has been little pursued in this area. The discovery provides a small but interesting addition to Gullfaks South's resources.

Two oil discoveries were made by Norsk Hydro in wells 30/6-26 and 30/6-27 west of Oseberg. Overall, they represent resources which will form part of plans for further development of the area. In addition, Norsk Hydro found oil and gas in well 15/12-12 south of Varg.

Four new finds, all in Jurassic rocks, were recorded in the Norwegian Sea. Two were made by Statoil. The larger of these, well 6506/11-7 north of Kristin, contained light oil. The other was a small gas find in well 6406/1-1, close to Erlend. Conoco made a minor oil find with 6507/7-13, north of the Heidrun, while Norsk Hydro notched up a small gas discovery west of Midgard in well 6507/11-6.

In the Barents Sea, Statoil made a discovery in

Table 13.1 New discoveries on the NCS in 2001 (recoverable resources). *(Source: NPD)*

Well	Operator	Hydrocarbon type	Oil/condensate mill scm	Gas bn scm
6506/11-7	Statoil	oil/gas	10	5
15/12-12	Norsk Hydro	oil/gas	6-7	2-3
34/7-31	Norsk Hydro	oil	6	
30/6-26	Norsk Hydro	oil	3-5	
7228/7-1	Statoil	oil/gas	<1	5-10
6507/11-6	Norsk Hydro	oil/gas	<1	2-3
34/8-12	Norsk Hydro	oil	3	
6507/7-13	Conoco	oil	1-2	
30/6-27	Norsk Hydro	oil	1-2	
6406/1-1	Statoil	oil/gas	<1	1
34/10-44	Statoil	oil	<1	
34/10-43	Statoil	oil	<1	
Total			**33-38**	**15-22**

Triassic rocks in the North Cape Basin. This is considered interesting since it represents the first well in this part of the basin and applied an exploration model which has not been tested earlier in these waters. Norsk Agip also drilled an appraisal well on its 7122/7-1 Goliat discovery, with positive results.

Future exploration

Substantial undiscovered oil and gas resources remain on the NCS. Future exploration will be pursued in both new and established exploration regions of the North, Norwegian and Barents Seas. Future exploration above the 62nd parallel will face major challenges, such as geological understanding, technological solutions for deep water, establishing infrastructure and protecting the environment.

Exploration strategy and operations must reflect the special challenges faced in each area of the NCS.

North Sea

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

Exploration could also be extended to less well-known parts of the North Sea in coming years. These waters are likely to be a core area for exploration in the long term. As a general rule, the aim will be to award new acreage annually in the North Sea.

Six production licences were awarded in April 2001 under the North Sea round 2000. Exploration wells with interesting drilling targets are planned in several of these licences during 2002.

A total of 68 full or part blocks close to existing infrastructure were put on offer during September in the North Sea round 2001. Awards will probably be made in the spring of 2002.

Norwegian Sea

The biggest contribution to resource growth on the NCS over the past decade has come from exploration in the Norwegian Sea. A number of substantial finds have been made in these waters over this period. Infrastructure has also been established, helping to boost the commerciality of small discoveries.

These factors have prompted great interest in exploring this part of the NCS. New production licences have been awarded approximately every two-four years 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.

In coming years, the general rule will be to hold a licensing round for the Norwegian Sea every other year. That will contribute to greater predictability in licensing policy.

Fourteen licences were awarded in the 16th round, split between deepwater areas and the rather shallower Halten and Dønn Terraces. Interesting exploration wells are planned in several of these licences during 2002.

The 17th licensing round on the NCS was announced in December, covering 32 full or partial blocks in the Norwegian Sea. These include both deepwater areas and rather shallower areas north of the Dønn Terrace and in the Helgeland Basin. Awards will probably 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. The latest production licences awarded in these waters involved seven areas in the Barents Sea project in May 1997. Companies operating in these waters must take particular account of environmental and fishing interests.

Exploration wells were drilled in two production licences in the Barents Sea during 2001. One of these yielded an interesting discovery for Statoil in the North Cape Basin. In addition, Norsk Agip has drilled an appraisal well on the 7122/7-1 (Goliat) discovery made in 2000. The results of this well are considered positive for further progress with this find.