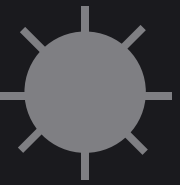


Offshore Norway  
2002

# Offshore Norway

2002



THE NORWEGIAN  
PETROLEUM  
REGULATORY  
ANNUAL REPORT



OLJEDIREKTORATET



## PART 1

## SIGNALS

Value is not found but created	4
A visible NPD - value and dilemma	7
Renewal required on the NCS	11
Those who seek will find	14
In the shadow of two fatalities	16

## PART 2

## FACTS

1 Resource Management	20
1.1 The Resource accounting	20
1.1.1 Resource accounting for 2002	20
1.1.2 Resource status	20
1.2 Exploration licenses	24
1.3 Exploration activities	24
1.4 Production licenses	25
1.5 Exploration activity	25
1.5.1 Exploration drilling	25
1.5.2 Exploration costs	32
1.6 Development and operations	33
1.6.1 Development drilling	39
1.6.2 Cessation plan	40
1.7 Transportation systems	40
1.8 Production of oil and gas	42
1.9 Sale and taxes	42
1.9.1 Sale of petroleum	42
1.9.2 Production royalty	42
1.9.3 Area fees	43
1.9.4 CO <sub>2</sub> -tax	45
1.10 Natural gas market	46

## PART 3

2 Health, Environment and Safety	48
2.1 Personal injuries	48
2.2 Work-related diseases	49
2.3 Damage to load-bearing structures and pipelines	50
2.4 Hydrocarbon leaks and fires	51
2.5 Diving activity	52
3 The Petroleum Activities and the Environment	53

## CO-OPERATION AND ORGANISATION

Projects	56
International Co-operation	60
Organisation	65

Appendix 1	68
Appendix 2	78
Appendix 3	80

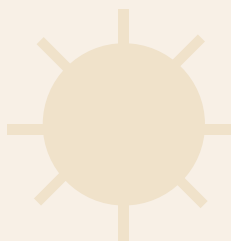
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## Value is not found but created

The Norwegian continental shelf is now in a phase in which identifying opportunities for enhanced value creation and areas where measures need to be applied has the highest priority.

Good resource management offers huge gains. Report no 38 to the Storting (parliament) on oil and gas activities outlined two scenarios for the future of Norwegian petroleum production – decline and long-term. The difference in value creation between the two comes to more than NOK 2 000 billion up to 2050, at today's oil prices.

### Content

The pessimistic decline scenario is based on government and industry resting content with what Norway has achieved so far. New capital spending and funds for research and development are cut, and the country simply reaps the benefit of earlier investment. In such a case, oil production will quickly decline to almost zero around 2020. Total output, including oil, gas and natural gas liquids, will approach zero around 2050.

However, the government's objective is to ensure that offshore development follows the long-term scenario. This assumes higher annual production and larger total volumes, and requires an aggressive and effective approach to resource development. Exploration wells must be drilled, expertise maintained, research intensified and heavy investment decisions taken – within a framework which includes many uncertain factors.

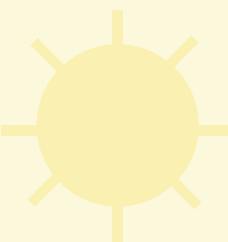
But the socio-economic rewards of success will be very great. The NPD carried out a study in 2002 which reviewed 41 producing fields to analyse the opportunities for enhanced value creation. This survey found that roughly half the identified potential called for the realisation of new technology. And 75 per cent of required measures are time-critical – in other words, possible new investment must be approved soon. Ensuring that the necessary decisions are taken will be a priority in 2003.

*Continued p 6 →*



*The NPD management team, from left: Finn Carlsen, Gunnar Nybø, Bente Nyland, Gunnar Østebø, Magne Ognedal, Anne Vatten, Gunnar Berge, Eva Halland, Rolf Wiborg and Øyvind Tuntland. (Photo: Emile Ashley)*

The NPD's overall aim is to contribute to creating the highest possible value for society from oil and gas activities founded on sound management of resources, safety and the environment.





### Measures

The challenges facing Norway relate on the one hand to measures for lowering the level of risk and reducing threats to life and material assets. This must be paralleled by an emphasis on improving recovery to get more out of existing fields, cutting costs on these and exploring for new resources in areas where the infrastructure is still in place.

Ekofisk, Frigg, Statfjord, Gullfaks, Oseberg and Troll contain so much oil and gas that the licensees found it profitable to opt for stand-alone developments with dedicated process facilities and transport solutions. As these fields gradually move into a final phase, production declines while operating costs remain high.

Maintaining good value creation from the large fields on the NCS depends on reducing operating costs and improving recovery. The potential is particularly high in the Tampen area of the Norwegian North Sea, which embraces such fields as Statfjord, Gullfaks and Snorre. Here, the authorities have challenged the operator and licensees to assess possible coordination across field and licence boundaries to ensure maximum recovery of the remaining reserves.

The NCS contains a relatively large number of small and medium-sized discoveries which have yet to be developed, but which collectively contain a great deal of oil and gas<sup>1</sup>. A number of these finds depend on being tied back to existing infrastructure to achieve acceptable economics.

In that respect, the North Sea represents the most time-critical area since many of the fields there are in their final phase. If small discoveries fail to be exploited while the big installations remain in operation, there is a risk that they may never be profitable.

The challenge in the Norwegian Sea is to find good transport solutions for the small gas discoveries. Once again, these test the ability of licensees to cooperate.

### Costs

Older installations demand a great deal of maintenance, while improved recovery measures require new investment – although this can reduce operating costs.

The NPD is concerned that the players focus attention on managed maintenance of their facilities, not

least because cutting back on such spending as part of a planned run-down can hinder improved recovery projects.

These issues are particularly relevant for the mature part of the sector, and illustrate the importance of a holistic approach which integrates the need for sound health, safety and environmental (HSE) measures with resource management concerns.

Two tragic fatal accidents on the NCS in 2002 served as a sombre reminder of the dramatic consequences which can follow from breaches of prevailing procedures and regulatory requirements.

Against that background, it is important to stress that a culture based on short-sightedness will never be beneficial in the long run. On the contrary, all experience suggests that companies which invest heavily in HSE can also show the best financial results over time.

Accidents and undesirable incidents carry heavy costs. So a lack of focus on HSE can have a specific impact on value creation. In addition to the cost-saving aspect, a conscious commitment to HSE can be directly remunerative because it contributes to increased regularity, robustness against undesirable incidents, greater flexibility and increased efficiency.

Investment in HSE also has a strategic aspect. A company's reputation on safety is increasingly taken into account by customers, and good results in this area can yield competitive advantage both nationally and internationally.

### Collaborating

The authorities in the North Sea nations are collaborating with the industry to establish regulatory regimes which make it easier to move drilling units across offshore boundaries.

A template for applications to use mobile drilling units was developed in 2002 as a basis for official consideration in all the North Sea countries.

This will also make an important contribution to enhanced value creation because greater flexibility and less costly paper procedures will make the NCS more attractive to new players.

## A visible NPD – value and dilemma

By Gunnar Berge, director-general of the NPD

**An overall objective for the NPD is to be visible and have a high profile. But such visibility can also be a two-edged sword.**

The oil industry and the Norwegian community expect the NPD to play a clear and prominent role in managing the country's offshore resources and for HSE. Being conspicuous in both these areas is also an important objective for the agency.

But this visibility can easily become a dilemma, because another of the NPD's roles is to provide advice to its political masters – the Ministry of Petroleum and Energy for resources and the Ministry of Labour and Government Administration on the HSE side.

The NPD's high profile has certain limitations in relation to these ministries, which require a different professional approach. In this context, its analyses will above all form the basis for political decisions – and the visibility of these decisions must take precedence over the technical input on which they rest.

An appreciation of this "directorate dilemma" is crucial to understanding the role of the NPD.

### Communicate

Ownership of the Norwegian continental shelf is vested in the state. Having an agency which can communicate on professional terms – on the basis of existing oil policy – with players in all phases of the offshore industry is absolutely essential for the government. This responsibility has been delegated to the NPD.

A professional dialogue between companies and government authorities is very important for resource management, where corporate interests do not always coincide with more general social considerations.

The dialogue between the NPD and the industry on HSE is at least as important. Without a high level of individual and collective awareness in this area, the oil and gas industry would lose legitimacy and support with the Norwegian public.



<sup>1</sup> See tables 1.1.5 and 1.1.6, appendix 1.





However, visibility in the HSE area is not a question of acting as uniformed inspectors. The NPD will naturally pursue supervision and be seen offshore, but its primary job is to challenge the industry to develop new methods, contribute to shaping and implementing a functional and vigorous regulatory regime, and increase understanding of the industry's complex HSE culture.

#### Comprehensive

Maintaining a comprehensive knowledge and understanding of and for the NCS has been an essential part of the NPD's work over more than 30 years. As an integrated directorate covering both resource management and HSE, it has built up a unique position for discharging its role towards the oil and gas industry.

If the NPD is to lead, support and act as a corrective to the industry, it must have authority and legitimacy. These have been acquired through the way the agency has carried out its duties – on the basis of broad insights and advanced professional expertise.

To maintain this position, the NPD must continue to be innovative and lie at the cutting edge of the industry. That means in turn that it must also succeed in retaining an able staff.

Holistic thinking in the NPD provides a foundation for much of its staff's activity, and this "bird's-eye" perspective is an important reason why job-seekers are attracted to the agency.

If the government's proposal to divide the NPD into a directorate for resource management and a separate petroleum inspectorate goes through, it is essential that this division occurs in a way which preserves the holistic perspective in both organisations. All players and parties will benefit from that both in the immediate future and in the long term.

#### Pressure

The past year was characterised to some extent by an oil industry under pressure. Exploration results have not been particularly encouraging<sup>1</sup>, which could lead in the longer run to reduced interest in the NCS. Such a development would be serious, because it could mean substantial losses in exploiting national petroleum resources.

This position makes particularly heavy demands on both government and industry. The authorities must appreciate that international interest in the NCS will weaken if the industry is not heard and given acceptable framework conditions. At the same time, the industry must behave in a manner compatible with the government's interests and show that it is worthy of society's confidence.

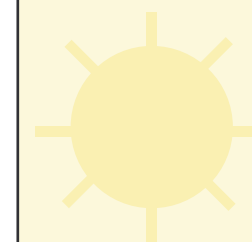
Figures for 2002 justify the assertion that inadequate attention is devoted to safety on the NCS<sup>2</sup>. The NPD expects the industry to maintain its HSE efforts so that clear improvements are achieved.

When all is said and done, a basis for optimism does exist. The oil and gas sector can remain Norway's most significant industry for many years to come, and Norwegian companies still have an important domestic market which provides good opportunities for increased deliveries to other parts of the world.

The NPD has important roles to play in all these visions of the future.

<sup>1</sup> See table 1.5.1 and 1.5.2, part 2.

<sup>2</sup> See chapter 2, part 2.





By Rolf Wiborg, director for framework and advice

## Renewal required on the NCS



The choices made now on the Norwegian continental shelf will determine developments there not only for the present decade but also for the next 20-50 years.

The position facing Norway today is not dissimilar to the one which prevailed for its first 15-25 years as an oil nation. But the country appears to have lost some of the driving force which characterised it in the pioneering period. An effort must now be made to regain a belief that the petroleum industry is a national good. This requires that faith in the NCS must also be restored.

### Record

Oil and gas production on the NCS is currently record-high. Roughly 258 million standard cubic metres of oil equivalent (scm oe) were sold from Norwegian fields last year, including 193 million scm of liquids – oil, condensate and natural gas liquids – and 65 billion scm of gas<sup>1</sup>. Oil production averaged more than three million barrels per day.

Recoverable petroleum resources on the NCS were estimated at the end of 2002 to total 13.7 billion scm oe<sup>2</sup>. After more than 30 years of production, roughly a quarter of this volume – or 3.5 billion scm oe – has been recovered and sold. If Norway exploits and processes its resources in a sensible way, and prices are maintained, it can maintain oil and gas production for another 50-100 years.

### Plateau

Norwegian oil production has been at plateau since 1996. The NPD's calculations indicate an output of just under three million barrels per day until 2005 on the basis of today's known discoveries and likely development. In addition will come 300-500 000 daily barrels of light oil/condensate. After 2005, production will probably go into decline.

The NPD's scenarios assume that the nation is willing to continue an active petroleum policy. If that proves the case, the agency sees opportunities for extending the plateau phase somewhat and ensuring that the decline in liquids production is less dramatic than present predictions suggest.

Considerable uncertainties naturally attach to this forecast, but the NPD believes it can still asset that the long-term scenario is attainable. One requirement is that the players on the NCS are willing to commit expertise and capital.

Norway is dependent on more exploration drilling, investment in additional gas transport capacity and further field developments. Perhaps 50-80 exploration wells should be drilled annually in future, with the consequent development of a number of small and medium-sized fields. In addition, the country must succeed in improving recovery from existing fields and extending their final phase – in part by reducing production costs. This will undoubtedly also require some changes in current framework conditions.

### Concerned

The NPD is concerned about the current low level of exploration activity. Twenty exploration wells were completed in 2002. These resulted in nine new discoveries, seven in the North Sea and two in the Norwegian Sea.

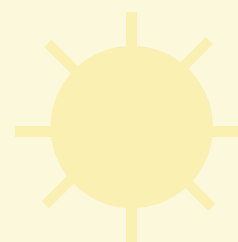
The discovery rate was over 45 per cent, in other words. But these finds were too small for their development to counter the decline in oil production. Undiscovered resources, which are estimated to total just under four billion scm oe, cannot contribute in time to avoid a fall in Norway's crude output.

The only thing which could help to extend plateau production in the short term and counter a large drop in output would be success with improved oil recovery (IOR) from existing fields – above and beyond the forecast level. But the oil companies are not giving sufficient priority to this work at present.



<sup>1</sup> See table 1.8, appendix 2.

<sup>2</sup> See chapter 1.1, part 2.



**Exceeded**

Norwegian oil production has exceeded the volume of new discoveries for a long time. Over the past two years, the country has also produced more gas than it has found.

Many major projects are currently in the offing on the NCS. Fields approved for development include Snøhvit, Kristin and Grane. Ormen Lange is also expected to be sanctioned in 2003. A number of smaller fields are due to be developed, along with modifications to existing fields.

This means that activity will remain high for some years to come. The problem is that, if we fail to find new fields now, development activity will cease abruptly around 2006-07. In that event, the subsequent decade could prove the biggest harvesting period on the NCS.

**Short-term**

Players on the NCS are making a big commitment to improving earnings and boosting production. But the focus today, as the NPD sees it, is on short-term projects and quick returns. The big additional volumes being obtained by IOR measures on such fields as Oseberg and Troll Oil are the result of decisions and pilot schemes which date back a number of years.

At the moment, the biggest commitment by the companies is to projects which maintain production and accelerate recovery. They are doing insufficient work on long-term measures that could make large new volumes commercially recoverable.

Some positive exceptions exist, such as Ekofisk and Valhall. But the NPD feels in general that far too little is being done. The companies appear to have difficulties in taking initiatives outside a secure and established framework of returns.

A telling indication of the position is that the NPD failed to find a single candidate worthy of its IOR prize for 2002.

Some positive tendencies can currently be seen, and the hope must be that some of these will materialise during the present year.

**Time-critical**

The concept of time-critical resources is not new. Introduced as early as the mid-1970s by the NPD's first director of resource management, Farouk Al-Kasim, it refers to oil and gas discoveries which are unlikely to be commercially recoverable unless they are found and developed while existing infrastructure is still in place – and can be operated at relatively low cost.

Possible supplementary resources in existing fields are also time-critical when installations approach the end of their economic life.

Many large fields on the NCS are nearing their final phase, particularly in the Tampen area. If Norway is to achieve the long-term scenario, major investment decisions must be taken within the next few years.

**Significance**

Since production began on the NCS in 1971, gas has accounted for a modest 27 per cent of annual output. Its significance for revenues is set to increase in coming years.

The NPD expects annual gas production to rise from 65 billion scm to 110 billion or more over the present decade. And the probability of making major new gas discoveries is widely regarded as good.

Norwegian oil discoveries are likely to be significantly smaller than the giant fields found from the 1970s and into the 1990s. All the same, continuing to focus on oil and the smaller finds will be important.

Norway must ensure the best possible utilisation of its existing infrastructure. The final phase on the major oil fields, not least in the Tampen region, makes

coordination, an area focus and a commitment to IOR essential for success.

Forecasts indicate that annual investment will lie around NOK 65 billion in 2003-2005, and then decline dramatically. But that fall is not certain.

If Norway succeeds in laying the basis for final-phase investment, pursues continued improvements in oil recovery, drills exploration wells and develops small fields and new pipelines, capital spending on the NCS could remain high for a number of years to come.



## Those who seek will find

**The NCS offers challenges and big opportunities to the bold and willing. Unfortunately, however, the trend appears to be towards a more conservative industry with short-term perspectives and few players who dare to gamble on new ideas.**

Exploration activity on the NCS has not been lower since the early 1970s, and the NPD is worried about the position. A sharp decline in exploration was recorded in 2002, when 19 wells were spudded. At the New Year, around 15 exploration wells were planned for 2003. And only one well is due to be drilled this year in the six production licences awarded in the 17th offshore licensing round.

About 60 per cent of the NCS has been opened for exploration, but only nine per cent of that area is currently covered by production licences. NPD calculations show that the NCS still conceals undiscovered resources at least as large as those Norway has produced and sold over the past three decades. In other words, the biggest petroleum assets remain to be recovered if the country plays its cards right. The simple part of the job has been done, but the right move now will be to abandon the idea of making more large discoveries. The challenge lies in identifying and understanding natural processes and giving free rein to trying something new. That is the only way Norway can access the big opportunities available for continued value creation from the NCS.

### Demanding

Both government and industry agree that the target is to achieve the long-term scenario. But the way ahead will be demanding and challenging – and depends on drilling many exploration wells to identify new resources.

Norwegian exploration and licensing policy aims to give companies the opportunity to discover resources which can permit profitable production. The shaping and composition of instruments to implement that policy depend on the maturity of the various regions of the NCS. The traditional approach to licensing has divided these waters into three areas: the North, Norwegian and Barents Seas.

Considerable variation exists within these regions in terms of maturity, resource potential, infrastructure and environmental challenges. This makes different

demands on exploration strategy, development and production solutions, and concern for other industries.

### Instrument

Production licence awards and availability of acreage represent important elements in the industry's framework conditions, and a key instrument of government regulation. In recent years, the authorities have sought to improve the efficiency of new licence awards in mature exploration areas. Fixed predefined areas in mature parts of the North and Norwegian Seas will be established from 2003. These will be notified to the companies, which can submit applications whenever it suits them. These requests will be considered once every 12 months, with awards made in the same year. Plans also call for the 18th round to be announced at the end of 2003.

One challenge is to persuade the companies to explore in areas with existing and planned infrastructure. The problem here is twofold: timely acreage awards and quick clarification of the resource potential in existing production licences to prevent companies sitting on extensive exploration acreage and discoveries they are not actively pursuing.

Licensees must be encouraged to move quickly in identifying prospectivity, exploring areas and clarifying the profitability of possible proven resources. In this way, acreage which a licence group does not regard as very prospective can be relinquished and others given the opportunity to explore it. That could make it appropriate to consider shorter licence periods in future awards in order to avoid acreage accumulating with certain players.

In the longer term, such a development would probably also lead to a change in player composition, with smaller and more specialised companies entering the arena. Many newcomers have appeared on the NCS recently, including DNO, Paladin and Dong, and more have expressed interest.

### Very good

Of the 648 exploration wells drilled on the NCS from the summer of 1966 to the end of 2002, 263 yielded discoveries. That gives a technical finding frequency of 40 per cent, which is very good by international standards. However, weak exploration results in recent years have increased pressure to award more acreage. As a result, the area put on offer over the

By Bente Nyland, director for data, information and knowledge management

past five years has been 50 per cent higher than in the preceding five.

Timeliness and cost-effectiveness have been a fundamental philosophy in Norwegian exploration and licensing policy. The aim has been to search in the right place at the right time. No acreage was awarded in deep water, for instance, until the technology available to the companies was capable of production in such depths. And blocks put on offer must simultaneously be able to reveal something about a larger area which can enhance knowledge of wider opportunities while laying the basis for future exploration with fewer wells.

The easiest and largest prospects on the NCS have by and large been drilled. Those which remain are the most difficult, with many small and medium-sized targets waiting to be explored.

Advances in geological and geophysical techniques and the use of visualisation technology have opened a new world, and could help to mature new projects. In the demanding years ahead, a major commitment is needed both to continuing development of mapping tools and – not least – to enhancing expertise.

### Gas

Most of the discoveries in the Norwegian Sea contain gas but, with the exception of Ormen Lange, are not large enough in themselves to sustain a dedicated pipeline.

Companies with small prospects and finds in their portfolio are accordingly choosing to delay exploration and development until the infrastructure is in place. In other words, the problem here lies not below ground but in decisions on gas transport.

The logical approach would be to withhold blocks until the transport problem has been solved, but the desire of the companies for more exploration acreage turns this dilemma into a highly relevant debate.







**Two deaths were experienced in Norway's petroleum business during 2002. These tragic incidents made the heaviest mark on the HSE year, which otherwise showed no strong changes in any direction.**

One of the fatal accidents falling under the NPD's regulatory authority occurred on the mobile unit *Byford Dolphin* on 17 April, where the victim was hit by a falling object. The other took place on Gyda on 1 November, when a man was crushed between two containers during a lifting operation. The immediate causes of these accidents have been clarified, but the NPD felt it was important to identify the deeper reasons and has done much work on these. Its findings have been conveyed to the players concerned.

#### Overtime

Problems associated with the use of overtime on the NCS attracted much attention in 2002, and the discussion received fresh impetus from the *Byford Dolphin* death. The NPD devoted greater resources to making checks on working hours from the beginning of the year, partly in response to a number of union requests.

Supervision in this area aims to prevent overtime being used in a manner which could endanger health and safety. Experience shows that illegal overtime working can only be combated when all sides collaborate and are actively opposed to such breaches. The NPD accordingly expects an increased commitment from companies and employees to observing the rules in this area. That applies to the actual working time regulations as well as requirements for registering hours worked and organising work to reduce the need for overtime.

#### Reduced

The number of personal injury cases declined significantly from earlier years in 2002<sup>1</sup>. However, the figures may not be directly comparable. This is because checks on personal injury reporting reveal that some companies have changed the criteria governing which injuries are reported. The NPD believes that these criteria fail to accord with the regulations, and is considering various follow-up measures.

As part of its checks on personal injuries, the NPD has also looked at the use of accident figures by the companies for various incentive schemes. In its view, making accident data an element in contracts with

By Magne Ognedal, director for supervision of activities



suppliers could be unfortunate. The same could be said of in-house bonus arrangements.

#### Attention

The number of gas leaks exceeding 0.1 kilogram per second increased in 2002 from the year before<sup>2</sup>. Greater attention will accordingly be paid to this problem by the NPD in 2003, in part through more independent investigations of major leaks.

Incidents which the regulations require to be reported immediately to the NPD remained at roughly the same level in 2002 as in the year before. Falling objects continued to represent the largest single category.

#### Risk

Knowledge of developments in the level of risk, and of conditions with the most negative impact on that level, is important for guiding the commitment of responsible personnel in the industry and of the authorities. Work began at the NPD in 1999 on a tool which can measure these developments and help identify critical areas. Annual reports on the risk level, produced since 2000, provide an ever-improving basis for such findings.

Assessment of the risk level is based on two complementary approaches. One evaluates the risk of major accidents on the basis of their number and damage potential, while the other provides a qualitative evaluation in terms of the worker's perceived risk. The data on which these assessments build are obtained from the industry and supplemented in part through questionnaire-based surveys and interviews.

Since 1999, the risk of loss of life in major accidents has lain at a higher level than in the 1996-98 period. Preliminary figures for 2002 reinforce that trend.

#### Principle

A fundamental principle of the regulatory regime is that supervision focuses on the way companies manage their operations to look after HSE as required by statutes and regulations.

During 2002, the NPD's priorities included checks on how observance of HSE regulations is divided between operator and shipping company for the chartering of mobile units. Checks also looked at what the companies know about, and how they manage,

the technical condition of selected permanent installations, and at measures to reduce the risk of major accidents.

In addition, special attention was paid to the safety of crane and lifting operations. A number of serious accidents and near misses in this area indicate a need for improvement. That supposition was confirmed by the checks carried out, and will accordingly be followed up. The NPD is otherwise satisfied that the industry itself appears to be taking note of the problems, not least through the Working Together for Safety forum.

Priority is still being given by the NPD to checking the way companies manage change processes. Particular attention has been paid to carrying out impact assessments from an HSE perspective, and to worker participation in these processes.

#### Culture

The NPD is currently pursuing a three-year programme aimed at defining a good HSE culture and analysing the factors which influence it. Unfortunately, both supervision and accident investigations have revealed that the HSE culture is not always what it should be. The need for change appears to exist at every level, from boardroom to shop floor.

The new regulations address an expectation that the industry will now achieve a cultural boost to counter the negative trend of recent years. Challenging established attitudes and developing a new and more integrated understanding of reality are the aims.

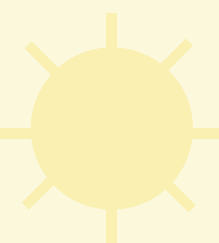
#### Regulations

A new set of regulations governing offshore petroleum operations came into force at the beginning of 2002. In addition to providing an appropriate tool for both industry and the authorities, these regulations contribute to the government's goal of simplification. The 14 earlier NPD regulations have been replaced by four, developed in close cooperation with the Norwegian Pollution Control Agency, the Norwegian Board of Health and the relevant ministries.



<sup>1</sup> See chapter 2.1, part 2.

<sup>2</sup> See chapter 2.4, part 2.



In cooperation with the Norwegian School of Management, the industry has developed a course programme on the new regulations which was taken by almost 6 000 workers in 2002.

#### Compliance

The compliance statement (SUT) scheme for mobile drilling units was implemented in 2002, and nine such documents had been issued by 31 December. This arrangement provides the owner with a guiding statement that the unit with associated management systems complies with the regulatory requirements. The aim is to improve predictability for owners and enhance efficiency for operators, vessel contractors and the authorities when considering applications to use such units.

An assessment of the SUT scheme was carried out in 2002, when everyone concerned agreed that it had been very positive. The system has led to clear HSE gains and improvement processes, while also enhancing efficiency. Aspects of the scheme which need to be improved were also identified, and responsibility for new measures was assigned.

A recommendation submitted to the Ministry of Labour and Government Administration (AAD) by the evaluation group calls for the scheme to be extended to flotels, multipurpose vessels and flagged floating production, storage and offloading (FPSO) units. The Storting indicated in the spring of 2002 that the system should be made obligatory, and work is now under way to implement that decision.

#### Forum

The Safety Forum, which was established in the autumn of 2000, occupied a central place in HSE-related work at the NPD during 2002. Comprising representatives from the authorities and the various parts of the industry, this body provides an arena for discussing, initiating and following up relevant safety and working environment issues.

The forum has already yielded good results in the shape of increased cooperation between players in the industry and the authorities. Two new working parties are due to be established this spring, one on ageing, health and exclusion from work, and the other on worker participation. The latter will be chaired by the NPD, which is to have observer status in the former.

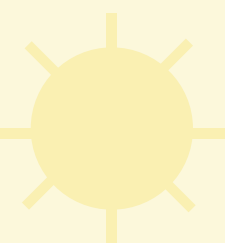
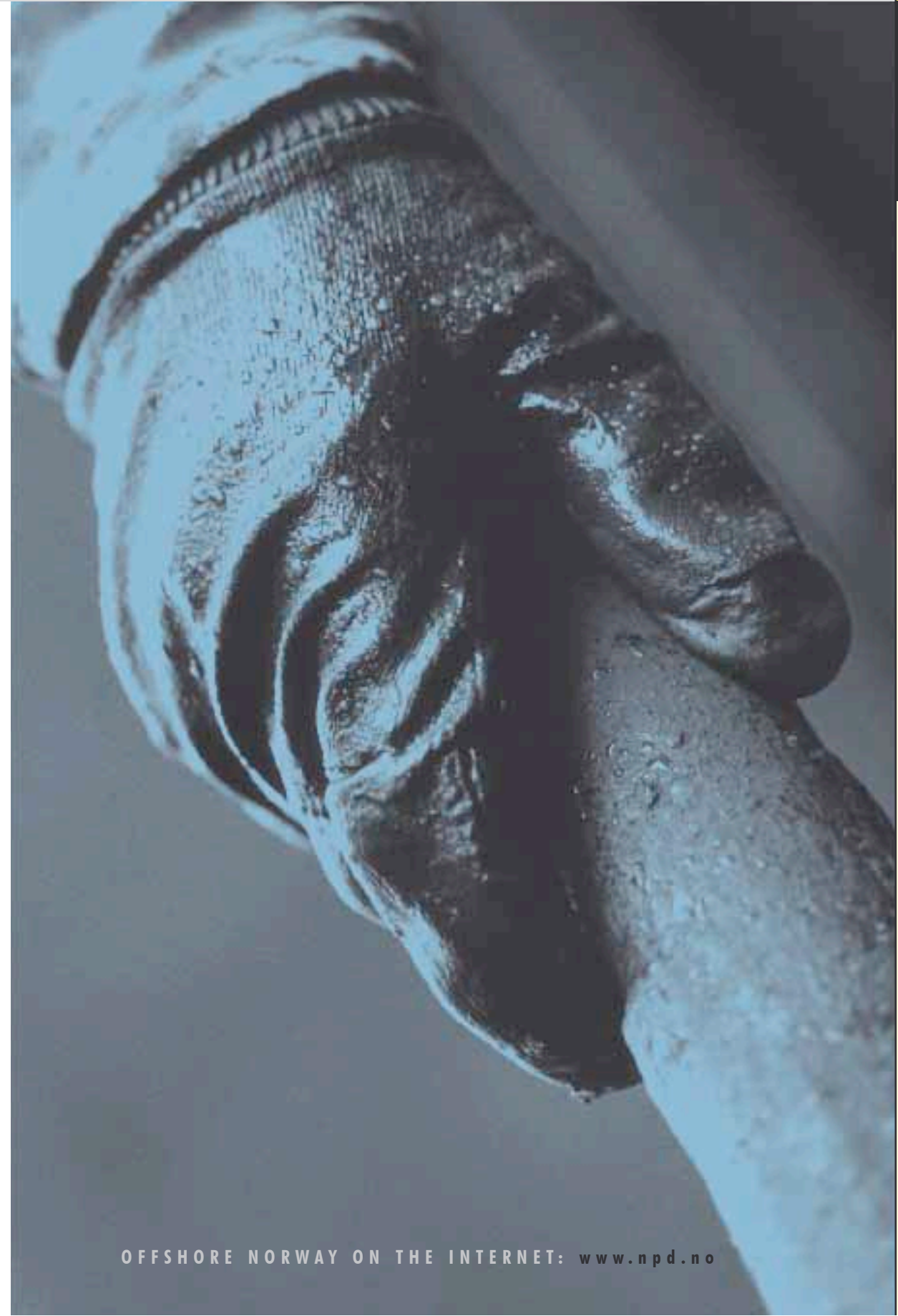
Collaboration with international authorities over HSE issues is given priority by the NPD. One important outcome of such cooperation was achieved when the International Association of Drilling Contractors (IADC) completed its North West Europe HSE Case Guidelines in 2002. These provide guidance in completing application documents to satisfy regulatory requirements for all the countries in the North Sea area. The IADC launched this work several years ago under pressure from the North Sea Offshore Authorities Forum (NSOAF).

#### Plans

The NPD has prepared plans for following up Report no 7 to the Storting on HSE in petroleum activities during 2003. Some work was already initiated in 2002, such as measures to avoid health-related exclusion from work.

When debating this policy document, the Storting requested that a new HSE report be submitted in 2005. In cooperation with the AAD, the NPD is already working on this and will again use the Safety Forum as a reference group.

Regulatory responsibility for a number of petroleum-related functions at land-based plants will rest with the NPD from 2004. Work on organising this began in December and will continue until the end of 2003.





# 1 Resource Management

The fact section primarily contains features that are new or have been changed in the course of 2002. We aim at incorporating historical information about discoveries and fields in the NPD's Fact pages on the Internet, [www.npd.no](http://www.npd.no)

## 1.1 The Resource accounting

The Norwegian Petroleum Directorate's resource accounting includes an overview of both the original recoverable and remaining recoverable petroleum volumes on the Norwegian continental shelf. Changes in the resource accounting are inter alia due to new discoveries or that the resource estimates for existing fields and discoveries are adjusted based on new surveys or new production technology. The remaining resources are also reduced by production.

The resources are classified in accordance with the Norwegian Petroleum Directorate's resource classification system ([www.npd.no](http://www.npd.no)).

### 1.1.1 Resource accounting for 2002

The total estimate of original recoverable resources on the Norwegian shelf as of 31 December 2002 is 13 743 million Sm<sup>3</sup> oil equivalents (o.e.). The distribution and maturity of the resources is shown in Table 1.1.1 and Figure 1.1.1. Total remaining recoverable resources are 10 226 million Sm<sup>3</sup> oil equivalents with a range of uncertainty from 8 000 to 14 200 million Sm<sup>3</sup> oil equivalents, see Figure 1.1.2. The geographical distribution of the resources is shown in Figure 1.1.3.

The estimates for the undiscovered resources and the estimates for potential improved recovery measures are unchanged from last year's resource accounting. An evaluation is in progress and the Norwegian Petroleum Directorate will publish updated estimates before summer.

### 1.1.2 Resource status

#### Historical production

Historical production describes the total volume of petroleum that has been sold and delivered. The produced volumes come from fields that are in production and from fields that have already been shut down.

#### Shutdown fields

No fields ceased production in 2002. There are a

#### Terms

*Discovered resources* comprise Resource Categories 0 - 7 and is used for petroleum volumes proven through drilling.

*Contingent resources* refers to discovered resources that have not yet been approved for development.

*Undiscovered resources* are petroleum resources that are presumed to be in place in defined play models, confirmed or unconfirmed, but that have not yet been proven through drilling (Resource Categories 8 and 9). There is always great uncertainty associated with estimates of undiscovered resources. The resource estimate stated for undiscovered resources is the statistical expected value.

*Reserves* comprises remaining recoverable, marketable petroleum resources that the licensees have decided to develop, and for which the authorities have approved a PDO or granted a PDO exemption. Reserves also include petroleum resources in deposits which the licensees have decided to develop, but which have not yet been considered by the authorities in the form of a PDO or PDO exemption. Reserves are distributed among Resource Categories 1 - 3.

*A petroleum deposit* is an accumulation of petroleum in a geological unit, delimited by rocks with structural or stratigraphic boundaries, contact surfaces between petroleum and water in the formation, or a combination of these, so that the overall petroleum included is in pressure communication through liquid or gas.

*A discovery* is one or more petroleum deposits together which were discovered in the same well and which through testing, sampling or logging have shown probable mobile petroleum (includes both commercial and technical discoveries). There is only one discovery well for each discovery. This means that new wells that prove resources that are part of, or that will be incorporated in, the resource estimate for an existing discovery are not regarded as being new discovery wells. The discovery year is the year the discovery well was temporarily abandoned or completed.

*A field* is one or more discoveries together which are covered by an approved Plan for Development and Operation (PDO) or have been granted an exemption from the PDO requirement.

total of 12 fields on the Norwegian continental shelf where production has ceased. Production from these fields is shown in Table 1.1.2, Appendix 1.

#### Producing fields

In 2002, there were 45 fields in production on the Norwegian Shelf, of which 40 fields in the North Sea and five fields in the Norwegian Sea. During the course of 2002, the Tune, Vale and Sigyn fields were put into production, all of them in the North Sea.

#### Reserves

Reserves in producing fields (Resource Category 1) As of 31 December 2002, there were 65 fields on the Norwegian continental shelf with approved plans for development and operation (PDOs), including the 12 fields that have ceased production. Troll is considered to be one field, in spite of the fact that it consists of separate developments with different operators. Table 1.1.3, Appendix 1 provides information on fields in production, or fields with approved plans for development and operation. The original recoverable volumes and remaining reserves in fields in production are shown in Table 1.1.4, Appendix 1.

Overall, the reserves in fields in production have not changed significantly compared with last year, although there have been substantial changes on

some individual fields. Heidrun's gas reserves have increased by 16 billion Sm<sup>3</sup>. The gas reserves on Gullfaks Sør have been reduced by 15 billion Sm<sup>3</sup>. The reason is poorer than expected productivity due to difficult reservoir conditions. On Eldfisk the oil reserves have been reduced by 14 million Sm<sup>3</sup> due to the fact that the operator has reduced the number of planned wells.

#### Reserves in fields with an approved plan for development and operations (Resource Category 2F)

There are eight fields that have approved plans for development and operations (PDOs), but which have

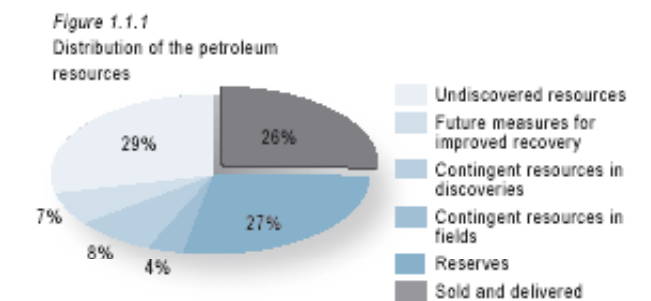


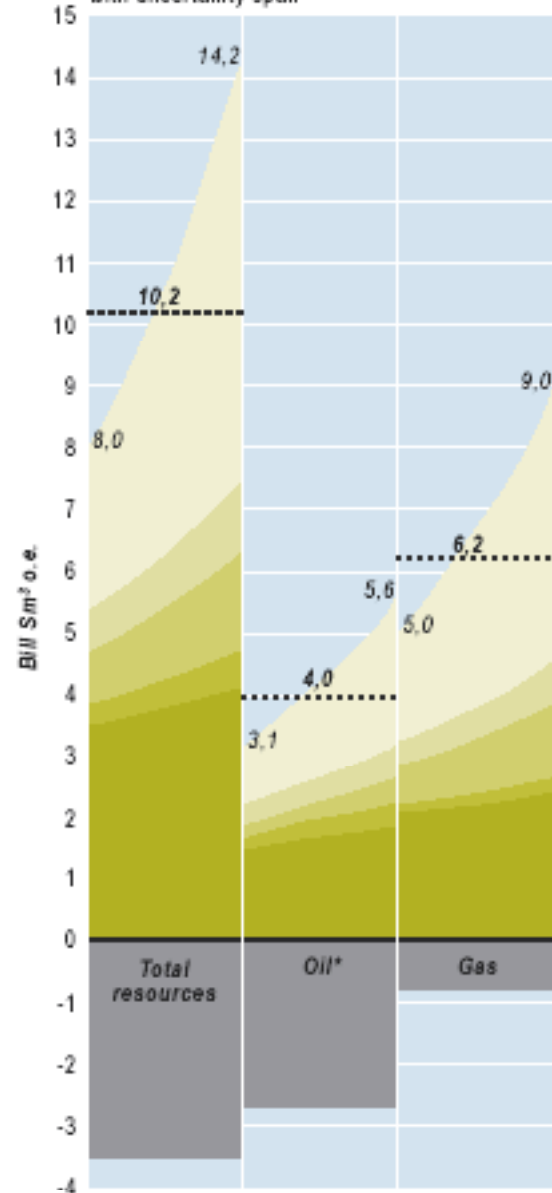
Table 1.1.1 Total petroleum resources on the Norwegian continental shelf as of 31 December 2002

Change 2002-2001

Class	Category	Project status	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill. tonne	Condensate mill. Sm <sup>3</sup>	Oil equiv. <sup>1</sup> mill. Sm <sup>3</sup>	Oil equiv. <sup>1</sup> mill. Sm <sup>3</sup>
Historical production		<b>FIELD</b>						
		<b>Sold and delivered as of 31 Dec.2001</b>						
Reserves	0		2542	796	63	59	3517	259
	1	Remaining reserves in production	1085	1399	84	53	2695	-204
	2-3	Reserves with approved/submitted PDO	221	719	34	77	1082	-53
Contingent resources		<b>Total reserves</b>	<b>1306</b>	<b>2117</b>	<b>118</b>	<b>130</b>	<b>3776</b>	<b>-257</b>
	4	In the planning phase	192	136	19	5	369	50
	5	May be developed in the long term	58	62	4	7	133	8
	7F	New discoveries being evaluated	2	0	0	0	2	-1
		<b>Total contingent resources in fields</b>	<b>252</b>	<b>198</b>	<b>22</b>	<b>12</b>	<b>504</b>	<b>60</b>
		<b>Total resources in fields and reserves</b>	<b>1558</b>	<b>2315</b>	<b>141</b>	<b>142</b>	<b>4281</b>	<b>-197</b>
		<b>Discoveries</b>						0
	4	In the planning phase	87	529	12	37	676	-14
	5	May be developed in the long term	80	322	4	25	433	-97
	7F	New discoveries being evaluated	3	1	0	2	6	-39
	<b>Total contingent resources in disc.</b>	<b>170</b>	<b>852</b>	<b>16</b>	<b>64</b>	<b>1115</b>	<b>-150</b>	
	7A	Poss.future measures for improved recovery	400	500			900	0
Undiscovered resources		Undiscovered resources	1420	2510			3930	0
		<b>Total Remaining resources</b>	<b>6090</b>	<b>6974</b>	<b>219</b>	<b>265</b>	<b>13743</b>	<b>-90</b>
			<b>3548</b>	<b>6177</b>	<b>156</b>	<b>206</b>	<b>10226</b>	<b>-349</b>

1) 1,9 is the conversion factor for NGL in tonnes to Sm<sup>3</sup>.

Figure 1.1.2  
The distribution of the petroleum resources with uncertainty span



\* Oil includes NGL and condensate

- Undiscovered resources
- Future measures for improved recovery
- Contingent resources in discoveries
- Contingent resources in fields
- Reserves
- Sold and delivered

In addition come the Grane and Kvitebjørn fields approved in 2000, and Fram, Kristin and Mikkel approved in 2001.

**Contingent resources  
Resources in discoveries in the planning stage (Resource Category 4F)**

At the turn of the year 2002/2003, the operators had concrete plans for developing 21 discoveries, see Table 1.1.5, Appendix 1. These are discoveries where the operator has indicated that a plan for development and operation will be submitted and where it is assumed that a plan will be approved by the authorities within five years.

Compared with last year, the resources in this category have been reduced by about 14 million Sm<sup>3</sup> oil equivalents. The PDOs for 25/5-3 Byggve and 25/5-4 Skirne have been approved and these fields are now categorized in Resource Category 2F. 15/5-2 and 6608/10-6 Svale have been moved to Category 5F after the volume estimates were reduced as a consequence of results from exploration activity. Discoveries that have matured and thus moved from Resource Category 5F are 30/6-26 Gamma Vest, 6507/3-3 Idun and 7122/7-1 Goliat. 6608/10-8 Star was discovered in 2002, and development planning is already underway. The PDO is expected in 2004. The resources in 6305/5-1 Ormen Lange have been reduced by 25 billion Sm<sup>3</sup> gas due to altered reservoir interpretation.

**Resources in discoveries where development is likely, but unresolved (Resource Category 5F)**

At year-end there were a total of 41 discoveries where development is likely, but unresolved, see Table 1.1.6, Appendix 1. This includes discoveries where there are no concrete plans for development, and where it is assumed that a plan for development and operation will be approved in the course of five years, at the earliest.

The resource volume amounts to 433 million Sm<sup>3</sup> oil equivalents. This is a reduction of 97 million Sm<sup>3</sup> oil equivalents compared with last year. The most important reasons for the reduction are that discoveries 6507/3-3 Idun and 7122/7-1 Goliat, totaling 26 million Sm<sup>3</sup> oil equivalents, are now reported under Category 4F; that discoveries 35/3-2 Agat and 7120/12-2, totaling 31 million Sm<sup>3</sup> oil equivalents, have been moved to Category 6; and that discoveries 6507/3 Alve and 6406/2 Ragnfrid have had their resource estimates downgraded by a total of 20 mil-

lion Sm<sup>3</sup> oil equivalents. In 2002, the authorities approved PDOs for the Byggve, Skirne and Snøhvit fields. Snøhvit is the first field to be approved for development in the Barents Sea, and production is expected to get underway in the course of 2005.

lion Sm<sup>3</sup> oil equivalents. In addition, ten discoveries in relinquished areas which have been classified in Resource Category 5F in recent years have now been transferred to Resource Category 6. This amounts to 38 million Sm<sup>3</sup> oil equivalents.

**Resources in discoveries where development is not very likely (Resource Category 6)**

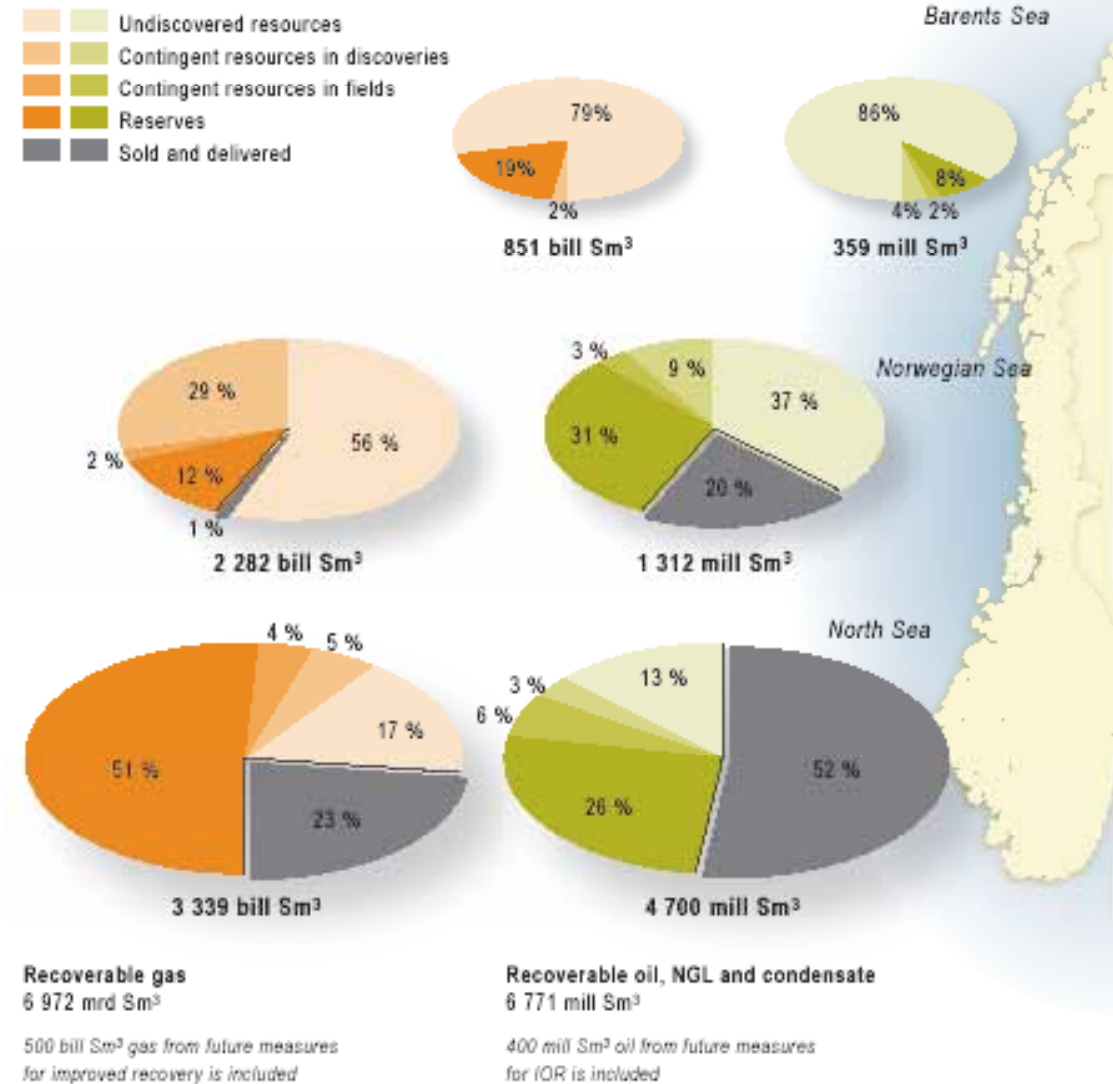
A number of technical discoveries have been made over the years where the petroleum volume is either so small or so difficult to produce that, even over the long term, it seems unlikely that development will take place. Since the Norwegian Petroleum Directorate has a low expectation of these discover-

ies being developed, they are not included in the year's accounting. This also includes discoveries located in relinquished areas.

**Resources in discoveries where evaluation is not complete (Resource Category 7F)**

As of the end of the year, two discoveries have been registered in this resource category. The preliminary estimates for discoveries in Resource Category 7F amount to 6 million Sm<sup>3</sup> oil equivalents (Table 1.1.7, Appendix 1). The estimates are preliminary and have a high degree of uncertainty.

Figure 1.1.3  
The distribution of the petroleum resources





## 1.2 Exploration licenses

### Licenses to explore for petroleum

As of 31 December 2002, a total of 284 exploration licenses have been awarded. Such licenses have a duration of three years. The following licenses were awarded in 2002:

Company	
Amerada Hess Norge A/S	278
Esso Exploration and Production Norway AS	279
Norsk Agip A/S	280
Petroleum Geo-Services ASA	281
Norsk Hydro Produksjon AS	282
SeaBed Geophysical AS	283
Norsk Mineralutvikling	284

### Licenses for scientific exploration

As of 31 December 2002, 390 licenses have been granted for scientific exploration. Sixteen such licenses were awarded in 2002, see Table 1.2.

Table 1.6.1

Licenses for scientific exploration for natural deposits in internal Norwegian waters, in Norwegian sea territory and on the continental shelf

License	Name	Field of work			Area
		Geophysics	Geology	Other	
375/2002	Alfred Wegener Institut für Polar- und Meeresforschung		X	Oceanography, marine biology,	Svalbard, Sea of Greenland
376/2002	Alfred Wegener Institut für Polar- und Meeresforschung		X	Geochemistry	North Sea
377/2002	Alfred Wegener Institut für Polar- und Meeresforschung	X	X	Marine biology	Svalbard north
378/2002	University of Tromsø	X	X		The Norwegian Sea
379/2002	JSC Marine Arctic Geological Expedition (JSC MAGE)	X	X		Svalbard west
380/2002	French Research Institute for Exploitation of the Sea (IFREMER)	X	X		The Norwegian Sea
381/2002	British Antarctic Survey	X		Geochemistry, marine biology	North Sea north, Norwegian Sea, Svalbard west
382/2002	Murmansk Marine Biological Institute	X		Marine biology	Svalbard south
383/2002	University of Tromsø	X	X		Ullsfjorden, Balsfjorden
384/2002	University of Tromsø	X	X		The Norwegian Sea
385/2002	University of Tromsø	X	X		Isfjorden, Sassenfjorden, Tempelfjorden, Billefjorden
386/2002	Bundesanstalt für Landwirtschaft und Ernährung			Marinbiologi	North Sea south
387/2002	University of Gothenburg		X		Southern Norway, seven fjords
388/2002	British Geological Survey	X			The North Sea, the Norwegian Sea South
389/2002	Alfred Wegener Institut für Polar- und Meeresforschung		X	Geochemistry	Norwegian Sea, North Sea
390/2002	Alfred Wegener Institut für Polar- und Meeresforschung	X	X	Oceanography, marine biology, geochemistry	Svalbard

## 1.3 Exploration activities

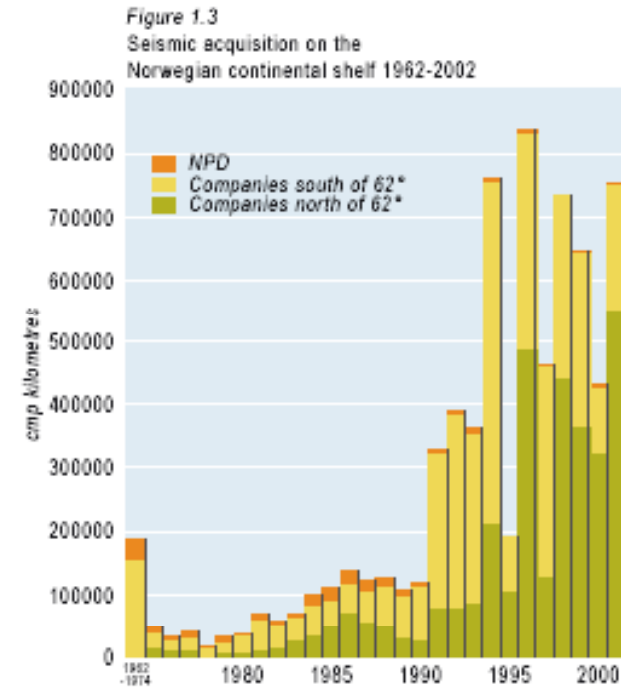
### Geophysical surveys

A total of 502 506 km of seismic data were collected on the Norwegian shelf in 2002. The number of kilometers refers to line kilometers.

In the North Sea, a total of 172 612 km of seismic data were collected, while 329 894 km were collected in the Norwegian Sea. No seismic data was collected in the Barents Sea in 2002.

The Norwegian Petroleum Directorate did not collect seismic data in 2002. Of this total, Norwegian oil companies collected 220 016 km and foreign oil companies collected 56 558 km. The contracting companies PGS and Veritas collected 225 932 km for their own accounts.

Of the total amount of seismic data collected, 3D seismic accounted for 499 189 km: 170 730 km in the North Sea and 328 459 km in the Norwegian Sea, see Figure 1.3.



## 1.4 Production licenses

On 15 March 2002, ten production licenses were awarded in the North Sea in the North Sea Award 2001. Six licenses were awarded on 14 June 2002 in the 17th Round. The production licenses comprise 28 blocks or parts of blocks. There have also been five awards/partitions outside the formal licensing rounds. These were production license 018C (partition of 018 area linked to 1/5-2 Flyndre), 085C (supplement to the Troll field), 094B (supplement to 6406/3-2 Trestakk), 122B and 212B (supplements to 6507/3-1 Alve).

## 1.5 Exploration activity

### 1.5.1 Exploration drilling

As of 31 December 2002, a total of 1041 exploration wells had been spudded on the Norwegian continental shelf. Nineteen exploration wells were spudded in 2002, of which 14 were wildcats and five were appraisal wells.

The drilling activity in 2002 has been divided among 12 wildcat and two appraisal wells in the North Sea, and two wildcat and three appraisal wells in the Norwegian Sea. In addition, three temporarily abandoned exploration wells in the North Sea were re-entered for permanent plugging.

At the turn of the year 2001/2002, drilling of eight exploration wells was in progress. At the end of 2002/beginning of 2003, one exploration well was being drilled, so that 26 exploration wells were completed in 2002. The geographical distribution of these is as follows: Fourteen wildcat wells and three appraisal wells in the North Sea, six wildcat wells and three appraisal wells in the Norwegian Sea.

Regional distribution of the total number of exploration wells is shown in Figure 1.5.1. Exploration wells completed in 2002 are shown in Table 1.5.1.

### New discoveries 2002

Nine new discoveries were made on the Norwegian shelf during 2002, see Table 1.5.2. Two discoveries were made in the Norwegian Sea and seven in the North

Sea. Based on the number of completed wildcat wells (20), this gives a technical discovery rate of 45 percent.

### Detailed description of drilling in 2002

Figures 1.5.2, 1.5.3 and 1.5.4 show the locations of exploration wells that have been spudded or completed during the year.

### North Sea

**Wildcat well 1/5-4 S** was drilled by Amerada Hess Norge AS as operator of production license 144. This acreage is located about 300 km southwest of Stavanger.

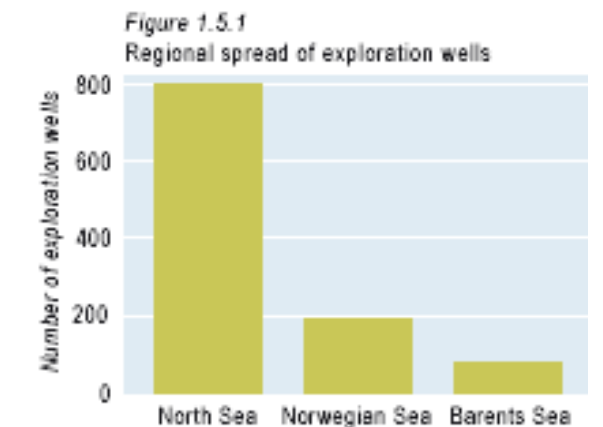
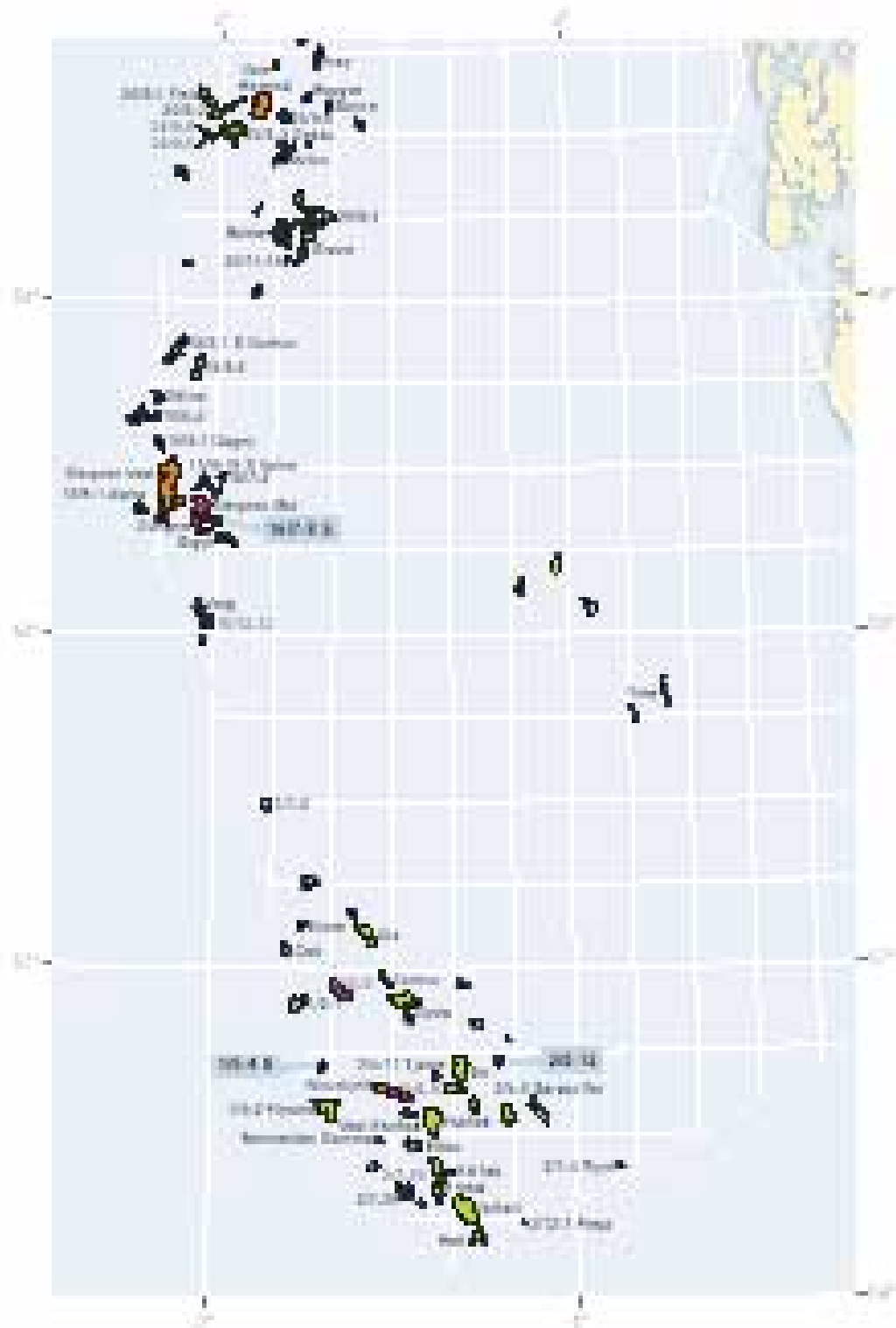


Figure 1.5.1  
Geographical spread of the exploration wells that are drilled or completed during the year 2002



\* Because of safety reasons, some development and exploration wells are drilled in the same area as existing production wells.

The well was drilled in 70 meters of water to a total depth of 3090 metres below sea level, and was completed in rocks from the Permian Age. Only traces of hydrocarbons were found in the well.

**Wildcat well 2/5-12** was drilled by Amerada Hess Norge AS as operator of production license 006C. This acreage is located about 280 km southwest of Stavanger. The well was drilled in 58 metres of water to a total depth of 4114 meters below sea level, and was completed in rocks from the Jurassic Age. Only traces of hydrocarbons were found in the well.

**Wildcat well 30/9-20 S** was drilled by Norsk Hydro as operator of production license 104. This acreage is located about 130 km west of Bergen. The well was drilled in 101 meters of water to a total depth of 3072 metres below sea level, and was completed in Jurassic rocks. The well proved oil in sandstone

strata from the Jurassic Age in a separate structure south of the Oseberg main field.

**Wildcat well 31/2-20 S** was drilled in production license 054 by Norsk Hydro Produksjon AS, as operator of production license 191, in cooperation with Statoil as operator of production license 054. The well was drilled as an independent sidetrack of a three-branch production well in the Troll Vest oil province where Norsk Hydro is the operator. The sidetrack was drilled to a total depth of 3400 metres MD, and was completed in rocks from the Middle Jurassic Age. No mobile hydrocarbons were found in the well.

**Wildcat wells 33/12-8 S and 33/12-8 A** were drilled by Statoil ASA as operator of production license 152. The wells were drilled on two separate prospects just to the west of the Rimfaks deposit in the Gullfaks Sør area. Both wells proved light oil

Table 1.5.1 Exploration wells completed in 2002

Exploration well	Production licence	Operator	Status	Well classification	Total depth	Total depth (age)
1/5-4 S	144	Amerada	oil	wildcat well	3090	Permian
2/5-12	6-C	Amerada	oil	wildcat well	4153	Jurassic
30/9-20 S	104	Hydro	oil	wildcat well	3124	Jurassic
31/2-20 S	54	Hydro	dry	wildcat well	3400	Jurassic
33/12-8 S	152	Statoil	oil	wildcat well	3750	Jurassic
33/12-8 A	152	Statoil	oil	wildcat well	5098	Jurassic
34/6-1 S	268	Conoco	dry	wildcat well	4360	Triassic
34/10-45 S	50	Statoil	gas/cond	wildcat well	7594	Jurassic
34/10-45 A	50	Statoil	gas/cond	appraisal well	6523	Jurassic
34/10-46 S	50	Statoil	gass	wildcat well	5568	Jurassic
34/10-46 A	50	Statoil	oil/gas	wildcat well	6860	Jurassic
34/10-46 B	50	Statoil	dry	appraisal well	7725	Cretaceous
34/10-47 S	50-B	Statoil	oil	wildcat well	4027	Cretaceous
34/10-47 A	50-B	Statoil	dry	wildcat well	3016	Jurassic
35/1-1	269	Phillips	dry	wildcat well	4540	Triassic
35/3-6	270	RWE-DEA	dry	wildcat well	3343	Jurassic
36/7-3	153	Hydro	dry	wildcat well	2948	Jurassic
6305/4-1	209	Hydro	gas	appraisal well	2975	Cretaceous
6403/10-1	253	Hydro	dry	wildcat well	3400	Cretaceous
6404/11-1	254	BP Amoco	dry	wildcat well	3650	Cretaceous
6406/3-6	91	Statoil	oil/gas	appraisal well	4175	Jurassic
6406/5-1	255	Shell	gas/cond	wildcat well	4692	Jurassic
6507/5-5	212	BP Amoco	oil	appraisal well	3932	Jurassic
6608/10-8	128	Statoil	oil	wildcat well	2600	Jurassic
6608/10-8 A	128	Statoil	oil	appraisal well	2600	Jurassic
6608/11-3	128	Statoil	dry	wildcat well	2031	Triassic



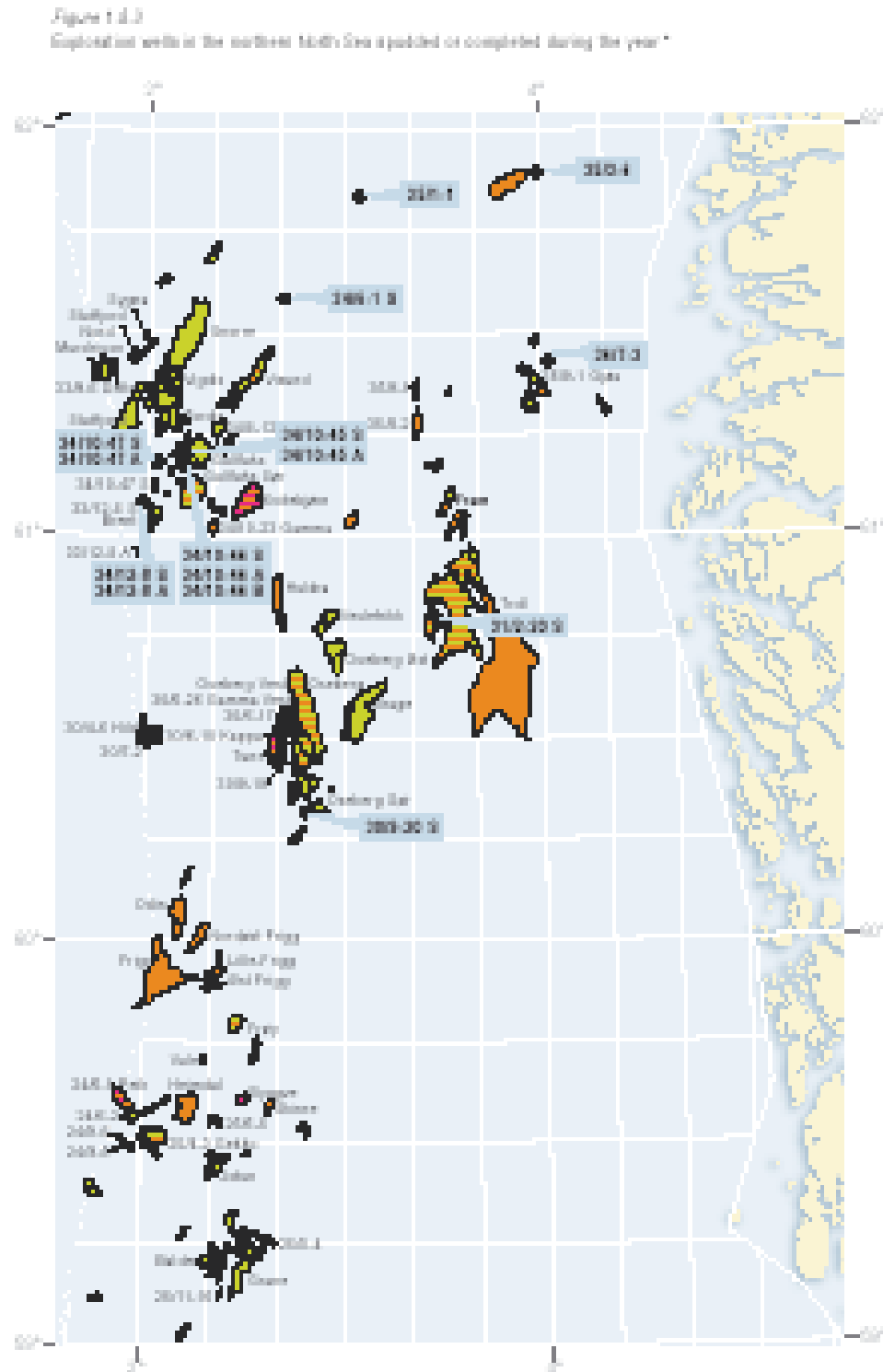


Figure 1.4.2  
Exploration wells in the northern North Sea drilled or completed during the year\*

\* Resource category B – resources where development is not very likely are shown as 'Potential discovery' rather than 'Discovery well'

Table 1.5.2 New discoveries in 2002, recoverable resources

Wellbore	Operator	Hydrocarbontype	Oil/condensate million Sm <sup>3</sup>	Gas billion Sm <sup>3</sup>
30/09-20	Norsk Hydro	oil	<1	
33/12-8 S	Statoil	oil/gas	1	<1
33/12-8 A	Statoil	oil	1	<1
34/10-45 S	Statoil	oil/gas	<1	<1
34/10-46 A	Statoil	gas	<1	<1
34/10-47 S	Statoil	oil	3	<1
6406/5-1	Shell	gas/condensate	2	1
6608/10-8	Statoil	oil	4	
<b>Total</b>			<b>10-13</b>	<b>&lt;10</b>

Discoveries were made in eight wells in 2002. Two discoveries were made in wellbore 33/12-8 S, one in the Brent formation and one in the Statfjord formation.

and gas in rocks from the Late and Middle Jurassic. Two discoveries were made in wellbore 33/12-8 S, one in the Brent group from the Middle Jurassic and one in the Statfjord formation from the Early Jurassic Age. The discoveries are now being evaluated for development together with other nearby discoveries in the Gullfaks area.

**Wildcat well 34/6-1 S** was drilled by Norske Conoco AS as operator of production license 268, 120 km west of Florø. The well was drilled in 380 metres of water to a total vertical depth of 3896 metres below sea level, and was completed in rocks presumably from the Late Triassic Age. No hydrocarbons were found in the well.

**Wildcat well 34/10-45 S and appraisal well 34/10-45 A** were drilled by Statoil ASA as operator of production license 050B. The wells were drilled from the Gullfaks B installation to an area just west of Gullfaks Vest. The drilling was completed in Late Jurassic rocks at about 2220 metres vertical depth. Both wellbores proved small amounts of gas/condensate in sandstone from the Cretaceous Age. The discovery was incorporated into Gullfaks and put into production.

**Wildcat wells 34/10-46 S, 34/10-46 A and 34/10-46 B** were drilled by Statoil ASA, as operator of production license 050, with the objective of investigating undrilled segments on the fringes of Gullfaks. 34/10-46 S proved gas, while 34/10-46 A proved

oil and gas. The discovery will be incorporated into Gullfaks. Well 34/10-46 B was dry.

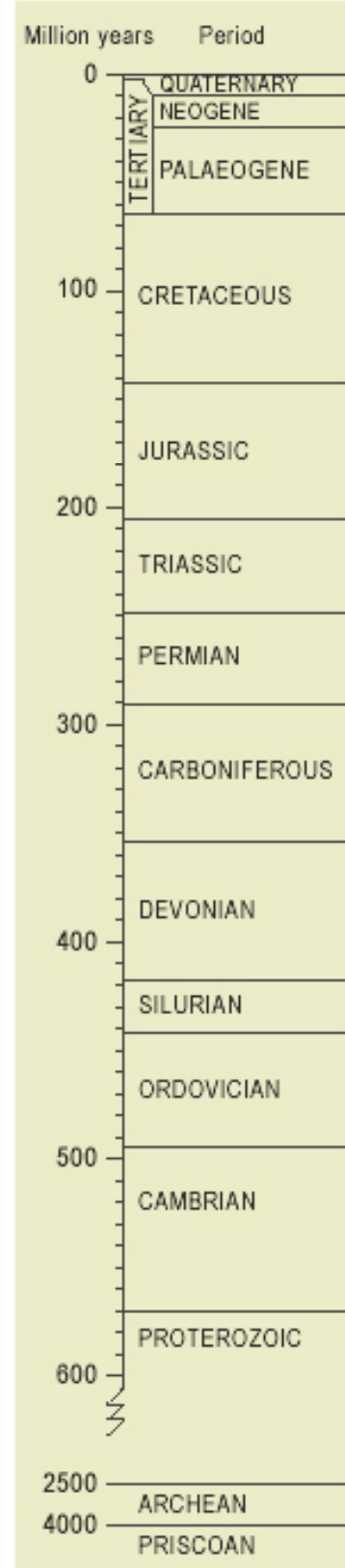
**Wildcat wells 34/10-47 S and 34/10-47 A** were drilled by Statoil ASA as operator of production license 050B, approx. 8 km west of Gullfaks A. 34/10-47 S proved light oil in Middle Jurassic rocks with excellent reservoir quality. This discovery is now being evaluated for development together with other nearby discoveries in the Gullfaks area, with tie-in either to Statfjord or Gullfaks. Wildcat well 34/10-47 A was drilled on a prospect in the Statfjord formation from the Early Jurassic Age. No hydrocarbons were found in the well.

**Wildcat well 35/1-1** was drilled by Phillips Petroleum Norsk AS as operator of production license 269, 115 km northwest of Florø. The well was drilled in 408 metres of water to a total vertical depth of 4517 metres below sea level, and was completed in Triassic rocks. No hydrocarbons were found in the well.

**Wildcat well 35/3-6** was drilled by RWE-DEA Norge AS as operator of production license 270, approx. 65 km northwest of Florø. The well was drilled in 225 metres of water to a total vertical depth of 3343 metres below sea level, and was completed in rocks from the Late Jurassic Age. No hydrocarbons were proven in the well.

**Wildcat well 36/7-3 S** was drilled by Norsk Hydro

The geological time scale



as operator of production license 153. The well was drilled to a total depth of 2 924 MD below sea level, and was completed in Jurassic rocks. The well has been plugged and permanently abandoned. Sandstone from the Cretaceous Age was proven at the expected reservoir level in the well, but no mobile hydrocarbons were proven.

The Norwegian Sea

**Appraisal well 6305/4-1** was drilled by Norsk Hydro in production license 209 based on a pre-unitization agreement between the licensees in the three production licenses 208, 209 and 250. The well was drilled on 6305/5-1 Ormen Lange, about 4 km north-northwest of the discovery well 6305/5-1. The well was drilled in 997 metres of water to a total depth of 2949 metres below sea level, and was completed in rocks from the Cretaceous Age. Gas was proven in the Våle formation from the Tertiary Age.

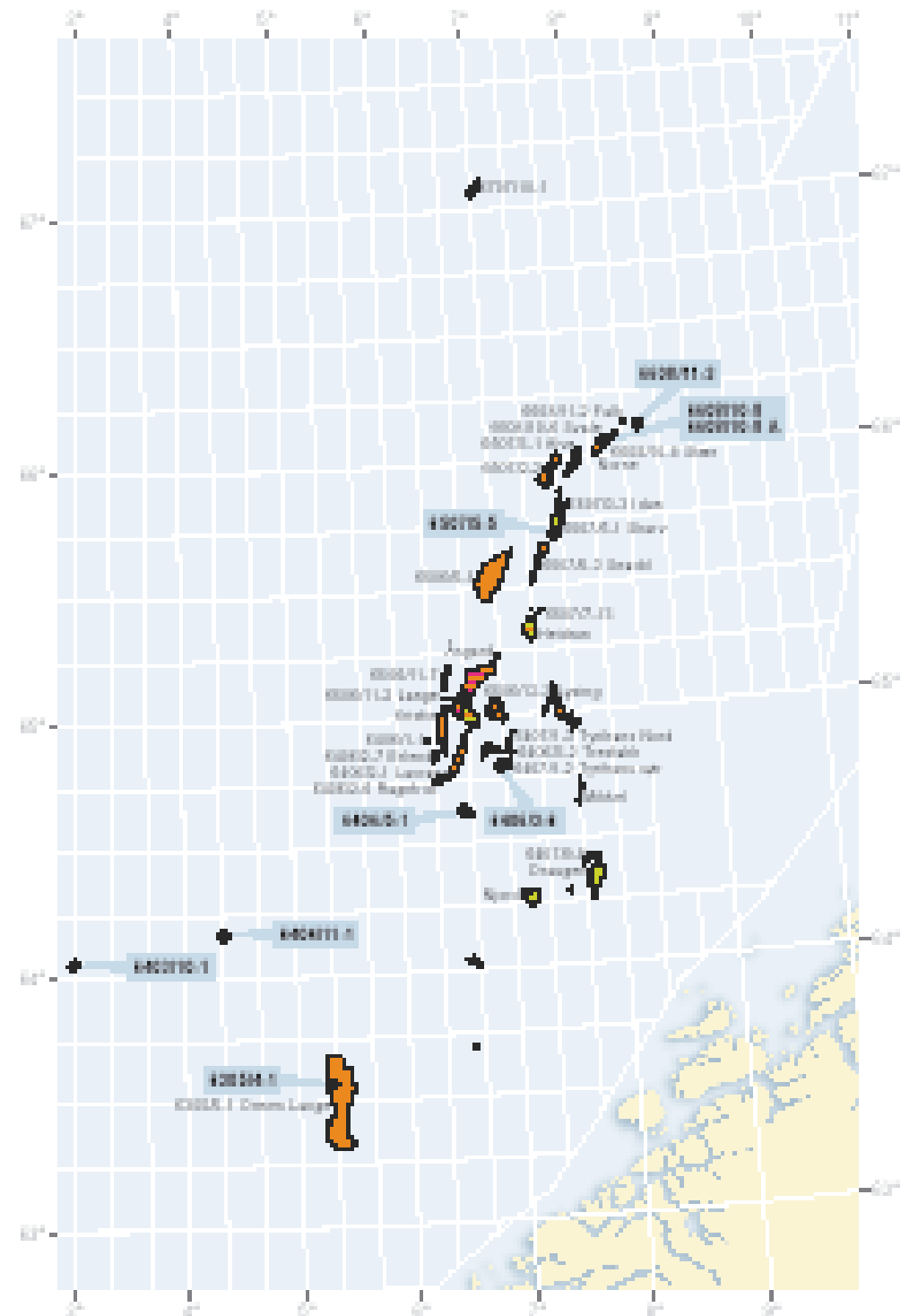
**Wildcat well 6403/10-1** was drilled by Norsk Hydro, as operator of production license 253, in the western part of the Møre Basin. The well had a drilling target in Cretaceous rocks, but was dry. The water depth here was 1717 metres. To date, this represents the deepest water ever drilled in on the Norwegian shelf.

**Wildcat well 6404/11-1** was drilled by BP Amoco Norge AS, as operator of production license 254, approx. 80 km northwest of 6305/5-1 Ormen Lange. The well was drilled on the Havsule structure in 1495 metres of water to a total vertical depth of 3625 metres below sea level, and was completed in rocks from the Late Cretaceous Age. No discoveries were made in any of the expected prospective intervals within the Late Cretaceous to the Tertiary Age.

**Appraisal well 6406/3-6** was drilled by Statoil ASA as operator of production license 091, on a structure that extends into production license 073. This well is the second the well on 6407/1-2 Tyrhans Sør and proved oil and gas.

**Wildcat well 6406/5-1** was drilled by A/S Norske Shell as operator of production license 255, on a structure to the south of the Kristin field. This drilling activity took place about 180 km northwest of Kristiansund. The well was drilled in 288 metres of water to a total vertical depth of 4658 metres below sea level, and was completed in Early Jurassic rocks.

Figure 1.8.8 Exploration wells in the Norwegian Sea added or completed during the year\*



\*Resource category B - resources where development is not yet likely are shown without discovery name/discovery well



Gas/condensate were proven in the upper part of the Garn formation from the Middle Jurassic Age.

**Appraisal well 6507/5-5** was drilled by BP Amoco Norge AS as operator of production license 212. This acreage is located about 200 km west of Sandnessjøen. The well was drilled in 375 metres of water to a total depth of 3932 metres below sea level, and was completed in rocks from the Jurassic Age. The well proved oil and gas in sandstone layers from the Jurassic Age.

**Wildcat well 6608/10-8 and appraisal well 6608/10-8A** were drilled by Statoil ASA, as operator of production license 128, approx. 175 km off the coast of Helgeland and to the northeast of the Norne field. The well was drilled in 376 metres of water to a total depth of about 2600 metres below sea level, and was completed in Early Jurassic rocks. Oil was proven in sandstone strata from the Jurassic Age.

**Wildcat well 6608/11-3** was drilled by Statoil ASA, as operator of production license 128 B, about 175 km off the coast of Helgeland and about 15 km east of the Norne field. The well was drilled in 374 metres of water to a total depth of 2031 meters below sea level, and was completed in Triassic rocks. No commercial hydrocarbons were proven in the well.

### 1.5.2 Exploration costs

Nineteen exploration wells were spudded in 2002. This is a decline compared with 2001 when 34 exploration wells were spudded.

Figure 1.5.5 shows total exploration costs from and including 1980. The costs include the costs of exploration drilling, general surveys, field evaluation/field development, as well as administration and other costs. A total of NOK 3.96 billion was spent in 2002. This is the lowest level ever in the period. Total exploration costs from 1980 through 2002 amounted to 188 billion 2002-NOK. Table 1.5.3 shows the exploration costs for 2002 in total and for the four cost groups. Figure 1.5.6 shows the percentage distribution among the cost groups.

In 2002, the share of exploration costs related to exploration drilling was 57 per cent, while the corresponding figure for 2001 was 67 per cent. Figure 1.5.7 shows average drilling costs per exploration well. In 2002, NOK 2.24 billion worth of drilling

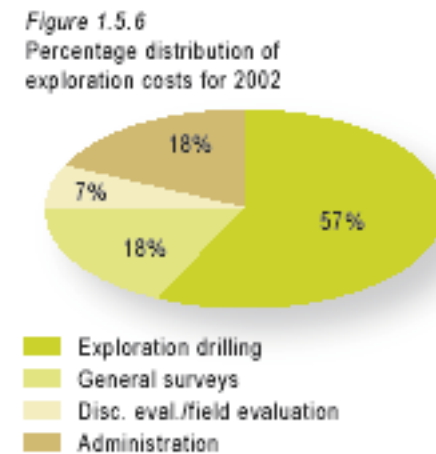
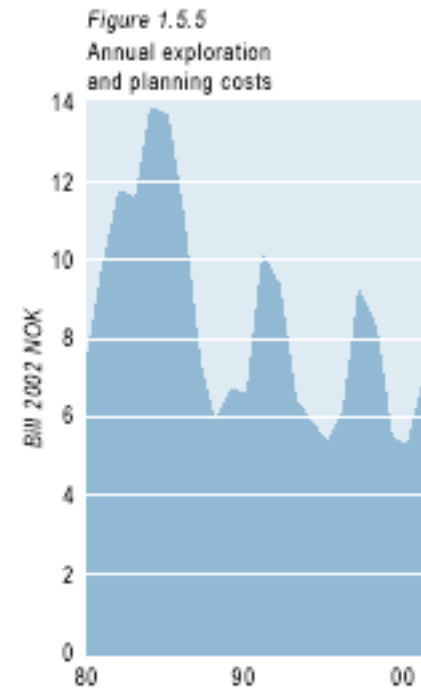
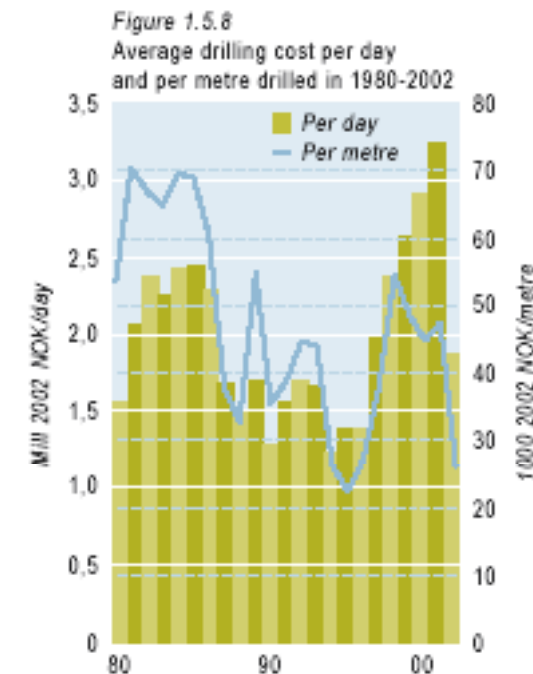
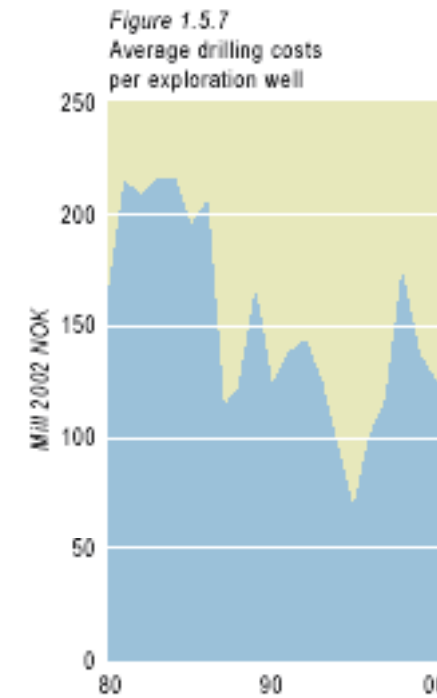


Table 1.5.3 Exploration costs distributed by cost groups

Cost groups	Million NOK
Exploration drilling	2237
General surveys	724
Discovery evaluation / field development	272
Administration and other costs	726
<b>Total</b>	<b>3959</b>



was carried out and the drilling cost per exploration well is estimated at NOK 118 million. The drilling cost per exploration well in 2001 was 128 million 2002-NOK. A major reason for the reduction was the reduced chartering expenses for drilling installations.

Figure 1.5.8 shows the average drilling cost per day and per metre drilled in the years 1980 through 2002 inclusive.

## 1.6 Development and operations

Facts and figures relating to fields and discoveries may be obtained at the Norwegian Petroleum Directorate's web site: [www.npd.no](http://www.npd.no). Descriptions of fields, etc. can also be found in Facts 2003: [www.oed.dep.no](http://www.oed.dep.no), published by the Ministry of Petroleum and Energy.

Figures 1.6.1, 1.6.2, 1.6.3 and 1.6.4 show fields and discoveries in the southern North Sea, the northern North Sea, the Norwegian Sea and the Barents Sea.

### Southern North Sea

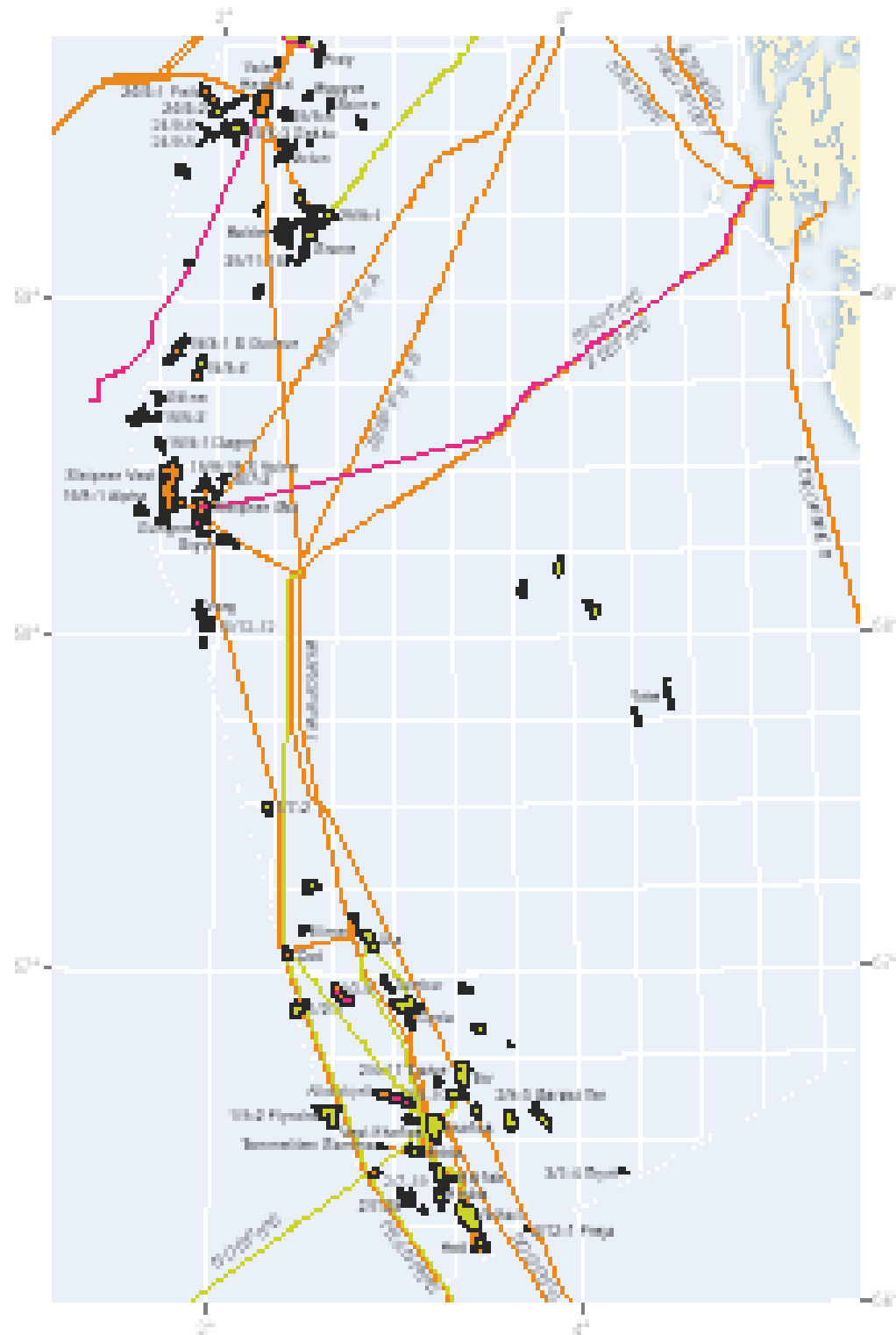
#### Valhall

A simple wellhead installation was installed on the southern flank of the Valhall field in 2002. Production start-up is planned for the spring of 2003. This is the first of the two installations approved in the development plan in the autumn of 2001. The installation to be situated in the north is undergoing construction, and the plan is to install it in 2003.

The water injection installation approved in 2002 was supposed to have been installed in the autumn of 2002. Unexpected problems encountered when piling the substructure led to a delay of the project. At best, water injection will start in 2003.

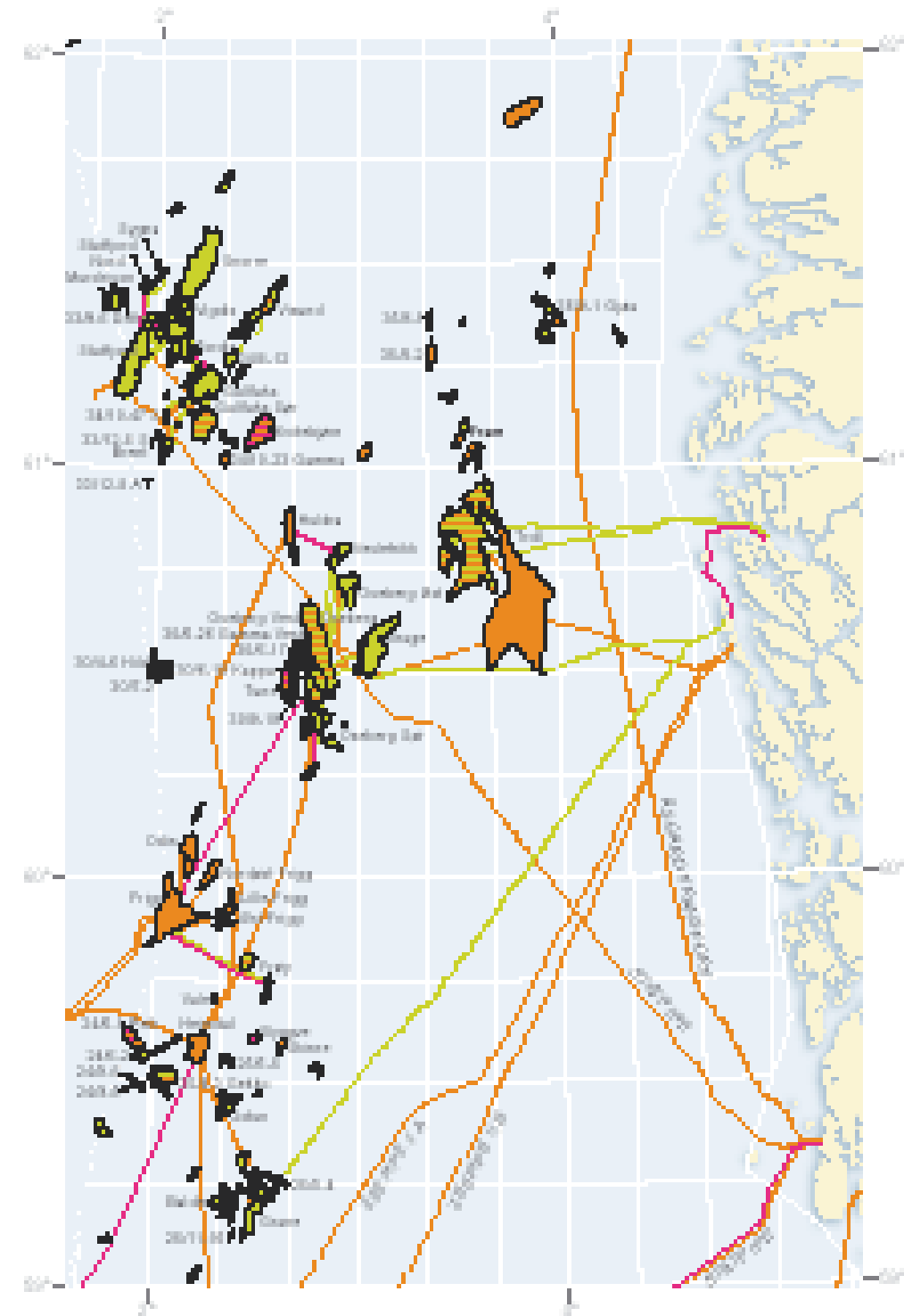
**Vale** is a gas and condensate field that started production in 2002. The field is developed with a production well drilled from a subsea installation and tied in via a pipeline to Heimdal for processing. Vale has not produced according to expectations in 2002, due in part to reservoir problems.

Figure 1.6.1  
Fields and discoveries in the east to the North Sea (Resource category 1-6) \*



\*Resource category 6 - resources where development is not very likely are shown without discovery name/discovery well

Figure 1.6.2  
Fields and discoveries in the north to the North Sea (Resource category 1-6) \*



\*Resource category 6 - resources where development is not very likely are shown without discovery name/discovery well



**Sigyn** was developed with using subsea-completed wells as a satellite to Sleipner A. The field started producing in December 2002. Esso is the operator of the Sigyn field, and an agreement has been reached with Statoil as operator of Sleipner A concerning operation of this field.

**Balder/Ringhorne.** Esso Norge AS applied for permission to amend the Ringhorne plan for development and operation so as to transfer part of the production to Jotun for processing instead of Balder as originally planned. This will also accelerate the production and provide available capacity on the Balder vessel with the possibility of increased production on Balder. Production on Jotun is declining, and the field is therefore starting to have free capacity.

At the same time, Esso Norge AS applied for approval of the plan for installation and operation for pipelines from Balder and Ringhorne to Jotun. According to this plan, a 12-inch oil pipeline and an 8-inch gas pipeline will be installed from the Ringhorne installation to Jotun. In addition, a 6-inch gas pipeline will be laid from Balder to Jotun to enable sale of gas that was previously reinjected on Balder.

### Northern North Sea

**Tune** is a gas/condensate field 12 km to the west of the Oseberg field. It started production in November 2002. The plan for development and operation was approved in December 1999. Tune will be developed with a subsea installation with transportation of the well stream to the Oseberg field center. During the course of 2001-2002, four production wells were drilled and a pipeline was laid for tie-in to the Oseberg field.

**Byggve and Skirne.** The plan for development and operation was approved by the authorities in 2002. The fields, which are gas/condensate fields east of the Heimdal field, will be developed by means of a production well on each field, connected by pipeline to Heimdal for processing.

**Troll NGL.** When the export of gas from Kvitebjørn to Kollsnes was agreed, the development solution was a normal gas dehydration facility without separation of wet gas components (dew point treatment) of the Kvitebjørn gas on Kollsnes. At

the same time the licensees in Troll were to evaluate a more comprehensive processing in a NGL facility (which separates out wet gas components) as an alternative to the dew point solution. The conclusion was that building an NGL plant would yield more creation of value. A decision was made to submit a plan for installation and operation of a plant large enough to also accommodate other additional resources. The plan for installation and operation of the NGL plan was considered by the authorities in early 2002. The Visund licensees have subsequently decided to process their gas in the same plant. The plant will thus achieve full utilization as early as from 2005.

**Troll precompression.** The plan for development and operation for precompression on Troll A was submitted to the authorities in the autumn of 2001. Planned start-up is in 2005. Since the solution described for the first phase precompression was sufficiently similar to previously approved plans, the authorities granted an exemption from the PDO requirement in 2002.

**TOGI.** The subsea system Troll Oseberg Gas Injection (TOGI), is controlled from the Oseberg Field Center and produces gas from Troll Øst for injection in the Oseberg field. TOGI was shut down in 2002 in accordance with agreements for delivery of gas. Further use of TOGI will be evaluated.

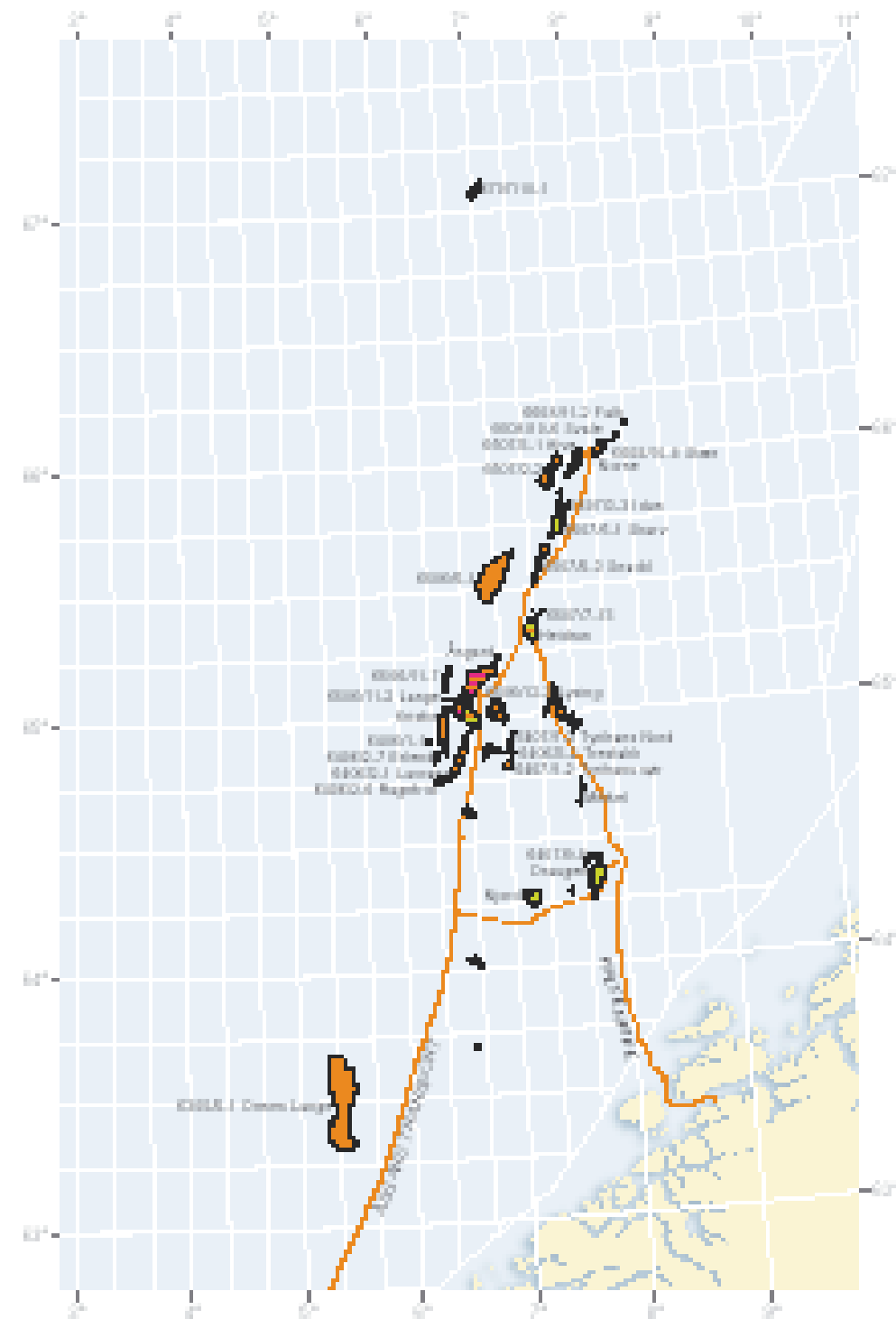
### Vigdis – further development

Several small discoveries and prospects, collectively referred to as Vigdis Extension by the operator, have been proven near the Vigdis field. The plan for development and operation was approved by the authorities in December 2002. The field will be developed using subsea templates and satellite wells, and will be tied in to Snorre via the Vigdis installations. The development is now considered to be a part of the Vigdis field.

### Visund

The Visund field is located in the far north of the North Sea, and has been in operation since 1999. The development concept comprises a semi-submersible integrated living quarters, drilling and process installation in steel, and the oil is transported via pipeline to Gullfaks A for storage and shipping. In addition, the northern part of Visund is developed using a subsea installation which came on stream in January 2002. So far, the field has only produced oil,

Figure 1.6.3  
Fields and discoveries in the Norwegian Sea (Resource category 1-5)\*



\*Resource category 1-5 – resources where development is not very likely without discovery, and a discovery well is required.

but in October 2002, the plan for development and operation and the plan for installation and operation for Visund gas export were approved.

The approved development plan for gas export entails that a total of 55.5 billion Sm<sup>3</sup> wet gas is sent from Visund in a new pipeline to Kvitebjørn, where the gas goes directly into the Kvitebjørn gas pipeline for further transport to Kollsnes. There NGL is separated out for further transport to the market. A total of approx. NOK 2.7 billion will be invested, of which NOK 0.8 billion in the pipeline.

The original PDO was limited to the production of oil from the field, while all gas produced prior to 2007 was to be injected back into the reservoir. This would ensure good oil resource management as the reservoir dynamics would be preserved for a long period prior to gas withdrawal. Based on production experience, the gas export has been moved up to 2005. With the approved plan for gas export, the Visund field could continue operations for about another 25 years.

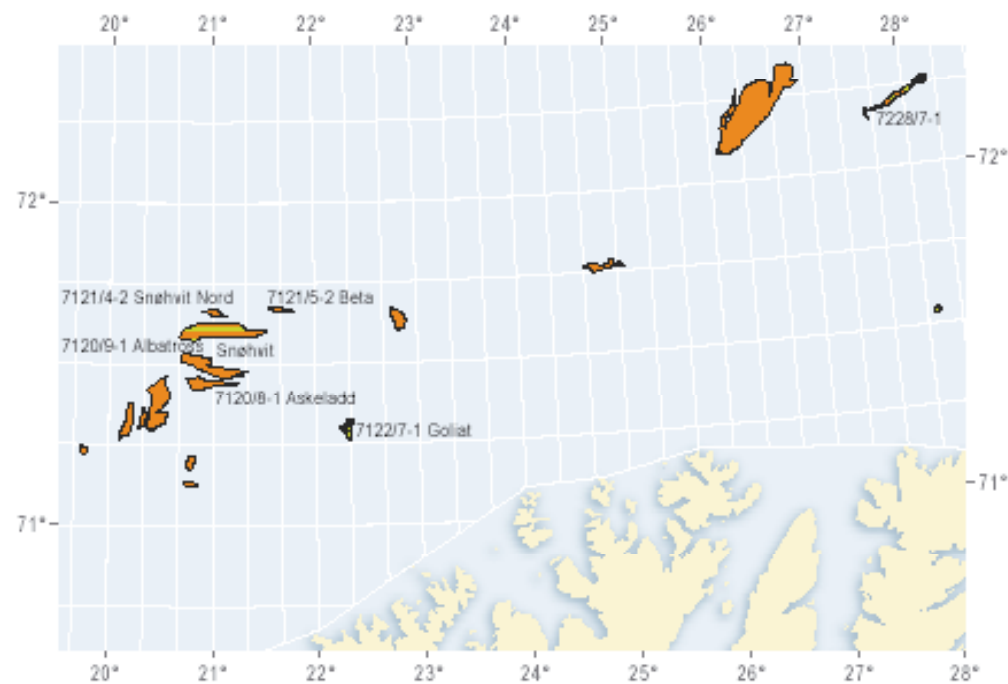
## Barents Sea

### Snøhvit

Snøhvit was proven in 1984 and is located about 140 km northwest of Hammerfest. The plan for development and operation and plan for installation and operation of Snøhvit LNG were submitted to the authorities in September 2001. The plans were approved by the Storting in March 2002. The Snøhvit development consists of the 7121/4-1 Snøhvit, 7120/8-1 Askeladd and 7120/9-1 Albatross discoveries. Volumes from 7121/4-2 Snøhvit Nord, 7121/5-2 Beta and other small discoveries in the area, as well as the oil zone in the Snøhvit field, are not included in the development plans.

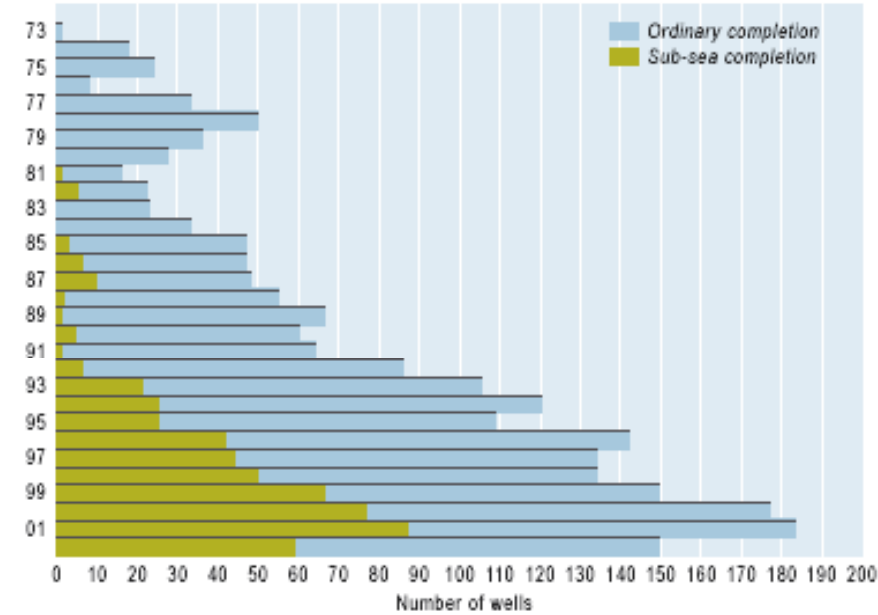
The development concept is based on subsea installations where gas and condensate are sent in a multi-phase pipeline to a plant on Melkøya, just outside of Hammerfest. On Melkøya, the gas will be processed and converted to liquid form (LNG), and sent to the market in custom-built ships. The by-products will be liquid natural gas (LPG) and condensate, which

Figure 1.6.4  
Fields and discoveries in the Barents Sea (Resource category 1-5) \*



\* Resource category 6 - resources where development is not very likely are shown without discovery name/discovery well

Figure 1.6.5  
Development wells on the Norwegian continental shelf 1973-2002



will be shipped from Melkøya and sold on the spot market. Start-up of the gas production is planned for December 2005, while the delivery commitments to the buyers in the USA and Europe run from October 2006. Recoverable volumes amount to 193 billion Sm<sup>3</sup> gas, including CO<sub>2</sub>, and production is expected to last until 2035.

Construction work on Melkøya started in the summer of 2002, about three months behind schedule. The delay is due to the wait for ESA approval of the tax regime for the Snøhvit development. The delay also resulted in the replacement of the main contractor for the construction work on Melkøya. A number of factors have led the operator to significantly increase the investment budget in relation to the development plan. The decision to accelerate start-up of gas production from 7120/9-1 Albatross in relation to the plan for development and operation has, however, yielded a reduction in the project costs of just less than a half billion kroner over the project lifetime.

The work to establish a profitable and flexible exploitation of the oil resources on Snøhvit, including a coordinated development of the oil in Snøhvit and the 7122/7-1 Goliat oil discovery, has been continued in 2002.

### Player evaluations

In 2002 the Norwegian Petroleum Directorate has evaluated the following companies concerning a possible role as operator and/or licensee on the Norwegian shelf: Petra/PGS, Norske AEDC and DNO.

### Changes in operator

Up to the end of 2002, Norsk Hydro was the operator of the production licenses encompassing the Snorre, Vigdis, Tordis and Visund fields. Statoil will be the operator of these production licenses as from 1 January 2003.

Petra AS has taken over the operatorship on Varg, replacing Norsk Hydro.

CNR International (UK) Ltd has assumed operatorship of Murchison, replacing Kerr-McGee.

### 1.6.1 Development drilling

Since 1973, 2 171 development wells have been spudded on the Norwegian continental shelf; 1 974 of these in the North Sea and 197 in the Norwegian Sea. 1 565 are production wells, 370 are injection wells and 236 are observation wells.

Drilling was in progress on 18 development wells as



of 31 December 2002. Figure 1.6.5 shows development wells spudded per year during the period 1973-2002.

In 2002, 150 development wells were spudded on 33 fields; 132 of these were in the North Sea and 18 in the Norwegian Sea. 69 of the wells, i.e. 46 per cent, were drilled from 19 different mobile units.

### 1.6.2 Cessation plans

According to the Petroleum Act, the licensees shall submit a cessation plan 2-5 years before expiration of a production license or a license for installation and operation, or the use of an installation ceases. Cessation plans consist of a disposal section and an impact assessment section. Based on the plan, the authorities make decisions regarding disposal.

The Norwegian Petroleum Directorate assists the Ministry of Petroleum and Energy with assessments related to the cessation plans for the individual fields or facilities. The Norwegian Petroleum Directorate also assists the Ministry of Petroleum and Energy in formulating guidelines for a cessation plan. The cessation plan for the Frigg field was considered in 2002. In addition, the Storting approved the abandonment of the concrete structure on 2/4-T, the Ekofisk tank, after concluding the OSPAR consultation.

## 1.7 Transportation systems

The various transportation systems are shown in Figure 1.7.1.

The transport capacity in any pipeline depends, among other things, on the composition of petroleum being transported, temperature and pressure. A change in any of these parameters will change the transport capacity. Therefore, the capacities listed below will change if the preconditions are changed.

### Planned transportation systems

#### Grane gas pipeline

The Grane gas pipeline has been built to enable import of injection gas to the Grane field. The pipeline runs from the Heimdal riser platform to the Grane installation. The pipeline is 50 kilometers long and has a diameter of 18 inches. Planned start-up is in the autumn 2003. The capacity will be approxi-

mately 3.5 billion Sm<sup>3</sup> per year. Norsk Hydro is the operator.

#### Grane oil pipeline

The Grane oil pipeline connects Grane to the Sture terminal. The pipeline will initially transport oil from the Grane field, but it is possible that other discoveries in the area can also use the pipeline later on. The pipeline is 220 km long, and has a diameter of 29 inches. This will provide a transportation capacity for oil from Grane of 40000 Sm<sup>3</sup> per day. With an oil that is less heavy than the Grane oil, the pipeline capacity will increase. Planned start-up is in the autumn of 2003. Norsk Hydro is the operator.

#### Kvitebjørn gas transport and Visund gas export

In October 2002, plans for development and operation and for installation and operation were approved for Visund gas export. Several gas transport alternatives were studied, and tie-in to an existing T-connection on the gas pipeline from Kvitebjørn to Kollsnes was selected. At the same time, a new T-connection was installed to accommodate new gas in the area. The total cost of the pipeline is somewhat in excess of NOK 0.8 billion for the selected route. In addition, an agreement has been made regarding a new compressor that may be necessary on Kvitebjørn at some point, when the pressure difference between the Visund pipeline and the Kvitebjørn reservoir becomes too high. After the Visund tie-in, the Kvitebjørn pipeline will have a high degree of capacity utilization. Export from Visund will commence in 2005.

The pipeline from Visund to the Kvitebjørn T will be 38 km long and have an outer diameter of 20 inches. The pipeline is made of standard carbon steel.

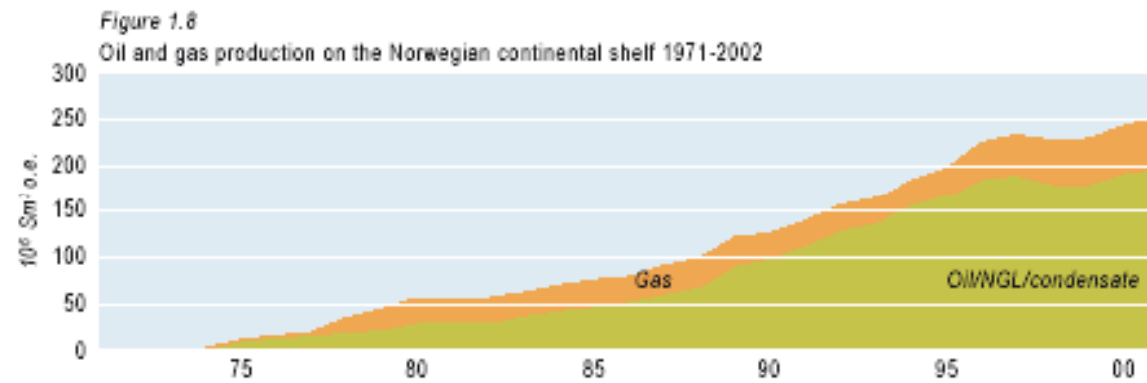
#### Kristin export solution

The export pipeline for gas between the Kristin semi and the existing Åsgard Transport gas export pipeline will be a 27-28 km long loop. The design pressure for the 18-inch gas pipeline is 212 bar, and standard carbon steel has been selected as the material.

The pipeline for transporting liquids from Kristin to Åsgard C (storage ship for condensate on Åsgard) will be 20-22 km long, depending on the final route selected. The interior diameter of this pipeline is 12 inches. The pipeline will be manufactured in standard carbon steel, and the design pressure will be 100 bar.

Figure 1.7  
Transportation systems for oil and gas from Norwegian fields





## 1.8 Production of oil and gas

The production of oil and gas on the Norwegian shelf amounted to 258.6 million Sm<sup>3</sup> oil equivalents in 2002. Production in 2001 amounted to 251.4 million Sm<sup>3</sup> o.e. Production details are presented in Table 1.8, Appendix 2 and in Figure 1.8.

## 1.9 Sale and taxes

### 1.9.1 Sale of petroleum

In 2002, 146.6 million tonnes of crude oil were sold from the Norwegian continental shelf. This represents a decline of 4.0 per cent compared with 2001. The United Kingdom was the largest recipient with 22.4 per cent of the shipments, Norway received 16.0 per cent, the Netherlands 13.8 per cent, France 10.3 per cent and Sweden 4.0 per cent. Figure 1.9.1 illustrates crude oil price trends in 2002.

Norway exported 64.2 billion Sm<sup>3</sup> gas in 2002.

### 1.9.2 Production royalty

The basis for calculation of the royalty is the value of the produced petroleum at each production area's loading point. As it is not customary to calculate the price of petroleum products at the loading point, the calculation basis applied is in practice the difference between the gross sales value and the costs incurred between the taxation point and the point of sale.

Since, on some fields, oil and NGL are a single product at the loading point and the NGL is separated at a later stage, royalty will be paid on the NGL for these fields. On the other hand, royalty will not be levied on NGL in those fields where NGL is part of the gas at the loading point.

### Total production royalty

In 2002, licensees on the Norwegian shelf paid royalties totaling NOK 1 320 012 856 to the Norwegian Petroleum Directorate. Table 1.9.1 shows the breakdown for the various petroleum products for 2001 and 2002. Figure 1.9.2 shows paid production royalty for the period 1993-2002.

### Production royalty on oil

In 2002, NOK 1 318 858 224 was paid in royalties for oil from the Ula, Statfjord, Oseberg, Gullfaks and Heimdal fields. This is a reduction of 47 per cent compared with the previous year. The Ula payment is due to coverage of transportation costs for royalty oil received. Payments for Heimdal relate to previous years. The production royalty for oil is normally taken out in oil. Sale of this oil is handled by Statoil, which makes monthly payments to the Norwegian Petroleum Directorate.

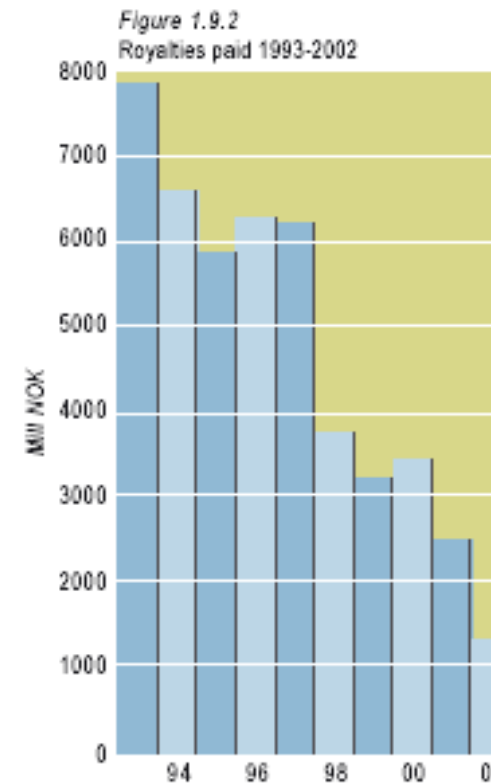
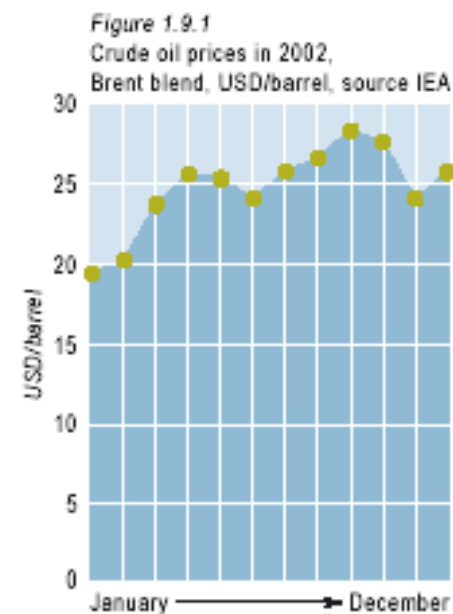


Table 1.9.1 Total paid production royalty in 2001 and 2002 (million NOK)

Product	Field/area	2001	2002
Oil	Ekofisk area, Ula and Valhall	0,2	-2,2
"	Statfjord	1058,8	330,9
"	Oseberg	577,2	437,3
"	Gullfaks	845,7	552,5
"	Heimdal	0,0	0,4
Total oil		2481,9	1318,9
NGL	Ekofiskområdet	0,1	0,0
"	Valhall	-0,4	0,0
"	Ula	-0,2	1,1
Total NGL		-0,5	1,1
<b>Total</b>		<b>2 481,4</b>	<b>1 320,0</b>

The received quantity of royalty oil was reduced by 44 per cent in 2002. The reduction in quantity is the result of two specific factors. Firstly, there was a general decline in production in 2002 in those fields which still pay production royalty. Secondly, tax relief was implemented for all fields from 1 January 2000. In 2002, the royalty oil was settled at an average price of approximately NOK 217 per barrel, compared with NOK 226 per barrel in 2001.

### Production royalty on NGL

In 2002, production royalties totaling NOK 1 154 632 were paid for NGL from Gyda.

Settlement of royalties paid in cash is on a six-month basis, with a three-month term for payment. The settlement for NGL has been made at contract prices which vary for the individual fields/groups.

After the production royalty was repealed for the Heimdal, Tor, Valhall and Murchison fields as of 1 January 2000, production royalty on NGL is only collected from one field, Ula.

### 1.9.3 Area fees

In 2002, the Norwegian Petroleum Directorate collected NOK 483 933 955 in gross area fees, prior to rebates. The amount is broken down for the various award years as shown in Table 1.9.2. The area fee divided among the award years 1998, 1999, 2000 and 2001 applies mainly to production licenses that are partitioned off from existing production licenses and awarded as new production licenses pursuant to Section 3-10 of the Petroleum Act in these years. The rate of the area fee follows the original production license.

The Norwegian Petroleum Directorate has refunded NOK 37 335 089 in area fees in 2002. This represents the deductible portion of the area fee in the royalty settlement for production licenses 019A, 019B, 037, 050, 053 and 079.



Table 1.9.2 Area fee divided among award years

Area Fee			
Award Year	NOK	Award Year	NOK
1965	36 208 887	1986	31 274 787
1969	20 857 920	1987	7 434 000
1971	3 904 501	1988	18 399 244
1973	19 110 000	1989	7 862 354
1975	1 722 000	1991	14 260 324
1976	25 536 000	1992	1 055 086
1977	4 595 400	1993	39 899 667
1978	14 658 000	1995	8 956 330
1979	47 124 000	1996	5 951 043
1981	7 614 600	1998	2 635 200
1982	8 093 400	1999	5 544 000
1983	33 390 000	2000	18 153 423
1984	58 993 200	2001	8 505 000
1985	32 046 000	2002	149 589
		<b>Total</b>	<b>483 933 955</b>

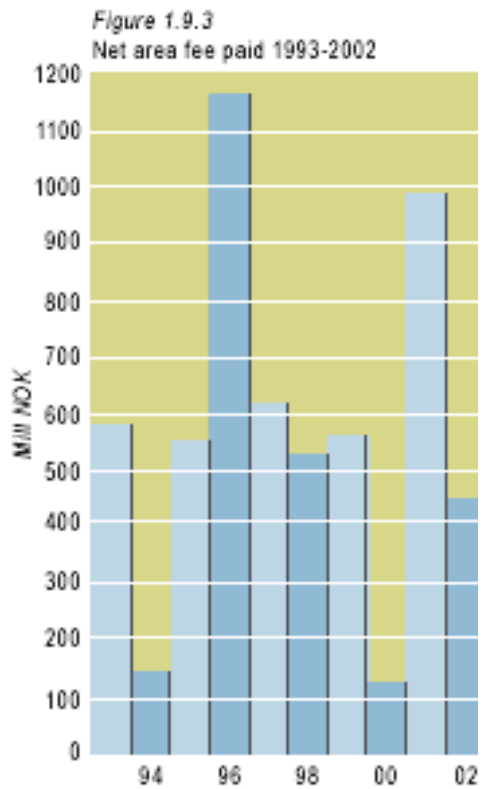


Figure 1.9.3 shows the net area fee receipts for 1993 - 2002. There is an increase of more than NOK 536 million in 2002 as compared with 2001. The reason for this reduction is that area fees for both 2001 and 2002 were paid in 2001, while only area fees for 2003 were paid in 2002.

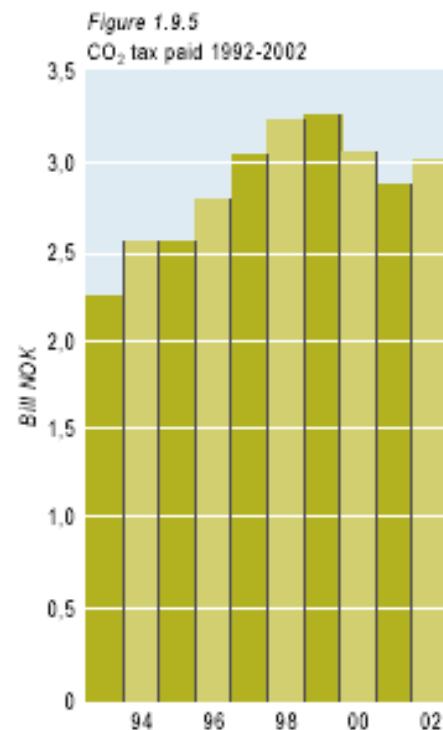
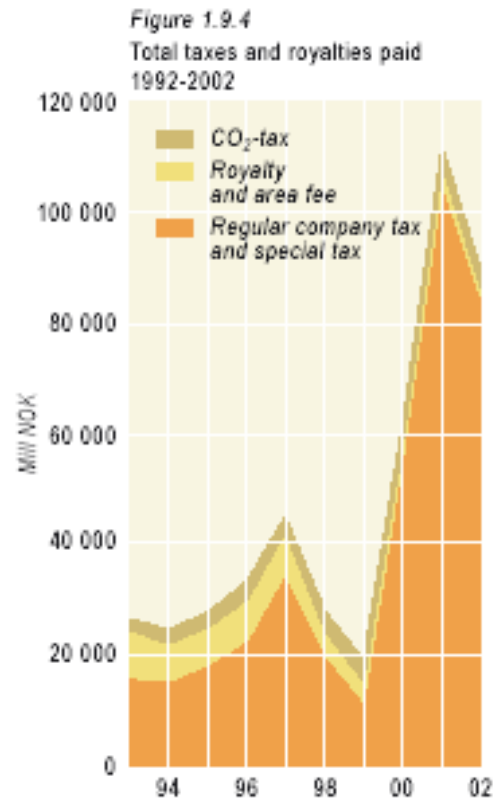
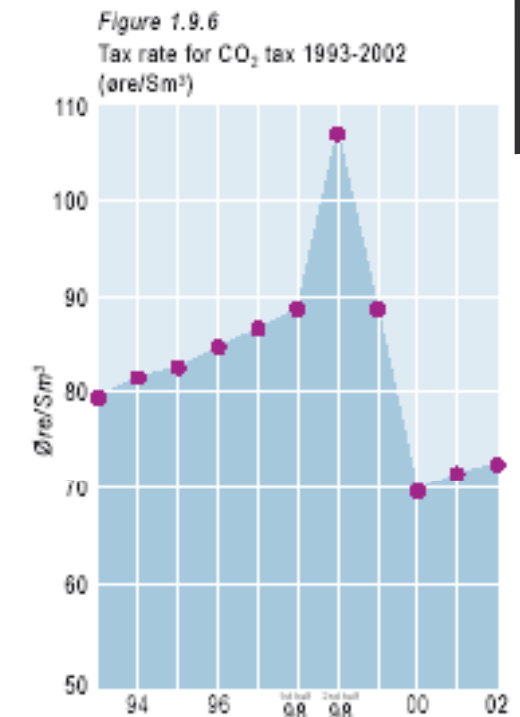


Table 1.9.3 CO<sub>2</sub> tax paid in 2002

Field	First half-year	Second half-year	Total 2002
Balder	17 183 506	11 221 724	28 405 230
Brage	30 921 120	26 633 870	57 554 990
Draugen	25 305 971	27 047 624	52 353 595
Ekofisk area	152 440 037	168 765 081	321 205 118
Frigg area	4 028 627	3 811 850	7 840 477
Glitne	16 447 108	12 083 652	28 530 760
Gullfaks A/B/C	186 713 163	173 421 005	360 134 168
Gyda	11 646 774	13 306 109	24 952 883
Heidrun	65 398 533	49 746 006	115 144 539
Heimdal	16 253 593	25 406 780	41 660 373
Hod	75 600	38 970	114 570
Jotun	17 913 464	18 969 778	36 883 242
Murchison	5 769 218	6 002 780	11 771 998
Njord A/B	28 923 840	27 681 750	56 605 590
Nome	61 348 720	60 424 455	121 773 175
Oseberg A/B/C/D	144 068 400	138 489 410	282 557 810
Oseberg Sør	25 532 640	25 845 870	51 378 510
Oseberg Øst	14 275 440	13 170 760	27 446 200
Sleipner	126 929 098	125 481 257	252 410 355
Snorre A/B	80 955 900	64 592 220	145 548 120
Staffjord A/B/C	181 347 556	175 948 769	357 296 325
Tambar	864 792	0	864 792
Troll A	615 528	506 613	1 122 141
Troll B	45 776 880	43 843 860	89 620 740
Troll C	46 789 200	38 535 390	85 324 590
Ula	20 479 539	19 578 020	40 057 559
Valhall	35 719 186	35 593 751	71 312 937
Varg	6 174 619	7 836 845	14 011 464
Veslefrikk	27 941 519	27 992 867	55 934 385
Visund	33 434 654	32 358 080	65 792 734
Åsgard A/B/C	84 179 974	110 827 634	195 007 608
<b>Transportation systems</b>			
Norpipe	3 709 009	3 464 408	7 173 418
Statpipe	2 193 106	2 071 028	4 264 134
<b>Total</b>	<b>1 521 356 314</b>	<b>1 490 698 215</b>	<b>3 012 054 529</b>



Production royalties and area fees in 2002 accounted for two per cent of the total taxes and fees paid from the petroleum activities. Figure 1.9.4 shows total taxes and royalties paid for 1993-2002.

1.9.4 CO<sub>2</sub> tax

The CO<sub>2</sub> tax rates in the second half of 2001 and the first half of 2002 were fixed at NOK 0.72 and NOK 0.73 per Sm<sup>3</sup> gas and NOK 0.72 and NOK 0.45 per liter diesel. Starting from 1 January 2002, the authorities have reduced the CO<sub>2</sub> tax rate for diesel used on the offshore installations to the same rate charged for normal purchase of diesel. The tax is paid on a six-month basis with a three-month term of payment (as of 1 October and 1 April in the following year) by the operator of the individual fields and installations. Table 1.9.3 shows the total tax paid in 2002. New fields/installations subject to the tax are Glitne, Tambar and Huldra. Huldra is included in the figures for Veslefrikk. Corrections relating to previous six-month periods are included. CO<sub>2</sub> taxes totaling NOK 3 012 054 529 were paid in 2002. Figure 1.9.5 shows the annual receipts of CO<sub>2</sub> tax for 1993-2002, and Figure 1.9.6 shows changes in the tax rate.

### 1.10 Natural gas market

In 2002, Norway exported gas to the United Kingdom, Germany, the Netherlands, Belgium, France, Italy, Spain, Austria, Czechia and Poland.

Exports from Norway amounted to 64.2 billion Sm<sup>3</sup>. This is an increase of approx. 13.7 billion Sm<sup>3</sup> (27 percent) gas compared with the previous year. The average energy content in the exported gas was approx. 40 mega joules per cubic meter.

#### Organization of Norwegian gas sales

The first gas sales from the Norwegian shelf were primarily based on depletion of accessible reserves in the individual fields. Norway entered a new era as a gas supplier on 1 October 1993 when deliveries under the Troll agreements (TGSA) got underway. These are sales contracts which offer the customers fixed annual volumes, where also other fields than Troll may provide deliveries.

Since 1986, the sale of Norwegian gas has been coordinated by the government-appointed Gas Negotiation Committee (GFU) under the direction of Statoil and with participation by Norsk Hydro and Saga. Other companies were also involved in the negotiation of some gas sales contracts. In 1993, the authorities set up the Gas Supply Committee (FU). This committee, which consisted of the largest gas owners on the Norwegian shelf, was to have an advisory role vis-à-vis the Ministry of Petroleum and Energy in questions related to development and management of gas fields and transportation systems.

The compulsory Norwegian gas sales organization with GFU and FU ceased to exist on 1 January 2002. In this connection, a comprehensive restructuring of a complex contract portfolio was undertaken. All gas sales contracts are now separate agreements between the gas buyer and the individual licensee on the Norwegian shelf. Each company is now free to choose its own sales level and to enter into gas sales contracts with buyers within the framework stipulated under production licenses issued by the Ministry for each field.

Operatorship for a number of pipelines and transport-related installations was transferred to Gassco

AS from 1 January 2002, cf. the Storting White Paper No. 38 (2001-2002).

The authorities continue to handle necessary resource management considerations in that they issue production licenses for natural gas in part to ensure optimal liquid extraction, and also govern the gas transportation system.

#### Future gas exports from the Norwegian shelf

It is expected that Norway's total gas sales for export may reach 110 billion Sm<sup>3</sup> per year in the course of the next 8-12 years.

Figure 1.10 shows anticipated future gas sales used as a basis for the revised national budget for 2003. In addition to sales from the Norwegian shelf come the gas volumes used for injection on the shelf, as well as production of power for operating field installations and transportation systems.

#### Use of gas in Norway

The most important Norwegian gas market is the market for injection gas on the continental shelf. The gas is injected in order to achieve increased oil recovery. The largest consumers are Oseberg, Åsgard, Statfjord, Gullfaks, Njord, Snorre, Visund and Grane. Primarily gas produced from the field itself is used for these purposes. The most important exceptions are Oseberg and, in the future, Grane, which import significant volumes of injection gas from other Norwegian fields. Gas is also the most important source of energy for operation of fields and transportation systems. In 2002, a total of 32.9 billion Sm<sup>3</sup> gas was used for injection and 3.5 billion Sm<sup>3</sup> gas was used for fuel on the shelf.

Gas has been landed in Norway since Statpipe began operations in 1985. The gas is landed at Kårstø in northern Rogaland, at Kollsnes in Hordaland and at Tjeldbergodden in Møre og Romsdal.

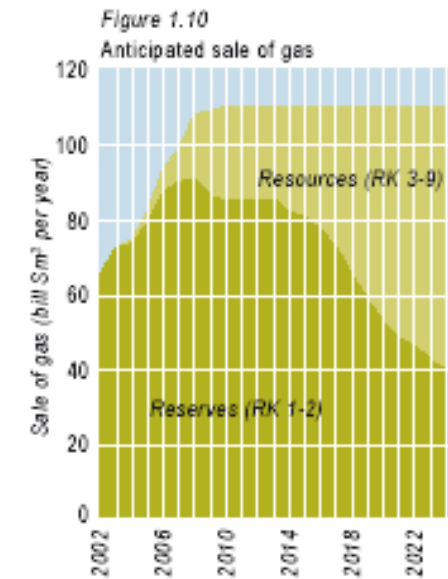
In 2002, the licensees decided that the gas from the Ormen Lange development will be landed and processed in Nyhamna on Aukra in Møre og Romsdal.

In 1997, methanol production got underway at Tjeldbergodden. Total gas consumption is 0.7 billion Sm<sup>3</sup> per year. In northern Rogaland, an agreement has been signed regarding smaller deliveries to the

distribution company Gasnor. Deliveries commenced in 1994.

The company Naturgass Vest has started developing a distribution network for natural gas from Kollsnes in Øygarden.

In 1994, Statkraft, Statoil and Norsk Hydro set up a joint company, Naturkraft. Naturkraft plans to build gas power plants at Kårstø and Kollsnes. Total consumption of gas in the planned gas power plants will be 0.9 billion Sm<sup>3</sup> gas per year.





## 2 Health, Environment and Safety

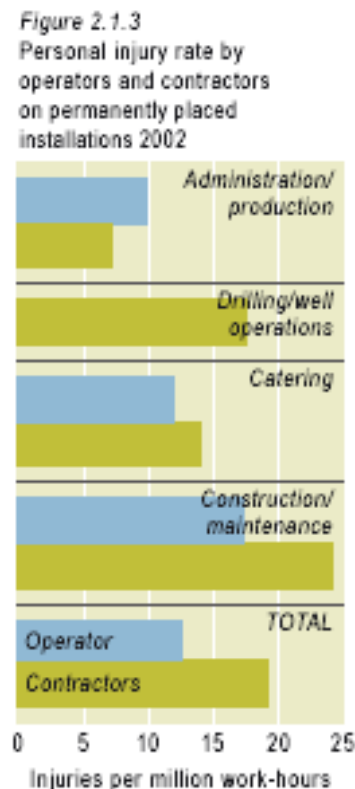
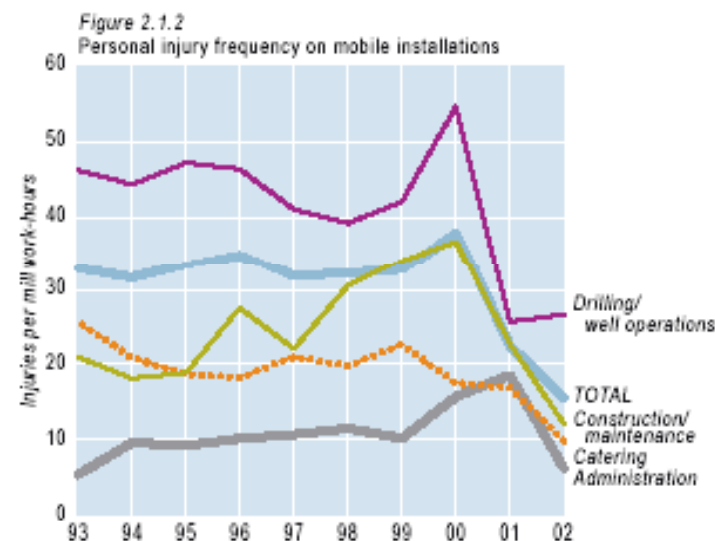
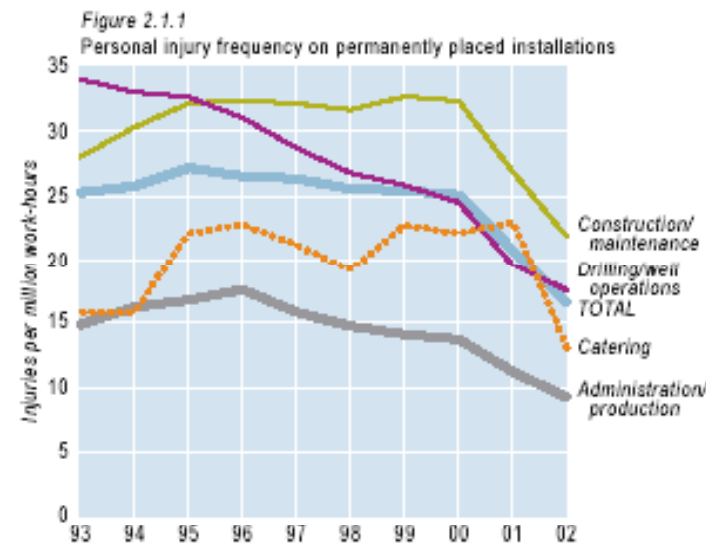
### 2.1 Personal injuries

The number of personal injuries shows a substantial decline from 2001 to 2002. Because some companies have changed their reporting procedures, the figures for 2002 cannot automatically be compared with the figures from previous years.

Figures 2.1.1 and 2.1.2 show the rate of personal injuries for the various main types of activities on permanent and mobile installations respectively. It emerges from the figure that the injury frequency for catering employees on permanent installations has been cut nearly in half compared with the previous year. We find an even greater reduction for the administration group on mobile installations. These

substantial differences could be due to the fact that the changed reporting procedures mean that certain types of injuries that are typical for these activity groups are no longer reported. The injury frequency for the drilling and well operations group shows little change.

Figure 2.1.3 shows that there is a lower injury rate among employees of operating companies as compared with contractor companies, with the exception of administration and production, where there has been a 50 per cent reduction of the injury rate for contractor employees from 2001 to 2002.



### 2.2 Work-related diseases

Work-related illnesses inflict substantial costs on the community and the companies, in addition to suffering for the individual. The incidence of work-related disease can be an indicator of the quality of the working environment, and the Norwegian Petroleum Directorate is working to ensure that the companies utilize information on the incidence and causes of such diseases in the preventive work on safety and working environment.

The Directorate received reports of 655 cases of work-related diseases in 2002. This is an increase of nearly ten percent compared with the previous year. However, fluctuations from year to year must be evaluated cautiously, as there is reason to believe that there is still some degree of variation in reporting from the companies.

Figure 2.2.1 shows that noise-induced hearing loss accounts for a significant portion of the reported cases. It must be expected that this group of ailments will fluctuate somewhat, without this having a decisive bearing on the status of the working environment. It emerges from the figure that muscular and skeletal disorders account for the largest diagnosis group. Thus, the offshore petroleum activities do not vary much from other industrial and commercial activity in Norway.

Skin ailments constitute another large diagnosis group. A large percentage of the cases relate to eczema on the hands after contact with oil-based drilling mud.

The group "undiagnosed conditions" includes ailments such as sleep disturbances. Many people experience

sleep disturbances after having worked a so-called swing shift. The percentage of cases attributed to this is lower than in the previous year. This reduction may be due to the fact that several companies have discontinued

Figure 2.2.1 Distribution of work-related diseases on diagnosis groups 2000-2002

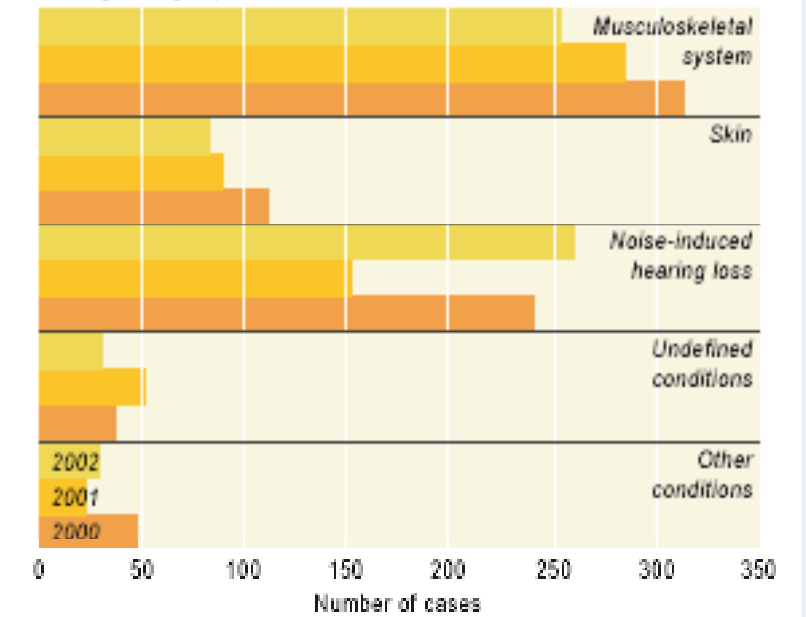
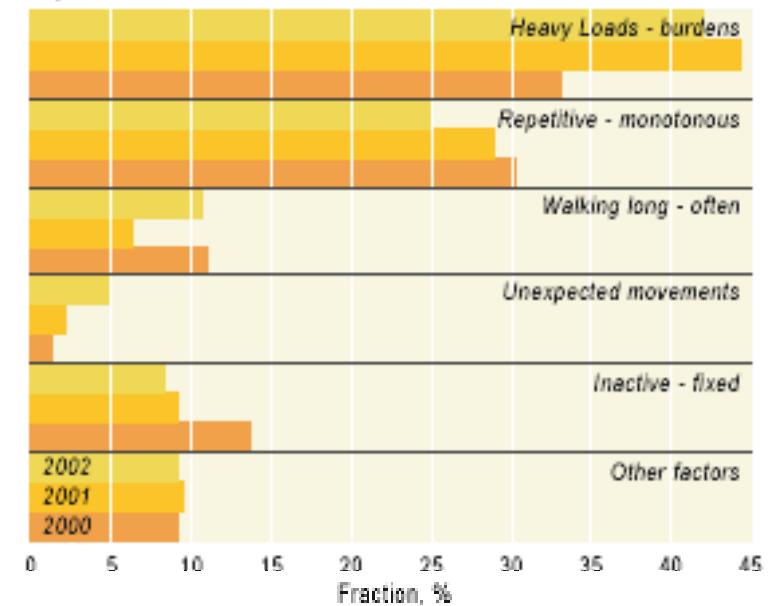


Figure 2.2.2 Exposure - musculoskeletal conditions



# Health, Environment and Safety

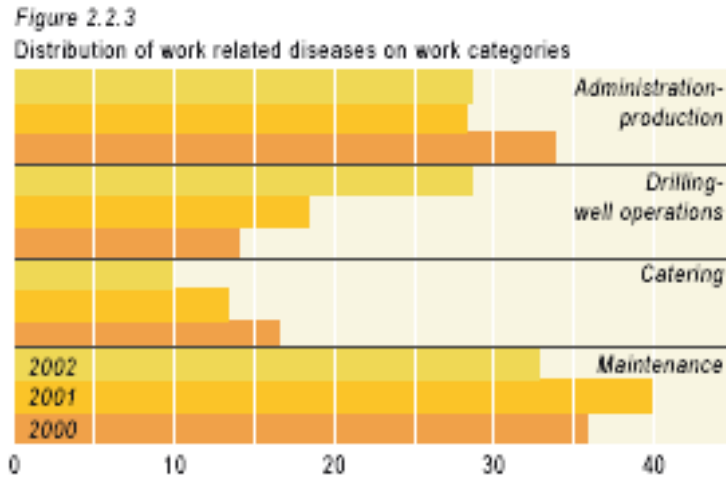
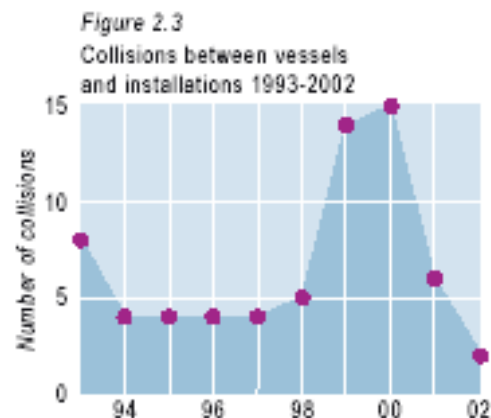
the swing shift system. However, significant use of sleeping medications on the installations could indicate a certain under-reporting of sleep problems.

Figure 2.2.2 shows how muscular and skeletal disorders are distributed among various groups of causes. The two most important groups of causes are heavy loads or lifts, and repetitive, monotonous work. These groups account for nearly two-thirds of all cases. It may seem difficult to explain that heavy lifting accounts for such a large percentage in light of increasing mechanization. However, this just highlights the importance of good work organization.

Figure 2.2.3 shows how the reported cases are distributed across position categories. Maintenance personnel still has the largest proportion (in per cent) of work-related illness. In the group drilling and well operations, however, the proportion has been doubled in the course of two years. This must be viewed in connection with the considerable increase in reported cases of hearing loss, where drilling and well personnel appear as a vulnerable group.

## 2.3 Damage to load-bearing structures and pipelines

The Norwegian Petroleum Directorate receives reports of damage to and incidents in connection with load-bearing structures and pipeline systems. The information is compiled in the CODAM database, which now



contains data on nearly 6000 incidents. In 2002, there were reports of 18 incidents related to pipeline systems and 12 related to load-bearing structures.

Damage and incidents are classified in the categories "insignificant", "minor" and "major". The two first are incidents that do not require much repair or follow-up. Incidents in the "major" category include, for example, leaks in pipelines and risers, incidents involving buckling of pipelines, as well as external and internal corrosion, depending on the scope of the damage and the criticality.

In 2002, there were eight incidents and damage events classified as "major" involving pipelines and risers. None of these led to personal injuries, significant harm to the environment or damage to installations and other associated equipment. Measures have been implemented to repair the damage and prevent it from becoming more severe.

Most damage and incidents related to load-bearing structures are in the categories "insignificant" and "minor". As in previous years, there were no reports in 2002 of incidents classified as "major".

Two collisions between vessels and installations have been reported in 2002. Compared with previous years, 2002 also shows a definite decrease in this type of incidents, as illustrated in Figure 2.3. One reason for the reduction in the number of collisions seems to be the focus placed on avoiding such incidents and measures that have been implemented to counteract such incidents.

## 2.4 Hydrocarbon leaks and fires

The number of hydrocarbon leaks has shown relatively large variations in recent years. These variations lie within a statistical range of uncertainty, however, it emerges from Figure 2.4.1 that the number and size of the leaks do not appear to be shrinking. To illustrate the scope of the leaks, a leak rate of 1 kg/s would fill a 500 cubic meter room - a medium-sized classroom - with an explosive gas mixture in less than one minute. It follows from this that even the "minor" gas leaks, down to 0.1 kg/s, can have a considerable damage potential.

Information from the reports on the leaks shows that more than half are discovered by automatic detection equipment, while the remainder are discovered by personnel in the relevant area. This applies mostly to the small leaks from valves and connections.

Figure 2.4.2 shows that it is still valve faults and incorrect operational actions that account for the majority of the leaks. The category corrosion and fracture accounts for a relatively small number, but

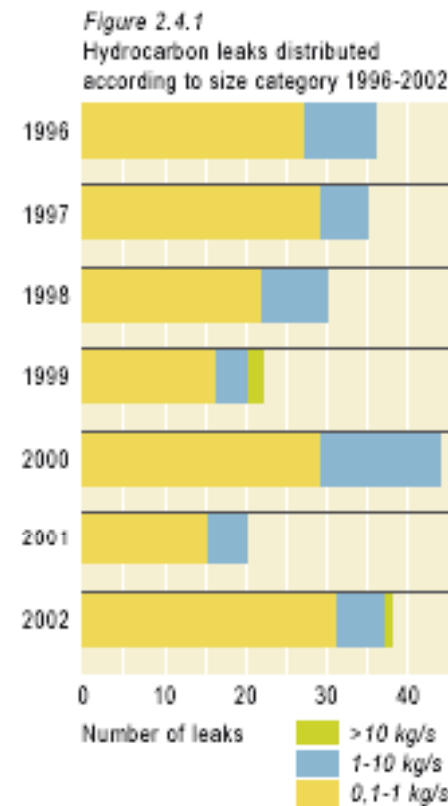
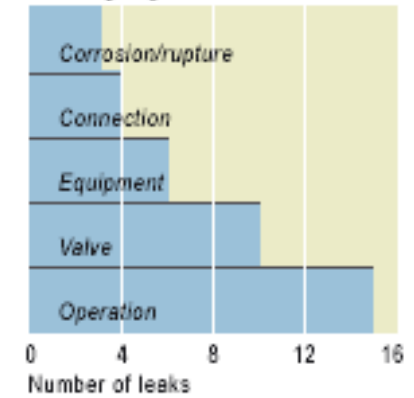
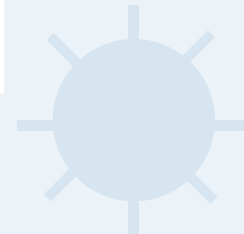
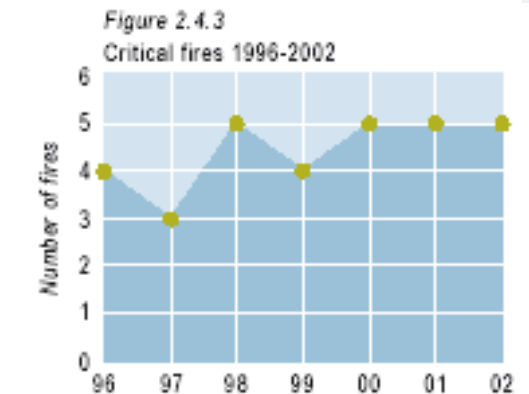


Figure 2.4.2 Main group of faults resulting in gas leaks 2002



these types of incidents can lead to leaks of significant size.

Only fires that are evaluated as being critical according to specific criteria are to be reported to the Norwegian Petroleum Directorate, while it is assumed that other fires and near-fires will be handled by the companies' own follow-up procedures. Figure 2.4.3 shows that the number of such fires has been relatively constant over a number of years. Two of the critical fires in 2002 entailed personal injuries, but none of a serious nature.

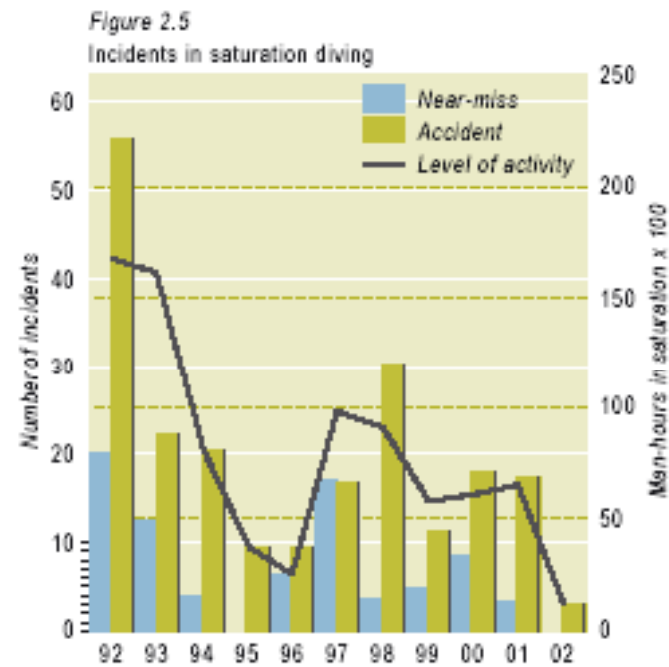




### 2.5 Diving activity

In 2002 there were 21 surface-oriented dives and 122 bell runs amounting to around 12426 man-hours of saturation diving on the Norwegian shelf and on Norwegian pipelines on shelves abroad. This is a reduction in both surface-oriented diving and saturation diving compared with 2001.

Figure 2.5 shows the number of undesirable incidents related to diving activities which have been reported to the Norwegian Petroleum Directorate over the last ten years. As can be seen, the number of injuries in 2002 has been reduced in relation to the previous year, in line with a lower activity level. One of the reported injuries was of a serious nature. No near misses were reported.



## 3 The Petroleum Activities and the Environment

### Consideration for the environment

Consideration for the external environment has attained a central position in the formulation of petroleum and energy policy. The external environment is safeguarded as an integral part of the work aimed at proper management of the Norwegian petroleum resources.

The main activities in this work are stipulation of regulations and other frameworks for the activities, preparation of reports and professional advice to the responsible ministries, and supervision of the activities on the shelf. Other activities are related to participation in national and international forums that work on external environmental issues.

A large portion of the work that is done out of consideration for the safety of personnel and financial assets also has a positive effect on the external environment.

### Authorities and framework

The Norwegian Petroleum Directorate and the Norwegian Pollution Control Authority have the authority to supervise the petroleum activities under the Petroleum Act and the Pollution Act. The Norwegian Petroleum Directorate also enforces the Act concerning CO<sub>2</sub> tax on the shelf.

The Petroleum Act requires that all activities be carried out in a responsible manner which safeguards the safety of personnel, the environment and financial values.

The Pollution Act has the objective of ensuring proper environmental quality so that pollution and waste do not lead to health hazards, do not affect general well-being or harm nature's capabilities of production and self-renewal. As part of the Ministry of Petroleum and Energy's responsibility for the sector as regards environmental aspects, the Norwegian Petroleum Directorate is responsible for energy efficiency and safety on installations and in connection with facilities. This applies also to limiting potential accidental discharges and emissions that are harmful to the environment.

### Supervision of the activities

Security against pollution is also covered under the safety concept as it is applied in the petroleum activities. Supervision of environmental measures and

environmental activities is an integral part of the Norwegian Petroleum Directorate's supervision activities. The Norwegian Petroleum Directorate also carries out supervision of internal control systems for operators and contractors in order to ensure that the activities are planned and implemented in accordance with the authorities' requirements and the companies' acceptance criteria goals.

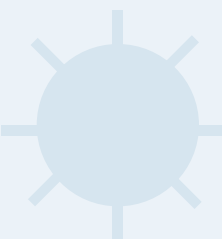
In its supervision of exploration drilling in environmentally sensitive areas, the Norwegian Petroleum Directorate has placed particular emphasis on preventive measures which the operators implement. In addition, the Directorate has followed up the operators' work on stipulating acceptance criteria for environmental risk, in other words, the risk the operator itself can accept for its activity.

The Norwegian Petroleum Directorate also carries out supervision of the use of equipment which measures fuel consumption and the quantity of gas used for flaring and cold venting. Collection of the CO<sub>2</sub> tax on the shelf is the responsibility of the Norwegian Petroleum Directorate, and the Directorate makes an annual evaluation of the companies in order to assess the impact of the tax on CO<sub>2</sub> emissions.

### Evaluation of environmental aspects

When the Norwegian Petroleum Directorate evaluates regional impact analyses, plans for development and operation, applications for consent and applications for the award of production licenses, the environmental aspects are a natural and fully integrated part of the Directorate's evaluation. The Directorate shall be a driving force to get the industry to develop and put to use technology that reduces emissions to air and discharges to sea, and thus maximize the value creation from the activities in a life-cycle perspective.

In 2002, the Norwegian Petroleum Directorate has considered and made recommendations in respect of nine new field and pipeline developments. The possibility of implementing various environmental measures



# The Petroleum Activities and the Environment

was a central aspect of the Directorate's evaluation of these plans. Together with the Ministry of Petroleum and Energy, the Norwegian Petroleum Directorate has again in 2002 prepared a publication that provides an overview of environmental aspects on the Norwegian shelf: "Environment 2002. The Petroleum Sector in Norway".

The oil industry's Environmental Forum is a continuation of the Miljøsok work concluded in 2000. The Environmental Forum has 45 members, and the Director General of the NPD participates in the Forum's Executive Committee. The Directorate has also taken part in the Environmental Forum's working group on "Oil/Fisheries". This group has considered potential measures that can contribute to ensuring that various players have access to adequate data on how the various users of the sea areas affect the marine environment.

Within the arena of international cooperation under the Oslo and Paris Convention (OSPAR), the participating countries seek, among other things, to arrive at common standards and goals for reducing discharges to sea. Together with other Norwegian authorities, the Norwegian Petroleum Directorate has contributed to this work, which in 2001 resulted in resolutions for reduced discharge of oil in produced water by 2006. The Norwegian Petroleum Directorate participates in the Ministry of Environment's advisory committee on the "Marine Preservation Plan". In 2003, the committee will submit recommendations for formulation of the first preservation plan for protected marine areas in Norway.

In cooperation with a number of operators, the Norwegian Petroleum Directorate has continued work in 2002 to evaluate the potential for using CO<sub>2</sub> for injection into oil fields to improve recovery. It is expected that this work will be completed in June 2003. The Directorate also follows up the ongoing work among the Gullfaks licensees on mixable gas injection, where CO<sub>2</sub> is one of the alternatives.

## Power from land

Together with the Norwegian Water Resources and Energy Directorate (NVE), the Norwegian Petroleum Directorate prepared a study examining the possibility of replacing turbines and generators that produce electricity on the installations in the southern North Sea, the Oseberg area and the Norwegian Sea with power from land. The purpose

was to identify the effects and the costs of measures associated with utilizing power from land for operation of installations in the above-mentioned areas.

The study contains estimates of the costs of measures, i.e. the cost per reduced unit of CO<sub>2</sub> and NOX emissions for four power supply alternatives from land (hydroelectric power, conventional gas power, gas power with CO<sub>2</sub> management, as well as imported power). The conclusion of the study is that supplying the Norwegian shelf with power from the mainland will be too expensive, and the environmental benefit is extremely uncertain. The study is available on the Norwegian Petroleum Directorate's web site.

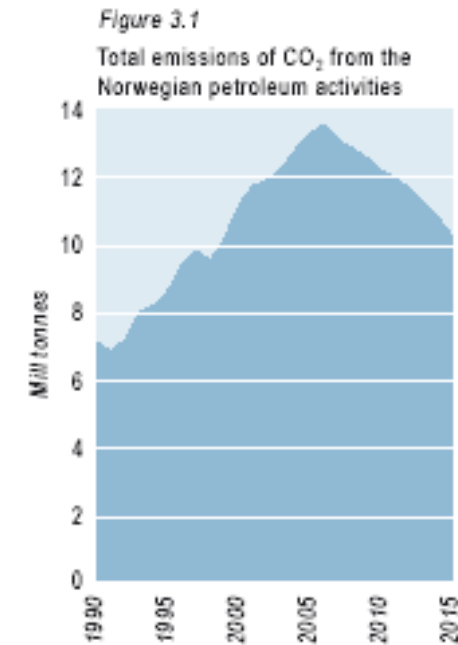
## Emissions and discharges from the activities on the shelf

The most significant emissions to air from the activities on the shelf are CO<sub>2</sub>, NOX and volatile organic compounds (nmVOC and methane). In addition come discharges of chemicals, oil and other organic components to the sea. Each year, the Norwegian Petroleum Directorate compiles historical emission/discharge data and prepares forecasts for the activities with main emphasis on emissions to air and produced water. The emission/discharge data is an important basis from which to evaluate policy instruments so that national and international commitments may be followed up in a cost-effective manner. For more information on up-to-date emission/discharge trends, please see the Norwegian Petroleum Directorate's web site and the publication "Environment 2003. The petroleum sector in Norway" on the Ministry of Petroleum and Energy's web site.

## Emissions of carbon dioxide (CO<sub>2</sub>)

Preliminary figures from the Norwegian Petroleum Directorate show that the total CO<sub>2</sub> emissions from the shelf increased slightly from 2001 to 2002. The forecast for emissions of CO<sub>2</sub> shows a growth in emissions as a result of an anticipated increase in activity up to 2006, see Figure 3.1.

A higher level of total emissions does not mean that there have not been improvements as regards the environment. However, improvements in energy exploitation and reduced flaring have not been great enough to make up for the increased energy consumption resulting from a higher activity level. An indication that the activities have become more efficient are that the emissions per sold unit of petro-



leum are increasing less than the increase in the total emissions.

## The work on nitrogen oxides (NOX)

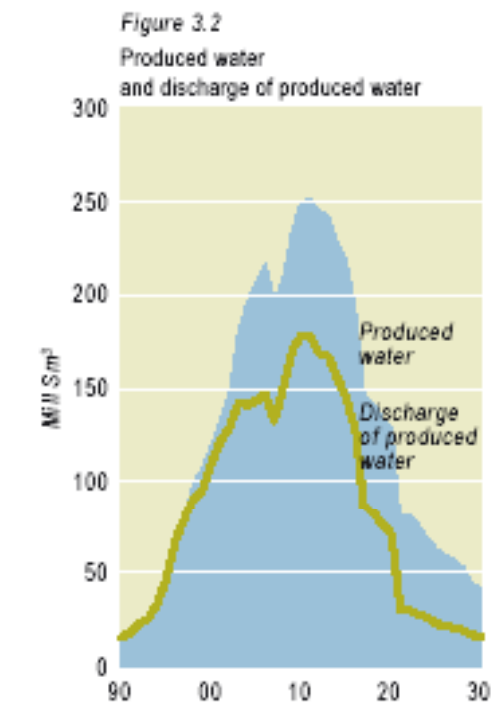
In the operations phase, emissions of NOX are not yet regulated on the continental shelf other than in any conditions stipulated in connection with consideration of the PDO. In 1999, Norway signed the international Gothenburg Protocol which inter alia stipulates requirements for reduction of national NOX emissions equivalent to a 29 per cent reduction in 2010 compared with the 1990 level.

## Produced water

Preliminary figures indicate that water production on the Norwegian shelf in 2002 was 12 per cent higher than the previous year, while the discharges of produced water increased by five percent during the same period. As shown in Figure 3.2, water production is expected to climb until 2011, however, an increasingly larger portion of the produced water will be reinjected. There has been a positive trend in 2002 in the use of improved purification methods for produced water that is discharged to sea.

The Directorate has cooperated with other authorities and the industry on implementation of the zero discharge philosophy.

In the research program *Long-term effects of discharges to sea from the petroleum activities* – PROOF, the industry and the authorities are working together to enhance knowledge of some of the high-priority issues. The program is run by the Research Council of Norway. It started in 2002 and will run through 2008 with an annual budget of approx. NOK 20 million.





**FORCE**

FORCE ("Forum for Reservoir Characterization, Reservoir Engineering and Exploration Technology Co-operation") is a cooperation forum on problems related to exploration and improved oil recovery.

FORCE started in 1995 with a three-year period. Good experiences led to FORCE being continued in Phases 2 and 3 (Phase 3 from 2002 to 2004). FORCE gained a new member in 2002, Pertra, thus bringing the total number of members up to 23. BP holds the chairmanship until the end of 2004, while the Norwegian Petroleum Directorate has a permanent secretariat function.

In 2002, FORCE has aimed increased focus at initiation of projects. Permanent arenas have been set up between the research and university institutions and the oil companies.

The following seminars/workshops were organized in 2002:

- *Prestack Data - The Key to the future?*
- *Future Petroleum Research Directions*
- *4C/OBC Data Processing*
- *Depositional Architecture within the Ainsa Turbidites*
- *Turbidites Reservoir modelling - improved reservoir models by use of Field analogue*
- *Polygonal Faulting and Sand Remobilization*
- *New opportunities for monitoring the dynamic processes in the reservoir*
- *Tidal Architecture and Signature in regressive vs. transgressive Shorelines*

A total of 2970 persons have participated in FORCE seminars/workshops since 1995. 499 of these attended in 2002. For more information on FORCE and the activity in the committees, please check the web site [www.force.org](http://www.force.org).

**FUN**

FUN (Forum for Forecasting and Uncertainty Evaluation Related to Petroleum Production) is a cooperation forum relating to problems within the areas of preparing prognoses and uncertainty evaluations for future oil and gas production. FUN was started in May 1997 and has 13 oil companies and the Norwegian Petroleum Directorate as members. The Ministry of Petroleum and Energy and the Norwegian Oil Industry Association are observers in the forum. The forum is organized with a board consisting of representatives from all of the members. The Norwegian Petroleum Directorate current-

ly holds the chairmanship. The secretariat is located in the Norwegian Petroleum Directorate.

In 2002, FUN has been used actively in connection with the national budget reporting in order to discuss reporting changes. The forum has also been used for feedback to and from the operators.

In 1999, FUN also initiated a project relating to best practice within the field of forecasting and decision-making under uncertainty. The project is divided into three phases. The initial phase of the best practice project has consisted of mapping current practice in the companies and the authorities and was completed in the first half of 2000. Phase two of the project started in 2001. In this part of the project, a teaching system has been developed in which focus is placed on making decisions under uncertainty from exploration to cessation of production. Three five-day courses have been organized with a total of 64 attendees from 13 oil companies, in addition to the Norwegian Petroleum Directorate.

Together with the Society of Petroleum Engineers (SPE), FUN organized the Applied Technology Workshop (ATW) "Petroleum Reserves and Resources Management" on 24-26 September 2002. Participants numbered 53 representatives from 30 different organizations in nine countries. For more information, please refer to the web site [www.fun-oil.org](http://www.fun-oil.org).

**SAMBA**

The Norwegian Petroleum Directorate makes extensive use of modern data bases and analysis tools. This provides great advantages in connection with production of reports and analyses, and in the delivery of final reports with a high level of quality. The SAMBA project has been established in order for the Norwegian Petroleum Directorate to maintain the advantage of having good, quality-controlled databases based on modern IT technology in the future as well.

The SAMBA project was started with a pre-project in 1996. The first modules of the system were put into use in 1997. SAMBA consists of the following modules: Companies, production licenses, agreement-based areas, fields, field sections, discoveries, deposits, resource estimates for deposits, profile collections, transportation and exploitation facilities, parts of transportation and exploitation facilities, prospects and prospect estimates.

SAMBA entails a systematization and integration of information which provides the Norwegian Petroleum Directorate with a good overview of the activities on the Norwegian shelf. The project also emphasizes use of standards found in the market. POSC's (Petrotechnical Open Software Cooperation) Epicentre data model is used in the data modeling.

SAMBA is a key tool in connection with reporting for the national budget. The entire resource accounting is now found in the database. Provisions have been made which mean that the data is easily accessible both for ordinary end users and for advanced users who want to explore the database in more detail and assemble and analyze the data themselves.

**DISKOS**

The DISKOS project started as a collaboration between Saga Petroleum, Norsk Hydro, Statoil and the Norwegian Petroleum Directorate in 1993 for development and operation of a common national database (the DISKOS database) for technical petroleum data. The project now includes a total of 16 oil companies as well as the Norwegian Petroleum Directorate that are linked together in a high-speed electronic network. The DISKOS database includes most of the processed 2D and 3D seismic from the Norwegian shelf, in addition to all navigation and velocity data. The DISKOS database also contains quality-controlled well data and production data from the Norwegian shelf. The database has the functionality to carry out data swaps between the oil companies. Data swaps are administered by the Norwegian Oil Industry Association.

The collaboration in the DISKOS group is headed by the Norwegian Petroleum Directorate. The costs of development and operation will be divided among the users of the system. The operation of the database itself has been outsourced to the company PetroData A/S in Stavanger.

In 2002, the contract for operation of the DISKOS database was sent out on tender for the next contract period, which is 2004 - 2008. After a comprehensive evaluation of technical and financial criteria, the contract for the next period was awarded to Schlumberger Information Systems (SIS). At the end of 2002, a project was implemented to move data from the current operator to SIS, so that the database will be available to all users starting from

1 January 2004. The PetroBank (Landmark) software will still be used. A new business model for the DISKOS collaboration was developed in connection with the tender work. The intention is to streamline the use of the database and provide easier access to more users. The challenges associated with expanded access to the database are both technical and commercial in nature.

Work continued in 2002 to load all historical well data from the Norwegian shelf into the database. The goal is to achieve a complete collection of all well data from the Norwegian shelf, accessible to all DISKOS members.

The Norwegian Petroleum Directorate delivers quality-controlled administrative data to the database on a weekly basis. This data relates to production licenses, blocks, fields, seismic navigation, well locations, pipelines, etc. The database now contains approximately 60 terabytes of data.

Other countries are very interested in the Norwegian DISKOS concept and the DISKOS project management has provided support for similar projects in several countries. Similar projects have been already established in Brazil and the U.K.

**Other co-operation projects within data management**

The Norwegian Petroleum Directorate participated in the following groups/projects initiated by the Norwegian Oil Industry Association in 2002:

- LicenseWeb is now being used for administrative communication between the operator, partner and the authorities for permits, including permits for installations and operations. The steering committee decided in 2002 to establish a joint archive in LicenseWeb. The Norwegian Petroleum Directorate participated as an observer in the steering committee, the working group for the archive solution and in the user forum. The Norwegian Petroleum Directorate has in

2002 clarified how the Directorate is to be notified, what type of information will be directly accessible, what will be sent to the observers and what will be sent to Norwegian Petroleum Directorate's main address.

- the working group for electronic government correspondence has assessed alternative solutions for electronic correspondence which will replace paper correspondence. Initially the project includes the Norwegian Petroleum Directorate, the Norwegian Oil Industry Association, the Ministry of Petroleum and Energy and the operators and partners on the shelf.
- e-operation – project group for the preparation of scenarios for the Norwegian shelf in 2010.

Common Drilling Reporting System (CDRS) is a cooperation project between the Norwegian Petroleum Directorate, Statoil, Norsk Hydro, BPAmoco and TotalFinaElf concerning daily drilling reports. The Norwegian Petroleum Directorate is responsible for the project management.

The Norwegian Petroleum Directorate participates as an observer on the Board of Brukerforum SOIL. SOIL is the petroleum industry's own Extranet, the initials representing Secure Oil Information Link. This infrastructure solution is a prerequisite for cooperation solutions such as LicenseWeb.

### Participation in research and technology development programs

#### Long-term effects of discharges to sea from the petroleum activities (PROOF)

The basis for the program is the need for increased knowledge of the long-term effects of discharges from the offshore activities. This type of knowledge is necessary in order for the authorities to be able to manage the development in the activities and coordinate exploitation of the oil and gas resources with other use and protection of the marine environment. It is essential that the overall impact on the marine environment does not lead to changes in biological diversity or the marine system. The plan is for the program to last for six years. The newly established program board has been appointed for three years, from 15 August 2002 to 15 August 2005. The Norwegian Petroleum Directorate is represented on the board.

#### Oil and gas (OG)

The petroleum sector represents the industry in Norway with the highest value creation potential, and it will create a substantial portion of the nation's economic basis throughout this entire century. Prerequisites for this include a major, long-term commitment to research and development of technology. The return on R&D is greater than in any other sector, and most of this return falls to the Norwegian state. This is a high-tech industry, with a considerable need for supply of key expertise. An important commitment area in the program will therefore be small and medium-sized businesses (SMB) within the supplier industry. The program will support reciprocal cooperation among SMBs, between SMBs and expertise circles, and between SMBs and large companies. Assistance in setting up international cooperation projects is also offered.

The commitment to health, environment and safety (HES) in the petroleum industry is an integrated part of the program, and a major project financed by the Ministry of Labor and Government Administration will be an important part of the program board's work in the next few years. The program period will last for eight years, from 2002 to 2010. The Norwegian Petroleum Directorate is represented on the board.

#### National technology strategy for value creation and increased competitiveness in the oil and gas industry(OG21)

The program is a continuation of the work done during the interim period 2000 - 2001, in which the Norwegian Petroleum Directorate was represented in the core group and management committee. A goal for the strategy work is to facilitate a comprehensive coordination of research and technology development through integration of long-term and short-term research, technology development, demonstration and commercialization of new technology. The Norwegian Petroleum Directorate is represented on the new board.

#### Other projects

##### The Norwegian Petroleum Directorate's mapping of the borders of the Norwegian continental shelf

The UN Convention on the Law of the Sea gives coastal states the right to draw up the boundaries of the continental shelf beyond the exclusive economic

zone of 200 nautical miles. Norway ratified the convention in June 1996 and must present its claim with regard to this outer boundary to the UN within 2006.

The Ministry of Foreign Affairs is responsible for this work and, through the Ministry of Petroleum and Energy, has delegated the responsibility for the necessary technical studies to the Norwegian Petroleum Directorate. It is also possible that boundaries of the continental shelf off the coast of the Norwegian possessions in the southern hemisphere may be submitted.

In this connection in 2002, seismic data was collected and processed off the coast of Dronning Mauds Land. A total of 2660 km multi-channel reflection seismic data and 2 sonar buoys (refraction seismic) were collected.

#### Development of HES expertise

In 2002, the Norwegian Petroleum Directorate received an additional appropriation of NOK 7 million for internal expertise enhancement in the field of HES. For several years, the Directorate had argued in favor of increased resources for such a commitment, and a goal-oriented plan had been prepared in advance for expertise development, particularly special expertise in priority areas, with a view towards being able to keep pace with the technological and organizational development.

Forty projects were initiated in 2002, several of which will run over several years. The projects can largely be divided into three main areas:

- Technological issues
- Supervision methods
- Regulatory development

The basis is that the guiding principles in Storting White Paper No. 7 (2001-2002) relating to health, environment and safety in the petroleum activities are to be emphasized. Therefore, relevant main themes of the projects have been:

- HES, with emphasis on preventing serious personal injuries and major accidents, including also interruption of production and deliveries.
- Methods and tools for managing HES in

dynamic change and decision processes, including decisions made under uncertainty.

- Risk-based management of complex technological and organizational systems, including information security and ICT vulnerability.
- Opportunities and limitations for use of human resources in the HES work, including monitoring and control room functions.
- Management of HES knowledge and risk communication.

After review and evaluation of the 2002 projects, it can be confirmed that the Norwegian Petroleum Directorate has already gained valuable new expertise, and has also secured predictable planning of superior expertise projects for a period of three to five years. Of the forty projects carried out in 2002, most are within the main field of technological issues.



## International Co-operation

### Co-operation with NORAD

In 2002, the Norwegian Petroleum Directorate's assistance work financed by NORAD amounted to approximately six man-years. Assistance has also been provided by a number of firms, mainly Norwegian. The majority of the assistance has been directed towards the following co-operating countries: Angola, Namibia, Mozambique, Bangladesh and Vietnam. The Norwegian Petroleum Directorate also had limited cooperation with the Coordinating Committee for Coastal and Offshore Geoscience Programmes in East and Southeast Asia (CCOP).

As regards the majority of the projects, institutional co-operation agreements have been entered into with sister organizations in the south, providing an opening for assistance within an extensive part of the Norwegian Petroleum Directorate's sphere of activities, both technically and administratively. Training and establishing a legal framework for the petroleum activities are central elements of all projects.

The Norwegian Petroleum Directorate also assists NORAD in connection with the preparation of new national strategies, evaluation of new project proposals, and also cooperates with other governmental institutions (the Norway axis) on executing these types of projects. Potential future collaborations with Nigeria and East Timor are being considered.

#### Angola (Ministry of Petroleum MINPET)

This is a three-year co-operation program started in the autumn of 2000. An advisor from the Norwegian Petroleum Directorate has assisted MINPET in their work in the last half of the year, and has also assisted in the implementation of the program. The main activity has been aimed at assistance in the development of regulations within the HSE area, as well as within resource management and downstream activities for the oil and gas sector. A comprehensive study has been made of the future needs for manpower in the petroleum sector. The study was a collaboration with Statoil and Norsk Hydro. Access to qualified local labor will be a bottleneck for significant utilization of national goods and services.

#### Namibia (Ministry of Mines and Energy - MME)

The main activity in MME is aimed at organizing the future development of the country's gas resources. Disappointing appraisal wells on the Kudu offshore

gas field have led to the evaluation of new and smaller development solutions. During last year's program, assistance was also provided towards the development of statutes and regulations for the development and production of natural gas. Last year's work program also included further training in supervisory methodology and assistance in connection with promoting exploration activity. Up until April 2002, the Norwegian Petroleum Directorate had an advisor stationed with MME in Winhoek.

#### South Africa (Department of Mineral Resources and Energy - DME)

Organization of upstream oil and gas activities, establishment of framework conditions for marketing of natural gas in South Africa, organization of sales of petroleum, organization of state ownership interests in the petroleum sector and training are important areas for Norwegian assistance to DME. The project started in the spring of 1999 was largely completed in 2001. Phase two was started in 2002, with largely the same focus as phase one.

A major development is now underway of the gas infrastructure in South Africa, based on gas to be imported from Mozambique. The NORAD-financed assistance to South Africa and Mozambique has been an important precondition for realization of this project.

#### Mozambique (National Directorate for Coal and Hydrocarbons - NDCH)

NDCH has received support to complete the work on regulations for the petroleum sector under the country's new petroleum act. In 2001, the Norwegian Petroleum Directorate assisted in consideration of the development plan for the Pande and Temane gas fields and the associated transportation system for gas to Secunda in South Africa (approx. 700 km). The project, which has a total budget of approx. USD 1.3 billion, is now on a fast-track for completion. The Norwegian Petroleum Directorate and the Norwegian Pollution Control Authority assisted NDCH and MIKOA in the planning and implementation of HSE supervision of the project. The national data archives for the petroleum sector are now in full operation and installation of interactive interpretation stations is being prepared. This center now assists TPDC in Tanzania in securing their petroleum data.

Considerable funds are being used for additional university training abroad for NDCH employees, in addition to practical training in resource planning and supervision activities. A decision has been made to continue the program for another four years.

The Norwegian Petroleum Directorate has also assisted Empresa Nacional de Hidrocarbonetos (ENH), the national state oil company, in obtaining consultancy support to finalize negotiations with Sasol on development and financing of the natural gas project.

#### Bangladesh

The Norwegian Petroleum Directorate has co-operated with Bangladesh for a number of years. In recent years, the co-operation has been carried out through the Hydrocarbon Unit (HCU) under the Ministry of Energy and Mineral Resources, which is the Norwegian Petroleum Directorate's co-operating organization.

The main work in the current phase of the project is aimed at the development of expertise within resource mapping, resource evaluation and data management. HCU has recently presented new gas resource estimates which will be of great importance in connection with evaluation of potential gas exports from Bangladesh. The program has also financed planning of a new resource data base and a major gas market study.

#### Vietnam

The Norwegian Petroleum Directorate has entered into a new agreement with Petrovietnam for continued assistance on the development of safety regulations and training in the area of safety management. The Norwegian Pollution Control Authority co-operates with the Norwegian Petroleum Directorate and will continue its environmental project with Petrovietnam.

The "Vietnam Total Resource Assessment" project was approved at the end of 2002. The project is to provide assistance to Petrovietnam in improving methods of conducting resource analyses as a basis for resource planning.

#### Nicaragua (Instituto Nicaraguense de Energia - INE)

The project is being continued at a lower level, and

the assistance was aimed at promoting blocks for the first nomination/announcement round, which has now been completed. The first awards are expected in 2003.

#### CCOP

The Norwegian Petroleum Directorate has provided assistance to the co-operation organization CCOP in Eastern and Southeastern Asia which works on the mapping of petroleum resources in the area and lays plans for exploitation of these resources. The new program, "Petroleum Policy and Management" has been started with the assistance of an adviser from the Norwegian Petroleum Directorate in Bangkok. Four sample studies will be conducted of petroleum basins in the region with differing maturity levels in order to increase knowledge of resource planning.

#### The Philippines

On assignment from NORAD, the Norwegian Petroleum Directorate assists the Department of Energy (DOE) on the Philippines in developing expertise on the part of the authorities in following up development projects within the petroleum sector.

#### East Timor

The Norwegian Petroleum Directorate co-operates with the authorities on East Timor to develop a program for enhancing expertise in the field of petroleum management. The program will probably get underway in the spring of 2003.

#### Nigeria

The co-operation with Nigeria within the petroleum sector has gone on for several years. The Norwegian Petroleum Directorate has contact with the Department of Petroleum Resources (DPR), which has a similar function in Nigeria as the Norwegian Petroleum Directorate has in Norway. An institutional cooperation is planned in order to further develop this contact, and financing is expected from NORAD.

DPR is interested in information and knowledge about new technology, everything from deep-water technology or advanced technology for producing petroleum. They are also interested in technology and methodology linked to metering of oil and gas,

## International Co-operation

as well as systems established to follow-up ongoing development and operations activity.

Another priority area for the Nigerians is data management. The data management model established in Norway has attracted considerable attention. In this connection, two seminars have been held, the most recent in Lagos on 23- 24 April 2002.

During the course of the year, DPR has prepared a co-operation program which, together with an application for financial support, was submitted to NORAD towards the end of 2002. Continued co-operation will largely depend on this application; how one can implement the Nigerians' wishes and how the co-operation can be organized so that it concurs with the Norwegian objectives, desires and established practice for this type of co-operation.

### Co-operation with PETRAD

As a result of a pilot project carried out by the Norwegian Petroleum Directorate for NORAD during the period 1989-1993, Petrad was established as an independent foundation by the Norwegian Petroleum Directorate and NORAD on 1 January 1994.

The objective of the foundation is to place Norwegian expertise and expertise in the fields of management and administration of petroleum resources at the disposal of managers from the authorities and national oil companies in Africa, Asia, Latin America, Oceania and the CIS (Commonwealth of Independent States). This is accomplished by adapting seminars to the inquiries and needs of the authorities in the above-mentioned regions, in addition to the organizing of two eight-week courses each year, "Petroleum Policy and Management" and "Management of Petroleum Operations" in Stavanger. All Petrad activities are aimed at senior and middle management personnel.

During the course of 2002, the Norwegian Petroleum Directorate contributed through implementation of Petrad's two annual eight-week courses, conducted in the Norwegian Petroleum Directorate's offices. This activity contributes to professional exposure to and understanding of different cultures while simultaneously increasing the overall expertise for those employees of the Directorate who are involved.

### Co-operation within resource management

#### Annual meetings with the authorities in the North Sea area

As an oil and gas province, the North Sea is divided between the UK, the Netherlands, Germany, Norway and Denmark. Even though the individual fields are quite different, there are many similarities among the fields in the North Sea area. The petroleum resource management problems encountered by government agencies in these countries are therefore similar in many ways. The objective of the meetings is primarily to exchange opinions and experience from the respective activities. This particularly applies to areas that cover environmental issues, data management, improved recovery, development of small fields and unitization.

#### Annual meetings with other countries' authorities - exploration phase

Since 1983, annual meetings on technical issues have taken place between the Norwegian Petroleum Directorate and state administration units in other Northern and Western European countries with responsibility for exploration for oil and gas: England, Ireland, Denmark, Germany, the Netherlands, France, the Faeroe Islands and Norway.

The main issues of discussion at the meetings are geotechnical, exploration technology and data management issues, as well as challenges faced by the various countries in their efforts towards efficient discovery of new oil and gas resources. The responsibility for hosting the meetings is on a rotation basis among the various countries. The Department of Trade and Industry (DTI) was responsible for the arrangement in 2002.

#### Annual meetings with other countries' authorities - fiscal metering

In those countries where Norwegian petroleum is landed, the authorities' responsibility and roles are stipulated in treaties and cooperation agreements. There is extensive cooperation on the part of the authorities in order to safeguard the individual country's requirements for fiscal metering. An important forum in this cooperation is annual meetings in which status and future activities in the area of metering technology are reviewed. The Norwegian Petroleum Directorate has established cooperation agreements with German, Belgian, British and French authorities.

### Co-operation with Russian authorities Norwegian- Russian Forum

The Norwegian Petroleum Directorate is also involved in cooperation with Russia. This commitment is mainly coordinated through the Norwegian-Russian Forum for Energy and Environment, which is led by the Ministry of Petroleum and Energy.

### International research co-operation regarding improved oil recovery

Since 1979, Norway has participated in international research cooperation under the direction of the International Energy Agency (IEA) regarding improved oil recovery using advanced methods. Twelve countries currently participate, and the cooperation largely consists of a commitment for a certain scope of research in specific areas and the exchange of results.

Since 1986, the Norwegian Petroleum Directorate has represented Norway in the international management committee for this IEA co-operation.

### Co-operation within health, safety and environment management

#### International co-operation agencies

The Norwegian Petroleum Directorate co-operates extensively with international technical institutions and government agencies, either directly or indirectly through Norwegian government agencies. The purpose of this co-operation is to:

- contribute to ensuring that safety and the working environment in the petroleum activities at least meet accepted international standards,
- ensure access to relevant information for competence building and regulatory development,
- contribute insight and experience in an international context in order to promote positive development in safety and working environment.

In general, the co-operation has consisted of participation in international governmental co-operation in Europe and in agencies of the United Nations, but also more direct co-operation with the various types of international and regional professional institutions. Key cooperation forums in the area of safety and working environment in 2002 have been the International Regulators Forum (IRF) and the North Sea Offshore Authorities Forum (NSOAF).

### IRF - International Regulators Forum

The International Regulators Forum (IRF) was established in 1994 by a group of authorities who wanted to promote a common understanding of issues related to safety, health and the environment. The forum provides for exchange of ideas and opinions regarding methods and principles applied to efficient exercise of the supervision of safety and working environment, and exchanges facts regarding the supervision activities and informs one another regarding relevant technical issues, regulatory development, etc.

Within the possibilities and limitations stipulated through national frameworks for the activities, this will contribute to promoting a common understanding among the members with regard to issues such as: the role of the supervision authorities, use of policy instruments in the supervision, supervision methods, competence development, the relationship between the authorities and industry, etc. The following participate in the co-operation in addition to Norway: Australia, the Netherlands, Canada, the United Kingdom and the USA. An increase in the number of participating countries is being considered.

### NSOAF - North Sea Offshore Authorities Forum

In the field of health, safety and environment, the Norwegian Petroleum Directorate participates in the North Sea Offshore Authorities Forum (NSOAF), where representatives from all the North Sea countries' governmental authorities in charge of supervision of offshore petroleum activities take part. The goal of the forum is to ensure continuous improvement in health, safety and the environment in the petroleum activities in the North Sea.

The members of NSOAF meet for an annual working meeting where the activities are summarized and new tasks are discussed and initiated. Two independent working groups have been appointed by the forum the Norwegian Petroleum Directorate is represented in these.

One of the groups works towards mutual acceptance of methods of documenting compliance with national regulatory requirements. This group is chaired by a Norwegian.



Audit teams have been established under this working group made up of representatives from several of the member countries. In 1999, these teams conducted for the first time joint audits directed towards five mobile drilling installations on the respective shelves of the participating countries. The reports have been presented to the relevant shipping companies in 2000, and the forum has received positive feedback. Based on these experiences, a decision was made to implement a new international audit, which was carried out in 2001. The overall experiences from such joint audits are considered to be very positive, both with regard to the development of a common understanding of the countries' different regulatory and supervision strategies, and with regard to the actual findings and observations made. The experience from the international activities is an important contribution to further co-operation in an NSOAF context in order to unitize and harmonize important authority issues in the North Sea basin.

The other group, which has a Danish chairman, is working to achieve mutual acceptance of the requirements for safety training in the various North Sea countries. Previously, the member countries have agreed on which elements of the training programs are mutually acceptable and in which areas there are different requirements. In 2001, the working group has assessed the opportunities for mutual acceptance of different types of special training.

#### Co-operation with Russian supervisory authorities - "The Boris Project"

The co-operation with the Russian supervision agency Gosgortekhnadzor (GGTN) continued in 2002. The Russian authorities want to increase their expertise in safety management and supervisory methodology. Through seminar activity and implementation of supervision according to Norwegian principles and methods, GGTN personnel gain insight into the supervision methods employed on the Norwegian shelf.

In May, GGTN and the Norwegian Petroleum Directorate held a joint seminar on development of regulations for future oil and gas production in Russia and Norway. In addition to local and central GGTN representatives, there were also participants from several companies that have petroleum activities in Russia.

GGTN selected Sakhalin Energy Investment Company and their Molikpaq rig as the target for supervision this year. The topic of the audit was safety management in the preparedness function. Together with GGTN, the Norwegian Petroleum Directorate carried out supervision in the land division in Juzno-Sakhalinsk and on the Molikpaq platform in the Sea of Okhotsk off Sakhalin.



#### Regulations and delegations

An overall presentation of the regulations for the petroleum activities with associated information has been provided on the Norwegian Petroleum Directorate's web pages at [www.npd.no](http://www.npd.no):

The duties of the Norwegian Petroleum Directorate are set out in the special instructions of 1 October 1992. Duties have also been assigned to the Norwegian Petroleum Directorate by delegation of authority. Such authority is delegated either directly pursuant to acts/regulations or by individual delegation decisions by a superior authority.

Delegations of responsibility in the resource management area:

- a) The Petroleum Act of 29 November 1996, No. 72  
Including:  
The Petroleum Regulations, Royal Decree of 27 June 1997  
The Petroleum Register Regulations, Royal Decree of 19 June 1997
- b) The CO<sub>2</sub> tax act of 21 December 1990, No. 72
- c) Regulations relating to scientific research for natural resources on the Norwegian continental shelf, etc., Royal Decree of 31 January 1969

The delegations in the area of health, safety and the environment:

- a) The Petroleum Act of 29 November 1996, No. 72  
Including:  
The Framework Regulations, Royal Decree of 31 August 2001
- b) The Working Environment Act of 4 February 1977, No. 4  
Including:  
The Working Environment Regulations, Royal Decree of 27 November 1992  
Certain joint regulations for land and at sea issued with authority in the Working Environment Act
- c) The Tobacco Act of 9 March 1973, No. 14
- d) Regulations concerning safe practices in scientific research and exploration for petroleum deposits on Svalbard, Royal Decree of 25 March 1988

#### Activity plan

The annual activity plan is prepared on the basis of "Functional requirements for public financial administration" and guidelines from the Ministry of Petroleum and Energy and the Ministry of Labor and Government Administration. The plan contains governing goals, performance goals, performance indicators and priority tasks assigned by the above-mentioned ministries. The following is an extract of prioritized tasks in 2002:

- The work on the 17th licensing round in the Norwegian Sea.
- Work on the North Sea awards.
- Further develop the licensing policy framework.
- Highlight the potential for increased value creation from the Norwegian shelf, identify measures necessary to realize the potential and to be a driving force to realize this.
- Further develop a gas management model based on the new frameworks/principles to help ensure that the industry selects solutions that are comprehensive and efficient.
- Continue the work on area studies for Tampen, Haltenbanken Sor and in the southern parts of the North Sea.
- Contribute to completion of the Oil White Paper and facilitate follow-up of same.
- Assist in SDFI value assessment.
- Continue the work of identifying technology challenges in the various phases.
- Evaluate environmental requirements under the Norwegian Petroleum Directorate's sphere of authority and ensure a high level of technical integrity.
- Minimize emissions/discharges that are a burden on the external environment.
- Contribute to ensure that the industry institutes measures to reduce the scope of health-related expulsion from work in the petroleum activities on the Norwegian shelf.
- Follow up the licensees duties in the petroleum activities with a view towards the licensees role as facilitator and stipulator of terms and conditions.

## Organisation

- Follow up to ensure that the players fulfill their duties through change and development processes.
- Better organization for comprehensive enforcement of the new regulations for health, environment and safety in the petroleum activities.
- Contribute to the establishment of a realistic and unified picture of HES trends, and support the industry's measures to improve the HES level in the petroleum activities.
- Follow up to ensure that the players make provisions for and maintain the technical integrity of installations.
- Follow up that the players ensure that mobile installations are in compliance with current safety regulations.
- Follow up to ensure that the industry familiarizes itself with and implements necessary measures in line with guidelines in the Storting White Paper relating to health, environment and safety in the petroleum activities.
- Follow up to ensure that employee participation is safeguarded.
- Contribute to experience transfer between the various players in the activities, including by helping the players establish a "forum for best practice".
- Prioritize increased visibility of supervision and activities within the field of HES.
- Help ensure clear interfaces vis-a-vis other authorities with interfaces adjacent to the petroleum activities.
- Participate actively in the establishment and implementation, as well as operationalization, of results from the program for HES-related research conducted under the direction of the Research Council of Norway.
- Further develop the Norwegian Petroleum Directorate's overall HES expertise.

### Concerning the product area Data, information and knowledge management

The many activities and tasks of the Norwegian Petroleum Directorate are based on a diverse landscape of technical expertise and knowledge management. The data, information and knowledge bank plays a central role in all this. The Norwegian Petroleum Directorate is in a unique position in that it is the only body with access to all key data from the Continental shelf. The Norwegian Petroleum

Directorate views data and information as a resource and important raw material for the production process. It enables us to have a complete overview of the resources on the Norwegian shelf at any one time – we can describe the status of health, safety and the environment, production, costs, emissions/ discharges, income and values, etc.

We must look after and develop our role as the national manager of data and information related to the petroleum activities and our role as the keeper of our national "land register" for the Continental shelf. This provides the Norwegian Petroleum Directorate, the industry and other authorities with a common basis for assessments and decisions.

The Norwegian Petroleum Directorate is to contribute to having data and information generated in the petroleum activities efficiently stored, quality-assured and made accessible, facilitating value creation as well as improved resource management and safety levels on the Norwegian shelf.

All of the Norwegian Petroleum Directorate's activity is based on converting data and information on natural and man-made matters on the shelf into knowledge. This knowledge is managed by the Norwegian Petroleum Directorate's staff and is continually being used in following up individual issues and in more long-term strategic evaluations. Another important task for the Norwegian Petroleum Directorate is to contribute to good communication in common arenas and in projects for knowledge development in cooperation with the industry and research institutions. The Norwegian Petroleum Directorate sees it as very important that key areas of this knowledge also are transmitted to other users, the public and the media.

The Norwegian Petroleum Directorate has in 2002 prepared a new strategy for data, information and knowledge and for how the factual basis should be communicated to the authorities, the industry and other users. Increasing the efficiency of storing, quality-assuring and handling data in the management of both resources and HES. There has been a great emphasis on having updated data in integrated databases and continually publishing relevant data on the Norwegian Petroleum Directorate's web pages, inter alia on the facts pages. The industry has shown a great interest in making use of released resource data. This release is now mostly being done efficiently via

the Norwegian Petroleum Directorate's web pages.

Regarding publications: it follows from the plan that the number of publications have been reduced. The main publications in 2002 were the Annual Report "Offshore Norway", four editions of the "Norwegian Petroleum Diary", a report on the risk level on the Norwegian shelf and "Tankekraft" ("Mind Power") – a small publication and a work calendar with a clear HES profile which will help emphasize the Norwegian Petroleum Directorate's HES message in 2003. There is a brief presentation of the Norwegian Petroleum Directorate's publications on [www.npd.no](http://www.npd.no).

### Personnel

At the end of 2002, the Norwegian Petroleum Directorate had 346 employees. An additional 17 employees were on leave. Fifty-six percent of the employees are men and 44 percent are women.

Fifteen employees were hired in permanent positions. Of these, six came from oil-related activities. Thirteen permanent employees have left their positions, four of these as retirees. Thirty percent of managers were female.

### Budget and finances

#### Expenses

A total of NOK 351.7 million was spent on the Norwegian Petroleum Directorate's operations in 2002. The amount was appropriated as follows:

Wages/compensation incl. employer's contribution	157 783 055	
Goods and services	97 663 152	
Total operating expenses, item 01		255 446 207
Wages/compensation incl. employer's contribution	11 384 373	
Supervision expenses	14 671 330	
Assignments and co-operation	37 052 945	
Surveys	26 575 724	
Total operating expenses, item 21		89 684 372
Major equipment purchases, item 45		6 519 436
<b>TOTAL EXPENSES, Chapter 1810</b>		<b>351 650 015</b>

In connection with the reporting for the National Accounts 2002, the Norwegian Petroleum Directorate has applied for transfer of funds to 2003, cf. authorizations granted in the Award Letter for 2001, Chapter 1810, Item 01, in the amount of NOK 1,305,000.

#### Revenues

In addition to paid production royalties, area fees and CO2 taxes totaling NOK 4.78 billion, the Norwegian Petroleum Directorate received NOK 119.5 million in miscellaneous revenues under Chapter 4810.

Fee and tax income	1 952 008
Assignment and co-operation income	46 919 896
Reimbursement of supervision expenses	58 146 859
Sale of publications	46 930
Misc. income	1 643 294
Income kindergarten	3 635 928
Reimbursement	959 692
Reimbursement of labour market measures	281 959
Reimbursement maternity benefit	1 850 592
Reimbursement trainees	192 500
Reimbursement sick benefit	3 826 998
<b>TOTAL INCOME, chapter 4810</b>	<b>119 456 656</b>

#### Green nation - Green Norwegian Petroleum Directorate

In 2002 the Norwegian Petroleum Directorate completed the work of integrating environmental management in the management system for internal HES work. This is a continuation of the work on internal environment efficiency after participation in the State pilot project Green Nation 1998-2001. Annual measurements are made of environmental indicators developed in the Green Nation project. One effect of the recent years' commitment to the use of information and communication technology for internal streamlining of environmental efficiency is that purchases of paper have been reduced by 20 per cent from 1998 to 2002.



## Appendix

1

Table 1.1.2 Historical production from fields where production has ceased and from fields which are in production

Field	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill tonnes	Condensate mill Sm <sup>3</sup>	Oil equiv. <sup>1</sup> mill Sm <sup>3</sup>	Discovery year <sup>2</sup>
Albuskjell	7,4	15,5	1,0		24,8	1972
Cod	2,9	7,3	0,5		11,2	1968
Edda	4,8	2,0	0,2		7,2	1972
Frøy	5,6	1,6		0,1	7,3	1987
Lille-Frigg	1,3	2,2			3,5	1975
Mime	0,4	0,1			0,5	1982
Nordøst Frigg		11,6			11,7	1974
Odin		27,3		0,2	27,5	1974
Tommeliten Gamma	3,9	9,7	0,6		14,6	1978
Vest Ekofisk	12,2	26,0	1,4		40,8	1970
Yme	7,9				7,9	1987
Øst Frigg		9,2		0,1	9,3	1973
<b>Total shutdown fields</b>	<b>46,2</b>	<b>112,4</b>	<b>3,7</b>	<b>0,4</b>	<b>166,2</b>	
Balder	12,4				12,4	1967
Brage	41,3	1,9	0,7	0,1	44,5	1980
Draugen	87,9	0,5	0,7	0,1	89,8	1984
Ekofisk	312,1	120,9	10,6		453,2	1969
Eldfisk	71,5	33,4	3,3		111,1	1970
Embla	7,8	2,5	0,3		10,9	1988
Frigg		114,6		0,5	115,1	1971
Glitne	2,9				2,9	1995
Gullfaks	295,2	20,1	1,5	0,7	318,9	1978
Gullfaks Sør	12,8	3,0	0,2	0,1	16,3	1978
Gungne			0,6	2,1	3,4	1982
Gyda	31,0	5,2	1,7		39,5	1980
Heidrun	81,9	4,5	0,1	0,1	86,7	1985
Heimdal	6,2	43,2			49,5	1972
Hod	7,3	1,3	0,2		9,0	1974
Huldra	1,3	2,7	0,0	0,0	4,0	1982
Jotun	16,1	0,6			16,7	1994
Murchison	13,1	0,3	0,3	0,0	14,1	1975
Njord	14,3				14,3	1986
Norne	47,0	1,9	0,1	0,1	49,2	1992
Oseberg	302,0	8,0	0,9	0,9	312,7	1979
Oseberg Sør	10,2				10,2	1984
Oseberg Vest	1,1				1,1	1984
Oseberg Øst	10,4				10,4	1981
Sigyn					0,0	1982
Sleipner Vest		5,0	3,5	16,4	28,1	1974
Sleipner Øst		77,3	10,0	26,8	123,1	1981
Snorre	104,2	4,5	3,1	0,6	115,3	1979
Statfjord	526,9	46,4	10,5	3,4	596,6	1974
Statfjord Nord	25,3	1,3	0,4	0,1	27,4	1977
Statfjord Øst	26,3	2,0	0,6	0,1	29,6	1976
Sygn	5,0				5,0	1996
Tambar	2,3		0,1		2,4	1983

Field	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill tonnes	Condensate mill Sm <sup>3</sup>	Oil equiv. <sup>1</sup> mill Sm <sup>3</sup>	Discovery year <sup>2</sup>
Tor	21,6	10,6	1,1		34,4	1970
Tordis	36,1	2,7	0,9	0,2	40,6	1987
Troll	117,6	136,9		2,4	256,9	1979
Tune	0,0		0,0	0,0	0,0	1996
Ula	63,6	3,8	2,4		71,9	1976
Vale	0,1				0,1	1991
Valhall	74,9	15,1	2,5		94,8	1975
Varg	5,5				5,5	1984
Veslefrikk	41,9	2,0	1,1	0,2	46,1	1981
Vigdis	22,4				22,4	1986
Visund	7,9				7,9	1986
Åsgard	28,3	11,6	1,5	3,8	46,7	1981
<b>Total production</b>	<b>2495,6</b>	<b>684,0</b>	<b>58,9</b>	<b>58,8</b>	<b>3350,3</b>	
<b>Total sold and delivered</b>	<b>2541,8</b>	<b>796,5</b>	<b>62,7</b>	<b>59,1</b>	<b>3516,5</b>	

1) 1,9 is the conversion factor for NGL in tonnes to Sm<sup>3</sup>.

2) Discovery year is discovery year for the oldest discovery well in the field.

Table 1.1.3 Fields in production and fields with approved plans for development and operation

Field	Reserves mill. Sm <sup>3</sup> o.e	Discovery year <sup>4)</sup>	Operator as of 31 December 2002	Production licence/ Agreement-based area
Balder	63,2	1967	Esso Exploration and Production Norway A/S	001
Brage	48,8	1980	Norsk Hydro Produksjon AS	Brage
Byggve <sup>1</sup>	3,0	1991	TotalFinaElf Exploration Norge AS	102
Draugen	143,9	1984	A/S Norske Shell	093
Ekofisk	669,4	1969	ConocoPhillips Norway	018
Eldfisk	145,8	1970	ConocoPhillips Norway	018
Embla	18,3	1988	ConocoPhillips Norway	018
Fram <sup>1</sup>	20,0	1987	Norsk Hydro Produksjon AS	090
Frigg	116,4	1971	TotalFinaElf Exploration Norge AS	Frigg
Glitne	5,9	1995	Statoil ASA	048 B
Grane <sup>1</sup>	120,0	1991	Norsk Hydro Produksjon AS	Grane
Gullfaks	361,4	1978	Statoil ASA	050
Gullfaks Sør	75,2	1978	Statoil ASA	050
Gungne	15,5	1982	Statoil ASA	046
Gyda	43,3	1980	BP Norge AS	019 B
Heidrun	213,6	1985	Statoil ASA	Heidrun
Heimdal	48,8	1972	Norsk Hydro Produksjon AS	Heimdal
Hod	10,3	1974	BP Norge AS	033
Huldra	18,1	1982	Statoil ASA	Huldra
Jotun	29,9	1994	Esso Exploration and Production Norway A/S	Jotun
Kristin <sup>1</sup>	85,7	1997	Statoil ASA	Haltenbanken Vest
Kvitebjørn <sup>1</sup>	73,1	1994	Statoil ASA	193
Mikkel <sup>1</sup>	32,8	1987	Statoil ASA	Mikkel

## Appendix

1

Table 1.1.3 cont.

Field	Reserves mill. Sm <sup>3</sup> o.e	Discovery year <sup>4)</sup>	Operator as of 31 December 2002	Production licence/ Agreement-based area
Murchison	15,4	1975	CNR International (UK) Ltd	Murchison
Njord	23,9	1986	Norsk Hydro Produksjon AS	Njord
Nome	103,8	1992	Statoil ASA	Nome
Oseberg	438,0	1979	Norsk Hydro Produksjon AS	Oseberg
Oseberg Sør	64,0	1984	Norsk Hydro Produksjon AS	Oseberg Sør
Oseberg Vest	8,0	1984	Norsk Hydro Produksjon AS	Oseberg
Oseberg Øst	25,3	1981	Norsk Hydro Produksjon AS	053
Sigyn	10,9	1982	Esso Exploration and Production Norway A/S	072
Skime <sup>1</sup>	5,2	1990	TotalFinaElf Exploration Norge AS	102
Sleipner Vest	152,7	1974	Statoil ASA	Sleipner Vest
Sleipner Øst	104,5	1981	Statoil ASA	Sleipner Øst
Snorre <sup>5</sup>	252,5	1979	Norsk Hydro Produksjon AS	Snorre
Snøhvit <sup>1</sup>	188,6	1986	Statoil ASA	Snøhvit
Statfjord	647,1	1974	Statoil ASA	Statfjord
Statfjord Nord	41,8	1977	Statoil ASA	037
Statfjord Øst	39,8	1976	Statoil ASA	Statfjord Øst
Sygna	11,0	1996	Statoil ASA	Sygna
Tambar	9,7	1983	BP Norge AS	065
Tor	39,8	1970	ConocoPhillips Norge	Tor
Tordis <sup>5</sup>	61,6	1987	Norsk Hydro Produksjon AS	089
Troll <sup>2)</sup>	1611,6	1979	Norsk Hydro Produksjon AS	Troll
Troll <sup>3)</sup>		1983	Statoil ASA	Troll
Tune	29,1	1996	Norsk Hydro Produksjon AS	190
Ula	88,3	1976	BP Norge AS	019
Vale	4,7	1991	Norsk Hydro Produksjon AS	036
Valhall	205,2	1975	BP Norge AS	Valhall
Varg	6,1	1984	Pertra AS	038
Veslefrikk	60,1	1981	Statoil ASA	052
Vigdis <sup>5</sup>	43,0	1986	Norsk Hydro Produksjon AS	089
Visund <sup>6</sup>	101,4	1986	Norsk Hydro Produksjon AS	Visund
Åsgard	369,3	1981	Statoil ASA	Åsgard

1) Fields that are approved for development but have not started producing as of 31 December 2002

2) The resources comprise the total resources on Troll, also the part operated by Statoil ASA

3) The resources are included in the above row.

4) Discovery year is discovery year for the oldest discovery well in the field.

5) Statoil ASA takes over as operator from 1 January 2003

Table 1.1.4 Original saleable volume and remaining reserves in fields in production

Field	Original saleable <sup>1</sup>					Remaining reserves <sup>4</sup>				
	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill. tonnes	Condensate mill. Sm <sup>3</sup>	Oil equiv. <sup>2</sup> mill. Sm <sup>3</sup>	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill. tonnes	Condensate mill. Sm <sup>3</sup>	Oil equiv. <sup>2</sup> mill. Sm <sup>3</sup>
Balder <sup>a</sup>	60,3	2,9	0,0	0,0	63,2	48,0	2,9	0,0	0,0	50,8
Brage	45,4	2,0	0,7	0,0	48,8	4,1	0,1	0,1	0,0	4,3
Byggve <sup>3</sup>	0,7	2,4	0,0	0,0	3,0	0,7	2,4	0,0	1,0	3,0
Draugen	134,5	6,0	1,7	0,0	143,9	46,6	5,5	1,1	0,0	54,0
Ekofisk	467,8	175,9	13,5	0,0	669,4	155,7	55,0	2,9	0,0	216,2
Eldfisk	94,5	44,0	3,8	0,0	145,8	23,0	10,7	0,5	0,0	34,7
Embla	11,8	5,4	0,5	0,0	18,3	4,0	2,9	0,2	0,0	7,4
Fram <sup>3</sup>	16,1	3,7	0,1	0,0	20,0	16,1	3,7	0,1	0,0	20,0
Frigg	0,0	115,9	0,0	0,5	116,4	0,0	1,3	0,0	0,0	1,3
Glitne	5,9	0,0	0,0	0,0	5,9	3,0	0,0	0,0	0,0	3,0
Grane <sup>3</sup>	120,0	0,0	0,0	0,0	120,0	120,0	0,0	0,0	0,0	120,0
Gullfaks <sup>b</sup>	335,3	22,3	2,0	0,0	361,4	40,2	2,2	0,5	-0,7	42,5
Gullfaks Sør <sup>c</sup>	35,5	32,1	4,0	0,0	75,2	22,6	29,1	3,8	0,0	58,9
Gungne	0,0	9,9	1,3	3,1	15,5	0,0	9,9	0,6	1,0	12,1
Gyda <sup>d</sup>	34,0	5,8	1,8	0,0	43,3	3,0	0,5	0,1	0,0	3,8
Heidrun	180,2	29,9	1,8	0,0	213,6	98,3	25,4	1,7	0,0	126,9
Heimdal	7,0	41,8	0,0	0,0	48,8	0,8	0,2	0,0	0,0	1,0
Hod	8,3	1,6	0,2	0,0	10,3	1,0	0,3	0,0	0,0	1,3
Huldra	5,0	12,9	0,1	0,0	18,1	3,7	10,2	0,1	0,0	14,1
Jotun	29,3	0,7	0,0	0,0	29,9	13,2	0,1	0,0	0,0	13,2
Kristin <sup>3</sup>	0,0	34,9	8,5	34,6	85,7	0,0	34,9	8,5	34,6	85,7
Kvitebjørn <sup>3</sup>	0,0	51,8	0,5	20,4	73,1	0,0	51,8	0,5	20,4	73,1
Mikkel <sup>3</sup>	0,0	19,3	4,2	5,5	32,8	0,0	19,3	4,2	5,5	32,8
Murchison	14,2	0,4	0,4	0,0	15,4	1,1	0,1	0,1	0,0	1,3
Njord	23,9	0,0	0,0	0,0	23,9	9,6	0,0	0,0	0,0	9,6
Nome	87,4	13,7	1,4	0,0	103,8	40,4	11,8	1,3	0,0	54,5
Oseberg	349,0	89,0	0,0	0,0	438,0	47,0	81,0	-0,9	-0,9	125,3
Oseberg Sør	56,6	7,4	0,0	0,0	64,0	46,4	7,4	0,0	0,0	53,8
Oseberg Vest	2,0	6,0	0,0	0,0	8,0	0,9	6,0	0,0	0,0	6,9
Oseberg Øst	24,5	0,8	0,0	0,0	25,3	14,1	0,8	0,0	0,0	14,9
Sigyn	0,0	5,1	1,5	3,0	10,9	0,0	5,1	1,5	3,0	10,9
Sleipner Vest	0,0	109,2	8,1	28,1	152,7					
Sleipner Øst <sup>a</sup>	0,0	58,0	11,3	25,2	104,5					
Sleipner Vest and Sleipner Øst <sup>5</sup>						0	84,9	5,8	10,0	105,9
Skime <sup>3</sup>	1,0	4,3	0,0	0,0	5,2	1,0	4,3	0,0	0,0	5,2
Snorre	232,0	8,8	6,2	0,0	252,5	127,8	4,3	3,0	-0,6	137,2
Snøhvit <sup>3</sup>	0,0	161,0	5,1	17,9	188,6	0,0	161,0	5,1	17,9	188,6
Statfjord	561,4	58,4	14,4	0,0	647,1	34,5	12,0	3,9	-3,4	50,5
Statfjord Nord	38,4	1,9	0,8	0,0	41,8	13,1	0,5	0,4	0,0	14,4
Statfjord Øst	35,0	2,6	1,1	0,0	39,8	8,7	0,6	0,6	0,0	10,2
Sygna	11,0	0,0	0,0	0,0	11,0	6,0	0,0	0,0	0,0	6,0



Table 1.1.4 cont.

Field	Original saleable <sup>1</sup>					Remaining reserves <sup>4</sup>				
	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill. tonnes	Condensate mill. Sm <sup>3</sup>	Oil equiv. <sup>2</sup> mill. Sm <sup>3</sup>	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill. tonnes	Condensate mill. Sm <sup>3</sup>	Oil equiv. <sup>2</sup> mill. Sm <sup>3</sup>
Tambar	7,0	2,3	0,2	0,0	9,7	4,8	2,3	0,1	0,0	7,3
Tor	26,0	11,5	1,2	0,0	39,8	4,4	0,9	0,1	0,0	5,5
Tordis <sup>f</sup>	54,5	4,4	1,5	0,0	61,6	18,4	1,6	0,6	0,0	21,0
Troll <sup>g</sup>	224,3	1325,7	31,6	1,6	1611,6	106,7	1188,8	31,6	-0,8	1354,8
Tune	6,1	22,9	0,1	0,0	29,1	6,0	22,9	0,1	0,0	29,1
Ula	79,2	4,0	2,7	0,0	88,3	15,6	0,2	0,3	0,0	16,4
Vale	2,6	2,2	0,0	0,0	4,7	2,5	2,2	0,0	0,0	4,7
Valhall	166,9	30,3	4,2	0,0	205,2	92,0	15,2	1,7	0,0	110,4
Varg	6,1	0,0	0,0	0,0	6,1	0,6	0,0	0,0	0,0	0,6
Veslefrikk	55,0	3,0	1,1	0,0	60,1	13,2	0,9	0,0	0,0	14,0
Vigdís	39,7	3,2	0,0	0,0	43,0	17,4	3,2	0,0	0,0	20,6
Visund	38,4	50,3	6,7	0,0	101,4	30,5	50,3	6,7	0,0	93,5
Åsgard	67,9	191,9	32,9	47,1	369,3	39,6	180,2	31,4	43,3	322,6
Sum	3801,6	2799,5	177,3	186,9	7124,9	1306,0	2117,1	118,4	130,2	3776,3

1) The table states expected values. All estimates are subject to uncertainty

2) The conversion factor for NGL in tonnes is 1,9

3) Fields that are approved for development but have not started producing as of 31 December 2002

4) Negative figures for remaining reserves in some fields are due to the fact that the product is not reported under original recoverable volume. This applies to produced NGL and condensate.

5) Production for Sleipner Vest and Sleipner Øst is measured together. Consequently the remaining reserves are also shown together.

a) Balder also includes Ringhorne

b) Gullfaks also includes Gullfaks Vest

c) Gullfaks Sør also includes Gullveig and Rimfaks

d) Gyda also includes Gyda Sør

e) Sleipner Øst also includes Loke

f) Tordis also includes Tordis Øst and Borg

g) Troll also includes TOGI

Table 1.1.5 Resources in discoveries in the planning stage

	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill. tonnes	Condensate mill. Sm <sup>3</sup>	Oil equiv. <sup>1</sup> mill. Sm <sup>3</sup>	Discovery year <sup>2</sup>
15/12-12	3,2	4,1		1,1	8,4	2001
15/5-1 Dagny		3,8	0,2	1,2	5,3	1978
15/9-19 S Volve	11,7	1,6	0,5		14,1	1993
2/12-1 Freja	2,9	0,6			3,5	1987
24/6-2	7,9	3,9			11,8	1998
25/11-16	3,6				3,6	1992
25/4-3 Gekko		7,6		1,3	8,9	1974
25/5-5	4,3				4,3	1995
3/7-4 Trym		3,3		0,8	4,1	1997
30/6-17	0,3	1,7			2,0	1986
30/6-18 Kappa	0,8	2,7		0,2	3,7	1986
30/6-26 Gamma Vest	2,1	0,8			2,9	2001
30/9-19	0,4	7,5		2,2	10,1	1998
35/9-1 Gjølø	6,5	29,4	1,5		38,8	1989
6305/5-1 Ormen Lange		375,2		22,1	397,3	1993
6406/2-1 Lavrans <sup>3</sup>		13,4	2,5	4,7	22,9	1995
6407/1-2 Tyrhans Sør	16,6	26,1	3,6		49,5	1983
6507/3-3 Idun	0,6	17,4			18,0	1999
6507/5-1 Skarv	13,5	29,2	3,6	3,6	53,1	1998
6608/10-8 Stær	4,7	0,3			5,0	2002
7122/7-1 Goliat	8,1				8,1	2000
<b>Total</b>	<b>87,0</b>	<b>528,6</b>	<b>11,9</b>	<b>37,3</b>	<b>675,6</b>	

1) 1,9 is the conversion factor for NGL in tonnes to Sm<sup>3</sup>.

2) Discovery year is discovery year for the oldest discovery well in the discovery.

3) 6406/2-1 Lavrans has resources in both category 4F and 5F.

Table 1.1.6 Resources in discoveries where development is likely, but not yet resolved

	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill. tonnes	Condensate mill. Sm <sup>3</sup>	Oil equiv. <sup>1</sup> mill. Sm <sup>3</sup>	Discovery year <sup>2</sup>
1/2-1	2,1				2,1	1989
1/3-6	1,1	1,8		0,3	3,2	1991
1/5-2 Flyndre	5,1	1,6			6,6	1974
15/3-1 S Gudrun	14,0	7,7		0,5	22,2	1975
15/3-4	7,7	3,9			11,6	1982
15/5-2		4,9		0,4	5,3	1978
15/8-1 Alpha		4,1	0,5	1,0	6,1	1982
16/7-2		1,8	0,3	0,5	2,9	1982
2/4-10	2,1				2,1	1973
2/4-17 Tjalve	1,0	1,6	0,1		2,8	1992
2/5-3 Sørøst Tor	1,0				1,0	1972
2/7-19	3,6	3,4			7,1	1990
2/7-29	1,5	0,6			2,1	1994
24/6-1 Peik		5,3		1,2	6,5	1985
24/9-5	4,4				4,4	1994
25/8-4	1,0				1,0	1992
30/7-6 Hild	4,3	33,2		7,7	45,2	1978
33/12-8 A	0,9	0,6	0,1	0,2	1,8	2002
33/12-8 S Brent	0,9	0,5	0,1	0,1	1,7	2002
33/9-6 Delta	0,5				0,6	1976
34/10-23 Gamma		12,8		1,3	14,1	1985
34/8-12	2,0	3,0			5,0	2001
35/8-1		15,3		2,6	17,9	1981
6406/2-1 Lavrans <sup>3</sup>		13,4	2,5	4,7	22,9	1995
6406/2-6 Ragnfrid		2,7		1,8	4,5	1998
6406/2-7 Erlend		1,7		1,3	2,9	1999
6406/3-2 Trestakk	5,3	1,8			7,0	1986
6407/9-9	0,3	0,3			0,6	1999
6506/11-2 Lange	1,0	0,5			1,5	1991
6506/11-7	2,2	1,0			3,1	2001
6506/12-3 Lysing	1,5	0,3			1,8	1985
6506/6-1		118,0			118,0	2000
6507/2-2		19,8			19,8	1992
6507/3-1 Alve	1,2	6,1			7,3	1990
6507/7-13	0,9				1,0	2001
6608/10-6 Svale	7,6	0,4			8,0	2000
6608/11-2 Falk	1,0				1,0	2000
6707/10-1		38,3			38,3	1997

	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill. tonnes	Condensate mill. Sm <sup>3</sup>	Oil equiv. <sup>1</sup> mill. Sm <sup>3</sup>	Discovery year <sup>2</sup>
7/7-2	2,4	0,1			2,5	1992
7121/4-2 Snøhvit Nord		3,5		0,2	3,7	1985
7121/5-2 Beta	3,1	3,3		0,2	6,6	1986
7228/7-1	0,5	8,7		0,6	9,8	2001
<b>Total</b>	<b>80,1</b>	<b>322,0</b>	<b>3,5</b>	<b>24,5</b>	<b>433,2</b>	

1) 1,9 is the conversion factor for NGL in tonnes to Sm<sup>3</sup>.

2) Discovery year is discovery year for the oldest discovery well in the discovery.

3) 6406/2-1 Lavrans has resources in both category 4F and 5F.

Table 1.1.7 Resources in new discoveries where evaluation is not complete

Discovery Resource Category 7F	Oil mill. Sm <sup>3</sup>	Gas bill. Sm <sup>3</sup>	NGL mill. tonnes	Condensate mill. Sm <sup>3</sup>	Oil- equivalents <sup>1</sup> mill. Sm <sup>3</sup>	Discovery year <sup>2</sup>
30/6-27	1,4	1,1			2,5	2001
34/8-12	3				3	2001
6506/11-7	9,3	4,5			13,8	2001
6507/11-6		2,6		0,3	2,9	2001
6507/7-13	1,5				1,5	2001
7019/1-1		11,5			11,5	2001
7228/7-1	0,5	8,7		0,6	9,8	2001
34/10-47	3	0,3			3,3	2002
6406/5-1		1		1,9	2,9	2002
<b>Total</b>	<b>18,7</b>	<b>29,7</b>	<b>0</b>	<b>2,8</b>	<b>51,2</b>	

1) 1,9 is the conversion factor for NGL in tonnes to Sm<sup>3</sup>.

2) Discovery year is discovery year for the oldest discovery well in the discovery.



## Appendix

1

Table 1.1.8 Discoveries that in 2002 are reported as parts of other fields/discoveries.

Discovery	Reported in field	Discovery year
15/12-10 S	Varg	1996
15/9-17 Loke	Sleipner Øst	1983
15/9-20 S	Gungne	1994
16/7-7 S	Sigyn	1997
2/11-10 S	Hod	1994
2/1-9 Gyda Sør	Gyda	1991
2/7-8	Eldfisk	1973
25/7-3 Jotun	Jotun	1995
25/8-1 Ringhome	Ringhome	1970
25/8-10 S Ringhome	Ringhome	1997
25/8-11 Ringhome	Ringhome	1997
25/8-8 S Jotun	Jotun	1995
30/3-6 S	Veslefrikk	1994
30/3-7 A	Veslefrikk	1998
30/3-7 B	Veslefrikk	1998
30/3-7 S	Veslefrikk	1995
30/3-9	Veslefrikk	2000
30/6-19 Beta Sadel	Oseberg Øst	1986
30/9-10 Oseberg Sør	Oseberg Sør	1990
30/9-13 S Oseberg Sør	Oseberg Sør	1991
30/9-15 Oseberg Sør	Oseberg Sør	1994
30/9-16 K Oseberg Sør	Oseberg Sør	1994
30/9-20 S	Oseberg Sør	2002
30/9-4 S Oseberg Sør	Oseberg Sør	1985
30/9-5 S Oseberg Sør	Oseberg Sør	1985
30/9-6 Oseberg Sør	Oseberg Sør	1987
30/9-7 Oseberg Sør	Oseberg Sør	1988
30/9-9 Oseberg Sør	Oseberg Sør	1989
31/4-11	Brage	2000
33/9-0 Murchison NØ Horst	Murchison	1989
34/10-17 Rimfaks	Gullfaks Sør	1983
34/10-21	Gullfaks Sør	1984
34/10-34 Gullfaks Vest	Gullfaks	1991
34/10-37 Gullveig	Gullfaks Sør	1995
34/10-43 S	Gullfaks Sør	2001
34/10-44 S Lunde	Gullfaks Sør	2001
34/10-45 S	Gullfaks	2002
34/10-46 A	Gullfaks	2002
34/7-16	Vigdis	1990
34/7-18	Vigdis	1991
34/7-22 Tordis Øst	Tordis	1993
34/7-23 S	Vigdis	1994
34/7-25 S	Tordis	1996

Discovery	Reported in field	Discovery year
34/7-29 S	Vigdis	1998
34/7-31	Vigdis	2001
34/8-4 S	Visund	1991
35/11-2	Fram	1987
35/11-7	Fram	1992
35/11-8 S	Fram	1996
6506/12-1 Smørbukk	Åsgard	1985
6506/12-3 Smørbukk Sør	Åsgard	1985
6507/8-4 Heidrun Nord	Heidrun	1990
6608/10-4	Norne	1994
7120/7-1 Askeladd Vest	Snøhvit	1982
7120/7-2 Askeladd Sentral	Snøhvit	1983
7120/8-1 Askeladd	Snøhvit	1981
7120/9-1 Albatross	Snøhvit	1982
7121/7-1	Snøhvit	1984
7121/7-2 Albatross Sør	Snøhvit	1986
9/2-3	Yme	1990
9/2-6 S	Yme	1996
9/2-7 S	Yme	1997
9/2-9 S	Yme	1999
Discovery	Reported in discovery	Discovery year
2/7-31	2/7-19	1999
24/9-6	24/9-5	1994
30/7-2	30/7-6 Hild	1975
33/12-8 S Statfjord	33/12-8 S Brent	2002
35/8-2	35/8-1	1982
36/7-1	35/9-1 Gjøa	1996
6406/1-1	6406/2-7 Erlend	2001
6407/1-3 Tyrhans Nord	6407/1-2 Tyrhans	1984
6507/5-3 Snadd	6507/5-1 Skarv	2000

## Appendix

Table 1.8 Production in million Sm<sup>3</sup> oil equivalents

	PRODUCTION			CONSUMPTION		SALEABLE PRODUCTS			
	Oil	Gas	Condensate	Flare	Fuel	Oil	Gas	NGL / Condensate	Total
Balder	3,436	0,233		0,012	0,006	3,436			3,436
Brage	2,116	0,243		0,008	0,052	2,143	0,113	0,106	2,362
Draugen	11,067	0,629		0,006	0,046	11,067	0,238	0,638	11,943
Ekofisk	17,343	3,168		0,012	0,273	17,233	2,770	0,605	20,608
Eldfisk	2,330	1,450		0,001	0,094	2,394	0,925	0,162	3,482
Embla	0,366	0,167				0,386	0,079	0,037	0,502
Frigg		0,726	0,001		0,008		0,717	0,001	0,718
Giltne	2,157	0,108		0,008	0,021	2,157			2,157
Gullfaks	9,214	4,910		0,063	0,313	9,214	0,604	0,162	9,980
Gullfaks Sør	3,773	1,362				3,727	1,903	0,276	5,905
Gungne			0,745					0,801	0,801
Gyda	0,694	0,130		0,001	0,025	0,698	0,088	0,060	0,846
Heidrun	10,132	2,028		0,019	0,115	10,132	1,010	0,111	11,253
Heimdal		0,517	0,108	0,008	0,031	0,099	0,547		0,646
Hod	0,362	0,060				0,372	0,050	0,015	0,437
Huldra		2,473	0,912	0,000		1,227	2,614	0,032	3,873
Jotun	2,587	0,118		0,005	0,040	2,587	0,068		2,655
Murchison	0,094	0,011		0,002		0,105			0,105
Njord	1,863	2,768		0,008	0,062	1,863			1,863
Norne	10,268	2,053		0,012	0,130	10,270	0,794	0,146	11,209
Oseberg	11,073	10,450		0,208	0,304	10,113	2,975	1,019	14,107
Oseberg Sør	4,340	1,232		0,005	0,064	4,360			4,360
Oseberg Øst	3,123	0,331		0,006	0,026	3,113			3,113
Oseberg Vest								3,731	3,731
Sleipner Vest		7,963	3,344	0,006	0,070			3,519	3,519
Sleipner Øst incl Loke and saleable gas from Sleip. Vest		6,817	3,327	0,006	0,183		13,470		13,470
Snorre	11,309	1,705		0,027	0,122	12,640	0,446	0,935	14,021
Statfjord	8,873	5,619		0,076	0,249	8,872	1,554	0,657	11,083
Statfjord Nord	2,275	0,173				2,275	0,126	0,115	2,516
Statfjord Øst	1,917	0,272				1,917	0,197	0,180	2,294
Sygna	1,814	0,114				1,813			1,813
Tambar	1,758	0,406				1,724		0,088	1,812
Tor	0,213	0,030		0,000	0,007	0,213	0,022	0,008	0,243
Tordis	4,586	0,523				4,614	0,321	0,321	5,256
Trollomr.	21,444	26,375	0,658	0,018	0,187	21,194	25,581	0,767	47,543
Tune		0,043	0,020			0,018		0,001	0,019
Ula	1,217	0,115		0,002	0,043	1,243	0,045	0,091	1,379
Vale		0,033	0,041			0,052			0,052
Valhall	4,107	1,089		0,009	0,072	4,180	0,875	0,199	5,254

	PRODUCTION			CONSUMPTION		SALEABLE PRODUCTS			
	Oil	Gas	Condensate	Flare	Fuel	Oil	Gas	NGL / Condensate	Total
Varg	0,784	0,319		0,007	0,010	0,784		0,024	0,808
Veslefrikk	1,536	0,504		0,011	0,025	1,644	0,026		1,670
Vigdis	3,053	0,196				3,052			3,052
Visund	2,458	2,225		0,001	0,065	2,459			2,459
Åsgard	8,231	16,106		0,041	0,266	8,232	7,242	4,808	20,282
<b>Total 2002</b>	<b>171,912</b>	<b>105,792</b>	<b>9,156</b>	<b>0,587</b>	<b>2,908</b>	<b>173,621</b>	<b>65,400</b>	<b>19,612</b>	<b>258,633</b>
Total 2001	180,508	94,569	8,592	0,551	3,402	180,940	53,878	17,387	252,205
Total 2000	181,641	90,266	8,749	0,685	3,267	181,181	49,748	13,498	244,427
Total 1999	170,693	80,255	9,812	0,660	2,647	168,690	48,479	13,488	230,657
Total 1998	170,039	72,594	9,433	0,441	2,890	168,744	44,190	13,388	226,322
Total 1997	178,388	70,365	10,133	0,411	3,034	175,914	42,950	14,474	233,338
Total 1996	177,282	59,456	8,400	0,448	2,833	175,422	37,407	12,674	225,503
Total 1995	157,926	47,190	6,971	0,409	2,640	156,776	27,814	11,668	196,258
Total 1994	147,674	45,393	5,300	0,364	2,630	146,282	26,842	9,952	183,076
Total 1993	133,770	41,576	1,464	0,340	2,544	131,843	24,804	6,072	162,719

For Statfjord, Frigg and Murchison the Norwegian share of production is shown.



# Appendix

## Units of measurement for oil and gas

Oil and gas are often stated in volumetric units under defined ISO standard conditions (temperature = 15°C and pressure = 1.01325 bar). Oil volumes are stated in million Sm<sup>3</sup> (10<sup>6</sup> Sm<sup>3</sup>) and gas volumes in billion Sm<sup>3</sup> (10<sup>9</sup> Sm<sup>3</sup>).

Oil and gas volume units are converted to oil equivalents when adding or comparing oil and gas resources and when an exact figure for the quantity is not needed.

The conversion to oil equivalents is based on the amount of energy that is released during oil and gas combustion.

As of 1 January 1996 the Norwegian Petroleum Directorate states the total petroleum resources in Sm<sup>3</sup> oil equivalents (Sm<sup>3</sup> o.e.). The following conversion factors are used for conversion to Sm<sup>3</sup> o.e.:

1 000	Sm <sup>3</sup> gas is equivalent to:	1 Sm <sup>3</sup> o.e.
1	Sm <sup>3</sup> oil is equivalent to:	1 Sm <sup>3</sup> o.e.
1	Tonne NGL is equivalent to:	1,9 Sm <sup>3</sup> o.e.
1	Sm <sup>3</sup> condensate is equiv. to:	1 Sm <sup>3</sup> o.e.

For conversion of NGL from tonnes to Sm<sup>3</sup> o.e., a factor of 1.3 tonnes/Sm<sup>3</sup> o.e. has previously been used. This has now been changed to 1.9 tonnes/ Sm<sup>3</sup> o.e.

Other conversion factors		
<b>Gas</b>	1 cubic metre	35,30 cubic feet
<b>Crude oil</b>	1 Sm <sup>3</sup>	6,29 barrel
	1 Sm <sup>3</sup>	0,84 tonne o.e.
	1 barrel	159 litre
	1 tonne	7,49 barrel