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Seismic surveys

Exploration drilling

New discoveries

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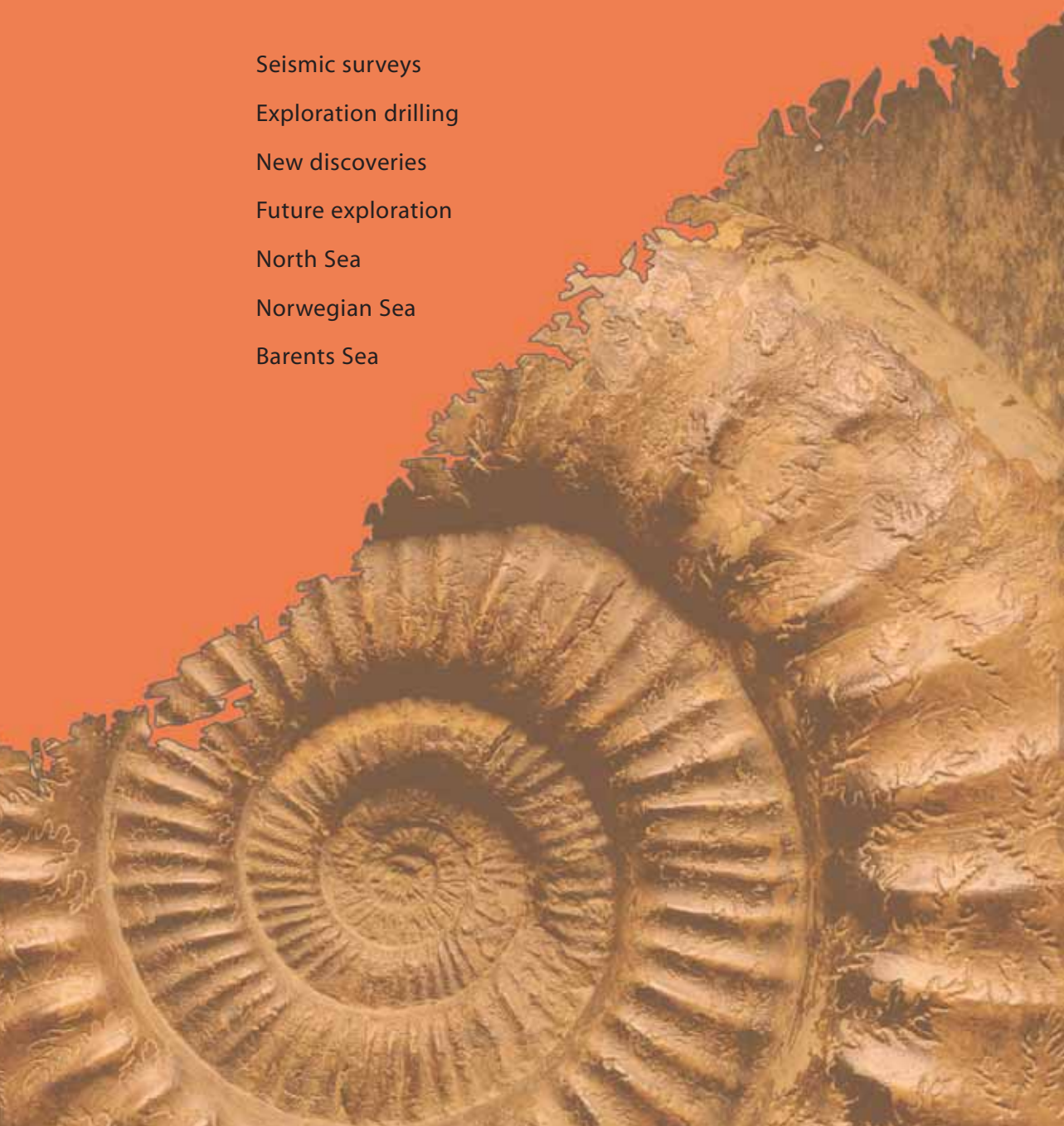
North Sea

Norwegian Sea

Barents Sea



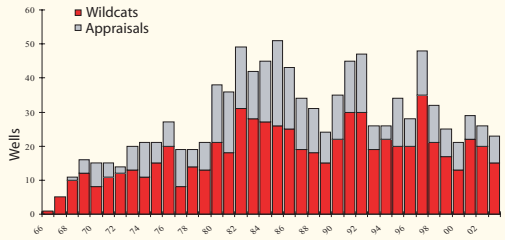


Figure 9.1 Exploration wells completed per year after reclassification
(Source: NPD)

Exploration operations seek to identify new commercial petroleum resources, 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 of rock formations deep underground to be formed. Data collected in this way fall 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 8 114 068 km had been shot by 31 December 2003. Of this, 4 005 615 km was collected above 62°N since surveying began there in 1969. The NPD, oil companies and survey contractors shot 329 129 km of seismic lines in 2003.

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 2003, 23 exploration wells – 16 wildcat and seven appraisal – were completed or temporarily abandoned on the NCS. These included 17 (10 wildcat and seven appraisal) in the North Sea and six (five wildcat and one appraisal) in the Norwegian Sea. No wells were drilled in the Barents Sea during 2003. Operators for the wells completed in 2003 were Statoil six, Norsk Hydro two, ConocoPhillips one, Shell one, EssoMobil four, Agip one, Marathon four and Pertra four.

A total of 1 063 exploration wells had been completed or temporarily abandoned on the NCS at 31 December 2003.

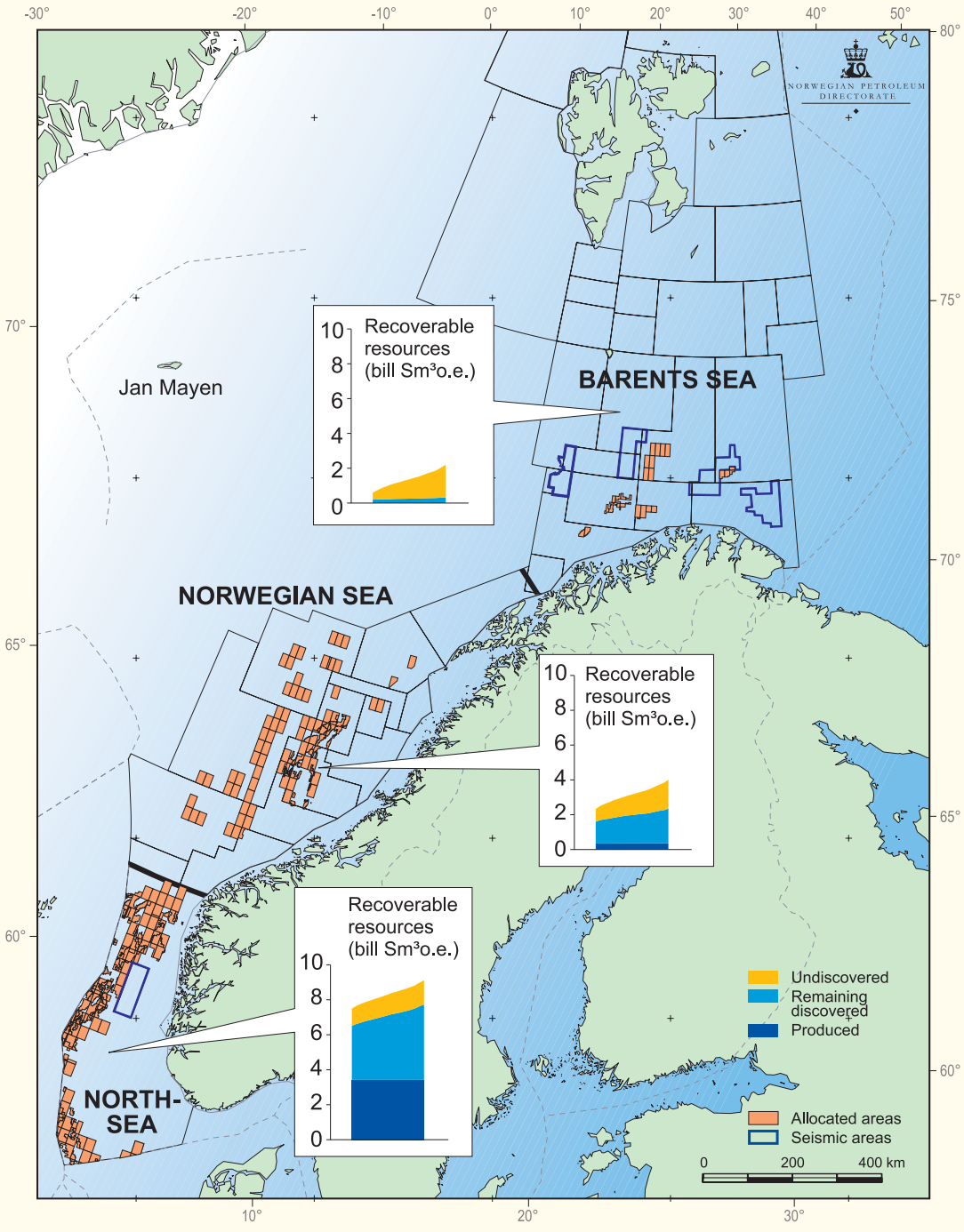
The future level of exploration will be determined by a number of factors, with oil price expectations, the scope of licence awards and discoveries leading to appraisal drilling as the most important.

New discoveries

Petroleum was discovered in 11 of the 16 exploration wells drilled in 2003. Seven of these were in the North Sea and four in the Norwegian Sea.

The overall increase in resources from exploration operations in 2002 is estimated to be 29-89 mill scm of oil and condensate and 36-69 mill scm of gas. This was a better result than in recent years. However, the volume of oil and gas discovered was smaller than the amount produced.

Most of the new discoveries in the North Sea were made around the Heimdal and Balder fields. Marathon made two discoveries west of Heimdal. Well 25/4-7 proved oil, while 24/6-4 proved both oil and gas. Both finds were made in Tertiary sediments, and plans call for them to be developed in the near future as a part of a major development of the area.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NORWEGIAN PETROLEUM DIRECTORATE
Jan Mayen
BARENTS SEA
NORWEGIAN SEA
NORTH-SEA
Recoverable resources (bill Sm³o.e.)
10
8
6
4
2
0
Undiscovered
Remaining discovered
Produced
Allocated areas
Seismic areas
0
200
400 km

Hydro found oil in well 25/4-9 S just north of Heimdal, again in Tertiary sediments. Plans exist for a development of this discovery.

Esso made two new oil finds north of Balder and close to the Ringhorne structure. Well 25/8-C-20 proved oil in Tertiary rocks, while 25/8-14 S established oil in Jurassic sediments. The first of these discoveries will be quickly developed through a tie-in with Ringhorne, which in turn forms part of the Balder development.

South of Balder, Statoil's 16/1-6 S well made a small gas discovery in Tertiary sediments. Oil has also been identified in a shallower level which is little explored.

Statoil found oil west of Gullfaks with well 34/10-45 B. This discovery represents supplementary resources for the Gullfaks field and will be brought on stream immediately.

Two discoveries were made in the deepwater part of the Norwegian Sea, with Esso striking gas in Tertiary sediments with well 6706/6-1 in a less-explored area on the Naglfar Dome. The results of this well indicate that a number of issues remain to be clarified in gaining an understanding of geological developments in this part of the NCS, and that further exploration will be important for clarifying its petroleum potential.

Statoil proved oil in well 6405/7-1 on the Grip Ridge north of Ormen Lange. Because of reservoir quality, the size of this discovery remains uncertain.

Two other discoveries were made in the Norwegian Sea. Norsk Agip proved gas and condensate with well 6406/2-2 on the Sklinna Ridge just west of Kristin. Made in Cretaceous sediments, this discovery is considered interesting. But more

Tabell 9.1 New discoveries on the NCS in 2003 (recoverable resources).
(Source: NPD)

Well	Operator	Oil mill scm	Gas bn scm	Condensate mill scm
16/1-6 S	Statoil		1<	
24/6-4	Marathon	2-8	2-1	
25/4-7	Marathon	6-17		
25/4-9 S	Hydro	5-7		
25/8-14 S	Esso	2-10		
34/10-45 B	Statoil			1
6405/7-1	Statoil	1-30		
6406/1-2	Agip		14-16	6-8
6608/10-9	Statoil	1<		
6706/6-1	Esso		20-50	
Total		**22-80**	**36-69**	**7-9**

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wells will be needed to provide final confirmation of its size. A small oil discovery was made by Statoil in Jurassic sediments with its 6608/10-9 well on the Dønn Terrace north-west of Norne.

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 may 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.

Large parts of the North Sea have been included in the annual licensing rounds and awards in pre-defined areas for mature parts of the NCS.

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 discoveries have been made in these waters over this period. Infrastructure has also been established, offering opportunities for the profitable development of small discoveries.

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.

The 18th licensing round on the NCS was announced in December 2003, with awards due to be made in the second quarter of 2004. Parts of the Norwegian Sea were also included in the announcement of awards in pre-defined areas for 2004.

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. The government decided in December 2003 to permit all-year petroleum activities in the southern Barents Sea. It also concluded that discovering additional gas resources near the Snøhvit field will be important. In line with that decision, an area close to Snøhvit was included in the announcement of awards in pre-defined areas for 2004.

Companies operating in these waters must take particular account of environmental and fishing interests.

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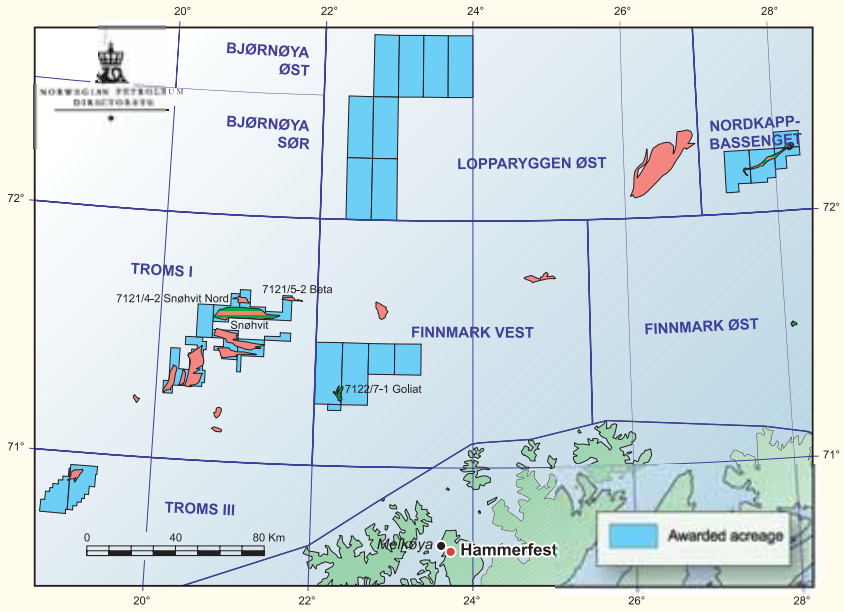
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BJØRNØYA SØR
LOPPARYGGEN ØST
NORDKAPP-BASSENGET
TROMS I
7121/4-2 Snøhvit Nord
7121/5-2 Beta
Snøhvit
FINNMARK VEST
FINNMARK ØST
7122/7-1 Goliat
TROMS III
0
40
80 Km
Melkøya
Hammerfest
Awarded acreage