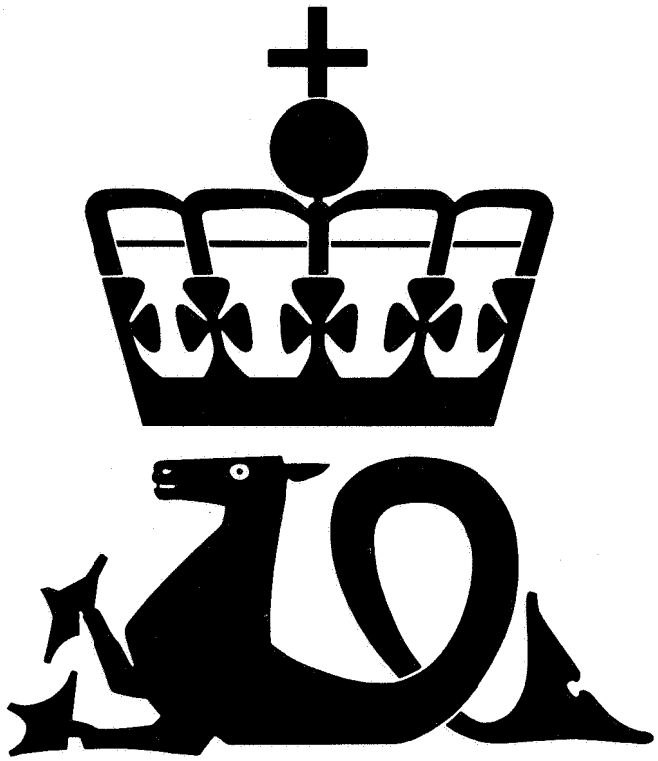

Norwegian Petroleum Directorate

ANNUAL REPORT 1995

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The Director General's Statement

1995 was a year on the shelf characterized by many small discoveries and low oil percentages. In all ten discoveries were made - nine in the North Sea and one in the Norwegian Sea. This gives a high rate of technical discovery - 48% - but the majority of the discoveries are small compared with the fields which are currently producing on our continental shelf.

The only large discovery in 1995 is located in block 6406/2 on Haltenbanken with Saga as operator. The size of the discovery is estimated to be in the order of 50-100 million Sm^3 o.e. of gas.

The nine discoveries in the North Sea are all small, nevertheless, most will be candidates for development and production because they are located near existing production facilities. Simultaneously, the NORSOK process has begun, with the authorities and the industry working together to find cost-effective solutions which will enable development of more of our small oil discoveries in the years to come. The Norwegian Petroleum Directorate participates as an observer in the NORSOK process. Preliminary evaluations indicate that a number of the proposals lie within the scope of current rules and regulations and overriding frameworks for safety and working environment. The Directorate will assist in incorporating NORSOK's recommendations into the rules and regulations, inter alia by referring to NORSOK standards as examples of acceptable solutions in the guidelines to the regulations.

On the basis of our knowledge of undiscovered resources on the Norwegian shelf, it is likely that the discovery scenario in the years to come will be similar to 1995, at least as regards the North Sea. Larger discoveries may be expected in the Norwegian Sea.

The Norwegian Petroleum Directorate has estimated the total growth in resources in 1995 to 130 million Sm^3 o.e. Approximately 40%, or 50 million Sm^3 of this is oil. For purposes of comparison, oil production for the year amounted to 157 million Sm^3. In other words, production was three times greater than the growth of oil resources in 1995.

For gas the situation is a different one. Three times as much gas was discovered as was produced during the year.

Total production from the Norwegian shelf in 1995 was 193 million Sm^3 o.e. Oil production, including NGL and condensate, was 165 million Sm^3, while gas production was 28 billion Sm^3.

While the growth in resources due to new discoveries is relatively modest in 1995, the total upward adjustment of resources was significant and larger than the production. The Norwegian Petroleum Directorate's calculations for aggregate discovered and recoverable resources on the Norwegian shelf reached 7.56 billion Sm^3 o.e. at the end of the year, divided between 55% oil/NGL and 45% gas. Altogether the increase in the estimates for the total discovered resources was 348 million Sm^3, divided between 188 million Sm^3 oil/NGL and 160 billion Sm^3 gas.

Another aspect of the overall scenario is the fact that the Norwegian Petroleum Directorate now includes 234 million Sm^3 oil in the potential for improved resource utilization. Improved drilling technology, new development techniques and better understanding of the reservoirs in fields such as Troll, Åsgård, Ekofisk, Valhall, Gullfaks, Eldfisk, Snorre, Heidrun and Oseberg provide the explanation for these additional resources now being included in the total accounting of resources.

Even though good results have already been achieved through our management strategy, in the future it will also be necessary to direct additional efforts towards improved utilization of resources from fields already in production. As a step in this commitment, the Norwegian Petroleum Directorate took the initiative to establish a cooperation forum, FORCE, between the oil companies and the authorities. The objective is to focus on the users' needs in the areas of development and application of new technology to improve resource utilization in existing fields. Seventeen oil companies, the Norwegian Research Council and the Norwegian Petroleum Directorate are members of the cooperation forum in which the Norwegian Petroleum Directorate is also responsible for the secretariat function.

Unfortunately, a fatality was claimed by the petroleum activities in 1995. Offshore oil and gas activities embody a great risk potential. Nevertheless, our goal must always be to work to ensure that lives are not lost or destroyed by the way the activities are carried out.

The number of accidents that led to personal injury has remained at about the same level as for the last three years. Even though the injury frequency in the petroleum activities is lower than in other comparable industry, the Norwegian Petroleum Directorate believes that the injury frequency must be lowered. The Directorate registers, investigates and follows up accidents, injuries and incidents, and uses the results as an important part of the basis for giving priority to measures. These prioritizations provide guidelines for the supervision, regulatory work, information activities and continued development of own expertise.

The number of reported cases of work-related disease has continued to increase in 1995, however, the Directorate has reason to believe that this is connected with the fact that reporting of such diseases has improved after several years of focus on the companies' reporting obligations. In addition to inflicting suffering on the individual, work-related diseases cost the companies and society a great deal of money, and it is therefore important that the operators, through good reporting routines, contribute to an improved basis for prioritization of the efforts in this area.

We are pleased to report that 1995 has also been free from accidents leading to serious damage to the environment, or to significant material loss or interruption of production. However, many gas leaks still occur on the installations. The Norwegian Petroleum Directorate is concerned about this, primarily due to the large damage

potential accompanying this type of undesirable incident. The Directorate therefore takes a positive view of the industry's increasing involvement and willingness to implement systematic measures to reduce the extent of gas leaks as much as possible.

The Regulations relating to systematic follow-up of the working environment in the petroleum activities was completed and entered into force in 1995. In the work to prepare the regulation, the Directorate has placed emphasis on active participation from the concerned parties in the industry. It has not been the objective to introduce new and stricter working environment requirements, but rather to clarify and systematize the requirements which already exist. The Directorate believes that the new regulations will be a good tool both for the industry and for the authorities to establish and further develop a good working environment in a cost-effective manner.

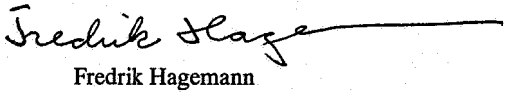
In 1995, the Norwegian Petroleum Directorate submitted proposals for minor adjustments to the detailed regulations for consultation. The changes included requirements due to the incorporation of the EEA Agreement, and to incorporate individual decisions, etc. A project has also been conducted to map users' experience with the new regulations. The results of this survey will be used in the preparation of a plan for revision of the regulations. In 1995, the Norwegian Petroleum Directorate also charted regulatory requirements in the areas of resource managment and has implemented activities for preparation of strategies for the formulation of the rules and regulations. The result of this work will be used for preparation of a plan for revision of the rules and regulations on the resource side.

Experience gained from supervision shows that overall, the petroleum activities are carried out within a prudent framework and, for the most part, in accordance with regulatory requirements related to safety and working environment. However, the supervision has revealed weaknesses in the management systems of certain participants. It is a prerequisite for a supervision system based on internal control that these systems are in place, and that they function as expected and contribute to a continual improvement which leads to measurable results.

Development trends in the years to come will entail a number of challenges to the industry, including those related to developments in great water depths and deep drilling under high reservoir pressure, while, at the same time, demands on cost-effective development and operation increase. In future developments, the use of mobile installations will be given greater consideration, also for production purposes. The Directorate has started an internal study in order to, if possible, meet the industry's requirements for increased predictability for mobile installations in relation to the rules and regulations for the shelf.

We continue to note great interest in the Norwegian model of resource management, safety and working environment in petroleum activities. A number of countries would like to establish a functional regulatory system which sets clear goals for the activities through result-oriented requirements. There is also much interest in the Norwegian method of carrying out independent public supervision, where comprehensive thinking, coordination and cooperation among the involved parties are key elements.

Stavanger, 22 April 1996



Fredrik Hagemann
Director General

1. Duties and administration

1.1 DUTIES OF THE NORWEGIAN PETROLEUM DIRECTORATE

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 in direct pursuance of acts/regulations or by individual administrative decisions of delegation from a superior authority. Delegation applies to parts of:

a) The Petroleum Act, of 23 March 1985 No. 11, including:
   - the Petroleum Regulations, Royal Decree of 14 June 1985
   - the Safety Regulations, Royal Decree of 28 June 1985
   - the Internal Control Regulations, Royal Decree of 28 June 1985
   - the Safety Zone Regulations, Royal Decree of 9 October 1987
b) The Working Environment Act, of 4 February 1977 No. 4, including:
   - the Working Environment Regulations, Royal Decree of 27 November 1992
c) The CO_2 Act, of 21 December 1990, No. 72
d) The Tobacco Act, of 9 March 1973, No. 14
e) The Svalbard Act, of 17 July 1925, No. 11, including:
   - Regulations concerning safe practices in scientific research and exploration for petroleum deposits on Svalbard, Royal Decree of 25 March 1988
f) Act relating to scientific research and exploration for and exploitation of subsea natural resources other than petroleum resources, of 21 June 1963 No. 12, including:
   - Regulations relating to scientific research for natural resources on the Norwegian continental shelf, Royal Decree of 31 January 1969
g) Provisional regulations concerning littering and pollution caused by petroleum activities on the Norwegian continental shelf, Royal Decree of 26 October 1979

1.2 THE OBJECTIVE OF THE NORWEGIAN PETROLEUM DIRECTORATE

The overall objective of the Norwegian Petroleum Directorate is to promote the sound management of Norwegian petroleum resources through balanced consideration of the natural, safety-related, environmental, technological and economic aspects of the petroleum activities in the context of an overall social evaluation.

1.3 ADMINISTRATION

1.3.1 ORGANIZATION

There have been no significant organizational changes in the Norwegian Petroleum Directorate in 1995.

1.3.2 STAFF

At the end of the reporting period the Norwegian Petroleum Directorate had 354 authorized positions. In addition, four positions are funded by NORAD (the Norwegian Directorate for Development Cooperation), two by the Ministry of Foreign Affairs, three by the Employment Service Division and five are contract assignments. The Directorate received no new positions in 1995. At the end of 1995 there were 379 staff members in service and 12 on leave.

Six new staff members were hired in permanent positions, whereof one comes from oil-related activities, four from other private activities, and one was newly qualified.

Five staff members have left their positions, representing 1.4% of the total authorized positions.

1.3.2 BUDGET AND ECONOMY

A total of NOK 267,440,900 was spent on the Norwegian Petroleum Directorate's various tasks in 1995.

The amount was appropriated as follows:

- Operating budget	NOK	206,304,477
- Supervision costs	NOK	8,535,077
- Geological and geophysical surveys	NOK	49,640,311
- Projects related to safety and working environment	NOK	2,961,044
Total	NOK	267,440,909

Of the operating budget, payroll costs account for NOK 126,609,650, lease and operation of buildings NOK 26,741,572, consultancy assistance to the Division for resource management NOK 11,254,014, consultancy assistance to the Division for safety and working environment NOK 3,815,785 and collection of meteorological and oceanographic data in the Barents Sea NOK 3,138,309.

The remainder covers expenses related to travel, training, electronic data processing (EDP) operations, new investments in equipment, etc.

In addition to its regular operations, the Norwegian Petroleum Directorate is responsible for:

- Clean-up of the seabed	NOK	4,438,128
- Administration of the RUTH research program	NOK	1,704,633
- Contribution to the PETRAD foundation	NOK	1,000,000

Revenues

In addition to production royalties, area fees and carbon dioxide taxes totalling NOK 8,995,011,529, the Directorate received NOK 114,624,366 in revenues.

For 1995 the breakdown of revenues was as follows:

- Exploration fees	NOK	1,553,014
- Commission fees		1,714,108
- Reimbursed supervision costs		53,286,348
- Sale of publications		4,988,338
- Kindergarten fees		2,490,688
- Reimbursed for job schemes		453,984
- Reimbursed from National Insurance Administration		1,630,358
- Reimbursed from other government agencies		3,579,105
- Sale of seismic survey data		37,695,986
- Income from cooperation projects		6,087,602
- Credit interest, bank		747,944
- Miscellaneous income		396,891

1.3.4 INFORMATION

During the reporting period, great interest has been shown in information from the Norwegian Petroleum Directorate by Norwegian and foreign institutions, the press and other media, companies and individuals. A number of foreign media representatives have, for example, visited the Directorate individually or in groups in order to acquaint themselves with the Directorate and the petroleum activities. The Norwegian Petroleum Directorate has in turn carried out extensive activities including lectures in various forums.

The NPD Annual Report occupies a central position in the Directorate's information activities. The 1994 Annual Report was presented at the end of May.

The Norwegian Petroleum Directorate launched its own home page on Internet on 19 December 1995. The Internet address is http://www.npd.no.

As planned, four issues of the Directorate's internal magazine *Oss Direkte* were published in 1995.

During 1995, 52 press releases were issued, the majority in connection with the completion of exploration wells.

1.3.5 DOCUMENT AND INFORMATION MANAGEMENT

560 requests for access to documents were received by the Norwegian Petroleum Directorate in 1995 compared with 180 in 1994. Reply time to these requests varies, but on average it is about six days.

The library has published the eighth revised edition of the Petroleum thesaurus, now containing 6,200 terms. New this year is the English translation of the terms and a separate English-Norwegian register.

Use of the library's services has been stable for the last two years. The Norwegian Petroleum Directorate continues to receive many inquiries from other libraries and external customers. New library administration software was implemented at the end of the year. During autumn, use of Internet for information searches for the library's users was implemented.

In February the Directorate made the transition to the SIFT search language for the reference data base OIL. The data base is now updated weekly. After the transition, OIL has been available for all users of the «Info Market» in the National Data Center. Efficiency measures have been implemented in the production of the paper edition, including the English and Norwegian versions being combined into a single publication: Oljeindeks/Oil Index. The use of OIL has continued to increase this year, but not as much as expected.

2. Resource management on the Norwegian continental shelf

Introduction

The objective of the Norwegian Petroleum Directorate is to actively promote the best possible management of the petroleum resources in order to maximize the creation of value on the Norwegian shelf, and to act as the Ministry of Industry and Energy's key advisory and executive body in this field. An objective such as this can only be achieved by the Norwegian Petroleum Directorate having a good overview of the petroleum resources at all times, and by evaluating alternative methods for the optimum exploration, development and production of the resources. Such overviews and evaluations form the basis for advice to the central authorities with respect to the best possible management of the petroleum resources.

Resource management activities on the Norwegian shelf in 1995 were also characterized by a high level of activity in exploration, development and operation. A significant upward adjustment of the reserves basis for discoveries and fields has been made, and a number of new discoveries have been registered.

In addition, a number of important activities may be noted within the resource management activity area, including preparation and processing of the 15th licensing round, evaluations and recommendations in connection with gas allocation, work in connection with improved resource utilization and implementation of FORCE, continuation of DISKOS and revision of the Petroleum Act.

2.1 RESOURCE ACCOUNTING

The Norwegian Petroleum Directorate's resource accounting includes an overview of both the original marketable and remaining petroleum volumes on the Norwegian continental shelf. Changes in the resource accounts 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 total resource accounts for the Norwegian continental shelf are shown in Table 2.1.a.

Classification system for discovered resources

There are seven classes of discovered resources in the Norwegian Petroleum Directorate's classification system:

- fields where production has ceased
- fields in production
- fields decided to be developed
- discoveries with firm development plans
- discoveries without firm development plans
- discoveries in relinquished areas
- small, technical discoveries and new discoveries where evaluation is not completed

For the last two classes the individual resource estimates are uncertain, and the Norwegian Petroleum Directorate therefore issues only an aggregate estimate of the resources.

"Resources" is a generic term used for all types of petroleum volumes. "Reserves" comprise recoverable resources in accordance with approved plans for fields in operation and for fields under development. In other words, reserves are distributed among the first three classes. Distinction can be made between original recoverable and remaining reserves.

In order to receive the designation discovery, a well must have proven mobile hydrocarbons in a separate geological structure or a separate stratigraphic level. This can be done both by testing of the formation's production properties (DST), and through the use of various sampling equipment (RFT/FMT, MDT, etc.). One discovery, or several discoveries together may be called a field when the plan for development and operation (PDO) is approved by the authorities. Any discovery and any field has only one discovery well. This means that wildcat wells which prove resources that are or will be included in the resource figure for an existing discovery or field, are not considered to be new discovery wells. The discovery year is the year the discovery well was temporarily abandoned or completed.

Undiscovered resources

The undiscovered resources comprise both mapped prospects and unmapped resources in areas where play models have been defined. There is always great uncertainty connected with such analyses. The size stated for undiscovered resources is the statistical expected value.

Changes in 1995

Existing fields and discoveries

For existing fields and discoveries (that is, excluding discoveries made in 1995), the oil resources have increased by 338.6 million Sm^3 and the gas resources by 80.3 billion Sm^3, while the NGL resources have increased by 25.6 million tonnes (see Table 2.1.b).

The changes are based on revisions to the resource estimates for a number of the fields and discoveries. Several of the large oil fields have experienced significant upward adjustments of their oil resources in 1995. This is primarily due to the fact that projects aimed at increasing recoverability of oil have been realized or are in the process of being realized. Thereby, some of the resource potential called "improved resource utilization" (formerly "improved oil recovery") has been included in the oil fields' recoverable reserves. Additional details regarding resource changes for the individual fields is presented in a separate paragraph.

New discoveries

During 1995, discoveries were made in 10 exploration wells. These are 15/5-5, 17/3-1, 25/5-5, 25/7-3, 25/8-8 S, 30/3-7 S, 30/8-1 S, 34/10-37, 34/10-40 S, and 6406/2-1.

Evaluation has been completed only for a few of the discoveries, but the preliminary estimate is that the resource growth due to new discoveries in 1995 will be about 130 million Sm^3 o.e. The estimate varies between 85-180 million Sm^3 o.e.

Production

Recovery of petroleum on the Norwegian continental shelf in 1995 was 157.2 million Sm^3 of oil, 27.8 billion Sm^3 of gas and 6.5 million tonnes of NGL (including condensate). Transfer of resources from Troll to Oseberg through the TOGI project is not included.

Resource status

The resource accounting for the Norwegian continental shelf is presented in Table 2.1.a, and the geographical distribution of resources is shown in Figure 2.1. The resources in the individual fields and discoveries on the Norwegian continental shelf are set out in accordance with the Norwegian Petroleum Directorate's resource classification system.

Fields where production has ceased

There were no fields which ceased production in 1995. The three fields on the Norwegian continental shelf where production has ceased are shown in Table 2.1.c.

Reserves in fields in production/decided to be developed

As of 31 December 1995, it was decided to develop 47 development projects on the Norwegian continental shelf (including three fields where production has ceased), which is five more than at the end of the previous year. This includes the two approved development phases on the Troll field, but not TOGI, which, for the time being, is being held outside the Norwegian Petroleum Directorate's resource accounting for the continental shelf. The new development projects are Gungne, Njord, Tordis Øst and Yme. There are, however, several new plans for development and operation being considered by the authorities, and several major and minor developments will be approved in 1996.

During 1995, five new fields started production: Frøy, Gyda Sør, Heidrun, Statfjord Nord and Troll Oil (Phase II). Thus, at the end of the year there were 36 fields in production on the Norwegian continental shelf (Table 2.1.d). It has been decided to develop eight fields, but these have not yet commenced production (Table 2.1.e). This is the same number as last year.

The total, original recoverable reserves in fields decided to be developed is 4831 million Sm^3 o.e., divided between 3025 million Sm^3 o.e. oil/NGL and 1806 billion Sm^3 gas. In addition, a potential improved resource utilization of 267 million Sm^3 oil has been identified.

Up to 31 December 1995, a total of 1370 million Sm^3 o.e. oil/NGL and 454 billion Sm^3 o.e. gas has been produced. This constitutes 34% of the discovered oil and 13% of the discovered gas. This includes the potential for improved resource utilization.

Resources in discoveries with firm development plans

At the end of the year, there were 23 discoveries considered to have firm development plans (Table 2.1.f). This includes discoveries which have plans for development and operation under consideration by the authorities. This category also includes discoveries where it has been indicated that such plans will be submitted in the near future (2-3 years), and where there is significant activity by the operator and the licensees. The petroleum resources for these discoveries constitute a total of 1438 million Sm^3 o.e. Three of these discoveries are located in the Norwegian Sea and make up Åsgard.

Resources in discoveries without firm development plans

Table 2.1.g provides an overview of discoveries on the Norwegian shelf which do not currently have firm development plans. This list does not include discoveries in relinquished areas, small, technical discoveries or discoveries made in 1995, which are separate resource categories.

The total of 61 discoveries have been placed in this category because they are not regarded by the Norwegian Petroleum Directorate as having sufficiently firm development plans or because activity on the part of the operators is low in relation to these discoveries. This does not mean that the Norwegian Petroleum Directorate regards all of these discoveries as being unprofitable. Several of the discoveries would be profitable for development today under the judgement of the Norwegian Petroleum Directorate. There is, therefore, a great challenge to make use of infrastructure and develop technology so that the resources in these discoveries may be realized. The resource volume constitutes a total of 738 million Sm^3 o.e., whereof 396 million Sm^3 o.e. is located in the North Sea, 99 million Sm^3 is located in the Norwegian Sea, and a significant volume, roughly 243 million Sm^3 is located in the Barents Sea.

Resources in discoveries in relinquished areas

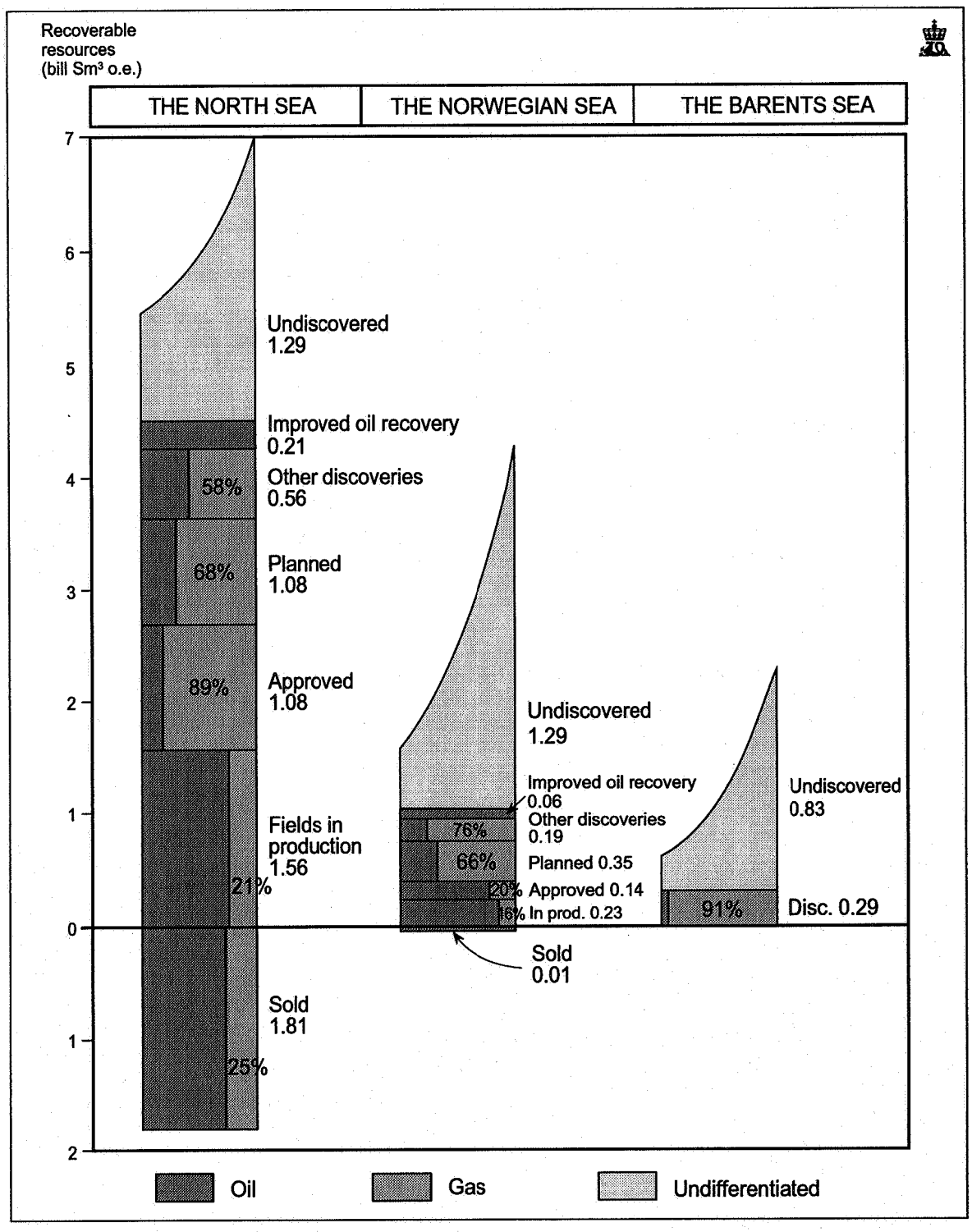
In addition to the discoveries discussed in the preceding paragraphs, 16 discoveries are found in the Norwegian Petroleum Directorate's data base in areas with relinquished production licenses. Most of these are small, technical discoveries, but this category also includes larger discoveries such as 35/3-2 Agat, 35/8-1, 35/8-2, 7120/12-2 Alke Sør and 7226/11-1. This category consists mainly of gas discoveries. In all, resources in the production licenses in the relinquished discoveries amount to about 11 million Sm^3 oil and 110 billion Sm^3 gas (Table 2.1.h).

Resources in small, technical discoveries and new discoveries in 1995

A total of 41 discoveries are registered in this category. Of the new discoveries, only a few have been completely evaluated. Therefore, 34/10-37 is the only discovery in 1995 placed in one of the categories above.

The small, technical discoveries include discoveries with poor or non-conclusive formation tests as well as discoveries which were not tested.

Figure 2.1
Geographical distribution of resources on the Norwegian continental shelf



There is great uncertainty connected with the resource estimates in this discovery category, but the Norwegian Petroleum Directorate estimates a total expected value of approximately 70 million Sm^3 oil and approximately 100 billion Sm^3 gas.

Undiscovered resources

The Norwegian Petroleum Directorate estimates that the undiscovered resources constitute between 1.4 - 7.3 billion Sm^3 o.e. The statistical expected value is roughly 3.4 billion Sm^3 o.e. Figure 2.1 shows the geographic

distribution of these resources. The figure also attempts to illustrate the uncertainty by indicating a low estimate and a high estimate for each area. It is expected that about 60% of the undiscovered resources are gas.

Table 2.1.a
The resource account for the Norwegian continental shelf

		Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.
3 fields where production has ceased		0	39	0	39
36 fields in production	Present plan	2672	781	90	3570
	Improved recovery	267			267
8 fields with approved development plan		164	987	55	1222
23 discoveries with firm development plans		462	891	65	1438
61 discoveries without firm development plans		129	546	48	738
16 discoveries in relinquished areas		11	110		121
41 new discoveries and small technical discoveries		70	100		170
Sum fields and discoveries		3775	3454	258	7565
Undiscovered resources		1385	2010		3395
Sold as of 31 December 1995		1317	454	41	1824

Reserves

Table 2.1.b
Change in discovered and total resources

	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.
New discoveries	50.0	80.0		130.0
Change in estimates	338.6	80.3	25.6	452.3
Total change in original discovered resources	388.6	160.3	25.6	582.3
Change in remaining potential for improved recovery	-234.0			-234.0
Overall change in total estimate for fields and discoveries	154.6	160.3	25.6	348.3
Production	-157.2	-27.8	-6.5	-193.4
Change in undiscovered resources	-50.0	-80.0		-130.0
Overall change in remaining total resources	-52.6	52.5	19.1	24.9

Table 2.1.c
Original petroleum reserves in fields having ceased production

	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.
Mime	0.4	0.1		0.5
Nordøst Frigg		11.8	0.1	11.9
Odin		26.6		26.6
Sum	0.4	38.5	0.1	39.1

Table 2.1.d
Petroleum reserves in fields in production

	ORIGINAL RECOVERABLE				REMAINING			
	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.
North Sea:								
Albuskjell	7.4	16.1	1.0	24.8	0.2	1.1	0.0	1.3
Brage	46.2	1.9	0.8	49.1	33.6	1.5	0.6	35.8
Cod	2.9	7.4	0.5	11.0	0.1	0.5	0.0	0.6
Edda	4.9	2.1	0.2	7.3	0.4	0.2		0.6
Ekofisk	404.0	157.4	15.0	580.8	198.9	61.8	6.5	269.2
Eldfisk	79.2	58.3	4.7	143.6	20.7	32.3	2.0	55.6
Embla	7.3	4.8	0.5	12.8	4.0	3.8	0.4	8.3
Frigg [1)]		111.5	0.4	112.0		0.8	0.0	0.8
Frøy	15.8	3.2	0.2	19.3	14.9	3.0	0.2	18.3
Gullfaks	308.7	21.9	2.5	333.9	134.3	10.1	1.2	146.0

	ORIGINAL RECOVERABLE				REMAINING			
	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.
Gullfaks Vest	2.9	0.3		3.2	1.8	0.3		2.1
Gyda [2]	30.6	3.9	1.7	36.7	11.4	1.4	0.7	13.7
Gyda Sør [2]	1.5	0.9	0.2	2.7	1.5	0.9	0.2	2.7
Heimdal	6.8	40.6		47.4	2.0	7.6		9.6
Hod	9.3	2.3	0.3	11.9	4.3	1.3	0.2	5.8
Lille-Frigg	1.7	4.2	0.0	5.9	0.9	3.0	0.0	3.9
Loke [3]		3.4	1.4	5.2		3.4	1.4	5.2
Murchison [4]	12.5	0.4	0.4	13.4	0.8	0.1	0.0	0.9
Oseberg	325.0	90.9		415.9	159.2	90.9		250.1
Oseberg Vest	2.0	7.5		9.5	1.1	7.5		8.6
Sleipner Øst [3]		41.0	26.0	74.8		31.0	19.1	55.9
Snorre	189.2	10.1	5.5	206.5	159.5	8.8	4.5	174.1
Statfjord [5]	538.0	57.0	15.0	614.5	110.2	26.2	6.3	144.6
Statfjord Nord	27.6	1.9	0.4	30.0	25.1	1.8	0.4	27.3
Statfjord Øst	24.7	3.0	0.7	28.6	20.9	2.8	0.7	24.5
Tommeliten Gamma	3.8	9.5	0.6	14.0	0.4	1.6	0.1	2.0
Tor	25.0	11.3	1.2	37.8	5.3	1.0	0.1	6.4
Tordis	29.6	2.0	0.7	32.5	23.9	1.6	0.5	26.2
Troll Vest oil (phase II)	71.0	19.3		90.3	67.0	19.3		86.3
Ula	69.1	3.6	2.6	76.1	17.3	0.2	0.5	18.2
Valhall	130.9	32.0	5.1	169.5	88.1	23.4	3.4	116.0
Veslefrikk	54.4	2.7	1.0	58.4	31.3	1.9	0.3	33.5
Vest Ekofisk	12.2	27.0	1.5	41.1	0.2	1.5	0.1	1.7
Øst Frigg		9.3	0.1	9.4		0.8	0.0	0.8
Sum	2444.2	768.7	90.0	3329.9	1139.1	353.2	49.5	1556.6
Norwegian Sea:								
Draugen	94.5			94.5	83.5			83.5
Heidrun	133.0	12.5		145.5	132.1	12.5		144.6
Sum	227.5	12.5		240.0	215.6	12.5		228.1
Total	2671.7	781.2	90.0	3569.9	1354.7	365.7	49.5	1784.8

1) Norwegian share only: 60.82%
2) The combined production from Gyda and Gyda Sør is measured as one. The production is subtracted from Gyda.
3) The combined production from Sleipner Øst and Loke is measured as one. The production is subtracted from Sleipner Øst.
4) Norwegian share only: 22.2%
5) Norwegian share only: 85.46869%

Table 2.1.e
Petroleum reserves in fields with approved development plan

	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.
North Sea:				
Gungne		2.1	0.9	3.3
Sleipner Vest		126.9	33.7	170.7
Tordis Øst	5.4	0.5	0.5	6.5
Troll Øst (phase I)		825.0	20.0	851.0
Vigdis	33.9	2.4		36.3
Yme	10.5			10.5
Sum	49.8	956.9	55.1	1078.3
Norwegian Sea:				
Njord	37.5	14.0		51.5
Norne	76.2	15.6		91.8
Sum	113.7	29.6		143.3
Total	163.5	986.5	55.1	1221.6

Table 2.1.f
Petroleum resources in discoveries with firm development plan

	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.
North Sea:				
15/9-19 SR	4.8	0.8		5.6
15/12-4 Varg	9.8			9.8
25/8-5 S	24.0	5.0		29.0
25/11-1 Balder	39.3			39.3
25/11-15 Hermod	60.0	0.9		60.9
30/2-1 Huldra	7.9	22.3		30.2
30/6-5 Oseberg Øst	19.0	1.0		20.0
30/9-3 Omega Nord	14.2	10.7		24.9
30/9-6	2.0	0.9		2.9
30/9-10 Omega Sør	12.5	1.8		14.3
30/9-13 S	8.1	3.2		11.3
30/9-16	3.8	1.2		5.0
31/2-1 Troll Vest gas (phase III)		407.0	11.0	421.3
31/2-1 Troll Vest oil (phase II B)	74.0	68.0		142.0
34/7-21	11.0			11.0
34/7-23 S	3.9			3.9
34/8-1 Visund	48.4	56.4	2.1	107.5
34/10-2 Gullfaks Sør	20.1	62.5	17.8	105.7
34/10-17 Rimfaks	20.3	17.0		37.3
34/10-37	2.1	0.7		2.8
Sum	385.2	659.4	30.9	1084.7
Norwegian Sea:				
Åsgard:				
6506/12-1 Smørbukk	53.5	98.0	21.6	179.6
6506/12-3 Smørbukk Sør	23.5	21.0		44.5
6507/11-1 Midgard		113.0	12.7	129.5
Sum	77.0	232.0	34.3	353.6
Total	426.2	891.4	65.2	1438.3

Table 2.1.g
Petroleum resources in discoveries without firm development plan

	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.
North Sea:				
1/2-1 [1)]	2.9	0.4		3.3
1/3-3	1.2	0.3		1.5
1/3-6	3.3	5.8		9.1
1/9-1 Tommeliten Alpha	3.2	3.5	0.3	7.1
2/2-5	0.9			0.9
2/4-17 Tjalve	0.9	2.4		3.3
2/5-3 Sørøst Tor	0.8	0.3		1.1
2/7-22		0.6		0.6
2/7-29	3.0			3.0
2/12-1 Mjølner	1.5	0.7		2.2
3/7-4 Trym		3.0	0.6	3.8
6/3-1 Pi	0.8	0.4		1.2
7/7-2	2.7	0.1		2.8
7/8-3	3.6	0.2	1.1	5.2
15/3-1 S	4.6	19.4		24.0
15/3-4	2.2	1.3		3.5
15/5-1 Dagny		5.8	2.0	8.4
15/8-1 Alpha		4.1	0.9	5.2
15/12-8			1.0	1.3
16/7-2		1.8		1.8
16/7-4	1.4	8.0		9.4
24/6-1 Peik		9.1	3.0	13.0
24/9-6	4.0			4.0
25/2-5 Lille Frøy	1.2	1.5	0.3	3.1

	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.
25/4-6 S Vale	3.4	2.5		5.9
25/5-3 Skirne		5.2	0.4	5.7
25/5-4 Byggve	0.6	3.1	0.0	3.7
25/6-1	2.0			2.0
25/8-1	7.0			7.0
30/6-18 Kappa	3.1	3.4		6.5
30/7-2	1.5	0.4		1.9
30/7-6 R Hild	7.7	33.2		40.9
30/9-4 S	0.8	1.2		2.0
30/9-7	0.8	0.3		1.1
30/9-9	1.6	0.6		2.2
30/9-15	2.8			2.8
34/10-23 Gamma	6.0	69.0		75.0
34/11-1		45.0	14.3	63.6
35/9-1 R	5.0	11.5		16.5
35/11-2	1.5	4.9	2.6	9.8
35/11-4 R	9.0	8.6		17.6
35/11-7	9.0	4.0		13.0
Sum	100.2	261.3	26.5	395.9
Norwegian Sea:				
6406/3-2 Trestakk	4.8	1.2		6.0
6407/1-2 Tyrihans Sør		11.5	3.8	16.4
6407/1-3 Tyrihans Nord	2.5	16.0	1.5	20.5
6407/6-3 Mikkel	1.0	17.4	2.6	21.8
6506/11-2 Lange		2.0	3.4	6.4
6507/2-2		6.8		6.8
6507/3-1 Alve	2.9	10.5	1.0	14.7
6507/8-4	3.2	1.8		5.0
6608/10-4	1.3			1.3
Sum	15.7	67.2	12.3	98.9
Barents Sea:				
7120/7-1		15.1		15.1
7120/7-2 Askeladd Sentral		10.4		10.4
7120/8-1 Askeladd		55.7		55.7
7120/9-1 Albatross		38.0		38.0
7121/4-1 Snøhvit	6.7	83.0	9.2	101.7
7121/4-2 Snøhvit Nord		3.5		3.5
7121/5-2 Beta	3.1	0.5		3.6
7121/7-2 Albatross Sør		5.8		5.8
7122/6-1	3.2	3.7		6.9
7124/3-1		2.1		2.1
Sum	13.0	217.8	9.2	242.8
Total	128.9	546.3	48.0	737.5

1) Norwegian share only

Table 2.1.h
Petroleum resources in discoveries in relinquished areas, in small technical discoveries and new discoveries in 1995

	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Total mill Sm³ o.e.
Discoveries in relinquished areas	11	110		121
Small technical discoveries and new discoveries in 1995	70	100		170
Sum	81	210		291

CHANGES IN RESOURCE ESTIMATES SINCE THE LAST ANNUAL REPORT

Fields in production/decided to be developed

A number of re-evaluations of the reserve estimates have been carried out during 1995, as shown in Table 2.1.i. The reasons for the most significant changes is discussed below:

Draugen
The increase in reserves is due to a higher recovery factor because of an increased number of production wells.

Ekofisk
The increase in the oil and gas reserves is due to expected lower residual oil saturation after water flooding, more

optimal production from new wells as well as future blowdown of the reservoir.

Eldfisk
The increase is based on a higher recovery factor through production from horizontal wells.

Embla
The increase is due to new interpretation of the reservoir after pressure testing of all wells.

Frøy
Higher reserves estimates are based on information from the first four wells on the field.

Gullfaks
The increase is due to expectations of improved resource utilization and extended production period. In addition, the resources in the Lund formation have been included in the reserves.

Heidrun
The increase in the estimated reserves is due to new geo-technical and technical reservoir evaluation of the entire field.

Hod
The increase is due to the inclusion of reserves from the so-called "Saddle area".

Oseberg
The increase is due to the Norwegian Petroleum Directorate's preparation of its own prognoses for improved resource utilization taking into consideration pressure support, recirculation of gas and new well technology.

Sleipner Øst
The change is due to the gas previously reported as wet gas is now reported as dry gas.

Snorre
Higher reserve estimates are primarily due to an optimization of the recovery strategy.

Statfjord Øst
The increase is based on the results of new reservoir studies.

Tor
The change is due to the estimated production period being extended by 4 years until 2011.

Valhall
The increase is due to the inclusion of the water injection project. The licensees are expected to make the decision regarding implementation of the project during spring of 1996.

Gungne
The reduction is due to new surveys in connection with the PDO.

Njord
The increase is due to the performance of new reservoir simulation in connection with the PDO.

Discoveries
Changes in the resource estimates from 1994-1995 are presented in Table 2.1.i. Discoveries with more significant changes are commented on separately.

15/12-4 Varg
After the change of operators, the new operator has reported somewhat lower resources than the previous operator. The resources have been downgraded after further geo-technical and technical reservoir work.

25/11-1 Balder
The increase is due to the fact that new studies show lower residual oil saturation after water flooding, increased permeability and more reserves in place.

30/9-10 Omega Sør
Higher resource estimates are due to new surveys of the discovery.

30/9-13 S
The resource figures have been increased somewhat due to new surveys.

31/2-1 Troll Vest Gas Province (Phases II B and III)
Based on the fact that the PDO for the oil zone in the Troll Vest gas province is being planned, the Norwegian Petroleum Directorate is now including these resources in the total resource account. The Norwegian Petroleum Directorate is using the Troll Phase III operator's resource estimates for recoverable gas resources.

34/8-1 Visund
Higher estimates for oil are due to changes in the planned reservoir management, including gas recirculation. The gas resources have been increased inter alia because earlier estimates for fuel gas are now included in the marketable resources.

34/10-2 Gullfaks Sør
The increase in the gas volume is due to the gas formerly calculated for delivery to 34/10-17 Rimfaks, being incorporated in the marketable reserves. In addition, the change in resources is also due to a change in the calculation method for this discovery.

34/10-17 Rimfaks
Higher resource estimates are due to the appraisal well 34/10-38 S showing new resources and also new surveys and more exhaustive analyses of the reservoir in connection with the PDO.

6506/12-1 Smørbukk
6506/12-3 Smørbukk Sør
6507/11-1 Midgard
These three discovery groups, which together will comprise

the Åsgard field, are currently undergoing re-evaluation in connection with a unified development. The resource estimates used in this annual report are the operator's estimates in connection with the PDO. The Norwegian Petroleum Directorate's own resource estimates are not calculated on the basis of a unified development and are therefore not directly comparable. Next year the Norwegian Petroleum Directorate will report a total resource estimate for the field.

7/8-3
The change is due to new surveys based on 3D seismic shot in 1994.

15/3-1 S
The increase is the result of new surveys and new reservoir simulations.

24/6-1 Peik
The operator has now adjusted the resource estimate upward in connection with a change in the reporting routines.

25/4-6 S Vale
The change is due to the operator's upward adjustment of the resource estimate in connection with a change in the reporting routines.

30/6-18 Kappa
The change is a result of the correction of an error in the 1994 reporting.

34/7-21
The increase comes from a update of the geological model.

6507/2-2
The increase is due to new surveys and improved understanding of the reservoir.

Table 2.1.i
Change in reserve/resource estimates, annual reports 1994-1995

	Annual report 1994			Annual report 1995			Changes 1994 to 1995		
	Oil mill Sm^3	Gas bill Sm^3	NGL mill tons	Oil mill Sm^3	Gas bill Sm^3	NGL mill tons	Oil mill Sm^3	Gas bill Sm^3	NGL mill tons
Fields in production									
Albuskjell	7.4	15.8	1.0	7.4	16.1	1.0		0.3	
Brage	46.2	2.0	0.8	46.2	1.9	0.8		-0.1	
Cod	2.9	7.3	0.5	2.9	7.4	0.5	0.0	0.1	0.0
Draugen	92.0			94.5			2.5		
Edda	4.8	2.1	0.2	4.9	2.1	0.2	0.1		
Ekofisk	359.7	150.8	14.1	404.0	157.4	15.0	44.3	6.6	0.9
Eldfisk	70.7	44.9	3.7	79.2	58.3	4.7	8.5	13.4	1.0
Embla	5.0	3.0	0.3	7.3	4.8	0.5	2.3	1.8	0.2
Frigg		110.9	0.4		111.5	0.4		0.6	
Frøy	13.9	3.0	0.2	15.8	3.2	0.2	1.9	0.2	0.0
Gullfaks	281.0	21.5	2.2	309.0	21.9	2.5	27.7	0.4	0.3
Heidrun	87.3	37.8		133.0	12.5		45.7	-25.3	
Heimdal	6.5	38.6		6.8	40.6		0.3	2.0	
Hod	7.9	2.0	0.3	9.3	2.3	0.3	1.4	0.3	0.0
Lille-Frigg	3.6	7.0		1.7	4.2	0.0	-1.9	-2.8	0.0
Loke	1.4	5.8	0.7		3.4	1.4	-1.4	-2.4	0.7
Murchison	12.0	0.4	0.3	12.5	0.4	0.4	0.5	0.0	0.0
Oseberg	310.0	88.9		325.0	90.9		15.0	2.0	
Oseberg Vest	1.3	6.2		2.0	7.5		0.7	1.3	
Sleipner Øst		47.8	30.4		41.0	26.0		-6.8	-4.4
Snorre	173.3	6.9	3.6	189.2	10.1	5.5	15.9	3.2	1.9
Statfjord	530.0	57.0	16.0	538.0	57.0	15.0	8.0		-1.0
Statfjord Nord	29.0	2.4		27.6	1.9	0.4	-1.4	-0.5	0.4
Statfjord Øst	19.4	2.4	0.7	24.7	3.0	0.7	5.3	0.6	
Tommeliten Gamma	3.8	9.7	0.5	3.8	9.5	0.6	0.0	-0.2	0.1
Tor	21.3	10.8	1.1	25.0	11.3	1.2	3.7	0.5	0.1
Tordis	29.0	2.0	1.0	29.6	2.0	0.7	0.6		-0.3
Troll Vest oil (phase 2)	71.0	17.5		71.0	19.3			1.8	
Ula	69.1	4.7	2.7	69.1	3.6	2.6		-1.1	-0.1
Valhall	100.7	26.3	4.1	130.9	32.0	5.1	30.2	5.7	1.0
Veslefrikk	52.8	2.3	0.9	54.4	2.7	1.0	1.6	0.4	0.1
Vest Ekofisk	12.2	27.2	1.4	12.2	27.0	1.5		-0.2	0.1
Øst Frigg		8.8	0.1		9.3	0.1		0.5	

	Annual report 1994			Annual report 1995			Changes 1994 to 1995		
	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Oil mill Sm³	Gas bill Sm³	NGL mill tons	Oil mill Sm³	Gas bill Sm³	NGL mill tons
Fields with approved dev. plan									
Gungne		4.4	1.9		2.1	0.9		-2.3	-1.0
Njord	35.0	7.2		37.5	14.0		2.5	6.8	
Tordis Øst	5.5			5.4	0.5	0.5	-0.1	0.5	0.5
Yme	5.8			10.5			4.7		
Discoveries with firm dev. plan									
15/9-19 SR	6.5			4.8	0.8		-1.7	0.8	
15/12-4 Varg	12.3			9.8			-2.5		
25/8-5 S [1]				24.0	5.0		24.0	5.0	
25/11-1 Balder	32.2			39.3			7.1		
25/11-15 Hermod	60.0	1.8		60.0	0.9			-0.9	
30/9-3 Omega Nord	16.6	8.0		14.2	10.7		-2.4	2.7	
30/9-6	2.0	0.2		2.0	0.9			0.7	
30/9-10 Omega Sør	3.2			12.5	1.8		9.3	1.8	
30/9-13 S	7.5	1.7		8.1	3.2		0.6	1.5	
30/9-16 [1]				3.8	1.2		3.8	1.2	
31/2-1 Troll Vest gas (phase III)		463.0	10.8		407.0	11.0		-56.0	0.2
31/2-1 Troll Vest oil (phase II B)				74.0	68.0		74.0	68.0	
34/7-21	13.6			11.0			-2.6		
34/7-23 S [1]				3.9			3.9		
34/8-1 Visund	47.0	51.0		48.4	56.4	2.1	1.4	5.4	2.1
34/10-2 Gullfaks Sør	25.6	56.1		20.1	62.5	17.8	-5.5	6.4	17.8
34/10-17 Rimfaks	13.0	10.0		20.3	17.0		7.3	7.0	
6506/12-1 Smørbukk		95.0	35.0	53.5	98.0	21.6	53.5	3.0	-13.4
6506/12-3 Smørbukk Sør	31.0	24.0		23.5	21.0		-7.5	-3.0	
6507/11-1 Midgard	1.3	87.0	13.0		113.0	12.7	-1.3	26.0	-0.3
Discoveries without firm dev. plan									
1/2-1	3.0			2.9	0.4		-0.1	0.4	
1/9-1 Tommeliten Alpha	2.5	2.7	0.5	3.2	3.5	0.3	0.7	0.8	-0.2
2/2-5 [2]				0.9			0.9		
2/4-17 Tjalve	1.0	2.1		0.9	2.4		-0.1	0.3	
2/5-3 Sørøst Tor	2.5	2.0		0.8	0.3		-1.7	-1.7	
2/7-22	0.6	1.4			0.6		-0.6	-0.8	
3/7-4 Trym	1.1	4.1			3.0	0.6	-1.1	-1.1	0.6
6/3-1 Pi	0.8			0.8	0.4			0.4	
7/8-3	6.2			3.6	0.2	1.1	-2.6	0.2	1.1
15/3-1 S	5.2	10.5		4.6	19.4		-0.6	8.9	
15/5-1 Dagny		6.1	1.4		5.8	2.0		-0.3	0.6
15/8-1 Alpha		4.3	3.6		4.1	0.9		-0.2	-2.8
15/12-8	0.6	1.3				1.0	-0.6	-1.3	1.0
16/7-2 [2]					1.8			1.8	
24/6-1 Peik	0.9	3.1			9.1	3.0	-0.9	6.0	3.0
24/9-6 [3]				4.0			4.0		
25/4-6 S Vale	1.3	1.0	0.3	3.4	2.5		2.1	1.5	-0.3
25/5-3 Skirne		3.3	0.3		5.2	0.4		1.9	0.1
25/5-4 Byggve	0.6	2.6		0.6	3.1	0.0		0.5	0.0
30/6-18 Kappa	1.0	3.6		3.1	3.4		2.1	-0.2	
30/7-2 [2]				1.5	0.4		1.5	0.4	
30/7-6 R Hild	6.6	27.6		7.7	33.2		1.1	5.6	

	Annual report 1994			Annual report 1995			Changes 1994 to 1995		
	Oil mill Sm^3	Gas bill Sm^3	NGL mill tons	Oil mill Sm^3	Gas bill Sm^3	NGL mill tons	Oil mill Sm^3	Gas bill Sm^3	NGL mill tons
30/9-4 S	0.3	0.2		0.8	1.2		0.5	1.0	
30/9-7	0.9			0.8	0.3		-0.1	0.3	
30/9-9		1.7		1.6	0.6		1.6	-1.1	
30/9-15 [1]				2.8			2.8		
34/11-1 [1]					45.0	14.3		45.0	14.3
35/11-2	4.6	4.9		1.5	4.9	2.6	-3.1		2.6
6406/3-2 Trestakk	4.8			4.8	1.2			1.2	
6407/1-2 Tyrihans Sør		11.5	5.1		11.5	3.8			-1.3
6407/1-3 Tyrihans Nord	2.5	15.4	2.0	2.5	16.0	1.5		0.6	-0.5
6407/6-3 Mikkel		18.2	3.7	1.0	17.4	2.6	1.0	-0.8	-1.1
6506/11-2 Lange		1.6	2.8		2.0	3.4		0.4	0.6
6507/2-2	0.5	2.6			6.8		-0.5	4.2	
6507/3-1 Alve		11.0		2.9	10.5	1.0	2.9	-0.5	1.0
6507/8-4	7.3	1.9		3.2	1.8		-4.1	-0.1	
6608/10-4 [1]				1.3			1.3		
7120/7-1		22.5			15.1			-7.4	
7120/7-2 Askeladd Sentral		9.9			10.4			0.5	
7120/8-1 Askeladd		49.8			55.7			5.9	
7120/9-1 Albatross		41.7			38.0			-3.7	
7121/4-2 Snøhvit Nord		3.3			3.5			0.2	
7121/5-2 Beta		4.3		3.1	0.5		3.1	-3.8	
7121/7-2 Albatross Sør		10.8			5.8			-5.0	
7122/6-1		11.0		3.2	3.7		3.2	-7.3	
Misc. adjustments									
Small technical discoveries							11.0	5.8	
New discoveries in 1994 [4]	65.0	55.0					-65.0	-55.0	
Sum							338.6	80.3	25.6

1) Discovery made in 1994 which did not have resource estimate in the 1994 annual report.
2) Old discovery that have been upgraded from small technical discovery, without separate estimate, to the category «discoveries without firm development plan».
3) 24/9-6 was drilled in 1994 as an appraisal to the 24/9-5 discovery. The well made a new discovery and has been reclassified to a wildcat well. 24/9-6 did not have a separate resource estimate in the 1994 annual report.
4) The combined estimate for discoveries made in 1994 is balanced against the new estimates for these discoveries (see footnote 1) and against adjustments in «small technical discoveries».

Name changes in 1995

Name changes are normally made upon application from the operator. Discoveries which have an approved field name change names when the plan for development and operation is approved by the dropping of the discovery well in front of the name.

Some discoveries have unofficial names which are in common use. In some cases, these names are also used in this annual report, together with the discovery well. If the operator applies for approval of a different name, the name will be changed. The discovery well, however, will always remain the same. The Norwegian Petroleum Directorate has also made some small changes to the names of certain discoveries compared with previous annual reports.

The name changes made in 1995 are as follows:

Present name	Previous designation
Gungne	15/9-15 My
Njord	6407/7-1 S Njord
Norne	6608/10-2 Norne
Oseberg Vest	30/6 Gamma Nord
Tordis Øst	34/7-22
Yme	9/2-1 Yme
15/12-4 Varg	15/12-4 Beta
15/3-1 S	15/3-1,3

IMPROVED RESOURCE UTILIZATION

Of 31 oil fields in production or decided to be developed as of December 1995, 25 have reservoirs in sandstone, with reserves estimated to 2098 million Sm^3 oil. This equals an expected average recovery factor from the sandstone fields of about 43%. The oil reserves in six oil fields with chalk reservoirs are estimated to 653 million Sm^3 with an average recovery factor of around 33%. This means that the average recovery factor for all Norwegian oil fields is now approximately 40%.

During recent years a number of studies have been performed, both by the licensees and by the Norwegian Petroleum Directorate with the purpose of estimating the potential to increase the recovery factor for oil. These studies have varied from general possibility studies, which often address a number of fields, to detailed simulation

studies for individual fields. The studies also incorporate many different methods, from measures for better reservoir management and reduced operating costs to the use of advanced recovery methods. Such methods are undergoing research in various contexts, including the research programs RUTH and PROFIT which are discussed in more detail in Section 5.

The Norwegian Petroleum Directorate sees a large future potential for improved resource utilization. This includes both measures to increase the recovery factor from the individual reservoir and the possibility of phasing in additional resources on the fields.

2.1.1 PRODUCTION PROGNOSES

Several of the producing oil fields on the Norwegian shelf, including the largest fields, Gullfaks, Oseberg and Statfjord, are now in or are approaching the decline phase. This gives an increased degree of uncertainty related to the short-term production of these fields. In 1996, approximately 80% of the production from the Norwegian shelf will come from fields producing at plateau. Around the year 2003, it is expected that all fields in operation and decided to be developed as of 31 December 1995 will be in the decline phase. Over the long term, the greatest uncertainty for these fields will therefore be related to the rate of decline. More recovery from the fields at plateau can lead to a greater rate of decline. Additional resources on the fields, a better rate of recovery than expected, improved resource utilization as well as phase-in of satellite fields are factors which could reduce the decline in production, increase recovery and thereby also extend field lifetime.

In the year 2000, production from fields in production and decided to be developed as of 31 December 1995 is evaluated to be between 115 (2 million barrels per day) and 150 million Sm³ (2.6 million barrels per day) with expectancy of 130 million Sm³ (2.2 million barrels per day).

In the coming five-year period, approximately 80% of the production on the Norwegian shelf will come from

Figure 2.1.1.a
Future oil production from fields in operation, fields decided to be developed and discoveries expected to be developed

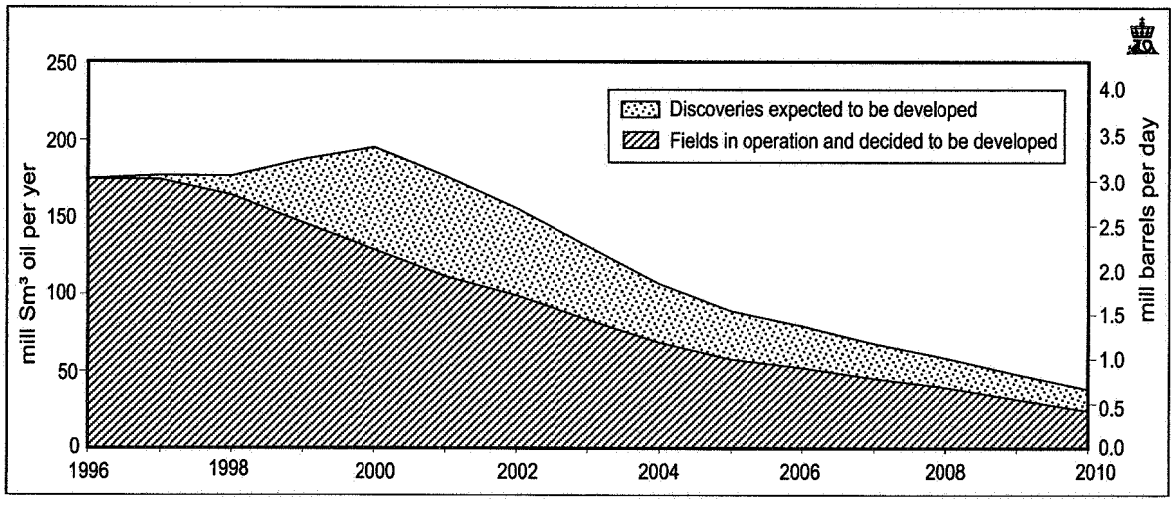
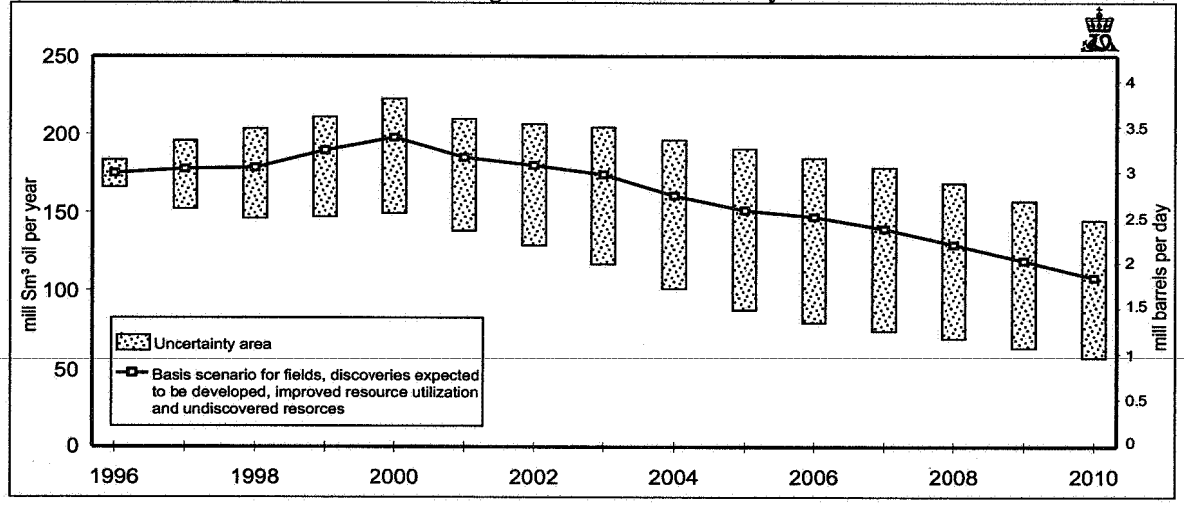


Figure 2.1.1.b
Basis scenario for oil production on the Norwegian shelf - with uncertainty area



fields which are in production as of December 1995 (Figure 2.1.1.a). The uncertainty related to production from these fields will therefore have the greatest significance in the short term. In the longer term (2001-2010), fields in production and fields decided to be developed will make up about 45% of the expected production, while discoveries which are expected to be developed are estimated to account for 25%. The uncertainty here is primarily tied to the size of the recoverable resources. In the short term, however, uncertainty related to the timing of production start for discoveries is also a significant factor.

Making prognoses of production from deposits which are not yet discovered is based on a number of assumptions and suppositions which are, evaluated separately, extremely uncertain. The most important uncertainties in the prognoses are related to the size of future discoveries and the start-up date, as well as the frequency of new developments. Future oil price and development of technology will be important factors in the continued exploration and development activities on the Norwegian shelf. Improved resource utilization from fields in production and production from undiscovered resources is estimated to 30% of the expected production during the period from 2001 to 2010.

Figure 2.1.1.b shows the expected total oil production with areas of uncertainty (prediction interval). In the evaluation of uncertainty in future oil production, only uncertainty in oil production for individual years is evaluated, no low and high prognoses are given. The highest level of Norwegian oil production is expected in the year 2000 with roughly 200 million Sm^3 (3.4 million barrels per day). The uncertainty related to this estimate is, however, great. The uncertainty area in the year 2000 is estimated to 65 million Sm^3 (1.1 million barrels per day). In 2005, production is expected to be 150 million Sm^3 (2.6 million barrels per day), with a prediction interval of 100 million Sm^3 (1.7 million barrels per day).

2.2 SURVEYS AND EXPLORATION DRILLING

2.2.1 GEOPHYSICAL AND GEOLOGICAL SURVEYS

A total of 192,393 km of seismic data were acquired on the Norwegian shelf in 1995. The number of kilometers refers to cmp-line kilometers. Figure 2.2.1.a shows an overview of the recent years' development with regard to number of cmp-line kilometers.

The Norwegian Petroleum Directorate's geophysical and geological surveys in 1995

The Norwegian Petroleum Directorate acquired a total of 2,117 km 2D seismic during 1995.

The North Sea

This year the Norwegian Petroleum Directorate gave priority to acquisition of high-resolution seismic in the North Sea as a supplement to the industry's acquisition of conventional 2D data, see Figures 2.2.1.b and 2.2.1.c. A limited number of lines were collected covering some of the key structures with a view towards the Norwegian Petroleum Directorate's recommendations in connection with the 15th licensing round. The data was collected by the vessel "Geolog Dmitry Nalivkin", operated by Geoteam AS. Some lines were registered twice using different

Figure 2.2.1.a
Seismic surveys on the Norwegian continental shelf 1962-1995

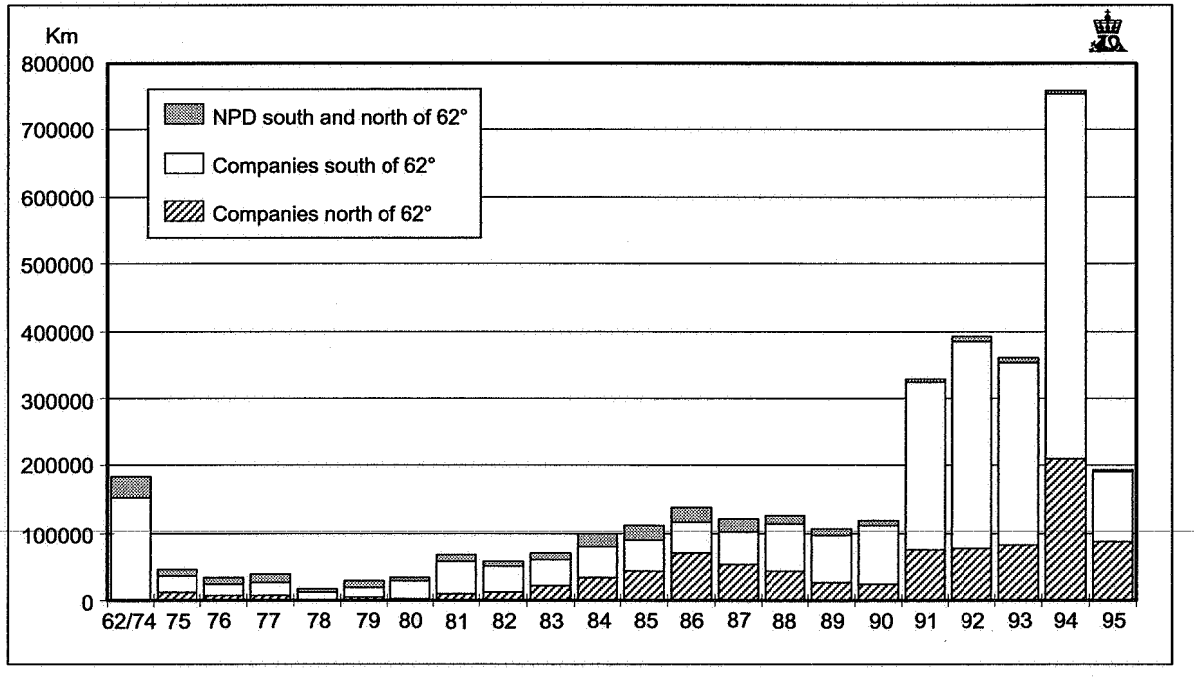


Figure 2.2.1.b
Geophysical surveys in the Heimdal and Balder areas

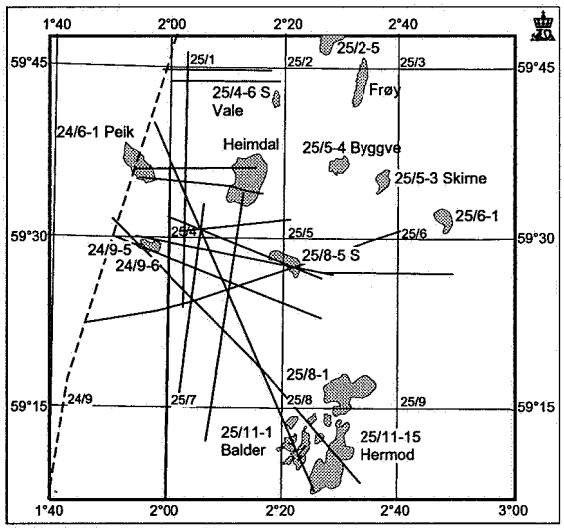
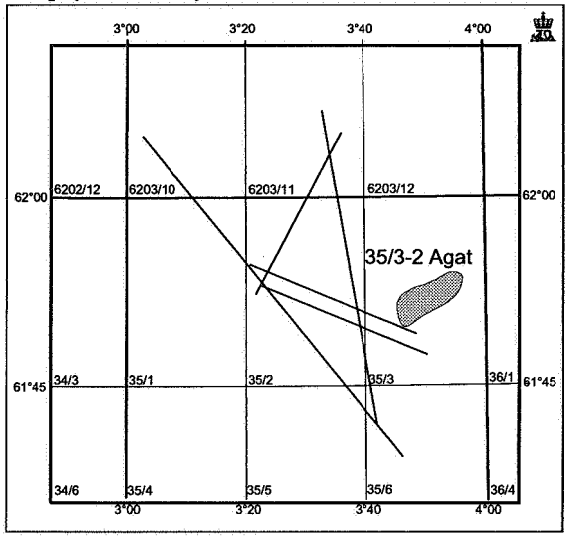


Figure 2.2.1.c
Geophysical surveys in the northern North Sea



acquisition parameters. The vessel acquired a total of 899 km.

Coastal areas

In order to study coastal sedimentary basins and the most important landlineaments' marine extension, shallow seismic surveys were made of the stretch from Utsira - Kristiansand with the vessel "Geo Scanner" operated by Geoteam AS. 1,178 km of seismic data were collected, see Figure 2.2.1.d. At the same time, single-channel registration of data from a small air gun was conducted to enable study of the geology just under the seabed and to register any neo-tectonic movements.

Coastal land areas

Coastal seismic shows that there is a good chance of finding submerged fault sedimentation basins of the Mesozoic or Paleozoic Ages both on Lista and Jæren. If this is the case, it will be possible to take samples of rock which may be prospects on the shelf. Eight km of land seismic were therefore collected on Lista and 32 km on Jæren. A vibroseis source with three or four vibrators was used and the equipment was operated by the University of Bergen.

Processing

The Norwegian Petroleum Directorate has finalized the processing of data from 1994. A great deal of reprocessing of older data from the northern part of the Barents Sea has also been performed this year, in some cases with significant improvements.

Gravimetric data

In connection with marine seismic surveys, approximately 2,100 km of gravimetric data were acquired.

Geological surveys

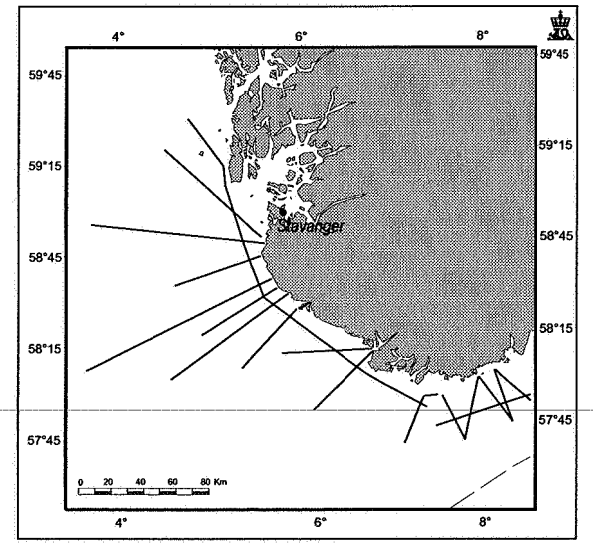
In 1995 the Norwegian Petroleum Directorate conducted shallow drillings in the Barents Sea North in areas which have not been opened for exploration drilling. The purpose of this type of survey is to supplement seismic surveys with geological information in the form of core samples of rock types under the quaternary uncompacted material.

The survey comprised three locations roughly 50 km southeast of Spitzbergen. The total core catch from this area was 478 meters and included rock from the Cretaceous and Jurassic Ages.

Two locations in Hopendjupet, which is 250 km southeast of Hopenøya, were also examined. The core catch was 331 meters and included rock from the Triassic Age.

The quaternary overburden in the two areas varied from 1 meter to 13 meters.

Figure 2.2.1.d
Shallow seimic surveys offshore Utsira-Kristiansand



The following drilling was conducted:

Location	Co-ordinates	Depth under seabed
7534/04-U-01	75° 44' 17.33"N 34° 12' 21.32"E	233.55 m
7534/06-U-01	75° 33' 33.72"N 34° 55' 43.20"E	121.10 m
7618/12-U-01	76° 11' 08.11"N 18° 39' 59.95"E	198.5 m
7618/09-U-01	76° 19' 28.88"N 18° 55' 37.64"E	170.6 m
7619/08-U-01	76° 29' 57.65"N 19° 28' 20.47"E	138.7 m

Companies' geophysical surveys

In 1995, a total of 190,276 cmp-line kilometers of seismic were acquired on the Norwegian shelf under the direction of oil companies and seismic companies. Of this figure, 171,498 km are 3D seismic. 82,835 km were collected in the North Sea and 107,441 km in the Norwegian Sea and the Barents Sea. The activity level in the North Sea in 1995 was only just over 15% of the activity in 1994. In the Norwegian Sea and the Barents Sea the reduction was less, 50% compared with 1994.

Norwegian oil companies acquired 112,765 cmp-line kilometers, a reduction of 163,708 km compared with 1994. Foreign companies collected 32,642 cmp-line kilometers, which represents a reduction of 289,415 km compared with the previous year.

In addition, the contractor companies (Geco-Prakla, PGS Exploration, Norex, Geoteam and CGG Norge) collected 44,369 cmp-line kilometers of seismic for their own account. This is a reduction of 111,828 km compared with 1994.

2.2.2. EXPLORATION DRILLING

At the turn of the year 1994/1995, drilling of three exploration wells was in progress.

36 new exploration wells were spudded in 1995, of which 22 were wildcats and 14 were appraisal wells. Drilling activities in 1995 comprised 19 wildcat and 11 appraisal wells in the North Sea and three wildcat and three appraisal wells in the Norwegian Sea. Four suspended exploration wells were also re-entered for further work.

At the turn of the year 1995/1996, seven exploration wells were in progress, two of which were re-entered wells.

As of 31 December 1995, a total of 836 exploration wells had been spudded on the Norwegian continental shelf: 596 wildcat wells and 240 appraisal wells. The figures refer to the original classification of well type, see Table 7.3.a.

In 1995, 34 exploration wells were completed on the Norwegian shelf, consisting of 21 wildcat wells and 13 appraisal wells. The geographical distribution of the wells is as follows: 17 wildcat and 11 appraisal wells in the North Sea, and four wildcat and two appraisal wells in the Norwegian Sea.

The operators for the wells completed in 1995 were as follows: Statoil 13, Hydro 7, Esso 5, Elf 3, Saga 2, Amerada 2, Phillips 1 and Conoco 1.

A wildcat well is a well drilled to explore a new, clearly defined geological unit delimited by rock formations with structural or stratigraphic limits. An appraisal well is a well drilled in order to determine the extent and size of discovered petroleum deposits. All exploration wells have one of these classifications when they are spudded. If it should later prove that a well does not meet the criteria for the classification it was originally given, it is reclassified. 71 exploration wells on the Norwegian shelf have been reclassified, 69 of these from wildcat to appraisal wells and two from appraisal to wildcat wells.

As of 31 December 1995, 829 exploration wells were completed or suspended on the Norwegian shelf. After reclassification, these comprise 523 wildcat and 306 appraisal wells, see Figure 2.2.2. Table 7.3.f provides an overview of spudded and/or completed exploration wells in 1995.

As of year-end, a total of 41 exploration wells have been temporarily abandoned on the Norwegian continental shelf. The suspended exploration wells with equipment remaining on the seabed are:

2/01-09 A	25/04-06 S	30/09-13 S
2/04-15 S	25/05-04	31/02-16 SR
2/04-17	25/08-05 S	31/02-18 A
2/07-23 S	25/08-06	31/05-04 AR
2/07-25 S	25/11-16	31/05-05
2/10-02	25/11-19 S	34/04-07
2/12-02 S	25/11-21 S	34/08-04 A
7/12-08	30/02-01	34/10-34
7/12-09	30/03-04	34/10-37 A
9/02-05	30/09-07	6407/07-02 R
15/09-19 SR	30/09-08 R	6407/07-04
15/12-06 S	30/09-09	6506/12-08
15/12-09 S	30/09-10	6507/08-04
25/02-13	30/09-12 A	

The Norwegian companies Statoil, Hydro and Saga have been the operators of 22 of the spudded wells, representing 61.1%. The remaining 14 wells were divided among Phillips, Esso, Amoco, BP, Elf, Conoco and Amerada Hess. This is illustrated in Table 7.3.c.

Figure 2.2.2
Exploration wells completed each year after re-classification

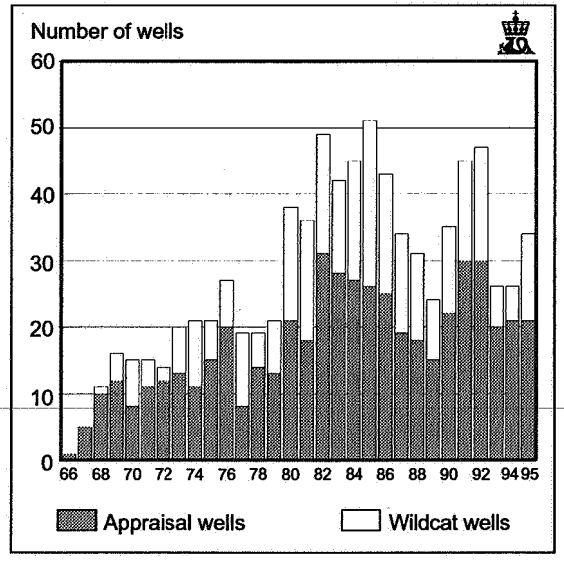


Table 2.2.4
New discoveries

Exploration well	Operator	Hydro-carbon type	Reservoir-level	Forma-tion tested	Production rate (per day)	Choke	Size of discovery (recoverable)
15/5-5	Norsk Hydro	oil	Paleocene	yes	600 Sm^3 oil + 38,000 Sm^3 gas	23.8 mm	5-15 million Sm^3 oil
17/3-1	Elf Petroleum	gas	Middle Jurassic	no			1-3 billion Sm^3 gas
25/5-5	Elf Petroleum	oil	Paleocene	yes	455 Sm^3 oil + 13,200 Sm^3 gas	38 mm	5-10 million Sm^3 oil
25/7-3	Conoco	oil	Paleocene	yes	740 Sm^3 oil + 29,000 Sm^3 gas	25 mm	5-10 million Sm^3 oil
25/8-8 S	Esso Norge	oil	Paleocene	yes	1,067 Sm^3 oil + 75,900 Sm^3 gas	50 mm	8.5 million Sm^3 oil
30/3-7 S	Statoil	*	Middle Jurassic	*			
30/8-1 S	Norsk Hydro	gas/ condensate	Early/Middle Jurassic	*			
34/10-37	Statoil	oil	Middle Jurassic	no			2 mill Sm^3 oil + 0.7 bill Sm^3 gas
34/10-40 S	Statoil	gas	Middle Jurassic	no			0.1-1 billion Sm^3 gas
6406/2-1	Saga Petroleum	gas/ condensate	Early/Middle Jurassic	yes	250 Sm^3 condensate + 780,000 Sm^3 gas	28.6 mm	50-100 million Sm^3 o.e.

* Well 30/3-7 S and 30/8-1 S are planned for formation testing in 1996.

2.2.3 EXPLORATION TARGETS

For the most part, exploration activity in 1995 has continued to target Jurassic sandstone prospects, however, the number of wells drilled to prospects in the Tertiary showed a marked increase. Of the 36 exploration wells spudded, 21 had Jurassic as the main prospect, while 13 had the Tertiary and two had the Cretaceous. Secondary prospects were divided among 10 in the Jurassic, three in the Cretaceous, two in the Tertiary and one in the Permian.

2.2.4 NEW DISCOVERIES IN 1995

21 wildcat wells were completed in 1995. Three of the wildcat wells have been suspended. Ten discoveries have been made, whereof five have been confirmed through formation testing. One discovery was made in the Norwegian Sea and nine in the North Sea, see Table 2.2.4.

A more detailed description of the various discoveries may be found in Section 2.2.5.

Figure 2.2.5.a
Exploration wells drilled in the southern North Sea

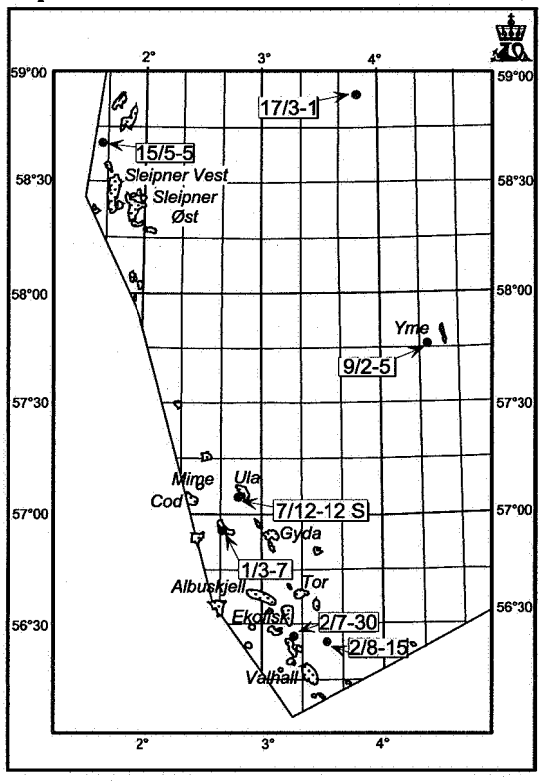


Table 2.2.5.a
Exploration wells drilled in the southern North Sea

Exploration well	Well classification	Production licence	Operator	Total depth (MSL)	Total depth (age)	Status
1/3-7	appraisal	065	Elf Petroleum	3300 metres	Tertiary	gas
2/7-30	wildcat	018	Phillips Petroleum	3434 metres	Cretaceous	dry
2/8-15	wildcat	006	Amoco Norge			
7/12-12 S	wildcat	019	BP Norge			
9/2-5	appraisal	114	Statoil	3332 metres	Middle Jurassic	oil
17/3-1	wildcat	188	Elf Petroleum	2827 metres	Precambrian	gas

2.2.5 DETAILED DESCRIPTION OF DRILLING IN 1995

Southern part of the North Sea

Four exploration wells were completed in the southern part of the North Sea in 1995 (Table 2.2.5.a and Figure 2.2.5.a). Two of the exploration wells were wildcat wells and two were appraisal wells. In addition, two wildcat wells (2/8-15 and 7/12-12 S) have been spudded, but were not completed at year-end.

One new discovery of hydrocarbons was made in the area in 1995.

Well 17/3-1, drilled on the southern margin of the Stord basin, hit small volumes of gas in rocks of the Middle Jurassic Age. The well was not formation- tested.

Both appraisal wells also revealed hydrocarbons. 1/3-7 confirmed the presence of gas/condensate in the 1/3-6 discovery, and 9/2-5 in the Egersund basin confirmed the presence of oil in the 9/2-3 discovery, a structure southwest of the Yme field.

Only well 1/3-7 was formation-tested, by means of a test in sandstone from the Paleocene Age. The flow rate was measured to 126 Sm^3 oil and 36,850 Sm^3 gas per day through a choke opening of 11 mm. The results showed that the 1/3-6 discovery is more complicated than previously assumed.

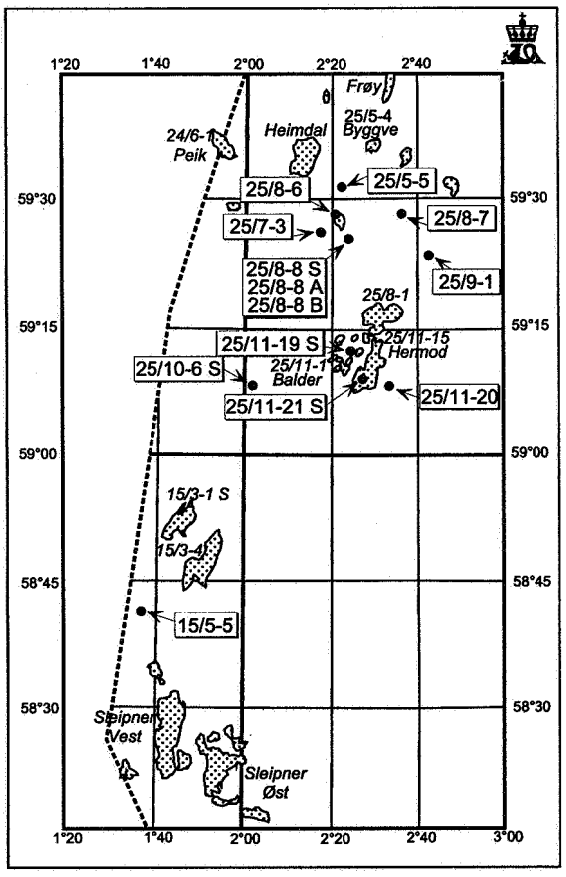
The Sleipner / Balder area

Twelve exploration wells were completed in this area in 1995 (Table 2.2.5.b and Figure 2.2.5.b). Seven were wildcat wells and five were appraisal wells. One wildcat well (25/10-6 S) was spudded, but was not completed by year-end.

Four oil discoveries were made in the area in 1995. The reservoir level for all of these discoveries has been Tertiary. The discoveries were made by the following wells: 15/5-5, 25/5-5, 25/7-3 and 25/8-8 S. 15/5-5 was drilled just to the north of the fields in the Sleipner area, and 25/5-5, 25/7-3 and 25/8-8 S just to the north of 25/11-1, the Balder discovery. All the wells were formation- tested and the test results are shown in Table 2.2.4.

In addition to the discoveries, five appraisal wells have been drilled with positive results.

Figure 2.2.5.b
Exploration wells drilled in the Sleipner and Balder area



25/8-6 was drilled to delineate an oil discovery made in 1994 by well 25/8-5 S. The result was a confirmation of the discovery. The well was not formation-tested.

Two appraisal wells were also drilled on the 25/8-8 S discovery made in 1995. The wells (25/8-8 A and 25/8-8 B) were drilled as sidetracks from 25/8-8 S, and oil was found. No formation tests were done on these wells.

An appraisal well (25/11-19 S) was also drilled on 25/11-1, the Balder discovery. Oil was also found here in Tertiary sandstone. The well was not formation-tested.

Table 2.2.5.b
Exploration wells drilled in the Sleipner and Balder area

Exploration well	Well classification	Production licence	Operator	Total depth (MSL)	Total depth (age)	Status
15/5-5	wildcat	048	Norsk Hydro	2619 metres	Cretaceous	oil
25/5-5	wildcat	102	Elf Petroleum	2600 metres	Tertiary	oil
25/7-3	wildcat	103	Conoco	2571 metres	Cretaceous	oil
25/8-6	appraisal	027 P	Esso Norge	2545 metres	Cretaceous	oil
25/8-7	wildcat	189	Amerada Hess	2355 metres	Early Jurassic	dry
25/8-8 S	wildcat	027 P	Esso Norge	2343 metres	Jurassic	oil
25/8-8 A	appraisal	027 P	Esso Norge	2158 metres	Tertiary	oil
25/8-8 B	appraisal	027 P	Esso Norge	2153 metres	Tertiary	oil
25/9-1	wildcat	189	Amerada Hess	2525 metres	Triassic	dry
25/10-6 S	wildcat	168	Statoil			
25/11-19 S	appraisal	001	Esso Norge	2019 metres	Early Jurassic	oil
25/11-20	wildcat	169	Norsk Hydro	1802 metres	Cretaceous	dry
25/11-21 S	appraisal	169	Norsk Hydro	1931 metres	Cretaceous	oil

Figure 2.2.5.c
Exploration wells drilled in the Oseberg area

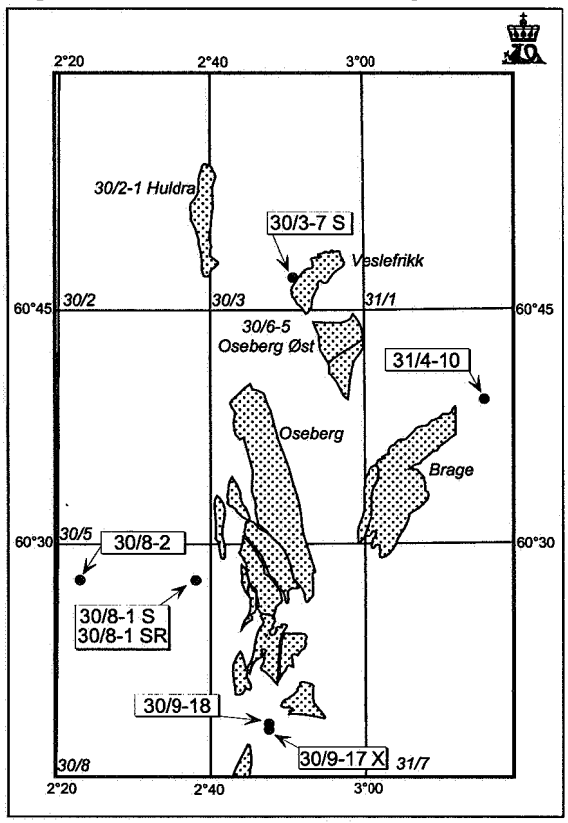
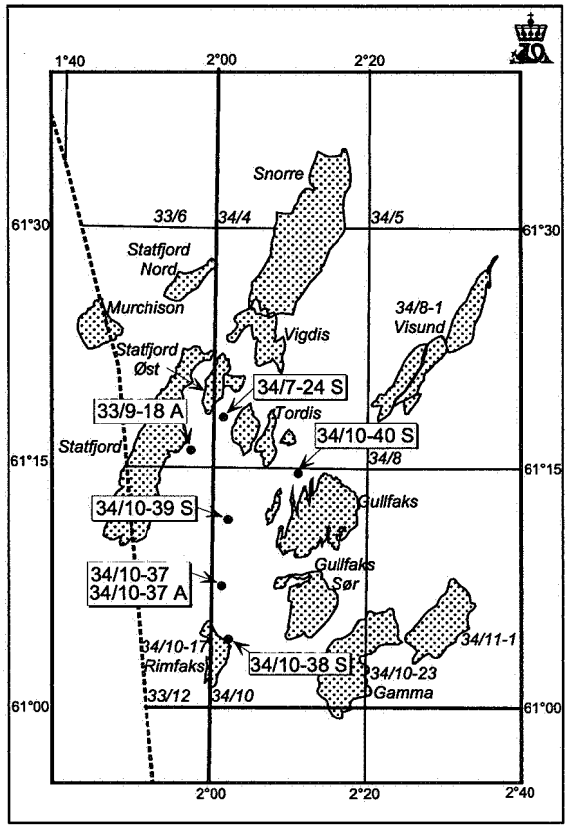


Figure 2.2.5.d
Exploration wells drilled in the Gullfaks, Statfjord and Snorre area



The last of the appraisal wells (25/11-21 S) was drilled on 25/11-15, the Hermod discovery. Oil-filled sandstone was found in Tertiary rock. The well was not formation-tested.

The Oseberg area

Five exploration wells were completed in the Oseberg area in 1995 (Table 2.2.5.c and Figure 2.2.5.c). Four of these were wildcat wells and one was an appraisal well. Two wildcat wells, 30/8-1 S and 30/3-7 S were suspended during the year. In addition, two wildcat wells (30/8-1 SR and 30/8-2) were spudded, but were not completed at year-end.

Two new discoveries were made in the area. Well 30/3-7 S drilled just west of the Veslefrikk field struck hydrocarbons in Middle Jurassic sandstone. Formation testing of the discovery is planned in 1996 to clarify the type of hydrocarbons and reservoir characteristics.

A discovery of gas/condensate was also made in well 30/8-1 S, just west of the Oseberg field. This discovery will also be formation-tested in 1996.

The 31/4-10 appraisal well was drilled northeast of the Brage field. The well confirmed the presence of oil in the Sognefjord formation, a formation in which oil has previously been proven, but which has not been produced. The well was not formation-tested.

One of the wells, 30/9-17 X, had to be plugged and abandoned because of technical problems before the reservoir was reached. Wildcat well 30/9-18 will replace this well.

The Gullfaks, Statfjord and Snorre area

Seven exploration wells were completed in this area in 1995 (Table 2.2.5.d and Figure 2.2.5.d). Four of these were wildcat wells and three were appraisal wells. No wells were

Table 2.2.5.c
Exploration wells drilled in the Oseberg area

Exploration well	Well classification	Production licence	Operator	Total depth (MSL)	Total depth (age)	Status
30/3-7 S	wildcat	052	Statoil	3994 metres	Late Triassic	
30/8-1 S	wildcat	190	Norsk Hydro	4322 metres	Early Jurassic	gas/cond
30/8-1 SR	wildcat	190	Norsk Hydro			
30/8-2	wildcat	190	Norsk Hydro			
30/9-17 X	wildcat	104	Norsk Hydro	1382 metres	Tertiary	dry
30/9-18	wildcat	104	Norsk Hydro	2968 metres	Jurassic	dry
31/4-10	appraisal	055	Norsk Hydro	2328 metres	Jurassic	oil

Table 2.2.5.d
Exploration wells drilled in the Gullfaks, Statfjord and Snorre area

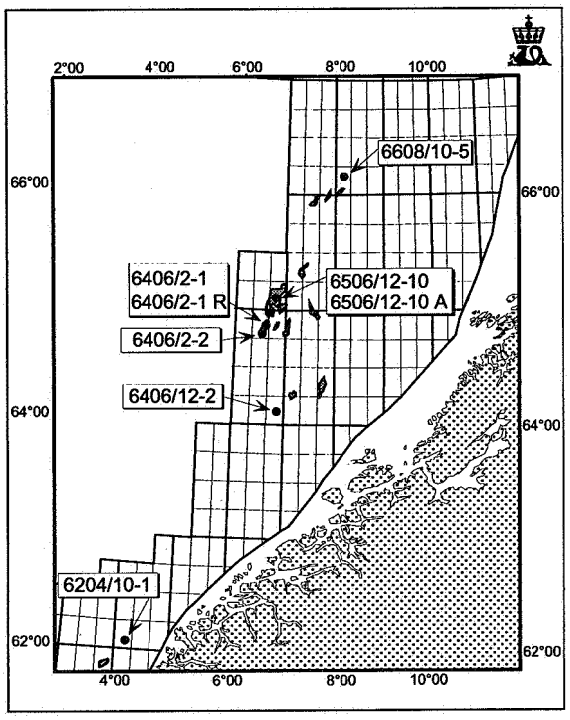
Exploration well	Well classification	Production licence	Operator	Total depth (MSL)	Total depth (age)	Status
33/9-18 A	wildcat	037	Statoil	3230 metres	Jurassic	dry
34/7-24 S	appraisal	089	Saga Petroleum	2913 metres	Late Jurassic	dry
34/10-37	wildcat	050	Statoil	2850 metres	Early Jurassic	oil
34/10-37 A	appraisal	050	Statoil	2845 metres	Early Jurassic	oil
34/10-38 S	appraisal	050	Statoil	3369 metres	Triassic	gas/oil
34/10-39 S	wildcat	050	Statoil	3119 metres	Early Jurassic	dry
34/10-40 S	wildcat	050	Statoil	2294 metres	Early Jurassic	gas

in progress at the end of the year.

Two new discoveries were made in the area. Well 34/10-37 found light oil in Middle Jurassic sandstones. The well was not formation-tested, but a sidetrack appraisal well 34/10-37 A, drilled from the well was tested. The flow rate was measured at 1,969 Sm^3 oil and 635,000 Sm^3 gas per day through a choke opening of 35 mm.
The other discovery in the area was made by well 34/10-40 S. Gas was found in sandstone from the Middle Jurassic age. No formation test was done on the well.

Oil and gas were also proven in appraisal well 34/10-38 S on the eastern part of 34/10-17, the Rimfaks discovery. The well showed hydrocarbons in sandstone from the Middle and Early Jurassic ages. A formation test was carried out in Early Jurassic sandstone. The flow rate was measured to 900 Sm^3 oil and 200,000 Sm^3 gas per day through a 14.3 mm choke opening.

Figure 2.2.5.e
Exploration wells drilled in the Norwegian Sea



The Norwegian Sea

Six exploration wells were completed in the Norwegian Sea in 1995 (Table 2.2.5.e and Figure 2.2.5.e).

Four of the wells were wildcat wells and two were appraisal wells. One wildcat well (6406/2-1) was suspended during the year due to drilling restrictions. In addition, one wildcat well (6406/2-1 R) and one appraisal well (6406/2-2) were spudded, but were not completed at year-end.

One major discovery of hydrocarbons was made in the area. Wildcat well 6406/2-1 drilled south of 6506/12-1, the Smørbukk discovery, (part of Åsgard) found gas and condensate in Jurassic rock.

The re-entered well (6406/2-1 R) was formation-tested at seven different levels. Preliminary analyses of data from the well show that the reservoir quality varies considerably. Some zones are very compact, while others have been shown to have very good production characteristics. At year-end, the operator was drilling the second well on the structure (6406/2-2) in order to determine the size of the discovery.

Table 2.2.5.e
Exploration wells drilled in the Norwegian Sea

Exploration well	Well classification	Production licence	Operator	Total depth (MSL)	Total depth (age)	Status
6204/10-1	wildcat	175	Statoil	2686 metres	Late Cretaceous	dry
6406/2-1	wildcat	199	Saga Petroleum	5268 metres	Early Jurassic	gas/cond
6406/2-1 R	wildcat	199	Saga Petroleum			
6406/2-2	appraisal	199	Saga Petroleum			
6406/12-2	wildcat	157	Statoil	4344 metres	Late Jurassic	dry
6506/12-10	appraisal	094	Statoil	5073 metres	Early Jurassic	dry
6506/12-10 A	appraisal	094	Statoil	5337 metres	Early Jurassic	gas/cond
6608/10-5	wildcat	128	Statoil	3177 metres	Early Jurassic	dry

Hydrocarbons were also found in an appraisal well on 6506/12-1, the Smørbukk discovery. Well 6506/12-10 A found gas/condensate in Jurassic rocks. A formation test was conducted on sandstone from the Early Jurassic Age. The flow rate was measured at 900 Sm^3 oil and 450,000 Sm^3 gas per day through a choke opening of 20.6 mm.

The Barents Sea
No wells were drilled in 1995.
Svalbard
No exploration drilling has been conducted on Svalbard in 1995.

2.3 DISCOVERIES

2.3.1 DISCOVERIES WITHOUT FIRM DEVELOPMENT PLANS

The Ekofisk and Valhall area
An overview of the fields and discoveries in the area is shown in Figure 2.5.4.a. Typical of the area is that most of the production comes from chalk fields, while most of the exploration prospects are in sandstone at deep levels. During recent years, the licensees in the area have laid down comprehensive work to define the remaining potential, also in Cretaceous rock. There are a few minor discoveries in the area and some of these may be linked to existing installations. Other discoveries are too isolated or are for other reasons considered not commercial at this time.

2/12-1 Mjølner
2/12-1 Mjølner is located in production license 113 which was awarded in 1985. The discovery lies near the borderline between the Norwegian and Danish sectors. In 1995, Amerada Hess Norge AS has taken over Norsk Hydro's share as well as operatorship in the production license. Work commenced in 1995 with a view towards further development of the discovery. Recoverable resources are estimated at 1.5 million Sm^3 oil and 0.7 billion Sm^3 gas. The declaration of commerciality was submitted in June 1992.

3/7-4 Trym
3/7-4 Trym is located in production license 147 which was awarded in 1988. Shell is the operator.

The discovery lies on a structure crossing the borderline between the Norwegian and Danish continental shelves. In 1992, a well was drilled in the Danish sector in the southern part of the same structure and oil was found. This oil discovery was named Lulita, with Statoil Denmark as operator. Shell's interpretation of 3D seismic for the entire structure divides it into three segments, whereof two extend into the Danish sector. Trym is regarded to be 100% Norwegian. Recoverable resources are estimated at 0.6 million tons NGL and 3 billion Sm^3 gas.

In 1995, Shell took the initiative to set up cooperation with the Danish operator for the development of Trym/ Lulita.

1/9-1 Tommeliten Alpha
1/9-1 Tommeliten Alpha is located south of Tommeliten Gamma in block 1/9, production license 044, which was awarded in 1976. The discovery was Statoil's first as an operator. In 1995, a feasibility study was performed for development of the discovery. The study concluded that additional resources needed to be proved prior to further development. Recoverable resources are estimated at 3.2 million Sm^3 oil and 3.5 billion Sm^3 gas.

2/5-3 Sørøst Tor
2/5-3 Sørøst Tor is located in production license 006, which was awarded in 1965 with Amoco as operator. Recoverable resources are estimated at 0.8 million Sm^3 oil and 0.3 billion Sm^3 gas.

2/4-17 Tjalve
2/4-17 Tjalve was proven in 1992. The discovery contains hydrocarbons in sand in the Upper Jurassic Ula formation. The discovery is located in production license 018, which was awarded in 1965 with Phillips Petroleum as operator. Recoverable resources are estimated at 0.9 million Sm^3 oil and 2.4 billion Sm^3 gas. Development of the discovery via the Tor field was considered in 1994, but this has been put on ice due to future limitations in gas processing capacity on Ekofisk II.

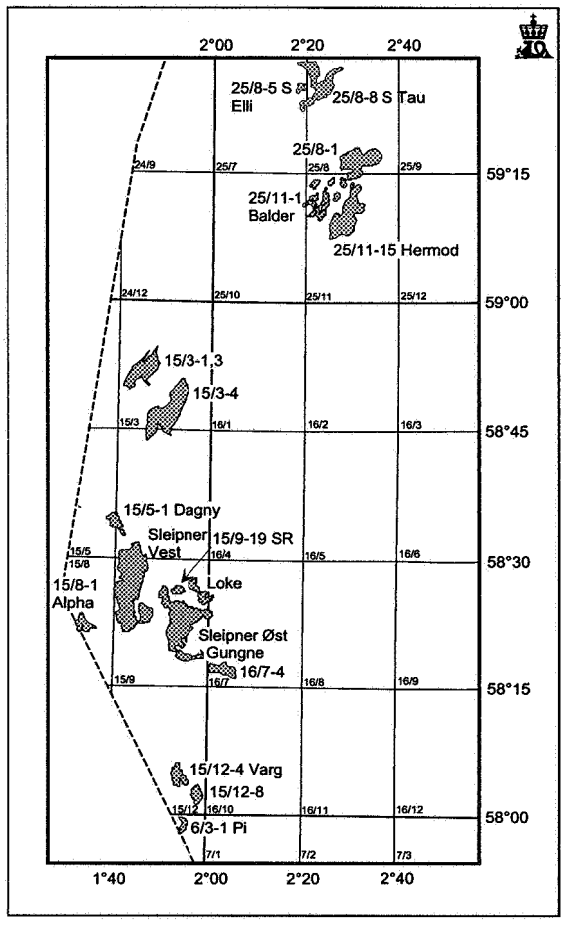
The Sleipner area
In addition to Sleipner Øst, Loke and Gungne which are in operation, Sleipner Vest which is decided to be developed, 15/12-4 Varg which has firm development plans, there are also a number of other, smaller petroleum deposits in this area (see Figure 2.3.1.a). In the area around Sleipner there are a number of relatively small gas/condensate discoveries which are expected to be linked to the infrastructure in the area.

15/8-1 Alpha
This discovery was made in production license 046 in 1982 in the Hugin formation at the Triassic/Jurassic level. Statoil is the operator. Recoverable reserves are estimated at 4.1 billion Sm^3 gas and 0.9 million tons NGL.

15/5-1 Dagny
This gas/condensate discovery is located in production license 048, with Norsk Hydro as operator. Due to the fact that the discovery extends into block 15/6, it must be unitized with the licensees in production license 029. Recoverable resources are estimated at 5.8 billion Sm^3 gas and 2 million tons NGL. The most likely development solution is a subsea solution with tie-in to the nearby infrastructure.

Other discoveries
Two discoveries have been made in the 15/3 block, one gas/condensate discovery by well 15/3-1 S in 1975 and one gas/oil discovery by well 15/3-4 in 1982. The estimate of recoverable resources for 15/3-1 S is 19.4 billion Sm^3 gas and 4.6 million Sm^3 oil. On the 15/9 block, Statoil made an oil discovery, 15/9-19 SR in 1993, in rock from

Figure 2.3.1.a
Fields and discoveries in the Sleipner and Balder area



the Jurassic/Triassic Age just north of Sleipner Øst. Recoverable reserves are estimated at 4.8 million Sm^3 oil and 0.8 billion Sm^3 gas. There are many small gas discoveries in the area which are expected to be phased-in to Sleipner.

The Frigg area

There have been gas fields in production in this area since 1977, see Figure 2.5.10.a. Several small discoveries have been made in the area, including oil. Skirne and Byggve have been candidates for development, but are inter alia dependent on a gas solution. The same applies to the development of Vale.

25/5-3 Skirne

25/5-3 Skirne is located in production license 102. Elf Petroleum is the operator of the production license, which was awarded in 1985. The discovery was proven by well 25/5-3 in the Brent group in 1990. Recoverable resources are estimated at 5.2 billion Sm^3 gas.

25/5-4 Byggve

25/5-4 Byggve is located in production license 102. Elf Petroleum is the operator of the production license which was awarded in 1985. The discovery was made by well 25/5-4 in the Brent group in 1991. Recoverable resources are estimated at 0.6 million Sm^3 oil and 3.1 billion Sm^3 gas.

24/6-1 Peik

24/6-1 Peik was proven in 1985 and is located in production license 088. Total Norge AS is the operator of the production license which was awarded in 1984. In 1987, hydrocarbons were found on the British side. Recoverable resources are estimated at 3 million tons NGL and 9.1 billion Sm^3 gas.

25/4-6 S Vale

25/4-6 S Vale is located in production license 036, awarded in 1981 with Elf Petroleum as operator. The discovery was proven in 1991. Recoverable resources are estimated at 3.4 million Sm^3 oil and 2.5 billion Sm^3 gas.

25/2-5 Lille Frøy

This discovery is located in production license 026, awarded in 1969 with Elf Petroleum as operator. 25/2-5 proved oil in 1976. There are no plans for development. Recoverable reserves are estimated at 1.2 million Sm^3 oil and 1.5 billion Sm^3 gas.

30/7-6 R Hild

30/7-6 R Hild is located in production licenses 040 and 043 with Norsk Hydro and Total Norge, respectively, as operators, see Figure 2.3.2.a. The discovery was proven by well 30/7-6 in 1977.

Production license 040 was awarded in 1975 and comprises blocks 29/9 and 30/7. Production license 043 was awarded in 1976 and comprises blocks 29/6 and 30/4. In the event of development, negotiations will be conducted regarding unitization of the production licenses.

Recoverable resources are estimated at 7.7 million Sm^3 oil and 33.2 billion Sm^3 gas.

The Oseberg area

A number of discoveries have been proven which are planned to be produced as satellites to the existing infrastructure, see Figure 2.3.2.a. West of the Oseberg field center, mostly in production license 053, lies 30/6-18 Kappa in the Statfjord formation. There are no firm development plans for this discovery.

The Troll area

There is very high activity in connection with the development of the significant oil and gas resources on Troll. Some of the discoveries in the area are being considered for development as independent solutions, or possibly as satellites to the decided infrastructure in the area.

35/11-2, 35/11-4 R and 35/11-7

Block 35/11 was awarded in 1984 under production license 090. On 1 August 1995 the operatorship in the license was transferred from Mobil Development Norway AS to Norsk Hydro Produksjon AS. Seven wells have been drilled and

three have shown hydrocarbons. The hydrocarbons are found in several reservoir layers. 35/11-2 was drilled in the northern part of the block in 1987. Recoverable reserves are estimated at 1.5 million Sm^3 oil, 2.6 million tonnes NGL, and 4.9 billion Sm^3 gas.

Two wells, 35/11-4 R and 35/11-7, have been drilled (on the so-called F/C complex) in the southeastern part of the block in 1991 and 1992 respectively. Recoverable reserves are estimated to be 9 million Sm^3 oil for each of the discoveries and 8.6 billion and 4.0 billion Sm^3 gas respectively for 35/11-4 R and 35/11-7.

The Gullfaks, Statfjord and Snorre area

There is extremely high activity in this area with several fields in production and under development. At the same time, several discoveries have been proven and are being evaluated, see Figure 2.5.15.a.

34/10-23 Gamma

The discovery is located in block 34/10 and was awarded in production license 050 in 1978. Statoil is the operator. The Gamma structure is located approximately 14 km south of the Gullfaks field.

The discovery was proven in 1985 and contains gas in sandstone from the Middle Jurassic age. Appraisal well 34/10-35 was drilled on the northern part of the structure in 1992 and also proved gas in Jurassic sandstone. The discovery probably extends into block 34/11, production license 193, which was awarded in 1993 with Statoil as operator. Well information from the Gamma structure in this block is lacking. Recoverable reserves are estimated at 69 billion Sm^3 gas and 6 million Sm^3 oil.

The Norwegian Sea

Development activity has been considerable during recent years, see Figure 2.3.2.b, and has, up to now, primarily concentrated on development of oil resources in the area. Work is proceeding on various development solutions for a unitized development of the significant gas resources in the area.

6407/1-2 Tyrihans Sør and 6407/1-3 Tyrihans Nord

Tyrihans Sør was proven in 1983 and Tyrihans Nord was proven in 1984, both in production license 073. The discoveries are most likely in pressure communication across a common water zone. Tyrihans Sør is characterized as a gas/condensate discovery, while Tyrihans Nord contains an oil zone with overlying gas cap. The reservoirs are from the Middle Jurassic age. The size of the Tyrihans Nord oil zone is uncertain as the oil/water contact is not proven. Re-surveying based on new 3D seismic is ongoing, and an appraisal well in Tyrihans Nord is being planned. Recoverable resources are estimated at 9.6 million Sm^3 oil/condensate and 27.5 billion Sm^3 gas.

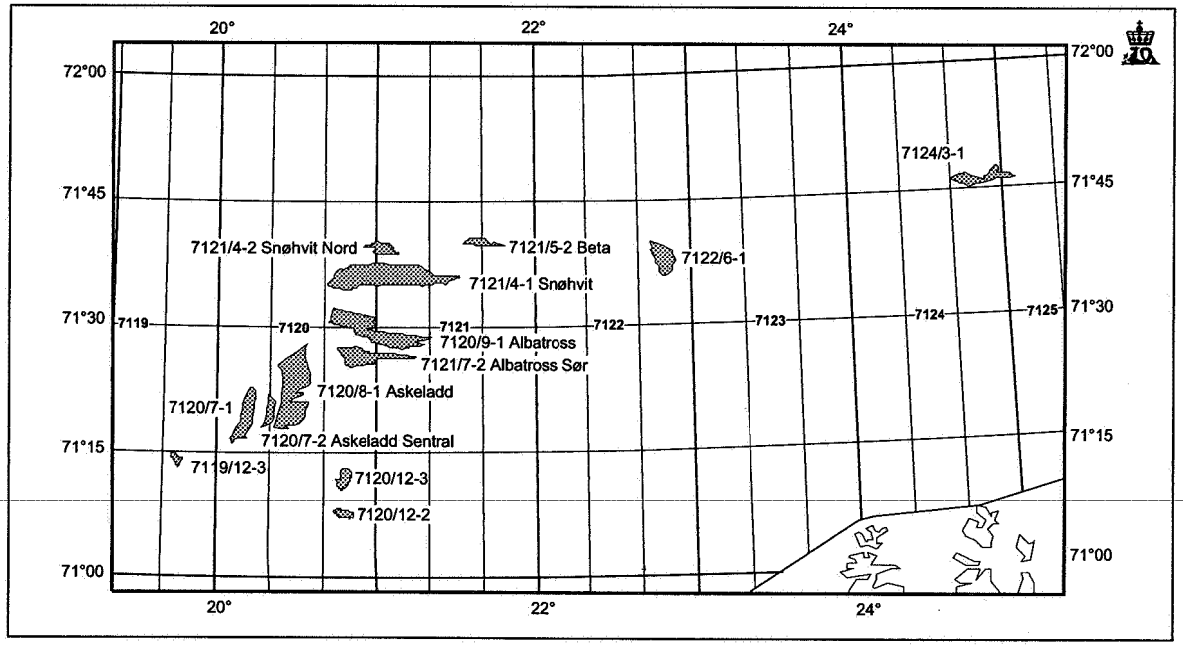
6406/3-2 Trestakk

Trestakk is an oil discovery which was proven in 1986 in production license 091. Recoverable resources are estimated to 4.8 million Sm^3 oil if the associated gas is reinjected. his is based on an evaluation of Trestakk as a satellite to Tyrihans, which means that the production period will be limited. The reservoir is from the Middle Jurassic age, has low permeability and in a deep location. This is expected to give low well productivity.

The Barents Sea

Approximately 250 billion Sm^3 recoverable gas has been proven in the Barents Sea, see Figure 2.3.1.b. In addition, there is a thin oil zone on 7121/4-1 in the Snøhvit discovery.

Figure 2.3.1.b
Discoveries in the Barents Sea



7121/4-1 Snøhvit

Snøhvit lies in the following blocks: 7120/6, 7121/4, 7121/5 and 7120/5. Norsk Hydro is the operator of production license 097 (block 7120/6) and Statoil is the operation for productions licenses 099 (block 7121/4) and 110 (blocks 7120/5 and 7121/5). Production licenses 097 and 099 were awarded in 1984 and production license 110 was awarded in 1985. Snøhvit was proven in 1984, and the reservoir is from the Jurassic age. There is no infrastructure in the area. Recoverable reserves are estimated at 83 billion Sm^3 gas, 6.7 million Sm^3 oil and 9.2 million tonnes NGL.

Plans for transporting the gas in liquid form as LNG have been considered, but so far have not been able to show profitability.

2.3.2 DISCOVERIES WITH FIRM DEVELOPMENT PLANS

The Sleipner area

15/12-4 Varg

This discovery is located in production license 038 with Saga as operator, see Figure 2.3.1.a. In 1994, Saga purchased Esso's 50% interest and took over the operatorship from Statoil. This is part of a package deal tied to Midgard being incorporated in the plans for a unitized development of Åsgard, where Statoil is the operator. Saga transferred 15% of the production license to Statoil, so that Saga now owns 35% of the discovery, while Statoil and the State Direct Financial Interest (SDFI) have 65%. During 1995 the discovery has matured and the plan for development and operation is expected to be submitted during the first half of 1996. The resource basis has been adjusted downwards in 1995, and recoverable resources are now estimated at 9.8 million Sm^3 oil.

The Balder area

25/11-15 Hermod

In 1991, Norsk Hydro found oil in well 25/11-15 east of the Balder discovery in production license 169, see Figure 2.3.1.a. Parts of the discovery lie in production license 001. The Hermod discovery contains oil which is more viscous than the Balder oil. The discovery was further matured in 1995, with new surveys and drilling of appraisal well 25/11-21 S. Test production from the discovery is planned in 1996. Recoverable resources are estimated at 60 million Sm^3 oil and 0.9 billion Sm^3 gas.

25/11-1 Balder

The Balder discovery was proven in 1967 by well 25/11-1, see Figure 2.3.1.a. Esso owns 100% of production license 001, which contains most of the discovery. The Balder discovery contains relatively viscous oil. The reservoir sandstone is poorly consolidated, but has good reservoir properties. An extended test was carried out in summer 1991 by the production ship Petrojarl I. During the test valuable production information was acquired. During the first half of 1995 the 25/11-19 S appraisal well was drilled. The PDO was submitted in October 1995, and the authorities' consideration of this is expected to be completed during the first quarter of 1996. Production start is planned for around the turn of the year 1996/1997 and will be carried out from a ship. The Balder discovery consists of several structures. Six structures are included in the plan for development and operation. Recovery from these is estimated at 27 million Sm^3. The total recoverable resources from all the Balder structures is estimated at 39.3 million Sm^3 oil.

25/8-5 S

In 1994, Esso found oil in production license 027 P with well 25/8-5 S which lies between the Heimdal field and 25/11-1, the Balder discovery, see Figure 2.3.1.a. The discovery was made in the Heimdal formation in the Paleocene age. Production tests have shown good production parameters for the reservoir. In 1995, the discovery was appraised by drilling of 25/8-6, and it seems clear that the discovery extends into production license 103 where Conoco is the operator. The licensees in production licenses 027 P and 103 are working on a unitization agreement between the production licenses, and the goal is to prepare a plan for development and operation as early as 1996. Discoveries have been made in exploration wells 25/8-8 S and 25/7-3 nearby, and it is natural to view all of these discoveries together. Recoverable resources are estimated at 24 million Sm^3 oil and 5 billion Sm^3 gas.

The Oseberg area

30/6 - 5 Oseberg Øst

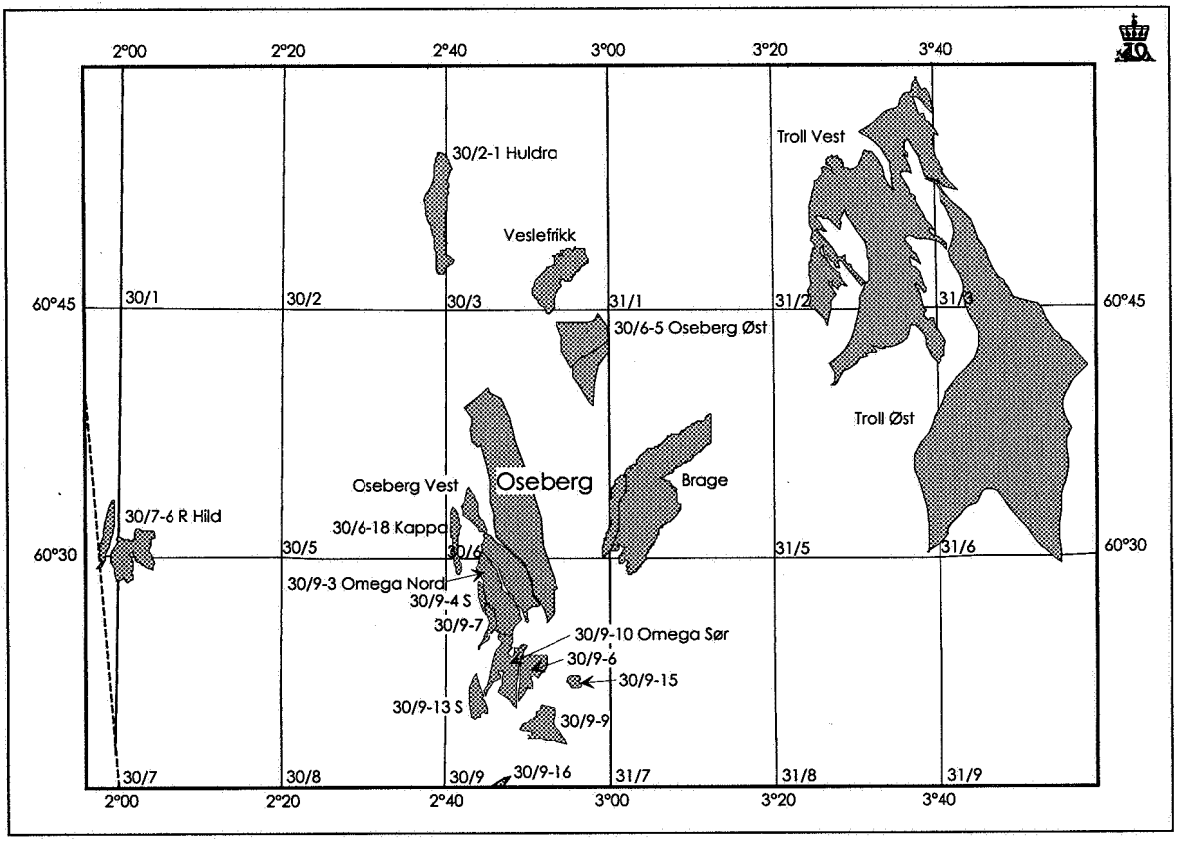
Oseberg Øst is located within production license 053, block 30/6, approximately 14 km from Oseberg C, see Figure 2.3.2.a.

The field consists of two structures which are separated by a sealing fault. Four wells have been drilled on the field. Both structures contain several oil-bearing layers within the Brent group with variable porosity and permeability, as well as several different oil-water contacts. Recoverable reserves are estimated at 19 million Sm^3 oil and 1 billion Sm^3 gas. Norsk Hydro is the operator of the discovery which was declared commercial in June 1991. Potential development concepts include both a subsea solution and a wellhead installation considered for tie-in to Oseberg C or the field center. Pressure maintenance with the aid of water or WAG injection is being evaluated. The plan for development and operation is expected to be submitted to the authorities in the spring of 1996.

30/2-1 Huldra

Huldra is a discovery to the northwest of Veslefrikk, Figure 2.3.2.a. The main part of the field lies in block 30/2 in production license 051, however, the field also extends into production license 052 in block 30/3. Statoil is the operator of both of these production licenses. The field was declared commercial in summer of 1991. Gas has been proven in the Brent group. Recoverable resources are estimated at 7.9 million Sm^3 oil and 22.3 billion Sm^3 gas.

Figure 2.3.2.a
Fields and discoveries in the Oseberg and Troll area



Both an independent installation with treatment capacity and a wellhead installation connected to existing production facilities in the area are being considered as potential development solutions.

The Oseberg Sør area

South of the Oseberg field, several oil and gas discoveries have been made within production licenses 079 and 104, see Figure 2.3.2.a. Eight discoveries lie within the area defined as Oseberg Sør by the operator, Norsk Hydro. Recoverable resources are estimated at 46 million Sm^3 oil and 25 billion Sm^3 gas. The area is very complex with regard to resources, with uncertainty regarding the resource estimate.

The development strategy is being evaluated, and the potential concepts are based on the use of the Oseberg field center for processing and further transportation. Part of 30/9-3 Omega Nord can be reached by wells from the Oseberg field center and can be produced from the center, depending on the number of available well slots on the field center. The declaration of commerciality and the plan for development and operation are expected to be submitted in the spring and autumn of 1996, respectively.

The Gullfaks, Statfjord and Snorre area

34/7-21 and 34/7-23 S

These discoveries are located in block 34/7 which was awarded under production license 089 in 1984, see Figure 2.5.15.a. Saga Petroleum is the operator. Both discoveries have proven oil in rocks from the Late Jurassic age.

Discovery 34/7-21, which is located west of the Tordis field, was proven in November 1992. A sidetrack, 34/7-21 A, was drilled to appraise the oil discovery. The sidetrack confirmed the discovery, but also showed that the lateral development and extent of the reservoir sands are difficult to map. The operator submitted an application for test production of the discovery to the authorities in November 1995. The purpose of the test production is to optimize the recovery strategy and development solutions for the discovery. Recoverable resources are estimated at 11.0 million Sm^3 oil.

Discovery 34/7-23 A, which lies southwest of the Vigdis field, was proven in March 1994. In order to improve the appraisal of the reservoir, a sidetrack well was drilled, 34/7-23 A. Recoverable resources are estimated at 3.9 million Sm^3 oil.

The operator plans to drill an appraisal well in the area in 1996. Based on the proven resource basis, the operator is considering phasing in the 34/7-21 discovery to Tordis and the 34/7-23 discovery to Vigdis.

34/10-17 Rimfaks

The Rimfaks discovery lies in blocks 34/10 and 33/12, which are included in production license 050 awarded in 1978, and production license 037 awarded in 1973. Statoil

is the operator of both production licenses. The Rimfaks discovery is located roughly 15 km southwest of the Gullfaks main field, see Figure 2.5.15.a.

Hydrocarbons in the Brent group were proven in 1983 by exploration well 34/10-17, and in the Statfjord formation in 1995 by exploration well 34/10-38 S. The main part of the discovery is located in block 34/10, production license 50, while a smaller part extends into block 33/12. The PDO was submitted to the authorities at the end of December 1995, together with the PDOs for 34/10-2 Gullfaks Sør and 34/10-37 Delta. Recovery plans are based on gas injection and the development concept includes three subsea templates with a total of 10 wells. The Brent group will receive imported gas from 34/10-2 Gullfaks Sør for full pressure maintenance. Development and operation are planned for integration with 34/10-2 Gullfaks Sør and 34/10-37 Delta. Fluid processing will take place on Gullfaks A and production start is planned in 1998. Recoverable resources in Phase 1 are estimated at 20.3 million Sm^3 oil and condensate, and marketable gas in Phase 2 is estimated at 17 billion Sm^3.

34/10-37 Delta

The discovery is located in block 34/10, which was awarded under production license 050 in 1978. Statoil is the operator. The Delta structure is located southwest of the Gullfaks main field (north of 34/10-17 Rimfaks), see Figure 2.5.15.a. The discovery was proven in February 1995 and contains oil and gas. The PDO was forwarded to the authorities at the end of December 1995 together with the PDOs for 34/10-2 Gullfaks Sør and 34/10-17 Rimfaks. Recovery from the Delta structure is planned by means of pressure relief from two wells coupled to a subsea template. The discovery is planned for integration with development and operation of the 34/10-2 Gullfaks Sør and 34/10-17 Rimfaks fields. Fluid processing will take place on Gullfaks A and production start is planned for 1998. Recoverable resources are estimated at 2.1 million Sm^3 oil and 0.7 billion Sm^3 gas.

34/10-2 Gullfaks Sør

The Gullfaks Sør discovery is located in block 34/10 which was awarded under production license 050 in 1978. Statoil is the operator. The discovery is located roughly 9 km south of Gullfaks, see Figure 2.5.15.a, and was proven in 1979 by well 34/10-2. The Brent reservoir contains both gas and oil and several independent gas-oil and oil-water contacts have been observed. The Statfjord reservoir has a thicker oil zone than Brent with a small gas cap. Ten wells have been drilled to the reservoir level on Gullfaks Sør.

A phased development is planned, and the plan for development and operation for Phase 1 was submitted to the authorities at the end of December 1995, together with the PDOs for 34/10-17 Rimfaks and 34/10-37 Delta. Phase 1 consists of the oil phase. Phase 2, the gas phase, is not covered under this plan.

The plan is to recover the resources using gas injection and the development concept includes three subsea templates with 12 wells. Development and operation is planned for integration with 34/10-17 Rimfaks and 34/10-37 Delta. Liquid processing will take place on Gullfaks A. Production start is planned for 1998. Recoverable resources in Phase 1 are estimated at 20.1 million Sm^3 oil and condensate, and the marketable gas in Phase 2 is estimated at 62.5 billion Sm^3.

34/8-1 Visund

The Visund discovery is located in block 34/8, which was awarded under production license 120 in 1985. Norsk Hydro is the operator. The discovery is located about 22 km northeast of Gullfaks, see Figure 2.5.15.a. The Visund discovery was proven in 1986 by well 34/8-1 in the Brent reservoir.

34/8-3 was drilled in 1988 and proved hydrocarbons in a northerly Brent segment. In 1992, three wells were drilled on the structure, whereof 34/8-4 A and 34/8-8 showed oil in the Statfjord formation and the Brent group, respectively. In 1993, 34/8-10 S proved hydrocarbons in several reservoir layers. In order to improve the delimitation of the oil reservoir and to verify the fluid type in the Brent group, 34/8-11 was drilled at the turn of the year 1993/1994. 3D seismic has been shot over the entire structure. The Visund discovery has proven resources in the Brent group, as well as the Amundsen, Statfjord and Lunde formations. Recoverable resources are estimated at 48.4 million Sm^3 oil and condensate and 56.4 billion Sm^3 gas.

The plan for development and operation of the oil resources was submitted to the authorities in September 1995. According to the plan, the discovery will be developed with a semi-submersible steel installation equipped for complete stabilization of oil and injection of gas. The oil will be transported via a pipeline to Gullfaks A for storage and tanker loading. Drilling and well maintenance will be carried out from the installation. Planned production start-up is mid-1998.

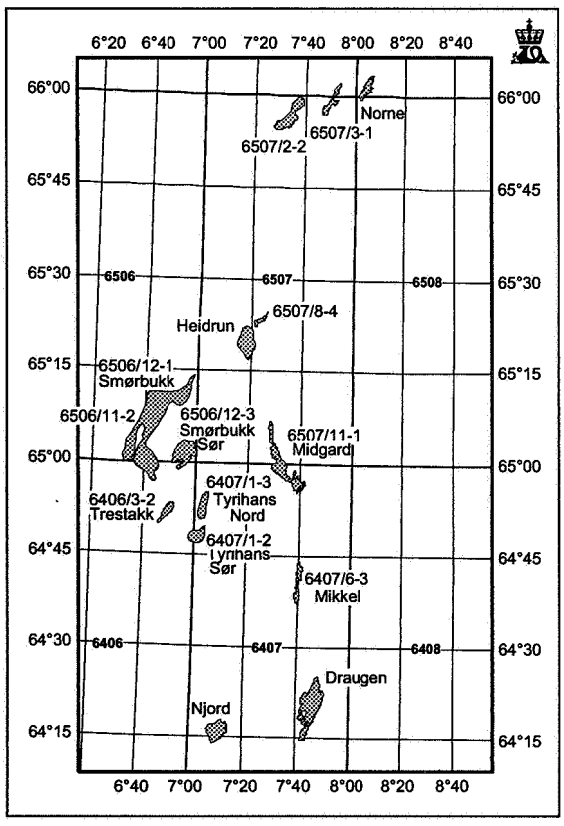
The Norwegian Sea

Åsgard

Åsgard is a joint name for the three discoveries Smørbukk, Smørbukk Sør and Midgard, see Figure 2.3.2.b. These three discoveries are incorporated in a unitization agreement between the licensees in production licenses 062, 074, 094 and 134. The unitization agreement was approved by the Ministry of Industry and Energy in spring of 1995. As a result of the agreement, Statoil and Saga are working in an integrated project with Statoil as operator. The agreement comprises the development and construction periods.

Åsgard is located for the most part in blocks 6506/11 and 6506/12 (Smørbukk), 6506/12 (Smørbukk Sør) and 6507/11 and 6407/2 (Midgard) on Haltenbanken, roughly 200 km from land and 50 km south of the Heidrun field. The discoveries are located in an area where the water depth varies between 240 and 300 meters. Recoverable resources are estimated at 232 billion Sm^3 gas, 77 Sm^3 oil and 34.3 million tonnes NGL.

Figure 2.3.2.b
Fields and discoveries in the Norwegian Sea



6502/11-1 Midgard

Blocks 6507/11 and 6407/2 were awarded under production license 062 in 1981 and production license 074 in 1982. Saga made the Midgard discovery in 1981. There are seven exploration wells in the area, whereof four on the discovery, which is divided into four structural segments. The recoverable resources are estimated at 113 billion Sm^3 gas and 12.7 million tonnes NGL.

6506/12-1 Smørbukk

Blocks 6506/11 and 6506/12 were awarded under production licenses 094 and 134, in 1984 and 1987, respectively. Statoil made the Smørbukk discovery in 1984. Eight wells have been drilled in the area, of which six are appraisal wells for the discovery. Recoverable resources are estimated at 98 billion Sm^3 gas, 53.5 million Sm^3 oil and 21.6 million tonnes NGL.

6506/12-3 Smørbukk Sør

Statoil made the Smørbukk Sør discovery in 1985. Three wells have been drilled on the discovery. Recoverable resources are estimated at 21 billion Sm^3 gas and 23.5 million Sm^3 oil.

The plan for development and operation (PDO) for Åsgard was submitted to the authorities on 15 December 1995.

The development plan for Åsgard is for two phases, one early liquid phase with production start 1 October 1998, and a gas-export phase with delivery of gas from 1 October 2000. Three floating production installations will be utilized; one production ship/storage tanker for liquid production, and a semi-submersible installation for gas production. All wells will be completed as subsea wells.

The total field investment for Åsgard is estimated at NOK 26.7 billion.

2.4 FIELDS DECIDED TO BE DEVELOPED

2.4.1 YME

Production licenses 114 and 114B

Operator:
Den norske stats oljeselskap a.s (Statoil)

Licensees:

Den norske stats oljeselskap a.s (Statoil)	
(SDFI 30%)	65.00000%
Saga Petroleum a.s	25.00000%
Deminex Norge AS	10.00000%

Field history
Yme lies in blocks 9/2 (production license 114, awarded in 1985) and 9/5 (production license 114B, awarded in 1995), see Figure 2.2.5.a. The field is located in the Egersund basin and was discovered in 1987 by well 9/2-1. There is no infrastructure in the area. Development of the Yme field will be carried out in several phases.

Phase I comprises Yme Gamma Vest, which has been proven and confirmed by two wells. The plan for development and operation of Phase 1 was submitted to the authorities in October 1994 and was approved in early 1995.

Phase II entails draining the resources in an adjacent structure (Beta Øst) as well as extended production from Gamma Vest. The plan for development and operation of Phase II was submitted and approved during the autumn of 1995. An appraisal well drilling during 1995 on Yme Beta Øst proved resources which provide the foundation for development of Phase II.

Phase III may include several prospects in the area. Production start for Yme was planned for autumn of 1995, but due to delays in connection with planned changes to the production installation, production start has been postponed until early 1996.

Reservoir
The main reservoir on Yme is the Gamma Vest structure. Here oil is found in the Sandnes formation, which is from the Late Jurassic age. The reservoir will for the most part be produced by depressurization, but limited water injection and the use of downhole pumps is also planned.

Yme Beta Øst will be produced via two subsea completed wells. Depressurization with gas lift has been selected as the driving mechanism. Production from Beta Øst will lead to an extended production period on Yme

Gamma Vest and thereby increased recovery from this reservoir.

The reserves are estimated to be 10.4 million Sm^3 oil for Yme Phases I and II.

Development concept
The field development concept consists of a jack-up installation and a storage tanker with buoy loading to ships.

Transport
The oil will be transported by ship to Mongstad. The plan is to inject excess gas into a water-filled reservoir under the main field.

Costs
Total investments on Yme are estimated at 1.5 billion 1995-NOK from 1993 to 1996. At the end of 1995, approximately 992 million 1995-NOK had been invested on Yme.

2.4.2 GUNGNE
Production license 046

Operator:
Den norske stats oljeselskap a.s (Statoil)

Licensees:

Den norske stats oljeselskap a.s (Statoil) (SDFI 34.4%)	52.60000%
Esso Exploration & Production Norway A/S	28.00000%
Norsk Hydro Produksjon AS	9.40000%
Elf Petroleum Norge AS	9.00000%
Total Norge AS	1.00000%

Field history
Gungne is located in block 15/9 and was proven by exploration well 15/9-15 in 1982, see Figure 2.3.1.a. Production license 046 was awarded in 1976. Statoil is the operator for the production license. The field was decided to be developed in 1995.

Reservoir
Gas/condensate have been found in the Skagerrak formation laid down in the Triassic period. The reserves are estimated at 2.1 billion Sm^3 gas, 0.8 million Sm^3 stabilized condensate and 0.3 million tonnes NGL.

Development concept
The Gungne reserves are to be recovered via a well drilled from Sleipner A. The oil stream will be processed in the process facilities on Sleipner A.

Costs
Investments on Gungne include a new well from Sleipner A, and upgrading of the drilling rig on Sleipner A. Total investments are estimated to be about 125 million 1995-NOK.

2.4.3 SLEIPNER VEST
Production licenses 046 and 029

Operator:
Den norske stats oljeselskap a.s (Statoil)

Licensees:

Den norske stats oljeselskap a.s (Statoil) (SDFI 2.3745%)	49.50290%
Esso Exploration & Production Norway A/S	32.23940%
Norsk Hydro Produksjon AS	8.84650%
Elf Petroleum Norge AS	8.47010%
Total Norge AS	0.94110%

Field history
Sleipner Vest lies in blocks 15/6, 15/9 and 15/8, see Figure 2.3.1.a. Production license 046 was awarded in 1976 and production license 029 in 1969. Statoil is the operator of production license 046, while Esso operates 029. The field was proven in 1974 by the appraisal well 15/6-3, and was decided to be developed in 1992. The plan is for Sleipner Vest to be ready for production in October 1996. A unitization agreement has been signed for the two production licenses.

Reservoir
Sleipner Vest is a gas/condensate field. The reservoir consists of sandstone in the Hugin formation laid down in the Jurassic period. The reserves are estimated to 126.9 billion Sm^3 gas and 33.7 million tonnes NGL. The Sleipner Vest gas contains up to 9 volume per cent CO_2 (not included in the reserve estimate).

Development concept / transportation
The first phase of the development includes a wellhead installation, Sleipner B, and an installation for processing and removal of CO_2, Sleipner T, see Figure 2.5.8. Sleipner B will be placed in the southern part of the Sleipner Vest field with wellstream transfer to the Sleipner T installation. Sleipner T will be located near Sleipner A to enable the use of common utility systems. Further development of the northern areas of Sleipner Vest are planned to be carried out using subsea well templates or wellhead installations with wellstream transfer to Sleipner B.

The gas is incorporated in a sales and injection cooperation with Sleipner Øst. Sleipner Vest has been allocated gas sales in connection with the contracts signed in 1991 by exercise of the 30 per cent option under the Troll gas sales agreement. NGL will be transported to Kårstø through a common condensate pipeline from Sleipner Øst.

Costs
Total investments up to 1995 are 9.2 billion 1995-NOK. Total investments are estimated to be about 21.3 billion 1995-NOK from 1991 to 2016.

2.4.4 TROLL

Production licenses 054 and 085

Operator:

TOGI:	Development /operation **Norsk Hydro**
Troll I:	Development **Shell** / Operation **Statoil** (Statoil will assume the entire operating responsibility in mid-1996)
Troll II:	Development / operation **Norsk Hydro**
Troll III:	Development / operation **Statoil**

Licensees:

Den norske stats oljeselskap a.s (Statoil) (SDFI 62.696%)	74.57600%
A/S Norske Shell	8.28800%
Norsk Hydro Produksjon AS	7.68800%
Saga Petroleum a.s	4.08000%
Elf Petroleum Norge AS	2.35344%
Norske Conoco A/S	1.66113%
Total Norge AS	1.35343%

Field history

The Troll field is located in blocks 31/2 (production license 054) and 31/3, 31/5 and 31/6 (production license 085), see Figure 2.3.2.a. Production license 054 was awarded in 1979 and production license 085 in 1983. The field was discovered in 1979 with exploration well 31/2-1 in Troll Vest. The gas resources in Troll Øst were proven in 1983 by well 31/6-1. Subsequent drillings in 1986 laid the foundation for unitization of the field between the licensees in the two production licenses.

Development of the Troll field, see Figure 2.4.4, comprises the following phases:

TOGI:	Troll-Oseberg gas injection
Troll I:	Development of the gas reserves in Troll Øst
Troll II:	Development of the oil reserves in Troll Vest
Troll III:	Development of the gas resources in Troll Vest

Reservoir

The Troll field has a gas column of over 200 meters with an underlying oil column which diminishes to the east. The western part of the field, Troll Vest oil province, is located mostly in block 31/2 and has an oil column of 22-26 meters. The Troll Vest gas province has an oil column of 12-14 meters. In Troll Øst, the proven oil layers vary in thickness from zero to four meters. The reservoir is from the Late Jurassic age and the Sognefjord formation constitutes the main reservoir for the gas and oil in the field.

The reserve estimate for Troll Øst is 825 billion Sm^3 gas and 20 million tonnes NGL. The oil reserves for Troll Vest oil province are 61 million Sm^3, and for the decided part of Troll Vest gas province (the H cluster) 10 million Sm^3 oil. Norsk Hydro (operator for Troll Phase II) estimates the time-critical recoverable oil reserves in the parts of the Troll Vest gas province which have not been decided to be developed, to about 80 million Sm^3, depending on which development concept and draining strategy is selected.

Troll Phase I: Development of the gas reserves in Troll Øst

A/S Norske Shell is the development operator for Troll Phase I. Statoil will assume the role of operator for the operation of the field in the summer of 1996. The plan for development and operation (PDO) was approved in December 1986. A revised PDO was approved in December 1990.

The revised development plan for Troll Phase I calls for the gas reserves in Troll Øst to be produced from Troll A, a permanent wellhead installation with concrete substructure, with wellstream transfer via two multi-phase pipelines to the gas treatment facilities at Kollsnes. At the land facilities the condensate will be separated from the gas and transported through a pipeline to the Sture terminal for further transportation to the market. The dry gas will be compressed and exported via pipeline to the Continent.

The condensate will be flow-metered through a fiscal metering station before it leaves the Kollsnes terminal. Under the current plans, the Kollsnes facility is expected to have an export gas capacity of 84-100 million Sm^3 per day. Metering of the gas to fiscal standard will tak place through two identical metering stations at Zeepipe and Statpipe, respectively. Each metering station has a capacity of about 58.8 million Sm^3 per day. The gas treatment facilities at Kollsnes are arranged so as to accommodate additional expansion.

In May 1995, the world's largest installation for offshore production of hydrocarbons, Troll A, towed from its construction site in Vats and placed on the Troll field approximately 80 km northwest of Bergen at a water depth of 303 meters. The drilling program was commenced in autumn of 1995. The first gas is expected on Troll A early in 1996 for testing purposes. At the same time, the installation, pipelines for transportation to land and the gas treatment facility at Kollsnes are all expected to be complete. As early as the second quarter of 1996, the Troll field is expected to be able to export gas in connection with the completion of the first gas treatment unit in the Kollsnes facility. Gas deliveries to the initial buyers under the Troll gas sales agreements (TGSA), concluded in 1986, are planned to start on 1 October 1996.

At the end of 1995, roughly 31.1 billion 1995-NOK was invested in Troll Phase I. Total investments are expected to be approximately 36.3 billion 1995-NOK from 1979 through 2006. The operating costs for 1995 were about NOK 809 million

Troll Vest oil province

The Troll Vest oil province includes the draining of the 22-26 meter thick oil column on the western part of the Troll field. The plan for development and operation (PDO) was approved in May 1992. The oil reserves in the oil province will be produced from Troll B, a floating concrete installation with no storage capacity. Troll B was towed to the field during summer of 1995, the pre-drilled wells were hooked up, and production started on 19 September 1995, approximately 3-1/2 months ahead of the planned production start under the PDO. Less that a month later, production was at plateau level (30,000 Sm^3 oil per day).

The wells in the Troll Vest oil province are divided among four subsea installations (well clusters) hooked up to Troll B. Troll B also has the capacity to hook up an additional five subsea installations from the Troll Vest gas province, whereof one has been targeted for the first step in the development of oil in the gas province (the H cluster).

The oil is transported from the Troll B installation through a 404 mm (16") diameter pipeline, Troll pipeline, «Troll oljerør», approximately 90 km to Mongstad.

Significant amounts of gas are produced together with the oil. The gas is injected into the oil province until Troll A is ready to receive gas via the export pipeline for gas from Troll B to Troll A. Gas which is not injected will then be sent to Kollsnes together with the gas/condensate from Troll A (Phase I).

Troll Vest gas province

Troll Vest gas province includes development of the part of the Troll field reservoir which lies between Troll Øst and the Troll Vest oil province, see Figure 2.4.4. The oil column here is 12-14 meters thick.

The plan for development and operation (PDO) of the first subsea installation (the H cluster) for recovery of oil in the south of the Troll Vest gas province was approved on 20 May 1994. The subsea installation is tied to the riser base on the Troll B installation via two parallel pipelines approximately 7 km long. The oil is processed on Troll B together with oil from the Troll Vest gas province.

The first of a total of six wells in the H-cluster started producing on 23 November 1995, nearly 11 months ahead of the planned production start under the PDO.

A relatively significant amount of gas will be produced together with the oil in the gas province. The gas will be mixed with gas from the Troll B oil province and will transported about 29 km via pipeline to Troll A when this installation is ready to receive gas, sometime during 1996. On Troll A, gas from Troll Vest and Troll Øst will be mixed and transported to Kollsnes for treatment and further export to the market.

Recovery of the oil reserves in Troll Vest is time-critical compared with recovery of gas from both Troll Øst and Troll Vest. The earliest possible production of oil from Troll Vest will therefore ensure the highest recovery of the oil resources in the Troll field. Early oil production is an important element in the work to optimize the future hydrocarbon recovery from the Troll field and for decisions related to further development of both oil and gas.

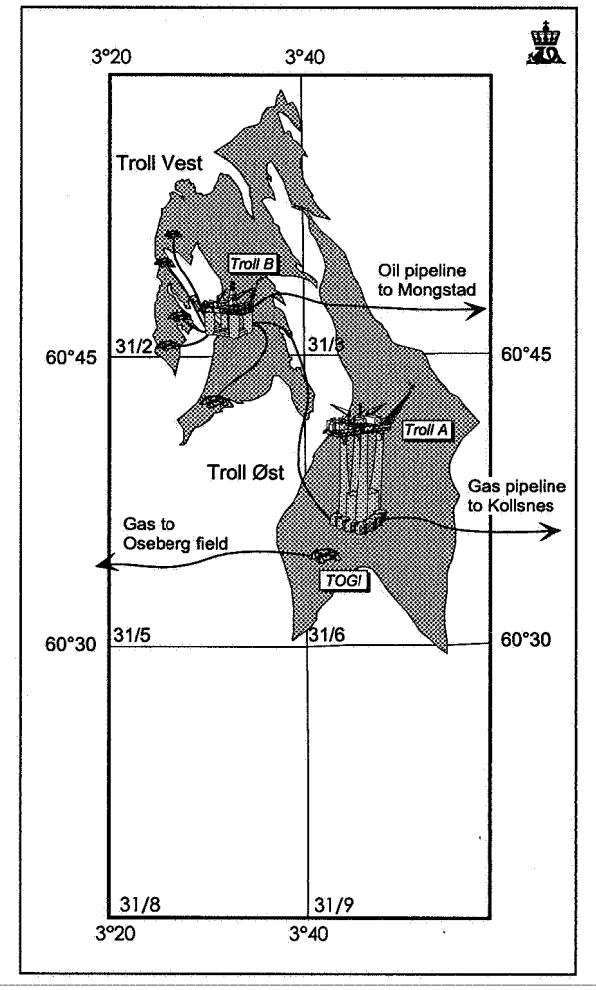
The licensees are working on a continuation of the recovery strategy for oil in the Troll Vest gas province and the PDO is expected to be submitted to the authorities in the autumn of 1996.

At the end of 1995, approximately 16.7 billion 1995-NOK had been invested in Troll Phase II. Total investments for the approved development are expected to be about 18.75 billion 1995-NOK from 1991 through 1997. The operating costs for 1995 were approximately NOK 393 million.

Troll Phase III: development of the gas resources in Troll Vest

A future development of the gas resources in Troll Vest gas province will comprise Phase III of the development of the Troll field. Decided and future recovery of the oil resources in Troll Vest (Phase II) are time-critical compared with recovery of gas from Troll. It is uncertain when a major extraction of gas from Troll Vest should commence. Due to technical reservoir reasons, with today's understanding of the reservoir, it is important that the gas production from Troll Øst and Troll Vest be concluded more or less simultaneously. Decisions related to further development of the oil resources in Troll Vest in 1996/1997 and the Troll field's total commitments and physical delivery capability for gas viewed in context with gas supply solutions on the Norwegian continental shelf, will provide guidelines for the final decision as to timing of decisions for development of Troll Phase III.

Figure 2.4.4
The Troll field



2.4.5 TORDIS ØST

Production license 089

Operator:
Saga Petroleum a.s.

Licensees:

Den norske stats oljeselskap (Statoil) (SDFI 51%)	55.40000%
Esso Exploration & Production Norway A/S	10.50000%
Idemitsu Petroleum Norge A/S	9.60000%
Norsk Hydro Produksjon AS	8.40000%
Saga Petroleum a.s.	7.70000%
Elf Petroleum Norge AS	5.60000%
Deminex Norge AS	2.80000%

Field history
The Tordis Øst field lies in block 34/7, which was awarded under production license 089 in 1984, see Figure 2.5.15.a. The field was discovered in September 1993 by drilling of the well 34/7-22. The plan for development and operation was approved in October 1995, and production start is planned in July 1997.

Reservoir
The field consists of two main segments, a northern and a southern segment, separated by an east-west oriented fault. For the most part, the reserves are found in the Tarbert formation belonging to the Brent group. The reserves are estimated at 5.4 million Sm^3 oil, 0.5 billion Sm^3 gas and 0.5 million tonnes NGL. The reserves are to be produced using a production well and a water injection well. The decision on a possible injection well will be made after some production experience has been gained, and is dependent on the communication across the fault, as well as the amount of natural pressure support the field has from the underlying water zone.

Development concept/transportation
The field will be developed by means of a new four-well subsea template which will be tied-in to the existing subsea manifold on the Tordis field. The wellstream from Tordis and Tordis Øst will be mixed and then transported through existing field pipelines to the Gullfaks C installation for processing, metering, storage and tanker loading.

Costs
At the end of 1995, approximately 80 million 1995-NOK had been invested in Tordis Øst. Total investments are estimated to be about 509 million 1995-NOK.

2.4.6 VIGDIS

Production license 089

Operator:
Saga Petroleum a.s.

Licensees:
Den norske stats oljeselskap (Statoil)

(SDFI 51%)	55.40000%
Esso Exploration & Production Norway A/S	10.50000%
Idemitsu Petroleum Norge AS	9.60000%
Norsk Hydro Produksjon AS	8.40000%
Saga Petroleum a.s.	7.70000%
Elf Petroleum Norge AS	5.60000%
Deminex Norge AS	2.80000%

Field history
The Vigdis field is located in block 34/7 which was awarded under production license 089 in 1984, see Figure 2.5.15.a. The eastern part of Vigdis was proven in 1986 by well 34/7-8. Subsequently, three wells have been drilled for further exploration and appraisal of the field. The plan for development and operation was approved in December 1994. Pre-drilling of the production wells commenced in November 1995. Production start is scheduled for July 1997.

Reservoir
Large faults divide the field into three main segments, one western, one middle and one eastern segment. The reservoir in the western and middle segment, which have been decided to be developed, consist of sandstones in the upper and lower part of the Brent group. The reserves are estimated to be 33.9 million Sm^3 oil and 2.4 billion Sm^3 gas based on a production lifetime of 15 years. The recovery mechanism is pressure maintenance aided by water injection. The plan is to develop the field with eight production wells and four injection wells. There is a potential for additional resources in the surrounding structures, particularly in the eastern segment.

Development concept/transportation
The field will be development with subsea installations tied-in to Snorre TLP. The subsea installations will consist of three templates, whereof two are for production and one for water injection. The wellstream will be transferred to Snorre TLP for processing and metering. The stabilized oil will be sent via a separate pipeline to Gullfaks A for storage and tanker loading. According to the plan, the gas will be injected into the Snorre reservoir.

Costs
At the end of 1995, about 1.7 billion 1995-NOK had been invested in Vigdis. Total investments are expected to be about NOK 4.9 billion, including modification work on Snorre and the costs of an oil export pipeline to Gullfaks A. Operating costs in 1995 amounted to approximately NOK 37 million.

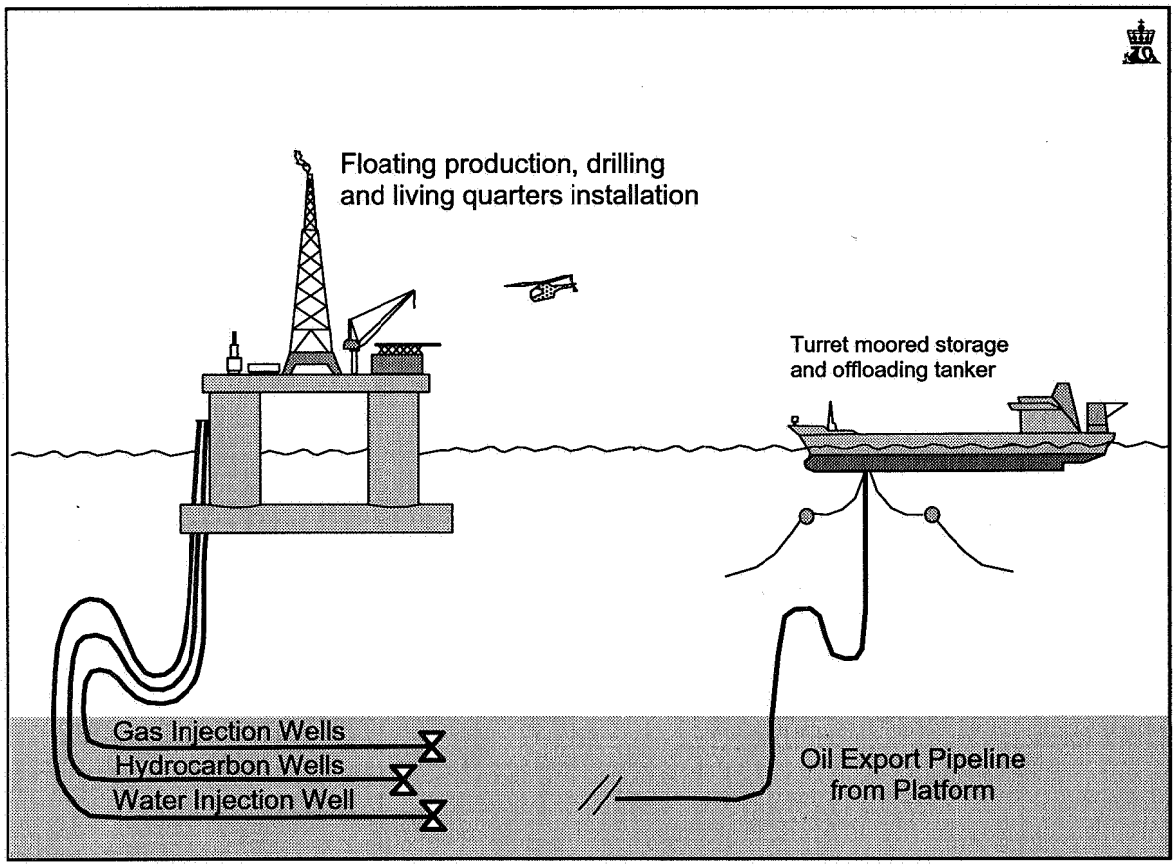
2.4.7 NJORD

Production licenses 107 and 132

Operator:
Norsk Hydro Produksjon AS

Licensees:
The field belongs to production licenses 107 and 132. In

Figure 2.4.7
Planned installations on Njord



1995, A/S Norske Shell's and Norsk Agip's interests in the production licenses were taken over by Mobil Development Norway AS and Norsk Hydro Produksjon a.s. A unitization agreement was then signed by the licensees:

Den norske stats oljeselskap (Statoil) (SDFI 30%)	50.00000%
Norsk Hydro Produksjon AS	30.00000%
Mobil Development Norway AS	18.50000%
Deminex Norge AS	1.50000%

Field history

The Njord field is located in block 6407/7, belonging to production license 107. The field also extends into the northern part of block 6407/10 which belongs to production license 132, Figure 2.3.2.b. The licenses were awarded in 1985 and 1987.

The plan for development and operation was approved in June 1995.

Production plans

A total of seven exploration wells have been drilled in the two blocks. Four of the wells showed oil in sandstone from the Jurassic age. One of the wells also showed free gas.

The main structure consists of a western and an eastern segment with a complicated fault pattern. The western segment is planned to be produced by depressurization and limited water injection, while pressure maintenance through gas injection is planned for the eastern segment. Production experience may, however, lead to alternative drainage mechanisms.

The Norwegian Petroleum Directorate has estimated the reserves at 37.5 million Sm^3 oil and 14 billion Sm^3 gas. The operator has estimated the additional resources in the main structure and adjacent areas to be about 3-7 million Sm^3 recoverable oil. Production start is scheduled for 1 October 1997, and according the the Norwegian Petroleum Directorate's evaluations, production is expected to last until 2018. Reproduction and export of injected gas will be considered by the operator when sufficient operating experience from the field is available, and when a disposal solution for Haltenbanken gas has been found.

Production installations

The Njord production installation will consist of a loosely moored, semi-submersible production, drilling and living quarters installation made of steel, Figure 2.4.7. Stabilized oil will be transferred to a tankship for storage and loading.

The installation will be placed directly over the field's 15 subsea wells, which will be connected to the installation via flexible risers. Ten of the wells will be oil-producers, four are gas-injectors, and one well will take care of water injection. The plan is to pre-drill three wells in 1996.

The installation will initially have three available well slots for phase-in of additional resources.
Fabrication of the installation began in June 1995. Fabrication of the storage tanker will start in 1996, and the subsea systems in 1995 and 1996.

Plateau production will be roughly 11,000 Sm^3 oil per day. Water treatment and water injection capacity will be 2,500 m3 per day each, with additional upgrading potential. Gas treatment capacity will be 10 million Sm^3 per day.

Transportation
Stabilized oil will be transferred to a storage tanker 2.5 km from the installation for storage and loading on to shuttle tankers.

Costs
Njord's total investments, including future investments, are estimated at 5.9 billion 1995-NOK.

2.4.8 NORNE
Production license 128

Operator:
Den norske stats oljeselskap (Statoil)

Licensees:
In connection with the approval of the plan for development and operation, it was decided to increase Statoil's participating interest from 50% to 70%, whereof the State's Direct Financial Interest accounts for 55%. The remaining licensees' interests were reduced accordingly:

Den norske stats oljeselskap (Statoil) (SDFI 55%)	70.00000%
Saga Petroleum a.s	9.00000%
Norsk Hydro Produksjon AS	9.00000%
Norsk Agip AS	6.00000%
Enterprise Oil Norwegian AS	6.00000%

Field history
Norne is located in blocks 6608/10 and 11, Figure 2.3.2.b. The blocks were awarded in 1986, and well 6608/10-2 proved the field in 1992. The plan for development and operation was approved in the spring of 1995. In connection with the consideration of the development case, it was decided to defer the decision on location of the base activities and operating organization. A decision on the location question is expected in 1996. Four wells have been drilled on the structure. Planned production start is April 1997.

Reservoir
The reservoir consists of sandstone from the Early and Middle Jurassic ages, and the plan is to produce the reservoir with 10 production wells. The recovery strategy is a combination of gas and water injection. Five water injection wells and two gas injection wells are planned. All gas is expected to be re-injected in to the reservoir. The reserves are estimated at 76.2 million Sm^3 oil and 15.6 billion Sm^3 gas.

Development concept
Field development is planned by means of a subsea well system linked to a combined production and storage ship. The subsea system will consist of five well templates with four wells each, as well as the possibility of tying-in satellite wells. The oil will be transported from the field in shuttle tankers. Construction of the subsea system and the production ship commenced in 1995.

Transportation
The oil will be stored in a tanker ship before it is loaded on to shuttle tankers via a loading system on the aft of the production ship. Provisions will be made for future gas export.

Costs
The total investment for the Norne development is estimated to be 7.4 billion 1995-NOK.

2.5 FIELDS IN PRODUCTION

2.5.1 HOD
Production license 033

Operator:
Amoco Norway Oil Company

Licensees:

Amoco Norway Oil Company	25.00000%
Amerada Hess Norge AS	25.00000%
Enterprise Oil Norwegian AS	25.00000%
Elf Petroleum Norge AS	25.00000%

Field history
The Hod field is located in block 2/11, see Figure 2.5.4.a. Production license 033 was awarded in 1969, and the field was discovered in 1974. The field is located about 12 km south of the Vallhall field. Parts of the block have subsequently been relinquished, and parts of the relinquished area are incorporated in production license 068.

The plan for development and operation of the Hod field was approved in 1988 and production from the field started in 1990. In 1994, a well was drilled on a structure in the north, and oil was found. Further surveys of this area (the Hod Saddle area) have led to the drilling of a new well in 1995, which also struck oil. Both wells have been put into production.

Production
The Hod field is the southernmost chalk field in the Norwegian part of the North Sea, and produces from reservoir zones in the Ekofisk, Tor and Hod formations. Production is in progress from six wells, whereof four are horizontal. The field is produced with the aid of

depressurization. The reserves are estimated at 9.3 million Sm^3 oil, 2.2 billion Sm^3 gas and 0.3 million tons NGL.

Production installations
The development features a normally unmanned production installation. Oil and gas are separated by means of a separation unit and then metered before being transported via pipeline to Valhall for further processing.

Transportation
Oil and gas are transported in a common pipeline to Valhall, and then in the existing transportation systems to Emden and Teesside.

Costs
At the end of 1995, approximately 1.3 billion 1995-NOK had been invested. Total investments on the Hod field from and including 1988 through 2015 are estimated at 1.5 billion 1995-NOK. Operating costs for 1995 amounted to NOK 157 million, including tariffs.

2.5.2 VALHALL

Production licenses 006 and 033

Operator:
Amoco Norway Oil Company

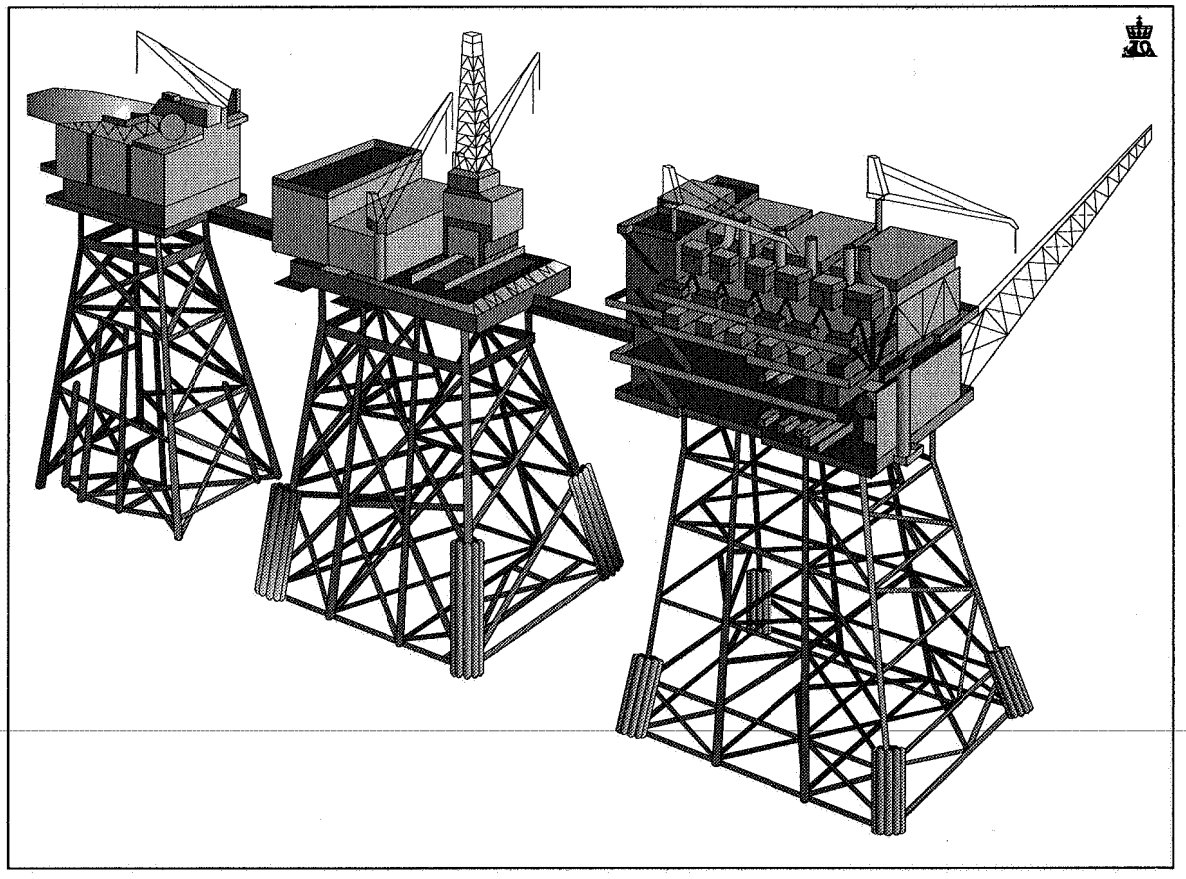
Licensees after unitization of Valhall:

Amoco Norway Oil Company	28.09377%
Amerada Hess Norge AS	28.09376%
Enterprise Oil Norwegian AS	28.09376%
Elf Petroleum Norge AS	15.71871%

Field history
Vallhal is located for the most part in block 2/8 (see Figure 2.5.4.a), which contains 92.8% of the reserves (production license 006). The remaining 7.2% of the reserves are located in block 2/11 (production license 033 where the licensees each have a 25% interest). Production license 006 was awarded in 1965 and production license 033 was awarded in 1969. Valhall was discovered in 1975. The field development plan was approved in 1977 and production commenced in 1982. An amended plan for development and operation of Valhall was approved in the spring of 1995. The plan features development of a new wellhead installation.

Production
The Valhall field produces from upper chalk limestone. The production strategy on Valhall is based on depressurization with a high degree of compacting drive. Compacting of the reservoir rocks have led to subsidence of the seabed measured at about 3 meters at the end of

Figure 2.5.2
Installations on Valhall



1995. Horizontal wells have been drilled on the field since 1991. At the end of 1995, 14 of 29 production wells were horizontal.

The new wellhead installation with 19 well slots will increase the well density on the field. The reserves have now been adjusted upwards and are estimated at 130.9 million Sm^3 oil, 32 billion Sm^3 gas and 5.1 million tonnes NGL. In order to increase the recovery rate of the oil, the operator is considering the possibility of carrying out water injection on the field. A test project with water injection in a well centrally located on the field was performed during the period 1990-1993.

Production installations
The development includes installations for living quarters, drilling, and production, as well as a riser installation. The three first-named installations are located on the Valhall field and are connected to each other by gangways. Figure 2.5.2 shows these installations. The riser installation 2/4 G, for which Phillips Petroleum is the operator, is connected to the Ekofisk Center.

Oil is separated from gas on Valhall by means of two separation units. The gas is compressed, dried and the dewpoint is checked. The heavier gas fractions, NGL, are separated on Valhall using a fractioning column and are then mainly transported in the oil stream.

Transportation
Oil and NGL are transported by pipeline to Ekofisk for further transportation to Teesside. Gas is transported in a separate pipeline to Ekofisk for further transportation to Emden.

Metering system
Oil and gas are fiscally metered on the riser installation 2/4-G. The metering system is part of the Ekofisk system for hydrocarbon distribution.

Costs
At the end of 1995, approximately 15.3 billion 1995-NOK had been invested. Total investments on the Valhall field from August 1977 through the year 2030 are estimated to be roughly 20 billion 1995-NOK. 1995 operating costs were NOK 1.1 billion, including tariffs.

2.5.3 TOMMELITEN GAMMA

Production license 044

Operator:
Den norske stats oljeselskap (Statoil)

Licensees:

Den norske stats oljeselskap (Statoil) (SDFI 42.384%)	70.64000%
Fina Production License AS	20.23000%
Norsk Agip AS	9.13000%

Field history
Production license 044 was awarded in 1976 and includes block 1/9, southwest of the Ekofisk area, see Figure 2.5.4.a. Tommeliten Gamma was discovered in 1978. The plan for development and operation of Tommeliten Gamma was approved in 1986, and production started in October 1988.

Production
The chalk rock reservoir is located in the Ekofisk and Tor formations. Tommeliten Gamma production is treated on the Edda installation. Part of the gas is used for gas lift on Edda, thus extending the economical lifetime for the Edda field. The reserves are estimated at 3.8 million Sm^3 oil, 9.5 billion Sm^3 gas and 0.55 million tonnes NGL.

Production installations
The Gamma structure is development with subsea completed wells. All production is transpored to Edda for first stage separation:

Transportation
After first stage separation on Edda, the Tommeliten Gamma gas is sent by a pipeline to the Ekofisk Center for further drying, and is then transported through Norpipe to Emden. Oil and NGL from Tommeliten Gamma are transferred from Edda to the Ekofisk Center and are transported further through the pipeline to Teesside.

Metering system
Separate metering of oil and gas both from the Edda field and Tommeliten Gamma is carried out on Edda.

Costs
At year-end 1995, approximately 3 billion 1995-NOK had been invested in Tommeliten Gamma. This is also the estimate for total investments from 1986 through 1997. Operating costs in 1995 were approximately NOK 380 million, including tariffs.

2.5.4 EKOFISK AREA

Production license 018

Operator:
Phillips Petroleum Company Norway AS

Licensees:

Phillips Petroleum Company Norway AS	36.96000%
Norske Fina AS	30.00000%
Norsk Agip AS	13.04000%
Elf Petroleum Norge AS	7.59400%
Norsk Hydro Produksjon AS	6.70000%
Total Norge AS	3.54700%
Den norske stats oljeselskap (Statoil)	1.00000%
Elf Rex Norge AS	0.85500%
Norminol AS	0.30400%

Production license 018 includes the fields Cod, Edda, Ekofisk, Eldfisk, Embla and Vest Ekofisk. Cod is located in block 7/11, Edda, Embla and Eldfisk in block 2/7 and

Ekofisk and Vest Ekofisk in block 2/4, see Figure 2.5.4.a.

Albuskjell, which lies in blocks 1/6 and 2/4, was previously split between production licenses 018 and 011. In 1995, A/S Norske Shell has relinquished the part of production license 011 which contains the Albuskjell field. At the same time, this area has been allocated as additional area (018B) to production license 018, until 31 December 1998. The licensees in 018B are the same as for 018.

Tor, which is located in blocks 2/4 and 2/5, is divided between production licenses 018 and 006. In 1995, Amoco Norway Oil Company and Enterprise Oil Norwegian have relinquished their rights in the part of production license 006 which contains the Tor field. Amerada Hess Norge and Elf Petroleum Norge have retained their rights.

As a consequence of the approval of a new development of Ekofisk, the ownership structure in production license 018 will be changed effective 1 January 1999. SDFI will receive a 5.00000% share. Current licensees' shares will be reduced accordingly.

Field history

The Ekofisk area has eight fields in production: Albuskjell, Cod, Edda, Ekofisk, Embla, Tor and Vest Ekofisk, see Figure 2.5.4.b. Cod was discovered first, in 1968. Ekofisk was discovered in 1969, and was declared commercial in 1970. During the period from 1969 to 1974, the other fields in the area were discovered. The area has been developed in several stages. Production from Ekofisk started in June 1971, and during the first years the field was produced to loading ships from four wells until the concrete tank was in place from 1973. The Cod, Tor and Vest Ekofisk fields were developed and tied-in to the Ekofisk Cener from 1976-1978. At the same time, an oil pipeline was laid to Teesside and a gas pipeline to Emden. Up until the time the gas pipeline was completed, the produced gas was reinjected into the Ekofisk field. The next stage in the development consisted of tying-in the Albuskjell, Edda and Eldfisk fields to the Ekofisk Center in 1979. Embla is the last field to come onstream in the area. The field is developed with a wellhead installation which is remotely controlled from Eldfisk, and production started in May 1993.

Due to the subsidence of the seabed around Ekofisk, and an expectation of production from the field well into the next century, a plan for development and operation of Ekofisk II was presented to the authorities and approved in December 1994.

Production

The Cod and Embla fields produce from sandstone rocks. The other fields in the area produce from chalk rocks.

Ekofisk is the largest field in the area, and the second largest field on the Norwegian continental shelf as regards recoverable oil. The reserves are estimated at 404 million Sm^3 oil, 157 billion Sm^3 gas and 15 million tonnes NGL. After nearly 25 years of production, a little over half of the field reserves have been produced. All the fields in the Ekofisk area were originally developed wit depressurization as the drive mechanism, but for Ekofisk, limited gas injection and comprehensive water injection has contributed to a considerable increase in the rate of recovery. The estimated recovery factor for oil has increased from the original approximately 18% to nearly 40% for this field. Large scale water injection began in 1987, and in the subsequent years the area for water injection has been expanded in several stages. 130,000 m^3 of water is distributed in the reservoir through 36 injection wells every day. Experience has shown that the water's displacement of the oil is more effective than expected, and the reserves estimate has been adjusted accordingly. In addition to water injection, the compacting of the limestone rocks also provides an extra drive to the drainage of the field. During recent years the operator has performed extensive and detailed surveys of the field as preparation for drilling wells from the new installation, 2/4-X, from the autumn of 1996, as well as for the construction of a new reservoir model for the field. The operator is evaluating the possibility of increasing oil recovery from the field even more, including by means of a combination of gas and water injection. A trial project with water alternating gas injection (WAG) will therefore be implemented in 1996.

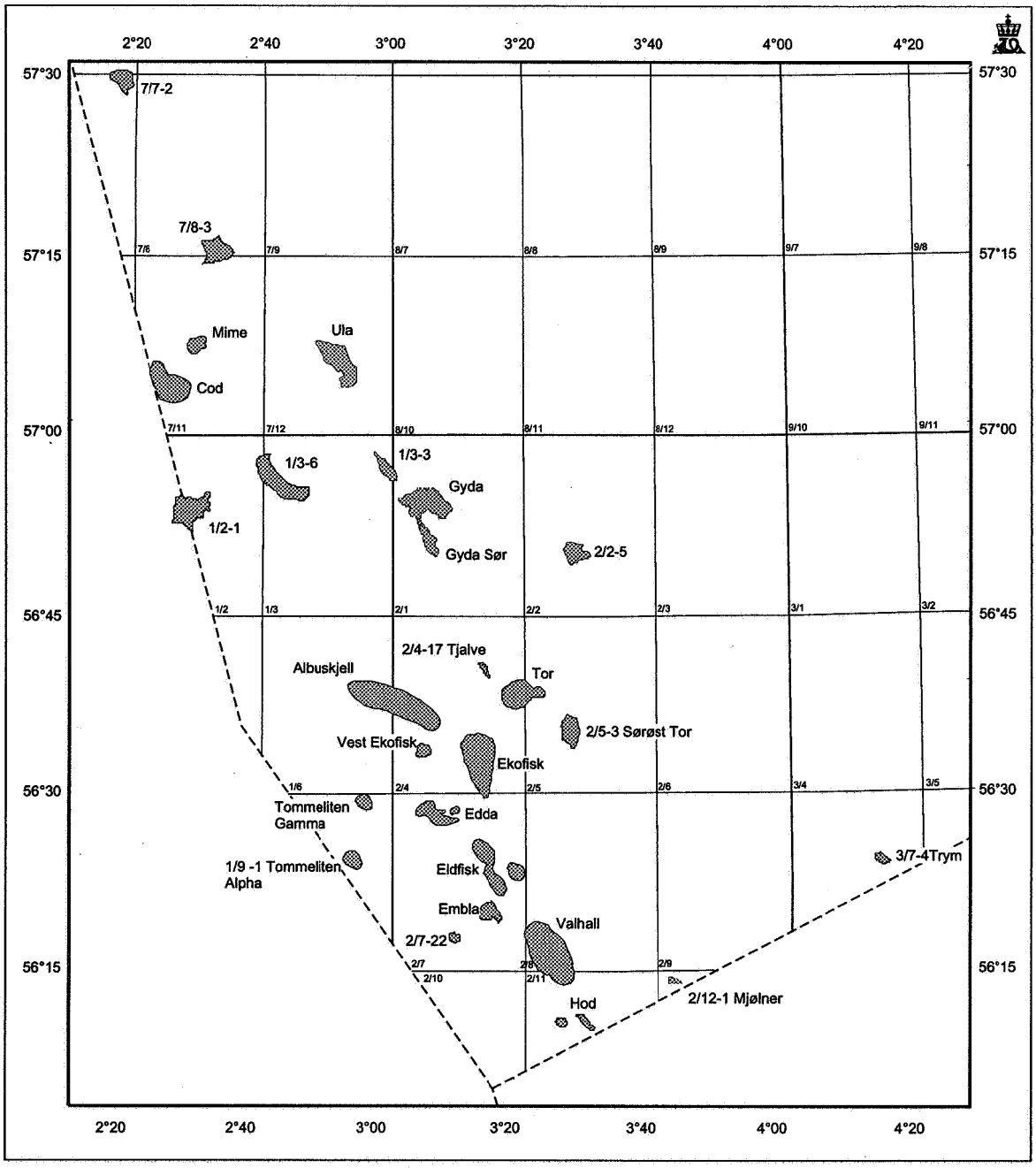
Eldfisk is the second largest field in the area, with original recoverable reserves estimated at 79 million Sm^3 oil, 58 billion Sm^3 gas and 4.7 million tonnes NGL. The field produces from three separate structures, all with depressurization as the only drive mechanism. The recovery factor is low, about 21% of the gross oil in place. Over 70% of the Eldfisk reserves have now been produced. In recent years, seven horizontal wells were drilled on Eldfisk, and an additional six horizontal wells are planned in 1996. The horizontal wells have increased production from the field. In 1995 the operator presented the authorities with a possible plan for full-field water injection on Eldfisk, which could increase the recovery factor from the field. So far, the plan has not proven sufficiently profitable for the licensees, and therefore, no decision regarding water injection has been made.

Limited water injection was implemented on Tor in 1992. Nearly 4500 m^3 water is injected daily in two wells on the field. Original recoverable reserves on Tor are estimated at 25 million Sm^3 oil and over 11 billion Sm^3 gass. The recovery factor for oil from the field is estimated to be roughly 22%.

Embla, which lies at a great reservoir depth with high pressure, was originally planned to be developed in several stages. The development has subsequently been reduced to a wellhead installation with room for 18 wells. Four wells now produce from the field. In 1995, an amended plan for development and operation of Embla was approved by the authorities. Recoverable reserves are estimated to be more than 7 million Sm^3 oil, 5 billion Sm^3 gas and 0.5 million tonnes NGL. The field is difficult to map due to poor seismic data, and the volume estimates are therefore uncertain. Production analyses performed in 1995 resulted in an increase in the reserves estimate.

On Cod, a gas field, produced water is reinjected into the reservoir. Up to now, over 95% of the field reserves have been produced. The Edda field produces with the aid of gas lift from Tommeliten Gamma, and in 1995 a gas lift compressor was installed in order to increase the pressure of the gas. Technical well work has been implemented on

Figure 2.5.4.a
Fields and discoveries in the Ekofisk area



several of the fields which are expected to be shutdown before 1999 in order to maximize final production.

Subsidence

Subsidence of the seabed has been registered on the Ekofisk, Eldfisk and Vest Ekofisk fields. Nevertheless, the subsidence has only caused signficant installation problems on Ekofisk. Satellite measurements show a total subsidence as of November 1995 of 6.7 meters at 2/4-H. Figure 2.5.4.c shows the measured subsidence values at 2/4-H during the period 1985-1995. The subsidence rate in 1995 was approximately 38 cm per year.

The subsidence of the sea bed is due to th highly porous reservoir rock being compressed by the weight of the overlying rocks due to depletion of hydrocarbons from the reservoir. In order to limit the subsidence and well problems related to compaction in the Ekofisk reservoir, the depletion of oil and gas from the field during the past two years has been balanced with injection of corresponding or larger volumes of water and gas. So far this has not resulted in any noticeable decrease in the subsidence. Reservoir measurements indicate that compaction is now greatest in the regions which have been flooded with water.

Figure 2.5.4.b
Installations in the Ekofisk area

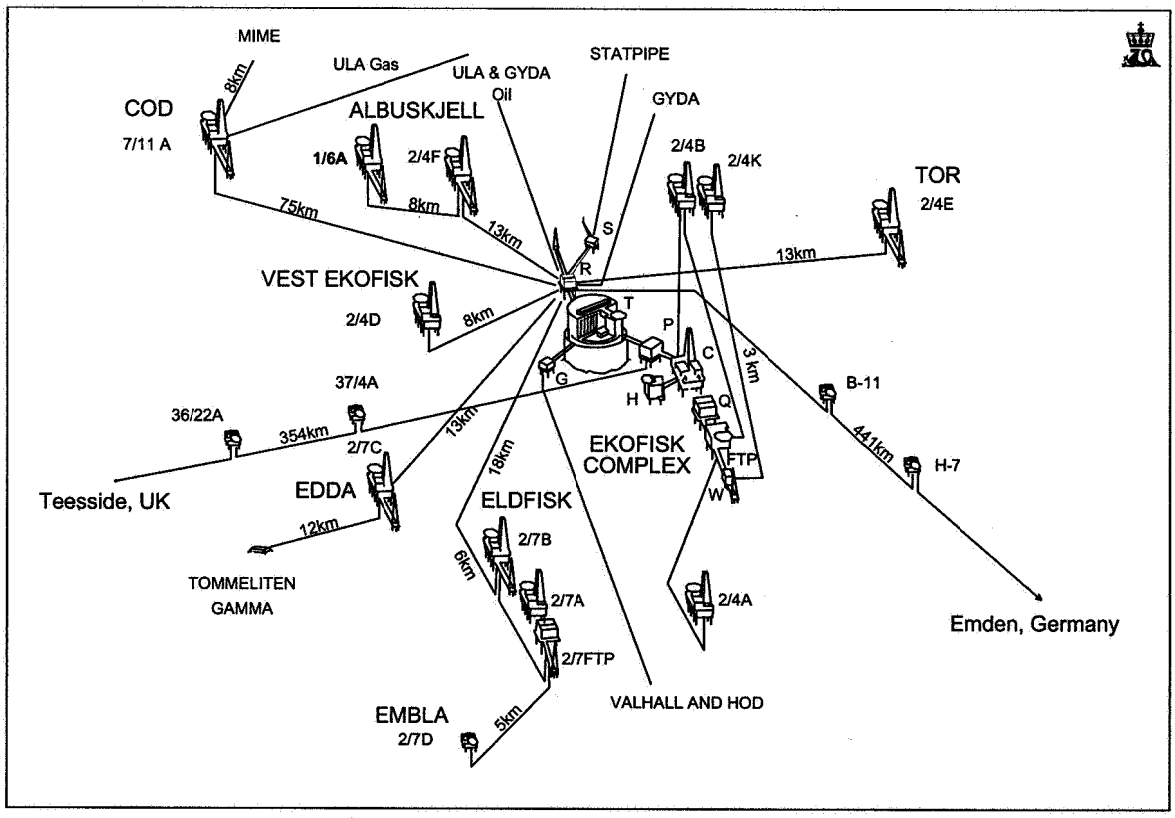
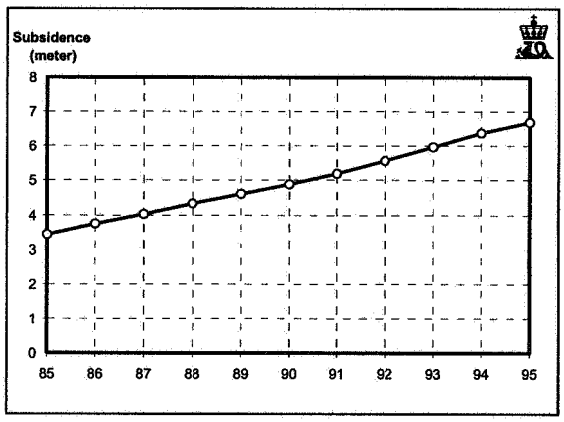


Figure 2.5.4.c
Subsidence at 2/4-H in the Ekofisk area



Production facilities

Figure 2.5.4.b shows the installations in the Ekofisk area. In all there are around 25 different installations connected to the fields in the area. All the fields, except Embla, were originally developed with manned installations with steel jackets. Vest Ekofisk has since been converted to a remote-controlled field, and Embla has been developed and is remote-controlled from Eldfisk. The Albuskjell gas field currently produces from only one installation, 1/6-A, while 2/4-F is shutdown. Oil and gas is transported from the fields to the export pipelines via 2/4-R and 2/4-P on Ekofisk. 2/4-K and 2/4-W are water injection installations for Ekofisk.

In connection with the Ekofisk II development, a new wellhead installation for 50 wells will be in place on Ekofisk from autumn of 1996. In 1998, a new process and transportation installation will be installed. Both installations will be scaled to stand a further 13 meters of subsidence of the seabed. Eldfisk, Embla and Tor will be tied-in to the new center, while the other fields, Albuskjell, Cod, Edda and Vest Ekofisk are scheduled to be shut down by 1999.

Transportation

The gas from the Ekofisk area is transported via pipeline to Emden. The oil, which contains NGL fractions, is sent by pipeline to Teesside. Total transportation capacity is over 95,000 Sm^3 per day.

Metering systems

Sales metering of oil, NGL and natural gass is carried out at the terminals in Teesside and Emden. The total oil and gas deliveries to the Teesside and Emden pipelines from the area are metered and analyzed at the Ekofisk tank. In addition, oil and gas production from the individual satellite installations is metered prior to pipeline transportation to the Ekofisk Center, with the exception of production from the Vest Ekofisk and Ekofisk fields, which is metered at the Ekofisk tank. All metering systems comply with fiscal standards and are incorporated in the operator's system for distribution of hydrocarbons.

Costs
During the period 1994-2000, Ekofisk II investments are estimated at 19.3 billion 1995-NOK. Of this amount, investments in a new process and transportation installation account for NOK 9.8 billion, while investments related to a new wellhead installation account for NOK 2.9 billion kroner. New pipelines will cost around 1 billion, and drilling of new wells is planned to account for NOK 3.4 billion. The costs of modifications to and shut-down of installations in the area is expected to cost over NOK 1.3 billion. Operating costs will be significantly reduced in connection with the implementation of Ekofisk II. Operating costs for 1994 were over NOK 6 billion. This figure will be reduced to approximately NOK 3.4 billion in the year 2000.

2.5.5 GYDA SØR

Production licence 019B

Operator:
BP Petroleum Dev. of Norway AS

Licensees:

Den norske stats oljeselskap a.s. (Statoil) (SDFI 30%)	50.00000%
BP Petroleum Dev. of Norway AS	26.62500%
Norske Conoco A/S	9.37500%
Norske AEDC A/S	5.00000%
Norske MOECO A/S	5.00000%
AS Pelican	4.00000%

Field history
Gyda Sør is located in block 2/1 and constitutes an extension of the Gyda field to the southeast, see Figure 2.5.4.a. The plan for development and operation was approved in 1993. Production of Gyda Sør from a longrange well on Gyda began in August 1995.

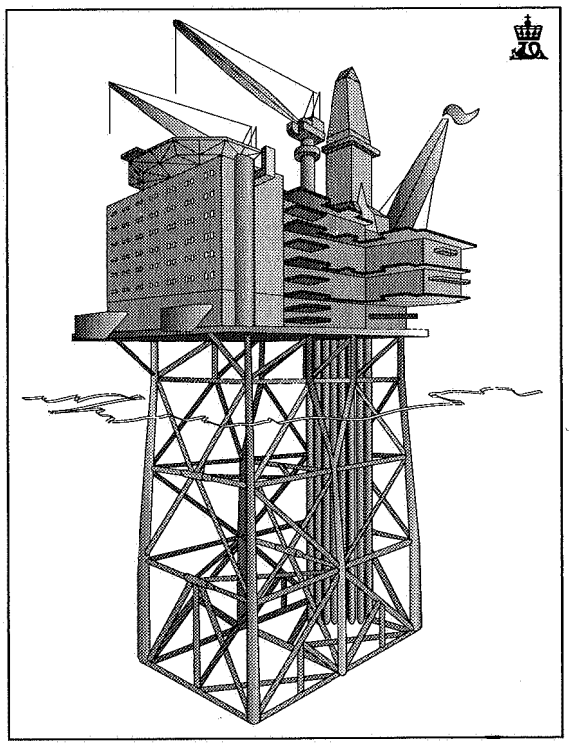
Production
No pressure communication has been observed between Gyda Sør and Gyda, although it is possible that there is pressure communication in the water zone. Total reserves are estimated at 1.5 million Sm^3 oil, 0.9 billion Sm^3 gas and 0.2 million tonnes NGL.

Production installations
The production well from the Gyda installation to Gyda Sør has a horizontal range of approximately 5,700 meters. The wellstream is treated in existing facilities on Gyda.

Transportation
Gas and oil production from Gyda Sør is transported in the transportation system for gas and oil from the Gyda installation.

Costs
Total investments on Gyda Sør are expected to be approximately 378 million 1995-NOK from 1993 to 1998. At year-end 1995, approximately 188 million 1995-NOK had been invested in Gyda Sør.

Figure 2.5.6
Installation on Gyda



2.5.6 GYDA

Production license 019B

Operator:
BP Petroleum Dev. of Norway AS

Licensees:

Den norske stats oljeselskap a.s. (Statoil) (SDFI 30%)	50.00000%
BP Petroleum Dev. of Norway AS	26.62500%
Norske Conoco A/S	9.37500%
Norske AEDC A/S	5.00000%
Norske MOECO A/S	5.00000%
AS Pelican	4.00000%

Field history
The Gyda field lies in block 2/1, see Figure 2.5.4.a. The field was discovered in 1985. The plan for development and operation was approved in 1987. Production from the Gyda field started in 1990.

Production
The reservoir is made up of upper Jurassic sandstone. Total reserves are estimated to be 30.6 million Sm^3 oil, 3.9 billion Sm^3 gas and 1.7 million tonnes NGL, based on production until the year 2008. Gyda is produced using water injection as the drive mechanism.

1995 oil production has been higher than the prognosis due to good production from a sand layer in the northwest part of the field, the C sand. A new water injection well has been drilled in this area to provide pressure support.

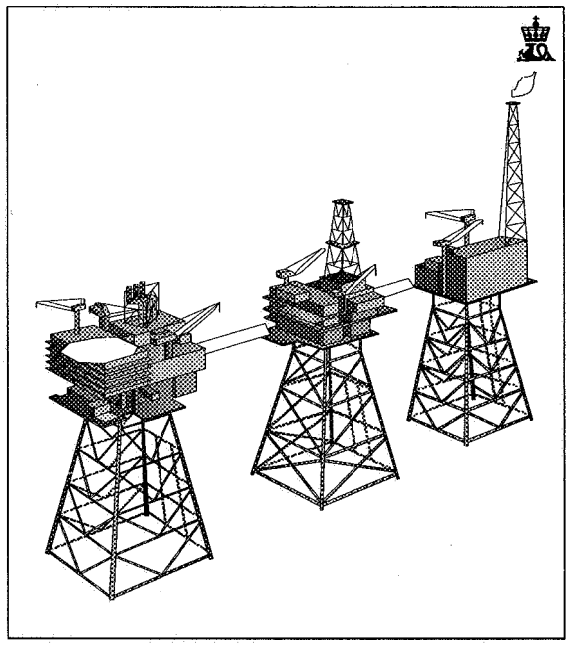
Production installations
The field development concept consists of a combined drilling, living quarters and processing installation with a steel jacket, see Figure 2.5.6. Production capacity is currently 14,300 Sm^3 oil per day and 1.8 billion Sm^3 gas per day. Water injection capacity is 24,500 m^3 per day.

Transportation
The oil is transported to Ekofisk via the oil pipeline from Ula, and then on to Teesside. The gas is transported in a separate pipeline to Ekofisk for further transport to Emden.

Metering system
The oil and gas production is metered to fiscal standards prior to pipeline transpor to Ekofisk. The metering systems are included in the Ekofisk system for distribution of hydrocarbons.

Costs
At the end of 1995, 8.7 billion 1995-NOK had been invested in the Gyda field. Total investments are expected to be approximately 9.3 billion 1995-NOK from 1988 and up to the year 2000. Operating costs for 1995 were around NOK 1 billion, including tariffs.

Figure 2.5.7
Installations on Ula



2.5.7 ULA

Production license 019A

Operator:
BP Petroleum Dev. of Norway AS

Licensees:

BP Petroleum Dev. of Norway AS	57.50000%
Svenska Petroleum Exploration AS	15.00000%
Den norske stats oljeselskap a.s. (Statoil)	12.50000%
Norske Conoco A/S	10.00000%
AS Pelican	5.00000%

Field history
The field lies in block 7/12, see Figure 2.5.4.a, and was discovered in 1976. The plan for development and operation was approved in 1984. Production from the Ula field started in 1986.

Production
The reservoir consists of Jurassic sandstone and is produced using water injection as the driving mechanism. The water front is advancing from the north and east towards the central parts of the field, and production now has an increasing amount of water.

Test production from the underlying Triassic reservoir commenced in late 1995. The objective of the test is to evaluate the volume, productivity and possible communication with the reservoir in the Ula formation. The operator's estimate of reserves for the Triassic reservoir is in the order of 0.1 - 0.8 million Sm^3 oil. Reserves for the main field are estimated at 69.1 million Sm^3 oil, 3.6 billion Sm^3 gas and 2.6 million tonnes NGL.

Production installations
The development concept consists of three conventional steel installations for production, drilling and living quarters, respectively, see Figure 2.5.7. Production capacity is currently 24,000 Sm^3 oil per day and 1.6 million Sm^3 gas per day. Water injection capacity was upgraded in 1992 to 32,000 m^3 per day. The capacity for treatment of produced water is approximately 19,000 m^3 per day. All produced water on Ula is reinjected. The operator is currently working on plans to implement WAG (water alternating gas injection) for reinjection of produced gas on Ula from 1997.

Transportation
The oil is transported by pipeline via Ekofisk to Teesside. Statoil is the operator of the pipeline. The gas is transported by pipeline via Cod to Ekofisk and then on to Emden.

Metering system
The oil and gas production is metered to fiscal standards prior to pipeline transpor to Ekofisk. The metering systems are included in the Ekofisk system for distribution of hydrocarbons.

Costs
At the end of 1995, approximately 12.5 billion 1995-NOK had been invested in the Ula field. Total investments are expected to be around 13.2 billion 1995-NOK from 1983 to 2000. Operating costs for 1995 were around NOK 1.3 billion, including tariffs.

2.5.8 SLEIPNER AREA

Sleipner Øst
Production license 046

Operator:
Den norske stats oljeselskap a.s. (Statoil)

Licensees:

Den norske stats oljeselskap a.s. (Statoil) (SDFI 29.6%)	49.60000%
Esso Exploration & Production Norway A/S	30.40000%
Norsk Hydro Produksjon AS	10.00000%
Elf Petroleum Norge AS	9.00000%
Total Norge AS	1.00000%

Field history
The production license was awarded in 1976 and includes blocks 15/8 and 15/9, see Figure 2.3.1.a. The plan for development and operation was approved in 1986. Sleipner Øst production start was in August 1993.

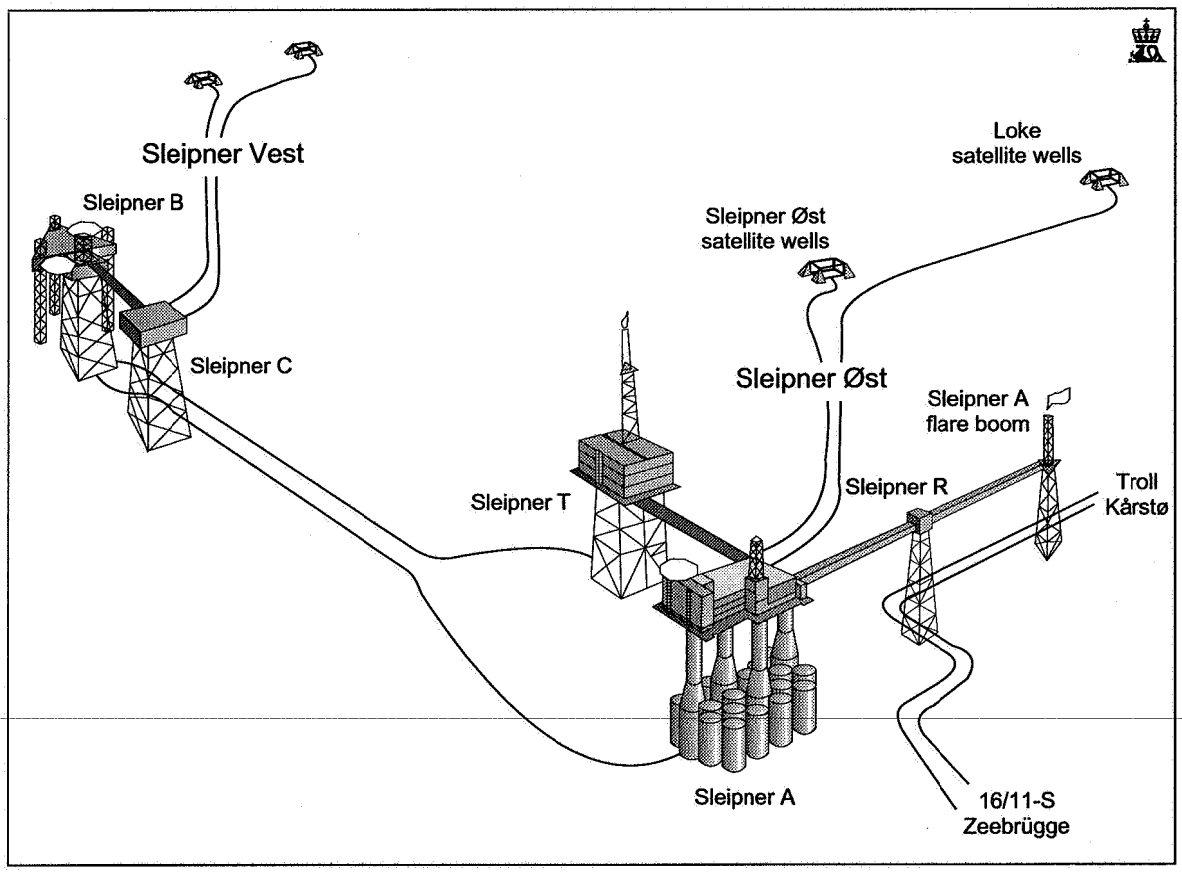
Production
Two reservoir layers have been proven in Sleipner Øst, one in the Tertiary, Heimdal formation, and one in the Jurassic/Triassic, Hugin formation. The reserves are estimated at 44.4 billion Sm^3 gas and 27.4 million tonnes NGL. 14 wells have now been drilled from the Sleipner A installation, 11 gas producers and three gas injectors. Three production wells have also been drilled from the subsea templates on Sleipner Øst. Reinjection of gas in Sleipner Øst is intended to increased condensate recovery from the field.

Production installations
Sleipner Øst is developed with an integrated process, drilling and living quarters platofmr with a four-shafted gravity base structure in concrete, see Figure 2.5.8. In addition, a separate riser installation with gangway connection to the process installation has been built, and a subsea template has been installed to drain the northern part of the field.

Transportation
The condensate is landed at Kårstø through a 250 km long, 508 mm diameter pipeline from the Sleipner A installation to Kårstø. The gas is transported by pipeline both to Zeebrügge in Belgium and through the Statpipe/Norpipe system to Emden in Germany.

Metering system
Produced gas and condensate are metered on the installation to fiscal standard.

Figure 2.5.8
Existing and projected installations in the Sleipner area



Costs
Total investments up to 1995 were 23.2 billion 1995-NOK. Total overall investments are expected to be around 23.5 billion 1995-NOK from 1987 to 1999. Operating costs for 1995 were approximately NOK 2.5 billion, including tariffs.

Loke
Production license 046

Operator:
Den norske stats oljeselskap a.s (Statoil)

Licensees:

Den norske stats oljeselskap a.s (Statoil) (SDFI 29.6%)	49.60000%
Esso Exploration & Production Norway A/S	30.40000%
Norsk Hydro Produksjon AS	10.00000%
Elf Petroleum Norge AS	9.00000%
Total Norge AS	1.00000%

Field history
The production license was awarded in 1976, and is the same license as for Sleipner Øst, see Figure 2.3.1.a. The field was discovered by well 15/9-17 in 1983 which showed gas/condensate at two geological levels. The plan for development and operation of the reservoir in the Heimdal formation was approved in 1991, and production start was in September 1993. The plan for development and operation of the Triassic reservoir was approved in 1995 and production start is planned after the production from the Heimdal reservoir is terminated in 1997.

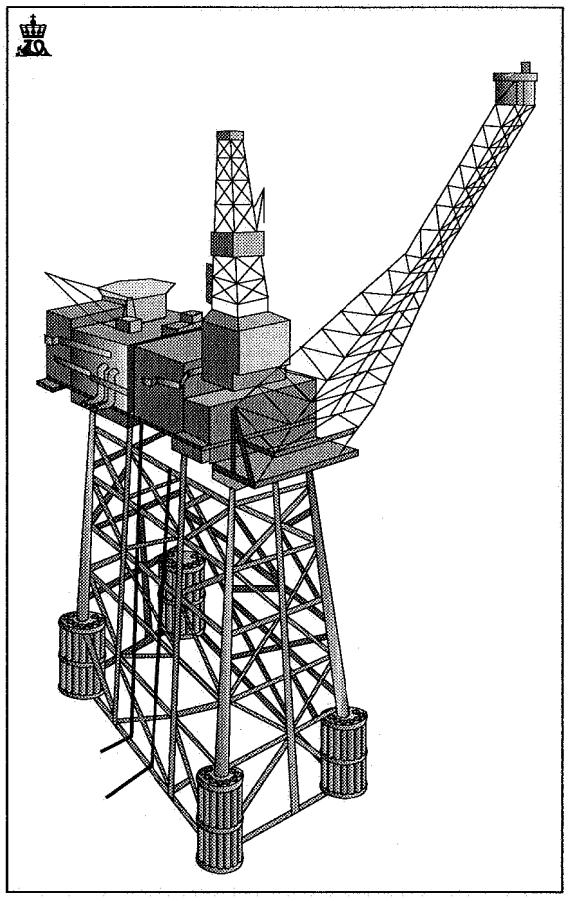
Production
The Heimdal formation in Loke has pressure communication with the Heimdal formation in Sleipner Øst. Production of Sleipner Øst will affect the pressure in Loke and production from Loke will therefore prevent the loss of large volumes of hydrocarbons in the aquifer between Loke and Sleipner Øst. The Heimdal reservoir will be drained by one well, and after this reservoir is emptied, the well will be extended and used as a producer in the Triassic reservoir.

The reserves in the Heimdal formation are estimated to be 0.7 billion Sm^3 gas and 0.42 million tonnes NGL. The reserves in Loke Triassic are estimated to be 2.4 billion Sm^3 gas, 0.7 million Sm^3 stabilized condensate and 0.3 million tonnes NGL.

Production installations
Loke will be produced by means of a subsea production system with transfer of the well stream to the Sleipner A installation, see Figure 2.5.8.

Costs
At the end of 1994, approximately 650 million 1995-NOK had been invested in Loke. The operating costs for 1995 were approximately NOK 60 million, including tariffs.

Figure 2.5.9
Installation on Heimdal



2.5.9 HEIMDAL

Production license 036

Operator:
Elf Petroleum Norge AS

Licensees:

Den norske stats oljeselskap a.s (Statoil) (SDFI 20%)	40.00000%
Marathon Petroleum Norge AS	23.79800%
Elf Petroleum Norge AS	21.51400%
Norsk Hydro Produksjon AS	6.22800%
Total Norge AS	4.82000%
Saga Petroleum a.s	3.47100%
Ugland Construction Company AS	0.16900%

Field history
Production license 036 was awarded in 1971 and comprises block 25/4, see Figure 2.5.10.a. The Norwegian State has exercised its option for the part of the production license which includes Heimdal.

The field was discovered in 1972, and declared commercial in April 1974. Landing of the gas to the Continent was approved in 1981 and the landing concept

for condensate to the United Kingdom was approved in 1983. Production from the Heimdal field started in 1985.

Production
The field produces from the Heimdal formation, which consists of Paleocene sand. The reserves are estimated at 6.5 million Sm^3 oil/condensate and 40.6 billion Sm^3 gas.

Ten wells have been drilled from the field installation, nine production wells and one observation well. Because of the powerful water drive in the field, pressure development and water ascent are both carefully monitored.

Production installations
The Heimdal field has been developed with an integrated steel jacket structure with combined drilling, production and living quarters functions, see Figure 2.5.9. Delivery of gas via Emden began in February 1986.

Transportation
The gas from the Heimdal field is transported in Statpipe. The pipeline from Heimdal is tied in to the Statpipe system at the 16/11-S riser platform. The condensate is transported from Heimdal to Brae in the British sector through a separate pipeline. From the Brae field the condensate goes to Cruden Bay in Scotland.

Costs
At the end of 1995, about 14.4 billion 1995-NOK had been invested in Heimdal. This is an estimate of the total field investments from 1981 to 1998. Operating costs for 1995 were about NOK 1.9 billion, including tariffs.

2.5.10 FRIGG AREA

Frigg
Production license 024

Operator:
Elf Petroleum Norge AS

Licensees:
Norwegian share (60.8200%)

Elf Petroleum Norge AS	25.19100%
Norsk Hydro Produksjon AS	19.99200%
Total Norge AS	12.59600%
Den norske stats oljeselskap a.s (Statoil)	3.04100%
British share (39.1800%)	
Elf Exploration UK Ltd.	26.12000%
Total Oil Marine Ltd.	13.06000%

Field history
Elf Petroleum Norge AS is the operator of the Frigg field and Total Oil Marine Ltd. is the operator of the pipeline system and the St. Fergus terminal in Scotland. The Frigg field is located in blocks 25/1 and 30/10 on the Norwegian shelf and in blocks 10/1, 9/5 and 9/10 on the British shelf, see Figure 2.5.10.a. The field is unitized and under the agreement, 60.82% of the gas reserves are deemed to belong to the Norwegian licensees. The Frigg field was discovered in 1971 and development was approved in 1974. Production got underway in 1977.

Production
The field produces gas from the Frigg formation, which consists of Eocene sand. The reserves are estimated at 184 billion Sm^3 gas. On CDP1, all production wells have been permanently plugged, while 15 wells are available for production on DP2. All of these have reduced production potential due to water influx in the wells. Future development of produced water volume will be a crucial factor in determining when the field will be shut down.

Production installations
The field was developed in three phases. Phase 1 consists of one production and one processing installation in the British part of the field, as well as a living quarters installation (CDP1, TP1 and QP). Production from Phase 1 started in 1977.

Phase 2 consists of one production and one processing installation located in the Norwegian part of the field (DP2 and TCP2). Production from Phase 2 started in 1978. Figure 2.5.10.b shows the Frigg field installations.

Phase 3 of the development comprises the installation of three turbine-driven compressors on the TCP2 installation. The compressors are necessary to compensate for reduced reservoir pressure. These facilities were put into operation in the autumn of 1981.

Gas from Øst Frigg and Lille-Frigg is processed and metered on TCP2 at Frigg. Prior to their shutdown, gas from Nordøst Frigg and Odin was also processed on Frigg. Transport of gas from the Alwyn North field on the British side takes place via TP1.

TP1 has been converted from a processing installation to a riser platform. TCP2 has been modified to adapt the compressor facilities to altered pressure conditions and reduced gas volumes. In 1995, a new module for processing oil and gas from Frøy was installed.

Transportation
The gas is transported 355 km to St. Fergus in Scotland via two pipelines, each with a diameter of 813 millimeters.

Metering system - Frigg area
Gas export via the pipeline to St. Fergus is metered to fiscal standard collectively for the Norwegian fields in the Frigg area. The contribution from the Frigg field is determined by subtracting the contributions from Øst Frigg and Lille-Frigg from the total gas export. Separated condensate is metered separately and transported in the oil pipeline (Frostpipe) to Oseberg and on to the Sture terminal.

Costs
At the end of 1995, around 26 billion 1995-NOK had been invested in Frigg. This is also the estimate of the total investments in the Norwegian part of the field over the field lifetime. Investments in the transportation system are

not included in these figures. Operating costs for 1995 were approximately NOK 400 million, including tariffs, excluding operating costs for the transportation system.

Frøy
Production licenses 026 and 102

Operator:
Elf Petroleum Norge AS

Licensees:

Den norske stats oljeselskap a.s (Statoil) (SDFI 41.616%)	53.96000%
Elf Petroleum Norge AS	24.75730%
Total Norge AS	15.23460%
Norsk Hydro Produksjon AS	6.04810%

Field history
Frøy is located in blocks 25/2 and 25/5, see Figure 2.5.10.a. Production licenses 026 and 102 were awarded in 1969 and 1985, respectively. The field was discovered in 1987 by well 25/5-1. The Frøy plan for development and operation was approved in 1992. Production from the field started in May 1995, five months behind schedule. The main reason for the delay was the fact that the modification work on the TCP2 installation on Frigg was more extensive than expected.

Production
Frøy is an oil field, produced with water injection as the driving mechanism. The reserves are estimated at 15.8 million Sm^3 oil, 3.2 billion Sm^3 gas and 0.2 million tonnes NGL.

Development concept/transportation
The field was developed by means of a wellhead installation with single stage separation. Oil and gas is transferred in separate pipelines to Frigg for further processing and metering. Further transport takes place in the existing transportation system for gas to the United Kingdom and in the Frostpipe oil pipeline to Oseberg.

Costs
At year-end 1995, around 5.6 billion 1995-NOK had been invested in Frøy. Total investments costs are estimated at 5.7 billion 1995-NOK. Operating costs for 1995 were NOK 566 million, including tariffs.

Øst Frigg
Production license 024 (block 25/1), production license 026 (block 25/2) and production license 112 (previously relinquished part of block 25/2, re-awarded in 1985), see Figure 2.5.10.a.

Operator:
Elf Petroleum Norge AS

Licensees in the unitized Øst Frigg field:

Elf Petroleum Norge AS	37.22500%
Norsk Hydro Produksjon AS	32.11200%
Total Norge AS	20.23200%
Den norske stats oljeselskap a.s (Statoil) (SDFI 1.4613%)	10.43100%

Field history
Øst Frigg is located in blocks 25/1 and 25/2. The field was discovered in 1973. The reserves are split with 21.593 % in production license 024, 77.536 % in production license 026 and 4.871 % in production license 112. The landing application was approved in 1984 and production commenced in 1988.

Production
Øst Frigg is a gas field consisting of two main structures, Alpha and Beta, which are a part of the same pressure system as the Frigg field. The reserves are estimated to be 9.3 billion Sm^3 gas, split between 5.4 billion Sm^3 in the Alpha structure and 3.9 billion Sm^3 in the Beta structure. There are four wells producing on the field.

Production installations
Development of Øst Frigg is based on subsea technology with two subsea templates for the wells and a central manifold station which links the systems together. The production systems are remote-controlled from Frigg. From the manifold, a gas and service line goes to TCP2 where the gas is processed and sent into the Frigg field transportation system. The gas is sold to British Gas Corporation under the existing sales agreement.

Costs
Total investments in the field are expected to reach 2.9 billion 1995-NOK. Operating costs for 1995 were approximately NOK 150 million, including tariffs.

Figure 2.5.10.a
Fields and discoveries in the Frigg area

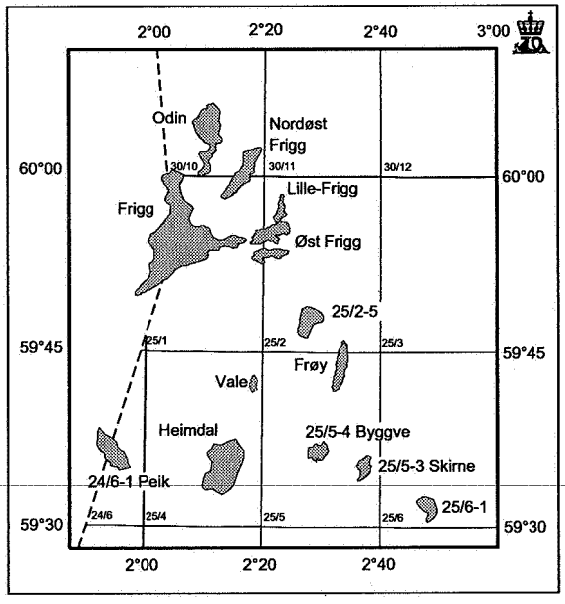
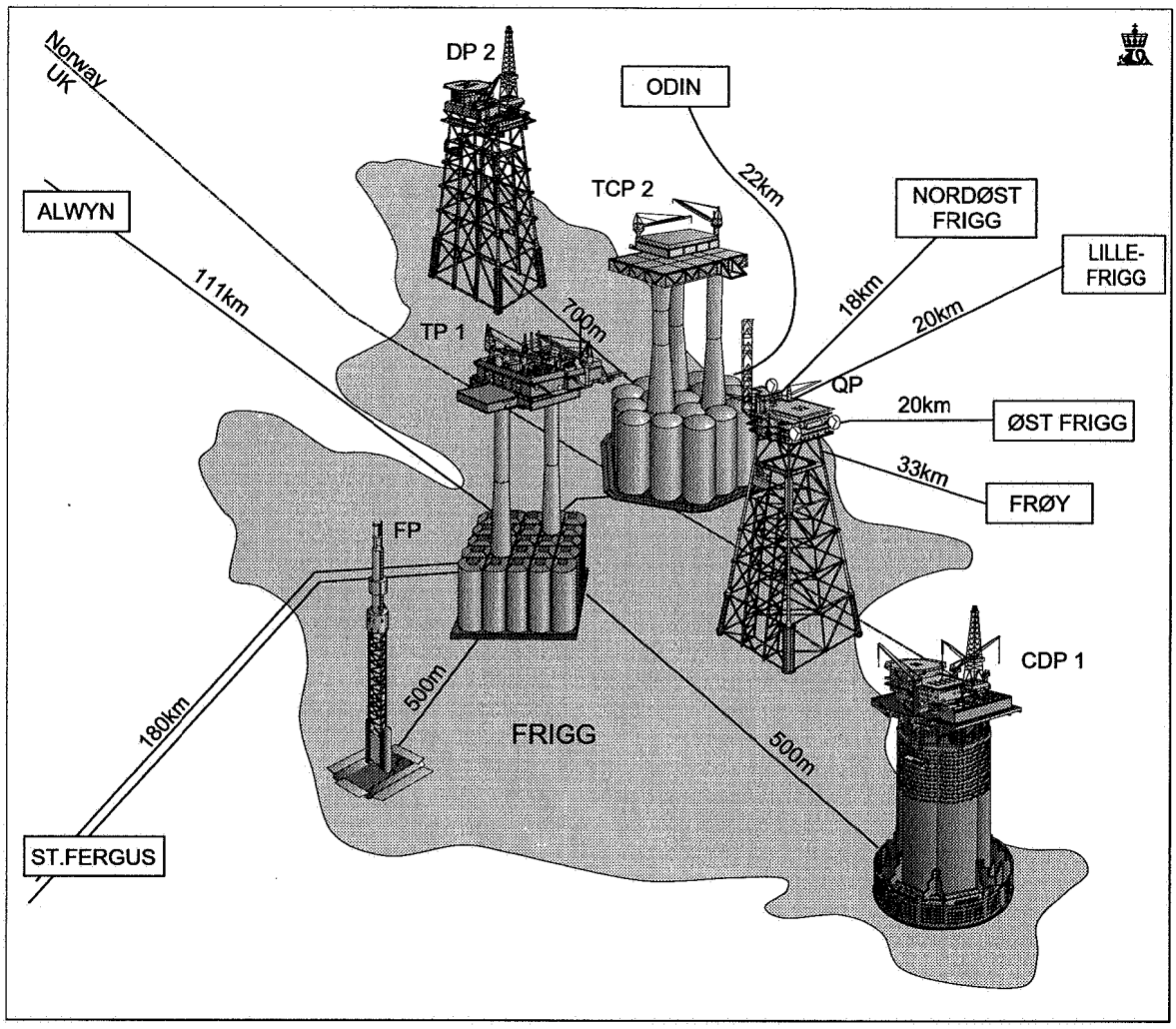


Figure 2.5.10.b
Installations in the Frigg area



Lille-Frigg
Lille-Frigg lies in block 25/2, production license 026, see Figure 2.5.10.a.

Operator:
Elf Petroleum Norge AS

Licensees:

Elf Petroleum Norge AS	41.42000%
Norsk Hydro Produksjon AS	32.87000%
Total Norge AS	20.71000%
Den norske stats oljeselskap a.s (Statoil)	5.00000%

Field history
The production license was awarded in 1969. The field was discovered in 1975 by well 25/2-4. The plan for development and operation was approved in 1991 and production started in May 1994.

Production
Lille-Frigg is a gas/condensate field. The reservoir is located in the Brent group in a fault block which is an extension of the Heimdal ridge. The reserves are estimated to be 1.7 million Sm^3 marketable oil and 4.2 billion Sm^3 gas. The reserves estimates have been adjusted downwards in 1995 due to new information about the reservoir.

Development concept/transportation
Lille-Frigg is developed with a subsea installation remote-controlled from Frigg. The development is based on three production wells, with the possibility of connecting two extra wells. The untreated wellstream is transferred under high pressure directly to Frigg for processing. The gas is further transported to St. Fergus in the existing pipeline. Stabilized condensate is transported via Frostpipe to Oseberg, and from there is sent to the oil terminal at Sture.

Metering
The condensate transported in Frostpipe is metered to fiscal standard on Frigg. Gas export to St. Fergus is metered on Frigg. To this end, use is made of the gas metering system which became available when production from the Nordøst Frigg field terminated.

Costs
At year-end 1995, approximately 4.1 billion 1995-NOK had been invested in Lille-Frigg, which is also the estimate of total field investments over the lifetime of the field. Total operating costs for 1995 were around NOK 263 million, including tariffs.

2.5.11 OSEBERG AREA

Oseberg
Production license 053 and production license 079

Operator:
Norsk Hydro Produksjon AS

Licensees in the unitized Oseberg field:

Den norske stats oljeselskap a.s (Statoil) (SDFI 50.7838%)	64.78379%
Norsk Hydro Produksjon AS	13.68186%
Saga Petroleum a.s.	8.55276%
Elf Petroleum Norge AS	5.76959%
Mobil Development Norway AS	4.32720%
Total Norge AS	2.88480%

The Oseberg field lies in two blocks, block 30/6 in production license 053 which was awarded in 1979, and block 30/9 in production license 079 which was awarded in 1982, see Figure 2.3.2.a.

The part of the production licenses which comprises Oseberg is unitized between the two production licenses. In 1993, the licensees completed a new unitization agreement between blocks 30/6 and 30/9. The result is the following field interests, effective from 1 January 1994:

61.8171% for production license 053
38.1829% for production license 079

Field history
The plan for development and operation was approved in 1984. Production start for the Oseberg field center was in December 1988. Oseberg C started producing in September 1991.

Production
The first discovery showed gas in 1979, while subsequent drilling showed oil with a gas cap. The field consists of several reservoirs in the Brent group, with several structures. The main reservoirs are in the Oseberg and Tarbert formations.

The reserves have been upgraded in 1995 and are now estimated at 325 million Sm^3 oil including NGL. The operator's reserves estimate is 315 million Sm^3 oil including NGL. The use of horizontal production wells was not included in the original plans, but most of the production wells are now drilled horizontally, with good results.

The gas reserves on Oseberg are approximately 91 billion Sm^3, including the produceable part of injected gas from TOGI and Oseberg Vest. No decision has been made on the timing for gas export from Oseberg.

Production installations
The Oseberg field was developed in two phases, see Figure 2.5.11. Phase 1 was developed with a field center in the south with two installations. seberg A comprises one processing and one living quarters installation with concrete gravity bases, and Oseberg B comprises one drilling and water injection installation with a steel jacket. The middle part of the field is drained by two subsea completed wells tied in to the field center. Average oil processing capacity is about 55,000 Sm^3 per day.

Phase 2 comprised development of the northern part of the field. In the revised plan for Oseberg, the C installation was upgraded from a satellite installation to an integrated production, drilling and living quarters (PDQ) installation with the use of support vessels in the drilling phase. Average oil processing is about 23,000 Sm^3 per day.

Metering system
Oseberg A and Oseberg C are equipped with metering stations for fiscal metering of stabilized oil prior to pipeline transport to Sture. Purchase of injection gas from Troll (TOGI) is metered via the fiscal gas metering station installed on Oseberg A. Stabilized oil is exported from the terminal at Sture via two quay facilities which are linked to two identical fiscal oil metering stations.

Costs
At the end of 1995, about 46 billion 1995-NOK had been invested in the Oseberg field. Total investments are estimated to be around 50 billion 1995-NOK from 1983 to 1999. Operating costs in 1995 were around NOK 4.7 billion, including tariffs.

Oseberg Vest
Production license 053

Operator:
Norsk Hydro Produksjon AS

Licensees:

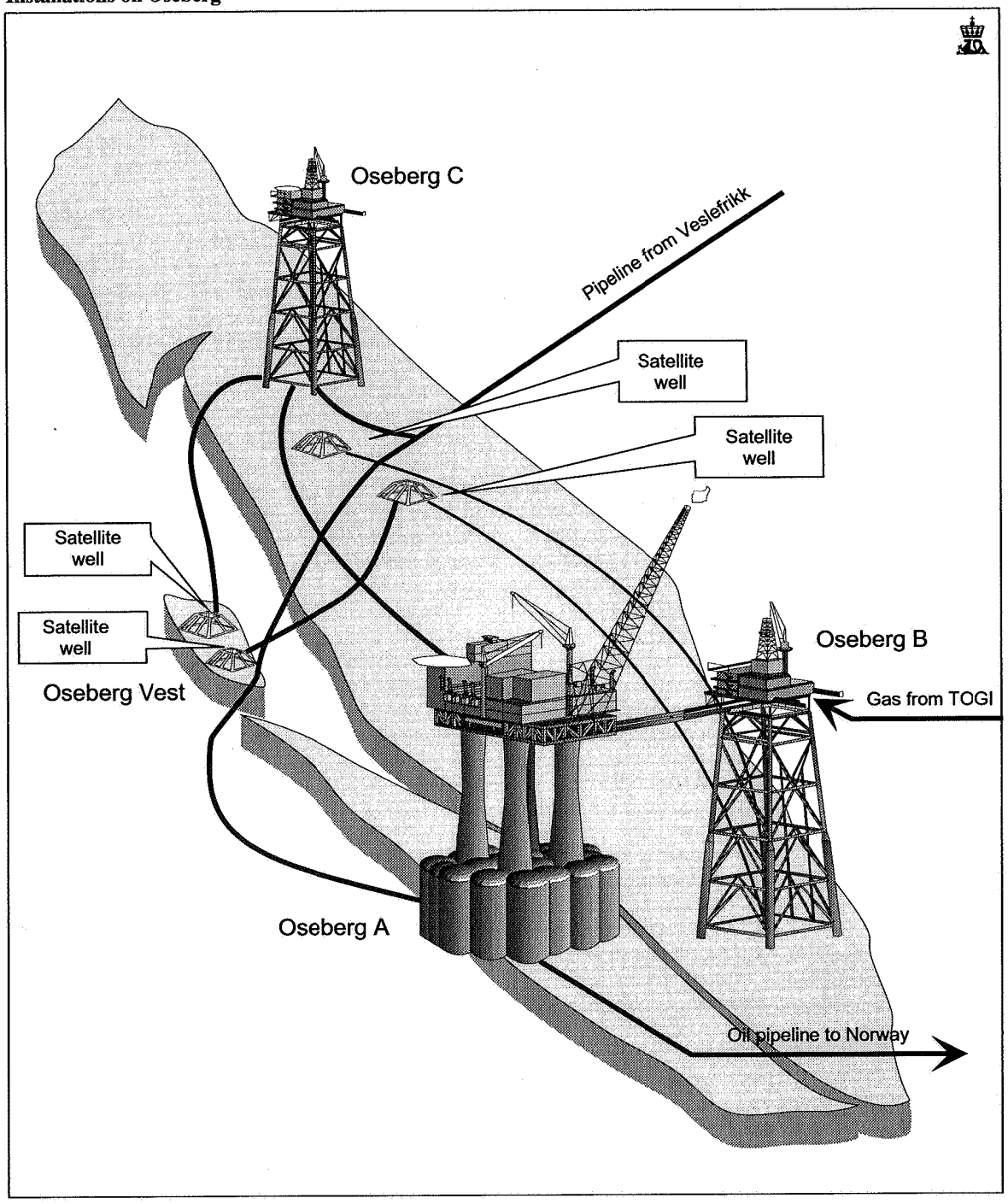
Den norske stats oljeselskap a.s (Statoil) (SDFI 45.4%)	59.40000%
Norsk Hydro Produksjon AS	12.25000%
Elf Petroleum Norge AS	9.33300%
Saga Petroleum a.s.	7.35000%
Mobil Development Norway AS	7.00000%
Total Norge AS	4.66700%

Field history
Oseberg Vest is located in production license 053, block 30/6, which was awarded in 1979, see Figure 2.3.2.a.

Oseberg Vest is included in the revised development plan for the northern part of the Oseberg field. The field began to produce in October 1991.

Production
The Oseberg Vest structure lies to the west of the Oseberg field. It is a angled fault block where the hydrocarbon-bearing strata are found in the Statfjord formation. A layer of rich, coal-bearing shale divides the Statfjord formation into an upper and a lower reservoir zone. Gas was proven

Figure 2.5.11
Installations on Oseberg



first with a thin oil zone in the upper part of Statfjord. In order to produce as much of the oil as possible before the gas is depleted, a horizontal production well was chosen. In connection with the drilling of this well, oil was discovered in the lower part of the reservoir. The production well is now a subsea completed well linked to Oseberg C. Oil production from the horizontal well is significantly higher than expected. All produced gas is injected in the Oseberg field. The reserves are estimated at 2 million Sm^3 oil and 7.5 billion Sm^3 gas.

Well no. 2 is currently being completed. According to the plan, flow from this well will be led to Oseberg B. Further processing and simplified fiscal metering will be carried out on Oseberg A, see Figure 2.5.11.

Metering system
Based on oil and gas measurements from the test separator on Oseberg C, a simplified fiscal standard metering system for oil and gas has been prepared.

Costs
At year-end 1995, 868 million 1995-NOK had been invested in Oseberg Vest. The total investments are expected to be around 900 million 1995-NOK from 1988 to 1996. Operating costs in 1995 were about NOK 83 million, including tariffs.

2.5.12 BRAGE
Production licenses 053, 055 and 185

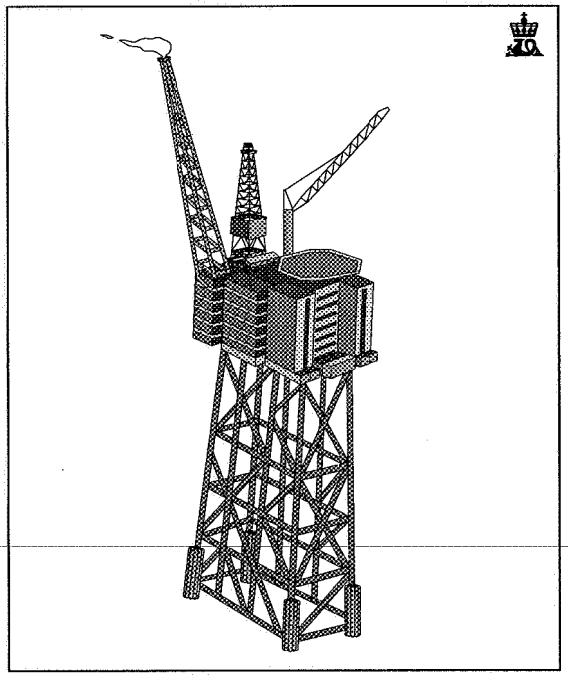
Operator:
Norsk Hydro Produksjon AS

Licensees in the unitized Brage field:

Den norske stats oljeselskap a.s (Statoil) (SDFI 34.2567%)	46.95670%
Esso Exploration & Production Norway A/S	16.34340%
Norsk Hydro Produksjon AS	22.41820%
Neste Petroleum AS	12.25750%
Saga Petroleum a.s.	0.52480%
Elf Petroleum Norge AS	0.66640%
Total Norge AS	0.33320%
Mobil Development Norway AS	0.49980%

Field history
The main part of the Brage field lies in block 31/4 which was awarded under production license 055 in 1979, see Figure 2.3.2.a. The field also extends into block 30/6 (production license 053) and into the northern part of block 31/7. In 1991, this part of block 31/7 was awarded to the licensees in production license 055 as production license 185. The split is 92.86 % for PL055 and 7.14% for PL053, effective 29 September 1993. The plan for development and operation was approved in 1990, and Brage started producing in September 1993.

Figure 2.5.12
Installation on Brage



Production
Oil has been proven in two formations providing a basis for development: Statfjord and Fensfjord. Oil and gas have been proven in the Sognefjord formation. This reservoir has not yet been included in the development plans, but a PDO may be expected in 1996. Five production wells and one water injection well were pre-drilled. Production occurs from the Statfjord and Fensfjord reservoirs. The reserves are estimated to 46.2 million Sm^3 oil, 1.9 billion Sm^3 gas and 0.8 million tonnes NGL.

Production facilities
The field is developed with an integrated production, drilling and living quarters installation with a steel jacket, see Figure 2.5.12.

Transportation
The oil is transported via pipeline to Oseberg and further through the Oseberg line to Sture. A pipeline for gas is connected to Statpipe.

Costs
At year-end 1995, approximately 9.8 billion 1995-NOK had been invested in the Brage field. Total investment costs from 1990 to 1998 are estimated to reach around 10.5 billion 1995-NOK. Operating costs for 1995 were around NOK 1.2 billion, including tariffs.

2.5.13 TROLL
Production licenses 054 and 085

Operator, licensees and field description
(See section 2.4.4)

TOGI
A subsea production system, known as Troll Oseberg Gas Injection (TOGI), has been constructed. The system is controlled from the Oseberg field center and takes care of delivery of gas from Troll Øst for injection in the Oseberg field. Production and delivery of TOGI gas began in February 1991. TOGI delivered 2.0 billion Sm^3 gas to Oseberg in 1995.

Norsk Hydro was responsible for the development of TOGI, and the operator in the operating phase. During the period 1987-1991, approximately 3.0 billion 1995-NOK was invested in TOGI. 1995 operating costs were approximately NOK 53 million.

Troll Phase II: Development of the oil reserves in Troll Vest
So far, the development of oil in the Troll Vest oil province and the first stage (the H-cluster) in a staged development of oil in the Troll Vest gas province, have commenced production. Norsk Hydro is the operator for both the development and operation phases.

Troll Oljerør (Troll oil pipeline)
The plan for installation and operation (PIO) of Troll Oljerør was submitted by a joint venture with the same ownership structure as for the unitized Troll field, cf. section 2.4.5. The PIO was approved in December 1993. Troll Oljerør was ready to transport oil when production started from Troll B on 19 September 1995, around 3-1/2 months ahead of the planned production start under the PIO.

Statoil is the operator of the joint venture. At the end of 1995, total investments in Troll Oljerør were approximately 860 million 1995-NOK. Operating costs for 1995 were approximately NOK 37 million.

2.5.14 VESLEFRIKK

Production license 052

Operator:
Den norske stats oljeselskap a.s (Statoil)

Licensees:

Den norske stats oljeselskap a.s (Statoil) (SDFI 37%)	55.00000%
Total Norge AS	18.00000%
Deminex Norge AS	11.25000%
Norsk Hydro Produksjon AS	9.00000%
Norske Deminex AS	4.50000%
Svenska Petroleum Exploration AS	2.25000%

Field history
The field is located southeast in block 30/3, see Figure 2.3.2.a. Production license 052 was awarded in 1979. The plan for development and operation was approved in April 1987. An updated reservoir management plan, after pre-drilling of six production wells, was submitted in September 1989. Production started in December 1989. The plan for development and operation of the Statfjord formation was approved by Royal Decree in June 1994. Upper Brent and the I area in the field were declared commercial in August 1994, and the plan for development and operation of the deposits was approved in December 1994. During drilling of well 30/7-3 S in 1995, a minor discovery was made. Testing will take place in 1996.

Production
The field produces from reservoirs in the lower part of the Brent group and the Dunlin group (Intra Dunlin Sand). The reserves are estimated at 54.4 million Sm^3 oil including the reserves in the Statfjord formation and Upper Brent. The volume of recoverable associated gas is estimated to be 2.7 billion Sm^3 dry gas and 1.0 million tonnes NGL.

The production strategy for the reservoirs in the Brent group and the Dunlin group is to maintain pressure in the reservoir with the aid of water injection. Some of the wells will, however, be controlled with a lower well pressure than boiling point pressure. WAG injection in the main field has been decided.

Production start from the Statfjord formation is planned for 1997. The plan is to drain the reservoir with a horizontal producer, and the recovery will be increased by recirculating the gas in a horizontal injector. The Statfjord formation has a gas cap and a higher content of associated gas than the other reservoirs.

Production installations
The field has been developed with a permanent wellhead installation with a steel jacket and a semi-submersible installation with process facilities and living quarters, see Figure 2.5.14. The wellhead installation is installed over a template with six pre-drilled wells. There are 13 production wells and seven water injection wells. The semi-submersible installation is anchored and connected to the permanent wellhead installation.

Water injection was implemented in the spring of 1991. Design of a high pressure separation stage in connection with production of the Statfjord formation and WAG injection was implemented in 1995.

Transportation
An oil pipeline is connected to the Oseberg transportation system for transport to the Sture terminal. Gas is transported via the Statpipe system. A temporary agreement has been signed for exchange of produced gas volumes between Veslefrikk and Heimdal.

Costs
At year-end 1995, approximately 10 billion 1995-NOK had been invested in the Veslefrikk field. Total investments are estimated to be roughly 10.8 billion 1995-NOK from 1987 until 2009. In 1995, operating costs including tariffs amounted to roughly NOK 1,550 million.

Figure 2.5.14
Installations on Veslefrikk

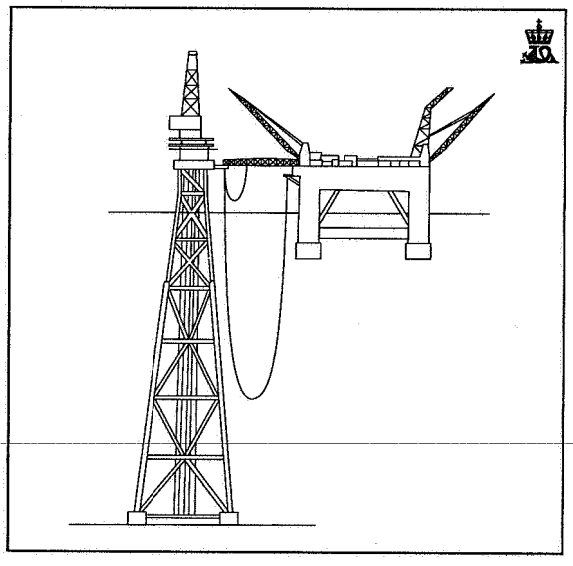
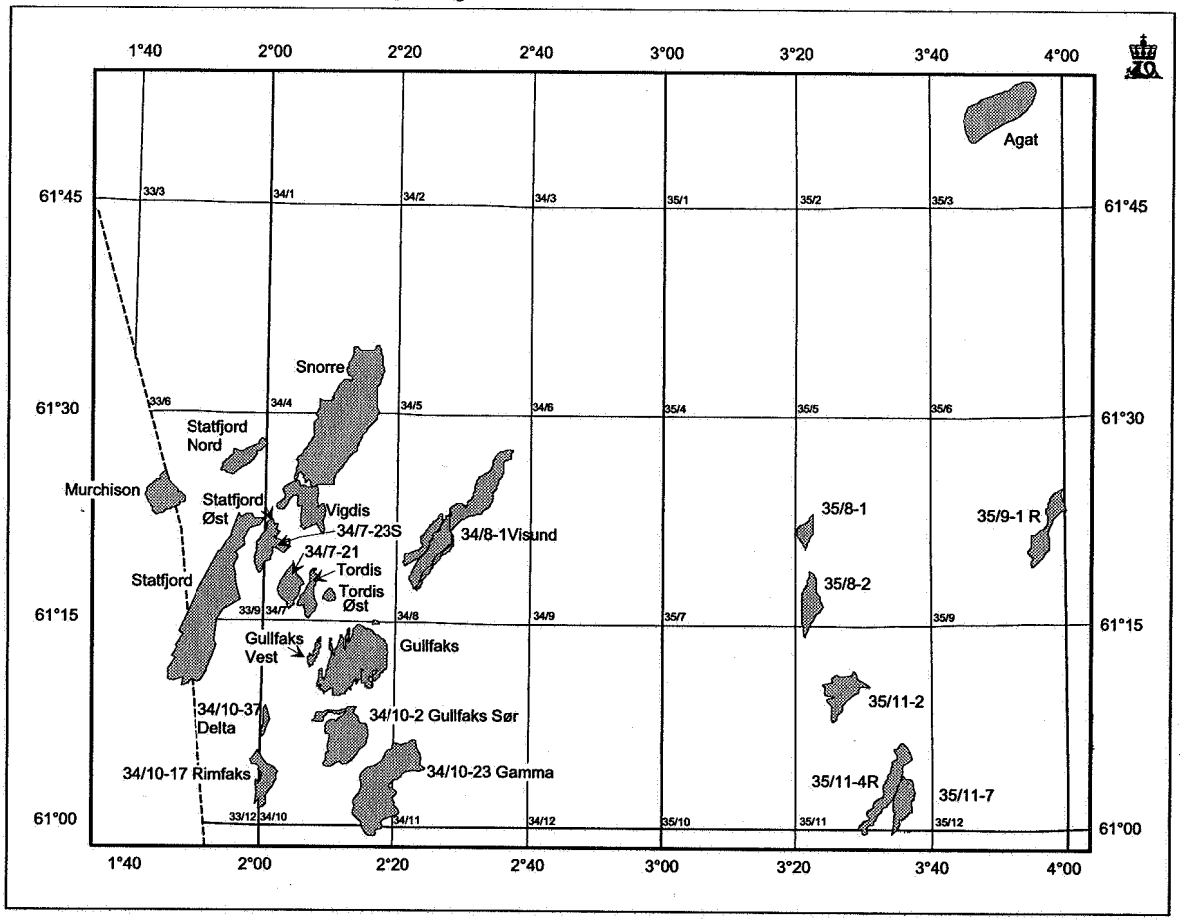


Figure 2.5.15.a
Fields and discoveries in the Gullfaks, Statfjord and Snorre area



2.5.15 GULLFAKS AND GULLFAKS VEST

Production license 050

Operator:
Den norske stats oljeselskap a.s (Statoil)

Licensees:

Den norske stats oljeselskap a.s (Statoil) (SDFI 73%)	85.00000%
Norsk Hydro Produksjon AS	9.00000%
Saga Petroleum a.s	6.00000%

Field history
The Gullfaks field is located in block 34/10, which was awarded under production license 050 in 1978, see Figure 2.5.15.a. The field was discovered in 1978. Due to a phased development, separate plans for Phase 1 and 2 were approved in 1981 and 1985, respectively. It was decided to develop parts of the Lunde formation which were not covered under the earlier development plans in 1995. Phase 1 included the Gullfaks A and Gullfaks B installations. Phase 2 comprised Gullfaks C - the installation and the Lunde formation. Production from the field started in December 1986.

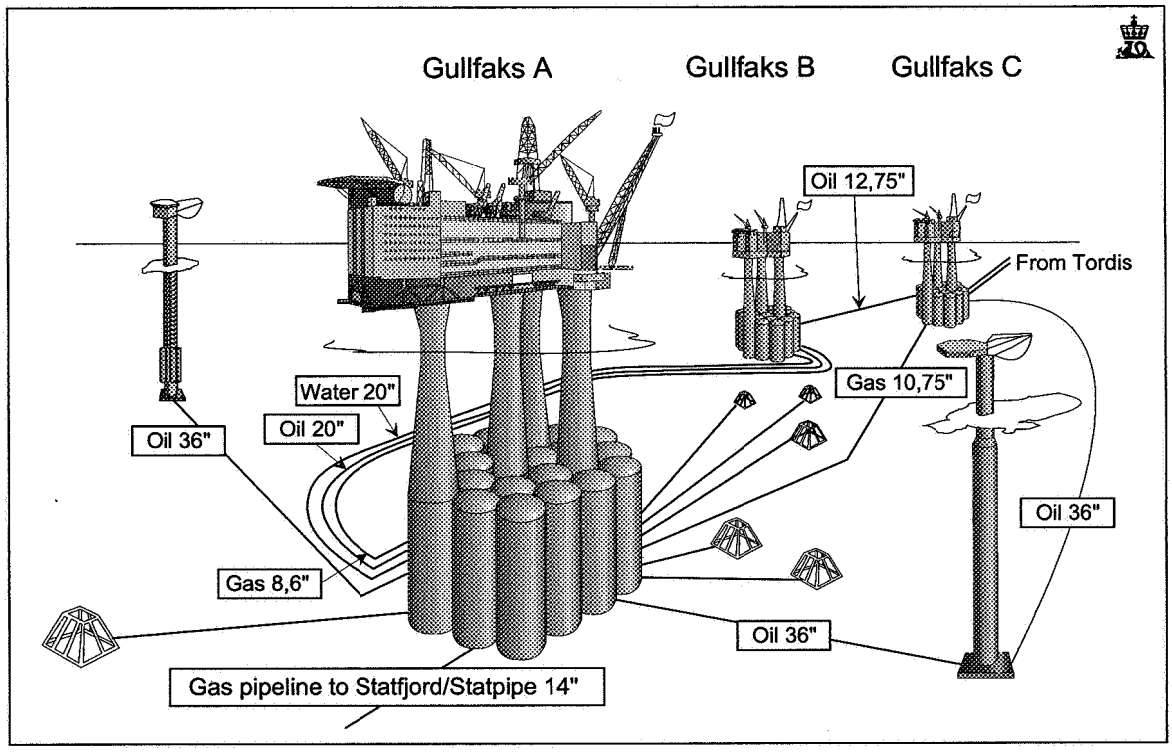
Production
The Gullfaks field contains oil in sandstone from the Jurassic and Triassic ages. The reservoir lies relatively shallow, and is made up of several angled and rotated fault blocks. The blocks have variable tilt degrees and parts of the area are heavily eroded. The field is complicated to develop, inter alia because of many faults.

The reservoirs in Phase 1 and 2 are separated by a north-south fault. Some communication has been proven in the northern area. Faults with more than 1000 meter skip distance delimit the field in the south, east and northeast. The Lunde formation is located to the east of and under the other reservoirs.

The reserves decided to be developed are divided among the Brent group, and the Cook, Statfjord and Lunde formations. The reserves are estimated at 309 million Sm^3 oil, 22 billion Sm^3 gas and 2.5 million tonnes NGL. The operator's estimate of reserves is 286 million Sm^3 oil.

The field driving mechanism is primarily pressure maintenance by means of water injection. Alternating injection of water and gas (WAG) is carried out where appropriate. Also injection of a thin gel is an alternate method on Gullfaks.

Figure 2.5.15.b
Installations on Gullfaks



Production installations

The A and B installations are both Condeep type concrete gravity base structures with steel frame topside, see Figure 2.5.15.b. The C installation is basically built as a copy of Gullfaks A. All three are fully-integrated process, drilling and living quarters installations, while Gullfaks B has a simplified process facility with only first stage separation. Gullfaks A, which is placed on the southwestern part of the field, started production in December 1986. Processing capacity for oil is 60,000 Sm^3 per day, while capacity for water is 35,000 m^3 per day. Water injection capacity on Gullfaks A is 75,000 m^3 per day. Gullfaks A is also equipped for gas injection with a capacity of 3.2 million Sm^3 per day.

Gullfaks B is located on the northwestern part of the field and was put into production in February 1988. It has a first stage liquid capacity of 45,000 Sm^3 per day. The oil from Gullfaks B is transferred to Gullfaks A and Gullfaks C for further processing and storage. The water injection capacity is 30,000 m^3 per day. In addition, water can be transferred from Gullfaks A for injection.

Gullfaks C was placed on the eastern part of the field for production from the reserves in Phase 2. Production started at the turn of the year 1989/1990. The process capacity of the installation is 60,000 Sm^3 oil and 30,000 m^3 produced water per day. Up to 60,000 m^3 water can be injected per day. At the end of 1995, a compressor was installed for injection of gas also on Gullfaks C. The capacity of the compressor is 2.2 million Sm^3 per day.

Gullfaks Vest

Gullfaks Vest is an oil field located in block 34/10, northwest of Gullfaks, see Figure 2.5.15.a. The field was discovered by exploration well 34/10-34 in the summer of 1991. The reserves are 2.9 million Sm^3 oil and 0.3 billion Sm^3 gas. Production started in May 1994 with one well from Gullfaks B. Production is based on natural water drive.

Gullfaks as infrastructure

In addition to Gullfaks Vest, the installations will also be used in connection with production from Tordis, Tordis Øst, Vigdis, 34/8-1 Visund, 34/10-17 Rimfaks, 34/10-2 Gullfaks Sør and 34/10-37 Delta.

May 1994 saw the beginning of deliveries from Tordis to Gullfaks C, where the oil is processed. A new first stage separator has been built on Gullfaks C, otherwise existing equipment is utilized. In 1995, it was also decided to tie Tordis Øst in to Gullfaks C. In 1994, it was decided that completely processed oil from Vigdis (via Snorre) should be delivered to Gullfaks A for storage and loading to tankers. A similar agreement for Visund was made in December 1995.

A plan for the development and operation of the oil resources in 34/10-2 Gullfaks Sør, 34/10-17 Rimfaks and 34/10-37 Delta was submitted in December 1995. According to the plan, these discoveries will be tied-in to Gullfaks A. In 1995, the Gullfaks licensees, production license 050, were awarded previously relinquished areas of block 34/10. There are also other discoveries which may be candidates for development in connection with Gullfaks.

The Gullfaks installations can also be used for new discoveries in this area.

Metering system and transportation
Gullfaks A and C have storage cells for storage of stabilized oil. The oil is fiscally metered and exported via loading buoys to tankers. Processed rich gas is fiscally metered on Gullfaks A and C before being sent into Statpipe via Statfjord C. Oil from Gullfaks Vest is metered with the aid of a test separator on Gullfaks B. The Tordis wellstream is metered after first stage separation on Gullfaks C. The metered and analyzed volumes are then further processed in the process facilities on Gullfaks C before the oil is loaded via the loading buoy system and the gas delivered to Statpipe. Oil from Vigdis will be metered to fiscal standards on Snorre before loading from Gullfaks A. Oil from the Visund field is also planned to be loaded from Gullfaks A.

Costs
At the end of 1995, about 69 billion 1995-NOK had been invested in Gullfaks and 0.2 billion in Gullfaks Vest. Total investments over the lifetime of the field are roughly 72 billion 1995-NOK for Gullfaks, and 0.2 billion for Gullfaks Vest. Operating costs including tariffs are estimated to reach NOK 4.2 billion in 1995. This figure includes Gullfaks Vest.

2.5.16 TORDIS

Production license 089

Operator:
Saga Petroleum a.s.

Licensees:

Den norske stats oljeselskap a.s. (Statoil) (SDFI 51%)	55.40000%
Esso Exploration & Production Norway A/S	10.50000%
Idemitsu Petroleum Norge AS	9.60000%
Norsk Hydro Produksjon AS	8.40000%
Saga Petroleum a.s.	7.70000%
Elf Petroleum Norge AS	5.60000%
Deminex Norge AS	2.80000%

Field history
The Tordis field lies in block 34/7 which was awarded under production license 089 in 1984, see Figure 2.5.15.a. The field was discovered by exploration well 34/7-12 in 1987. An appraisal well, 34/7-14, was drilled on the field in the autumn of 1989. On the basis of these two wells, the field was declared commercial and the plan for development and operation was approved in May 1991. Production from the field began in June 1994.

Production
The Tordis field reservoir consists of sandstone in the upper and lower part of the Brent group from the Middle Jurassic age. Faults divide the field into three main segments, one southern, one western and one eastern segment. The reserves are estimated to be 29.6 million Sm^3 oil, 2.0 billion Sm^3 gas and 0.7 million tonnes NGL. The plan is to produce the field by means of pressure maintenance aided by water injection. A total of five production wells and two injection wells are planned. Drilling of the injection wells has been postponed for the time being as the reservoir has more natural pressure support from the aquifer than expected.

Production installations/transportation
The field is developed with a subsea installation which is linked to the Gullfaks C installation. The subsea installation consists of a central manifold with hook-ups for satellite wells and other well templates, see Figure 2.5.17. The wellstream is transferred to Gullfaks C for processing. The oil is metered and exported via loading buoys to tankers. The gas is transported in the Statpipe system.

Metering system
The Tordis wellstream is separated in a separate single stage process on Gullfaks C. Oil and gas is metered and analyzed, and is further processed in the existing process facilities on Gullfaks C. Metering and analysis results are used to determine the Tordis field share of the total volume of hydrocarbons delivered from Gullfaks C. Due to higher production from the Tordis field, both the gas and oil metering stations will be upgraded in early 1996.

Costs
At year-end 1995, approximately 3.6 billion 1995-NOK had been invested in Tordis. Total investments over the lifetime of the field are estimated to be 3.9 billion 1995-NOK. The operating costs for 1995 are estimated at NOK 757 million, including tariffs.

2.5.17 STATFJORD AREA

Statfjord
Production license 037

Operator:
Den norske stats oljeselskap a.s (Statoil)

Licensees:
Norwegian part (85.46869%)

Den norske stats oljeselskap a.s (Statoil) (SDFI 0%)	42.734348%
Mobil Development Norway AS	12.820304%
Norske Conoco A/S	9.437169%
Esso Exploration & Production Norway A/S	8.546869%
A/S Norske Shell	8.546869%
Saga Petroleum a.s.	1.602534%
Amerada Hess Norge AS	0.890300%
Enterprise Oil Norwegian AS	0.890300%

British part (14.53131%)

Conoco North Sea Inc.	4.843769%
BP Petroleum Development Ltd.	4.843769%
Chevron U.K. Ltd.	4.843769%

Field history
The Statfjord field is located in blocks 33/9 and 33/12 which were awarded under production license 037 in 1973, see Figure 2.5.15.a. A small part of the field extends over to the British side in blocks 211/24 and 211/25. The field was discovered in the spring of 1974 and was declared commercial the same year. The field was approved for development in 1976, and was put in production in 1979. Mobil was the operator of the field until 1987 when Statoil took over as operator.

Production
The reservoirs on the Statfjord field consist of sandstone from the Brent group, the Cook formation and the Statfjord formation. The total field reserves are estimated at 630 million Sm^3 oil, 66.6 billion Sm^3 dry gas and 18.3 million tonnes NGL. The NGL is separated from the gas at Kårstø.

The Brent reservoir is produced with the aid of pressure support from water injection. The operator attempts to balance production and injection so that the reservoir pressure is gradually increased somewhat in order to improve the lift in wells with high water cuts. The operator plans to carry out a pilot project in 1996 with supplemental gas injection in lower Brent. The Statfjord reservoir is produced with the aid of pressure support from gas injection. A gas cap has now formed at the top of the Statfjord reservoir, leading to an increase in the gas/oil ratio in many of the producers in this reservoir. The operator is now considering a change in production strategy entailing upflank water injection in the upper Statfjord reservoir, as well as WAG (water alternating gas injection) in the lower part of the Statfjord reservoir. Results from pilot tests will provide answers as to whether the strategy will be changed. The Cook reservoir came onstream in 1994. The reservoir is produced by phasing in wells which have already penetrated the reservoir, and by pressure support from water injection.

In order to achieve better utilization of the remaining reserves, the operator is continually updating the production strategy for the field. The strategy entails both more wells and extensive re-use of the wells in several reservoir zones. Use of horizontal wells and long-range, high-deviation wells is also included in the strategy.

Production installations
The field is developed in three phases with the fully integrated installations A, B and C, see Figure 2.5.17. The Statfjord A installation is located near the center of the Statfjord field. It is a fully integrated installation with a concrete gravity base composed of 14 storage cells and three shafts. The deck is of steel. Processing capacity for oil is now roughly 67,000 Sm^3 per day split between two production lines (including Snorre). Statfjord A came onstream in November 1979. Loading of oil is done via one of the three oil loading systems on the field. The oil storage capacity is 175,000 Sm^3.

The Snorre field started producing in August 1992. Snorre's production received at Statfjord A after second stage separation. This has enabled good utilization of Statfjord A's available process capacity.

The Statfjord B installation is located in the southern part of the Statfjord field. It is a fully integrated installation with a concrete gravity base composed of 24 storage cells and four shafts. The deck is of steel. Production capacity is approximately 40,000 Sm^3 oil per day in one production line. Statfjord B started producing in November 1982. The installation has its own storage capacity for oil, 302,000 Sm^3.

Like the other Statfjord installations, Statfjord B delivers gas to Statpipe. In addition, gas is delivered to the British gas network via NLGP (Northern Leg Gas Pipeline).

The Statfjord C installation is placed in the northern part of the Statfjord field. It is a fully integrated installation, structurally identical to Statfjord B. In order to maximize utilization of the facility, the process capacity for oil was upgraded in 1995. The production capacity is now approximately 52,000 Sm^3 oil in a separate production line (including satellites). Statfjord C came onstream in June 1985. The Statfjord satellites have their own intake separator on Statfjord C with a capacity of roughly 24,000 Sm^3 oil.

Transportation systems
Gas is transported via the Statpipe pipeline and sold in Emden, while NGL is removed at Kårstø and sold there. The United Kingdom takes its share of the gas through NLGP (Northern Leg Gas Pipeline) from Statfjord B to Shell's terminal in St. Fergus, Scotland where the gas is sold. Stabilized oil is stored in storage cells on each installation prior to being pumped onto tankers via one of the three loading systems on the field.

Metering system
Oil and gas are metered to fiscal standard on each of the three installations. After Snorre started production, Statfjord A production is determined as the difference between the total volume metered on Statfjord A and the volume metered on Snorre.

A corresponding concept is used for determination of Statfjord C production after the Statfjord satellites began producing. The distribution between the satellites will be based on test separator metering, while the total volume from the satellites will be metered to fiscal standard.

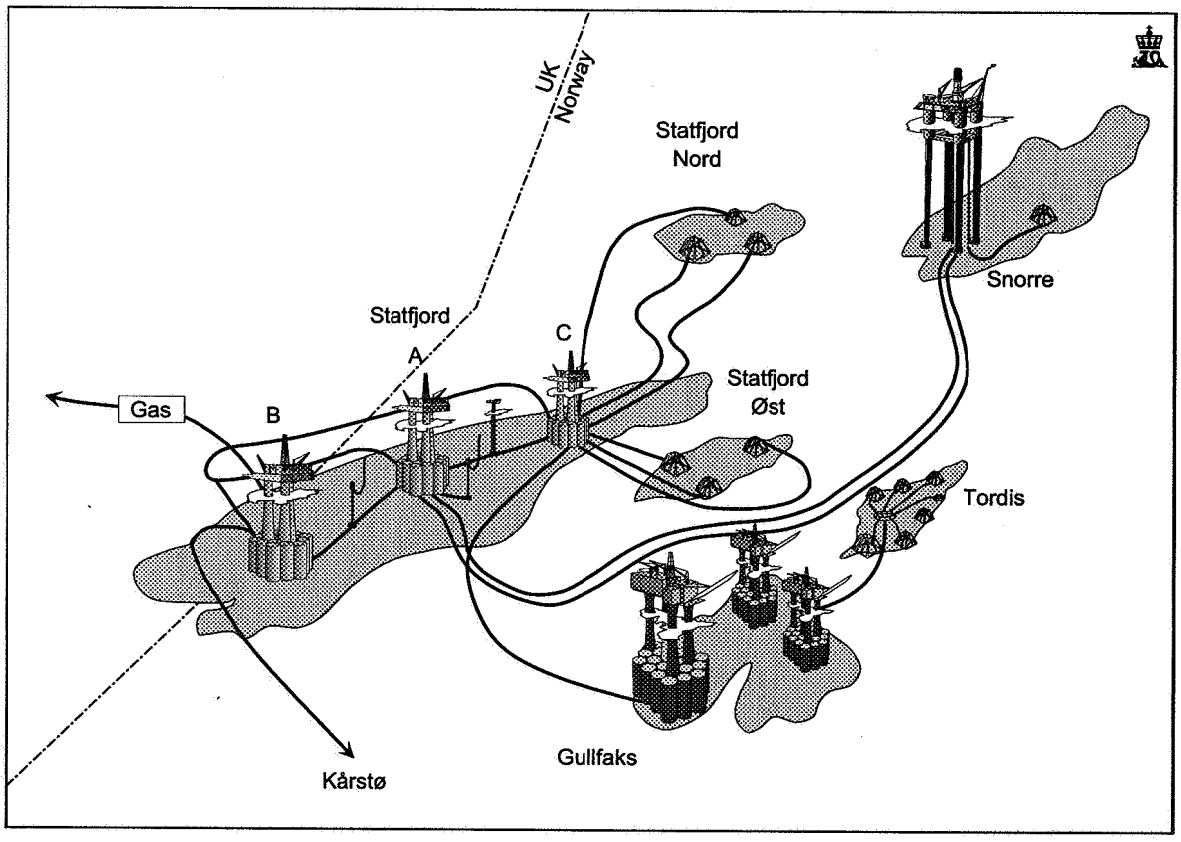
Costs
At the end of 1995, approximately 72.6 billion 1995-NOK had been invested in the Statfjord field. Total investments are expected to be approximately 75.4 billion 1995-NOK from 1974 and up to the year 2009. Operating costs were approximately 5.6 billion 1995-NOK.

Statfjord Øst
Production licenses 037 and 089

Operator:
Den norske stats oljeselskap a.s (Statoil)

Licensees:
The sliding scale has been exercised in the production license, and the licensees in the unitized field are:

Figure 2.5.17
Installations and infrastructure in the Statfjord, Gullfaks and Snorre area



Den norske stats oljeselskap a.s (Statoil) (SDFI 40.5%)	52.70000%
Esso Exploration & Production Norway A/S	10.25000%
Mobil Development Norway AS	7.50000%
Norske Conoco A/S	5.52000%
A/S Norske Shell	5.00000%
Idemitsu Petroleum Norge AS	4.80000%
Saga Petroleum a.s.	4.79000%
Norsk Hydro Produksjon AS	4.20000%
Elf Petroleum Norge AS	2.80000%
Deminex Norge AS	1.40000%
Amerada Hess Norge AS	0.52000%
Enterprise Oil Norwegian AS	0.52000%

Field history
The Statfjord Øst field lies in blocks 33/9 and 34/7, see Figure 2.5.15.a. Block 33/9 was awarded under production license 037 in 1973. Block 34/7 was awarded under production license 089 in 1984. The field was discovered in 1976 by well 33/9-7. The plan for development and operation of Statfjord Øst was approved in November 1990. A unitization agreement for Statfjord Øst was signed in June 1991, and divides the reserves with 50% to each of the two production licenses, 037 and 089. Production from the field got underway in October 1994.

Production
The reservoir on the Statfjord Øst field consists of sandstone in the upper and lower part of the Brent group. The reserves are estimated at 24.7 million Sm^3 oil, 3.0 billion Sm^3 gas and 0.7 million tonnes NGL. The field will be produced by pressure maintenance assisted by water injection. A total of six production wells and four injection wells are planned for the field.

Production installations/transportation
The field is developed with subsea installations which are coupled to the Statfjord C installation. The subsea installations consist of three templates, two for production and one for water injection, see Figure 2.5.17. The wellstream will be transferred via two pipelines to Statfjord C for processing, storage and transport. Statfjord Øst and Statfjord Nord utilize common facilities on Statfjord C.

Metering system
The Statfjord satellites are metered to fiscal standard in a common metering system on Statfjord C. Return allocation to the individual satellite field is done on the basis of test separator metering.

Costs
At year-end 1995, about 3.4 billion 1995-NOK had been invested in Statfjord Øst. Total investments are estimated to be around 3.6 billion 1995-NOK from 1990 up to 2009. The operating costs for 1995 were approximately NOK 292 million, including tariffs.

Statfjord Nord
Production license 037

Operator:
Den norske stats oljeselskap a.s (Statoil)

Licensees:

Den norske stats oljeselskap a.s (Statoil) (SDFI 30%)	50.00000%
Mobil Development Norway AS	15.00000%
Norske Conoco A/S	11.04200%
A/S Norske Shell	10.00000%
Esso Exploration & Production Norway A/S	10.00000%
Saga Petroleum a.s.	1.87500%
Amerada Hess Norge AS	1.04200%
Enterprise Oil Norwegian AS	1.04200%

Field history
Statfjord Nord is located in block 33/9 which was awarded under production license 037 in 1973, see Figure 2.5.15.a. The field was discovered in 1977 by well 33/9-8. The plan for development and operation of Statfjord Nord was approved in November 1990. Production from the field commenced in January 1995.

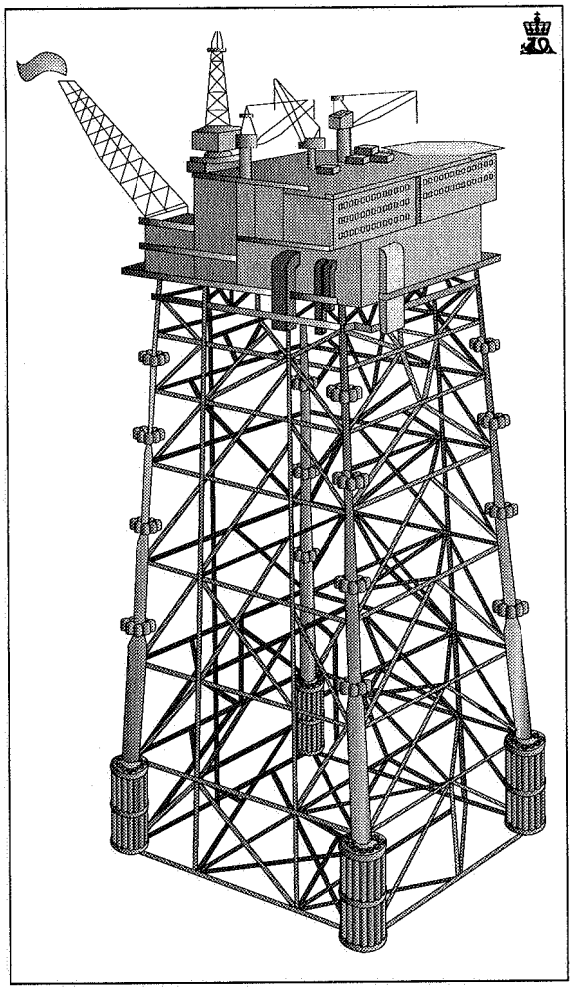
Production
The reservoir on Statfjord Nord consists of sandstone belonging to the Brent group (Middle Jurassic) and sandstone of the Late Jurassic age. The reserves are estimated to be 27.6 million Sm^3 oil, 1.9 billion Sm^3 gas and 0.4 million tonnes NGL. The field will be produced by means of pressure maintenance aided by water injection. A total of seven production wells and three injection wells are planned.

Production installations/transportation
The field is developed with subsea installations connected to the Statfjord C installation. The subsea installations consist of three templates, whereof two are for production and one for water injection, see Figure 2.5.17. The wellstream is transferred via two pipelines to Statfjord C for processing, storage and further transport. Statfjord Nord and Statfjord Øst use common facilities on Statfjord C.

Metering system
The Statfjord satellites are metered to fiscal standard in a common metering system on Statfjord C. Return allocation to the individual satellite field is done on the basis of test separator metering.

Costs
At the end of 1995, about 3.7 billion 1995-NOK had been invested in Statfjord Nord. Total investments are estimated to be roughly 4 billion 1995-NOK from 1990 until 2009. 1995 operating costs were approximately NOK 388 million.

Figure 2.5.18
Installation on Murchison



2.5.18 MURCHISON
Production license 037

Operator:
Oryx UK Energy Company

Licensees:
Norwegian part (22.2%)

Den norske stats oljeselskap a.s (Statoil)	11,10000%
Mobil Development Norway AS	3.33000%
Norske Conoco A/S	2,45130%
Esso Exploration & Production Norway A/S	2,22000%
A/S Norske Shell	2,22000%
Saga Petroleum a.s.	0.41620%
Amerada Hess Norge AS	0.23130%
Enterprise Oil Norwegian AS	0.23120%

British part (77.8%)

Oryx UK energy Company	51.86670%
Chevron UK Ltd.	25.93330%

Field history
The Murchison field is located in block 211/19 on the British side, and in block 33/9 on the Norwegian side, see Figure 2.5.15.a. Block 33/9 was awarded under production license 037 in 1973. The field was discovered in August 1975. The Norwegian share of the field is 22.2%. Development of the field was commenced in 1976 by the British licensees. The British and Norwegian licensees signed an agreement in 1979 for joint exploitation of the Murchison field. Production started in 1980.

Effective from 1 July 1994, the operator Conoco (UK)'s interest (25.9334 %) was taken over by Oryx UK. Oryx took over as operator of the field on 9 January 1995, after both the licensees and the authorities in both countries had approved the change of operator. Conoco (UK) assisted Oryx UK with administration of the field until June 1995. Oryx UK uses a contractor firm for operation of the field.

The licensees have agreed to amend the field agreements so that the ownership structure between the two countries remains unchanged. This amendment to the agreements must be approved by the British and Norwegian authorities.

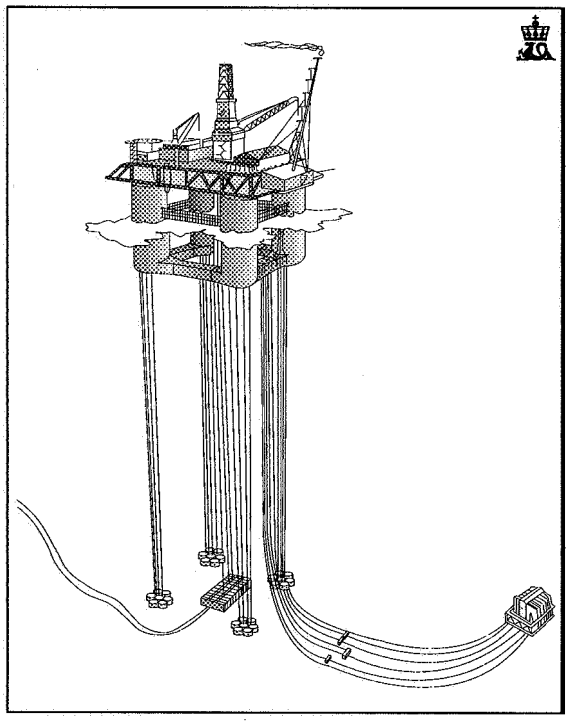
Production
The whole field reserves are estimated at 54 million Sm^3 oil and 1.5 billion Sm^3 in the Brent group. The field has produced at nearly maximum fluid processing capacity since 1981, and water treatment capacity has been increased several times. 1984 was the last year at plateau production. All production wells are now producing with a high water cut. Gas lift is used in some wells. Several production wells have been shut down due to mechanical problems or very high production of water.

Production installations
The field has been developed with an integrated steel installation with a production capacity of 26,200 Sm^3 oil per day, see Figure 2.5.18. Current field production is about 2,700 Sm^3 oil per day.

Transportation
The Norwegian share of the Murchison gas is landed via the NLGP pipeline (Northern Leg Gas Pipeline) to the Brent field on the British side, and on to St. Fergus, Scotland in the FLAGS pipeline (Far North Liquified and Associated Gas Gathering System). Gas deliveries through NLGP started in July 1983. Oil from Murchison is sent via pipeline to Sullom Voe on Shetland.

Costs
At year-end 1995, somewhat less than 4.9 billion 1995-NOK had been invested in the Murchison field. Total investments in Murchison up to 2001 are estimated to be around 5 billion 1995-NOK. Operating costs for 1995 were approximately NOK 123 million, including tariffs. These figures apply to the Norwegian share (22.2%).

Figure 2.5.19
Installations on Snorre



2.5.19 SNORRE
Production licenses 057 and 089

Operator:
Saga Petroleum a.s.

Licensees in the unitized Snorre field:

Den norske stats oljeselskap a.s (Statoil) (SDFI 31.4%)	41.40000%
Saga Petroleum a.s.	11.94470%
Esso Exploration & Production Norway A/S	10.33230%
Deminex Norge AS	10.03480%
Idemitsu Petroleum Norge AS	9.60000%
Norsk Hydro Produksjon AS	8.26580%
Elf Petroleum Norge AS	5.51060%
Amerada Hess Norge AS	1.45590%
Enterprise Oil Norwegian AS	1.45590%

Field history
The Snorre field, which lies in blocks 34/4 and 34/7, is comprised by production license 057 awarded in 1979 and production license 089 awarded in 1984, respectively. See Figure 2.5.15.a. Ownership of the field is unitized according to an estimated distribution of reserves: 30% in block 34/4 and 70% in block 34/7. The plan for development and operation of the Snorre field was approved in 1988. The field began producing in August 1992.

An amended plan for development and operation, which includes development of the upper part of the Lunde formation (L02-L05), upgrading of the process capacity on Snorre and increased use of gas injection in the reservoir, was approved in December 1994.

Production
The Snorre field consists of several larger fault blocks which are not generally regarded as having communication with each other. The reservoir rocks are fluvial sandstones in the Statfjord formation (Lower Jurassic) and the Lunde formation (Upper Triassic). The reservoir intervals vary from broad, continuous channel belts were reservoir communication is good, to smaller, isolated channel belts where the communication conditions are poorer.

Originally, the plan was to produce the field with water injection as the driving mechanism. Based on, inter alia, a pilot project with WAG (water alternating gas injection) in 1994, a decision was made to amend the production strategy to downflank WAG in the entire Statfjord formation. Further optimization of the production strategy has led to a change from downflank WAG to upflank WAG in one of the fault blocks (the eastern fault block). Use of horizontal and high deviation wells drilled from the installation are also a part of the strategy. The reserves are estimated to be 189.2 million Sm^3 oil. The operator's estimate of reserves is 179.2 million Sm^3 oil. Gas reserves are estimated at 10.1 billion Sm^3 and NGL reserves are estimated at 5.5 million tonnes.

Production facilities
The Snorre field development has been planned in two phases. Phase I consists of a floating tension leg platform in the south (Snorre TLP) and a subsea template (Template A) connected to Snorre TLP in the central part of the field, see Figure 2.5.19. Oil and gas will be separated in two stages on Snorre and transported further in separate oil and gas pipelines to Statfjord A for further processing. The increased reserves basis and increased need for gas injection have necessitated the upgrading of the process facilities on Snorre. Among other things, the capacity for oil processing and gas injection will be increased to 39,000 Sm^3 and 5 million Sm^3 per day, respectively. This upgrade will be completed by 1997. The Snorre process facilities will be upgraded simultaneously with the phase-in of Vigdis.

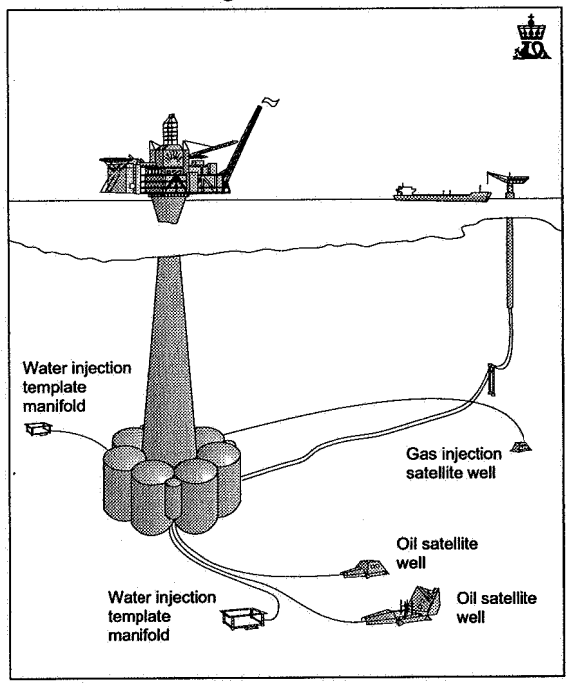
Phase II of the Snorre development comprises production from the Northern part of the field. The operator plans development with subsea installations connected to Snorre TLP. The final decision regarding development concept of Phase II has not yet been made.

Transportation systems
The Snorre oil will be exported via the loading system on Statfjord A. The gas will be transported in the Statpipe system via Statfjord A. In 1997, a separate pipeline will be installed from Snorre to Gullfaks A for transport of stabilized oil from Vigdis.

Metering system
Oil and gas is metered to fiscal standard on the Snorre installation.

Costs
At the end of 1995, about 25 billion 1995-NOK had been invested in Snorre. Total investments for development of Snorre Phase I are estimated at NOK 34.9 billion. In addition comes development of the northern part of Snorre with subsea completed wells, estimated to cost 3-5 billion 1995-NOK. Operating costs for 1995 are estimated to be NOK 2.5 billion, including tariffs.

Figure 2.5.20
Installations on Draugen



2.5.20 DRAUGEN
Production license 093

Operator:
A/S Norske Shell

Licensees:

Den norske stats oljeselskap a.s (Statoil)	
(SDFI 57.88000%)	73.00000%
A/S Norske Shell	16.20000%
BP Petroleum Development of Norway AS	10.80000%

Field history
The Draugen field is located in block 6407/9, see Figure 2.3.2.b. Production license 093 was awarded in 1984 and the field was discovered the same year. The plan for development and operation was approved in December 1988. Oil production began in October 1993.

Production plan
The reserves are estimated at 94.5 million Sm^3 oil. Additional resources in the western part of the field are estimated at 5 million Sm^3 oil. On the basis of upgraded process capacity in 1995, production is expected to last until 2010 with water injection as the driving mechanism.

The main reservoir consists of sandstone from the Late Jurassic age. Additional resources in the western part of

the field have been proven in sandstones from the Middle Jurassic age. A slate layer of variable thickness separates the underlying and primarily water-bearing Middle Jurassic sandstones from the main reservoir. To the west and the north on the field, this slate layer is thin and possibly absent in certain places. This, in addition to faults on the field, create some uncertainty with regard to early water production in the oil wells in central parts of the field. Some water influx has already occurred in the main reservoir. Planned injected water volumes are therefore decisive in order to limit the influx of water.

The gas from the oil production is injected into a nearby, water-bearing structure.

Production installations and production history
The field is developed with a concrete gravity base platform with integrated topsides, see Figure 2.5.20. The installation has ten well slots and a total of 34 J-pipes.

Oil production started with an approved plateau level of 90,000 barrels of oil per day on average per year. On the basis of production experience and tests during 1994 and 1995, the potential to increase production from the design capacity of 110,000 barrels per flow day to 140,000 barrels per flow day was proven. On the basis of the decision to partially exercise the sliding scale, process capacity was increased to 155,000 barrels per flow day and the water injection capacity was increased from about 25,400 to 28,800 m^3 per day in June 1995.

The operator's goal is to further upgrade the process capacity to 170,000-180,000 barrels per flow day in 1996. A production increase in excess of 155,000 barrels per flow day will be followed by an increase in water injection capacity from 28,800 m^3 per day to a planned 37,200 m^3 per day.

The plan calls for producing the main reservoir with the help of seven production wells. The field is now producing from six wells, and two of these are subsea completions. One of the subsea wells, 6407/9-A-55 AH, has been shut down for most of 1995 due to technical reasons. The well is expected to come onstream again in 1996. Draugen's fifth well from the installation, 6407/9-A-3, which was completed in 1995, is scheduled to come onstream in 1996. The total well capacity will then increase from around 190,000 to 243,000 barrels per flow day. Additional resources in the western part of the field are to be produced with well number eight when oil production from the field begins to decline.

Pressure support for production from the field will be ensured with the aid of five subsea completed water injection wells. Water injection on the field was started for the first time in September 1994, about 10 months after production start. During most of the third quarter of 1995, water injection was cut in half due to a rupture of the water injection pipeline between the installation and the water injection station on the south of the field. The operator expects to achieve full pressure support after the year 2000.

With the exception of planned shutdowns in January and June, as well as reduced production in March to reduce flaring of gas, oil production on Draugen has been stabile and high and 1995.

Gas injection from one well has gone on more or less continuously since the beginning in 1993.

Transportation
Stabilized oil is stored in integrated storage tanks and exported via a floating loading platform (FLP) to tankers.

Metering system
A fiscal metering station is installed on Draugen.

Costs
Draugen's total investments including future operations investments, are estimated at 15.5 billion 1995-NOK. Annual operating costs are around 700 million 1995-NOK.

2.5.21 HEIDRUN

Production licenses 095 and 124

Operator:
Den norske stats oljeselskap a.s (Statoil)

Licensees after unitization:

Den norske stats oljeselskap a.s (Statoil)	
(SDFI 65%)	76.87500%
Norske Conoco A/S	18.12500%
Neste Petroleum AS	5.00000%

Field history
The field lies in blocks 6507/7 and 6507/8, see Figure 2.3.2.b. Production license 095 (block 6507/7) was awarded in 1984, and production license 124 (block 6507/8) was awarded in 1986.

The Heidrun field was discovered in 1985 and declared commercial in December 1986. The plan for development and operation was approved in May 1991. In 1992, it was decided to land associated gas at Tjeldbergodden for methanol production starting in 1997.

The field was put into production on 18 October 1995. In connection with production start, the operatorship on Heidrun was transferred from Conoco to Statoil.

At year-end 1995, oil production was approximately 34,000 Sm^3 per day, which is about 7% higher than expected plateau production.

Reservoir
The field contains oil with an overlying gas cap. The reservoir consists of several geological formations and fault segments. The reserves are estimated at 133 million Sm^3 oil and 12.5 billion Sm^3 associated gas. In addition, it will be possible to produce around 36.5 billion Sm^3 gas from the gas cap. Based on consideration for optimum utilization of the resources, however, the gas cap should be produced after the main part of the oil has been produced.

Development concept/transportation
The water depth is 350 meters. The field has been developed with a floating tension leg platform of concrete, installed over a subsea template with 56 well slots. 41 production wells are planned, as well as 10 water injection

wells and two gas injection wells. Six of the water injectors are subsea completions. Production capacity for oil is 35,000 Sm^3 per day, while maximum processing capacity for water and gas is 24,600 m^3 and 4.7 million Sm^3 per day, respectively. The oil is exported with the aid of a new concept based on direct tanker transportation without the use of oil storage on the field (DSL).

Gas disposition
Associated gas will be injected in the reservoir during the period 1995-1996, and will thereafter be landed at Tjeldbergodden for methanol production starting in the first quarter of 1997. Production of the gas cap will not be attempted until the end of the oil production period.

Costs
At the end of 1995, about 27.5 billion 1995-NOK had been invested in Heidrun. Total investments are expected to reach approximately 31.5 billion 1995-NOK from 1988 to 2015.

2.6 FIELDS WHERE PRODUCTION HAS CEASED

2.6.1 MIME

Production license 070

Operator:
Norsk Hydro Produksjon AS

Licensees:

Den norske stats oljeselskap a.s (Statoil) (SDFI 31.4%)	51.00000%
Norsk Hydro Produksjon AS	24.50000%
Amoco Norway AS	14.70000%
Saga Petroleum a.s.	9.80000%

Field history
Mime is a small oil field 7 km north of the Cod field in block 7/11. The field was discovered in 1982. Production was carried out from one well, and started as test production in October 1990. The plan for development and operation of the field was approved in November 1992. In 1993, production on Mime was temporarily halted due to the precipitation of asphaltenes in the well. The well was permanently plugged in November 1994, when it was no longer profitable to re-complete the well. The reservoir consists of Upper Jurassic sandstone in the Ula formation. Production took place via a subsea completed well with transfer to the Cod installation.

Total field production was 0.4 million Sm^3 oil. This is equivalent to a recovery factor of around 4% of the original oil in place.

Costs
Total investment costs for the field were approximately 366 million 1995-NOK. 1995 disposal costs amounted to around 3 million 1995-NOK.

Cessation plan
A plan for future disposal is expected during 1996.

2.6.2 NORDØST FRIGG

Production license 025 (block 25/1)

Operator:
Elf Petroleum Norge AS

Licensees in the unitized Nordøst Frigg field:

Elf Petroleum Norge AS	41.42000%
Norsk Hydro Produksjon AS	32.87000%
Total Norge AS	20.71000%
Den norske stats oljeselskap a.s (Statoil)	5.00000%

Production license 030 (block 30/10)

Esso Exploration & Production Norway A/S	100%

Field history
Nordøst Frigg lies in blocks 25/1 and 30/10, see Figure 2.5.10.a, and a new division of the gas reserves in August 1984 gave 42% to block 25/1 and 58% to block 30/10. The field was discovered in 1974. The final development plan was approved in 1980, and the field began to produce in December 1983. Production from the field ceased on 8 May 1993.

Costs
Total investments in the field in the period from 1982 to 1993 were somewhat less than 3.3 billion 1995-NOK. Operating costs for 1995 are expected to be roughly 6 million 1995-NOK, the same amount as expected for disposal costs in 1995.

Cessation plan
The plan for future disposal of the installation was given final consideration by the Storting on 29 May 1995. Extensive re-use of the installations characterizes the planned disposal solution.

In November 1995, disposal costs were estimated to be approximately 230 million 1995-NOK, excluding any income from sale.

2.6.3 ODIN

Production license 030

Operator:
Esso Exploration & Production Norway A/S

Licensees:

Esso Exploration & Production Norway A/S	100 %

Field history
The Odin field is located in block 30/10, see Figure 2.5.10.a. The gas field was discovered in 1974, and the development plan was approved in 1980. Production from the field started in April 1984, and was terminated on 1 August 1994.

The field produced from the same sedimentation system as the Frigg field. Pressure measurements prior to production start showed pressure communication with the Frigg field through the underlying aquifer. The Odin reservoir experienced more rapid pressure reduction than the other fields in the Frigg area due to extremely limited water drive.

During the spring of 1990, water breakthrough was registered in the southernmost well on the field. This was expected, but not so early. New studies indicated that the remaining reserves were smaller than expected and the field's lifetime was reduced.

Total field production was 26.6 billion Sm^3 gas, equivalent to a recovery factor of about 71%.

The field was developed with a small steel installation with simplified process and drilling equipment as well as small living quarters. On the Odin installation, water was separated from gas and methanol injected to control hydrates. Then the gas was sent via pipeline to the TCP2 installation on Frigg for further processing prior to delivery through the Norwegian pipeline to St. Fergus.

Costs

Total field investments during the period from 1978 to 1994 are calculated to be about 4.6 billion 1995-NOK. Operating costs in 1995 were approximately 85 million 1995-NOK.

Disposal plan

The plan for final disposal of the installations was submitted to the authorities on 23 March 1995. Final consideration by the Storting will take place by 1 August 1996.

2.7 TRANSPORTATION SYSTEMS FOR OIL AND GAS

2.7.1 EXISTING TRANSPORTATION SYSTEMS

The various transportation systems for gas and oil/condensate from the Norwegian continental shelf are shown in Figure 2.7. Some of the transportation systems are British, where the Norwegian share comprises only a small part. This applies to:

- Northern Leg Gas Pipeline (NLGP), where Statfjord gas (British share) is transported to Shell's terminal at St. Fergus
- The Brent pipeline which transports Murchison oil to Sullom Voe on Shetland
- The Brae-Forties system which transports Heimdal condensate to BP's Kinneil terminal outside Edinburgh.

Gas transportation, Statpipe

Ownership structure

Den norske stats oljeselskap a.s (Statoil)	58.2500%
Elf Petroleum Norge AS	10.0000%
Norsk Hydro Produksjon AS	8.0000%
Mobil Development Norway AS	7.0000%
Esso Exploration & Production Norway A/S	5.0000%
A/S Norske Shell	5.0000%
Norske Conoco A/S	2.7500%
Saga Petroleum a.s.	2.0000%
Total Norge AS	2.0000%

Statoil is the operator for operation of the system which includes:

- a wet gas pipeline from Statfjord to Kårstø
- separation and fractioning plan at Kårstø, plus storage and loading facility
- dry gas pipeline from Heimdal, dry gas pipeline from Kårstø to riser platform in block 16/11 (Draupner), and a pipeline from this installation to the 2/4-S riser platform at the Ekofisk field center.

After production start, the Gullfaks, Veslefrikk, Snorre and Brage fields were connected to the Statpipe system upstream of the Kårstø facilities. Sleipner has also been connected to Statpipe via a branch pipeline to 16/11-S (Draupner).

Kårstø

The first North Sea gas was landed at Kårstø in March 1985. Delivery of dry gas from the terminal began in October 1985. Transport capacity from Statfjord to Kårstø is 25 million Sm^3 per day. This capacity will be fully utilized through the end of 1996.

At Kårstø, the heavy hydrocarbons are removed from the wet gas and sold as propane, butane, methyl propane and naphtha. Condensate from Sleipner is received at Kårstø via a separate pipeline from the Sleipner field. At Kårstø, the condensate is processed further and shipped on to the customers.

Both propane, butane, methyl propane, naphtha and condensate are stored in separate tanks, prior to being pumped via fiscal dynamic metering equipment to tankers.

Gas transportation, Norpipe

The pipeline system for transportation of natural gas from the Ekofisk center to Emden in Germany is owned by Norpipe A/S. Gas from the Ekofisk area and Statpipe is delivered to Norpipe. Norpipe A/S is a corporation which is owned 50/50 by Statoil and the Phillips group.

Phillips Petroleum Company Norway is the technical operator of the pipeline, while Statoil is responsible for the economic and administrative functions.

A bypass line from Statpipe to Norpipe avoiding the Ekofisk center is planned in connection with the building of Ekofisk II.

The gas pipeline is 442 kilometers long and has an inner diameter of 869 mm (outer diameter 36"). There are two compressor stations on the pipeline, both on the German continental shelf.

Design capacity of the pipeline is approximately 59.3 million Sm^3 per day. Gas sales vary from around 40 million Sm^3 per day in the summer to around 54 million Sm^3 per day in the winter.

Emden

Operator: Phillips Petroleum on behalf of the Phillips group

Ownership structure:

Phillips Petroleum Company Norway	36.960%
Norske Fina A/S	30.000%
Norske Agip AS	13.040%
Elf Petroleum Norge AS	7.096%
Norsk Hydro Produksjon AS	6.700%
Total Norge AS	3.047%
Den norske stats oljeselskap a.s (Statoil)	2.000%
Elf Rex AS	0.855%
Norminol AS	0.304%

The facilities are connected to Europipe, so that the Norpipe gas can be delivered through the Europipe system and vice versa.

Etzel gas terminal

Ownership structure:

Ruhrgass	74.80000%
Den norske stats oljeselskap a.s (Statoil)	20.10000%
Norsk Hydro Produksjon AS	2.40000%
Saga Petroleum a.s.	1.20000%
Elf Petroleum Norge AS	0.68955%
Norske Conoco A/S	0.42090%
Total Norge AS	0.38955%

As of 31 December 1995, Ruhrgass took over Esso's and Shell's interests in the Etzel gas terminal.

Gas transportation, Frigg

Operator: Total Oil Marine UK

Ownership structure:

Norsk Hydro Produksjon AS	32.87000%
Elf Petroleum Norge AS	26.42000%
Den norske stats oljeselskap a.s (Statoil)	24.00000%
Total Norge AS (operator)	16.71000%

The Frigg Norwegian pipeline is owned by the Frigg Norwegian licensees. The MCP-01 installation is a compressor station located midway between Frigg and St. Fergus, it is 50% Norwegian-owned. The compressors have now been removed and the installation is unmanned. Some British fields are connected to the Frigg Norwegian line via MCP-01. While the installation was manned, the volumes from the British fields were metered on MCP-01. After demanning, the volumes from the British fields are metered on the individual installation.

St. Fergus

The terminal is owned by the Frigg Norwegian licensees and the Frigg British licensees (Elf UK 66-2/3%, Total UK 33-1/3%). The various processing modules at the terminal are owned either by one partner group or by both. Total Oil Marine UK is the operator.

Oil transportation, Norpipe

The pipeline system for transportation of oil from the Ekofisk Center to Teesside in England is owned by Norpipe A/S. Norpipe receives oil from the fields in the Ekofisk area, and the nearby Valhall, Hod, Ula, Gyda and Tommeliten Gamma fields. The British fields Judy and Joanne are connected to Norpipe, and started production in October 1995.

Norpipe A/S is a corporation owned 50/50 by Statoil and the Phillips group. Phillips Petroleum Company Norway is technical operator of the pipeline, while Statoil is responsible for the economic and administrative functions.

Teesside

The ownership structure for the facilities at the Teesside terminal are split between Norpipe A/S and the Phillips group, through the Norpipe Petroleum UK Ltd. and Norsea Pipeline Ltd. companies. Phillips Petroleum Company UK Ltd. is the operator of the facilities.

Oil transportation, Oseberg

A pipeline for transportation of stabilized oil from Oseberg to the Sture terminal was laid in the summer of 1987. The pipeline has an inner diameter of 670 mm (outer diameter 28") and has a design capacity of approximately 95,000 Sm^3 per day. By adding drag reducers, the capacity has been increased to about 117,000 Sm^3 per day.

The plant, including the Sture terminal, is owned and operated by a separate joint venture, I/S Oseberg Transport System (OTS). The participants in the company are the licensees in the Oseberg field. Norsk Hydro is the operator of the pipeline and the terminal. Oseberg Transport System (OTS) was put into operation when production started from Oseberg. Veslefrikk, Brage, Frøy and Lille-Frigg have subsequently been connected to OTS.

Zeepipe

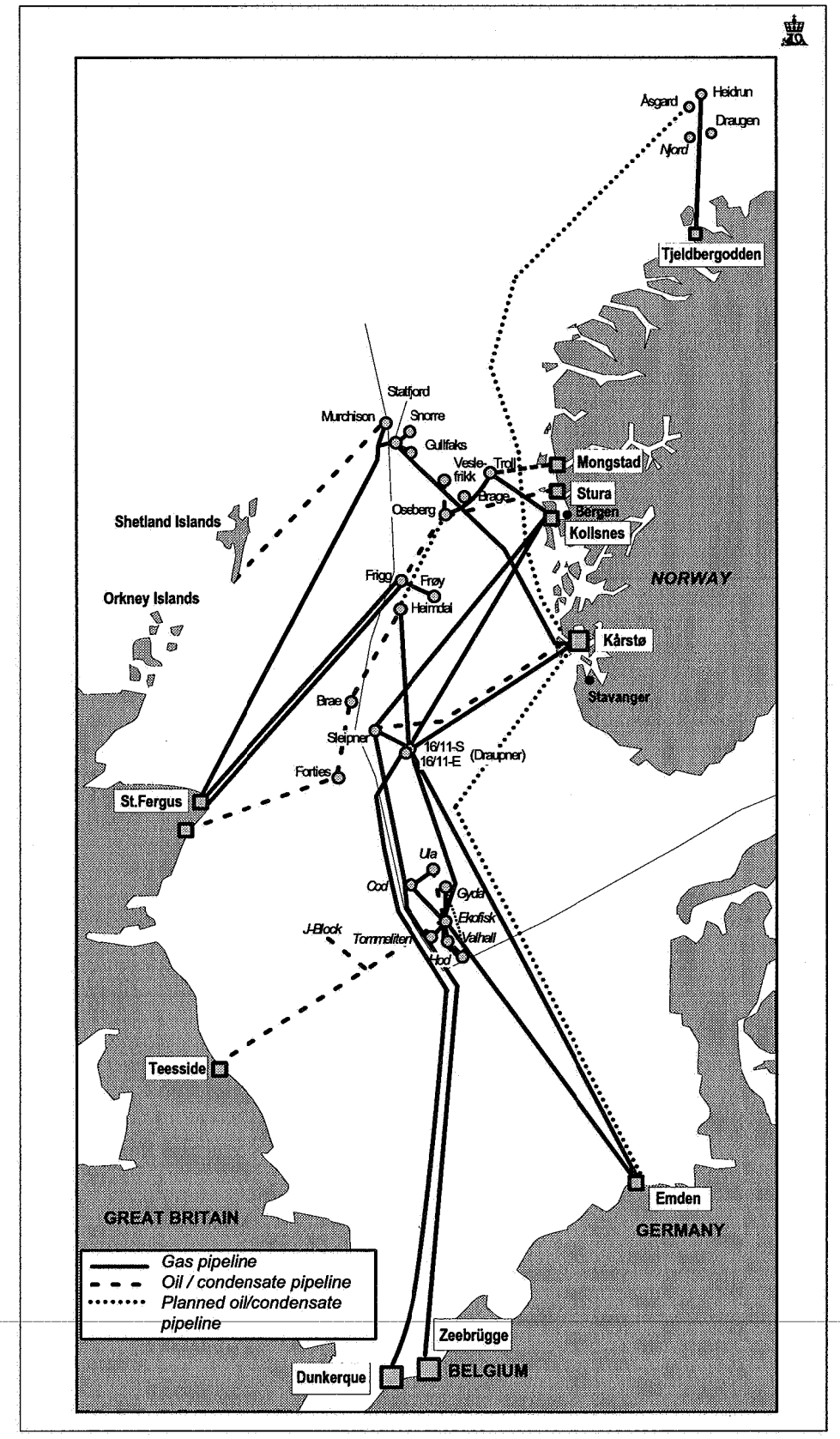
Operator: Den norske stats oljeselskap a.s (Statoil)

Ownership structure:

Den norske stats oljeselskap a.s (Statoil) (SDFI 55%)	70.0000%
Norsk Hydro Produksjon AS	8.0000%
A/S Norske Shell	7.0000%
Esso Exploration & Production Norway A/S	6.0000%
Elf Petroleum Norge AS	3.2985%
Saga Petroleum a.s.	3.0000%
Norske Conoco A/S	1.7015%
Total Norge AS	1.0000%

Zeepipe is a gas transportation system which is to transport gas from Kollsnes in Øygarden to the Continent. Phase I of the project comprises an 800 km long pipeline with an inside diameter of 966 mm (outer diameter 40") from Sleipner to Zeebrügge in Belgium. In addition, an approximately 40 km long line has been laid from Sleipner to 16/11-S (Draupner). Phase I, including the Zeebrügge terminal, was completed in 1993. The capacity without

Figure 2.7.
Transportation systems for oil and gas from Norwegian fields



compression will be about 13 billion Sm^3 per year.

Phase II comprises two pipelines from Kollsnes to Sleipner and 16/11-S (Draupner), respectively, with an inner diameter of 966 mm (outer diameter 40"). They will be put into use in 1996/1997.

Frostpipe

Ownership structure:

Den norske stats oljeselskap a.s (Statoil) (SDFI 30%)	50.00000%
Elf Petroleum Norge AS (operator)	22.00000%
Total Norge AS	14.25000%
Norsk Hydro Produksjon AS	13.75000%

Frostpipe is an approximately 80 kilometer long pipeline with an inner diameter of 374 mm (outer diameter 16") for transport of stabilized oil and condensate from Frigg to Oseberg. The transportation system has a capacity of 16,000 Sm^3 per day. Frostpipe was put into operation in the spring of 1994.

Europipe

Operator: Den norske stats oljeselskap a.s (Statoil)

Ownership structure
(same as for Zeepipe)

This pipeline goes from 16/11-E (Draupner) to Emden in Germany and is about 600 kilometers long. The pipeline has an inner diameter of 966 mm (outer diameter 40"). The capacity without compression is approximately 13 billion Sm^3 gas per year. Gas deliveries started as planned on 1 October 1995.

Troll oil pipeline

Operator: Den norske stats oljeselskap a.s (Statoil)

Ownership structure:

Den norske stats oljeselskap a.s (Statoil)	74.57600%
A/S Norske Shell	8.28800%
Norsk Hydro Produksjon AS	7.68800%
Saga Petroleum a.s.	4.08000%
Elf Petroleum Norge AS	2.35344%
Norske Conoco A/S	1.66113%
Total Norge AS	1.35343%

Troll oil pipeline transports oil from the Troll B installation to the terminal at Mongstad. The inner diameter is 381 mm (outer diameter 16").

2.7.2 PROJECTED TRANSPORTATION SYSTEMS

NorFra

Operator: Den norske stats oljeselskap a.s (Statoil) for the construction phase. No decision has been made on the operator for the operations phase.

Owners:

Den norske stats oljeselskap a.s (Statoil) (SDFI 60%)	69.71%
Norsk Hydro Produksjon AS	6.47%
Saga Petroleum a.s.	5.18%
Esso Exploration & Production Norway A/S	3.88%
Mobil Development Norway AS	3.88%
Total Norge AS	2.91%
Elf Petroleum Norge AS	2.14%
Norsk Agip AS	1.94%
A/S Norske Shell	1.29%
Neste Petroleum AS	1.29%

The final ownership structure will be decided during the spring of 1996. The gas pipeline will have an outer diameter of 42" and will run from 16/11-E (Draupner) to Dunkerque in France. Gas deliveries are planned to commence on 1 October 1998.

2.8 FINAL PRODUCTION AND DISPOSAL OF INSTALLATIONS

The question of to what extent a coastal state should be required to remove its installations on the continental shelf after the expiration of their useful life is a question of great importance to Norway. Removal of installations on the Norwegian shelf will, with few exceptions, be considerably more expensive and technically complex than in other areas of the world. Norway currently has about 80 installations (excluding about 60 subsea installations) which produce or have produced petroleum.

In the autumn of 1989, the International Maritime Organization (IMO) adopted international guidelines for removal of installations on the continental shelf.

The main points of the IMO guidelines are:

- All installations whose use is finally over and which are at a sea depth of less than 75 meters and have a base (jacket) weighing less than 4,000 tonnes shall be removed.
- All installations deployed after 1 January 1998 whose use is finally over and which are at a sea depth of less than 100 meters and have a base (jacket) weighing less than 4,000 tonnes shall be removed.
- For other installations the question of removal will be determined on the basis of the individual coastal state's evaluation in each case. Said evaluation shall weight considerations of safety at sea, other users of the sea, environmental impact and living resources, the costs and safety hazards of removal. Alternative uses and other reasonable grounds to allow the installation to remain wholly or partially in place must at the same time be considered.

- Should a coastal state determine that an installation shall be removed to below the sea surface, a free height of minimum 55 meters of water shall be left below the sea surface.
- Should a coastal state determine that an installation shall remain wholly or partially in place such that it protrudes above the sea surface, then adequate maintenance shall be carried out to prevent disintegration of the installation.
- After 1 January 1998 no installations shall be placed that are technically impossible to remove.

The adopted IMO rules are issued in the form of guidelines. Consequently they will not be legally binding on the states involved. On the other hand, the rules will have considerable moral force and it would be politically difficult for states to ignore them.

Fields on the Norwegian continental shelf where production has ceased are described in Section 2.6.

2.9 PETROLEUM ECONOMY

2.9.1 EXPLORATION AND PLANNING ACTIVITIES

In 1995, 36 exploration wells were spudded, while the number of exploration wells in 1994 was 21. Of the 36 spudded exploration wells, 22 were wildcat wells and 14 were appraisal wells. Corresponding figures for 1994 were 18 wildcat wells and 3 appraisal wells. On average over the period from 1966-1995, the number of spudded wildcat and appraisal wells has been 20 and 8, respectively.

Figure 2.9.1.a shows the costs of exploration and planning activities from and including 1980. The costs include exploration drilling, general surveys, field evaluations and administration. According to the Norwegian Petroleum Directorate's reported figures, the total exploration costs in the years 1980-1995 amount to approximately 124 billion 1995-NOK.

Exploration and planning costs for 1995 divided among the various types of costs are shown below. The figures

Figure 2.9.1.a
Annual exploration and planning costs

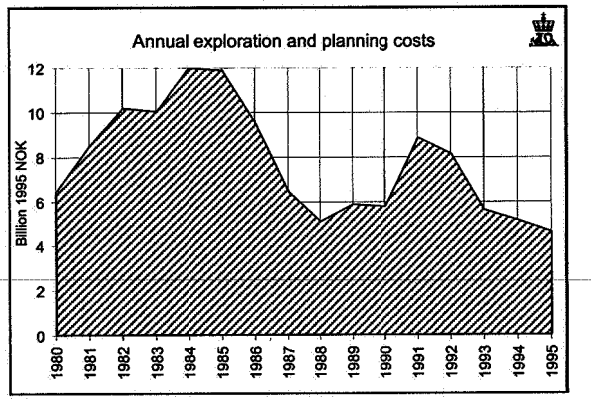


Figure 2.9.1.b
Percentage distribution of the costs

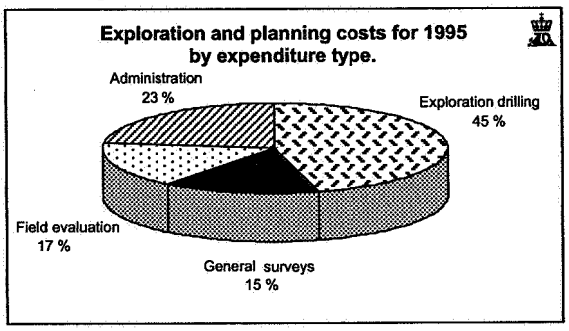
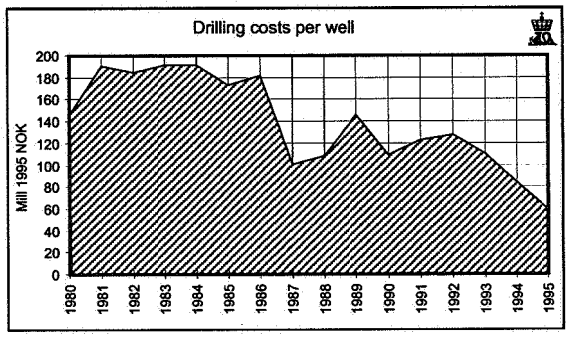


Figure 2.9.1.c
Average drilling costs per exploration well



are based on data reported by the operating companies. The same figures are used as a basis for Figure 2.9.1.b, which shows the percentage distribution of the costs.

Exploration and planning costs	Million NOK
Exploration drilling	2128
General surveys	683
Field evaluations	768
Administration *	1068
Total	**4647**

* Administration costs include area fees.

In 1995, the share of exploration costs related to exploration drilling was 45%, while the corresponding figure for 1994 is 34%. The share of costs related to general surveys is

Figure 2.9.1.d
Average drilling costs per day and per meter drilled in the years 1980-1995

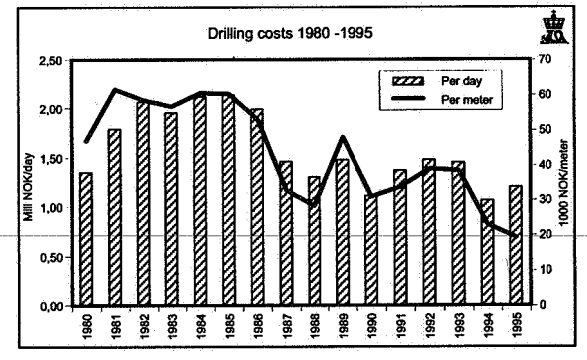


Figure 2.9.2.a
Investments - Norwegian continental shelf 1970-2010

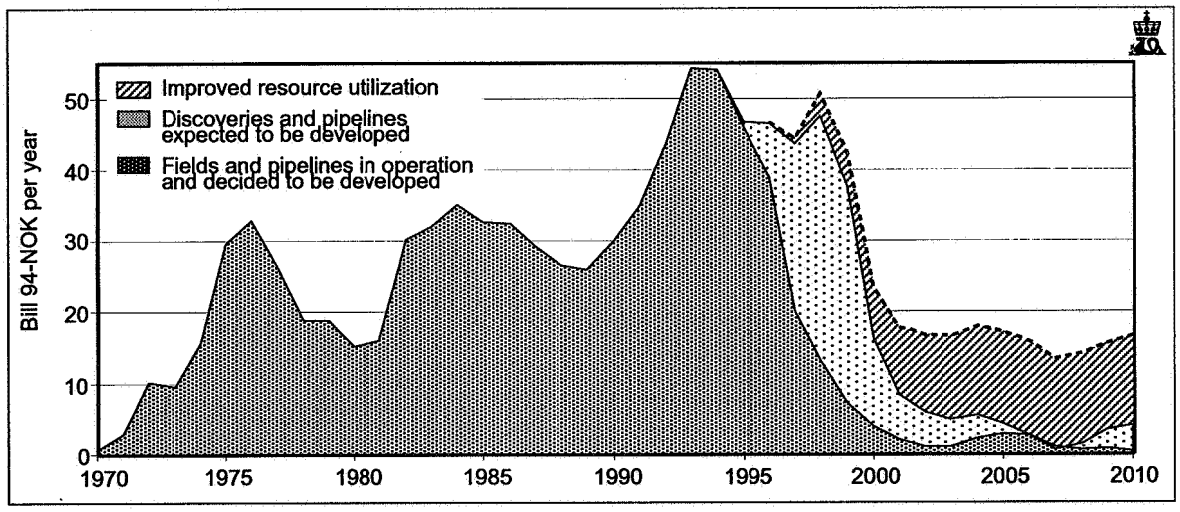
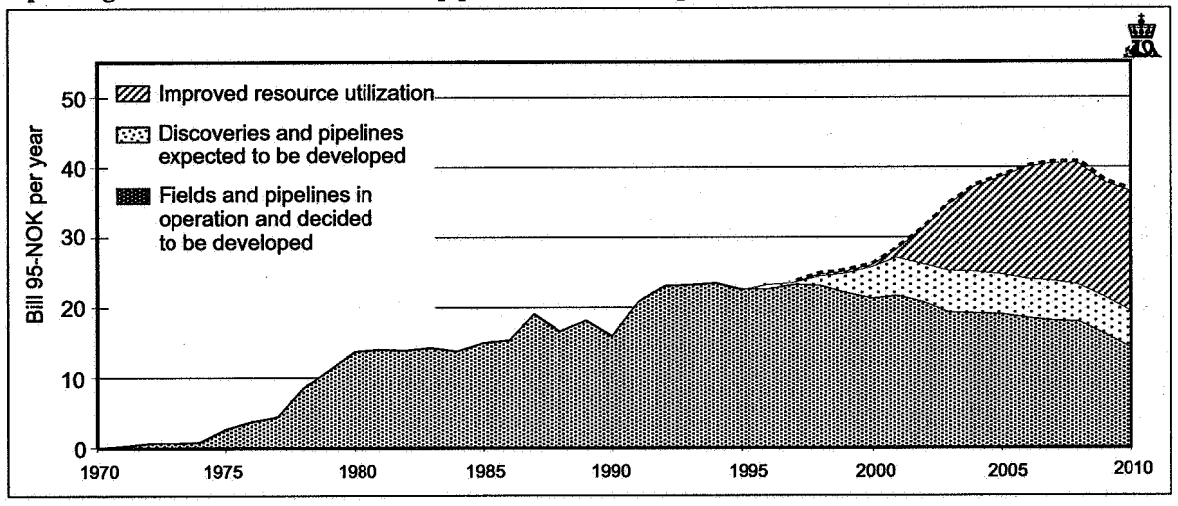


Figure 2.9.2.b
Operating costs for fields/discoveries and pipelines on the Norwegian shelf 1970-2010



15% in 1995 compared with 31% in 1994. General surveys include inter alia collection of seismic data.

Figure 2.9.1.c shows the average drilling expenses per exploration well, that is, wildcat and appraisal wells. In 1995, drilling was carried out at a cost of around NOK 2.1 billion, and the cost per well is estimated to be about NOK 60 billion. This is 25% lower than the drilling costs in 1994.

Figure 2.9.1.d shows the average drilling costs per day and per meter drilled in the years 1980-1995.

2.9.2 ACTIVITY LEVEL TOWARDS YEAR 2010

The Norwegian Petroleum Directorate has taken a closer look at the expected total activity level on the Norwegian shelf towards the year 2010. Estimates of the total petroleum production are expected to increase towards a level of about 260 million Sm^3 o.e. in the year 1999, and will thereafter be reduced to about 185 million Sm^3 o.e. in the year 2010. There is some uncertainty connected to the expected production in the future. In particular, the future development of oil and gas prices will have a significant affect on the long-term development of production.

There is great uncertainty connected with both investment and operating costs for the prospects. The average unit cost (investment + operation) is expected to be 10 USD/barrel (~ 400 NOK/Sm^3).

Estimates of the total investment level in the period 1970-2010 are shown in Figure 2.9.2.a. The investment level is expected to remain stabile from now until 1998, and then to decrease rapidly from about NOK 50 billion to under NOK 20 billion in the year 2001. Investments in discoveries and pipelines which are expected to be developed, as well as prospects constitute the majority of the expected investment level towards the year 2010. Changes in the future price of oil and gas will have significance for the estimate of the future investment level. Figure 2.9.2.b shows the expected development in operating costs on the Norwegian shelf towards the year 2010. Operating costs include CO_2 tax and insurance.

Figure 2.9.2.c
Operating costs per produced unit for fields in production

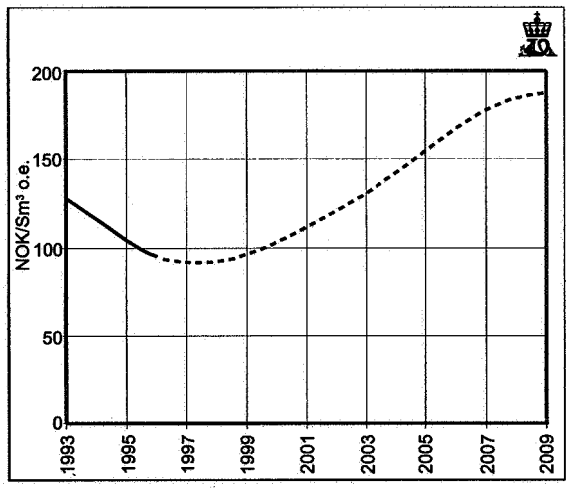


Figure 2.9.2.c shows the expected development in operating costs per produced unit for fields in operation. As production from the fields is reduced, the operating costs per produced unit will increase, since a large share of the operating costs are fixed costs. The figure shows that the operating costs per produced unit increase by about 50% in the period 1995 to 2005. Improved utilization of resources and reduction in total operating costs are important challenges to the reduction of unit costs on the Norwegian continental shelf.

2.9.3 STATE'S DIRECT FINANCIAL INTEREST

The State's Direct Financial Interest (SDFI) in the petroleum activities was established with effect from 1985. With a few but important exceptions, the cash flows linked to the total state participation in production licenses was split into a share for Statoil (20%) and a SDFI share (30%). Statoil is responsible for the operational and financial administration of the State's Direct Financial Interest.

SDFI is the largest investor on the Norwegian shelf, and represents a considerable volume of the exploration, development and operations phases.

Total investment costs on the Norwegian continental shelf for the period from 1995-2000 are estimated at NOK 119 billion (non-discounted fixed 1995-NOK). This includes investments in fields in production and fields decided to be developed as well as pipelines in operation and decided to be developed. SDFI's share is about 36%. The total operating costs during the period are estimated to be NOK 117 billion. These costs comprise operating costs incurred and CO_2 taxes, but not tariffs. SDFI's share is about 33%. Of the total expected production, SDFI is expected to account for around 36% of both oil (including condensate) and gas production during the same period.

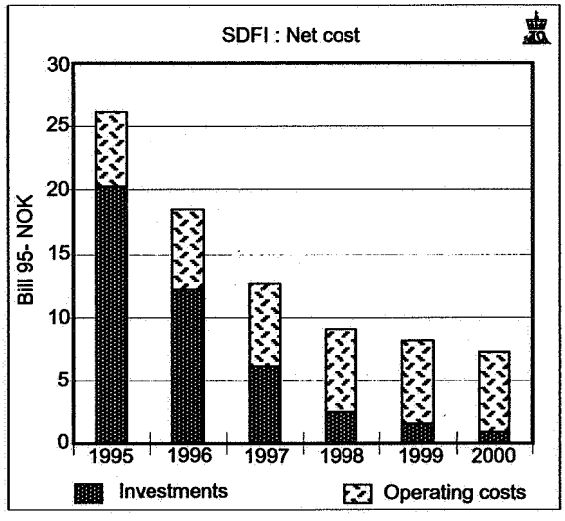
SDFI's total share in these investment and operating costs constitutes approximately NOK 82 billion. Distribution over time is illustrated in Figure 2.9.3.

For a few more years, SDFI will continue to make large investments which result in a build-up of real capital in the petroleum sector. The return on these investments will depend inter alia on future price development, as well as cost and production development on the relevant fields.

One of the main objectives of the licensing and taxation systems is to distribute costs and revenues between private licensees (companies) and the State. Through SDFI and framework conditions such as taxes, fees, carrying and use of a sliding scale favoring SDFI, the State has collected a maximum share of the net current value of the fields.

SDFI has achieved the goals set in 1985, including that of ensuring the highest possible direct share for the State in future revenues from production of hydrocarbons.

Figure 2.9.3
SDFI: Net costs



2.9.4 THE ROLE OF PETROLEUM IN THE NORWEGIAN ECONOMY

Gross national product

The petroleum sector makes a considerable contribution to the overall creation of value in Norway today. In 1975, the gross product in the petroleum sector was about 3% of the gross national product. In 1985, this share rose to 19%, only to fall again due to the decline in oil prices in 1985-86. During recent years, the share has been in the region of 13%. Development of the industry's share of the total gross national product is shown in Table 2.9.4.

Foreign economy

The petroleum sector also constitutes a relatively large share of Norway's export revenues. The export share increased from about 6% in 1975 to 38% in 1985. The petroleum sector's export share then fell to about 24% in 1988. During the last few years, the sector has accounted for about 33% of Norwegian export revenues. The development is illustrated in Table 2.9.4.

Table 2.9.4
Development of share of GNP, share of Norwegian total exports and the State's revenues

	1975	1980	1985	1988	1990	1991	1992	1993	1994	1995[4]
The petroleum sector's share of GNP [1]	3 %	15 %	19 %	8 %	13 %	13 %	15 %	14 %	13 %	13%
The petroleum sector's share of total exports [2]	6 %	33 %	38 %	24 %	31 %	32 %	33 %	33 %	33 %	31%
The State's revenues derived from petroleum activities [3] (Bill. 1995 NOK)	0,7	45,8	71,7	14,7	29,6	34,4	25,3	25,3	22,2	25,2

Source: Central Bureau of Statistics

1) Includes production of oil and gas and pipeline transportation.
2) Includes export of crude, natural gas and pipeline transportation services.
3) Includes ordinary corporate wealth and income tax, area fees and royalties.
4) Preliminary figures/estimates

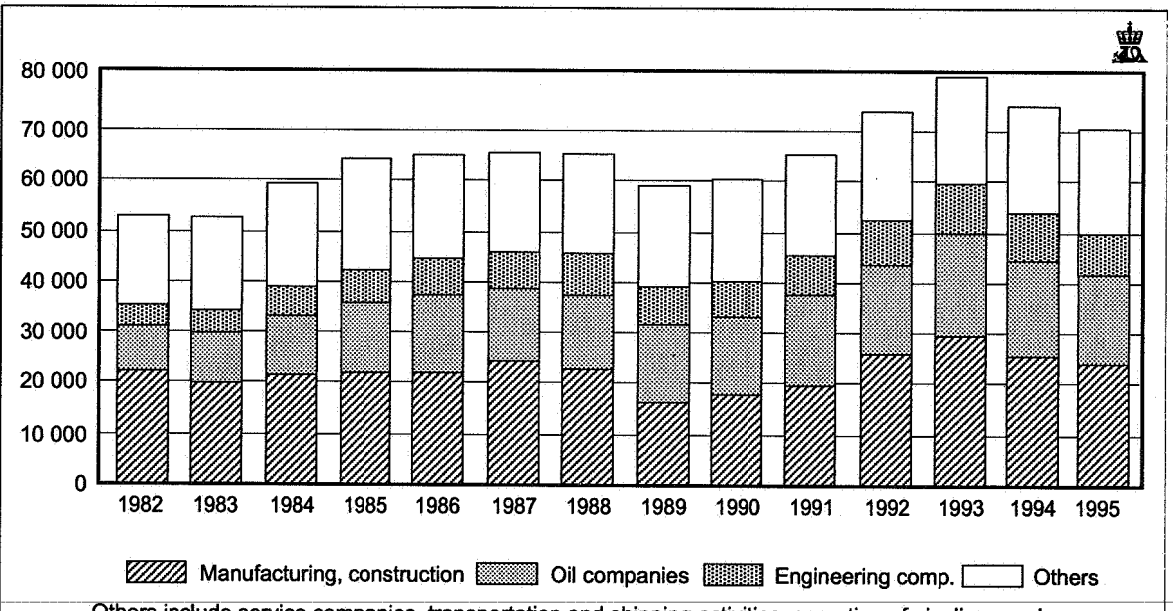
State tax revenues

The State's total tax revenues from the petroleum activities include regular corporate wealth and income tax, special tax, royalty and area fees. Tax revenues reached a preliminary high of 71.7 billion 1995-NOK in 1985, before falling to approximately 14.7 billion 1995-NOK in 1988. During recent years, there has once again been an increase in the State's tax revenues. In 1995, tax revenues from the petroleum sector were around NOK 25.2 billion. The development of tax revenues is shown in Table 2.9.4.

Employment

The activity level on the Norwegian continental shelf provides employment both offshore and onshore. In 1995, roughly 70,000 people were employed as a result of the petroleum activities in Norway. Figure 2.9.4 shows employment as a result of the petroleum activities, broken down by type of company. About 34% of the employees in the petroleum activities work in the areas of industry, building and construction, 26% work in the oil companies and 11% are employed through engineering firms. The remainder work in services, transportation, shipping, drilling companies, catering, operation of landing and

Figure 2.9.4
Employees in the petroleum industry, by kind of company



Others include service companies, transportation and shipping activities, operation of pipelines and refineries, drilling companies, catering, public administration, research and education, bases and other commodities and services
Source: Directorate of labour

refinery facilities, public administration, research and training.

2.9.5 CRUDE OIL MARKET

Global oil production in 1995 (excluding NGL) is estimated at about 61.4 million barrels per day (Source: Oil and Gas Journal (OGJ) December 1995). This corresponds to just under 3.6 billion Sm^3 per year, and means an increase of 1.5% from 1994 to 1995. Production from the OPEC countries increased by 1.4%, or about average. In Eastern Europe and the former Soviet Union, production declined by about 1%. Other regions, including the North Sea, showed an overall increase in production.

In 1995, Norwegian oil production accounted for over 4% of global production. Norway's production increased by more than 5% in 1995, and also in 1995 was somewhat larger than British production, which increased by just under 2%. OPEC's market share was just over 40%.

According to OGJ, the global proven oil reserves at the end of 1995 were over 160 billion Sm^3, up a scant 1% from 1994. This constitutes just under 45 years of production at 1995 level. The resources in certain African countries were adjusted dramatically upwards, while other regions showed an overall decline. On the basis of an evaluation of resource investments, the largest oil producing areas in the future will be OPEC and the Middle East.

At the beginning of 1995, the price of Brent Blend oil was about 16 dollars per barrel. The oil price rose to over 19 dollars per barrel in May due to increased American demand and acquisitions by financial funds. The oil price then fell, both as a result of the financial funds selling out, as well as statements from OPEC regarding a price war and market shares. At the end of the year, the price of Brent Blend once again rose, mainly due to colder weather in North America and Europe, combined with a lower reserve. The final notation of the year for Brent Blend was over 19 USD per barrel.

The average norm price for Norwegian produced crude in 1995 was around 17 dollars per barrel, or about 108 Norwegian kroner. For purposes of comparison, 1994 prices for Norwegian produced oil averaged around NOK 111 per barrel (also about 17 dollars).

2.9.6 NATURAL GAS MARKET

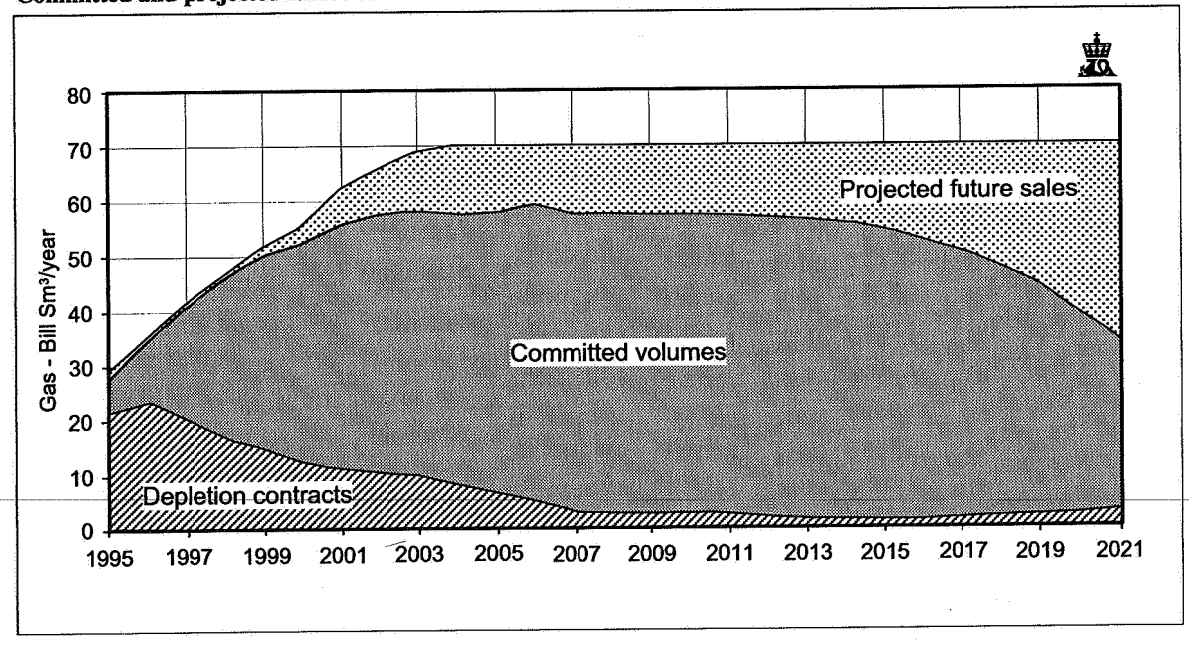
Today, all Norwegian export of gas goes to Western Europe. In 1995, Norway exported gas to the United Kingdom, Germany, the Netherlands, Belgium and France. Up to 1990, the United Kingdom was the largest customer, while Germany is now the largest buyer. Figure 2.9.6 shows the distribution of gas sales to the various buyer countries.

In 1995, export from Norway constituted 27.6 billion Sm^3, an increase of about 1 billion Sm^3 gas compared with the previous year. The first gas sales were primarily based on emptying 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 provide the customers fixed annual volumes, where also other fields than Troll may provide deliveries. In connection with the Troll agreements, through the establishment of the Troll commercial model, the authorities have provided an opportunity for the sale of associated gas and smaller gas fields.

Organization of Norwegian gas sales

In recent years, the sale of Norwegian gas have been coordinated by the Joint Gas Negotiations Committee (GFU) under the leadership of Statoil, and with

Figure 2.9.6
Committed and projected future sales



representatives from Norsk Hydro and Saga. The GFU negotiates contracts with purchasers of Norwegian gas. The licensees in a production license do, however, have the opportunity to sell gas on their own if the gas is to be used in their own facilities or if they can achieve better conditions. Within the framework of the existing gas organization, the authorities set up the Gas Supply Committee in 1993. This committee, which consists of representatives of the 12 largest resource owners on the Norwegian continental shelf, has an advisory role towards the Ministry of Industry and Energy in questions related to development and exploitation of gas fields and transportation systems for gas. The Ministry of Industry and Energy and the Norwegian Petroleum Directorate participate as observers in the committee.

Existing commitments

Field contracts

The fields which currently deliver under field contracts are Statfjord, Gullfaks, as well as fields in the Frigg and Ekofisk areas. Production from these fields is now in the decline phase, but, with the exception of Frigg, they will still deliver gas for many years. Gas deliveries from the Ekofisk and Frigg areas started in 1977, from Statfjord in 1985, from Heimdal in 1986 and from Gullfaks in 1987. The gas from the Frigg area is delivered to the United Kingdom, while the other fields deliver to buyers on the Continent.

Troll gas sales agreements from 1986 (TGSA)

The TGSA agreements were signed in 1986 between the Troll licensees and buyers on the Continent. The buyer countries are Germany, the Netherlands, Austria, France, Belgium and Spain. The Troll agreements consist of basic gas deliveries of 23.7 billion Sm^3 per year, as well as 30% and 50% options which have been exercised. In all, these sales to the Continent constitute 40.8 billion Sm^3 per year at plateau.

New commitments

In 1992, the Electrabel contract (Belgium) was signed. In 1993, two new contracts were signed for the sale of additional volumes to Ruhrgas and VNG (Germany). In 1994, contracts were signed with MEEG (Germany) and GdF (France). In 1995, contracts were signed with GdF (France) for the sale of additional volumes.

In all, these five contracts constitute 14.7 billion Sm^3 per year at plateau. New sales to the United Kingdom have also been negotiated, but these are dependent on a new Frigg treaty.

New sales

During 1995, negotiations and discussions have been conducted with possible buyers in a number of countries. Discussions have also been held with countries in Eastern Europe. Together with France, Italy and Spain, the sales opportunities for Norwegian gas would appear to be greatest in Eastern Europe. Sale of Norwegian gas to the Scandinavian market has not yet been economically interesting. The same applies to sale of Liquified Natural Gas (LNG).

The Norwegian Petroleum Directorate believes that Norway's total gas sales can be 70-80 billion Sm^3 per year. Figure 2.9.6 shows committed and potential new sales with a plateau of 70 billion Sm^3 per year.

Use of gas in Norway

In 1995, the Ministry of Industry and Energy presented a separate report to the Storting regarding the use of gas in Norway. The Storting report presents the government's objectives and the possibilities of use of natural gas in Norway.

The most important Norwegian gas market is now found on the continental shelf. The largest buyers on the shelf are Oseberg and Ekofisk. In 1995, Troll (TOGI) and Oseberg Vest sold a total of over 2 billion Sm^3 gas to Oseberg. The gas is injected in Oseberg in order to achieve increased oil recovery. In 1995, a total of over 3 billion Sm^3 gas from several fields was purchased by Ekofisk for fuel and other purposes. Other fields use gas to increase recovery of oil and NGL. Gas is also the most important source of energy for operation of field and transportation systems. It is primarily gas produced from the field itself which is used for these purposes. In 1995, a total of 2.6 billion Sm^3 gas was used as fuel on the Norwegian continental shelf.

Gas has been landed in Norway since Statpipe became operational in 1985. The gas is landed at Kårstø in Northern Rogaland. From 1996, gas will also be landed at Kollsnes (Hordaland) and Tjeldbergodden (Møre og Romsdal).

Over a period of time, resources have been used for research, reports and trial projects for use of gas onshore in Norway. Support has also been given to test projects in the transportation sector. The State Program for Exploitation of Natural Gas (SPUNG) has received the majority of the research funds. SPUNG, which aimed at developing basic competence, was concluded in 1993. The State's commitment was continued inter alia through the Natural Gas research program under the direction of the Norwegian Research Council. Efforts will be focused on application of the research results.

In February 1992, the Storting approved Heidrun's delivery of approximately 0.7 billion Sm^3 gas per year to a methanol factory at Tjeldbergodden starting in 1996. In Northern Rogaland, an agreement has been signed for smaller deliveries to the distribution company Gasnor. All of Gasnor's customers have previously used fuel oil as a source of energy. Deliveries commenced in 1994. The Vestgass company is considering distribution of gas from Kollsnes.

Since the mid-1980s, Statkraft, Statoil and Norsk Hydro have evaluated several different alternatives for gas power in Norway. For various reasons, none of these have been realized. In 1994, Statkraft, Statoil and Norsk Hydro set up a joint company, Naturkraft. The object of Naturkraft is to use natural gas from the continental shelf for production of electrical power for the Nordic market. Kårstø, Kollsnes

and Tjeldbergodden have all been considered as production sites. Naturkraft aims at submitting an application for a license for development and operation of a gas power plant in the first half of 1996. Probable consumption of gas in a gas power plant is 0.4 to 0.8 billion Sm^3 gas per year.

With the exception of the continental shelf, only small volumes of gas are contemplated for use in Norway as compared with the volumes which are exported.

2.9.7 SALE OF PETROLEUM FROM THE NORWEGIAN CONTINENTAL SHELF

In 1995, 131.6 x 10^6 tons of crude was sold from the Norwegian continental shelf. This represents an increase of 5.9% compared with 1994. The United Kingdom was the largest recipient with 19.7% of the shipments. The Netherlands received 18.3%, Norway 17.0%, France 10.4% and Germany 8.4%. In 1994, Norway received 22.2%, a decline compared with 1994.

Figure 2.9.7.a shows crude oil sales distributed by country in the period 1982-1995. Up to 1988, Belgium and Canada are included in the group "others". Sale of NGL (including condensate) from the Norwegian continental shelf in 1995 reached up to 6.5 x 10^6 tons. This is 1.0 x 10^6 tons more than in 1994.

Figure 2.9.7.b shows the sale of crude oil and NGL in 1995 distributed by licensees.

Norway exported 27.6 x 10^9 Sm^3 gas in 1995. This is an increase of 3.8% compared with 1994. 11.1 x 10^9 Sm^3 was sold to Germany, 1.7 x 10^9 Sm^3 to the United Kingdom, 7.1 x 10^9 Sm^3 to France, 3.0 x 10^9 Sm^3 to the Netherlands, 2.9 x 10^9 Sm^3 to Belgium, 1.5 x 10^9 Sm^3 to Spain and 0.3 x 10^9 Sm^3 to Austria, see Figure 2.9.7.c.

Figure 2.9.7.d shows the gas sales distributed by licensees. Sales under the TGSA agreements are divided among the Troll licensees.

Figure 2.9.7.a
Sale of crude oil from the Norwegian continental shelf

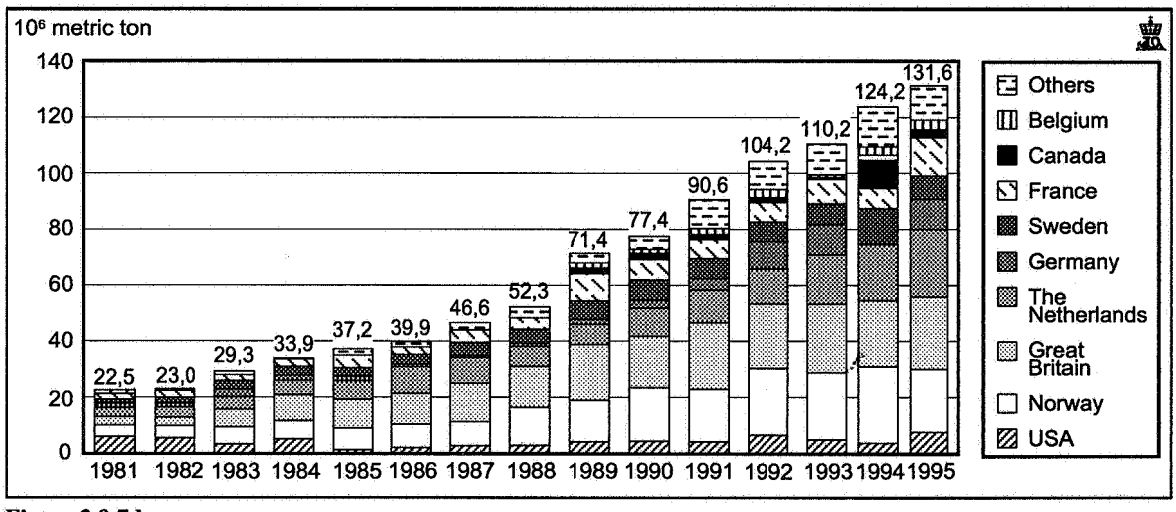


Figure 2.9.7.b
Sales quantities of oil/NGL (excl. condensate) per licensee in 1995

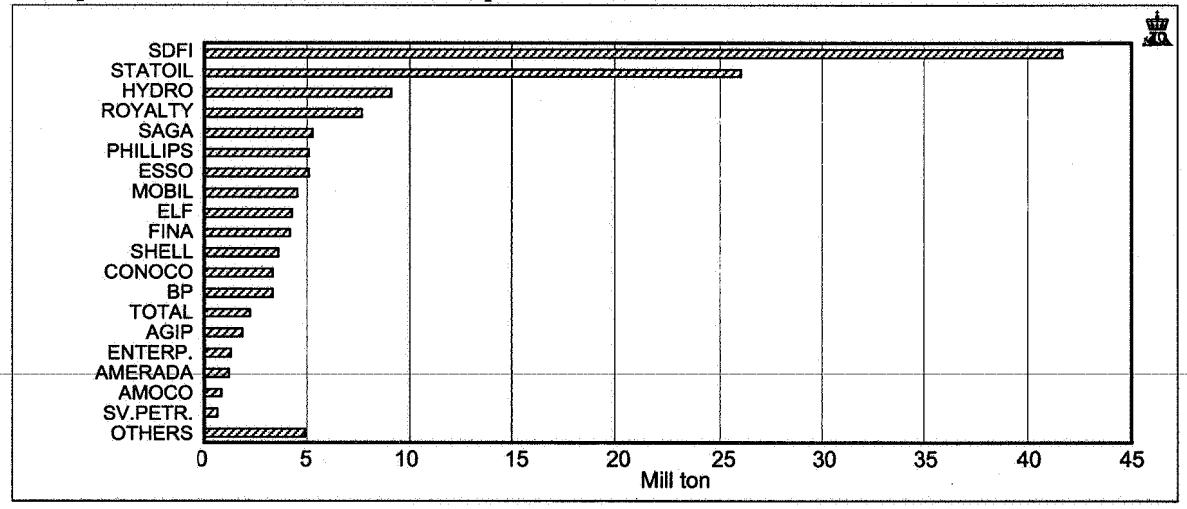


Figure 2.9.7.c
Sales quantities of gas per country

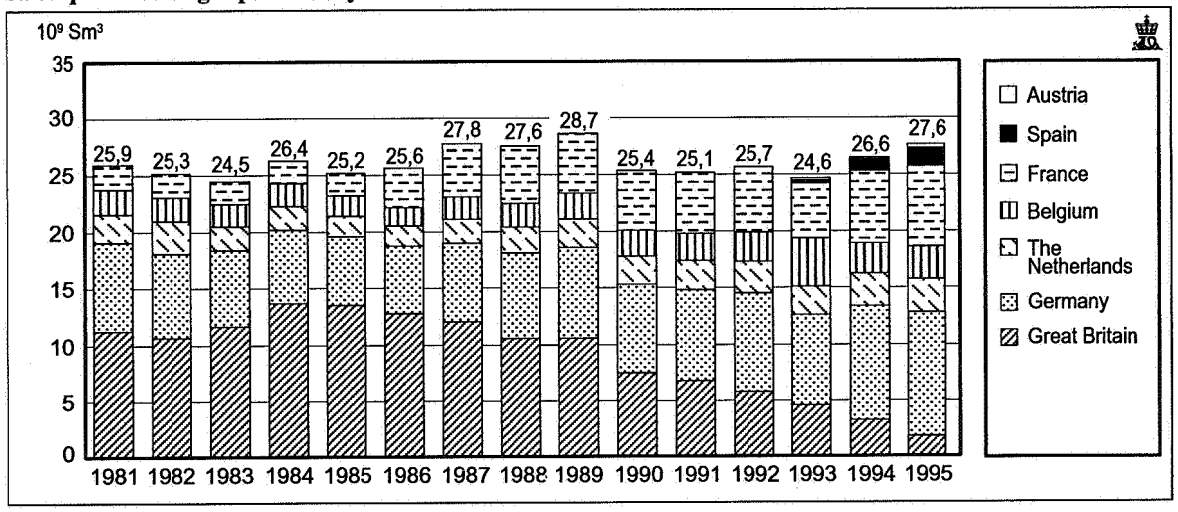
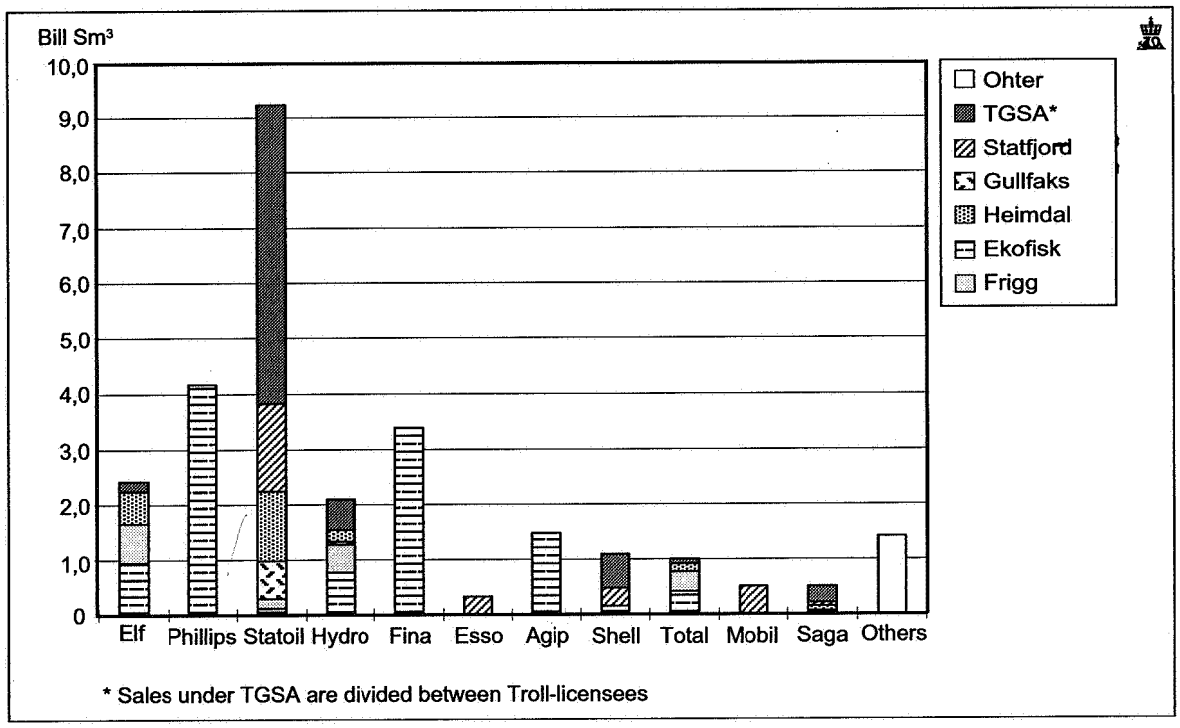


Figure 2.9.7.d
Sales quantities of gas per licensee in 1995



In the column labeled «others», companies are not specified as this column contains figures from several small fields and it would be very inaccurate to specify them.

2.9.8 ROYALTY

The Norwegian Petroleum Directorate has been delegated the responsibility for collection of royalty from petroleum production.

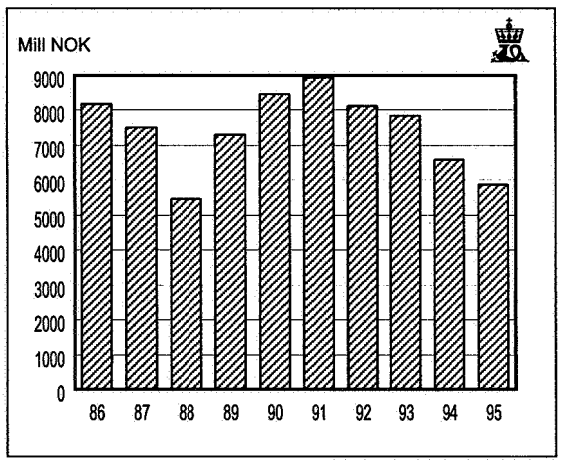
Production royalty is calculated according to the provisions of the Act relating to Petroleum Activities. The formula for calculation of the royalty is the value of the produced petroleum passing each field's loading point. As it is not customary to calculate the price of petroleum products at the loading point, in practice the formula applied is the difference between the gross sales value and the costs incurred between the taxation point and the point of sale.

In Odelsting Proposition No. 64 (1986-87), the Act regarding certain amendments to the Petroleum Act, it was provided that royalties would not be charged for production from areas for which the development plans were approved after 1 January 1986.

Interpretation and enforcement of the current laws and regulations in connection with calculation of royalties includes problems of a legal, economic, processing and measurement nature.

From 1 January 1992, the royalty rate for gas was set

Figure 2.9.8
Royalties paid 1986-1995



to nil, cf. Royal Decree of 27 March 1992 and The Crown Prince Regent's Decree of 22 May 1992. This means that from now on, royalty will only be levied on oil.

Since on some fields oil and NGL are a single product at the loading point, as the NGL is separated at a later stage, then for those fields royalty will be paid on the NGL. 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.

Table 2.9.8.a
Royalty paid in 1994 and 1995 (mill NOK)

Product	Field/area	1994	1995
Oil	Ekofisk area, Ula and Valhall	1,307.5	1,500.4
"	Statfjord	3,273.4	2,610.5
"	Murchison	17.0	8.3
"	Heimdal	0.0	*-7.8
"	Oseberg	985.6	934.9
"	Gullfaks	896.7	807.7
NGL	Ekofisk area	18.1	22.2
"	Valhall	1.9	4.8
"	Ula	101.6	2.9
"	Murchison	0.3	1.0
"	Heimdal	**-6.2	***-0.8
TOTAL		6,595.9	5,884.1

* Refund of transportation costs for royalty oil for previous years
** Repaid area fees, etc. for previous periods
*** Repaid production royalties for gas for previous years

For some fields the cost of transportation has at times been higher than the gross sales value of the specific petroleum product. This occurred most frequently in 1992 when there was still a production royalty on gas. Under these circumstances, the petroleum product in question has no value at the taxation point, and no royalty is charged.

Tabell 2.9.8.b
Royalty paid on oil (NOK)

Field/area	1st half	2nd half	Total 1995
Ekofisk area, Ula and Valhall	785,632,733	714,813,416	1,500,446,149
Statfjord	1 393,478,898	1,217,016,097	2,610,494,995
Murchison	1,148,825	7,169,868	8,318,693
Heimdal	0	-7,804,882	-7,804,882
Oseberg	453,151,954	481,760,514	934,912,468
Gullfaks	439,101,494	368,599,274	807,700,768
TOTAL	3,072,513,904	2,781,554,287	5,854,068,191

Tabell 2.9.8.c
Royalty paid on NGL (NOK)

Field/area	1st half	2nd half	Total 1995
Ekofisk area			
Phillips group	9,483,365	11,657,527	21,140,892
Amoco group (Tor)	404	165,597	166,001
Dyno/Methanor	581,130	269,274	850,404
Total Ekofisk area	10,064,899	12,092,398	22,157,297
Valhall	0	4,775,401	4,775,401
Ula	1,522,535	1,410,168	2,932,703
Murchison	693,802	336,725	1,030,527
Heimdal	*-819,568	0	*- 819,568
Total all fields	11,461,668	18,614,692	30,076,360

* Repaid production royalties for gas for previous years.

Total royalty

In 1995, licensees on the Norwegian continental shelf paid royalties totalling NOK 5,884,144,551 to the Norwegian Petroleum Directorate. Table 2.9.8 shows the breakdown for the various petroleum products for 1994 and 1995.

Figure 2.9.8 shows paid royalties from 1986-1995.

Royalty on oil

In 1995, NOK 5,854,068,191 was paid in royalties for oil from the Ekofisk area, Ula, Valhall, Statfjord, Murchison, Oseberg and Gullfaks, see Table 2.9.8.b. The royalty on oil is usually taken out at oil, but the Ministry of Industry and Energy has determined that the royalty on oil from Heimdal shall be taken out in cash as from 1 April 1993. Sale of the State's royalty oil is the responsibility of Statoil. Payment from Statoil to the Norwegian Petroleum Directorate is on a monthly basis. Settlement is at the nominal rate (norm price) stipulated by the Petroleum Price Council. The reason for the decline in the royalty on oil from 1994 to 1995 is a combination of lower oil prices and reduced production on the fields in question. The received quantity of royalty oil was reduced by more than 5% from 1994 to 1995.

Royalty on NGL

In 1995, NOK 30,076,360 has been paid in royalties on NGL. Table 2.9.8.c shows payments divided semi-annually per company/group.

Settlement of royalties paid in cash, is on a six month basis, with a three month term for payment. Even though the royalty on gas was set to nil effective 1 January 1992, the receipts for NGL in 1995 also include certain

Table 2.9.9
Area fees in production licenses

Production license awarded	NOK
1965	63,110,726
1969	52,431,355
1971	5,502,000
1973	35,478,000
1975	28,795,500
1976	73,872,000
1977	27,315,000
1978	42,403,500
1979	128,108,191
1981	46,513,768
1982	18,003,283
1983	25,741,664
1984	25,985,768
1985	31,436,717
1986	7,206,394
1987	9,327,743
1988	15,506,790
1989	8,895,000
1991	2,046,576
1992	61,582
1995	848,000
Total	648,589,557

Figure 2.9.9.a
Area fees 1973-1995

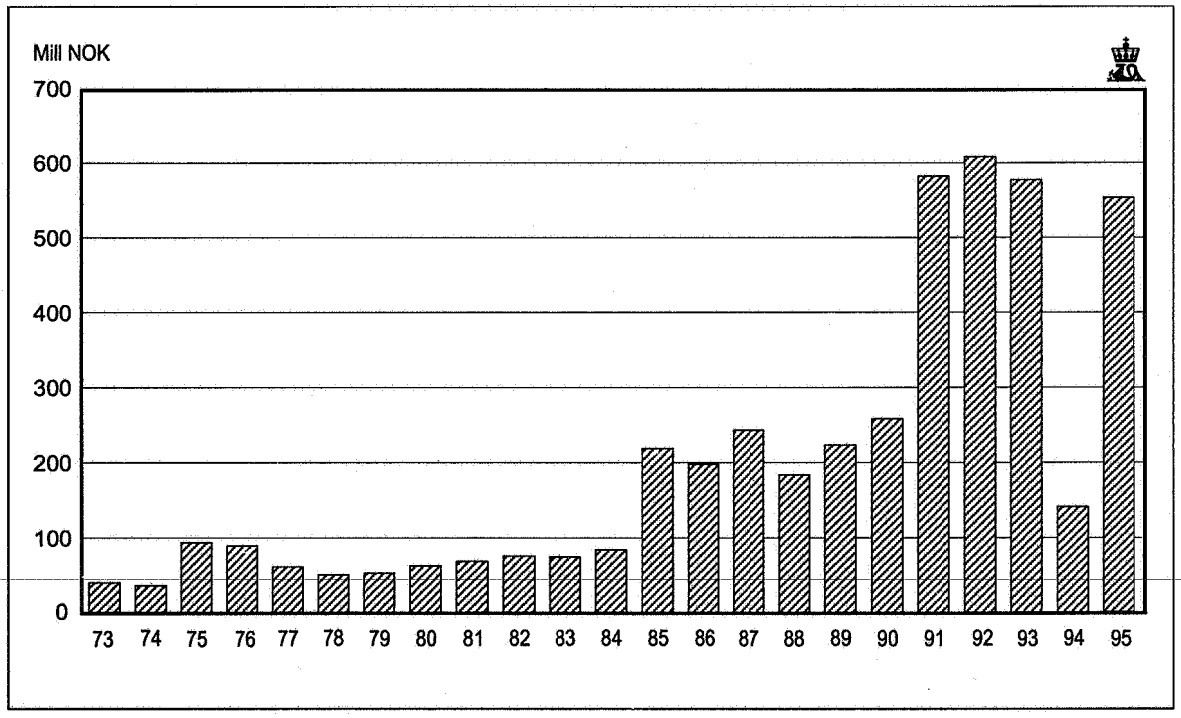


Figure 2.9.9.b
Total taxes and royalties

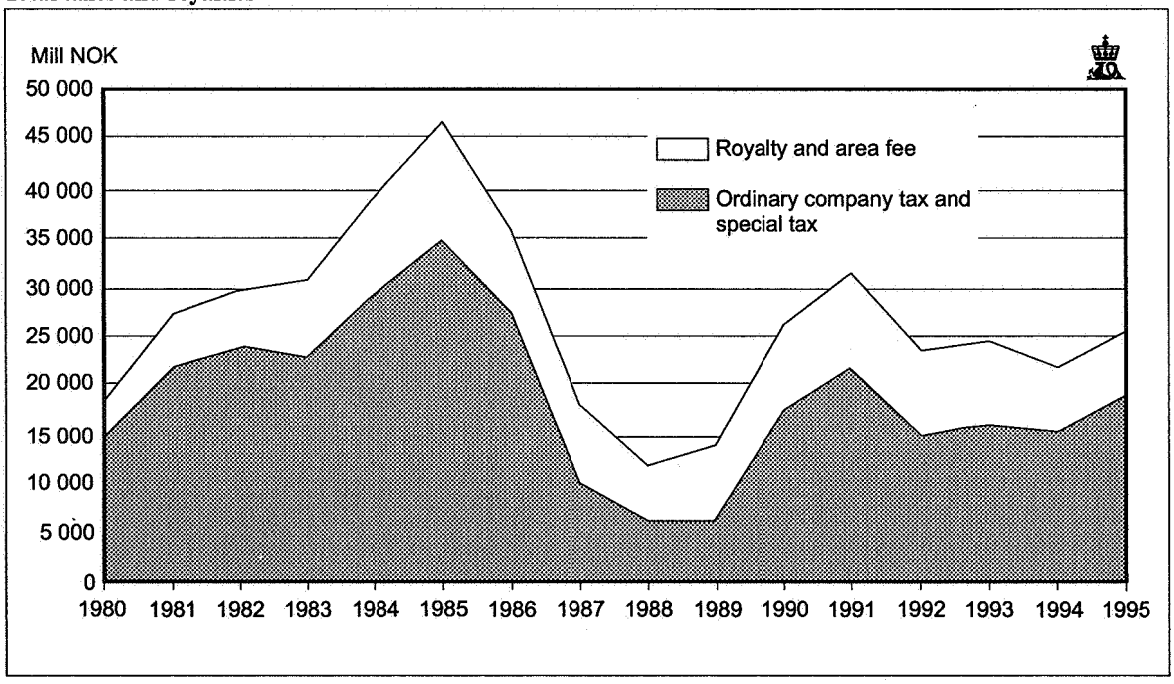


Table 2.9.10
CO_2-tax for the 1st and 2nd half 1995 (NOK)

Field/area:	1st half	2nd half	Total 1995
Ekofisk area	344,319,420	368,215,530	712,534,950
Frigg area	15,080,291	15,205,979	30,286,270
Gullfaks A+B+C	148,629,574	144,933,668	293,563,242
Tordis	10,646,121	15,655,778	26,301,899
Gyda	19,354,519	18,987,299	38,341,818
Heimdal	15,832,601	19,336,149	35,168,750
Hod	67,117	55,776	122,893
Murchison	7,587,592	5,787,354	13,374,946
Odin	3,313,473	839,130	4,152,603
Oseberg A+B+C	140,165,060	136,762,420	276,927,480
Brage	23,055,120	31,352,420	54,407,540
Sleipner	55,564,571	61,813,835	117,378,406
Statfjord A+B+C	210,737,426	215,497,173	426,234,599
Ula	30,384,642	26,623,046	57,007,688
Valhall	33,278,757	34,305,006	67,583,763
Veslefrikk	29,028,492	33,391,813	62,420,305
Snorre	48,311,244	45,262,233	93,573,477
Draugen	23,059,273	28,274,209	51,333,482
Transport systems:			
Norpipe	95,928,825	93,889,356	189,818,181
Statpipe	2,291,605	2,752,158	5,043,763
Total	**1,256,635,723**	**1,298,940,332**	**2,555,576,055**

adjustments in respect of royalties for gas in previous years. The settlement for NGL has been made at contract prices which vary for the individual fields/groups.

Deliveries of gas to Dyno/Methanor ceased effective 1 July 1984. The receipts from Dyno/Methanor related to the transportation and processing of gas already received and paid for.

There is a significant decline in paid royalty on NGL from 1994 to 1995. The decline can primarily be attributed to the fact that the 1994 royalties paid included a re-calculation of the royalty on both NGL and gas from the Ula field for the years 1986 to 1992.

2.9.9 AREA FEES IN PRODUCTION LICENSES

In 1995, the Norwegian Petroleum Directorate collected NOK 648,589,557 in area fees. The amount is broken down among production licenses as shown in Table 2.9.9.

The Norwegian Petroleum Directorate has refunded NOK 96,839,613 in area fees in 1995. This represents the deductible portion of the area fee in the royalty settlement for production licenses 006, 018, 019A, 033, 037, 050, 053 and 079.

Figure 2.9.9.a shows the net area fee receipts for 1973-1995. For 1995, there was an increase of over NOK 400 million compared with 1994. The reason for this is the production licenses awarded according to the 1972 resolution on account of a public holiday had a deferred due date.

Production royalties and area fees in 1995 amounted to 25% of total taxes and fees paid from the petroleum activities. The proportion of the fees has varied over time. The highest proportion was in 1989 with 53%. Figure 2.9.9.b shows the total taxes and fees paid from 1980 to 1995.

2.9.10 CARBON DIOXIDE TAX

The Act of 21 December 1990 No. 72 relating to tax on discharge of CO_2 in the petroleum activities on the continental shelf entered into force on 1 January 1991. The Norwegian Petroleum Directorate is given the authority to collect the CO_2 tax and to make administrative decisions necessary to enforce the law. The tax is calculated on petroleum flared and natural gas released to the atmosphere from platforms, installations and plants used in connection with production or transportation of petroleum. This tax is also levied on Norwegian systems for transportation of petroleum which extend beyond the continental shelf. For fields which extend over the median line in relation to another state, the CO_2 tax is only calculated on the Norwegian share.

The CO_2 tax was in 1994 and 1995 fixed at NOK 0.82 and 0.83 per Sm^3 gas and NOK 0.82 and 0.83 per liter diesel, respectively. The tax, payable on a six month basis with three months' due date (at 1 October and 1 April in the following year), is levied on the operators of the individual fields and installations. Table 2.9.10 shows the total tax paid in 1995. The tax is broken down by the individual fields and transportation systems. Corrections relating to previous six month periods are included. A total of NOK 2,555,576,055 was paid in 1995.

2.10 REGULATORY DEVELOPMENT

At the end of the year 1991/1992, the Norwegian Petroleum Directorate started work on a methodical regulatory development effort in the resource administration area (the MR project) with the understanding of the then Ministry of Petroleum and Energy. From 1994 the work, under the leadership of the Ministry of Industry and Energy, concentrated on the revision of the Petroleum Act (PROLO-94). Among other things, conditions in the EEA Agreement, the need for statutory regulation of the final disposal of installations, follow up of Storting Report No. 26 (1993-94) and follow up of the industry recommendations in connection with NORSOK have laid the guidelines for this work.

In addition to assisting the Ministry of Industry and Energy with the regulatory revisions, in 1995 the Norwegian Petroleum Directorate started preparations for revisions of the regulations in the area of resource management. This work will in part be a direct follow-up of the revisions to the statutory legislation insofar as this necessitates revisions to the regulations. In addition to revision of the petroleum regulations (Royal Decree of 14 June 1985), it is necessary to review parts of the underlying regulations.

The preparations have inter alia consisted of a survey of the need for new regulations and changes to the existing regulations both with regard to regulatory requirements and the methodical formulation of regulations. The surveying has in part been carried out as preparations for the changes which must be made due to the new Petroleum Act. Furthermore, the work has been based on documentation from the above-mentioned MR project, as well as more recent experiences. Possible changes required by the EEA Agreement must also be taken into account.

The goal of the Norwegian Petroleum Directorate's regulatory development is to ensure that the formal framework for the petroleum activities emerges as an appropriate management tool in order to maintain and further develop effective and responsible resource management. The following elements are among the central issues in this regard:

- to develop structured and comprehensive regulations in the area of resource management where, among other things, predictability and cost-efficiency both for the industry and the authorities are given priority.
- to ensure agreement between overarching and underlying regulations, to further development of the regulations in line with current needs, to fill deficiencies, to create uniformity in the regulatory system as well as carry out simplifications and make the regulations more functional.

As a natural consequence of the successive revision of the Petroleum Act and regulations, a step-by-step adjustment of the underlying regulations will most likely be necessary throughout the revision period in order to take into account significant changes to both the content and structure of the paramount regulations.

3. Safety and working environment administration

Introduction

The Norwegian Petroleum Directorate's performance of its administrative duties in connection with safety and the working environment is based on close cooperation in the areas of safety, working environment and resource administration, both internally within the Directorate as well as externally in relation to other authorities and institutions. The Norwegian Petroleum Directorate has a coordinating role in relation to other public authorities which have individual supervisory responsibility under the Petroleum Act. Furthermore, the Directorate draws upon expert assistance in areas where it has no expertise of its own.

From 1993, the Working Environment Act was also made applicable to mobile units in petroleum activities, as well as to manned subsea operations carried out from vessels or installations. The responsibility for supervision of these activities was delegated to the Norwegian Petroleum Directorate, thereby enabling comprehensive and coordinated supervision also of the working environment area of petroleum activities, as set out in the Royal Decree of 28 June 1985 concerning regulatory supervision.

Administration of safety and the working environment is based on the principle of internal control. This assumes that regulations and supervision are designed and implemented in a way which supports the participants' perception of their responsibility to ensure prudent operations in accordance with the formal framework related to petroleum activities.

This means that the supervision is directed at the industry's obligation to carry out internal control, that is, the Norwegian Petroleum Directorate's supervisory activities are first and foremost aimed at the licensees' control systems and decision-making processes which have significance for safety and the working environment. Conclusions from the supervision are directed at areas of improvement for the companies' control systems.

The system-oriented supervision consists of systems audits which are supported by verifications. The systems audits have the objective of determining whether the control systems have been established and whether they function. The objective of the verifications is to evaluate the effect of the control systems by examining the actual standard of safety and the working environment in the activities. The Norwegian Petroleum Directorate's supervisory activities come in addition to the industry's own audit and inspection activities which are carried out to ensure that the activities are at all times in compliance with the requirements of the authorities and of the industry itself.

3.1 REVISION AND DEVELOPMENT OF LEGISLATION

The regulations relating to systematic follow-up of the working environment in the petroleum activities (Systematic Follow-up regulations) was issued by the Norwegian Petroleum Directorate on 8 March 1995 and became effective on 1 August 1995. This completed the task of setting up a comprehensive and detailed regulatory system within the Norwegian Petroleum Directorate's sphere of responsibility under the Petroleum Act and the Working Environment Act.

The objective of the development of the Systematic Follow-up regulations has, among other things, been to achieve a comprehensive and structured regulation of working environment conditions in petroleum activities. The purpose of the regulation is to ensure a working environment which complies with the intentions contained in the working environment legislation. Therefore, the Systematic Follow-up regulations amplify the requirements of the Working Environment Act and paves the way for the authorities' supervision of the area.

The Systematic Follow-up regulations provide for the control of the working environment in the activities based on the requirement for internal control, and incorporates requirements resulting from the European Economic Area (EEA) agreement in the area of working environment. The regulation demands systematic planning and implementation of all phases of the activities, and places emphasis on the active participation of all parties in accordance with the intention of the Working Environment Act.

A number of earlier regulations which regulated various aspects of the working environment have now been rescinded, except for certain conditions on existing installations. The Systematic Follow-up regulations with their accompanying guidelines addresses the conditions which were covered under the previous regulations. The regulation also replaces a number of individual resolutions relating to the working environment which have been made by the Norwegian Petroleum Directorate.

In 1995, the Norwegian Petroleum Directorate circulated a proposal for amendments to the technology regulations to interested parties for comment. The amendments include requirements resulting from the incorporation of the EEA agreement. An internal project to chart user experience with the new regulations was also carried out. The results of this survey will be used in the development of a plan for revision of the regulations.

3.2 THE NORSOK WORK

In 1993, the Minister of Industry and Energy took the initiative to establish a Development and Operations Forum for the petroleum sector. This initiative was taken because the authorities wished to be a motivating force and contributor to the continued development of the competitiveness of the Norwegian Continental shelf. After a working committee derived from the forum presented its report «The Competitive Position of the Norwegian Shelf» (NORSOK) early in 1994, the safety authorities

became more directly involved in the NORSOK work through work groups which were established.

The NORSOK work has been driven by the industry itself. The safety authorities, represented by the Ministry of Local Government and Labour and the Norwegian Petroleum Directorate, have participated in the work as observers. This means that the authorities have not taken a formal position on the various NORSOK proposals as these were presented in a broad-based conference in 1995.

In 1996, the Norwegian Petroleum Directorate will conduct a review of the NORSOK standards as well as other recommendations from the work which address conditions regulated by the safety and working environment regulations.

The preliminary evaluations made in 1995 indicate that a number of the proposals lie within the framework of the current regulations, as well as the central political and principle frameworks drawn from the Storting's discussion of Storting Report No. 51 (1992-93) «Relating to safety and working environment in petroleum activities on the Norwegian Continental shelf».

In connection with the Norwegian Petroleum Directorate's participation during the development and consultation work on the proposals for NORSOK standards, the Directorate has noted certain areas where the standards provide for solutions which are not in compliance with the regulations. The Norwegian Petroleum Directorate assumes that the industry will continue to work with these proposals and the Directorate will contribute to this work, the Directorate's aim being to be able to refer to the NORSOK standards as examples of acceptable solutions in guidelines to the regulations.

In connection with the furtherance of the NORSOK initiative, the Norwegian Petroleum Directorate has been contacted by VANS (Furthering of the NORSOK Standards), which has proposed to take over portions of the Norwegian Petroleum Directorate's guidelines, with the objective of issuing these as NORSOK standards.

The Norwegian Petroleum Directorate has, also prior to the NORSOK initiative, worked towards the transfer of responsibility for portions of the Directorate's guidelines to the industry, and therefore has a positive view of the proposal from VANS. The proposal has also been discussed in the parties' forum for regulatory development (ERR), which has lent its general support to such a development.

However, it is a prerequisite of such development that the future updating of the standards be carried out according to fixed procedures which safeguard the contribution of employees and the authorities in a reasonable manner, in order to ensure that the standards for safety and working environment laid down in the Norwegian Petroleum Directorate's current guidelines are maintained and further developed in accordance with technological trends.

3.3 THE MILJØSOK WORK

The Norwegian Petroleum Directorate participates as an observer to the work on environmental issues implemented through MILJØSOK. This is a management group established by the Minister of Industry and Energy under the Forum for Development and Operations. The Directorate is also following the MILJØSOK work based on the aspects of the external environment which fall under the responsibility of the Ministry of Local Government and Labour.

3.4 SUPERVISORY ACTIVITIES

The supervision of safety and working environment in the petroleum activities was essentially carried out in accordance with the designated priority commitment areas for 1995.

Supervisory activities are carried out by means of audits and verifications specifically aimed at the individual operating company, with a point of departure which includes the Directorate's overall experience of each individual company.

Part of the supervision is, however, carried out as universal supervisory activities, which means that the supervision is aimed at several operating companies within the same problem area. This type of supervision provides a good basis for assessing the general situation within the respective areas.

3.4.1 CONSENTS

The consent system is one of the tools the Norwegian Petroleum Directorate uses to supervise the operating companies to see that they are in control of central decision elements in their activities. The application for consent to commence an activity implies a commitment by the operating company to provide status with regard to regulatory requirements for the control systems in general and the relevant activity in particular.

The Norwegian Petroleum Directorate's consent to commence the activity applied for is a formalized expression of the Directorate's confidence in the operator's ability to carry out the activity in accordance with the authorities' requirements.

A total of 105 consents were granted in 1995, compared with 82 the previous year. The consents granted in 1995 were divided among the following areas (1994 figures in parentheses):

4	(2)	consents for exploratory survey
21	(17)	consents for exploration drilling
8	(3)	consents for detail engineering
12	(6)	consents for fabrication
16	(14)	consents for installation
21	(18)	consents for use of installation
10	(8)	consents for rebuilding or changes in operation of installation
1	(1)	consent for removal
12	(13)	consent for use of service vessel

All applications for consent have been granted after the Norwegian Petroleum Directorate's review. In some cases,

the applications for consent were turned down because of lack of information regarding circumstances which had significance for the Directorate's consideration of the application. In these cases, the Directorate was nevertheless able to give its consent after the operator submitted a new application or provided the necessary additional information. In some cases, this has led to delays in the process, which could cause problems for the progress of the projects.

One operating company applied for a general consent for diving activities in connection with installation work in deep water. The application was rejected because it is a prerequisite that safety and working environment aspects of subsea operations be evaluated in light of the specific conditions for the specific development project. After this, the company retracted its application.

3.4.2 PRIORITY COMMITMENT AREAS

In 1995, the Norwegian Petroleum Directorate gave priority to supervisory activities associated with:

- New concepts in development and operation
- Risk of major accidents - hydrocarbon leaks and fires
- Cooperation during organizational changes
- Measures to protect the external environment
- Participants' systems for complying with the Systematic Follow-up regulations
- Safety and working environment on mobile units
- Licensees' own supervision
- Older installations

New concepts in development and operation

The Norwegian Petroleum Directorate has carried out a systems audit of the Yme project in 1995, where Statoil as operator is planning a development solution based on a modified jack-up installation and a storage ship. The installations will be owned and operated by the contractors. As documentation that the Norwegian continental shelf regulations are complied with, the use of a classification system as an independent verification and documentation system is being prepared.

The supervision has been directed towards the operator's systems for evaluation of the contractor prior to signature of the contract, and towards follow-up of the contractor in connection with engineering related to the modification work. The Norwegian Petroleum Directorate's supervision has focused on the operator's overriding responsibility for ensuring compliance with the regulations, documentation showing that the Norwegian continental shelf regulations have been taken care of and for the evaluation of the Norwegian continental shelf regulations' application in relation to this type of development concepts.

A systems audit of the Norne project was also performed as a «pilot project» with a view towards realizing goals and principles in the NORSOK work. The main purpose of this supervisory activity was to form an opinion as to whether the regulatory requirements for clear lines of responsibility among the various participants were safeguarded.

Furthermore, the supervision focused on how the project addresses transfer of experience internally within the project and in relation to new projects.

Risk of major accidents - hydrocarbon leaks and fires

Major modifications and changes in operation of installations represent particular challenges as regards compliance with requirements set out in the regulations relating to risk analyses and emergency preparedness, particularly in order to avoid the introduction of new risk elements with a major accident potential. Many of the installations were built according to earlier detailed regulations, and any accompanying analyses are often not suitable as a basis for evaluation under the current regulations.

As a first phase of the work, a supporting document was prepared in 1994 describing the problem areas and the regulatory requirements, and clarifying the concepts of «major modifications» and «changes in operation» in the safety regulations' requirements for applications for consent to commence an activity. This formed the basis for the selection of targets for supervision and the planning of the actual supervisory activities in 1995.

Activities carried out under this commitment area in 1995 included supervisory activities directed at operating companies' systems to prevent gas leaks. The conclusions from the supervision indicate that the companies are now working in a more systematic and goal-oriented fashion in order to minimize the problems of gas leaks. Nevertheless, some areas were targeted as needing improvement, such as more systematic use of experience gained. Certain ambiguities in internal routines and guidelines for marking of equipment not in use were also noted.

In 1995, the Directorate has also dedicated relatively extensive resources to the supervision of the operating companies' measures to prevent major accidents in connection with modifications, upgrading of process capacity, etc. Implementation of these activities has proven to require a large amount of resources, inter alia because they entail the review and evaluation of a number of risk analyses.

Cooperation during organizational changes

Systems audits have been performed of two operating companies which have implemented cost reduction measures in 1995 which have led to changes in the manning of installations. The purpose of the audits has been to supervise the manner in which the operators have safeguarded safety and working environment considerations during the planning, implementation and follow-up of the changes in manning.

The Norwegian Petroleum Directorate has registered relatively large differences between the various companies in this area, but there has been an overall positive development as regards the climate of cooperation and employee involvement in connection with changes in manning. The employees have been involved to an increasing degree in the planning of manning changes in a

constructive way which has been much more successful in contributing to an open dialogue regarding solutions which both parties can accept.

However, there is a trend to underestimating the complexity, scope and costs of the processes connected with projects for changes in manning. In one of the companies subjected to a systems audit in 1995, the Directorate found that the company appeared to lack a systematic and comprehensive approach to organization, implementation and follow-up of this type of project.

Measures to protect the external environment

In 1995, the Norwegian Petroleum Directorate has continued work on an internal report regarding regulatory requirements in connection with operators' measures to prevent damage to the environment when planning drilling operations in general, and particularly with regard to environmentally sensitive areas. In this connection, the Norwegian Petroleum Directorate has concluded its evaluation of a model for analysis of the risk of acute oil discharges to the sea resulting from a blow-out, which was jointly developed by several operating companies. This model is regarded as being a good point of departure to ensure compliance with the Norwegian Petroleum Directorate's regulatory requirements. A meeting with the State Pollution Control Authority (SFT) is planned in order to exchange information on this subject.

The Norwegian Petroleum Directorate planned to carry out a systems audit of Norsk Hydro, which contributed to the development of the above model, and which had plans for drilling activity near the coast (block 35/5) at the end of the year. However, the drilling operation was postponed, and it was not possible to perform the planned systems audit in 1995.

The Norwegian Petroleum Directorate carried out a systems audit in cooperation with SFT in order to evaluate Phillips' planning of the Ekofisk II project with regard to development of technical solutions which can reduce discharges to the sea. This supervisory activity showed that in many areas of the project, the company had taken actions to safeguard the environment, including the use of the company's own operational experience, setting ambitious goals for oil content in produced water, and by using the available environmentally-friendly technology.

Follow-up of the industry's phase-out of halon as a fire extinguishing substance has been continued in 1995. The Norwegian Petroleum Directorate is satisfied with the companies' progress and actions in this area.

In 1995, a systems audit of an operating company was also carried out in cooperation with SFT with regard to the company's criteria for choice of drilling mud type based on a considered judgment of technical drilling, working environment and environmental considerations. The company gave positive feedback with regard to the usefulness of this supervisory activity, which contributed to raise awareness in the company regarding comprehensive evaluations. The audit showed that the company attended to technical drilling and environmental considerations in a satisfactory manner, while considerations related to the working environment received less attention.

Participants' systems for complying with the Systematic Follow-up regulations

Before the regulations relating to systematic follow-up of the working environment in the petroleum activities (Systematic Follow-up regulations) entered into force, meetings were conducted with concerned parties in the industry in which the Norwegian Petroleum Directorate provided information regarding the contents of the Systematic Follow-up regulations, and plans for stipulation and implementation. It emerged from the meeting that the industry had largely familiarized itself with the regulation and that no critical areas or regulatory requirements had been identified that would indicate problems in complying with the regulation.

Moreover, the Systematic Follow-up regulations received particular focus in connection with a working environment seminar arranged by the Norwegian Petroleum Directorate in October. The seminar, which drew 165 participants, had broad support both from operating companies and from contractor companies in the fields of shipping, engineering and operations.

Furthermore, a questionnaire was sent to selected contractor companies in order to chart the status in relation to certain central requirements in the Systematic Follow-up regulations relating to preventive safety and environmental work. These are mainly contractors who have not been subjected to any systematic supervision of the working environment. The operators will be contacted in order to chart the status of their plans for implementation of measures to ensure compliance with the regulation, including whether special measures have been implemented, responsibility for follow-up of such measures and continuing plans for this work.

Safety and working environment on mobile units

Systems audits focusing on operational safety and working environment on two mobile drilling installations were carried out under this commitment area in 1995. The conclusion was that the activity itself was conducted in a proper manner, but some weak points were noted in the operator's evaluation of the quality of the contractor's own system for follow-up of the working environment prior to commencing the activity. A need for improvement in the shipowners' controlling documentation was also revealed.

Supervision of the operators' systems, routines and procedures in order to ensure a satisfactory technical standard when hiring mobile units was also conducted. The activities have generally been carried out as casework in connection with processing applications for consent for use of installation.

Under this commitment area, the Norwegian Petroleum Directorate has also examined how the operators comply with the requirements in the regulations relating to risk analyses in connection with planning and conducting drilling activities. In this connection, focus has also been directed on the link between the operator's operationally-oriented analyses and the technical analyses of the installation performed by the rig owner, and on how these analyses are followed up during the drilling activity. The conclusions show that neither the operators' requirements

for such analyses or the rig owner's performance of these meet the Norwegian Petroleum Directorate's expectations. Nor is the Directorate satisfied with the drilling contractors' ability to transfer the results of the risk analyses to an efficient management of safety in the daily activities, for example, follow-up of safe job analyses. Supervision in this area will therefore be continued in 1996.

Licensees' own supervision

It is a fundamental principle that the Norwegian Petroleum Directorate's supervision comes in addition to the internal supervision activities the operating companies themselves carry out to ensure regulatory compliance. Each year, the Directorate collects the companies' activity and supervision plans as a significant part of its basis for planning the supervision activities.

In 1995, the Norwegian Petroleum Directorate made available information with regard to how the Directorate evaluates the companies' activity and supervision plans. This seems to have been well received by the companies.

Overall, the Norwegian Petroleum Directorate received positive comments to the plans, which were largely regarded as being clearly set out and well-structured. It is also apparent from the plans that most of the companies carry out a more or less systematic non-conformance action process when plans, for whatever reasons, cannot be followed. In addition, the companies report changes in the supervision plan to the Norwegian Petroleum Directorate. However, it was most often difficult for the Norwegian Petroleum Directorate to clarify the companies' basis for deciding on priorities with regard to its own supervision.

Even if the Norwegian Petroleum Directorate's supervision for all practical purposes is directed at the company which is operator, all licensees in a production license have an obligation through internal control to ensure regulatory compliance. In 1995, the Norwegian Petroleum Directorate carried out an activity directed at two selected production licenses in order to survey the licensees' supervision of the operator of the production license. This activity seems to have set off a dialogue between the licensees regarding this matter, something which the Norwegian Petroleum Directorate believes to be positive in itself. The Norwegian Petroleum Directorate notes that during the operations phase, the licensees generally take care of their obligation for internal control through the cooperation committee's consideration of the operator's internal documentation related to quality assurance, safety and the working environment. However, the licensees are more active and show greater initiative in their supervision of the operator in connection with new projects.

In 1995, the Norwegian Petroleum Directorate has participated as an observer in a supervisory activity carried out by a contractor company in cooperation with the operating company who was the employer, directed towards an independent verifying entity. The Directorate regards the value of this activity as being good, both with regard to insight into the operating company's performance of supervision, and in relation to the area subjected to the supervision.

Older installations

Older installations, and in particular maintenance of such installations, has been given priority in the supervision for several years. Previously, comprehensive audits have been conducted of the operators' systems for control of the maintenance. In 1995, these audits have been followed up by smaller audits aimed at the actual status of maintenance on a number of installations. This combination of comprehensive audit and smaller follow-up audits has proven to be effective with regard to checking on changes in the management of maintenance, while at the same time the Norwegian Petroleum Directorate receives direct information regarding the technical condition of certain selected equipment units.

Supervision carried out within the area of maintenance and follow-up on the basis of incidents and accidents, has uncovered differences between different operators with regard to the ability to fulfill their own demands for management of maintenance. In several cases the Norwegian Petroleum Directorate has registered that the technical condition of equipment components has been unsatisfactory, due to poor quality of the maintenance work performed.

The Directorate has also criticized the fact that certain operators do not live up to their own requirements for order and tidiness on the installations.

On the Ekofisk field, there are a number of installations which are now nearing the end of their originally planned lifetime, the same is true of the A-installations on the Statfjord field.

The operators now face significant challenges in connection with organization of operations and maintenance in the final phase, including with regard to giving priority to replacement of equipment, maintaining the technical state of critical equipment as well as developing maintenance and preservation routines for equipment taken out of service. These are things which the NPD will continue to follow up in 1996.

Removal of installations has been a issue in the supervision of several operators. The production installation on the Odin field became a «cold» installation this year. Furthermore, a major project has been started to organize shut-down and removal of the installations which will be taken out of operation when Ekofisk II commences operations.

The temporary measures carried out by the operator to maintain a prudent safety level on 2/4-T have been followed up by regular status reports, and through a systems audit conducted at the end of 1995. A project to determine which factors contribute to the most significant changes in the risk scenario on 2/4-T has also been conducted. The Norwegian Petroleum Directorate will emphasize follow-up of the factors which make the largest contributions to changes in the risk scenario, and which have the greatest potential for change up to 1998.

3.5 CONSENT SYSTEM FOR MOBILE UNITS IN PETROLEUM ACTIVITIES

The use of mobile units in petroleum activities will increase significantly in the years to come. Traditionally, mobile units have mostly been used for the drilling of exploration wells, but increasingly also for the drilling of production wells. Development trends in petroleum activities in the future clearly indicated significant use of mobile units, also in the production phase. This type of solution is particularly suited to development of small fields with short production lifetimes, but also other factors, such as deep waters, can indicate use of mobile units for production purposes.

The shipping industry has particularly maintained that the Norwegian Petroleum Directorate's regulations and methods of supervision do not provide the desired degree of predictability with regard to the use of mobile units in petroleum activities on the Norwegian continental shelf. It was on this basis, among others, that the Business Legislation Committee in 1992 appointed a work group which was given a mandate to:

- evaluate and form an opinion as to whether the applicable safety regulations (including manning and qualifications rules) for mobile units and adjoining areas in the petroleum activities should be changed, and if necessary propose changes
- evaluate and form an opinion as to whether today's system of administration and supervision of the regulations should be changed, and if necessary propose changes

In the report submitted by the work group in 1993, the group recommends under the last part of the mandate inter alia that:

- a system of consents for use of mobile units on the Norwegian shelf be established

Furthermore, the work group recommends that the administrative responsibility for flag state legislation regarding safety, manning, etc. for mobile units in petroleum activities should be transferred from the Ministry of Foreign Affairs to the Ministry of Local Government and Labor, and that the latter be granted the authority to instruct the Norwegian Maritime Directorate and the Norwegian Petroleum Directorate, with regard to rules relating to safety, manning, etc. for mobile units in petroleum activities. The recommendations have been submitted to the ministries for consideration.

In 1995, the Norwegian Petroleum Directorate implemented an internal clarification of principle and administrative consequences for the Directorate if the work group's recommendations are implemented, with the objective of being able to follow-up such a decision with rapid and efficient action for implementation on the part of the Norwegian Petroleum Directorate. Options are being kept open in the internal clarification work for several solution models which could satisfy the intentions of the work group's recommendations.

3.6 PERSONAL INJURIES

3.6.1 INTRODUCTION

The Norwegian Petroleum Directorate receives daily reports about personal injuries in connection with petroleum activities on fixed and mobile units operating on the Norwegian continental shelf. This information can basically be divided into two categories:

Notification

In case of fatalities and serious personal injuries, the Directorate shall be notified immediately. This notification forms the basis for the Directorate's assessment of further follow-up of the accident. These follow-up activities may include on-site investigation of the event in cooperation with the police, review of the operating company's own investigation of the accident, or other supervisory activity.

Report

In addition to the notification of serious personal injuries and fatalities, the Norwegian Petroleum Directorate receives reports pertaining to personal injuries which require medical treatment and injuries which have led to absence during the next 12-hour shift. It is the responsibility of the individual employer in the petroleum activities to report personal injuries. This reporting is used as a basis for statistics, such as those presented in the Norwegian Petroleum Directorate's Annual Report.

The regulations also require that the operating companies be aware of all events on their own installations. The statistical base material registered in the Norwegian Petroleum Directorate with background in the employers' duty of notification is compared each year with information from the operating companies, so that under-reporting and any registration errors may be corrected. In 1995, this review led to retrospective reporting of approx. 17% of the total number of personal injuries included in this account. The control also led to 112 reported injuries being reclassified as first-aid cases or near misses, which are not included in the statistical summary presented in the Annual Report. These are incidents which have been reported based on possible subsequent complications, or because there was not enough information at the time of reporting to clearly ascertain the consequences. The Norwegian Petroleum Directorate also receives retrospective reporting of personal injuries which the companies themselves have subsequently identified as fulfilling the criteria for reporting. On the basis of such retrospective reporting, small adjustments have been made in the year's statistical summary for several years in the summary statistics. The vast majority of these supplementary reported incidents are from 1994.

Such an extensive reporting system will have a number of possible sources of error, and the Directorate has noted a somewhat variable understanding and knowledge of reporting criteria and routines. The statistical summaries presented in the Annual Report should nevertheless provide a reasonably accurate expression of the injury scenario on the Norwegian continental shelf.

3.6.2 FATAL ACCIDENTS

Unfortunately, petroleum activities on the Norwegian continental shelf in 1995 were not free from fatal accidents. Two tragic incidents in connection with lifting operations caused fatalities.

A deck operator on Oseberg A was killed instantly when he was hit by a four-inch loading hose which gave way. In connection with lifting the hose, the hose got caught on the railing on the cellar deck. The victim attempted to free the hose while at the same time telling the crane operator to hoist carefully. The hose broke at the crane suspension, fell down and hit the deck operator.

A seaman on the supply boat Normand Jarl was killed during loading of containers from the Snorre installation. A container was set down on deck with one of the cranes on Snorre, but was not finally in place for uncoupling. When the boat heaved on a wave, the chain sling and crane hook were set down on deck. This was taken as a sign that it was ready for uncoupling, and the victim ran forward to uncouple the crane hook. When the boat sank into a wave trough, the crane operator could not give slack quickly enough to prevent the wire from tightening. The container was thus lifted up from the deck and swung against a container which had already been placed, crushing the seaman between the two containers.

The accident on the Normand Jarl is not included in the personal injury statistics, as the statistics are based on the working environment regulations the Norwegian Petroleum Directorate administers for fixed and mobile installations on the Norwegian continental shelf. The petroleum legislation and the Working Environment Act apply to the activities which took place on the installation when the accident occurred, but do not encompass the crew of the vessel, where maritime legislation applies.

Both fatalities are being investigated by the police. The Norwegian Petroleum Directorate participated in the inquiries into both incidents, and partly based on these incidents, issued a safety notice regarding safety during crane operations.

3.6.3 TYPES AND CAUSES OF INJURY ON FIXED AND MOBILE INSTALLATIONS

The description of the incidents and causes thereof in the accident reports in 1995 give a picture of accident and causal relationships which is very similar to 1994.

Crushing injuries and wounds to the hands and fingers have been reduced by 3% since 1994, but are still the most common type of injury. The injuries are most often a result of inappropriate posture on the part of the injured person in relation to the tools and equipment used in the work. The most vulnerable occupational groups are drillfloor workers, roustabouts and mechanics.

The eyes continue to be one of the most vulnerable body parts. Most eye injuries are caused by airborne particles, particularly in connection with grinding and welding work.

Head and face injuries comprise approx. 16% of the injuries. Many of these are dental injuries caused by careless handling of tools and equipment. As regards head injuries, mechanics and roustabouts are most at risk.

Injuries to the toes and feet also comprise approx. 15% of the total number of injuries. These injuries are largely related to sprains or soft tissue injuries due to falling objects. The registrations show that drilling personnel are particularly vulnerable, especially when taking into account the length of exposure.

3.6.4 PERSONAL INJURIES ON FIXED INSTALLATIONS

In 1995, the Norwegian Petroleum Directorate registered 580 personal injuries on fixed installations, compared with 554 in 1994. The increase in reported work hours on fixed installations from 1994 to 1995 is somewhat less than 2%.

This means that in 1995, as in 1994, there has been a small increase in the total injury frequency on fixed installations. The Norwegian Petroleum Directorate does not regard the increase as dramatic, however, the Directorate will be paying close attention to observe whether the increase may be a result of special problems or circumstances which may have particular significance for safety at sea. It is important to note that the number of incidents which have been reclassified as first-aid incidents or near misses is significantly higher than previous years. It is also possible that the intense focus on reporting of undesirable incidents, including through the development of the common reporting system, Synergi, has had a stimulating effect on the reporting of injuries.

Table 3.6.4a
Injuries/deaths per 1000 man-years (1976-95) on fixed installations.

Year	Hours worked	Hours per man-year	Man-year	Injuries and deaths	Injuries and deaths per 1000 man-years	Deaths	Deaths per 1000 man-years
1976	4.876.316	1852	2633	213	80,9	2	0,76
1977	8.146.948	1852	4399	282	64,1	2	0,45
1978	14.932.296	1752	8523	624	73,2	6	0,70
1979	14.986.608	1752	8554	575	67,2	0	0,00
1980	12.237.720	1752	6985	451	64,6	0	0,00
1981	15.612.072	1752	8911	415	46,6	0	0,00
1982	14.790.384	1752	8442	526	62,3	0	0,00
1983	11.473.848	1752	6549	334	51,0	0	0,00
1984	14.643.216	1752	8358	492	58,9	1	0,12
1985	15.014.640	1752	8570	600	70,0	1	0,12
1986	17.108.280	1752	9765	606	62,1	0	0,00
1987	22.169.458	1612	13753	831	60,4	0	0,00
1988	19.878.727	1612	12332	638	51,7	0	0,00
1989	19.935.637	1612	12367	597	48,3	1	0,08
1990	19.852.093	1612	12315	571	46,4	1	0,08
1991	22.263.572	1612	13811	589	42,6	0	0,00
1992	22.203.641	1612	13774	583	42,3	0	0,00
1993	25.411.735	1612	15764	642	40,7	2	0,13
1994	21.542.463	1612	13364	554	41,5	1	0,07
1995	21.902.897	1612	13587	580	42,7	1	0,07
Total/ average	338.982.551		202756	10703	52,8	18	0,09

Tables and figures - fixed installations

Table 3.6.4a shows inter alia a summary of personal injuries per 1000 man-years during the period 1976-1995 on fixed installations and on the mobile production installation "Petrojarl 1", which was active on the Norwegian continental shelf in 1991. For 1995, mobile units engaged in production activities are also included in the figures for fixed installations. The injury frequency for 1995 is equivalent to 26.5 injuries per million hours worked.

Figure 3.6.4a shows the development of personal injury frequency from 1979-1995 for the various main activities. Within the areas of drilling and administration/production, there has been a small decrease in the injury frequency, while construction/maintenance has increased from 48.9 to 50.5 injuries per 1000 man-years.

The biggest change in the injury frequency from 1994 to 1995 for fixed installations may be found within catering. This increase is primarily related to the operator-employed catering workers, where the injury frequency has nearly doubled from 22.0 to 43.3 injuries per 1000 man-years. None of the injuries were serious, and most are related to cuts to the hands in connection with handling of kitchen equipment as well as soft-tissue injuries to the feet and legs due to coming in contact with objects through dropping or kicking. Catering contributes approx. 9.5% of the total number of hours worked on fixed installations. In 1995, catering accounted for 7.8% of the injuries, with an injury frequency of 34.9 injuries per 1000 man-years, compared with 25.5 the previous year.

There has been a small decline in construction and maintenance activities from last year to this year. In 1995 construction and maintenance account for 42.6% of the hours worked and 50.2% of the injuries. The greatest increase in injury frequency has been among contractor employees. However, for employees of operating companies where there was a marked increase from 1993 to 1994, the injury frequency has been somewhat reduced. The most common types of injury are, as before, cuts, bruising injuries and impact injuries. The hands are the most vulnerable body parts, while there has been a gratifying reduction in the number of head injuries.

Drilling accounted for approx. 21% of the total amount of work and approx. 26% of the injuries in 1995, roughly the same as in 1994. Within the area of drilling, the Directorate has registered a halving of the number of injuries to the hands and fingers in connection with equipment handling. On the other hand, there has been a marked increase in injuries due to stepping on uneven surfaces and back strain connected with improper lifting.

In 1995, the administrative/production function has once again maintained the lowest injury frequency, 25.6 injuries per 1000 man-years.

Figure 3.6.4b shows the injury frequency for operator employees and contractor employees in the main activity categories for 1995.

Table 3.6.4.b shows the distribution of injuries, man-years and injury frequency for operator and contractor employees during the period 1985 to 1995. In 1995, contractors contributed 60.8% of the total hours worked on fixed installations compared with 59.1% in 1995. The contractor employees sustained 76.6% of the injuries, compared with 75.8% in 1994. The total injury frequency increased somewhat for both contractor and operator employees.

Table 3.6.4.c shows the distribution of accident types in the various occupational categories. The table shows accumulated values for the period 1979-1995.

Figure 3.6.4.a
Personal injury frequency on fixed installations (1979-95)

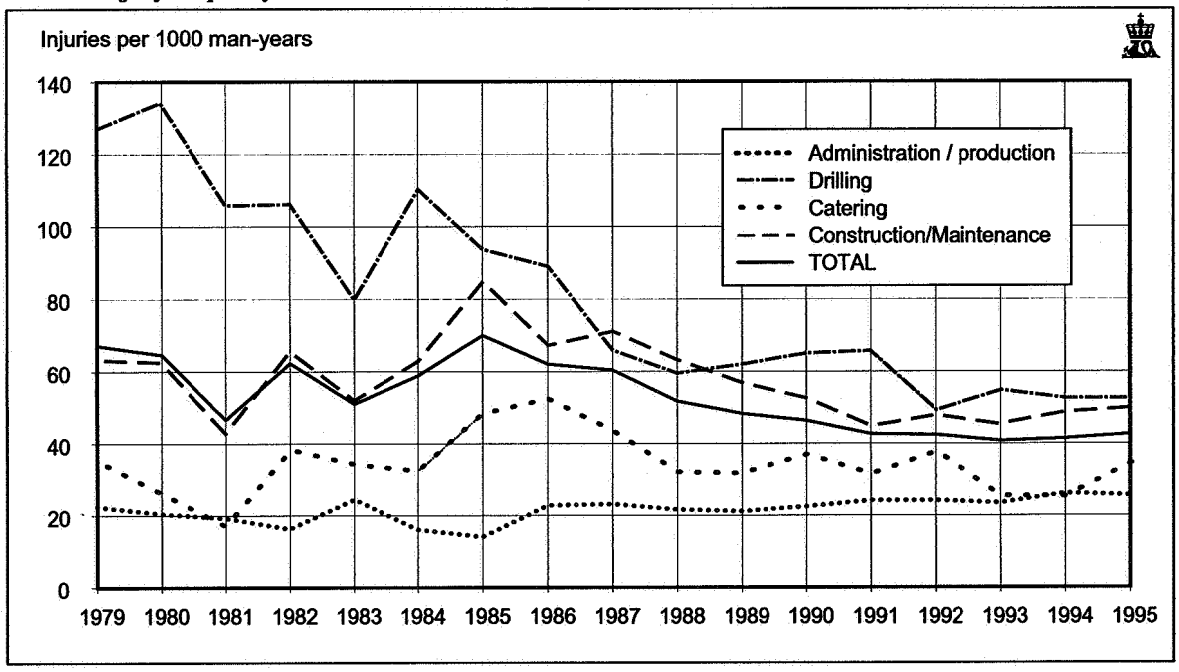


Figure 3.6.4.b
Personal injury by operators and contractors - 1995 on fixed installations

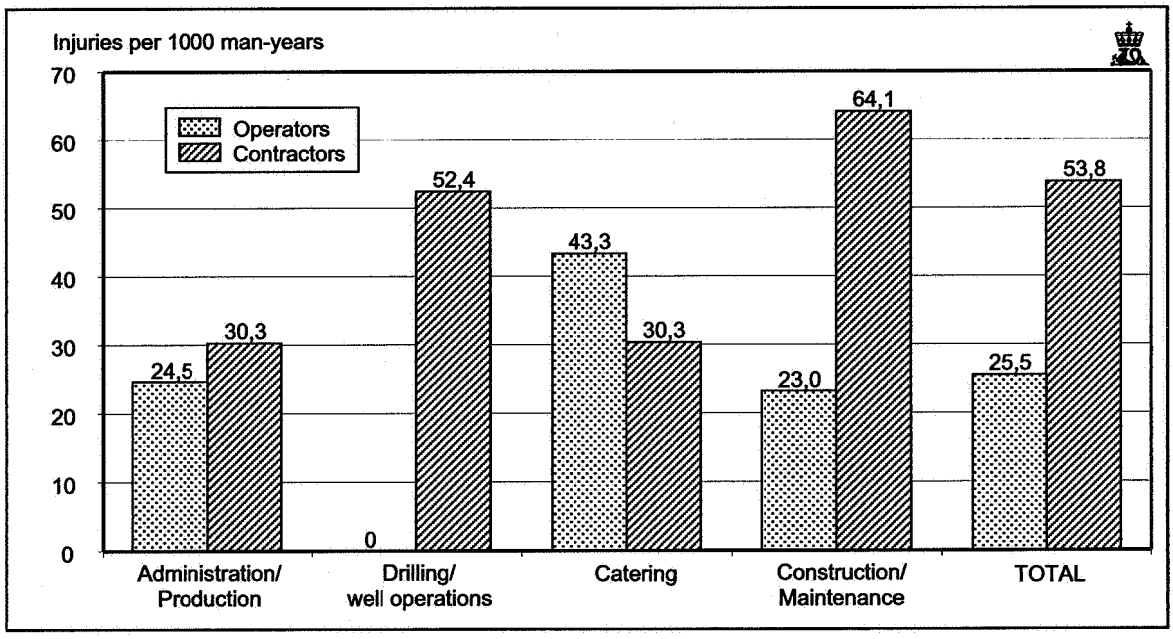


Table 3.6.4.b
Distribution of injuries and man-years on operator and contractor employees on fixed installations (1985-1995)

Function		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	
Administration/ production	Man-years	1575	1293	1692	1985	2099	2259	2366	2499	2607	3021	2939	Operator
		80	213	603	454	454	500	424	369	482	468	661	Contractor
	Injuries	19	33	44	47	44	50	53	54	59	76	72	o
		4	1	9	6	6	12	14	15	14	15	20	c
	Injuries/1000 man-years	12,1	25,5	26,0	23,7	21,0	22,1	22,4	21,6	22,6	25,2	24,5	o
		50,0	4,7	14,9	13,2	20,4	24,0	33,0	40,7	29,0	32,1	30,3	c
Drilling	Man-years	0	0	0	0	0	0	0	0	0	0	0	o
		1384	1371	1567	1883	2128	2027	2239	2340	2590	2648	2901	c
	Injuries	0	0	0	0	0	0	0	0	0	0	0	o
		130	122	103	112	132	132	147	115	142	140	152	c
	Injuries/1000 man-years	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	o
		93,9	89,0	65,7	59,5	62,0	65,1	65,7	49,1	54,8	52,9	52,4	
Catering	Man-years	0	39	94	209	340	396	447	464	498	454	439	o
		685	817	1073	882	888	868	953	887	956	839	857	c
	Injuries	0	5	5	4	3	13	13	17	12	10	19	o
		33	40	46	31	36	34	31	34	25	23	26	c
	Injuries/1000 man-years	0,0	128,2	53,2	19,1	8,8	32,8	29,1	36,6	24,1	22,0	43,33	o
		48,2	49,0	42,9	35,1	40,5	39,2	32,5	38,3	26,2	27,4	30,3	c
Construction/ maintenance	Man-years	1544	2063	2441	2399	2381	2364	2481	2536	2694	1985	1954	o
		3301	3969	6283	4520	4237	3901	4900	4679	5937	3949	3836	c
	Injuries	62	52	49	51	70	63	65	80	39	48	45	o
		352	353	575	387	306	267	266	268	351	242	246	c
	Injuries/1000 man-years	40,2	25,2	20,1	21,3	29,4	26,6	26,2	31,5	14,5	24,2	23,0	o
		106,6	88,9	91,5	85,6	72,2	68,4	54,3	57,3	59,1	61,3	64,1	c
TOTAL	Man-years	3119	3395	4227	4593	4820	5019	5294	5499	5799	5460	5332	o
		5450	6370	9526	7739	7547	7296	8516	8275	9965	7904	8255	c
	Injuries	81	90	98	102	117	126	131	151	110	134	136	o
		519	516	733	536	480	445	458	432	532	420	444	c
	Injuries/1000 man-years	26,0	26,5	23,2	22,2	24,3	25,1	24,7	27,5	19,0	24,5	25,5	o
		95,2	81,0	76,9	69,3	63,6	61,0	53,8	52,2	53,4	53,1	53,8	c

Table 3.6.4.c
Work accidents 1979-95 on fixed installations. Injury incident/occupation.

Occupation / Injury incident	Administration	Drillfloor worker	Driller	Electrician	Caterer	Assistant	Instrument technician	Crane operator	Painter / Gritblaster	Mechanic / Motorman	Operator	Plateworker / Insulator	Pipeworker / Plumber	Servicetechnician	Scaffolder	Welder	Derrickman	Other, unspecified	TOTAL	%
Other contact with object/machinery in motion	49	312	43	77	83	404	29	21	51	149	60	78	91	76	107	57	95	5	1787	18,6
Fire, Explosion etc.		1		3		8			1	5	2	4	4			3		0	31	0,3
Fall to lower level	19	33	12	50	17	116	21	15	58	53	37	39	43	30	35	35	20	3	636	6,6
Fall at same level	34	31	7	58	64	126	23	12	43	45	39	45	65	32	71	46	13	8	762	8,0
Stepping on uneven surface or tripping	37	32	11	74	42	116	24	17	53	53	54	41	66	38	67	62	16	9	812	8,5
Falling objects	11	49	11	15	16	87	7	1	19	40	7	41	36	28	70	32	6	2	478	5,0
Other contact with objects at rest	29	26	7	68	42	97	36	10	68	73	43	82	60	30	82	46	15	5	819	8,5
Handling accidents	30	97	14	96	130	208	35	19	60	187	48	132	135	60	96	104	35	3	1489	15,5
Contact with chemical or physical	6	19		19	39	73	10	4	106	25	34	23	27	24	10	31	9	1	460	4,8
Muscular strain	33	52	10	52	43	128	16	13	47	76	51	38	69	31	85	30	21	4	799	8,3
Splinter and splashes	20	40	9	43	23	108	8	5	175	90	40	156	179	22	33	316	10	4	1281	13,4
Electrical current		2		29	0	1	1	1		1		2			1	1		0	39	0,4
Extreme temperature	2			7	50	6	1	1	1	9	8	8	13	1	4	19		1	131	1,4
Fall into sea					0	1			1							1		1	4	0,0
Other	4	3		5	3	11	1	2	3	4	3	5	6		2	4		0	56	0,6
TOTAL	274	697	124	596	552	1490	212	121	686	810	426	694	794	372	663	787	240	46	9584	100
%	2,9	7,3	1,3	6,2	5,8	15,5	2,2	1,3	7,2	8,5	4,4	7,2	8,3	3,9	6,9	8,2	2,5	0,5	100,0	

3.6.5 PERSONAL INJURIES ON MOBILE UNITS

Nearly 20% fewer hours were worked on mobile units in 1995 compared with 1994. The Norwegian Petroleum Directorate has registered 90 personal injuries for 1995, a reduction of 21 injuries compared with 1994. The injury frequency for mobile units, on the other hand, has increased somewhat from 1994 to 1995. There have been no fatalities on mobile units in 1995 and the percentage of serious accidents is lower than for previous years. The Directorate has registered three off-duty injuries in 1995, the same as for 1994.

Reporting from mobile units shall be carried out according to the same criteria as for fixed installations. The Norwegian Petroleum Directorate continues to note greater uncertainty with regard to the reporting criteria in connection with reporting from mobile units. It has also proven to be difficult to achieve the same retrospective reporting of incidents, because of changes in the charterers of the units, units may be laid up, or no longer operate on the Norwegian continental shelf. These factors also make it difficult to achieve the same degree of accuracy in figures for hours worked on mobile units. The operators' reporting of hours worked is compared with rig-days registered in the Directorate and adjusted in consultation with the operating companies, thereby providing a fairly accurate estimate of the average manning on the installations. The Norwegian Petroleum Directorate therefore believes that the figures for recent years provide a reasonably correct picture of the conditions on mobile units.

Tables and figures - mobile units

Table 3.6.5.a shows inter alia a summary of personal injuries per 1000 man-years during the period 1989-1995 for mobile units. The injury frequency for 1995 is equivalent to approx. 31.9 injuries per million hours worked.

Figure 3.6.5.a shows the injury frequency for the main activities on mobile units over the past five years. Drilling and well operations account for 56% of the hours worked, but as much as 80% of the injuries. This makes for an injury rate which is relatively higher than for corresponding activities on fixed installations. There has been an increase in the injury frequency of 2 injuries per 1000 man-years for this group. The absolutely predominant types of injuries within drilling and well operations are cuts, bruises and impact injuries in connection with lifting operations and handling of equipment on the drill floor. The hands and feet are most vulnerable, while the number of head injuries in this category has been cut in half from 1994 to 1995. In 1995, no incidence of concussion leading to absence from work extending into the next shift was recorded.

The number of injuries within the administrative, catering, operations and maintenance functions is low, totaling only 18 injuries in 1995. There has been a small reduction in the injury frequency for all three groups.

As regards the relationship between operator employees and contractor employees on mobile units, the operator employees account for only 7% of the hours worked, and this is substantially work of an administrative nature. No injuries to operator employees were reported to the Norwegian Petroleum Directorate in connection with work on mobile units in 1995.

Table 3.6.5.b shows a cross-reference of the distribution of the various types of accidents in the various occupational categories. The table shows accumulated values for the period from 1989 - 1995.

Table 3.6.5.a
Injuries/deaths per 1000 man-years on mobile installations (1989-95)

Year	Hours worked	Hours per man-year	Man-year	Injuries and deaths	Injuries and deaths per 1000 man-years	Deaths	Deaths per 1000 man-years
1989	3584740	1612	2224	92	41,4	2	0,90
1990	4328907	1612	2685	139	51,8	1	0,37
1991	4878152	1612	3026	159	52,5	0	0,00
1992	4380013	1612	2717	141	51,9	0	0,00
1993	4205431	1612	2609	138	52,9	2	0,77
1994	3513753	1612	2180	111	50,9	0	0,00
1995	2821541	1612	1750	90	51,4	0	0,00
Total/ average	27712537		17191	870	50,6	5	0,29

Figure 3.6.5.a
Personal injury frequency on mobile installations 1991-95

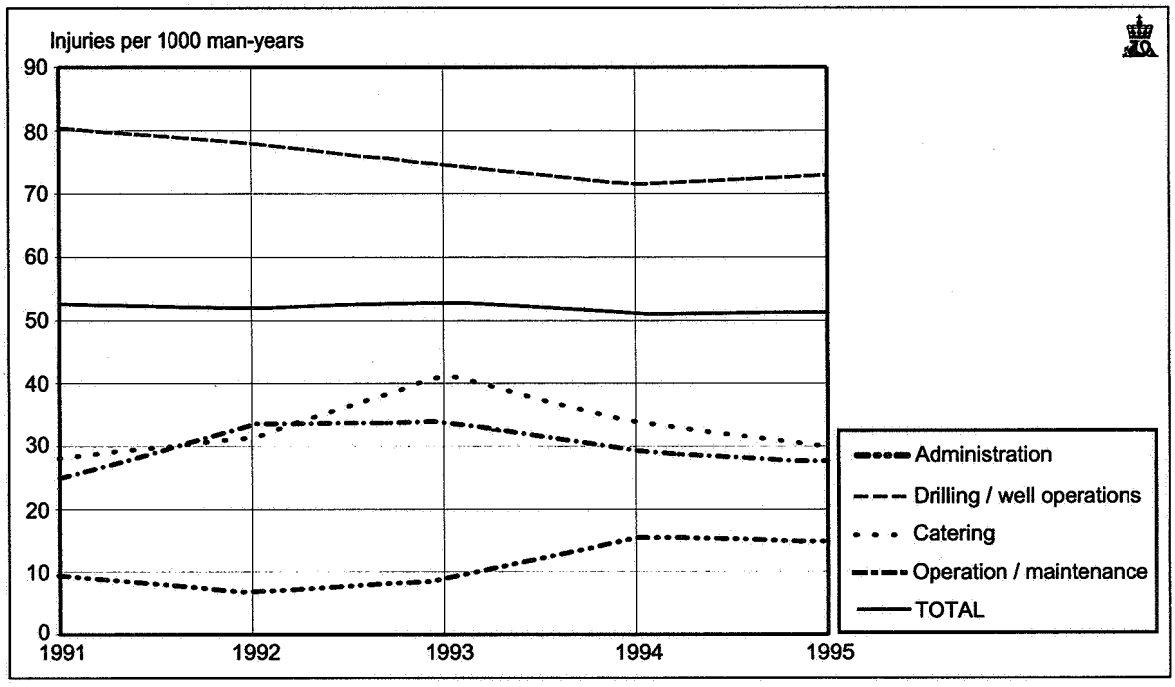


Table 3.6.5.b
Work accidents 1989-94 on mobile installations. Injury incident/occupation

Occupation / Injury incident	Administration	Drillfloor worker	Driller	Electrician	Caterer	Assistant	Instrument technician	Crane operator	Painter / Gritblaster	Mechanic / Motorman	Operator	Plateworker / Insulator	Pipeworker / Plumber	Servicetechnician	Scaffolder	Welder	Derrickman	Other, unspecified	TOTAL	%
Other contact with object/machinery in motion	4	102	18	1	5	79		4	1	10	4			26		5	20	3	282	32,4
Fire, Explosion etc.						1													1	0,1
Fall to lower level	3	5	2	1	2	9		2		2		1		6		5	3		41	4,7
Fall at same level	3	9	1	1	2	10	1	3		1				7			2		40	4,6
Stepping on uneven surface or tripping	4	16	6	1	3	14		4		3			1	11			11	1	75	8,6
Falling objects		24	4		2	12		4		2				6	1	2	4		61	7,0
Other contact with objects at rest	2	11	5	2	7	10				2	1	1		8		3	7		59	6,8
Handling accidents	5	50	4	1	13	13		2		10		1		15		4	11		129	14,8
Contact with chemical or physical compound	2	7	1	1	1	3				1			1	2	1	2	4		26	3,0
Muscular strain	5	23	6	2	4	14		2		1	1			11			8		77	8,9
Splinter and splashes	3	17	1	3	2	8		1	1	5				3		10	7	1	62	7,1
Electrical current														1			1		2	0,2
Extreme temperature		1			6					1			1			1			10	1,1
Other		2	1			1				1									5	0,6
TOTAL	31	267	49	13	47	174		22	2	39	6	3	3	96	2	32	78	5	870	100
%	3,6	30,7	5,6	1,5	5,4	20,0		2,5	0,2	4,5	0,7	0,3	0,3	11,0	0,2	3,7	9,0	0,6	100,0	

3.6.6 SUMMARY

Unfortunately, fatal accidents also occurred in 1995; when a deck operator died after being hit by a loading hose which gave way. Also, on a supply vessel a seaman died in connection with a loading operation. There has been an increase in the overall injury frequency compared with 1994, but it appears that the percentage of serious personal injuries is lower for both fixed and mobile units. For mobile units, the registered percentage of serious personal injuries is the lowest ever.

The Norwegian Petroleum Directorate does not view the increase in the overall injury frequency as dramatic, but will, however, pay close attention and observe whether this increase may be due to special problems or circumstances which may have particular significance for safety at sea.

The injury frequency for the drilling and well activities function for fixed installations is about the same as for 1994, while construction and maintenance activities have shown a small increase. Catering, which has had the largest increase in injury frequency, accounts for a relatively small share of the total amount of work and number of injuries. Administration/production has maintained a stable injury frequency since 1986, and is at about the same level as in 1994. The injury frequency for mobile units has increased a bit and also in 1995 shows just over 50 injuries per 1000 man-years.

The Norwegian Petroleum Directorate would like to thank the operating companies for their good cooperation in the review of injury registration for 1995. It has been proven that this review is valuable for both parties and contributes to a continuous dialogue regarding the reporting system. This is instrumental in ensuring a common understanding of the reporting routines and criteria. There is still varying knowledge within the industry, and we have seen that in particular projects and new organizational units do not have adequate knowledge of the routines for reporting to the authorities.

3.6.7 INJURY SUMMARY FOR DIVING ACTIVITIES

Figures 3.6.7.a and 3.6.7.b present a summary of the number of incidents reported to the Norwegian Petroleum Directorate for the years 1985-1995 in connection with diving activities. The incidents are subdivided into the categories near-accident, accident and fatal accident. An accident is defined as being all incidents which lead to some form of personal injury. Infections, such as inflammation of the external auditory canal, are consequently registered as accidents.

Figure 3.6.7.a shows that the number of accidents entailing personal injury related to saturation diving is basically unchanged in 1995 compared with 1994, even though the activity level has been halved. Inflammation of the external auditory canal is the predominant type of accident.

In 1995 as in 1994, no cases of decompression sickness in connection with diving related to the petroleum activities were reported.

Figure 3.6.7.a
Incidents in saturation diving

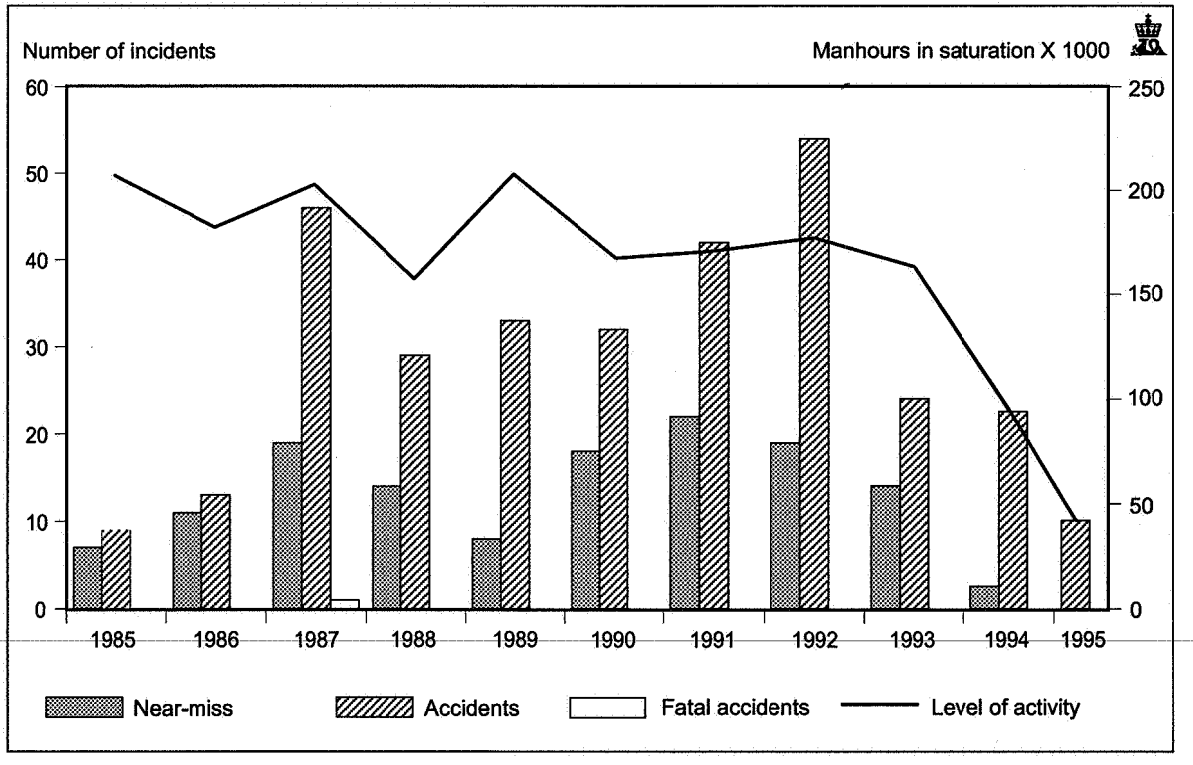
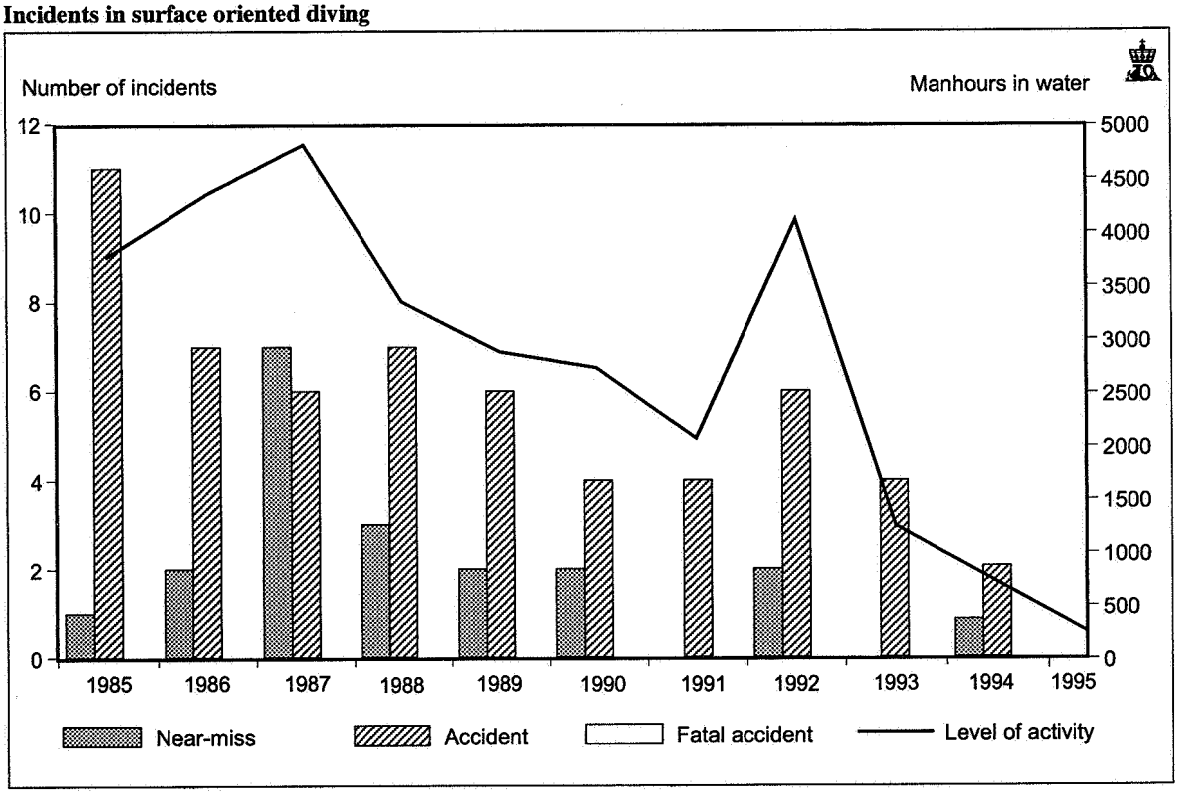


Figure 3.6.7.b
Incidents in surface oriented diving



3.7 WORK-RELATED DISEASES

The Norwegian Petroleum Directorate has continued to focus on the requirements of the Working Environment Act regarding notification to the supervisory authority of disease that can be attributed to work, and notes with satisfaction that this reporting obligation is being followed up by the companies more and more actively. Supervision of the companies' notification of work-related disease was also exercised in 1995.

The incidence of work-related diseases can be an indicator of the quality of the working environment. Our goal is for the companies to establish this as a working environment indicator and make vigorous use of it in their preventive safety and environmental work.

461 notifications regarding work-related disease were received, an increase of 36% from 1994, giving a notification frequency of 3.0% per man-year. Nominative (individual) notifications have been received for 40 cases of loss of hearing, but there is reason to believe that such damage is considerably underreported. If this group is excluded, the frequency of other occupational disease is 2.7%. This is substantially higher than the corresponding figure for onshore industrial operations in Norway. The Norwegian Petroleum Directorate expects that there may still be a degree of underreporting, since it is still receiving relatively few notifications from certain companies with many offshore employees. The Norwegian Petroleum Directorate has not received any summary notifications of loss of hearing.

Figure 3.7.a shows the diagnosis group distribution of work-related diseases registered in 1995, in accordance with the ICD classification. The figures for 1993 and 1994 are shown for purposes of comparison. These statistics exclude cases of noise-related loss of hearing.

The picture is as previously dominated by skeleto-muscular disorders (including disorders of the connective tissues) which are normally referred to as repetitive-strain injuries: back disorders, tendinitis and various forms of muscular pain. The exposures given as cause of these repetitive-strain injuries are summarized in Figure 3.7.b. This diagram includes data from 1994 and 1995, the years the current coding system for repetitive-strain injuries has been employed.

The diagram shows that handling of heavy loads and heavy lifting have been cited as the most important causes of disorders of the skeleto-muscular system in 1995, and that this share has risen from 1994. Another important cause of this kind of disorder was repetitive, monotonous work. Both these exposure categories are cited as causes of inter alia tendinitis and muscular pain. The proportion of cases of degenerative changes in knees and hips attributed to extensive walking on hard surfaces is relatively high and unchanged from the previous year. Sudden movements have often resulted in back problems like lumbago and sciatica.

Another large group of diseases are skin conditions, primarily eczema caused by exposure to different kinds of chemicals. This group is dominated by employees who have developed eczema on their hands after having been

Figure 3.7.a
Distribution of work-related diseases on diagnosis groups 1993 - 1995

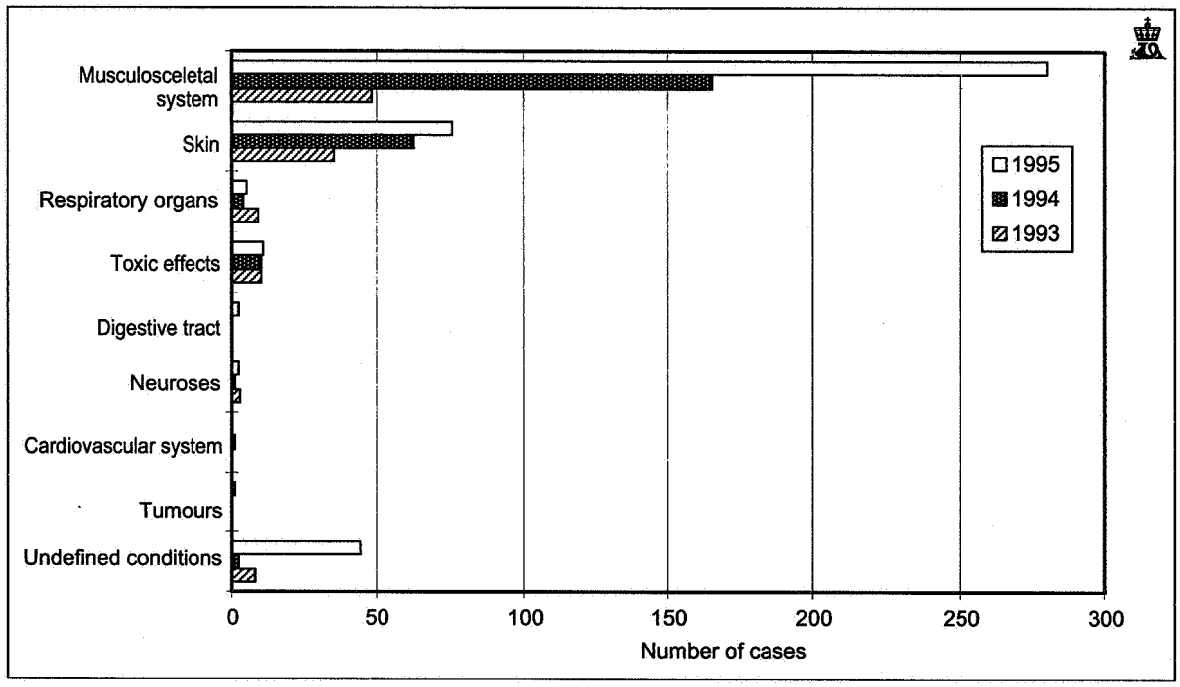
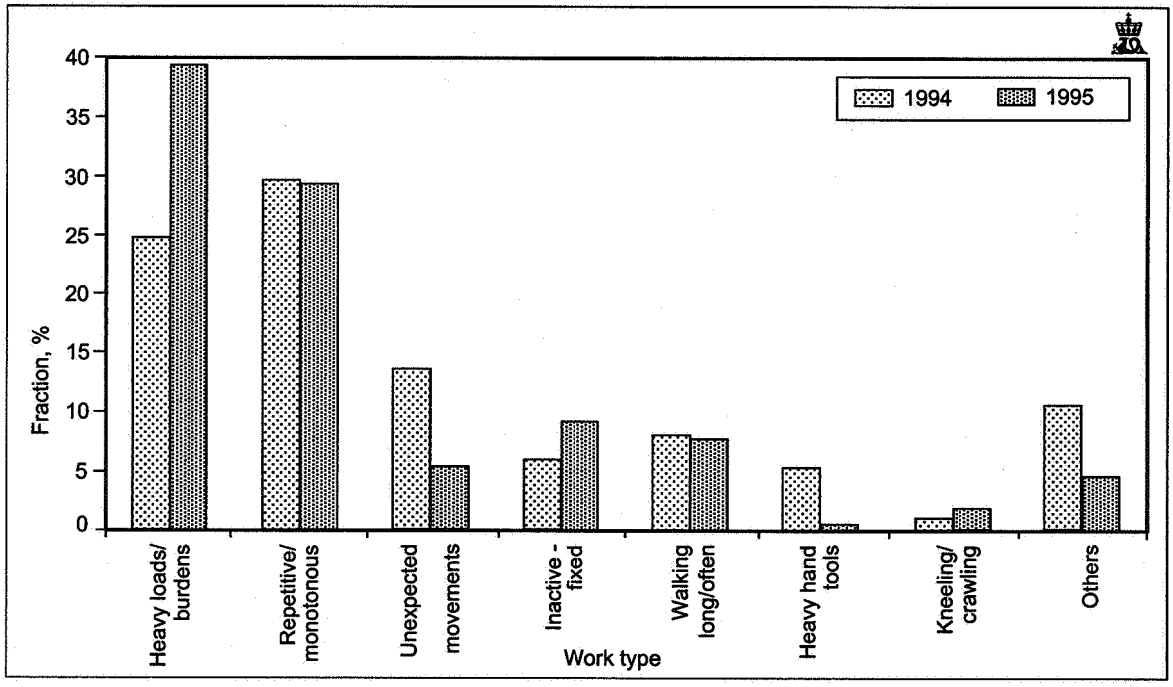


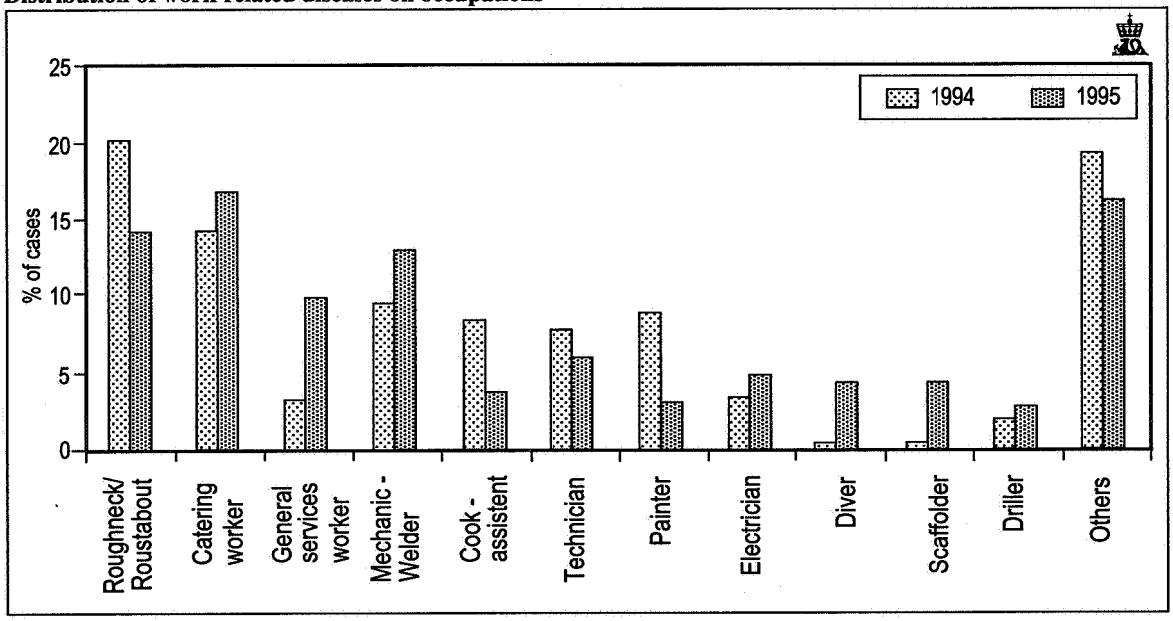
Figure 3.7.b
Unphysiological work - work positions



in contact with oil-based drilling mud. Some cases can also be attributed to other organic compounds, including epoxy, and in addition a certain proportion must be attributed to inorganic compounds such as various metals. Some eczema cases among the catering staff have been attributed to contact with detergents and other chemicals used by this category of employee.

Disorders of the respiratory system are asthma and bronchitis plus respiratory irritation due to airborne irritants, whereas the diagnoses grouped as toxic effects refer to a range of different symptoms caused by exposure to chemicals. Included in this group are cases of so-called Teflon fever.

Figure 3.7.c
Distribution of work-related diseases on occupations



Undiagnosed conditions are various symptoms that are due to exposure to undesirable working environment factors and are difficult to classify as disease. These include sleep disturbances resulting from two-shift work in the form of so-called swing shifts. In the group of mental diseases there are cases of neuroses caused by psychological stress in the working environment.

Figure 3.7.c shows how work-related diseases are distributed by various position categories.

The diagram may give the impression that workers within the drilling sector were particularly vulnerable. This group, however, is responsible for more than 25% of the number of man-years and the number of cases is therefore lower than expected. The catering staff, on the other hand, is a vulnerable group. In 1995 this group was responsible for 9.5% of the number of man-years but more than 20% of the number of cases of work-related diseases. There was a relatively large increase in the number of cases in divers, most of these suffering from the skin condition called "divers' hands".

3.8 WORKING ENVIRONMENT

3.8.1 THE INDUSTRY'S MEASURES TO PRACTICE THE SYSTEMATIC FOLLOW-UP REGULATIONS

The regulations relating to systematic follow-up of the working environment in the petroleum activities (the Systematic Follow-up Regulations) came into force on 1 August 1995. The regulations have been drawn up in close contact with the industry.

The regulations link quality assurance principles to the working environment field and formalize the use of management elements, of which the most important are:

- working environment objectives,
- specific requirements for the working environment,
- working environment program,
- charting and assessment of the working environment,
- implementation of preventive action.

In addition to imposing requirements that there be a management loop for the working environment in the activities, the regulations lay down specific requirements related to the individual working environment factors. The regulations are supplemented by an amplifying guideline that provides a more detailed description of and reference to accepted norms in the area of working environment.

In connection with the adoption of the regulations, a considerable amount of information work has been done vis-à-vis the industry. Inter alia, a working environment seminar held by the Norwegian Petroleum Directorate in the autumn of 1995 focused on the Systematic Follow-up Regulations.

Towards the end of 1995 the operating companies were asked to report back on the status of measures to comply with the Systematic Follow-up Regulations. This feedback provided limited information, but indicated that processes are underway within the companies with a view to reviewing their own systems and bringing them into conformity with the requirements of the regulations. There would seem to be major differences between the various operating companies as regards status, attitudes and awareness in relation to the requirements of the regulations.

Experience from supervision activities, however, points in the direction of the companies' having a more positive perception of the status of this work than there is a basis for. It would seem that compliance with the Systematic Follow-up Regulations is dependent on a change of attitude on the part of several of the companies and will necessitate

a more thorough analysis of own systems and activities than hitherto planned for. Many of the requirements of the Systematic Follow-up Regulations are directed towards the contractor as an employer. For this reason the Norwegian Petroleum Directorate sent a form containing questions regarding actions in connection with compliance with the Systematic Follow-up Regulations to 45 shipping companies, diving companies and drilling, maintenance and catering contractors. The survey revealed a somewhat deficient awareness of what the Regulations' requirements were and how they were relevant to their own operations. In context with experiences from the supervision, we see that in this sector of the industry too, the companies' self-image is more positive than appears to be justified.

On the other hand, the Norwegian Petroleum Directorate considers it positive that the industry has prepared common requirements as to working environment, in that the NORSOK work has involved the issue of a standard that will ensure that the quality of the working environment in the operational phase is taken care of in the engineering phase. It is also positive that the Norwegian Oil Industry Association (OLF) and the Norwegian Shipowners' Association have issued recommended guidelines for systematic follow-up of working environment on mobile units.

In many of the companies, however, it is not an established tradition that working environment requirements be submitted to non-conformance action and followed up in a systematic manner in the same way as other requirements. Furthermore, the experience of the Norwegian Petroleum Directorate is that the companies' charting and evaluation of the working environment is often defective. The Directorate also notes a tendency to scaling-down of expertise within the working environment field and is concerned that risk factors in the working environment have not adequately been identified, assessed, prioritized and followed up.

As part of the industry's strategy to achieve cost reductions, it has been considered important to leave more and more assignments to the contractor industry. This also has side-effects on safety and working environment, with an increased need for expertise in the contractor industry. The survey mentioned above and experience from the supervision indicates that the contractor industry suffers from a shortfall of expertise in this area. It is thus a challenge to the operating companies to ensure that the contractors have access to and make use of such expertise. For the contractor industry the challenge is to develop expertise in the field of working environment that is proportionate to the problems to be dealt with.

3.8.2 CLIMATE OF COOPERATION

In recent years the industry has worked vigorously to put into practice the recommendations and incorporate the standards that have emerged from the NORSOK work. This means inter alia that several operating companies have achieved considerable reductions in operating costs. Associated reorganizations presuppose good cooperation between all involved parties. Given the climate of change that prevails in the industry, the significance of the cooperation conditions for safety and working environment is becoming steadily greater. A good psycho-social working environment, inter alia with regard to worker co-determination, is a precondition for a successful incorporation of the NORSOK philosophy.

New forms of collaboration between operator and contractor companies have been attempted without sufficient advance clarification of the division of responsibility and labor. In some contexts it has been unclear what control documentation should be used, which has led to comments on the part of the Norwegian Petroleum Directorate.

These reorganization processes have presented the formal bodies charged with ensuring worker co-determination in preventive safety and working environment work, including the Working Environment Committee and Safety Delegate system, with substantial challenges. There has been discussion between the parties as to when and on what level of the organization worker co-determination is to be secured. In the opinion of the Norwegian Petroleum Directorate, the necessary clarifications now appear to have been completed, so that the systems for worker co-determination function as intended by the regulations.

On mobile units, however, deficiencies have been discovered, plus uncertainty as to how the joint Working Environment Committee on the individual installation is to be organized. The Norwegian Petroleum Directorate has remarked on such matters in connection with its supervision.

3.8.3 CHEMICALS IN THE PETROLEUM ACTIVITY

The Norwegian Petroleum Directorate has long been concerned that the companies make qualified advance assessments of health risks related to choice of chemicals. The Systematic Follow-up Regulations with guidelines amplify the Working Environment Act's demand that the least hazardous chemicals be chosen. In this connection the Directorate has focused on the quality of the occupational-health data sheets, because these are normally the most important basis for an advance assessment. In several cases it has been found that the data sheets have not been good enough for this purpose.

In 1995 the Norwegian Oil Industry Association established a system for quality assurance of occupational-health data sheets. The Norwegian Petroleum Directorate regards this as a rational scheme that can help to improve the basis for health hazard assessment and injury prevention work in connection with chemicals. The Directorate expects that the companies will join the scheme for quality assurance of occupational-health data sheets.

3.8.4 HEALTH HAZARDS CONNECTED WITH USE OF DRILLING MUD

The handling of drilling mud on offshore installations can in the short and long terms involve health hazards in

consequence of skin contact and inhalation of vapor. In recent years, a number of so-called pseudo-oilbased mud systems have come into use, with satisfactory properties with regard to discharges into the external environment. The working environment characteristics of these mud types have not, however, been adequately studied and evaluated, and it has therefore not proved possible to fully assess the potential health hazards of such substances. Nor do there exist criteria that can be employed in monitoring of the working environment when such mud types are in use.

Work is in progress under the Norwegian Oil Industry Association to develop criteria for assessment and choice of drilling mud, criteria covering both the working environment and the external environment. The Norwegian Petroleum Directorate expects and hopes that the companies will undertake a comprehensive and integrated assessment of the choice and use of drilling mud.

The Norwegian Petroleum Directorate has noted that the industry is to an increasing extent adopting a zero-discharges policy. This may mean that for reasons of cost the companies once more elect to use oil-based drilling mud, and the Directorate has observed that such a development is under way. The companies intend to solve the waste problem by reinjecting the cuttings or transporting them ashore for disposal. The working environment consequences have been considered only to a limited degree. In the light of previous experience it is known that with present-day technology there have been problems in adhering to the administrative norms for oil vapor in certain areas. The Norwegian Petroleum Directorate expects that companies that resume use of oil-based drilling mud make sure that the working environment conditions are entirely proper and that if necessary they will initiate the development of new technology in this area.

3.8.5 USE OF RADIOACTIVE SOURCES

The Norwegian Petroleum Directorate has previously recommended that personal acoustic alarms be employed by all radiography operators as soon as a suitable alarm in an explosion-proof design is available. Several incidents of uncontrolled exposure to radiation in petroleum activities mean that such equipment should be used for continuous monitoring of radiation dosage, and then as an extra line of defense to the radiography operator's use of an ordinary Geiger counter.

The Norwegian Petroleum Directorate considers that suitable equipment is now to be found on the market and has informed the industry that the Directorate aims to incorporate a requirement in the Systematic Follow-up Regulations that personal acoustic alarms are to be used in radiography work.

As regards ionizing radiation, the Norwegian Petroleum Directorate has informed the industry of the applicable standards for dosage limits for exposed workers in the petroleum industry.

3.8.6 WORKING HOURS AND DURATION OF OFFSHORE STAY

The systems used for planning, registration and control of the working hours on the individual installations are by and large good. However, the Norwegian Petroleum Directorate has revealed and called attention to some instances in which the accumulated working time and overtime for certain workers has exceeded the maximum limitations in the regulations. The Norwegian Petroleum Directorate has also uncovered a lack of conformity between working hours lists covering the same work period. The Directorate takes a serious view of the use of lists that give contradictory information and would urge that the operating companies and main enterprises exercise more thorough control of the lists and document this control, for example by countersigning the contractor's timesheets.

Under the Working Environment Regulations, the Norwegian Petroleum Directorate can, by way of exception and for a limited period, approve regular periods of stay offshore in excess of 14 days for workers with special qualifications. This applies solely to specialists and the criteria for approval of such extended periods are strict. These conditions have led to a restrictive attitude to permitting deviations from the normal period of 14 days on the installation. In 1995, none of the applications for permanent extension of offshore stays were granted.

3.8.7 REGISTRATION, NOTIFICATION AND FOLLOW-UP OF WORK-RELATED DISEASES

In recent years the Norwegian Petroleum Directorate has turned the spotlight on the companies' registration, notification and follow-up of work-related diseases. This has led to the topic increasingly appearing on the agenda of the companies and to a growing level of reporting to the Directorate.

After the Norwegian Petroleum Directorate gave the companies reasonable time to establish the necessary schemes, the Directorate has in 1995 initiated supervision of the companies in this area. The supervision has demonstrated potential for improvement in the system for classification of cases of work-related diseases and further notification to the Directorate of verified cases. In addition, it has been noted that the company health service collects considerable quantities of data on work-related disease, but such data is little used in preventive safety and environment work.

3.9 PREPAREDNESS

3.9.1 PREPAREDNESS MEASURES - COLLISION

On 30 September 1995 the German freighter M/V "Reint" collided with Compressor Installation H7, which is part of the Norpipe line that runs from Ekofisk to Emden in Germany. This installation is in the German sector, but under the agreement between Norway and Germany falls under

Norwegian jurisdiction. The collision caused minor damage to both installation and vessel.

The operating company Phillips has initiated a number of measures of both a short and long-term nature in order to improve the preparedness measures to be taken in the event of danger of ship collisions. The Norwegian Petroleum Directorate will follow this development carefully, on the basis of the severe potential consequences of a collision.

3.9.2 TRANSFER OF PREPAREDNESS EXPERIENCE TO SHORE-BASED ACTIVITIES

The Norwegian Petroleum Directorate's Preparedness Regulations are based on many years of preparatory work, in which major resources have been invested in achieving an integrated and systematic approach to establishment, maintenance and development of preparedness in the petroleum activities. A significant amount of the feedback from the users of these Regulations have been good.

Shore-based activities both in Norway and abroad have displayed growing interest in the principles on which the Preparedness Regulations are based. In 1995, therefore, the Directorate has dedicated some resources to information to different bodies, in the form of lecture activity and via participation in committees and work groups.

3.9.3 THE MYNDEX EXERCISE

In accordance with the coordination agreement made between the State Pollution Control Authority and the Norwegian Petroleum Directorate, the first MYNDEX exercise was held in 1995, under the leadership of the Directorate. The main rule is for the exercise to be held annually, and the two agencies are to alternate at having the responsibility, every other year. The object of the exercise is to ensure a coordinated and efficient procedure for safeguarding of the State's duties and responsibilities in hazard and accident situations that affect the two agencies. The 1995 exercise focused on factors connected with drifting objects, problems with oil wells that could lead to a blow-out, and threats to oil pipelines.

The exercise showed that the coordination agreement between the agencies is adequate for their collaboration in hazard and accident situations. The agreement covers both short-term and long-term situations in a satisfactory manner. The need for a coordinated handling of the news media also seems to be satisfactorily dealt with.

As a further follow-up of the exercise, the two agencies will in 1996 continue work on certain factors that also affect the administrative responsibilities of the Norwegian Maritime Directorate, particularly with regard to handling of drifting objects.

3.10 DRILLING

3.10.1 OVERVIEW OF DRILLING AND WELL ACTIVITIES

In 1995 a total of 36 exploration wells were spudded on the Norwegian shelf which is considerably more than in 1994, when 21 were spudded.

Geographically speaking, the exploration wells were distributed 30 to the North Sea and 6 in the Norwegian Sea. No new exploration wells were spudded in the Barents Sea in 1995.

In 1995 a total of 109 production wells were drilled, compared with 98 in 1994.
Of these, 42 were drilled from mobile units.

As regards well maintenance, the level of activity has continued to increase. An important cause of this is that the companies are deliberately investing in further development of the technical and operational solutions related to well maintenance.

3.10.2 DRILLING AND WELL MAINTENANCE

The total level of activity in exploration and production drilling has increased in comparison with previous years, as has activity in well maintenance. An important cause of the increase in well maintenance is the aging of existing wells and improved technology within certain areas.

In low-productive zones it is normal to perform well completion, perforation and in some cases stimulation of wells with cable and coil tubing and pressure pipe units under reduced overpressure and in some cases underbalanced. This is done primarily to reduce the damage to the producing zone. Another gain is that the use of an extra maintenance unit on board the installation liberates the drilling installation for drilling operations related to new wells.

Experiences with cable, coil and pressure pipe operations has also contributed to the fact that drilling with coil tubing is now being attempted on the Norwegian Shelf. Coil drilling may not reach any great scale, but as underbalanced operations are developed, may come to be numbered among routine operations on the Norwegian Shelf.

3.10.3 MULTILATERAL DRILLING

Multilateral drilling is a new technology that has been developed mainly to increase production at low cost. The technique involves drilling one or several branches out from a well and into zones that previously required several individual wells to reach. The technology is particularly well-suited to drilling in zones with low productivity.

Multilateral drilling can be done in both existing and new production wells. The most simple is open multilateral drilling, but there are variable solutions depending on reservoir- and well-specific needs.

The challenge is to control different pressure regimes between zones, temporary insulation of branches, re-entry of branches and flexibility between older and newer solutions. The need for number of well slots will be reduced, in that several wells can be drilled from the same slot, or else the size of new installations can be reduced.

3.10.4 FALLING OBJECTS

The Norwegian Petroleum Directorate has recently noted a considerable increase in the reporting of incidents with falling objects in the drilling and well areas. In several cases there have been personal injuries, sometimes serious ones.

Most of the serious incidents noted are due to inadequate preparation for the work, deficient maintenance, etc.

The Norwegian Petroleum Directorate is aware that some of the companies have already commenced targeted and structured work to solve this problem. In this work the companies have also laid great emphasis on the establishment of a close and trusting relationship between all parties within the activity concerned.

The Norwegian Petroleum Directorate firmly expects that the industry will initiate its own measures to clarify the incidents in question, undertake the necessary analyses of the course of events and causes and will take the measures required in the light of this.

3.11 NATURAL ENVIRONMENT DATA

Collection of natural environment data (currents, waves, wind, etc.) from Ekofisk, Sleipner, Frigg, Statfjord, Draugen, Heidrun, Ross Rig, Deepsea Bergen and Polar Pioneer has proceeded in a satisfactory manner in 1995. With the aid of the Norwegian Meteorological Institute, the Norwegian Petroleum Directorate has supervised the collection of data on these installations. The assistance arrangements have functioned in a highly satisfactory manner and enhance the quality of this supervision.

In 1995 the collection of natural environment data from the Heidrun field began. Preparations have also been made for the gathering of natural environment data from Yme and Norne, when production starts on these fields in 1996.

3.12 STRUCTURES AND PIPELINES

3.12.1 INTERNATIONAL STANDARDIZATION

In 1990 the Norwegian Building Standards Agency (Norges Byggstandardiseringsbyrå) established a committee to update Norwegian Standard NS 3479 regarding structure loads, a committee on which the Norwegian Petroleum Directorate was represented. After the work was begun, work also started on a European Standard (CEN) in the area. Subsequent work has taken the form of the committee being a Norwegian consultee for the CEN standard. Several parts of this standard were published in 1995; those with the greatest relevance to petroleum activities are the parts on specific gravity, variable loads and wind loads.

In 1991 the Norwegian Engineering Standards Association (NVS) established Norwegian reference committees for new ISO standards for Offshore Structures, Pipeline Transportation System for the Petroleum and Natural Gas Industries and Line Pipe. The Norwegian Petroleum Directorate has been represented both in national committees and has acted as the Norwegian representative in the international work.

ISO 13636 - Part 1, Offshore Structures, was published in December 1995, while the work on Part 2 on steel structures has been ongoing for over three years. This will to a large degree be based on the American standard API-RP-2A-LRDF. According to this plan, the final standard will be published in 1999. The Norwegian Petroleum Directorate is sitting on two panels dealing with the marine environment and corrosion prevention.

The work on Part 3, Concrete Structures, started up in 1994. This will to a large extent be based on the Norwegian standards NS 3420 and NS 3473. The Norwegian Petroleum Directorate has sent one representative to this work, who is also panel chairman for status control of concrete structures. It is planned to have the standard finished in the year 2000. The work on Part 4, Mobile units, was begun in 1995. The Norwegian Petroleum Directorate is here represented on one panel on anchoring and dynamic positioning.

3.12.2 COLLISIONS

Two collisions between vessels and installations were reported in 1995. One was between the H7 compressor installation and the German-registered freighter Reintz, the other was between Ross Rig and the supply ship Far Sea.

In the period 1982-95, 33 collisions between structures and vessels were reported. Statistically speaking, this gives a frequency of about 3 per installation per century. Four of this period's collisions involved tankers for buoy loading, while the others concerned other types of vessels. There is no clear trend to increase in the number of collisions, even though the number of installations has increased substantially in the period.

Only two collisions in the period 1982-95 have been caused by an unauthorized vessel, that is to say, vessels that have not been cleared to maneuver within the security zone around the installation. These were the submarine collision on Oseberg in 1988 and the collision between a German freighter and the H7 installation in September 1995.

Several studies of the North Sea environment have shown that contact and collisions between ships and fixed installations are the most common causes of damage to such installations. The figures vary between 16 and 31%. Studies indicate that 22% of the damage to British installations requiring repair are due to collisions.

There have been no reports in 1995 of drifting objects that have represented any hazard to installations on the Norwegian Shelf. In the period 1982-95, 10 such situations have been registered.

In 1994 a collaborative project was begun by British

and Dutch authorities to compare and standardize the calculation of collision risks. The work was continued in 1995 and will probably continue a while yet.

3.12.3 CALCULATION OF WAVE HEIGHT

Reliable values for wave conditions are of great significance for the industry. Particularly in connection with the subsidence problems on Ekofisk, wave heights are a crucial factor for decisions and implementation of measures to maintain a prudent safety level on the installations. If the wave height is estimated too high, it can impose heavy costs on the licensees, while underestimation can lead to the installation being exposed to damage in storms, not only endangering human life but also involving serious consequences for the external environment and operational regularity.

Calculation of wave heights and the effects of waves is, however, extremely complicated. The shape and size of waves depends on many factors; in addition to the wave height itself. The shape and direction of the waves are also relevant to the effect on the structures hit by the waves. There is also great uncertainty associated with the statistical treatment of wave data.

In 1994 several independent assessments and analyses of the wave conditions on Ekofisk have been carried out. For most parameters describing the size and shape of the waves, the results of the various calculations have been more or less consistent. They diverge, however, with regard to the values for wave crest height with a 100-year return period. The wave crest height expresses the height of the wave crest over a normal condition and is thereby important for calculation of possible damage to deck structures.

In 1994 and 1995 the Norwegian Petroleum Directorate performed several analyses of wave crest heights in the Ekofisk area, and has used consultancy assistance to go through the results. The conclusion was that higher wave heights than the operator had reckoned with may occur. This conclusion was passed on to Phillips, who was the operator for the fields in the area, and through the year the Directorate has followed up the operator's measures in relation to this.

3.12.4 EROSION AND SEDIMENTATION ON THE SEABED

The subsidence of the seabed in the Ekofisk area has led to the subsidence pit being gradually filled with sand which is in movement along the seabed. This means that the lowest part of the structures plus the pipelines in the area affected by the subsidence, are covered by a sand layer of increasing thickness.

The areas in the southern part of the North Sea have fine sand that erodes easily. Structures on the seabed alter the local current conditions so that the water masses increase in speed, which in turn increases erosion. Around the structures exposed to erosion, there is often a rapid development in the direction of a maximum erosion depth just after they are installed. Normally, the erosion then decreases or stagnates completely. During storms, erosion can increase sharply. An example of this was encountered on Ekofisk in January 1995, when erosion led to a jack-up rig sinking 1.5 meters at one corner.

The Norwegian Petroleum Directorate has gone through all the reports of erosion around Norwegian installations, back to 1976. In one case the erosion is about four meters, and in this case there is nothing to suggest that the erosion has reached its limits. After comparing the observed erosion with various theories, we are obliged to conclude that our chances of predicting the amount of erosion for a given structure are limited. Erosion depends on the geometry of the structure, water depths and current conditions. When erosion increases, the distance from surface to the seabed also increases, and thereby the stress that the structure has to withstand. It is therefore necessary to incorporate a sufficient safety margin for this factor when designing future installations.

3.12.5 STORM DAMAGE IN 1995

In the course of 1995, there were two storm periods in the North Sea, which led to material damage and operational problems.

On the jack-up rig West Omicron, installed with bridge to 2/4-K on the Ekofisk field, one of the legs sank 1.5 meters due to erosion of the foundations. The crew managed to compensate for the subsidence by jacking-up the installation, and major damage was thus avoided. However, there was minor damage to the bridge to 2/4-K.

On the tension-leg platform on the Snorre field, high waves led to minor damage to the deck structure. The damage was, however, restricted to secondary structures.

The semi-submersible installation on Veslefrikk was also hit by waves that led to damage to load-bearing structures. On the basis of this experience, the operator will in future ensure that in storm situations, the installation is raised three meters more than previously.

The 2/4-E installation on the Tor field incurred some minor damage to secondary and temporary structures underneath the cellar deck.

3.12.6 PROTECTION OF THE CONCRETE BASE ON TROLL A

During the construction of the concrete base of the Troll A installation, large concrete plates were placed over the tops of the cells as protection against any falling objects in the construction phase. A verification revealed that these plates would be liable to move in consequence of deformation of the concrete, due to water pressure when the base was submerged to allow for fitting of the deck. Such a shifting could lead to damage to the concrete shafts, and in the worst case this could lead to critical water entry into the base.

A short time before fitting of the deck, therefore, a special protection was manufactured and installed in order to secure the structure against such damage. This led to a two-week delay of the tow. However, Troll A was successfully installed on the field in the summer of 1995.

3.12.7 STRUCTURES AT GREAT OCEAN DEPTHS

In connection with the planned opening of the Vøring Plateau for exploration drilling, the Norwegian Petroleum Directorate has assessed the natural conditions on the plateau in comparison with those on other parts of the Norwegian Shelf.

The wind speeds on the Vøring Plateau are not materially different from those encountered on other parts of the Norwegian continental shelf.

Nor are the wave heights on the Vøring Plateau greater than on other parts of the Shelf. The distribution of wave sizes is, however, somewhat different, so that the proportion of high waves is larger than otherwise. This fact can have a certain significance for design against structural fatigue.

The average current speed in the area is high, and there are major local variations. It is also a characteristic that the current speed is high also at great depths. It will be necessary to undertake comprehensive measurements at relevant locations if it is planned to use structures where currents have significant force.

The air temperature in the area can fall to minus 10° C. The Norwegian Petroleum Directorate does not regard such temperatures as posing any major problem, provided that this factor is taken into account at a sufficiently early design stage.

3.12.8 MARINE FOULING

Marine fouling is an umbrella term for algae and marine animals growing on artificial surfaces in the sea. Fouling organisms vary in size from microscopic bacteria to large seaweed species several meters long. The fouling undergoes constant change, affected by biological factors, such as food supply, dispersal of larvae and spores, but also by factors such as geographical location, time of year, depths and so on.

Fouling leads to an increase in both the diameter of the structures and the roughness of their surfaces. This leads in turn to the load on the structures increasing more or less proportionately with the extent of the fouling. Marine fouling has the greatest effect on the stress loads of the elements that have the smallest cross-sections, that is, primarily those on the upper part of the installation. Here it is by and large mussels that account for most of the hard fouling, which can cover up to 100% of the surface of large areas. Mussel layers up to 250 mm have been registered.

In 1995 the Norwegian Petroleum Directorate reviewed the reported fouling on steel-base structures in the North Sea. In the light of this survey, the Directorate will consider making changes to the guidelines on load and load effects.

3.12.9 FLEXIBLE PIPELINES

The trend in field developments on the Norwegian continental shelf is proceeding in the direction of more and more concepts for satellite fields and associated satellite wells, plus floating production installations. Because of this, the need to use flexible lines has increased dramatically in recent years.

There are more incidents involved with flexible as opposed to conventional pipelines that are not caused by third parties or corrosion damage.

Damage to and breakage of flexible risers and pipelines that have involved a need to replace risers were registered on three installations in 1995. On two of the installations, the cause of the incident is the same: shrinkage of the pressure-bearing plastic layer, resulting in leakage at the end connector. There is reason to believe that this problem arises particularly when the temperature of the medium is relatively high and where there is considerable temperature variation, for example in connection with temporary shutdowns of the pipeline system.

Comprehensive work has been initiated under the leadership of Norsk Hydro, Saga and Statoil to solve the problem of end connector and high temperature. The work consists inter alia of qualification tests, qualifying new end connectors and preparing acceptance criteria for use of dynamic risers.

On the third installation the cause was different. A complete break was discovered in a water injection line about 400 meters from the installation. It was ascertained that the break was not due to fatigue; most probably it arose after there had been very small leaks through the innermost layer or end connector over a long period. The innermost layer was thereafter torn across in consequence of the pressure differential caused by e.g. a shut-down.

3.12.10 THE "TITANIUM CASE"

In April 1995 the Norwegian Petroleum Directorate was informed of problems with cracks in two flanges in partially non-critical pipe systems on the Heidrun installation. Indications that the problem might be extensive led to the Norwegian Petroleum Directorate calling in all the operating companies for a briefing, and separate follow-up meetings were held with several of the companies. These meetings turned up no negative experiences with use of titanium on the Norwegian Shelf. Nor were there any companies which had experienced equivalent discordances between the product and the product documentation to those reported from the Heidrun project.

After the cracks in the two flanges were discovered, the operating company Conoco turned the spotlight on all titanium components on the Heidrun installation. It transpired inter alia that eight inspection openings with associated titanium hatches had been cast within the concrete base. Special examination of the product documentation for these components was initiated, because they were regarded as potentially safety-critical. A thorough assessment of chemical, materials and product data - including pressure testing - concluded that the openings/hatches were entirely satisfactory.

3.13 LIFTING GEAR

There were two fatal accidents in connection with crane operations on offshore installations in 1995, the one on board a supply ship. Several serious undesirable incidents were also registered with use of lifting devices.

Use of lifting devices and lifting gear by its very nature involves a great potential for danger. In 1995 the Norwegian Petroleum Directorate circulated a safety notice dealing with safety in crane operations.

The Norwegian Petroleum Directorate has registered that the operating companies are focusing on incidents that occur in use of lifting devices, and analyzing the underlying causes of such incidents. The Directorate considers that systematic and well-planned work will enable the companies to achieve a considerable reduction in the number of such incidents, and will follow up the company's activities through its 1996 supervision.

3.14 HYDROCARBON LEAKS, FIRES AND NEAR-FIRES

3.14.1 HYDROCARBON LEAKS

The Norwegian Petroleum Directorate has received reports of 120 hydrocarbon leaks in 1995 compared with 124 in 1994. None of the reported hydrocarbon leaks were considered to be major, 28% were judged medium, and the remaining 72% were classified as small.

The Norwegian Petroleum Directorate believes that the oil companies are now displaying greater openness regarding incidents of this type, and willingness to report leaks in conformity with the regulatory requirements now appears to be good. This means that the reliability of the statistics is improved. Several of the operating companies are now using a common database to register hydrocarbon leaks. This contributes to more information on the causes of gas leaks being available to the industry and to the authorities.

Because of the great potential for damage associated with accidents involving hydrocarbon leaks, the Norwegian Petroleum Directorate will make it a commitment area for 1996 to continue the supervision of how the companies are following up their own targets and managing their activities with a view to reducing the number of gas leaks and fires.

Figure 3.14.1.a shows distribution of hydrocarbon leaks according to their degree of severity.

Table 3.14.1
Hydrocarbon leaks detected by gas detection system

Severity	Number of leaks	Detected by gas detection system	Reading in % LEL	
			20 %	60 %
Minor	80	22	16	6
Medium	31	15	4	11

(LEL = Lower Explosion Limit)

Table 3.14.1 gives the number of hydrocarbon leaks detected by gas detection systems. The table shows that detection systems only detect a small number of leaks out of the total, and most of those detected were medium size leaks.

Figure 3.14.1.a
Classification of reported gas leaks by degree of severity

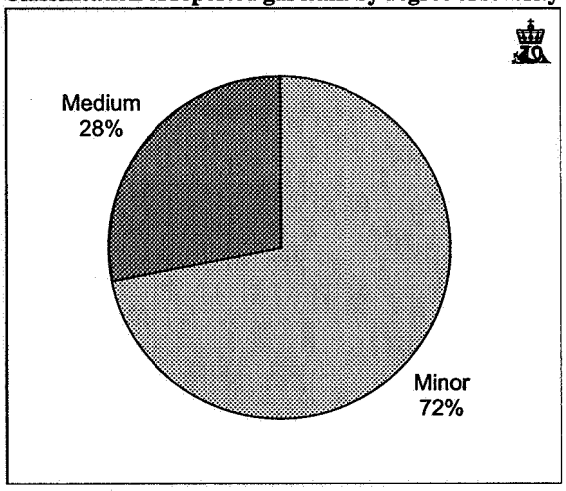


Figure 3.14.1.b
Causes of gas leaks - operational errors

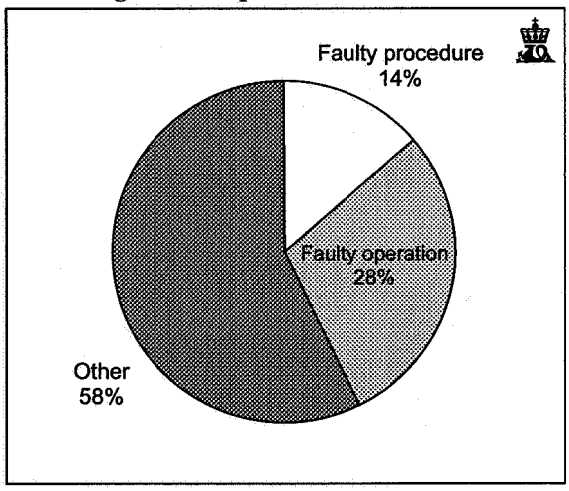
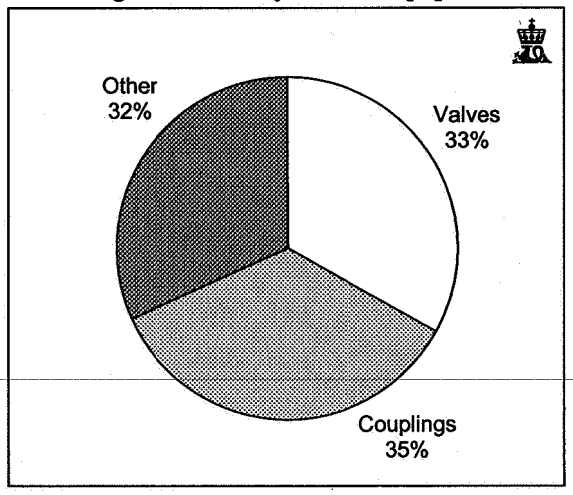


Figure 3.14.1.c
Causes of gas leaks - faulty technical equipment



Figures 3.14.1.b and c give an indication of the causes of the leaks. Often the causes behind the leaks are complex. The subdivisions reflect the Norwegian Petroleum Directorate's assessment of the factors that were most paramount in each particular incident.

3.14.2 FIRES AND NEAR-FIRES

The Norwegian Petroleum Directorate has registered 18 fires in 1995, compared with 38 in 1994 and 56 in 1993. Electrical defects and/or short circuits were the most frequent causes of ignition.

Table 3.14.2 provides an overview of the extent and causes of fires and near-fires reported to the Norwegian Petroleum Directorate in 1995. The Directorate notes that the figures show a clearly decreasing trend, and interprets this as a sign of positive development.

Table 3.14.2
Causes and extent of fires reported in 1995

Cause	Extent		
	Minor	Medium	Major
Welding	2		
Hot surfaces, overheating	1	3	
Electrical	5	2	
Other	3	2	
Total	**11**	**7**	**0**

3.15 ELECTRICAL SYSTEMS

During the summer of 1994, three different installations under construction reported discovery of cracks in the outer sheath of a special drilling mud-resistant cable. The supplier immediately began investigations together with the manufacturer in order to find the cause of the cracks and whether this was a phenomenon which was restricted to these installations, or whether there was a defect in the material. After a major testing program, it was found that the cables delivered had an insufficient level of ozone resistance, thus causing cracks in the outer sheath after a certain period of time.

The supplier changed the composition of the material in the outer sheath, and conducted thorough tests before the new mixture was released for production of outer sheath material for drilling mud-resistant cables. Defective cables were replaced by the supplier. Furthermore, it has been determined that the defect was limited to the drilling mud-resistant type of cable, and was thus not a problem for other types of cables used on the installations.

3.16 DIVING

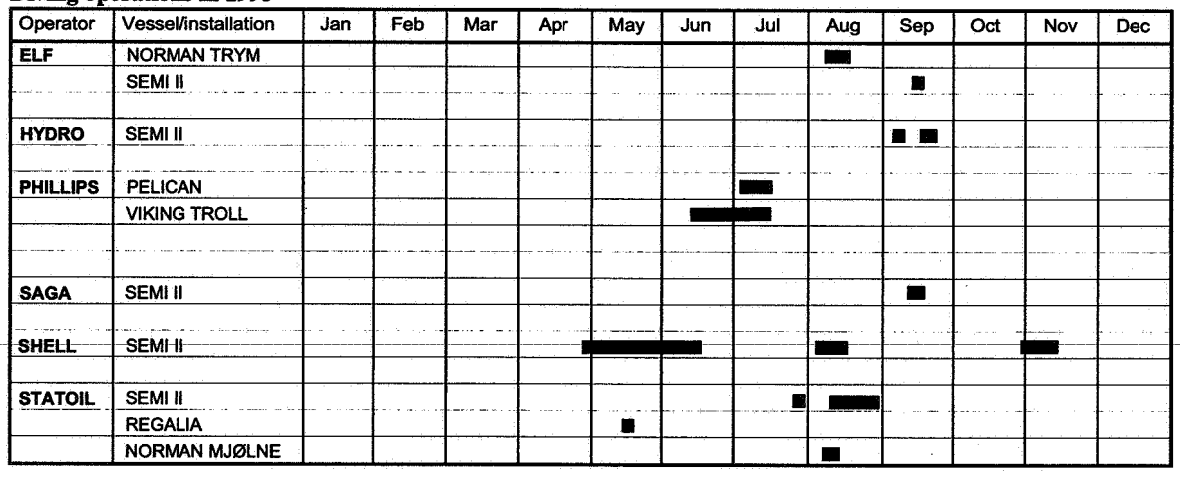
3.16.1 DIVING ACTIVITIES

During 1995, 157 surface-oriented dives and 667 bell runs totalling 45,726 man-hours in saturation were carried out on the Norwegian Shelf and in connection with Norwegian pipelines in foreign sectors under Norwegian jurisdiction. Compared with 1994, both surface- oriented diving and saturation diving have been reduced by nearly one-half.

The average length of bell dives for saturation diving was 6.7 hours in 1995, which is approximately the same as in 1994. The average saturation period was 15.5 days, an increase of 1.6 days from the previous year. The increase is due to the fact that a major part of the saturation diving has been carried out in relatively deep water, that is, down to 180 meters. The average time in the water for surface-oriented diving was 1.3 hours. The diving operations have been conducted from six different vessels and installations (Figure 3.16.1).

Diving activities have been divided among inspection, maintenance and construction activities on fields where Elf, Hydro, Phillips, Shell and Statoil are the operators. Diving in connection with construction work has constituted a large portion of the activity. This work has mainly been related to connection of pipelines and risers and assistance with installation of structures. Parts of the diving activities have been conducted at water depths up to 180 meters.

Figure 3.16.1
Diving operations in 1995



3.16.2 DIVER TRAINING

The National Divers' School (Statens dykkerskole) and the Norwegian Professional Divers' School (Norsk yrkesdykkerskole) have trained a total of 78 divers who have been issued Grade 1 certificates by the Norwegian Petroleum Directorate. No diving bell courses were arranged in 1995.

3.16.3 RESEARCH AND DEVELOPMENT

The Norwegian Petroleum Directorate has continued its participation as a member of the Board of OMEGA in 1995, as well as in the various steering committees established in connection with sub-projects within OMEGA. This involvement helps to ensure that the Directorate's professional and technical staff is kept up to date with regard to ongoing research and development activities in the diving sector, and that close ties are maintained with the industry.

In November 1995 the Program for Research and Development in Diving Technology and Diving Medicine (FUDT) Seminar was held for the last time in the form in which it has been conducted for several years. In the future, the seminar will be planned as a joint seminar for both open sea diving and diving in sheltered waters. The seminar will continue to aim for international participation.

Development work aimed at meeting the authorities' requirements with regard to spare gas supply has been ongoing for several years. These requirements will become effective on 1 January 1996. Work is still continuing in this area, but it is worth noting that Statoil and Shell have now accepted a make which satisfies the necessary requirements.

3.16.4 HARMONIZATION OF DIVING REGULATIONS

Questions in connection with the standardization of diving regulations was discussed in detail during the annual FUDT Seminar in Bergen. A widespread desire for standardization was expressed, both domestically and on an international basis. A meeting has also been conducted with the British authorities to discuss the possibility of such standardization.

4. Environmental measures in the petroleum activities

Introduction

Environmental issues have gradually attained a central position in the formulation of energy policy. For the petroleum industry, this means significant efforts connected with measures aimed at preventing and limiting environmental damage resulting from the activities. The costs connected with environmental measures may increase and thus contribute to reduced profitability on the Norwegian continental shelf unless both the industry and the authorities address the issues in a systematic and well thought out manner.

Consideration for the environment is an integral part of the Norwegian Petroleum Directorate's total efforts to contribute to sound management of Norwegian petroleum resources. The Norwegian Petroleum Directorate's efforts to protect the environment are thus directed towards preventive measures designed to avoid and limit damage due to pollution.

The main activities in this work are preparation of regulations and other frameworks for the activities, reports, supervision, collaboration with other authorities and information. These tasks in sum account for a substantial portion of the Directorate's total use of resources.

4.1 ENVIRONMENTAL FRAMEWORK

In 1995, the Norwegian Petroleum Directorate continued its efforts in a number of areas related to framework activities which have an impact on the protection of the external environment.

These activities include following up the environmental conditions stipulated in Storting (Parliament) propositions and reports related to opening of new areas for petroleum activities, development issues and applications for consent.

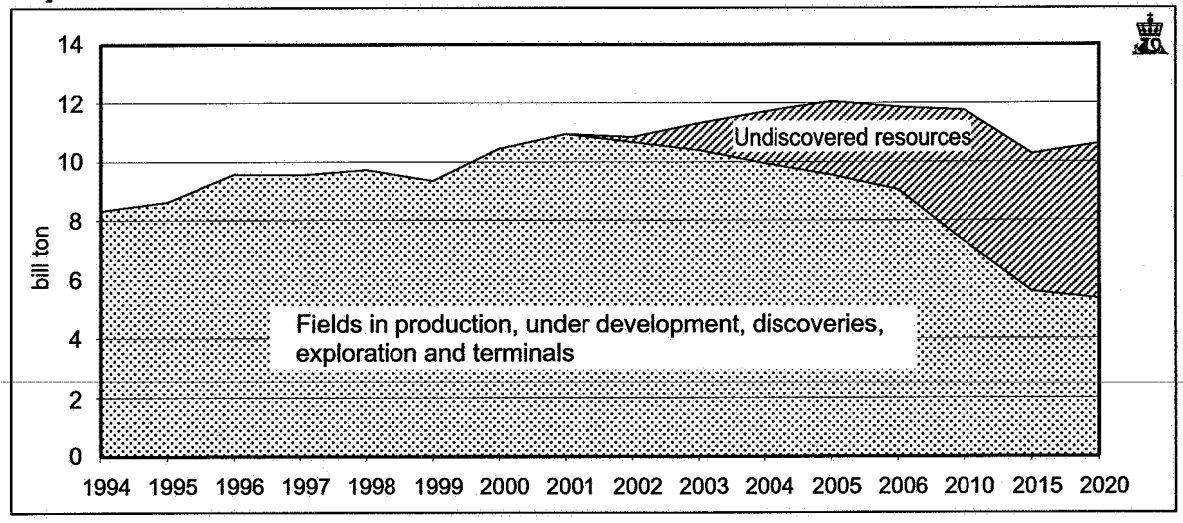
The Norwegian Petroleum Directorate, in cooperation with the State Pollution Control Authority (SFT) has assisted the Ministry of Industry and Energy in its work to prepare proposals for national action plans for reduction of acid precipitation and climatic gas emissions. The Norwegian Petroleum Directorate and SFT have had joint responsibility for preparing and evaluating various measures aimed at the petroleum activities. The measures have included the possibilities of reducing polluting emissions to the air in connection with energy production, flaring, cold venting, buoy loading and terminal loading as well as formation testing. Work on the national action plans has not yet been completed and will continue in 1996.

New prognoses for emission of CO_2, NOx, VOC (volatile organic compounds) and methane from the petroleum activities have been prepared. These prognoses have been prepared in cooperation with SFT. The prognoses are an important basis for evaluation of measures to ensure that national and international environmental obligations are met. Preparation of prognoses is also an important part of the work on national action plans to reduce acid precipitation and emission of climatic gases. Figure 4.1 shows the Directorate's prognosis for CO_2 emissions from petroleum activities in the period 1995 to 2020. Emissions from activities which are not currently subject to tax are also included in the prognosis.

In connection with follow-up of the NORSOK work (report work on the competitive situation of the Norwegian continental shelf), the Norwegian Petroleum Directorate has participated as an observer in a working group which has developed common criteria for choice of drilling mud type, giving consideration to factors which are of significance for safety, working environment and the external environment.

In connection with the establishment of MILJØSOK (work on environmental issues), the Norwegian Petroleum Directorate is represented in the management group and in working group 3, technical/economic action alternatives

Figure 4.1
CO_2 emissions from the petroleum activities



on the Norwegian shelf, cf. Chapter 5.1. Through this work, the Norwegian Petroleum Directorate contributes to influence the tasks which will be given priority in order to achieve more cost-efficient solutions to environmental challenges on the Norwegian shelf.

The Norwegian Petroleum Directorate, together with the Ministry of Industry and Energy, has taken part in discussions with the operating companies in connection with impact analyses, plans for development and operation and plans for installation and operation. In its evaluations of plans for development and operation of new projects, the Directorate has focused on the possibilities of using emission-reducing technology.

4.2 SUPERVISION OF OPERATING COMPANIES

Much of the supervision of the operating companies' activities in connection with environmental measures has been carried out as an integrated part of the supervision in the areas of safety and working environment. This supervision is aimed at the companies' internal control systems, which are intended to provide systematic assurance that all phases of the activities will be planned and carried out in accordance with the authorities' requirements and the companies' own goals and acceptance criteria.

In 1995 the Norwegian Petroleum Directorate continued work on an internal report regarding regulatory requirements in connection with operators' measures to prevent environmental damage in the planning of drilling operations in general and in environmentally sensitive areas in particular. In this context the Directorate completed evaluation of a risk analysis model for acute oil discharges to the sea resulting from a blow-out, which has been jointly developed by several operating companies. This model is regarded as being a good point of departure for compliance with the Norwegian Petroleum Directorate's regulatory requirements.

In addition, a systems audit was performed in cooperation with SFT to evaluate Phillips' planning of the Ekofisk II project with regard to development of technical solutions which could reduce discharges to the sea.

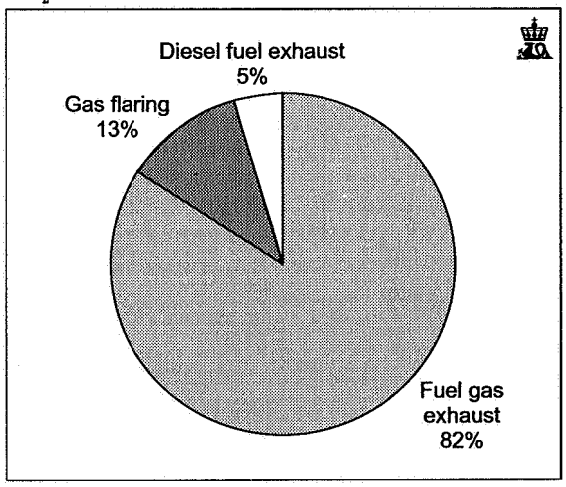
4.3 CO_2 TAX

On 1 January 1991, the Ministry of Finance delegated to the Norwegian Petroleum Directorate the responsibility for enforcing the Act relating to carbon dioxide tax on the Norwegian continental shelf. Apart from being responsible for the actual collection of the tax, the Directorate also carries out supervision of the measurement equipment for metering of fuel and flare gas.

The Norwegian Petroleum Directorate also considers complaints and other legal problems connected with the CO_2 tax. In addition, the Directorate conducts an ongoing evaluation of the effect of the tax. This work is organized to include annual meetings with the operating companies, as well as analysis of the statistics reported to the authorities.

In 1995, the tax rate was NOK 0.83 per Sm^3 of natural gas and NOK 0.83 per liter of oil or condensate. The total CO_2 emissions from activities subject to tax in 1995 were 7.5 million tonnes. This represents an increase in the emission of CO_2 of 0.2 million tonnes compared with 1994. Figure 4.3 shows how the emissions are distributed by source. There has been an increase in the use of natural gas both for flaring and for fuel, as well as increased use of diesel oil. The increase in CO_2 emissions has nevertheless been less than the increase in petroleum production, which shows a trend towards a more energy-efficient production of oil and gas.

Figure 4.3
CO_2 emission sources



4.4 TECHNOLOGY DEVELOPMENT

The Petroleum Act and the underlying regulations lay down requirements for technical solutions and activities, but also place demands on the continual development of safety and technology in accordance with technological developments and social developments in general. The Norwegian Petroleum Directorate follows up on this in many areas. In 1995 attention has been focused on:

- development of technology for reduced emission of volatile organic compounds (VOC) in connection with production of oil and gas.
- development of improved cleansing methods for produced water and development of new methods of measurement of discharge from produced water in accordance with international standards.
- development of technology for reduced emission of NOx from combustion.
- research and development of more energy
- efficient technology for oil and gas production.
- reduction of the need for burning of gas (flaring) during production and in connection with well testing.
- development and use of new types of drilling mud, and work to cut out or minimize the use of oil-based drilling mud.
- alternative methods of handling and storage of oily cuttings.
- more efficient drainage systems.

- new fire-fighting agents in connection with phasing out halons.
- use and handling of biocides, corrosion inhibitors, heavy metals and low activity isotopes.

4.5 OTHER ENVIRONMENTAL WORK

The Norwegian Petroleum Directorate participates in a number of national and international forums working on protection of the environment. These activities are intended to influence such forums and bodies in the desired direction as well as to build up the expertise the Directorate needs in order to carry out its responsibilities in this area. The following organizations were among those the Norwegian Petroleum Directorate participated in during 1995:

- Government Action Group (AKU)
- International Maritime Organization (IMO)
- North Sea Offshore Authorities Forum (NSOAF)
- Standardization organizations CEN and ISO

Since 1992, the Norwegian Petroleum Directorate has participated in the technical committee of the Norwegian Research Council's research program MUST. MUST is a program for environmentally friendly and profitable development of small petroleum fields.

The Directorate is also responsible for administering and carrying out an annual clean-up of the seabed in the North Sea. In 1995 this activity had a budget of approx. NOK 4.6 million.

4.6 COOPERATION WITH THE STATE POLLUTION CONTROL AUTHORITY

In accordance with the conditions of regulatory supervision of petroleum activities, the Norwegian Petroleum Directorate coordinates the practical implementation of the State Pollution Control Authority's and the Norwegian Petroleum Directorate's supervision under the Pollution Control Act and the Petroleum Act respectively, including coordination in connection with consents and discharge permits. The Directorate carries out supervision of the operators' systematic efforts to meet the requirements of the Regulations related to licensees' internal control, as well as the Regulations for implementation and use of risk analysis and the Regulations for emergency preparedness, for which the two agencies are jointly responsible. The coordinating role given to the Norwegian Petroleum Directorate means that the Directorate must evaluate the cost and safety aspects of actions contemplated by the environmental protection authorities which may be of significance to the petroleum activities.

Furthermore, the Norwegian Petroleum Directorate works in cooperation with the State Pollution Control Authority to encourage the industry to share and exchange experience in environmental issues. The objective of this involvement is to contribute to the development of solutions which are effective and which give the best possible economy.

In 1995 the Norwegian Petroleum Directorate and the State Pollution Control Authority jointly conducted the MYNDEX exercise, the objective of which was to ensure coordinated and effective actions in order to take care of the State's responsibilities and tasks in the event of dangerous or accident situations which fall under the jurisdiction of the two agencies. As a general rule, such an exercise will be conducted annually in the future. The 1995 exercise focused on conditions related to drifting objects, problems with oil wells which could lead to blow-outs and threats to oil pipelines.

5. Special projects

5.1 NORSOK - INTSOK - MILJØSOK

The Norwegian Petroleum Directorate's follow-up of NORSOK, INTSOK and MILJØSOK has been organized as internal projects with representation from large parts of the organization. In this way we can guarantee that new ideas and initiatives quickly reach the various units and case officers.

The final report from NORSOK (the Competitive Standing of the Norwegian Offshore Sector) presented in all 165 recommendations for measures that will make the petroleum activity on the Norwegian shelf more profitable. The great majority of these recommendations have now been implemented by the industry or the authorities, or are in the process of implementation.

Via new field development plans and budgets for operation of field installations, the Norwegian Petroleum Directorate has received clear indications that the target of a 30-50% cost reduction within five years has largely been reached.

The NORSOK process has involved a far-reaching cultural change for the petroleum industry, with a comprehensive need for retraining and readjustment. There is broad agreement on this and on the areas on which the industry must concentrate. The eight commitment areas identified are called NORSOK success factors: Wealth Creation - Simplification - Totality - Training - Standardization - Collaboration - Openness - Courage.

The Norwegian Petroleum Directorate has been an active participant in this work and contributes to the process by making changes and simplifications in the rules and regulations to adapt to the new project completion models, and by utilizing international standards, cf. Section 3.2. A closer dialogue with the participants at an early stage will also ensure smooth and rapid processing.

The Norwegian Petroleum Directorate has also attempted to take the initiative vis-à-vis the industry to start simplification and cooperation processes which can reduce costs, provide better data or methods of analysis, or provide improved utilization of resources. The DISKOS project for common storage of petrophysical data (cf. Section 5.2.5), the new research project FORCE for improved utilization of resources (cf. Section 5.2.1), an exploration technology cooperation project between the Norwegian oil companies and the Norwegian Petroleum Directorate and an external reference group for regulatory development are all examples of such initiatives.

In the wake of the NORSOK work, INTSOK was established in 1995 (Internationalization of Activities on the Norwegian shelf) according to the same cooperation model between the oil companies, the contractor industry, professional and industrial bodies, and the authorities.

The objective of INTSOK is to strengthen the long-term foundation for wealth-creation and employment in the Norwegian petroleum industry through focused international activities with a point of departure in the competitive strength developed on the Norwegian continental shelf.

The Norwegian Petroleum Directorate is involved in the INTSOK process through participation in the steering group and at the working group level. In particular, we see the possibility of a more systematic use of the Norwegian Petroleum Directorate's international contact network as an effective door-opener for Norwegian industry in many markets. Through NORAD, the Norwegian Petroleum Directorate provides technical assistance related to petroleum to a number of countries and organizations, mainly in Asia and Africa, cf. Section 6.1. A result of this work is that important decision-makers in these countries are exposed to the Norwegian petroleum milieu which increases the possibility of subsequent commercial involvement.

The Norwegian Petroleum Directorate also has bilateral cooperation agreements with organizations within petroleum management in a number of countries. When foreign delegations come to Norway, a visit to Norwegian oil companies or the Norwegian contractor industry is normally a regular item on the agenda.

PETRAD, which is a foundation owned by the Norwegian Petroleum Directorate and NORAD, arranges a number of courses and seminars on petroleum management and administration for senior and middle management persons in developing countries and in Russia/CIS, cf. Section 6.2. Since its inception in 1989, nearly 3000 participants from 60 countries have taken part in PETRAD courses and seminars which draw Norwegian lecturers from both the private and public petroleum sectors.

The third initiative is patterned on NORSOK and is called MILJØSOK (Environmental challenges for Norwegian shelf activities). The Norwegian Petroleum Directorate is also involved in this area and hopes to be an active contributor to the process on the basis of the environmental expertise which has been built up in the Directorate during recent years, cf. Section 4. The MILJØSOK goal is to chart the Norwegian petroleum sector in a global environmental perspective, evaluate means of action in climatological and environmental policy and to review technical/economic action alternatives on the shelf.

The environmental requirements which have historically been placed on the petroleum activities on the Norwegian shelf have led to technological innovation and development of good operational procedures which have brought petroleum activities on the Norwegian shelf to the forefront in an international perspective. It seems clear that access to good environmental-technological solutions, as well as a tradition of using such solutions, is a strong competitive advantage for participants in Norwegian petroleum activities in many markets.

However, we still face great environmental challenges on the Norwegian shelf. The best cost-effective solutions are most likely to be developed in a close, cooperative effort

between the public sector, the industry and other affected parties, in line with the MILJØSOK efforts.

5.2 PROJECTS WITHIN RESOURCE MANAGEMENT

5.2.1 FORCE

In 1995, the Norwegian Petroleum Directorate invited the oil companies to a cooperation forum on problems related to increased oil recovery. FORCE (Forum for Reservoir Characterization and Reservoir Engineering) is organized with a board consisting of representatives from 17 oil companies, the Research Council of Norway and the Norwegian Petroleum Directorate. The Norwegian Petroleum Directorate has the secretariat.

The goal of FORCE is to create a forum where the members can focus on specific problems related to increased oil recovery and responsible resource utilization, with a focus on application and demonstration of methods and tools. Communication with research and development institutions, universities and consultants regarding the specific needs of the companies in various aspects is carried out primarily through several "Problem Defining Workshops" On the basis of these workshops and through discussions in smaller groups, concrete projects will be defined.

The first «Problem Defining Workshop» was held at the Norwegian Petroleum Directorate in November, at which the Minister of Industry and Energy also marked the opening of FORCE. Work is currently ongoing on projects and project proposals for problems related to advanced wells, cracks and faults, mineral diagenesis, modelling and use of seismic for reservoir description.

5.2.2 PROFIT

The research program PROFIT (Program for Research On Field Oriented Improved Recovery Technology) was concluded with a seminar at the Norwegian Petroleum Directorate on 25-26 April 1995. The program has contributed to increased oil recovery, inter alia by improved methods and improved modelling and prediction tools within the fields of reservoir characterization and near well flow.

A more detailed description of the program was given in the 1994 annual report. At the conclusion of the program, a book was prepared giving a summary of each of the program's 24 projects. This book may be obtained from the Norwegian Petroleum Directorate at a cost of NOK 250 per copy.

5.2.3 RUTH

RUTH (Reservoir Utilization through Advanced Technological Help) is a research program for improved oil recovery under the direction of the Research Council of Norway. The program was started in 1992 and research was concluded in 1995.

The Norwegian Petroleum Directorate has been responsible for administering the program, and the Norwegian Petroleum Directorate has also been represented on RUTH's board and in technical advisory committees.

RUTH's main goal has been to contribute to increased oil recovery (300 million Sm^3) from sandstone and chalk reservoirs on the Norwegian shelf. Another goal has been to safeguard the authorities' long-term research requirements in the field of increased oil recovery, as well as to strengthening and further development of the Norwegian research establishment for the benefit of the oil companies.

The total budget was approximately NOK 105 million, of which the State (the Research Council) has contributed NOK 55 million. Another NOK 50 million has been provided by 18 participating oil companies. Research in the amount of NOK 23.6 million was carried out in 1995.

RUTH has been organized into six sub-programs as shown below, representing six recovery methods for increased oil recovery.

RF - Rogaland Research and IKU Petroleum Research have had the primary responsibility for implementing the sub-programs, with cooperation from a number of other Norwegian research institutions. Links have also been established with research institutions in the USA, France, England and Russia, among others.

Project title	Responsible institution
Gas flooding	IKU Petroleum Research
Combined gas/water injection	IKU Petroleum Research
Use of foam	RF/IKU
Use of polymer-gel	RF - Rogaland Research
Use of surfactants	RF - Rogaland Research
Microbial methods	RF - Rogaland Research

A total of 32 projects have been carried out, and most of these have achieved the goals set. The research has been of a high professional standard, illustrated inter alia by more than 40 papers and lectures from the program being accepted in international conferences or in professional publications.

Cooperation with the operating companies on planning and evaluation of field-scale pilot projects to qualify the methods has been an important aspect of the program. Separate projects have been dedicated for this purpose in the areas of alternating water/gas injection (WAG) and the use of foam and polymer gel. As a step in this cooperation process, separate Pilot Task Force Groups have been set up and researchers have also been posted to operating companies' project organizations. During the course of the RUTH program, pilot activities in the three above-mentioned areas have been implemented on the Norwegian shelf. RUTH was particularly involved in the evaluation of three pilot projects: the foam pilot project on Oseberg and the WAG pilot projects on Brage and Snorre.

International workshops have been organized under the direction of RUTH, as well as an annual seminar in the Norwegian Petroleum Directorate where the program results have been presented and discussed. The program

has been successful in creating constructive cooperation between the Research Council of Norway, the Norwegian Petroleum Directorate, the Norwegian research establishment and the participating oil companies.

At the conclusion of the program, work is being done to prepare a book which will summarize the main results from each project. This will be sold by the Norwegian Petroleum Directorate for NOK 250 per copy.

RUTH will be concluded with a seminar at the Norwegian Petroleum Directorate on 6-7 May 1996 where the main results from the four-year long research program will be presented.

5.2.4 "JOINT CHALK RESEARCH"

This research program, which is a joint chalk research program, was launched in 1982 on the initiative of Norwegian and Danish authorities. The goal was to improve knowledge of reservoir behavior during production from the chalk fields in the North Sea. During the period from 1982 to 1992, three phases of the program were completed and NOK 43 million has been spent.

A fourth phase (1994-1996) is now underway as a cooperative effort between the Norwegian Petroleum Directorate, the Danish Energy Agency and seven oil companies. This phase has a budget of NOK 17.5 million and will target the following areas in particular:

- Characterization of chalk rocks and fractures
- Mechanical properties of chalk rocks
- Effects of water injection

In one of the seven projects an overview of the results of the three preceding phases in the program was prepared, including results from other chalk research performed during the past ten years. This was completed in 1995 and the information was published in book-form by Rogaland Research.

The program is administered by Amoco, and the steering committee is headed alternately by the Danish Energy Agency and the Norwegian Petroleum Directorate. The current leadership rests with the Norwegian Petroleum Directorate.

5.2.5 DISKOS

The project started as a joint initiative between Saga Petroleum, Norsk Hydro, Statoil and the Norwegian Petroleum Directorate for system development and operation of a common data base for geodata. Towards the end of 1994, an agreement was also signed with Mobil Exploration to join in the project. IBM EPAC in Stavanger has prepared the software and is now in the process of further development and launching of version 2 in 1996.

A new company, PetroData AS, was established to operate the data base, while at the same time the remaining oil companies were invited to participate in the DISKOS group. Today there are a total of 13 members in the DISKOS group, whereof eight are companies who joined in 1995.

The effort is headed by the Norwegian Petroleum Directorate and all the companies in the DISKOS group are linked to the data base and have electronic access to the data. Data access will be governed by the rules and agreements for usage rights entered into, and the costs of operation and development will be divided among the users of the system.

Log project

The log project, or "High Quality Log Data Project" as it is called, was concluded in 1995. In all 750 exploration wells were reprocessed and the results distributed to 16 oil companies. The Norwegian Petroleum Directorate was the project leader and responsible for quality assurance, while processing was carried out by Simon/Robertson. All data from the project will be stored in the DISKOS data base.

Geophysical logs

In 1995, the Norwegian Petroleum Directorate commenced work on processing of velocity logs, directional and check shot data for all exploration wells on the shelf. The data will be available to the oil companies sometime during 1996, and will be stored in the DISKOS data base.

5.2.6 ESTABLISHMENT OF NORWEGIAN GEOCHEMICAL STANDARD SAMPLES FOR OIL AND SOURCE ROCK ANALYSIS

This project was begun in 1994 to establish standard samples to ensure better calibration in connection with organic geochemical analyses. 200 kg organically rich source rock samples from Yorkshire and 400 kg from Svalbard have been collected, as well as 1000 liters of oil from the Oseberg field. These samples have been sent out to around 50 laboratories all over the world for calibration. The establishment of standards is expected to have a positive effect on internal quality control in the laboratories, increase comparability between data from different laboratories and function as a quality control mechanism for analyses performed. The result of this work will be made available to the industry in 1996. This has been a cooperative effort by the Norwegian Petroleum Directorate, Saga, Norsk Hydro and Statoil.

5.2.7 NOMENCLATURE FOR STRUCTURAL ELEMENTS IN THE NORWEGIAN SEA

In 1995 the Norwegian Petroleum Directorate has published a new nomenclature for structural elements in the Norwegian Sea region. The purpose of the work has been to establish a formal definition and naming of main structural elements with the aim of having a common reference in connection with geological work and publications. This work has gone on for several years, mainly because there has been an increasing understanding of the geological

framework due to the fact that seismic data coverage and geological control have improved over the years. The latter applies particularly to the new exploration areas in the Vøring and Møre basins, which were targeted during the 15th licensing round. This work has been carried out in cooperation with Norsk Hydro a.s, Statoil, Saga Petroleum a.s and the University of Oslo. Published maps and profiles are also available in digital format.

5.2.8 GEOLOGICAL FIELD WORK ON SVALBARD

The Norwegian Petroleum Directorate has, in cooperation with Norsk Hydro a.s, Statoil and Saga Petroleum a.s, conducted geological field work on Hopen, Edgeøya, Wilhelmsøya, Barentsøya and Sørkapp. The objective of this work is to use field analogues from Svalbard to support the geological interpretation of the northern part of the shelf in the Barents Sea. In the structurally complex Sørkapp area, the work has focused on the strata from Late Permian to Tertiary Ages, while in the other locations outcroppings from the Early Triassic to Late Jurassic Ages have been studied.

A total of roughly 800 rock samples were gathered for use in continued analyses. A total of 6800 meters divided among 36 vertical profiles has been logged. The work will be completed in 1998.

5.2.9 PALEO-TECTONICS ON SHORE ALONG THE NORWEGIAN COAST

The project has been set up to study fault breccias from selected areas on land along the Norwegian coast in Southern Norway in order to correlate these with important fault zones which can be traced on seismic profiles on the shelf. The results from these examinations will be used to create a complete model of the geological evolution for large tectonic zones which have a significant affect on geodynamic basin development on important parts of the shelf. The study will provide vital information on Late Paleozoic and Cenozoic tectonics and basin evolution and can be used in the work to interpret play models in the eastern part of the North Sea and Skagerrak.

5.2.10 BIOSTRATIGRAPHIC STUDIES PERFORMED BY THE NORWEGIAN PETROLEUM DIRECTORATE'S LABORATORY

Geological sample collection from the Upper Cretaceous stratum in Southern England

The deposits in the Compton Bay area on the Isle of Wight contain one of Northern Europe's more complete Cenomanian intervals. Deposits of similar age are expected to be reservoir intervals in large parts of the Norwegian Sea. Detailed biostratigraphic knowledge of fossil-productive, complete intervals as found on the Isle of Wight are important with regard to age dating and correlation of new areas in the Vøring and Møre basins. In 1995, a dense network of samples was collected from the Compton Bay area for palynologic analysis. The Norwegian Petroleum Directorate's biostratigraphic laboratory will prepare and analyze these samples in 1996. The project is a cooperative effort with the University of Kingston.

Digitalization of biostratigraphic data

The project has aimed at building up a digital data base consisting of uninterpreted biostratigraphic data from exploration wells on the Norwegian shelf. The raw data is collected directly from biostratigraphic reports in the form of fossil-distribution diagrams. The objective is to link this data base to DISKOS so that DISKOS users will have access to biostratigraphic data from released exploration wells.

Dinium-Alpha: interactive dinoflagellate morphological data base

Dinium-Alpha is a Windows-based data base application which gives the user the ability to call up digital photomicrographs of dinoflagellate species on the basis of search identifiable morphological and stratigraphic criteria. Several hundred morphological parameters are represented in an iconographic, palynological-intuitive user interface. The objective of Dinium-Alpha is to increase the accuracy of species identification by functioning as a morphological analysis tool.

Neogene development of the continental margin off the coast of Mid-Norway and Svalbard

This is a combined biostratigraphic and seismostratigraphic study which has the main purpose of examining the stratigraphy in the Neogene and Upper Paleozoic sediments across the entire continental shelf. The project is being carried out in cooperation with the University in Bergen and will be concluded in 1996.

5.2.11 RESOURCE REPORT

In February 1995, the Norwegian Petroleum Directorate issued a new resource report. This contains an overview of the total petroleum potential on the Norwegian continental shelf. The contents are derived from the Norwegian Petroleum Directorate's resource accounting and a comprehensive analysis of the undiscovered petroleum resources conducted in 1994.

5.2.12 NEWSLETTER ON IMPROVED OIL RECOVERY

In 1995 the Norwegian Petroleum Directorate published four issues of their newsletter on improved oil recovery («The Norwegian Petroleum Directorate Newsletter on Improved Oil Recovery»). In addition, a special edition was prepared for the opening of FORCE. This is a step in the Norwegian Petroleum Directorate's strategy of disseminating information and making an active contribution to promote realization of profitable projects for improved

oil recovery. The newsletter will include information on ongoing research, field-oriented pilot projects designed to test new methods and field activities which contribute to increase the recovery factor. Not least, the newsletter is directed at decision-makers in the operating companies and is intended to provide both factual information as well as the Norwegian Petroleum Directorate's views on what may be considered the correct strategies and important commitment areas.

The issues raised in 1995 included: Pilot project with alternating water/gas injection (WAG), the PROFIT and SAFARI research programs, FORCE, updating of reserves for large fields and the potential for improved recovery.

The newsletter is available on the Norwegian Petroleum Directorate's home page on Internet.

5.2.13 INTERNET

The Norwegian Petroleum Directorate entered the Internet in 1995 with its own home page which contains information from the annual report relating to petroleum resources on the Norwegian shelf, maps of fields and discoveries, texts regarding safety and working environment as well as information services. Furthermore, all previous editions of the IOR Newsletter are also available.

The response from external users have been positive during the short time the page has been in existence. During the first month there were roughly 700 references to the page, which confirms that the Internet is a medium which the Norwegian Petroleum Directorate can use to distribute information. Continuous evaluations are made of what type of information is appropriate for issue on Internet.

The page can be called up from *http://www.npd.no* and is available in both Norwegian and English.

5.3 PROJECTS WITHIN SAFETY AND WORKING ENVIRONMENT

Project title	Executive Institution
Professorship in physiology (hyperbaric medicine)	University of Bergen / Norwegian Petroleum Directorate
Conference on employee participation during reductions in manning	Norwegian Petroleum Directorate
Well maintenance - status and trends related to equipment and operations	Maritime Well Services as and Odfjell Well Services as
Test procedure for jet fire	Sintef - NBL (Norwegian Building Research Laboratory)
Membership in Norwegian Electrical Engineering Committee (NEK)	NEK
Gas safety program 1993-96	CMR (Christian Michelsen Institute)
Perceived risk and safety	University of Trondheim
Working environment for divers	NUTEC
Technical and operational aspects of manned underwater operations	Sintef
Participation in the OMEGA program	NUTEC, Sintef
Reduction of leak frequency in flanged connectors in process facilities	DNV
Evaluation of internal leaks in emergency shut-down valves in process facilities	Liaaen Engineering A/S
Membership in The Welding Institute (TWI)	The Welding Institute
Membership in the Marine Technology Directorate (MTD)	Marine Technology Directorate
Ductility of high-strength concrete under special loads	Sintef - FCB
High-strength steels in petroleum activities	Cranfield Institute of Technology
Corrosion protective coating	Sintef - Corrosion Center
Reliability of corroded pipelines	DNV - Veritec
"Ringing" vibrations in offshore installations	DNV, NTH
Forum for research on steel materials in Norway (Stålmat forum)	Sintef
Reinforcement bar corrosion under dynamic load	Veritec
Corrosion in transportation pipelines	British Gas plc
Strain based criteria for design of pipeline systems	Advanced Mechanics & Engineering Ltd.
Pressure-testing of pipelines - evaluation of regulatory requirements	DNVI A/S
Revision of pipeline regulations	DNVI A/S
Guidelines for calculating reliability of supporting structures	DNV Research
Evaluation of possibilities with use of new EDP technology	Norwegian Petroleum Directorate
International standardization in the petroleum sector	Norwegian Technology Standardization Agency, et.al.
Maintenance management	Framatome, Sintef
Requalification of steel structures - Phase 3	Sintef
Management of simultaneous operational and modification activities	Sintef

Professorship in physiology (hyperbaric medicine)
The Norwegian Petroleum Directorate is funding a part-time position for one of its employees as Professor II at the University of Bergen, linked to a research project in the area of physiology. The project focuses on issues such as fluid balance, hyperbaric physiology, temperature regulation and sleep, which constitute issues with clear relevance to safety and working environment in the petroleum activities. The project is planned to last through 1998, and the results are published in annual status reports as well as in Norwegian and international technical periodicals.

Conference on employee participation during reductions in manning
The conference came about as a direct result of a meeting the Norwegian Petroleum Directorate held with employee representatives in the autumn of 1994. During the meeting it became apparent that employee participation in the rationalization processes the industry is going through, and particularly as regards reductions in manning, is not good enough. This problem was defined as a priority area for the Norwegian Petroleum Directorate's supervision in 1995, and it was therefore natural for the Directorate to take the initiative to arrange a conference as a further measure in this problem area.

The project has consisted of planning and carrying out a conference in which all parties have been allowed to give input regarding factors which must be taken into consideration in connection with determination of and changes to manning. In addition to providing the Norwegian Petroleum Directorate with the opportunity to clarify the Directorate's expectations as to the industry's compliance with the requirements for safety and working environment evaluations in connection with processes of this kind, the conference also provided valuable feedback from the industry. A conference report has been prepared and will form the basis for a follow-up conference in 1996.

Well maintenance - status and trends related to equipment and operations
The project aims at establishing an overview of status and trends for equipment and operations related to well maintenance (wireline, coiled tubing and snubling operations). The project has reviewed the Norwegian Petroleum Directorate's requirements in the Regulations relating to drilling and well activities with guidelines. In this context, a meeting was arranged with representatives from operating companies, contractor companies and the Norwegian Petroleum Directorate in order to acquire the industry's evaluations on how the regulations cover conditions related to well maintenance.

The project has also gathered information on the operating companies' internal routines, requirements, and views on current trends in drilling and well activities.

In 1995, a sub-report has been prepared and will form the basis for evaluating the need for a possible update of the regulatory requirements. At the same time, the work will be continued with regard to relevant standards for equipment and operations related to well maintenance, as well as a closer examination of factors related to operations while the well is underbalanced.

Test procedure for jet fire
Ignition of a gas leakage from a system under pressure may cause a so-called jet fire, which can contribute to a particularly dramatic development of a fire, as in the case of the Piper A accident on the British continental shelf in 1988. Following an initiative by the Health and Safety Executive in the UK, the Norwegian Petroleum Directorate was in 1992 invited to take part in a working group charged with the task of drawing up a procedure for determining the resistance of passive fire barriers to jet fires. The work resulted in a common British-Norwegian procedure for testing of such materials in a jet fire. In 1995 the project has continued its work on practical tests to verify this procedure and has also conducted tests to examine whether the method can be developed to also include insulation systems for piping. The project was concluded in 1995.

Membership in Norwegian Electrical Engineering Committee (NEK)
The Norwegian Petroleum Directorate's membership in NEK shall inter alia contribute to continuous review and development of regulations in the electrical engineering field in order to keep pace with technological development and international practice and experiences. The importance of this is underlined by the Norwegian efforts to comply with commitments under the EEA Agreement.

The Norwegian Petroleum Directorate also takes part in national and international cooperation with regard to preparation of a new regulatory framework. This work is headed by NEK.

Gas safety program 1993-96
During the period 1990-93, the Christian Michelsen Institute has, in cooperation with oil companies and government agencies in several countries, carried out a comprehensive research project on the risk of gas explosion in modules on installations in the petroleum activities. Among other things, the project led to the development of a new and improved version of the FLACS code, a model which describes flame acceleration for estimate of exploration overpressure in modules. A PC program for such estimates (MicroFLACS) and a Gas Blast Handbook have also been developed.

The project also demonstrated areas where there is a need for further research, and the new four-year program is to continue working on issues related to gas explosions in modules on petroleum installations. The project has developed further the FLACS code in order to enable estimation of pressure propagation in modules. In 1995 the project has modelled the effect of sprinkler and pressure water spraying systems and gas rarefication. Furthermore, a new 3D combustion model will be put into operation.

Perceived risk and safety
This project is a follow-up of a study conducted in 1990 on employees' own perceptions of their safety from injury due to potential risk elements on the installations and in the performance of their work. In 1994, a survey was conducted to chart possible changes in personnel's evaluation of risk and safety during this period. The results show that three out of four questioned feel reasonably safe in their work on the offshore installations.

A large number of persons on the installations have participated in the survey, which has provided a valuable foundation for the industry's and the Directorate's continued efforts to consider specific measures and, if necessary, further follow-up of the recommendations from the project. This work has continued in 1995 by conducting a comparison with results from a similar study done on the British continental shelf. The project was concluded in 1995.

Working environment for divers
Projects over many years have produced results with considerable practical value in the area of working environment for divers. In 1995 the work has focused on effect mechanisms for loss of body fluids under hyperbaric conditions, with the objective of forming the basis for development of a procedure to compensate for this fluid loss. The project is a continuation of an earlier project in the Norwegian Petroleum Directorate which revealed the incidence of relatively high fluid loss for certain divers during operational diving. High fluid loss can reduce both the physical and mental performance of the diver and can therefore be a safety risk.

Technical and operational aspects of manned underwater operations
Experience has shown that there still are technical and operational aspects of underwater operations which can be improved. The project has previously addressed problem areas such as battery capacity for diving bells in emergency situations, emergency training of diving personnel, depth monitoring of dives, decompression tables for surface-oriented diving, loss of bodily fluids (dehydration) and bell for air diving (mini-bell).

In 1995, the project focused on technical-operational aspects of manned underwater operations, including technical requirements to be placed on vessels and equipment used in connection with so-called "Flipper" diving (diving from smaller, open boats operating from a mother vessel). The results will form the foundation for preparation of the necessary guidelines for technical equipment and operational procedures used during "Flipper" diving.

Participation in the OMEGA program
The Norwegian Petroleum Directorate has earlier participated in a research program "Research and development in diving technology" (FUDT). This program has been continued in the form of the ALFA and OMEGA programs, for basic research and applied research and development, respectively, in the field of diving technology and diving medicine.

In 1995, the Norwegian Petroleum Directorate has participated in the OMEGA program, which has included a number of sub-projects in fields such as working environment, pressure changes, tools/equipment and implementation of research results. Participation in the program gives the Norwegian Petroleum Directorate access to results and the opportunity to exert influence in important parts of Norwegian R & D efforts in the area of diving technology and diving physiology.

Reduction of leak frequency in flanged connectors in process facilities
This project is a continuation of work begun in 1992 with the objective of achieving optimum function conditions for conventional flanged connectors, first and foremost to contribute to a reduction of the number of unintentional hydrocarbon leaks. The goal of the project is to prepare proposals for improvement both with regard to calculations as well as practical work on flanged connectors.

In 1995, the project has conducted full scale testing in laboratories to verify the calculations from the element-analyses performed.

Evaluation of internal leaks in emergency shut-down valves in process facilities
This project has examined the requirements and limit values placed by the operating companies on internal leaks in emergency shut-down valves (in this case sectioning valves), compared with the minimum requirements laid down in the regulations and by national and international standards.

In its final report the project has inter alia evaluated requirements for maintenance of emergency shut-down valves and to what extent internal leaks in emergency shut-down valves may be accepted. The project was concluded in 1995. The result from the project will be used inter alia in connection with the further development of the Norwegian Petroleum Directorate's regulations.

Membership in The Welding Institute (TWI)
The Norwegian Petroleum Directorate has been a member of The Welding Institute in the United Kingdom since 1981. This is the leading welding institute in the offshore field and is very active in the areas of research, training and consultancy services. Membership gives access to consultancy assistance, project participation and current information on developments within materials and welding technology.

Membership in the Marine Technology Directorate (MTD)
Since 1980, the Norwegian Petroleum Directorate has been a member of the British Offshore and Underwater Engineering Group (UEG) - a subdivision under the Construction Industry Research and Information Association (CIRIA). In 1989 the group merged with the Marine Technology Directorate (MTD). The projects administered

by the organization are extremely relevant to the Norwegian Petroleum Directorate's tasks in this technical sphere. Cooperation and available information have been very useful in safety reports, drafting of regulations and competence building. The Norwegian Petroleum Directorate participates in projects on guidelines for design and analyses of floating structures, and on guidelines for risk analysis for offshore installations.

Ductility of high-strength concrete under special loads
This project is a continuation of a work on further development of high-strength concrete with high ductility for use in structures which are subjected to special stresses such as blows, pressure shock, earthquake, heat and cold. Preparation of specifications for dimensioning and structural form of high-strength concrete subjected to special stress has also been a part of the project. In 1995 the project has focused on loads related to ship collisions and falling objects.

High-strength steels in petroleum activities
The project is a continuation of work to examine the properties of modern high-strength steel with regard to practical application in offshore petroleum activities. The project is conducted at Cranfield Institute of Technology in the United Kingdom, and has the objective of performing a thorough examination to verify the properties of available flux material for welding of steel. The project focuses on weldability, ductility, corrosion fatigue, sensitivity to hydrogen absorption as well as properties in Heat Affected Zones (HAZ). The project is expected to last throughout 1996 and has a total budget of NOK 1.4 million.

Corrosion protective coating
The design lifetime for installations in the petroleum activities is steadily increasing, and proper choise of materials combined with coating is vital in order to achieve the desired lifetime. So far, there has been little registration of factors which affect cathodic debonding and the effect of various forms of surface treatment before paint is applied. Nor is there any effective method of accelerated testing of how these factors affect the end result.

The project, which aims to answer these questions, is planned to last until 1998, with significant support from the operating companies and coating suppliers.

Reliability of corroded pipelines
This project is a continuation of a first phase which developed new formulas for calculation of residual strength in pipelines, risers and tension legs which have been damaged or are corroded on the interior. In Phase 2 the project will further develop formulas established in the first phase, and tie these to reliability analyses. This work has added valuable competence within pipeline design. The experiences gained may also have significance for regulatory development in this area, and for the Directorate's supervision of such damage.

"Ringing" vibrations in offshore installations
This project is a continuation of work which has the objective of arriving at calculation models to describe the so-called "ringing" effects observed under model tests of concrete gravity bases, so that the effect may be calculated in a predictable and standardized way. The Norwegian Petroleum Directorate has initiated and contributed to this industry-financed project. In 1995, the project has carried out further development of analysis methods and model tests in order to predict ringing on structures. The project was concluded in 1995.

Forum for research on steel materials in Norway (Steel materials forum)
The goal of this project is to be a unifying and coordinating body for steel-related research and development in Norway, with a view towards continued development of regulations, increasing the quality of supervision and providing the best possible advice to central authorities.

The forum further develops the R & D project established through the steel materials forum, implements pure industry projects, initiates user-controlled projects under the direction of EUREKA, EF programs, etc., coordinates and transmits results from projects supported by the Research Council, ensures a research basis for the Ph.d. degree and develops a common strategy between the Research Council and the steel-related industry.

The project supplies the Norwegian Petroleum Directorate with valuable experience in this field. The project has a total budget of NOK 1.2 million and is expected to last through 1996.

Reinforcement bar corrosion under dynamic load
The Norwegian Petroleum Directorate has supported this project which is sponsored by the industry and the authorities. The project was commenced in 1993, and is aimed to clarify the properties of light-weight concrete with respect to corrosion protection and corrosion resistance in a marine environment. Improved knowledge in this field is necessary if we are to draw full benefit from the increasing popularity of light-weight concrete in offshore structures, since until now there has been only limited understanding of the long term properties of light-weight concrete in a marine environment. Results from this project have led to initiation of particular supervision activities by the Norwegian Petroleum Directorate in this area. The project was concluded in 1995.

Corrosion in transportation pipelines
In recent years we have experienced several incidents of unexpected, in part severe, corrosion attacks on transportation pipelines both for oil and for gas. The existing calculation models for evaluation of the effect of corrosion in pipelines was developed for steel with low yield strength. For newer pipelines constructed of higher-strength steel, the existing calculation models may be too conservative.

The project will carry out a thorough review of the existing calculation tools, and if applicable develop new

calculation models which can better evaluate the effect of corrosion attacks on pipeline strength. Reliable calculations will contribute to ensuring maximum utilization of capacity in transportation systems attacked by corrosion. The project, which is supported by industry and the authorities in the United Kingdom, the USA, the Netherlands and Norway, commenced in 1994 and is planned to be concluded in 1996. The total budget is approximately NOK 12.5 million.

Strain based criteria for design of pipeline systems

The objective of the project is to establish the necessary basis in order to use strain based criteria for design of pipeline systems. Material tests have been performed in the project in order to find out how material properties are affected by significant straining. Analysis models have been established on this basis. The project has also prepared a method which can be used for strain based criteria in connection with design of pipeline systems.

The project, which started in 1994, comprises a necessary and important contribution for the Norwegian Petroleum Directorate to keep itself up-to-date as regards competence, and thereby follow and influence the development within the area as well as establish the necessary foundation in order to update the applicable regulations. The project will be concluded in early 1996, and a report will be prepared containing complete guidelines for use of strain based criteria in the design of pipeline systems.

Pressure testing of pipelines - evaluation of regulatory requirements

In this project a comparison has been made of the requirements in the Norwegian Petroleum Directorate's pipeline regulations with accompanying guidelines, other countries' regulations and accepted norms/standards regarding pressure testing of offshore pipeline systems. Through this work the project has given a short description of the pressure testing methods currently used for both rigid and flexible pipes. Furthermore, a evaluation has been performed of whether deviations may be made from the requirements and if so, what minimum requirements must be set. The project has also evaluated alternative methods of pressure testing.

The project was concluded in 1995. The results will be applied to the Norwegian Petroleum Directorate's consideration of applications for consent to installation and in supervision activities aimed at the installation phase.

Revision of pipeline regulations

The Regulations relating to pipeline systems in the petroleum activities with guidelines came into effect on 1 July 1990. The project is a part of the preliminary work in connection with revision of the pipeline regulations. The Norwegian Petroleum Directorate has acquired first-hand experience of the regulation through supervision and internal consideration, but also through contact with the industry and other external users. The goal of the project was to conduct a review of the regulation and point out areas where changes were needed, taking into consideration inter alia research results from project the Norwegian Petroleum Directorate has participated in and which will form the framework for future pipeline standards. The project was concluded in 1995. The final report prepared will form the foundation for updating the regulation.

Guidelines for calculating reliability of load-bearing structures

The purpose of the project has been to establish guidelines for calculation of reliability of load-bearing structures for permanent and floating installations offshore. Reliability analyses have been used in shore-based design, and the Norwegian Petroleum Directorate expects to be confronted with these methods in the future. There is therefore a need for such guidelines to carry out secure reliability analyses offshore. The project started in 1994 and was concluded in 1995.

Evaluation of possibilities with use of new EDP technology

This project contributes to continual development of competence regarding available EDP technology, with a view towards safeguarding internal needs for information systems which form a part of the foundation for regulatory development, supervision and information activities within the management spheres of safety and working environment. The project also contributes to making the Directorates activities more efficient by optimizing the use of EDP in consideration of relevant matters.

So far the project has contributed results related to conversion of existing systems for use on PCs, which has considerably increased the systems' frequency of use. The project has also contributed to the use of new, modern tools for the production of presentation material and project management.

International standardization in the petroleum sector

The Norwegian Petroleum Directorate's regulatory philosophy allows for a large part of the normative work to be taken care of by the industry itself in the form of industry standards. To the extent possible, Norwegian petroleum activities are to be based on national and international standards. The Directorate's involvement in the standardization work is partly in the form of support to standardization organizations, primarily Norwegian Technology Standardization Agency and the Norwegian Electrotechnical Committee, and partly by participation in national reference groups or direct working groups which prepare standards of particular significance to the offshore petroleum activities.

Maintenance management

The purpose of this project is to establish suitable methods of supervision using result indicators which can be used as a basis for evaluation of results from supervision targeting the operating companies planning and management of maintenance. The project has, among other things, considered whether the petroleum activities can benefit from

principles governing and experiences from maintenance management in the nuclear power industry and other types of activities where there are strict demands on reliability in a long-term perspective.

Requalification of steel structures - Phase 3
This project has developed a method for evaluating the strength of load-bearing structures in steel jackets that have been subjected to a load exceeding their original design load. The method may be used in situations where an installation has suffered a damage which is difficult to repair, or has been subjected to environmental loads exceeding the design assumptions. Relevant problem issues are changed weather criteria, subsidence of the sea bed and accidental loads. On the basis of the work performed, a handbook has been prepared for the evaluation of the strength of load-bearing structures in steel jackets after possible loads exceeding the design criteria. This project was started in 1993 and has had a budget of NOK 3.5 million. The project was concluded in 1995.

Management of simultaneous operational and modification activities
This project is a continuation of work carried out in 1993 which illuminated issues connected with simultaneous operation and continuous modification activities, based on data from the most serious accidents in the processing industry on a worldwide basis. The project resulted in a report prepared by Sintef.

The project is being continued in order to acquire a better data base inter alia with a view towards the authorities' consideration of development plans which entail tie-in of new fields to existing installations. Experiences from the Norwegian shelf and from comparable activities in other countries will be gathered, analyzed and compared. The objective is also to identify measures which can improve risk management in connection with simultaneous operation and modification. The project was started in 1995 and is planned to last through 1997.

5.4 SEABED CLEAN-UP

The Norwegian Petroleum Directorate's 1995 seabed clean-up project concentrated on a 950 km^2 area 100 km west of Bømlo, just south of the Vestrebakken fishing bank, which was cleared in 1994. The area is fishery intensive and was chosen on the basis of recommendations from fishery organizations and the fishery authorities. The commission for compensation for loss of fishing gear has dealt with several cases relating to loss of and damage to equipment in these waters.

Wire, remnants of trawling operations, purse nets, trawl doors and a steel mast were removed from the seabed. The exact positions of three wrecks and parts of a sinker were determined, which is of great importance for the fishermen in the area.

The mapping was conducted by M/S «L'Espoir» from the Dutch firm Oceonics Intersite BV. Identification and raising of the objects discovered were carried out by Stolt Comex Seaway A/S with the vessel M/S «Bergen Surveyor». The selection of contractors took place after announcement through the EEA system.

The steering committee for the clean-up action consisted of representatives from the Norwegian Petroleum Directorate, the Directorate of Fisheries, the Norwegian Mapping Authority, Hydrographic Survey Division, the Association of Fishermen and the Norwegian Oil Industry Association.

6. International cooperation

Introduction

The establishment of INTSOK, MILJØSOK and NORSOK have been important events for Norwegian petroleum activities during the last year. Through participation which has included the oil industry, contractor industry, maritime activities, special interest organizations and public administration, these forums can play a significant role in the development of a common strategy for internationalization of the petroleum sector. The expertise and experience which has been built during the past 25-30 years on the Norwegian continental shelf is a good point of departure for establishing a significant Norwegian presence in connection with petroleum activities abroad.

Through the years the Norwegian Petroleum Directorate has set up a very extensive international network in the petroleum sector. This network includes oil companies, contractors, research and development groups, authorities and international organizations.

In many of these groups, the Norwegian Petroleum Directorate has gained recognition for the management exercised in Norway, both in relation to international oil companies, the use of state and national oil companies, resource management in general, safety management, data management and management of working environment conditions. There is also increasing international interest in Norway's and the Norwegian Petroleum Directorate's management of the external environment on the shelf.

One of the most important management principles for which there appears to be a great deal of interest is *«the Norwegian model»* - the three-fold division between 1) the State's policy and framework-setting role, 2) the administrative and management role and 3) the business role. The Norwegian Petroleum Directorate has experienced a considerable number of inquiries from many countries for information about how *the Norwegian model* functions, and how it can be adapted to other petroleum-producing nations.

There is great interest within the area of resource management for how areas are opened and the resources charted in a planned way, how the licensing system works through active use of Norwegian and international oil companies, the plan for development and operation (PDO) and the plan for the installation and operation (PIO) system for field and area planning, the resource classification system, the regulations for management of the petroleum resources, philosophy and systems for management of petroleum resource data, improved utilization of resources, attitudes towards disposition of disused installations, to name some of the most important issues in resource management.

Within the area of safety management, which is based on the principle of internal control, the Norwegian Petroleum Directorate has noted great interest in many countries for the regulations used in Norway, not least because of the high safety standard established by the oil industry on the Norwegian continental shelf. The structure of a regulatory system where the principles of coordinated supervision, use of risk analyses, requirements for emergency preparedness planning, organization of safety and environmental work and safety training represents Norwegian expertise which is in great demand. It is also interesting to note that the safety philosophy developed for the offshore sector is gaining increasingly broad acceptance in land-based activities.

Norway's efforts in environmentally responsible production of petroleum has also gained international notice and may therefore be an area for sharing expertise with other nations.

In other words, Norway has a significant scope of expertise in petroleum management to offer the international market. It is therefore obvious that many recipient countries could take advantage of major synergy benefits through an institutional collaboration with, for example, the Norwegian Petroleum Directorate, which can offer support over a broad spectrum of management tasks. The Norwegian Petroleum Directorate's personnel also have the advantage of working in a compact Norwegian environment where the distance between the contractor industry, engineering firms, oil companies, management and research is short.

6.1 COOPERATION WITH NORAD

In 1995 the Norwegian Petroleum Directorate has participated in development cooperation in Tanzania, Mozambique, Namibia, the Seychelles, Bangladesh, India, Eritrea and Nicaragua. The Norwegian Petroleum Directorate has also continued its cooperation with the Coordinating Committee for Coastal and Offshore Geoscience Programmes in East and Southeast Asia (CCOP) in connection with planning of a new petroleum resource management project. The Norwegian Petroleum Directorate has also cooperated with Southern African Development Coordination (SADC). A total of 5.4 man-years has been spent on this work. The assistance has been focused on the following projects/countries:

Bangladesh

2.3 man-months of a planned total of 6 man-months assistance has been spent on Bangladesh Petroleum Institute (BPI) and the Ministry of Energy and Mineral Resources (MOEMR). The assistance has been given in connection with planning and conducting a seminar on Petroleum Resource Management which was arranged in Dhaka in January 1995.

In addition, time was spent on formulation of a work description for a project, as well as selection of a consultant and signing of a contract for this project. The project, «Management tools and administrative procedures for efficient regulation, planning and monitoring of petroleum exploration and development in Bangladesh» was planned

to commence in the spring of 1995, but due to problems with approval of the work description, the project will not get underway until the first quarter of 1996. Late implementation of the project, as well as the fact that BPI has not received the necessary data from Petrobangla to carry out the planned program, is the reason for the Norwegian Petroleum Directorate's efforts being lower than planned.

Namibia
A total of 2.7 man-months has been spent on assistance to Namcor. This work has been concentrated on follow-up of regulatory development and follow-up of drilling activities in Namibia. Assistance was also planned in the interpretation of geological data and build-up of a geodata base. Parts of this work have been performed by Namcor without assistance from the Norwegian Petroleum Directorate, and other parts have been postponed until next year.

Tanzania
In all, 2.8 man-months of a planned total 6 man-months has been spent on assistance to the Ministry of Water, Minerals and Energy (MWEM) and Tanzania Petroleum Development Corporation (TPDC). The assistance has been given in connection with follow-up of negotiations support for development of the Songo Songo gas field as well as the reformatting, reprocessing and storing of seismic data and general project follow-up. The activity level has been somewhat lower than planned.

Mozambique
A total of 12 man-months have been spent on assistance to Mozambique. The work has been divided between the state-owned oil company Empresa National de Hidrocarbonetos (ENH) and the recently established Directorate National Coals and Hydrocarbons (DNCH). As regards ENH, the work has included follow-up of processing of seismic data, interpretation, surveying and resource estimates for the Pande field, proposals for location of planned appraisal wells on the Pande field, evaluation of studies related to development and operation of a local gas network in Vilankulos as well as technical support to ENH in connection with meetings with the World Bank and the gas company ENRON. The support given to DNCH has been partly related to planning and carrying out a visit to the Norwegian Petroleum Directorate by the Director of DNCH and partly in connection with identifying consultants as general advisers to DNCH as well as preparing proposals for programs and budgets for the year's activities as well as the next few years. The activity level has been somewhat lower than expected due to certain problems in securing the agreement with the Directorate.

Nicaragua
A total of 5.97 man-months compared with the planned 4 man-months were spent on assistance to Instituto Nicaraguende Energia (INE) in connection with preparation and follow-up of re-formatting of seismic data, test reprocessing of old seismic data, preparation of data packages in connection with extra copies on film, follow up of the data program for storing technical geological information, preparation of a 4-year plan and strategy report for INE in cooperation with INE. The work on the 4-year plan and the strategy report were not included in the original work planned.

India
9 man-months of assistance has been given to the Directorate General of Hydrocarbons (DGH) in India after the signing of an agreement between the Norwegian Petroleum Directorate and DGH relating to institutional cooperation. This cooperation aims at assisting DGH in the development of the institution by transferring expertise within all segments of petroleum management.
The assistance has been related to planning and carrying out visits to the Norwegian Petroleum Directorate by DGH personnel for information and sharing of know-how in the fields of petroleum resource management, petroleum data management, exploration activities, development and operation, and safety and environment. From the Norwegian Petroleum Directorate, both management and groups of personnel engaged in the above fields have visited India and DGH for meetings. In this connection, lectures and seminars for up to 60 people have been arranged with representatives from DGH, the Ministry of Natural Gas and Petroleum and the state-owned oil companies ONGC and OIL. In addition, meetings have been held at the highest political and technical level in connection with the management visit.
The achievement of goals has been very good, with many contacts made on high levels within politics and management. A 2-year follow-up project is being prepared.

Angola
Approximately 4.5 man-months have been spent in connection with evaluation of previous Norwegian assistance and to the petroleum sector in Angola, as well as recommendations for future support and a draft project proposal from MINPET.

Eritrea
This year about 4 man-months were spent on a fact-finding mission to Eritrea with subsequent reporting and recommendation to NORAD regarding future aid to the country. The formulation of the project proposal has taken place in connection with visits from representatives of the Ministry of Energy, Mines and Water, Hydrocarbon Unit to Stavanger during the autumn of 1995.

The Seychelles
Approximately 1.8 man-months were spent on following up drilling activity in The Seychelles, in addition to follow-up of reformatting of seismic data.

CCOP
A total of about 2 man-months of assistance has been dedicated to the Committee for Coordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP) in connection with preparation of a new project proposal, Resource Evaluation Programme (REP) and

follow-up of this vis-à-vis NORAD. There has also been contact with Statoil regarding their support of the project and a meeting with the CCOP secretariat in Bangkok in connection with the signing of the new agreement in December.

Achievement of goals is good, as it has been possible to start up a training project within petroleum and geological disciplines, which will greatly benefit the weakest countries within CCOP.

Administration - miscellaneous advisory services

A total of 21.3 man-months have been spent on miscellaneous advisory services and administration. The advisory services have included evaluation of possible Norwegian aid to the petroleum sector in Eritrea, preparation for fact-finding and evaluation of aid to Angola, fact-finding mission to Vietnam, evaluation of a report on gas exploitation in southern Africa prepared by the Technical Assistant Unit (TAU) in the Southern Africa Development Council (SADC), assistance to CCOP and The Seychelles National Oil Company (SNOC), meetings with representatives from the authorities in South Africa, in addition to general administration and follow-up.

6.2 COOPERATION WITH PETRAD

PETRAD (International Programme for Petroleum Management and Administration) is a foundation under the Norwegian Petroleum Directorate and NORAD which tailors seminars in the fields of management and administration of the petroleum industry for the authorities and state-owned oil companies in Asia, Africa and Russia/CIS (Commonwealth of Independent States). In addition, PETRAD arranges two eight-week courses each year addressing «Petroleum Policy and Management» and «Management of Petroleum Operations». The courses are held in Stavanger.

All PETRAD activities are aimed at senior and middle management personnel.

PETRAD engages the very best Norwegian petroleum expertise available for the courses. So far, PETRAD has made use of about 250 experts from more than 50 companies, institutions and the authorities as lecturers and resource persons.

The response has shown that PETRAD has had a significant effect as regards opening doors and making contacts in other countries. PETRAD gives its course participants a «Norwegian backpack» which they can refer to when the need for Norwegian goods and services arises.

As a foundation under the Norwegian Petroleum Directorate and NORAD, PETRAD is looked upon as a neutral representative from the Norwegian public sector and also as an intermediary for the exchange of knowledge.

PETRAD's location within the Norwegian Petroleum Directorate means that the Directorate has a close and profitable cooperation with the foundation. The Norwegian Petroleum Directorate participates with lecturers and resource persons both at courses/seminars in Norway and abroad. In 1995, the Norwegian Petroleum Directorate contributed in carrying out the following arrangements:

- Petroleum Policy, Foreign Investment in Russia, Moscow
- Petroleum Policy and Management, China
- Russian-Norwegian Forum for Energy and Environmental Protection, Oslo
- Petroleum Policy and Management, Stavanger
- Petroleum Economics, Uganda

This activity contributes to technical exposure to and understanding of different cultures, while increasing the total competence of the individual worker.

The Norwegian Petroleum Directorate is also involved in PETRAD's commitment in relation to Russia. This involvement is primarily coordinated under the Norwegian/Russian Forum for Energy and Environment, which is led by the Ministry of Industry and Energy.

Several working groups and expert groups with participation from both the Russian and Norwegian sides have been established and are administered by PETRAD.

The Directorate takes part in all of these expert groups. The work takes place in the form of seminars and workshops. During the year the Directorate participated in several workshops held in connection with data management and taxation issues.

6.3 COOPERATION WITHIN RESOURCE MANAGEMENT

Research cooperation on improved oil recovery

Since 1979, Norway has participated in international research cooperation under the direction of the International Energy Agency (IEA) on increased oil recovery using advanced methods. There are currently nine countries participating, and the cooperation is mainly related to a commitment to a certain scope of research in specific areas, and in the exchange of results. For the period from 1992 to 1995, the Norwegian contribution to the cooperation has been managed through the state research program RUTH, which has been led by the Norwegian Petroleum Directorate. RUTH is described in more detail in Chapter 5.

The Norwegian Petroleum Directorate is represented in the international steering committee for this IEA cooperation.

Cooperation with government agencies of the North Sea countries

As an oil and gas province, the North Sea is basically divided between the U.K., 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 the three countries are therefore similar in many ways.

Consequently, for many years the Norwegian Petroleum Directorate has carried out regular meetings with British and Danish resource management authorities who share basically the same responsibilities for their sectors as the Norwegian Petroleum Directorate does for the Nor-

wegian shelf. For the U.K. shelf, it is the technical section of the Oil and Gas Division in DTI (Department of Trade and Industry) which is responsible for the resource aspect of exploration, development and operation activities. For the Danish shelf, the Danish Energy Agency (Energistyrelsen) has a comparable responsibility.

The objective of the meetings is primarily to exchange opinions and experience from the respective activities. The U.K. activities are a few years ahead of us. It has therefore been very useful to draw on their experiences with regard to increased oil recovery, development of small fields and unitization. The Danes have particular problems related to chalk fields. It has therefore been valuable to acquire first hand information on their experiences. Data management is another area where it has been very useful to exchange experience. Close cooperation is envisaged also in this connection.

During the year two meetings were conducted with the Danish authorities. The first meeting was held in Copenhagen on 16-17 March and the second was held in Oslo on 2-3 October.

In addition to the exchange of information regarding the status in the respective areas, a presentation was given on Danish gas distribution during the meeting in Copenhagen. The presentation included a visit to Stenlille where Dangas has one of its gas storage facilities. The Danes also presented their experiences with the licensing directive. Efforts within research and development in order to achieve better exploitation of oil and gas deposits is a continuous theme. Cooperation in this area was one of the main topics at the meeting in Oslo.

This year's meeting with the British authorities was held on Svalbard on 16-19 August. The main topic was exploration and development in new areas. The British presented their experiences in the West Shetlands area, while we contributed with a presentation of our plans for the areas off the coast of Mid-Norway. Both from a geological and a technical development point of view, in many ways these areas represent the same challenges.

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 North and West European countries with responsibility for exploration for oil and gas.

In the beginning England, Ireland, Denmark, Germany, the Netherlands and Norway took part in these meetings. Subsequently, France, the Isle of Man and the Faeroe Islands have joined.

The responsibility for hosting the meetings is on a rotation basis among the various countries. Norway has hosted these meetings twice previously (1988 and now in 1995).

The main issues of discussion at the meetings are geotechnical, exploration technology and data management issues and challenges faced by the various countries in their efforts towards efficient discovery of new oil and gas resources.

The combined expertise and experience at these meetings is considerable, and the access to information is important for each individual participating country with a view to developing optimal exploration strategies.

Annual meetings with other countries' authorities - metering

Some of the petroleum from the Norwegian continental shelf is produced from fields located on the border with the U.K. (Statfjord, Murchison and Frigg). This has necessitated a common understanding between the two countries as to how to the volumes produced and exported are to be determined.

In addition to joint verification of equipment and procedures for fiscal metering technology, an annual cooperation meeting is arranged between the competent Norwegian and British authorities.

Norwegian gas is marketed via large gas sales metering stations in Emden (Germany), Zeebrügge (Belgium) and St. Fergus (U.K.). Procedures for operation and maintenance of the metering stations have been prepared by the respective operating companies in consultation with the competent authorities in the host country and the Norwegian Petroleum Directorate.

The competent authorities in charge of fiscal metering technology in Germany, Belgium and the U.K. carry out supervision of their installations in accordance with requirements set out in national legislation. The Norwegian Petroleum Directorate carries out corresponding follow-up in accordance with Norwegian legislation.

Cooperation meetings are arranged annually between the Norwegian Petroleum Directorate and the competent authorities in charge of fiscal metering technology in Germany, Belgium and the U.K. in order to coordinate questions of common interest related to the gas sales metering stations.

International standardization in metering

International standards are used in the metering and analysis of oil and gas. The Norwegian Petroleum Directorate participates in the international work to revise existing standards and development new ones.

The European Standardisation Organisation (CEN) is responsible for standardization work in Europe. An agreement has been established between CEN and ISO, known as «the Vienna Agreement», which ensures that CEN will make use of ISO standards where they are available. The Norwegian Petroleum Directorate is also directly involved in the standardization work in CEN.

In Norway, Norwegian Technological Standardisation, (NTS), has set up working groups to follow up the standardization work on an international basis. NTS also functions as a secretariat. The Norwegian Petroleum Directorate is also actively involved in these working groups, including chairing the K141 group which follows up ISO TC193 «Natural Gas».

6.4 COOPERATION WITHIN MANAGEMENT OF SAFETY AND WORKING ENVIRONMENT

The Norwegian Petroleum Directorate cooperates extensively with international professional institutions and government agencies, either directly or indirectly through Norwegian government agencies. The purpose of this cooperation 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 on the international level in order to promote positive development in safety and working environment issues.

In general, the cooperation has consisted of participation in international governmental cooperation by European and United Nations agencies, but also in more direct cooperation with the various types of international and regional professional institutions. The most important partners in 1995 have been:

- NSOAF - North Sea Offshore Authorities Forum,
- the EU Commission, in cooperation with the Ministry of Local Government and Labour, on safety and the working environment,
- the United Nations' International Maritime Organisation (IMO) and International Labour Organisation (ILO) regarding safety at sea and the working environment, respectively,
- European Diving Technology Committee (EDTC) and the Association of Offshore Diving (AODC) regarding diving safety,
- Marine Technology Directorate (MTD), United Kingdom, regarding inspection and maintenance of installations,
- Welding Institute, United Kingdom, regarding research and development of materials and welding,
- American Petroleum Institute (API), participation in the annual conference on technical petroleum topics and standardization,
- National Association of Corrosion Engineers (NACE), USA, participation in the annual conference on corrosion and surface treatment,
- CENELEC, cooperation on electrical engineering standardization in Europe through the Norwegian Electrotechnical Committee (NEK).

BORIS - development of safety regulations for offshore petroleum activities in Russia

The BORIS project (Bilateral Cooperation on Development of Russian Regulations concerning Industrial Safety) started in 1995. This is a cooperation project between the Russian Gosgortekhnadzor (Supervisory Directorate), which is responsible for the supervision of safety in most sectors of Russian industry, and the Norwegian Petroleum Directorate. The project will run over a period of three years. The Norwegian part of the project is financed by the Ministry of Foreign Affairs.

In the BORIS project, the Norwegian Petroleum Directorate assists the Gosgortekhnadzor in the preparation and planning of development of safety regulations for the offshore Russian petroleum industry. No such regulations currently exist. Based on its own experiences in the development of regulations, the Norwegian Petroleum Directorate provides advice and guidance with regard to the charting and analysis of factors which will steer the development of regulations. The reforms now being carried out in Russia, including the transition from a centrally directed to a market economy, contribute to making the task of developing relevant regulations adapted to the Russian petroleum industry of the future a complicated one.

The nature of the project demands the building of a climate of trust and good communication between the participants in the Russian and Norwegian parts of the project. To assist in these efforts, the Norwegian Petroleum Directorate has employed two project team members whose qualifications include mastery of the Russian language. This has had a positive effect on the cooperation atmosphere.

The Norwegian value of the project is primarily the fact that by contributing to the development of effective safety regulations for petroleum activities in the Russian sector of the north, the danger of major catastrophes or accidents occurring in or near Norwegian coastal or ocean areas is reduced. In addition, the project also provides a practical means of strengthening cooperative relations between Norway and Russia, which can also provide interesting opportunities for Norwegian industry as a whole.

NSOAF - North Sea Offshore Authorities Forum

In the field of safety management, 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.

In May 1992, NSOAF established two working groups in which the Norwegian Petroleum Directorate is represented. One of the groups is to consider whether a NSOAF plan should be established with the aim of mutual acceptance of methods of documenting compliance with national regulatory requirements, such as the «Safety Case», which is specific to the individual mobile installation. This group is chaired by a Norwegian.

The other group, which has a Danish chairman, will seek to harmonize the requirements for safety training in the various North Sea countries.

Bilateral cooperation with the United Kingdom and Denmark

The Norwegian Petroleum Directorate cooperates with the British Health and Safety Executive (HSE) on common questions related to management of safety and the working environment on the two countries' continental shelves through a working group called "Special Working Group". The working group meets twice per year, and exchanges experiences gained from supervision, information on major events, etc.

A comparable forum has been established with the Danish Energy Agency (Energistyrelsen). This forum meets once each year.

International Regulators' Forum - IRF

Offshore petroleum activities are an international industry. The various oil companies often have operations in several countries, and in each of these countries must abide by a supervision system for safety and working environment. The elements of the different systems and the way they are practiced are primarily governed by the framework conditions established in the particular country. Nonetheless, it is of great interest to the particular government to know whether its supervision policy, the way the supervision is carried out, and the special safety questions or problems they must address, are similar to or different from those practiced or exercised in other countries.

While the international oil companies have set up national, regional and international organizations to promcte a common understanding of their interests, there is no comparable organization for supervisory authorities. Therefore, the International Regulators' Forum (IRF) was founded in 1994 by a group of national safety authorities. The objective of the forum's activities is to facilitate the exchange of ideas and opinions regarding applied methods and principles for efficient exercise of the supervision of safety and the working environment, to exchange facts about supervision activities, to inform each other of current technical problem areas, etc. Within the possibilities and limitations set by the national frameworks for the activities, this will contribute to promoting a common understanding among the members as regards factors such as: the role of the supervisory authorities, means of supervision employed, supervision methods, development of competence as well as the relationship between the authorities and the industry.

The EU Commission

Since 1982, Norway, represented by the Norwegian Petroleum Directorate, has held observer status in the EU proceedings on safety and the working environment in offshore petroleum activities.

This work comes under the EU's «Safety and Health Commission for the Mining and Other Extractive Industries» (SHCMOEI), and was until early 1993 carried out by a working group called «Working Party on Oil, Gas and Other Minerals Extracted by Borehole». The SHCMOEI activities were reorganized in 1993 and the working group is now called «Committee on Borehole Operations» - the Borehole Committee.

During the course of 1994-95, the Borehole Committee's work has particularly concentrated on a draft SHCMOEI report on the Piper Alpha catastrophe on the British sector in 1988, as well as a report on personal injury statistics for offshore petroleum activities. According to the plan, these reports are to be considered by SHCMOEI in February 1996.

Further work by the Borehole Committee is inter alia dependent on this consideration, as well as on what resources are made available.

Electrotechnical standards and regulations

The Norwegian Petroleum Directorate participates in the following committees on this subject:

a) Norsk Elektroteknisk Komité (NEK) (Norwegian Electrotechnical Committee), Standards Committee (NK) 18, Shipboard Installations,
b) NEK, NK 31 - Electrical Equipment for Explosion-Hazard Areas,
c) International Electrotechnical Commission (IEC), Technical Committee 18 (TC 18)-Electrical Installations of Ships and Mobile and of Fixed Offshore Units

The Norwegian Petroleum Directorate's representative is the project manager for Working Group 18 in TC 18, which is preparing a proposal for a new international standard - «Mobile and fixed offshore units - Electrical Installations».

7. Statistics and summaries

7.1 EXPLORATION LICENSES AND PRODUCTION LICENSES

7.1.1 NEW EXPLORATION LICENSES

As of 31 December 1995, a total of 227 exploration licenses have been awarded. These licenses are valid for three years. The following licenses were awarded in 1995:

Company	License No.
Den norske stats oljeselskap a.s (Statoil)	221
Total Norge AS	222
Elf Petroleum Norge AS	223
Enterprise Oil Plc	224
BP Norway Limited U.A	225
Phillips Petroleum Company Norway	226
Digeton Geophysical Ltd	227

7.1.2 SCIENTIFIC EXPLORATION

As of 31 December 1995, a total of 290 licenses for scientific exploration have been awarded on the Norwegian continental shelf.

As shown in Table 7.1.2, seven such licenses were awarded in 1995.

Exploration license 286/95 was granted for scientific drilling of 7 locations under the «Ocean Drilling Program» (ODP). Five of these were located on the Yermak Plateau, northwest of Svalbard, one on the Svalbard west margin and one on the Iceland Plateau. The Norwegian Petroleum Directorate gave its consent to exploration of the 6 locations on the Norwegian continental shelf.

Because of ice conditions, only one of the drilling operations on the Svalbard west margin was completed.

7.1.3 NEW PRODUCTION LICENSES

Three new production licenses were awarded in 1995. Production license 018B, which is a part of the Albuskjell field, was awarded on 25 August 1995. Production licenses 050B and 114B, additional area for the Yme and Gullfaks fields, respectively, were awarded on 11 August 1995. See Table 7.1.3.a.

An overview of licensing rounds with production licenses, allocated area, relinquished and current area is shown in Table 7.1.3.b. Table 7.1.3.c shows Norwegian and foreign shares in the licensing rounds. Licensees, operators and other information about active production licenses is shown in Table 7.1.6.

Table 7.1.2
Licenses for scientific exploration for natural resources

Licenses	Institution	Subject			Area
		Geo-physics	Geo-logy	Other	
284/95	University of Tromsø		X		Norwegian Sea
285/95	University of Bergen	X			Kolbeinsey-Ryggen Jan Mayen-Ryggen
286/95	Ocean Drilling Program Texas A&M University USA		X		Areas around Svalbard
287/95	Uppsala University Sweden	X			West of Tarva-Husøya West of Tautra-Hindremsbukta
288/95	University of Bergen		X		Beitstadfjorden
289/95	University of Bergen		X		Svalbard and Barents Sea margin
290/95	University of Oslo	X	X		Skagerrak

Table 7.1.3.a
Production licenses awarded 1995

Prod.lic. no	Quad./block	Share in%		Licensee (O=operator)
018B	1/6	1.000		Den norske stats oljeselskap a.s
		7.594		Elf Petroleum Norge AS
		0.855		Elf Rex Norge AS
		30.000		Fina Production Licences AS
		13.040		Norsk Agip AS
		6.700		Norsk Hydro Produksjon AS
		36.960	O	Phillips Petroleum Company Norway
		0.304		Saga Petroleum a.s.
		3.547		Total Norge AS
050B	34/10	85.000	O	Den norske stats oljeselskap a.s
		9.000		Norsk Hydro Produksjon a.s
		6.000		Saga Petroleum a.s.
114B	9/5	10.000		Deminex Norge AS
		65.000	O	Den norske stats oljeselskap a.s
		25.000		Saga Petroleum a.s.

Table 7.1.3.b
Production licenses and acreages as of 31 December 1995

Lic. round	Awarded	Production license no.	No of blocks *		Area km^2 awarded	Area km^2 relinquish.	Area km^2 in licenses
			Awarded	Relin-quished			
1.	1.9.1965	001-021	74	59	39,842.476	3,7018.724	2,823.752
	7.12.1965	022-022	4	4	2,263.565	2,263.565	
or.	25.8.1995	018B	1		102.503		102.503
	12.9.1977	019B	2		617.891		617.891
2.	23.5.1969	023-031	9	2	4,107.833	2,586.127	1,521.706
	30.5.1969	032-033	2		746.285	376.906	369.379
	14.11.1969	034-035	2		1,024.529	564.837	459.692
	11.6.1971	036-036	1		523.937	262.047	261.890
or.	10.8.1973	037-037	2		586.834	295.157	291.677
3.	1.4.1975	038-040					
		and 042	7	5	1,840.547	1,603.469	237.078
	1.6.1975	041	1	1	488.659	488.659	
	6.8.1976	043	2		604.558	555.553	49.005
	27.8.1976	044	1		193.076	90.417	102.659
	3.12.1976	045-046	4	2	1,270.682	814.708	455.974
	7.11.1977	047	2	2	368.363	368.363	
	18.2.1977	048	2	1	321.5	203.498	118.002
	23.12.1977	049	1	1	485.802	485.802	
or.	16.6.1978	050	1		500.509	151.962	348.547
or.	11.8.1995	050B	1		98.403		98.403
4.	6.4.1979	051-058	8	2	4,007.887	2,663.295	1,344.592
5.	18.1.1980	059-061	3	3	1,108.078	1,108.078	
	27.3.1981	062-064	3	1	1,099.522	867.542	231.98
	23.4.1982	073-078	6	2	2,311.912	1,849.47	462.442
6.	21.8.1981	065-072	9	3	3,218.945	2,149.358	1,069.587
or.	20.8.1982	079-079	1		102.167		102.167

Lic. round	Awarded	Production license no.	No of blocks *		Area km² awarded	Area km² relinquish.	Area km² in licenses
			Awarded	Relin-quished			
7.	10.12.1982	080-084	5	5	2,082.966	2,082.966	
or.	8.7.1983	085-085	3		1,521.16	725.816	795.344
or.	11.9.1992	085B	2		27.166		27.166
8.	9.3.1984	086-100	17	3	6,338.273	4,348.802	1,989.471
9.	1.3.1985	101-111	13	2	5,293.054	3,629.645	1,663.409
or.	26.7.1985	112-112	1		260.215	209.842	50.373
10a	23.8.1985	113-120	9	2	3,075.433	2,319.440	755.993
or.	11.8.1995	114B	1		11.059		11.059
10b	28.2.1986	121-128	9	3	3,828.258	2,323.566	1,504.692
or.	11.7.1986	129-129	1	1	225.393	225.393	
11.	10.4.1987	130-137	11	9	4,163.711	3,655.270	508.441
	29.5.1987	138-142	11	7	2,975.807	2,370.732	605.075
12a	8.7.1988	143-153	16	2	4,701.019	1,715.827	2,985.192
12b	9.3.1989	154-162	13	7	5,031.262	3,253.553	1,777.709
13.	1.3.1991	163-184	36	8	12,076.889	3,942.282	8,134.607
or.	13.9.1991	185-185	1		25.535		25.535
14.	10.9.1993	186-202	31		10,509.919		10,509.919
			329	140	129,983.582	87,570.671	42,412.911

* block or part of block or. = awards made outside licensing rounds

Table 7.1.3.c
Licensing rounds. Norwegian and foreign shares as of 31 December 1995

Licensing rounds	Year	Number of blocks	Share %		Operator %	
			Norweg.	foreign	Norweg.	foreign
1	1965	78	8	92	0	100
2	1969-1971	14	15	85	0	100
Statfjord (037)	1973	2	52	48	0	100
3	1974-1978	22	58	42	63	37
Prod.lic. 018B	1995	1	8	92	0	100
Ula (19B)	1977	2	50	50	0	100
Gullfaks (050)	1978	1	100	0	100	0
Prod.lic. 050B	1995	1	100	0	100	0
4	1979	8	58	42	68	32
5	1980	12	66	34	92	8
6	1981	9	64	36	50	50
Oseberg (079)	1982	1	100	0	100	0
7	1982	5	60	40	80	20
Troll (085)	1983	3	100	0	100	0
Prod.lic. 085B	1992	2	69	31	100	0
8	1984	17	60	40	60	40
9	1985	13	43	57	62	38
Prod.lic. 112	1985	1	67	33	0	100
10A	1985	9	64	36	67	33
Prod.lic. 114B	1995	1	90	10	100	0
10B	1986	9	65	35	56	44
Prod.lic. 129	1986	1	67	33	100	0
11	1987	22	59	41	62	38
12A	1988	16	58	42	38	62
12B	1989	13	64	36	67	33
13	1991	36	66	34	64	36
Prod.lic. 185	1991	1	69	31	100	0
14	1993	31	68	32	47	53

7.1.4 TRANSFER OF INTERESTS AND CHANGES IN OPERATOR

Transfer of interests

During 1995, 50 transfers of interest have been approved under Section 61 of the Act of 22 March 1985 No. 11 relating to petroleum activities. These are shown in Table 7.1.4.

Table 7.1.4
Transfer of interest

Areas: N=North Sea, M=Norwegian Sea, B=Barents Sea

Prod. lic.	From:	To:	Share	Date	Area
011	A/S Norske Shell	Amoco Norge AS	50.000000%	95.05.09	N
107	A/S Norske Shell	Mobil Dev. Norway AS	20.000000%	95.01.10	M
132	A/S Norske Shell	Mobil Dev. Norway AS	10.000000%	95.01.10	M
092	Britoil Norge AS	BP Petr. Dev. Norway AS	2.000000%	95.09.01	M
103	Britoil Norge AS	Norske Conoco A/S	7.500000%	95.01.06	N
103	Britoil Norge AS	Amerada Hess Norge AS	2.500000%	95.01.06	N
121	Britoil Norge AS	BP Petr. Dev. Norway AS	2.000000%	95.09.01	M
158	Britoil Norge AS	BP Petr. Dev. Norway AS	4.000000%	95.09.01	M
074	Deminex Norge AS	Den norske stats olje. a.s	3.000000%	95.01.01	M
074	Deminex Norge AS	Mobil Dev. Norway AS	7.000000%	95.04.05	M
132	Deminex Norge AS	Mobil Dev. Norway AS	10.000000%	95.04.05	M
065	Den norske stats olje. a.s	Enterprise Oil Norw. AS	10.000000%	95.01.19	N
086	Den norske stats olje. a.s	Saga Petroleum a.s.	10.000000%	95.06.22	N
094	Den norske stats olje. a.s	Saga Petroleum a.s.	7.000000%	95.06.22	M
116	Den norske stats olje. a.s	Saga Petroleum a.s.	10.000000%	95.06.22	N
134	Den norske stats olje. a.s	Saga Petroleum a.s.	7.000000%	95.06.22	M
150	Den norske stats olje. a.s	Enterprise Oil Norw. AS	10.000000%	95.01.19	N
190	Den norske stats olje. a.s	Enterprise Oil Norw. AS	5.000000%	95.01.19	N
069	DNO Olje AS	Saga Petroleum a.s.	5.000000%	95.05.09	N
089	DNO Olje AS	Saga Petroleum a.s.	7.700000%	95.05.09	N
092	DNO Olje AS	Saga Petroleum a.s.	8.000000%	95.05.09	M
100	DNO Olje AS	Den norske stats olje. a.s	1.000000%	95.02.16	B
104	DNO Olje AS	Saga Petroleum a.s.	5.000000%	95.05.09	N
115	DNO Olje AS	Saga Petroleum a.s.	5.000000%	95.05.09	N
121	DNO Olje AS	Saga Petroleum a.s.	8.000000%	95.05.09	M
124	DNO Olje AS	Saga Petroleum a.s.	5.000000%	95.03.06	M
157	DNO Olje AS	Saga Petroleum a.s.	15.000000%	95.05.09	M
134	Enterprise Oil Norw. AS	Den norske stats olje. a.s	10.000000%	95.01.19	M
064	Esso Expl. & Prod. Norway A/S	Norsk Hydro Produksjon AS	5.750000%	95.01.19	B
064	Esso Expl. & Prod. Norway A/S	Den norske stats olje. a.s	19.250000%	95.01.19	B
122	Esso Expl. & Prod. Norway A/S	Amerada Hess Norge A/S	10.000000%	95.01.19	M
074	Neste Petroleum AS	Den norske stats olje a.s.	4.500000%	95.04.05	M
018	Norminol AS	Saga Petroleum a.s.	0.304000%	95.01.01	N
018B	Norminol AS	Saga Petroleum a.s.	0.304000%	95.01.01	N
074	Norsk Agip AS	Den norske stats olje. a.s.	4.500000%	95.04.05	M
107	Norsk Agip AS	Norsk Hydro Produksjon AS	10.000000%	95.01.09	M
132	Norsk Agip AS	Norsk Hydro Produksjon AS	10.000000%	95.01.09	M
090	Norsk Hydro Produksjon AS	Mobil Dev. Norway AS	15.000000%	95.06.23	N
104	Norsk Hydro Produksjon AS	Mobil Dev. Norway AS	5.000000%	95.06.23	N
138	Norsk Hydro Produksjon AS	Amerada Hess Norge AS	5.000000%	95.09.06	B
138	Norsk Hydro Produksjon AS	Total Norge AS	5.000000%	95.09.06	B
114	Petrosaga AS	Saga Petroleum a.s.	10.000000%	95.05.04	N
153	Petrosaga AS	Saga Petroleum a.s.	10.000000%	95.05.04	N
157	Petrosaga AS	Saga Petroleum a.s.	10.000000%	95.05.04	M
008	Saga Petroleum a.s.	Amerada Hess Norge AS	50.000000%	95.06.19	N
038	Saga Petroleum a.s.	Den norske stats olje. a.s	15.000000%	95.06.22	N
066	Saga Petroleum a.s.	Amerada Hess Norge AS	20.000000%	95.02.22	N
074	Saga Petroleum a.s.	Den norske stats olje. a.s	3.000000%	95.04.05	M
077	Saga Petroleum a.s.	Den norske stats olje. a.s	5.000000%	95.02.16	B
124	Saga Petroleum a.s.	Den norske stats olje. a.s	5.000000%	95.06.22	M

Changes in operator
In 1995, the following six changes in operator were approved:

Production license 038
Operator: Saga Petroleum a.s took over the operatorship from Den norske stats oljeselskap a.s (Statoil) 1 September 1995

Production license 062
Operator: Den norske stats oljeselskap a.s (Statoil) took over the operatorship from Saga Petroleum a.s 1 September 1995

Production license 074
Operator: Den norske stats oljeselskap a.s (Statoil) took over the operatorship from Saga Petroleum a.s 1 September 1995

Production license 086
Operator: Saga Petroleum a.s. took over the operatorship from Den norske stats oljeselskap a.s (Statoil) 1 September 1995

Production license 090
Operator: Norsk Hydro Produksjon AS took over the operatorship from Mobil Development Norway AS 1 August 1995

Production license 116
Operator: Saga Petroleum a.s took over the operatorship from Den norske stats oljeselskap a.s (Statoil) 1 September 1995

7.1.5 RELINQUISHMENTS AND SURRENDERS

There have been 20 relinquishments and surrenders of production licenses in 1995. In four of the production licenses the total area was relinquished. This is shown in Table 7.1.5. The awarded and current area is shown in Table 7.1.3.b.

Table 7.1.5
Relinquishments

Production-license	Operator	Blocks	Original area km^2	Relinquished area km^2 in 1995	Area in prod.-licenses km^2
006	Amoco	2/5, 2/8 og 3/4	2,278.556	216.239	916.462
008	Saga	2/6, 18/10	2,214.404	328.270	110.182
011	Shell	1/3, 1/6	1,681.660	102.503	397.901
026	Elf	25/2	520.058	121.092	138.751
030	Esso	30/10	464.254	119.836	0.000
052	Statoil	30/3	504.440	105.925	144.929
102	Elf	25/5	523.937	261.665	262.272
104	Hydro	30/9	410.102	61.590	348.512
107	Hydro	6407/7	448.529	100.287	121.231
112	Elf	25/2	260.215	79.884	50.373
115	Total	9/3	550.790	58.881	115.861
122	Hydro	6507/2	424.012	211.990	212.022
124	Statoil	6507/8	432.220	216.294	215.926
135	Saga	7124/3, 7125/1	646.061	319.711	0.000
152	Statoil	33/12	137.968	64.500	73.468
154	Hydro	6205/3, 6305/12	941.433	941.433	0.000
170	Hydro	30/6	174.407	160.896	13.511
172	Mobil	33/9	157.188	79.053	78.135
180	Statoil	7128/4	327.322	327.322	0.000
183	Shell	7229/11, 7229/12	637.465	637.465	0.000

7.1.6 LICENSEES IN ACTIVE PRODUCTION LICENSES

Tabell 7.1.6
Licensees in active production licenses per 31 December 1995

PROD. LIC.	AWARD. EXPIRES	BLOCK		LICENSEES O = operator	SHARES %	SDFI %
001	65/09/01	25/11	O	ESSO EXPL. & PROD. NORWAY A/S	100.000000	
	11/09/01					
001 P	65/09/01	16/1		ENTERPRISE OIL NORWEGIAN AS	50.000000	
	11/09/01		O	ESSO EXPL. & PROD. NORWAY A/S	50.000000	
006	65/09/01	2/5		AMERADA HESS NORGE AS	28.333000	
	01/09/01	2/8	O	AMOCO NORWAY OIL COMPANY	28.333000	
		3/4		ELF PETROLEUM NORGE AS	15.000000	
				ENTERPRISE OIL NORWEGIAN AS	28.333000	
008	65/09/01	2/6		AMERADA HESS NORGE AS	50.000000	
	01/09/01	18/10	O	SAGA PETROLEUM A.S.	50.000000	
009	65/09/01	9/5	O	ELF PETROLEUM NORGE AS	65.612000	
	01/09/01			ELF REX NORGE AS	3.420000	
				PHILLIPS PETROLEUM COMPANY NORWAY	14.780000	
				TOTAL NORGE AS	16.188000	
011	65/09/01	1/3	O	A/S NORSKE SHELL	50.000000	
	11/09/01	1/6		AMOCO NORWAY OIL COMPANY	50.000000	
		1/6				
		1/6				
018	65/09/01	1/5		DEN NORSKE STATS OLJESELSKAP A.S	1.000000	
	11/09/01	2/4		ELF PETROLEUM NORGE AS	7.594000	
		2/7		ELF REX NORGE AS	0.855000	
		7/11		FINA PRODUCTION LICENCES AS	30.000000	
				NORSK AGIP AS	13.040000	
				NORSK HYDRO PRODUKSJON AS	6.700000	
			O	PHILLIPS PETROLEUM COMPANY NORWAY	36.960000	
				SAGA PETROLEUM A.S.	0.304000	
				TOTAL NORGE AS	3.547000	
018 B	95/08/25	1/6		DEN NORSKE STATS OLJESELSKAP A.S	1.000000	
	98/12/31			ELF PETROLEUM NORGE AS	7.594000	
				ELF REX NORGE AS	0.855000	
				FINA PRODUCTION LICENCES AS	30.000000	
				NORSK AGIP AS	13.040000	
				NORSK HYDRO PRODUKSJON AS	6.700000	
			O	PHILLIPS PETROLEUM COMPANY NORWAY	36.960000	
				SAGA PETROLEUM A.S.	0.304000	
				TOTAL NORGE AS	3.547000	
019	65/09/01	7/12		AS PELICAN	5.000000	
	11/09/01		O	BP PETROLEUM DEV. OF NORWAY AS	57.500000	
				CONOCO NORWAY INC.	10.000000	
				DEN NORSKE STATS OLJESELSKAP A.S	12.500000	
				SVENSKA PETROLEUM EXPLORATION AS	15.000000	
019 B	77/09/12	2/1		AS PELICAN	4.000000	
	11/09/01	7/12	O	BP PETROLEUM DEV. OF NORWAY AS	26.625000	
		7/12		CONOCO NORWAY INC.	9.375000	
				DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				NORSKE AEDC A/S	5.000000	
				NORSKE MOECO A/S	5.000000	
024	69/05/23	25/1		DEN NORSKE STATS OLJESELSKAP A.S	20.000000	
	15/05/23		O	ELF PETROLEUM NORGE AS	26.420000	
				NORSK HYDRO PRODUKSJON AS	32.870000	
				TOTAL NORGE AS	20.710000	
025	69/05/23	15/3	O	ELF PETROLEUM NORGE AS	53.200000	
	15/05/23			NORSK HYDRO PRODUKSJON AS	10.000000	
				TOTAL NORGE AS	36.800000	

PROD. LIC.	AWARD. EXPIRES	BLOCK		LICENSEES O = operator	SHARES %	SDFI %
026	69/05/23	25/2		DEN NORSKE STATS OLJESELSKAP A.S	5.000000	(1.461)
	15/05/23		O	ELF PETROLEUM NORGE AS	41.420000	
				NORSK HYDRO PRODUKSJON AS	32.870000	
				TOTAL NORGE AS	20.710000	
027	69/05/23	25/8	O	ESSO EXPL. & PROD. NORWAY A/S	100.000000	
	15/05/23					
027 P	69/05/23	25/8		ENTERPRISE OIL NORWEGIAN AS	50.000000	
	15/05/23		O	ESSO EXPL. & PROD. NORWAY A/S	50.000000	
028	69/05/23	25/10	O	ESSO EXPL. & PROD. NORWAY A/S	100.000000	
	15/05/23					
028 P	69/05/23	25/10		ENTERPRISE OIL NORWEGIAN AS	50.000000	
	23/05/15		O	ESSO EXPL. & PROD. NORWAY A/S	50.000000	
029	69/05/23	15/6	O	ESSO EXPL. & PROD. NORWAY A/S	100.000000	
	15/05/23					
031	69/05/23	2/10		FINA PRODUCTION LICENCES AS	30.000000	
	15/05/23		O	NORSK AGIP AS	18.260000	
				PHILLIPS PETROLEUM COMPANY NORWAY	51.740000	
032	69/05/30	2/9		AMERADA HESS NORGE AS	25.000000	
	15/05/30		O	AMOCO NORWAY OIL COMPANY	25.000000	
				ELF PETROLEUM NORGE AS	15.000000	
				ENTERPRISE OIL NORWEGIAN AS	25.000000	
				SVENSKA PETROLEUM EXPLORATION AS	10.000000	
033	69/05/30	2/11		AMERADA HESS NORGE AS	25.000000	
	15/05/30		O	AMOCO NORWAY OIL COMPANY	25.000000	
				ELF PETROLEUM NORGE AS	25.000000	
				ENTERPRISE OIL NORWEGIAN AS	25.000000	
034	69/11/14	30/5	O	A/S NORSKE SHELL	100.000000	
	15/11/14					
035	69/11/14	30/11	O	A/S NORSKE SHELL	100.000000	
	15/11/14	30/11				
036	71/06/11	25/4	O	ELF PETROLEUM NORGE AS	33.702000	
	21/07/11			MARATHON PETROLEUM NORGE AS	46.904000	
				NORSK HYDRO PRODUKSJON AS	6.920000	
				SAGA PETROLEUM A.S.	6.611000	
				TOTAL NORGE AS	5.541000	
				UGLAND CONSTRUCTION COMPANY AS	0.322000	
037	73/08/10	33/9		A/S NORSKE SHELL	10.000000	
	09/08/10	33/9		AMERADA HESS NORGE AS	1.042000	
		33/12	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	
				ENTERPRISE OIL NORWEGIAN AS	1.042000	
				ESSO EXPL. & PROD. NORWAY A/S	10.000000	
				MOBIL DEVELOPMENT NORWAY AS	15.000000	
				NORSKE CONOCO A/S	11.042000	
				SAGA PETROLEUM A.S.	1.875000	
038	75/04/01	15/12		DEN NORSKE STATS OLJESELSKAP A.S	65.000000	(30.000)
	11/04/01	15/12	O	SAGA PETROLEUM A.S.	35.000000	
040	75/04/01	29/9		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	11/04/01	30/7		ELF PETROLEUM NORGE AS	28.800000	
			O	NORSK HYDRO PRODUKSJON AS	6.800000	
				TOTAL NORGE AS	14.400000	
043	76/08/06	29/6		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	12/08/06	30/4	O	TOTAL NORGE AS	50.000000	
044	76/08/27	1/9	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	12/08/27			FINA PRODUCTION LICENCES AS	15.000000	
				NORSK AGIP AS	9.130000	
				PHILLIPS PETROLEUM NORSK AS	25.870000	
046	76/12/03	15/8	O	DEN NORSKE STATS OLJESELSKAP A.S	52.600000	(34.400)
	14/09/03	15/8		ELF PETROLEUM NORGE AS	9.000000	

PROD. LIC.	AWARD. EXPIRES	BLOCK		LICENSEES O = operator	SHARES %	SDFI %
048	77/02/18	15/5		BP PETROLEUM DEV. OF NORWAY AS	10.900000	
	13/02/18			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				ELF PETROLEUM NORGE AS	21.800000	
			O	NORSK HYDRO PRODUKSJON AS	17.300000	
050	78/06/16	34/10	O	DEN NORSKE STATS OLJESELSKAP A.S	85.000000	(73.000)
	16/06/30			NORSK HYDRO PRODUKSJON AS	9.000000	
				SAGA PETROLEUM A.S.	6.000000	
050 B	95/08/11	34/10	O	DEN NORSKE STATS OLJESELSKAP A.S	85.000000	(73.000)
	01/08/11			NORSK HYDRO PRODUKSJON AS	9.000000	
				SAGA PETROLEUM A.S.	6.000000	
051	79/04/06	30/2	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	15/04/06			NORSKE CONOCO A/S	25.000000	
				TOTAL NORGE AS	25.000000	
052	79/04/06	30/3		DEMINEX NORGE AS	11.250000	
	15/04/06	30/3	O	DEN NORSKE STATS OLJESELSKAP A.S	55.000000	(37.000)
				NORSK HYDRO PRODUKSJON AS	9.000000	
				NORSKE DEMINEX AS	2.250000	
				SVENSKA PETROLEUM EXPLORATION AS	4.500000	
				TOTAL NORGE AS	18.000000	
053	79/04/06	30/6		DEN NORSKE STATS OLJESELSKAP A.S	59.400000	(45.400)
	17/04/06	30/6		ELF PETROLEUM NORGE AS	9.333000	
				MOBIL DEVELOPMENT NORWAY AS	7.000000	
			O	NORSK HYDRO PRODUKSJON AS	12.250000	
				SAGA PETROLEUM A.S.	7.350000	
				TOTAL NORGE AS	4.667000	
054	79/04/06	31/2	O	A/S NORSKE SHELL	25.900000	
	30/09/30			DEN NORSKE STATS OLJESELSKAP A.S	58.800000	(40.800)
				ELF PETROLEUM NORGE AS	3.104500	
				NORSK HYDRO PRODUKSJON AS	4.900000	
				NORSKE CONOCO A/S	5.191020	
				TOTAL NORGE AS	2.104480	
055	79/04/06	31/ 4		DEN NORSKE STATS OLJESELSKAP A.S	46.000000	(33.400)
	17/04/06			ESSO EXPL. & PROD. NORWAY A/S	17.600000	
				NESTE PETROLEUM AS	13.200000	
			O	NORSK HYDRO PRODUKSJON AS	23.200000	
057	79/04/06	34/4		AMERADA HESS NORGE AS	4.900000	
	15/04/06			DEMINEX NORGE AS	24.500000	
				DEN NORSKE STATS OLJESELSKAP A.S	41.400000	(31.400)
				ENTERPRISE OIL NORWEGIAN AS	4.900000	
				IDEMITSU PETROLEUM NORGE A.S.	9.600000	
			O	SAGA PETROLEUM A.S.	14.700000	
062	81/03/27	6507/11	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	21/03/27			NESTE PETROLEUM AS	10.000000	
				NORSK HYDRO PRODUKSJON AS	5.000000	
				SAGA PETROLEUM A.S.	10.000000	
				TOTAL NORGE AS	25.000000	
064	81/03/27	7120/8	O	DEN NORSKE STATS OLJESELSKAP A.S	69.250000	(30.000)
	17/03/27			ELF PETROLEUM NORGE AS	5.000000	
				NORSK HYDRO PRODUKSJON AS	20.750000	
				PHILLIPS PETROLEUM NORSK AS	5.000000	
065	81/08/21	1/3		A/S NORSKE SHELL	15.000000	
	22/01/01	1/3		BP PETROLEUM DEV. OF NORWAY AS	8.333000	
				DEN NORSKE STATS OLJESELSKAP A.S	40.000000	(30.000)
			O	ELF PETROLEUM NORGE AS	16.667000	
				ENTERPRISE OIL NORWEGIAN AS	20.000000	

PROD. LIC.	AWARD. EXPIRES	BLOCK		LICENSEES O = operator	SHARES %	SDFI %
066	81/08/21	2/2		AMERADA HESS NORGE AS	20.000000	
	20/01/01			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
			O	SAGA PETROLEUM A.S.	30.000000	
067	81/08/21	2/5		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	18/01/01		O	NORSK AGIP AS	40.000000	
				PHILLIPS PETROLEUM NORSK AS	10.000000	
069	81/08/21	7/8		DEMINEX NORGE AS	5.000000	
	18/01/01			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				NORSK HYDRO PRODUKSJON AS	15.000000	
			O	NORSKE CONOCO A/S	25.000000	
				SAGA PETROLEUM A.S.	5.000000	
070	81/08/21	7/11		AMOCO NORWAY OIL COMPANY	14.700000	
	18/01/01	7/11		DEN NORSKE STATS OLJESELSKAP A.S	51.000000	(31.400)
			O	NORSK HYDRO PRODUKSJON AS	24.500000	
				SAGA PETROLEUM A.S	9.800000	
072	81/08/21	16/7		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	18/01/01		O	ESSO EXPL. & PROD. NORWAY A/S	40.000000	
				NORSK HYDRO PRODUKSJON AS	10.000000	
073	82/04/23	6407/ 1	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	18/04/23			NORSK HYDRO PRODUKSJON AS	16.667000	
				TOTAL NORGE AS	33.333000	
074	82/04/23	6407/ 2	O	DEN NORSKE STATS OLJESELSKAP A.S	65.000000	(45.400)
	18/04/23			MOBIL DEVELOPMENT NORWAY AS	7.000000	
				NESTE PETROLEUM AS	10.500000	
				NORSK AGIP AS	10.500000	
				SAGA PETROLEUM A.S.	7.000000	
077	82/04/23	7120/7	O	DEN NORSKE STATS OLJESELSKAP A.S	55.000000	(30.000)
	18/04/23			NORSK HYDRO PRODUKSJON AS	15.000000	
				PHILLIPS PETROLEUM NORSK AS	10.000000	
				TEXACO EXPLORATION NORWAY AS	10.000000	
				TOTAL NORGE AS	10.000000	
078	82/04/23	7120/9		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	18/04/23			ELF PETROLEUM NORGE AS	15.000000	
			O	NORSK HYDRO PRODUKSJON AS	25.000000	
				TOTAL NORGE AS	10.000000	
079	82/08/20	30/9		DEN NORSKE STATS OLJESELSKAP A.S	73.500000	(59.500)
	18/08/20		O	NORSK HYDRO PRODUKSJON AS	16.000000	
				SAGA PETROLEUM A.S.	10.500000	
085	83/07/08	31/3		DEN NORSKE STATS OLJESELSKAP A.S	82.000000	(73.000)
	30/09/30	31/5		ELF PETROLEUM NORGE AS	2.000000	
		31/6	O	NORSK HYDRO PRODUKSJON AS	9.000000	
				SAGA PETROLEUM A.S.	6.000000	
				TOTAL NORGE AS	1.000000	
085 B	92/09/11	31/9		DEN NORSKE STATS OLJESELSKAP A.S	82.000000	(73.000)
	30/07/08	32/4		ELF PETROLEUM NORGE AS	2.000000	
			O	NORSK HYDRO PRODUKSJON AS	9.000000	
				SAGA PETROLEUM A.S.	6.000000	
				TOTAL NORGE AS	1.000000	
086	84/03/09	6/3		AMERADA HESS NORGE AS	10.000000	
	20/03/09			DEN NORSKE STATS OLJESELSKAP A.S	40.000000	(33.000)
				NORSK HYDRO PRODUKSJON AS	10.000000	
				NORSKE CONOCO A/S	30.000000	
			O	SAGA PETROLEUM A.S.	10.000000	
088	84/03/09	24/6		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	22/03/09		O	TOTAL NORGE AS	50.000000	

PROD. LIC.	AWARD. EXPIRES	BLOCK	LICENSEES O = operator	SHARES %	SDFI %
089	84/03/09 24/03/09	34/7	DEMINEX NORGE AS DEN NORSKE STATS OLJESELSKAP A.S ELF PETROLEUM NORGE AS ESSO EXPL. & PROD. NORWAY A/S IDEMITSU PETROLEUM NORGE A.S. NORSK HYDRO PRODUKSJON AS O SAGA PETROLEUM A.S.	2.800000 55.400000 5.600000 10.500000 9.600000 8.400000 7.700000	 (51.000)
090	84/03/09 24/02/09	35/11	DEN NORSKE STATS OLJESELSKAP A.S MOBIL DEVELOPMENT NORWAY AS O NORSK HYDRO PRODUKSJON AS	50.000000 25.000000 25.000000	(30.000)
091	84/03/09 20/03/09	6406/3 O	DEN NORSKE STATS OLJESELSKAP A.S MOBIL DEVELOPMENT NORWAY AS SAGA PETROLEUM A.S.	50.000000 45.000000 5.000000	(30.000)
092	84/03/09 20/03/09	6407/6 O	BP PETROLEUM DEV. OF NORWAY AS DEN NORSKE STATS OLJESELSKAP A.S MOBIL DEVELOPMENT NORWAY AS SAGA PETROLEUM A.S.	2.000000 50.000000 40.000000 8.000000	 (30.000)
093	84/03/09 24/03/09	6407/9 O	A/S NORSKE SHELL BP PETROLEUM DEV. OF NORWAY AS DEN NORSKE STATS OLJESELSKAP A.S	16.200000 10.800000 73.000000	 (45.400)
094	84/03/09 24/03/09	6506/12 O	DEN NORSKE STATS OLJESELSKAP A.S MOBIL DEVELOPMENT NORWAY AS NESTE PETROLEUM AS NORSK AGIP AS NORSK HYDRO PRODUKSJON AS SAGA PETROLEUM A.S. TOTAL NORGE AS	44.000000 14.700000 9.800000 9.800000 4.900000 7.000000 9.800000	(31.000)
095	84/03/09 24/03/09	6507/7 O	DEN NORSKE STATS OLJESELSKAP A.S NESTE PETROLEUM AS NORSKE CONOCO A/S	75.000000 5.000000 20.000000	(65.000)
097	84/03/09 20/03/09	7120/6 7120/6 O	AMERADA HESS NORGE AS DEMINEX NORGE AS DEN NORSKE STATS OLJESELSKAP A.S NORSK HYDRO PRODUKSJON AS	11.250000 10.000000 56.250000 22.500000	 (30.000)
099	84/03/09 20/03/09	7121/4 O	DEN NORSKE STATS OLJESELSKAP A.S NORSK HYDRO PRODUKSJON AS TOTAL NORGE AS	50.000000 12.500000 37.500000	(30.000)
100	84/03/09 20/03/09	7121/7 O	DEMINEX NORGE AS DEN NORSKE STATS OLJESELSKAP A.S ELF PETROLEUM NORGE AS SVENSKA PETROLEUM EXPLORATION AS	4.000000 51.000000 35.000000 10.000000	 (30.000)
101	85/03/01 22/03/01	16/10 O	DEMINEX NORGE AS DEN NORSKE STATS OLJESELSKAP A.S NORSK AGIP AS	5.000000 50.000000 45.000000	 (30.000)
102	85/03/01 25/03/01	25/5 O	DEN NORSKE STATS OLJESELSKAP A.S ELF PETROLEUM NORGE AS TOTAL NORGE AS	50.000000 30.000000 20.000000	(30.000)
103	85/03/01 21/03/01	25/7 O	AMERADA HESS NORGE AS DEN NORSKE STATS OLJESELSKAP A.S NORSKE CONOCO A/S	12.500000 50.000000 37.500000	 (30.000)
104	85/03/01 25/03/01	30/9 O	DEN NORSKE STATS OLJESELSKAP A.S MOBIL DEVELOPMENT NORWAY AS NORSK AGIP AS NORSK HYDRO PRODUKSJON AS NORSKE CONOCO A/S SAGA PETROLEUM A.S.	50.000000 5.000000 5.000000 25.000000 5.000000 10.000000	(30.000)

PROD. LIC.	AWARD. EXPIRES	BLOCK		LICENSEES O = operator	SHARES %	SDFI %
107	85/03/01	6407/7		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	21/03/01			MOBIL DEVELOPMENT NORWAY AS	20.000000	
			O	NORSK HYDRO PRODUKSJON AS	30.000000	
108	85/03/01	7120/1	O	A/S NORSKE SHELL	40.000000	
	22/03/01			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				ELF PETROLEUM NORGE AS	5.000000	
				NORSK HYDRO PRODUKSJON AS	5.000000	
109	85/03/01	7120/2		DEN NORSKE STATS OLJESELSKAP A.S	55.000000	(30.000)
	22/03/01	7120/3		MOBIL DEVELOPMENT NORWAY AS	15.000000	
			O	NORSK HYDRO PRODUKSJON AS	20.000000	
				NORSKE CONOCO A/S	10.000000	
110	85/03/01	7120/5		AMERADA HESS NORGE AS	8.330000	
	21/03/01	7121/5	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
		7121/5		ELF PETROLEUM NORGE AS	20.000000	
				FINA PRODUCTION LICENCES AS	5.000000	
				NORSK HYDRO PRODUKSJON AS	16.670000	
112	85/07/26	25/2		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	21/07/26		O	ELF PETROLEUM NORGE AS	21.800000	
				NORSK HYDRO PRODUKSJON AS	17.300000	
				TOTAL NORGE AS	10.900000	
113	85/08/23	2/12	O	AMERADA HESS NORGE AS	50.000000	
	21/08/23			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
114	85/08/23	9/2		DEMINEX NORGE AS	10.000000	
	22/08/23		O	DEN NORSKE STATS OLJESELSKAP A.S	65.000000	(30.000)
				SAGA PETROLEUM A.S.	25.000000	
114 B	95/08/11	9/5		DEMINEX NORGE AS	10.000000	
	01/08/11		O	DEN NORSKE STATS OLJESELSKAP A.S	65.000000	(30.000)
				SAGA PETROLEUM A.S.	25.000000	
115	85/08/23	9/3		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	21/08/23			NORSKE CONOCO A/S	15.000000	
				SAGA PETROLEUM A.S.	5.000000	
			O	TOTAL NORGE AS	30.000000	
116	85/08/23	15/12		AMERADA HESS NORGE AS	10.000000	
	22/08/23	15/12		DEN NORSKE STATS OLJESELSKAP A.S	40.000000	(30.000)
				NORSK HYDRO PRODUKSJON AS	10.000000	
				NORSKE CONOCO A/S	30.000000	
			O	SAGA PETROLEUM A.S.	10.000000	
117	85/08/23	25/6		AMERADA HESS NORGE AS	10.000000	
	22/08/23			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
			O	FINA PRODUCTION LICENCES AS	15.000000	
				SAGA PETROLEUM A.S.	25.000000	
120	85/08/23	34/7		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(28.000)
	23/08/23	34/8		ELF PETROLEUM NORGE AS	13.000000	
			O	NORSK HYDRO PRODUKSJON AS	18.000000	
				NORSKE CONOCO A/S	13.000000	
				SAGA PETROLEUM A.S.	6.000000	
121	86/02/28	6407/5		BP PETROLEUM DEV. OF NORWAY AS	2.000000	
	22/02/28		O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(40.000)
				MOBIL DEVELOPMENT NORWAY AS	20.000000	
				NORSK HYDRO PRODUKSJON AS	20.000000	
				SAGA PETROLEUM A.S.	8.000000	
122	86/02/28	6507/2		AMERADA HESS NORGE AS	20.000000	
	25/02/28			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
			O	MOBIL DEVELOPMENT NORWAY AS	10.000000	
				NORSK HYDRO PRODUKSJON AS	20.000000	

PROD. LIC.	AWARD. EXPIRES	BLOCK		LICENSEES O = operator	SHARES %	SDFI %
124	86/02/28	6507/8	O	DEN NORSKE STATS OLJESELSKAP A.S	65.000000	(30.000)
	25/02/28			NESTE PETROLEUM AS	10.000000	
				NORSKE CONOCO A/S	25.000000	
127	86/02/28	6607/12		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	23/02/28		O	ELF PETROLEUM NORGE AS	35.000000	
				FINA PRODUCTION LICENCES AS	15.000000	
128	86/02/28	6608/10	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(25.000)
	96/02/28	6608/11		ENTERPRISE OIL NORWEGIAN AS	10.000000	
				NORSK AGIP AS	10.000000	
				NORSK HYDRO PRODUKSJON AS	15.000000	
				SAGA PETROLEUM A.S.	15.000000	
132	87/04/10	6407/10		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	23/04/10			MOBIL DEVELOPMENT NORWAY AS	20.000000	
			O	NORSK HYDRO PRODUKSJON AS	30.000000	
134	87/04/10	6506/11	O	DEN NORSKE STATS OLJESELSKAP A.S	53.000000	(30.000)
	96/04/10			NORSK AGIP AS	30.000000	
				SAGA PETROLEUM A.S.	7.000000	
				TOTAL NORGE AS	10.000000	
138	87/05/29	7122/6		AMERADA HESS NORGE AS	13.000000	
	23/05/29			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
			O	TOTAL NORGE AS	37.000000	
142	87/05/29	29/9		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	96/05/29	30/7	O	ELF PETROLEUM NORGE AS	40.000000	
		30/10		SAGA PETROLEUM A.S.	10.000000	
143	88/07/08	1/2		AMOCO NORWAY AS	10.000000	
	96/07/08			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				ENTERPRISE OIL NORWEGIAN AS	15.000000	
			O	PHILLIPS PETROLEUM NORSK AS	25.000000	
144	88/07/08	1/5		BP PETROLEUM DEV. OF NORWAY AS	25.000000	
	96/07/08	1/6		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
		1/6	O	NORSKE CONOCO A/S	25.000000	
145	88/07/08	1/9	O	BP PETROLEUM DEV. OF NORWAY AS	30.000000	
	24/07/08	2/7		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				NORSK AGIP AS	10.000000	
				NORSK HYDRO PRODUKSJON AS	10.000000	
146	88/07/08	2/4		AMERADA HESS NORGE AS	10.000000	
	96/07/08			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				ELF PETROLEUM NORGE AS	20.000000	
			O	SAGA PETROLEUM A.S.	20.000000	
147	88/07/08	3/7	O	A/S NORSKE SHELL	50.000000	
	96/07/08	3/8		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
148	88/07/08	7/4		AMERADA HESS NORGE AS	25.000000	
	24/07/08	7/7		AMOCO NORWAY AS	10.000000	
				DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				TOTAL NORGE AS	15.000000	
150	88/07/08	24/9		DEN NORSKE STATS OLJESELSKAP A.S	40.000000	(30.000)
	24/07/08			ENTERPRISE OIL NORWEGIAN AS	40.000000	
			O	FINA PRODUCTION LICENCES AS	10.000000	
				SAGA PETROLEUM A.S.	10.000000	
152	88/07/08	33/12		BP PETROLEUM DEV. OF NORWAY AS	30.000000	
	25/07/08		O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				IDEMITSU PETROLEUM NORGE A.S.	10.000000	
				SAGA PETROLEUM A.S.	10.000000	

PROD. LIC.	AWARD. EXPIRES	BLOCK		LICENSEES O = operator	SHARES %	SDFI %
153	88/07/08	35/9		A/S NORSKE SHELL	12.000000	
	96/07/08	36/7		DEMINEX NORGE AS	8.000000	
				DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
			O	NORSK HYDRO PRODUKSJON AS	20.000000	
				SAGA PETROLEUM A.S.	10.000000	
156	89/03/03	6406/11		AMERADA HESS NORGE AS	10.000000	
	96/03/03			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				MOBIL DEVELOPMENT NORWAY AS	20.000000	
			O	SAGA PETROLEUM A.S.	20.000000	
157	89/03/03	6406/12	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(20.000)
	96/03/03			NORSKE CONOCO A/S	10.000000	
				PHILLIPS PETROLEUM NORSK AS	15.000000	
				SAGA PETROLEUM A.S.	25.000000	
158	89/03/03	6407/8	O	BP PETROLEUM DEV. OF NORWAY AS	40.000000	
	96/03/03			DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
				TOTAL NORGE AS	10.000000	
159	89/03/03	6507/ 3	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(20.000)
	97/03/03			NORSK HYDRO PRODUKSJON AS	20.000000	
				SAGA PETROLEUM A.S.	10.000000	
				TOTAL NORGE AS	20.000000	
163	91/03/01	2/10		AMERADA HESS NORGE AS	10.000000	
	97/03/01	2/10		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(35.000)
				NORSK AGIP AS	10.000000	
			O	SAGA PETROLEUM A.S.	30.000000	
164	91/03/01	2/1	O	BP PETROLEUM DEV. OF NORWAY AS	30.000000	
	97/03/01	7/12		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
		7/12		NORSKE CONOCO A/S	10.000000	
		8/10		SVENSKA PETROLEUM EXPLORATION AS	10.000000	
166	91/03/01	15/6		A/S NORSKE SHELL	10.000000	
	97/03/01		O	DEMINEX NORGE AS	30.000000	
				DEN NORSKE STATS OLJESELSKAP A.S	60.000000	(30.000)
167	91/03/01	16/1		AMOCO NORWAY AS	10.000000	
	97/03/01		O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(20.000)
				NORSK HYDRO PRODUKSJON AS	30.000000	
				PHILLIPS PETROLEUM NORSK AS	10.000000	
168	91/03/01	25/10		AMERADA HESS NORGE AS	20.000000	
	96/03/01			BP PETROLEUM DEV. OF NORWAY AS	15.000000	
			O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(20.000)
				FINA PRODUCTION LICENCES AS	15.000000	
169	91/03/01	25/8		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(35.000)
	97/03/01	25/11		ESSO EXPL. & PROD. NORWAY A/S	10.000000	
			O	NORSK HYDRO PRODUKSJON AS	30.000000	
				NORSKE CONOCO A/S	10.000000	
170	91/03/01	30/6		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(35.000)
	25/03/01		O	NORSK HYDRO PRODUKSJON AS	30.000000	
				TOTAL NORGE AS	20.000000	
171	91/03/01	30/12		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(35.000)
	97/03/01		O	NORSK HYDRO PRODUKSJON AS	30.000000	
				SAGA PETROLEUM A.S.	20.000000	
172	91/03/01	33/9		AMERADA HESS NORGE AS	10.000000	
	25/03/01	33/9		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(35.000)
			O	MOBIL DEVELOPMENT NORWAY AS	25.000000	
				NORSKE CONOCO A/S	15.000000	
173	91/03/01	35/10	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(20.000)
	97/03/01			ELF PETROLEUM NORGE AS	15.000000	
				MOBIL DEVELOPMENT NORWAY AS	20.000000	
				NORSK HYDRO PRODUKSJON AS	15.000000	

PROD. LIC.	AWARD. EXPIRES	BLOCK		LICENSEES O = operator	SHARES %	SDFI %
174	91/03/01	35/12		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(35.000)
	96/03/01			ESSO EXPL. & PROD. NORWAY A/S	10.000000	
				MOBIL DEVELOPMENT NORWAY AS	10.000000	
			O	SAGA PETROLEUM A.S.	30.000000	
175	91/03/01	6204/10	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(25.000)
	97/03/01	6204/11		ENTERPRISE OIL NORWEGIAN AS	10.000000	
				NESTE PETROLEUM AS	10.000000	
				PHILLIPS PETROLEUM NORSK AS	20.000000	
				SAGA PETROLEUM A.S.	10.000000	
176	91/03/01	6407/11	O	A/S NORSKE SHELL	30.000000	
	97/03/01	6407/12		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(35.000)
				FINA PRODUCTION LICENCES AS	10.000000	
				NORSK HYDRO PRODUKSJON AS	10.000000	
177	91/03/01	6610/2		BP PETROLEUM DEV. OF NORWAY AS	30.000000	
	97/03/01	6610/3	O	DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(20.000)
				SAGA PETROLEUM A.S.	20.000000	
181	91/03/01	7128/6		AMOCO NORWAY AS	15.000000	
	97/03/01	7128/9		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
		7129/4		ELF PETROLEUM NORGE AS	10.000000	
			O	NORSKE CONOCO A/S	25.000000	
182	91/03/01	7219/7		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(30.000)
	97/03/01	7219/8		ENTERPRISE OIL NORWEGIAN AS	20.000000	
			O	SAGA PETROLEUM A.S.	30.000000	
185	91/09/13	31/7		DEN NORSKE STATS OLJESELSKAP A.S	46.000000	(33.400)
	96/04/06			ESSO EXPL. & PROD. NORWAY A/S	17.600000	
				NESTE PETROLEUM AS	13.200000	
			O	NORSK HYDRO PRODUKSJON AS	23.200000	
186	93/09/10	7/10	O	AMOCO NORWAY AS	25.000000	
	99/09/10	7/11		DEN NORSKE STATS OLJESELSKAP A.S	50.000000	(40.000)
				SAGA PETROLEUM A.S.	10.000000	
				TOTAL NORGE AS	15.000000	
187	93/09/10	15/2	O	AMOCO NORWAY AS	25.000000	
	99/09/10	15/3		DEN NORSKE STATS OLJESELSKAP A.S	55.000000	(40.000)
		15/3		NORSK HYDRO PRODUKSJON AS	20.000000	
188	93/09/10	17/3		AMERADA HESS NORGE AS	15.000000	
	99/09/10			DEN NORSKE STATS OLJESELSKAP A.S	40.000000	(30.000)
			O	ELF PETROLEUM NORGE AS	25.000000	
				NORSK AGIP AS	20.000000	
189	93/09/10	25/8	O	AMERADA HESS NORGE AS	20.000000	
	99/09/10	25/9		DEN NORSKE STATS OLJESELSKAP A.S	55.000000	(45.000)
				PHILLIPS PETROLEUM NORSK AS	15.000000	
				SAGA PETROLEUM A.S.	10.000000	
190	93/09/10	30/8		DEN NORSKE STATS OLJESELSKAP A.S	60.000000	(50.000)
	99/09/10			ENTERPRISE OIL NORWEGIAN AS	15.000000	
			O	NORSK HYDRO PRODUKSJON AS	25.000000	
191	93/09/10	31/1		DEN NORSKE STATS OLJESELSKAP A.S	60.000000	(45.000)
	99/09/10	31/2		MOBIL DEVELOPMENT NORWAY AS	10.000000	
		31/4		NESTE PETROLEUM AS	10.000000	
		31/5	O	NORSK HYDRO PRODUKSJON AS	20.000000	
192	93/09/10	34/5		DEN NORSKE STATS OLJESELSKAP A.S	55.000000	(35.000)
	99/09/10		O	MOBIL DEVELOPMENT NORWAY AS	25.000000	
				NORSKE CONOCO A/S	20.000000	
193	93/09/10	34/11		BP PETROLEUM DEV. OF NORWAY AS	15.000000	
	99/09/10		O	DEN NORSKE STATS OLJESELSKAP A.S	65.000000	(40.000)
				NORSK HYDRO PRODUKSJON AS	20.000000	

PROD. LIC.	AWARD. EXPIRES	BLOCK		LICENSEES O = operator	SHARES %	SDFI %
194	93/09/10	35/4		DEN NORSKE STATS OLJESELSKAP A.S	55.000000	(45.000)
	99/09/10	35/5		ELF PETROLEUM NORGE AS	10.000000	
			O	NORSK HYDRO PRODUKSJON AS	25.000000	
				SAGA PETROLEUM A.S.	10.000000	
195	93/09/10	35/8	O	BP PETROLEUM DEV. OF NORWAY AS	25.000000	
	99/09/10			DEN NORSKE STATS OLJESELSKAP A.S	45.000000	(35.000)
				NORSK HYDRO PRODUKSJON AS	15.000000	
				NORSKE CONOCO A/S	15.000000	
196	93/09/10	35/6	O	BP PETROLEUM DEV. OF NORWAY AS	25.000000	(25.000)
	99/09/10	36/4		DEN NORSKE STATS OLJESELSKAP A.S	45.000000	
				IDEMITSU PETROLEUM NORGE A.S.	10.000000	
				NORSK HYDRO PRODUKSJON AS	20.000000	
197	93/09/10	6306/2		AMERADA HESS NORGE AS	15.000000	
	99/09/10	6306/5		AMOCO NORWAY AS	15.000000	
				DEN NORSKE STATS OLJESELSKAP A.S	45.000000	(30.000)
			O	NORSKE CONOCO A/S	25.000000	
198	93/09/10	6306/6	O	DEN NORSKE STATS OLJESELSKAP A.S	65.000000	(40.000)
	99/09/10			ELF PETROLEUM NORGE AS	15.000000	
				NORSK HYDRO PRODUKSJON AS	20.000000	
199	93/09/10	6406/2		DEN NORSKE STATS OLJESELSKAP A.S	60.000000	(45.000)
	99/09/10			MOBIL DEVELOPMENT NORWAY AS	15.000000	
			O	SAGA PETROLEUM A.S.	25.000000	
200	93/09/10	6608/7	O	DEN NORSKE STATS OLJESELSKAP A.S	65.000000	(40.000)
	99/09/10	6608/8		NESTE PETROLEUM AS	15.000000	
				PHILLIPS PETROLEUM NORSK AS	20.000000	
201	93/09/10	7018/3		DEN NORSKE STATS OLJESELSKAP A.S	40.000000	(25.000)
	99/09/10	7019/1		ENTERPRISE OIL NORWEGIAN AS	20.000000	
				NESTE PETROLEUM AS	10.000000	
			O	NORSK AGIP AS	30.000000	
202	93/09/10	7227/11		AMERADA HESS NORGE AS	25.000000	
	99/09/10	7227/12	O	DEN NORSKE STATS OLJESELSKAP A.S	55.000000	(30.000)
		7228/7		SAGA PETROLEUM A.S.	20.000000	
		7228/10				

7.2 SALE AND RELEASE OF DATA

The Norwegian Petroleum Directorate received 72 orders for a total of 661 logs from 110 wells during 1995. 48 orders were for film/hard copies, 15 were orders for digital logs on magnetic tape, 8 orders were for digital core analyses and one order was a request for digital guidance data.

This is a significant reduction compared with 1994. The reason for the decline in the number of orders is that in 1995 the Norwegian Petroleum Directorate terminated the «High Quality Log Data project» (HQLD project). This entailed a quality upgrade and digitalization of logs from all exploration wells drilled from 1966 to 1993. Through this project, 16 oil companies automatically received a total of 11,381 digital log sets from 750 wells.

7.2.1 REPORTING AND RELEASE OF DATA AND MATERIAL FROM THE SHELF

In connection with the Norwegian Petroleum Directorate's supervision of the petroleum activities on the Norwegian continental shelf, the Norwegian Directorate receives inter alia copies of reports, borehole logs and continuous, representative samples of drill cuttings and cores. The Norwegian Petroleum Directorate also receives oil samples from all tested wells.

As of 31 December 1995, the Norwegian Petroleum Directorate has stocked 92,429 meters of core material from 1,032 wells, 397,039 samples of washed cuttings from 1,097 wells and 480,903 wet samples from 1,382 wells. In addition, there are oil and condensate samples from 285 wells.

This includes material from Svalbard, Hopen and Andøya as well as from some foreign wells, mostly from the U.K. sector of the North Sea. In connection with NORAD assignments, the Norwegian Petroleum Directorate has also received material from Tanzania and Mozambique.

In 1995 the Norwegian Petroleum Directorate received 4,718 m cores, 6,787 samples of washed cuttings, 11,676 wet samples and 18 oil samples.

The Norwegian Petroleum Directorate is responsible for publishing data and releasing material inter alia for the purposes of education and research. Geological and geophysical data are normally released five years after well completion. The licensees' interpretations are not released. «Well Data Summary Sheets» (WDSS) are issued annually. This publication shows which wells have been released and which core and log materials are available from the

various wells. In addition, some technical data and test results are also given, as well as a composite log with lithology specification of each well.

In addition to the WDSS, the Norwegian Directorate has annual publications which, in addition to information regarding released material, also contain an overview of each production license on the Norwegian continental shelf; license number, award date, operator, awarded area, current area, licensees and their shares, geographical coordinates for the areas, some data about each will drilled in the license and a map of the area with the wells plotted in. Some historical data and tables from the drilling activities are also included. This type of information can also be delivered in digital format on diskette or magnetic tape. Reference is also made to the Norwegian Petroleum Directorate's Publication List.

In the Norwegian Petroleum Directorate's core study room it is possible to examine core materials, drill cuttings and wet samples. In special cases material may be made available for studies and analyses performed outside of the Directorate.

Applications for release of geological samples should be addressed to the Release Committee at the Norwegian Petroleum Directorate.

39 applications have been considered in 1995. Twelve of these were for organic geochemistry studies, twelve for biostratigraphy, ten for sedimentology/petrophysical and four for oil-condensate samples.

A total of 187 kg of sample material and 159 ml of oil was released.

In 1995, the Norwegian Petroleum Directorate's two core study rooms were used by 14 different companies/ institutions for examination of cores and/or geological sampling. The core study rooms have been used by external guests on 112 days, in addition to 214 days of use by employees of the Norwegian Petroleum Directorate.

As of 31 December 1995, the Norwegian Petroleum Directorate has released data from 344 seismic surveys which comprise 290,523 line kilometers of seismic. The surveys are divided among 303 surveys in the North Sea and 41 in the Norwegian Sea. A list of these surveys may be found in the publication «Released seismic surveys, Volume A and B». «Volume A» contains seismic survey packages for the North Sea, while «Volume B» contains packages for the Norwegian Sea.

60 orders for company seismic were received and filled by the Norwegian Petroleum Directorate in 1995.

The data management department's distribution of data collections has increased somewhat in 1995. 108 digital data collections have been sold directly from the Directorate and 23 from subcontractors, compared with a total of 125 in 1994. The most common are well lists (exploration and production wells), production licenses (current and historic), exploration areas and blocks, pipelines, installations, field outlines, summary of available seismic data and other collections listed in the Norwegian Petroleum Directorate's Publications List. In addition, several special collections have been made to order.

Release of data from wells on Svalbard

The question of release of the 17 exploration wells drilled on Svalbard was raised by the Svalbard mine superintendent in 1993. Consideration of this question was ongoing in the Norwegian Petroleum Directorate, the Ministry of Local Government and Labour and the Ministry of Foreign Affairs until the summer of 1994. This resulted in an opening for release of geodata from these wells. The work of facilitating the practical release of the data has been carried out in 1995. This was carried out through the project «Digitalization of logs from wells drilled on Svalbard» where all log data was transferred to digital HQLD format. The logs may now be ordered in the same manner as other HQLD logs.

7.2.2 SEISMIC SOLD

Table 7.2.2
Summary of seismic data packages sold (NPD seismic data)

NO	NAME	1995	Total
001	MØRE-TRØNDELAG-REGIONAL-PK-1		34
002	MØRE-TRØNDELAG-REGIONAL-PK-2		27
003	TAMPEN-SPUR		22
004	MØRE-SOUTH-84		22
005	TRØNDELAG-REGIONAL		25
006	HALTENBANKEN-VEST-84		24
007	FRØYABANKEN-84		27
008	MØRE-TRØNDELAG-PAKKE-2 #)		22
009	MØRE-TRØNDELAG-PAKKE-3 #)		28
010	TRÆNABANKEN		30
011	REG-DATA-NORDLAND-RYGGEN		22
012	NORDLAND-IV-85		13
013	REG-DATA-MIDT-N-SOKKEL		21
014	NORDLAND-II-83		23
015	NORDLAND-III-84	1	17
016	TROMS-II	1	13
017	REGIONAL-DATA-TROMS-ØST		18
018	FINNMARK-VEST-83		19
019	FINNMARK-VEST-84		20
020	NORDLAND-III-85	1	16
021	MØRE-SØR-TEST-84 #)		5
022	STOREGGA-85	3	13
023	VØRINGPLATÅET	2	15
024	VØRING-BASSENGET-85/86	1	15
025	LOFOTEN-VEST-86	1	17
026	JAN-MAYEN-85		1
027	JAN-MAYEN-79/85		
028	VØRING-BASSENGET-87	1	15
029	NORDLAND-VI-87	1	18
030	NORDLAND-VII-87		13
031	NORDLAND-V-87		12
032	NORDLAND-VI-88	1	18
033	NORDLAND-VII-88		13
034	NORDLAND-V-73-79		12
035	NORDLAND-VI-73-79	1	18
036	NORDLAND-VI-89	1	18
037	NORDLAND-VII-89		13
038	NORDLAND-VII-74/75		13
039	NORDSJØEN-SØR-TEST-89 #)		1
040	VØRING-BASSENGET-88	1	15
041	VØRING-BASSENGET-MERLIN-89	1	15
042	VØRING-BASSENGET-WESTERN-89	1	15
043	MØRE-BASSENGET-88		11
044	TYPEPROFILER-BARENTSHAVET #)		2
045	VØRINGBASSENGET-I-90	1	15
046	STOREGGA-90	5	13
047	VIKINGGRABEN-SØR-TEST-91 #)		1
048	VIKINGBANKEN-TEST-91 #)		3
049	NORSKEHAVET-74/79		1
050	VØRINGBASSENGET-II-ENSIGN-91	4	13
051	VØRINGBASSENGET-II-DIGICON-91	4	13
052	MØREBASSENGET-91	2	12
053	JAN-MAYEN-88		1
054	VØRINGBASSENGET-II-92	4	13

#) Not compulsory

NO	NAME	1995	Total
055	MØREBASSENGET-ENSIGN-92	2	12
056	MØREBASSENGET-DIGICON-92	3	13
057	VESTFJORDEN	2	5
058	VESTFJORDEN-77/78	2	5
100	TROMS-HOVEDPAKKE		35
101	REG-DATA-TROMS-BAR.HAVET-73		22
102	TROMS-III-83/84		17
103	TROMS-III-85		17
104	TROMS-1976-SLAG #)		
105	TROMS-I-ØST-77		20
106	TROMS-NORD-82-PAKKE-1		24
107	TROMS-NORD-83-PAKKE-3		23
108	TROMS-NORD-82-PAKKE-2		17
109	TROMS-NORD-83-PAKKE-4		17
200	BJØRNØYA-PAKKE-1		21
201	BJØRNØYA-SØR-84		21
202	BJØRNØYA-ØST-REGIONAL-84		18
203	BJØRNØYA-ØST-84		17
204	BJØRNØYA-TILLEGG-NORD		17
205	BJØRNØYA-VEST-REGIONAL-84		15
206	LOPPARYGGEN-ØST-REGIONAL-84		19
207	LOPPARYGGEN-ØST-85-SSL-DIAG		19
208	LOPPARYGGEN-ØST-85-NORD		19
209	LOPPARYGGEN-ØST-85-GECO-DIAG		19
210	LOPPARYGGEN-ØST-85-GRID		19
211	BJØRNØYA-ØST-TEST-85 #)		1
212	BJØRNØYA-VEST-86-DIAG		13
213	BJØRNØYA-VEST-86-HIGH		13
214	BJØRNØYA-VEST-86-MARGIN		12
215	BJØRNØYA-VEST-86-SWATH #)		1
216	BJØRNØYA-VEST-87		13
300	BARENTSHAVET-SØR-ØST-HOVEDPK		22
301	BARENTSHAVET-SØR-ØST-PAKKE-2		21
302	NORDKAPP-BASS-85-GECO-DIAG		20
303	NORDKAPP-BASSENGET-85-NORD		20
304	NORDKAPP-BASSENGET-85-GRID		21
305	NORDKAPP-BASSENGET-86-DIAG		20
306	NORDKAPP-BASSENGET-86-SØR		21
307	NORDKAPP-BASSENGET-86-NORD		14
308	FINNMARK-ØST-86-REGIONAL		19
309	FINNMARK-ØST-86-DIAG		18
310	FINNMARK-ØST-86-GSI		19
311	NORDKAPP-FINNMARK-87 #)		
312	NORDKAPP-TEST-87 #)		1
400	BARENTSHAVETNORDVEST REGIONAL		2
500	BARENTSHAVETNORDØST REGIONAL		2

#) Not compulsory

7.3 EXPLORATION DRILLING STATISTICS

As of 31 December 1995, a total of 836 exploration wells had been spudded on the Norwegian continental shelf since drilling commenced in 1966. Of these, 596 were wildcats and 240 were appraisal wells.

788 exploration wells have been completed and 41 wells were suspended for various reasons. Some have been suspended with a view to subsequent testing, possible completion as production wells, continued drilling or subsequent plugging.

The northernmost well on the Norwegian shelf is 7316/5-1, which was drilled in 1992 with Norsk Hydro as operator, the easternmost is 7229/11-1, drilled in 1993 by Shell, and the westernmost is 6301/11-2 drilled by Statoil in 1991.

The exploration wells have been drilled by 21 different operating companies. Regional distribution of total wells per operator is shown in Figure 7.3.a.

The number of operating days per company in 1995 is shown in Figure 7.3.b. Figure 7.3.c shows the Norwegian operating companies' share of the drilling activities.

As of 31 December 1995, 2,692,392 meters have been drilled during exploration drilling, hereof 109,750 meters in 1995.

Average total depth for exploration wells which reached total depth in 1995 is 3,084 meters. Exploration well 6406/2-1 R drilled in 1995, is the deepest well ever drilled on the Norwegian shelf. Saga was the operator, and the total depth of this well was 5,790 meters RKB (5,767 MSL). The longest ever well path for an exploration well so far is 6506/12-10 A, which was drilled by Statoil in 1995. The well path was 6,260 meters RKB (6,236 m MSL), but the well was drilled at an angle and did not reach the same depth under the seabed as well 6406/2-1 R. The average water depth for exploration wells drilled in 1995 was 152 meters.

The deepest water ever drilled in on the Norwegian shelf is 523 meters. This was exploration well 6607/5-2 drilled in 1991 with Esso as operator. Table 7.3.d shows the average water depth for exploration wells drilled during the period 1966-1995.

78 different drilling rigs have been utilized for drilling on the Norwegian continental shelf, 9 of these under 2 different names. Of these, 52 have been semi-submersibles, 15 jack-ups, 5 drilling ships and 6 permanent installations. During 1995, 9 different drilling rigs have been active in exploration drilling on the Norwegian shelf.

Tables 7.3.a to 7.3.f contain data on exploration drilling on the Norwegian continental shelf.

Figure 7.3.a
Regional spread of exploration wells per operator

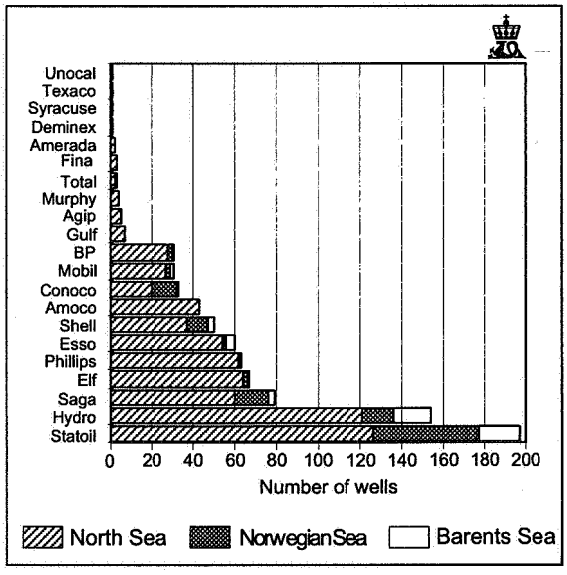


Table 7.3.a
Regional spread of spudded exploration and development wells

Year spudded	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	Sum
North Sea																															
Wildcat	2	6	10	12	11	11	11	17	12	18	20	12	14	18	23	19	27	20	22	13	14	9	9	15	18	23	21	14	13	19	453
Appraisal			2	1	6	5	3	5	6	8	3	8	5	10	10	15	13	7	11	14	5	8	10	6	9	13	14	5	3	11	216
Norwegian Sea																															
Wildcat															1	2	5	7	6	10	10	10	5	2	7	8	5	4	5	3	90
Appraisal																			1	6	5	4	1	1	1			2		3	24
Barents Sea																															
Wildcat															2	3	4	5	7	7	2	5	4	4	1	3	3	2			52
Appraisal																		1													1
Total expl. drilling																															
Wildcat	2	6	10	12	11	11	11	17	12	18	20	12	14	18	26	24	36	32	35	30	26	24	18	21	26	34	29	20	18	22	595
Appraisal			2	1	6	5	3	5	6	8	3	8	5	10	10	15	13	8	12	20	10	12	11	7	10	13	14	7	3	14	241
Exploration wells	2	6	12	13	17	16	14	22	18	26	23	20	19	28	36	39	49	40	47	50	36	36	29	28	36	47	43	27	21	36	836
Development wells								1	18	24	7	34	50	36	27	16	22	23	33	47	47	48	55	66	60	64	86	105	120	109	1098
Total	**2**	**6**	**12**	**13**	**17**	**16**	**14**	**23**	**36**	**50**	**30**	**54**	**69**	**64**	**63**	**55**	**71**	**63**	**80**	**97**	**83**	**84**	**84**	**94**	**96**	**111**	**129**	**132**	**141**	**145**	**1934**

Table 7.3.b
Regional spread of wells spudded as of 31 December 1995

Operator	North Sea			Norwegian Sea			Barents Sea			Total		
	W	A	E	W	A	E	W	A	E	W	A	E
Statoil	73	53	126	43	8	51	19	1	20	135	62	197
Hydro	82	39	121	13	2	15	18		18	113	41	154
Phillips	42	20	62	1		1				43	20	63
Elf	46	18	64	2		2	1		1	49	18	67
Saga	48	12	60	15	1	16	3		3	66	13	79
Esso	30	24	54	2		2	4		4	36	24	60
Shell	26	11	37	5	5	10	3		3	34	16	50
Amoco	30	13	43							30	13	43
Conoco	20		20	4	8	12	1		1	25	8	33
Mobil	18	9	27	2		2	2		2	22	9	31
BP	14	14	28	3		3				17	14	31
Gulf	7		7							7		7
Murphy	3	1	4							3	1	4
Total	2		2				1		1	3		3
Agip	5		5							5		5
Deminex	1		1							1		1
Syracuse	1		1							1		1
Texaco	1		1							1		1
Unocal	1		1							1		1
Fina	2	1	3							2	1	3
Amerada	2		2							2		2
Wildcat	454			90			52			596		
Appraisal		215			24			1			240	
Exploratin			669			114			53			836

W= Wildcat A = Appraisal E = Exploration

Figure 7.3.b
Rig days per operator

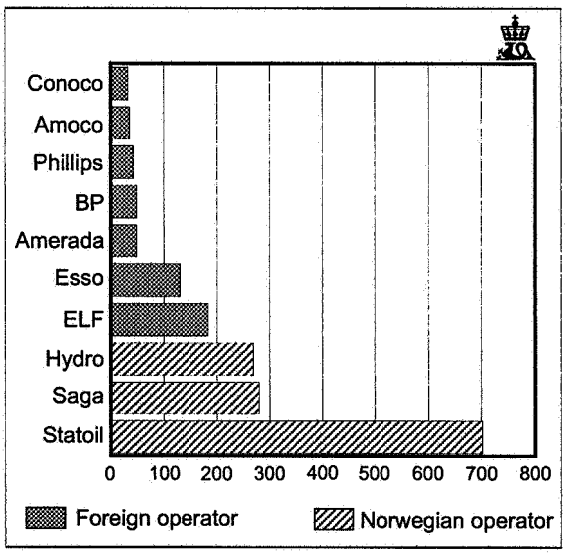


Figure 7.3.c
Participation of Norwegian operators in exploration drilling activity

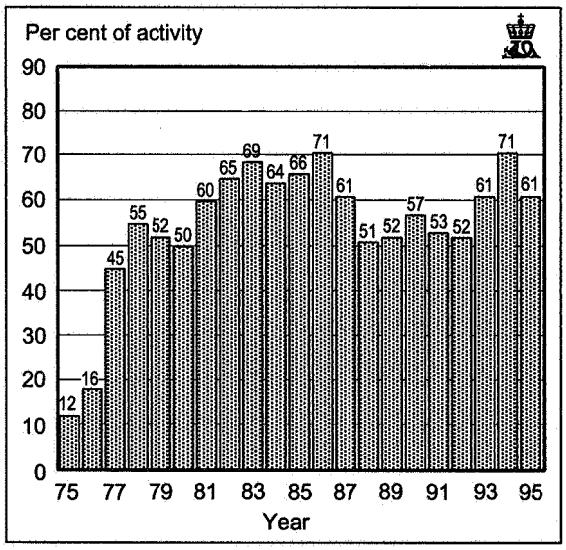


Table 7.3.c
Exploration wells by operating company and region in 1995

Operator	North Sea			Norwegian Sea			Barents Sea			Total		
	W	A	E	W	A	E	W	A	E	W	A	E
Statoil	5	3	8	3	2	5				8	5	13
Hydro	5	2	7							5	2	7
Phillips	1		1							1		1
Elf	2	1	3							2	1	3
Saga		1	1		1	1					2	2
Esso	1	4	5							1	4	5
Shell												
Amoco	1		1							1		1
Conoco	1		1							1		1
Mobil												
BP	1		1							1		1
Gulf												
Murphy												
Total												
Agip												
Deminex												
Syracuse												
Texaco												
Unocal												
Fina												
Amerada	2		2							2		2
Wildcat	19			3						22		
Appraisal		11			3						14	
Exploration			30			6						36

W = Wildcat A = Appraisal E = Exploration

Table 7.3.d
Average water depth and drilling depth

Year	Average water depth (m)	Average total depth (m)
1966	94	3,015
1967	100	2,682
1968	81	3,303
1969	74	3,276
1970	92	2,860
1971	79	3,187
1972	78	3,742
1973	85	3,075
1974	106	3,163
1975	106	3,173
1976	108	3,314
1977	104	3,450
1978	110	3,432
1979	157	3,444
1980	179	3,209

Year	Average water depth (m)	Average total depth (m)
1981	164	3,243
1982	163	3,457
1983	192	3,287
1984	212	3,247
1985	224	3,367
1986	234	3,248
1987	236	3,386
1988	248	3,598
1989	188	3,331
1990	156	3,619
1991	194	3,639
1992	225	3,560
1993	185	3,474
1994	185	3,371
1995	152	3,084

Table 7.3.e
Drilling rigs active on the Norwegian continental shelf as of 31 December 1995

Rig name	Number of wells	Number of re-entries	Type of rig
Aladdin	1		Semi-submersible
Arcade Frontier (was Norjarl)	7		"
Borgny Dolphin (was Fernstar)	27	8	"
Borgsten Dolphin (was Haakon Magnus)	9		"
Bucentaur		1	Drill ship
Byford Dolphin (was Deepsea Driller)	27		Semi-submersible
Chris Chenery	2		"
Deepsea Bergen	50	3	"
Deepsea Saga	16	3	"
Drillmaster	5	1	"
Drillship	1		Drill ship
Dyvi Beta	6	1	Jack-up
Dyvi Gamma	1		"
Dyvi Stena	23	1	Semi-submersible
Endeavour	2		Jack-up
Glomar Biscay II (was Norskald)	39	1	Semi-submersible
Glomar Grand Isle	11	3	Drill ship
Glomar Moray Firth I	2		Jack-up
Gulftide	3		"
Henry Goodrich	2		Semi-submersible
Hunter (was Treasure Hunter)	6	3	"
Kolskaya		1	Jack-up
Le Pelerin	1		Drill ship
Mærsk Explorer	7		Jack-up
Mærsk Gallant	2		"
Mærsk Giant	1		"
Mærsk Guardian	4	1	"
Mærsk Jutlander	4	1	Semi-submersible
Neddrill Trigon	3	1	Jack-up
Neptune 7 (was Pentagone 81)	13		Semi-submersible
Nordraug	12		"
Nortrym	32	3	"
Ocean Tide	5		Jack-up
Ocean Traveler	9		Semi-submersible
Ocean Victory	1		"
Ocean Viking	28	1	"
Ocean Voyager	2		"
Odin Drill	3		"

Rig name	Number of wells	Number of re-entries	Type of rig
Orion	7		Jack-up
Pentagone 84	2	1	Semi-submersible
Polar Pioneer	31	6	"
Polyglomar Driller	11		"
Ross Isle	32	10	"
Ross Rig	29		"
Ross Rig (new)	29	3	"
Saipem II	1		Drill ship
Scarabeo 5	1		Semi-submersible
Sedco 135 G	3		"
Sedco 703	3	1	"
Sedco 704	3		"
Sedco 707	8		"
Sedco H	2		"
Sedneth I	3		"
Sovereign Explorer	3	1	"
Transocean 8	15	2	"
Transworld Rig 61	2		"
Treasure Prospect	1	1	"
Treasure Saga	52	6	"
Treasure Scout	23		"
Treasure Seeker	24	5	"
Vildkat Explorer	37	5	"
Vinni	5		"
Waage Drill I	2		"
West Alpha (was Dyvi Alpha)	22	2	"
West Delta (was Dyvi Delta)	37	5	"
West Epsilon	1		Jack-up
West Vanguard	35	11	Semi-submersible
West Venture	12	2	"
West Vision	1		"
Yatzy	1		"
Zapata Explorer	13		Jack-up
Zapata Nordic	5		"
Zapata Ugland	5	1	Semi-submersible
	828	95	
In addition 8 wells have been drilled from fixed installations:			
Cod platform	1	1	
Ekofisk B	1		
Gullfaks B	1		
Sleipner A	1		
Ula A	1		
Veslefrikk A	3		
	836	96	

Table 7.3.f
Spudded and/or completed exploration wells in 1995

A/B/C=side drilled new well, X=junked well, R=re-entry, S=side drilled-Positions with one decimal are provisional

Well			Perm. Prod. lic.no	Position	Spudded Complet.	Operator Drilling rig	Exploration well type Completion status	WD KBE	TD (RKB) Age at TD
1/03-07			804	56 56 25.15	95.02.13	Elf	Appraisal	72	3345
			065	02 40 34.61	95.05.25	West Epsilon	Gas	42	
2/07-30			803	56 26 22.49	95.02.27	Phillips	Wildcat	71	3479
			018	03 16 25.50	95.04.10	Mærsk Guardian	Dry hole	43	Cretaceous
2/08-15			834	56 25 05.14	95.11.27	Amoco	Wildcat	69	3754
			006	03 28 58.96	00.00.00	Vildkat Explorer		25	
7/12-12	S		833	57 06 41.18	95.11.14	BP	Wildcat	70	
			019	02 50 50.73	00.00.00	Ula A		57	
9/02-05			816	57 45 15.30	95.06.23	Statoil	Appraisal	77	3355
			114	04 21 21.16	95.07.21	Deepsea Bergen	Re-class. to production	23	M. Jurassic
15/05-05			820	58 43 03.40	95.08.31	Hydro	Wildcat	109	2645
			048	01 38 39.41	95.10.05	Treasure Saga	Oil discovery	26	
17/03-01			815	58 55 02.50	95.06.29	Elf	Wildcat	273	2852
			188	03 48 21.33	95.08.20	Vildkat Explorer	Hydrocarbones	25	Basement
25/05-05			827	59 33 16.17	95.10.27	Elf	Wildcat	122	2600
			102	02 20 40.46	95.11.23	Vildkat Explorer	Oil discovery	25	
25/07-03			819	59 26 08.81	95.07.27	Conoco	Wildcat	127	2540
			103	02 19 28.00	95.08.28	Deepsea Bergen	Oil discovery	23	Cretaceous
25/08-06			813	59 28 18.42	95.05.19	Esso	Appraisal	128	2577
			027 P	02 20 15.37	95.06.27	Vildkat Explorer	Suspended	25	Cretaceous
25/08-07			818	59 28 28.43	95.07.21	Amerada	Wildcat	123	2380
			189	02 34 28.57	95.08.12	Dyvi Stena	Dry hole	25	Jurassic
25/08-08	S		823	59 25 51.87	95.08.22	Esso	Wildcat	127	2592
			027 P	02 24 18.73	95.09.24	Vildkat Explorer	Oil discovery	25	Jurassic
25/08-08	A		830	59 25 51.87	95.09.29	Esso	Appraisal	127	2601
			027 P	02 24 18.73	95.10.11	Vildkat Explorer	Oil	25	Tertiary
25/08-08	B		831	59 25 51.87	95.10.12	Esso	Appraisal	127	2510
			027 P	02 24 18.73	95.10.24	Vildkat Explorer	Oil	27	Tertiary
25/09-01			810	59 26 58.72	95.03.28	Amerada	Wildcat	111	2525
			189	02 42 35.67	95.04.21	Vildkat Explorer	Dry hole	25	Triassic
25/10-06	S		836	59 08 08.7	95.12.26	Statoil	Wildcat	116	
			168	02 01 37.6	00.00.00	Deepsea Bergen		23	
25/11-19	S		811	59 12 48.71	95.04.24	Esso	Appraisal	129	2250
			001	02 24 06.82	95.05.18	Vildkat Explorer	Suspended. Oil	25	
25/11-20			826	59 08 44.62	95.10.08	Hydro	Wildcat	119	1828
			169	02 33 44.27	95.10.23	Treasure Saga	Dry hole	26	Cretaceous
25/11-21	S		832	59 09 43.43	95.10.23	Hydro	Appraisal	129	1975
			169	02 27 53.07	95.11.13	Treasure Saga	Suspended	26	
30/03-07	S		822	60 46 57.76	95.09.21	Statoil	Wildcat	175	5581
			052	02 53 52.59	95.12.12	Veslefrikk A	Susp.	56	
30/08-01	S		797	60 27 46.93	94.11.01	Hydro	Wildcat	96	4688
			190	02 38 06.53	95.03.01	Treasure Saga	Susp. at 7"	26	Jurassic
30/08-01	SR		797	60 27 46.93	95.11.18	Hydro	Wildcat	96	5149
			190	02 38 06.53	00.00.00	Treasure Saga		26	
30/08-02			835	60 27 24.51	95.12.15	Hydro	Wildcat	100	2405
			190	02 21 47.92	00.00.00	West Vanguard		22	
30/09-17			806	60 17 39.08	95.03.03	Hydro	Wildcat	106	1408
			104	02 49 19.44	95.03.14	Treasure Saga	Susp. at 9 5/8"	26	
30/09-17	R	X	806	60 17 39.08	95.04.11	Hydro	Wildcat	106	1408
			104	02 49 19.44	95.04.13	Treasure Saga	Junked	26	
30/09-18			809	60 17 38.69	95.03.14	Hydro	Wildcat	106	2994
			104	02 49 22.59	95.04.11	Treasure Saga	Dry hole	26	Jurassic
31/04-10			829	60 37 30.24	95.11.14	Hydro	Appraisal	234	2350
			055	03 11 16.26	95.12.13	West Vanguard	Oil	22	
33/09-18	A		800	61 15 40.78	94.12.21	Statoil	Wildcat	145	3595
			037	01 56 07.73	95.01.24	Deepsea Bergen	Dry hole	23	Jurassic
34/07-24	S		801	61 18 32.92	95.02.25	Saga	Appraisal	152	3145
			089	02 01 51.55	95.03.24	Vildkat Explorer	Dry hole	25	
34/10-37			802	61 08 09.78	95.01.26	Statoil	Wildcat	140	2873
			050	02 00 55.81	95.02.24	Deepsea Bergen	Oil/gas discovery	23	
34/10-37	A		808	61 08 09.78	95.02.24	Statoil	Appraisal	140	2950
			050	02 00 55.81	95.04.03	Deepsea Bergen	Suspended. Oil/gas	23	
34/10-38	S		805	61 04 23.27	95.04.05	Statoil	Appraisal	137	3940
			050	02 01 37.18	95.05.29	Deepsea Bergen	Oil/gas	23	Triassic

Well	Perm. Prod. lic.no	Position	Spudded Complet.	Operator Drilling rig	Exploration well type Completion status	WD KBE	TD (RKB) Age at TD
34/10-39 S	812	61 12 44.79	95.05.31	Statoil	Wildcat	140	3290
	050	02 01 32.11	95.06.20	Deepsea Bergen	Dry hole	23	E.Jurassic
34/10-40 S	821	61 12 10.92	95.08.13	Statoil	Wildcat	143	5900
	050	02 12 04.86	95.10.13	Gullfaks B	Re-class. to waterinjector	81	
6204/10-01	828	62 03 20.50	95.10.28	Statoil	Wildcat	189	2709
	175	04 15 36.60	95.11.23	Deepsea Bergen	Dry hole	23	L.Cret.
6406/02-01	798	64 52 15.19	94.10.30	Saga	Wildcat	278	5292
	199	06 36 21.35	95.04.09	Ross Rig	Susp. at 7"	24	
6406/02-01 R	798	64 52 15.19	95.08.21	Saga	Wildcat	278	5892
	199	06 36 21.35	00.00.00	Ross Isle		22	
6406/02-02	825	64 49 46.35	95.12.12	Saga	Appraisal	272	
	199	06 34 15.43	00.00.00	Ross Rig		24	
6406/12-02	824	64 06 13.80	95.09.01	Statoil	Wildcat	330	4367
	157	06 51 43.06	95.10.17	Deepsea Bergen	Dry hole	23	L.Jurassic
6506/12-10	807	65 08 07.82	95.04.21	Statoil	Appraisal	285	5097
	094	06 49 06.47	95.06.26	Ross Rig	Dry hole	24	
6506/12-10 A	817	65 08 07.82	95.06.27	Statoil	Appraisal	285	6260
	094	06 49 06.47	95.12.11	Ross Rig	Oil/gas	24	
6608/10-03 R	753	66 02 06.66	95.08.08	Statoil	Appraisal	379	2920
	128	08 04 57.97	95.08.17	Ross Isle	Oil/gas	23	E.Jurassic
6608/10-05	814	66 10 25.69	95.07.05	Statoil	Wildcat	340	3200
	128	08 15 03.04	95.08.06	Ross Isle	Dry hole	23	E.Jurassic

7.4 DEVELOPMENT DRILLING STATISTICS

Since 1973, 1,098 development wells have been commenced on the Norwegian shelf. 831 of these are production wells, 212 are water or gas injection wells and 55 are observation wells. 409 are currently out of service, suspended for later completion or closed down for other reasons. The wells have been drilled from 64 installations (fixed, floating or templates). Drilling was in progress on 16 development wells as of 31 December 1995. Figure 7.4.a shows development wells commenced per year during the period 1973-1995.

As of 31 December 1995, production or injection is carried out from 61 installations divided among 36 fields.

Five new fields have started producing in 1995: Frøy, Gyda Sør, Heidrun, Statfjord Nord and Troll. Three fields have terminated production: Nordøst Frigg, Odin and Mime. In addition, the F platform on Albuskjell has been shut down. Development wells divided by the various fields are shown in Figure 7.4.b. Figure 7.4.c shows development wells divided by operating companies.

The first development wells on Gyda Sør, Heidrun B, Sleipner Vest, Troll A, Troll B, Valhall F, Yme and Vigdis were commenced in 1995.

In 1995, 109 development wells were spudded on 24 fields. 42 of the wells were drilled from 9 different mobile units. Development wells divided by installation are shown in Figure 7.4.d. Data on development wells is set out in Tables 7.4.a, 7.4.b and 7.4.c. Figure 7.4.e gives an overview of development wells drilled from mobile drilling units.

Table 7.4.a
Development drilling as of 31 December 1995

Field/installation	Drilled total	Drilled 1995	Producing Oil	Producing Cond.	Producing Gas	Injecting	Drilling	Closed/susp.
Albuskjell A	11			7				4
Albuskjell F	13							13
Brage	22	6	9			6	1	6
Cod	9			4				5
Draugen A	10	2	5			1		4
Draugen B	3					3		
Draugen C	2					2		
Edda	10		6					4
Ekofisk A	35		22					13
Ekofisk B	40		23			2		15
Ekofisk C	33		18			3		12
Ekofisk K	31	2				29	1	1
Ekofisk W	8					8		
Eldfisk A	42	2	24					18

Field/installation	Drilled total	Drilled 1995	Producing			Injecting	Drilling	Closed/susp.
			Oil	Cond.	Gas			
Eldfisk B	37		17					20
Embla	4		4					
Frigg (UK)	24							24
Frigg	28				8			20
Frøy	12	5	4			3	1	4
Gullfaks A	54	2	28			11	1	14
Gullfaks B	39	4	21			8		10
Gullfaks C	33	7	21			5	1	6
Gullfaks Vest	3		1					2
Gyda	30	1	10			9	1	10
Gyda Sør	1	1	1					
Heidrun A	10		3			1		6
Heidrun B	3	3				2		1
Heidrun C	3					1		2
Heimdal	12			8				4
Hod	13	2	6					7
Lille-Frigg	4		2					2
Loke	1				1			
Nordøst Frigg	7							7
Odin	11							11
Oseberg B	48	1	20			9		19
Oseberg C	39	8	11			8		20
Oseberg Vest	2	1	1					1
Sleipner A	16	6			10	3	1	2
Sleipner D	2				2			
Sleipner Vest	3	3					1	2
Snorre A	10		5			3		2
Snorre P	21	3	11			6	1	3
Statfjord A	53	3	22			12	1	18
Statfjord B	46	2	28			11		7
Statfjord C	39	4	24			12	1	2
Statfjord Nord	7	5	4				1	2
Statfjord Øst	8			4		3		1
TOGI	5				3			2
Tommeliten Gamma	7			6				1
Tor	19		10			2		7
Tordis	8	2	5					3
Troll A	3	3						3
Troll B	1	1				1		
Troll D,E,F,G,H	20	13	12				1	7
Ula	26	3	9			7		10
Valhall A	62	5	29					33
Valhall F	3	3					1	2
Vest Ekofisk	20			6				14
Veslefrikk	25	4	14			9	1	1
Vigdis	1	1					1	
Yme A	1	1						1
Øst Frigg A	3		3					
Øst Frigg B	2		1					1
	1,098	**109**	**434**	**35**	**24**	**180**	**16**	**409**

Table 7.4.b
Development wells spudded or completed in 1995
H=sub-sea completed, A/B/C=side drilled new well, X=junked well

Well	Permit Prod.lic	Position	Spudded Completed	Operator Installation	Classification Status	TD (RKB)
2/01-A-13	630	56 54 17.37	94.01.31	BP	Oil prod	7,269 m
	019 B	03 05 06.72	95.08.06	Gyda	Oil	
2/01-A-24 B	1056	56 54 17.42	95.08.21	BP	Water inj	5,200 m
	019 B	03 05 06.18	95.10.29	Gyda	Susp. at TD	
2/01-A-28	1034	56 54 17.36	95.10.30	BP	Oil prod	
	019 B	03 05 06.07	00.00.00	Gyda		
2/04-C-06 B	975	56 32 52.76	94.11.16	Phillips	Oil prod	3,742 m
	018	03 12 55.62	95.01.09	Ekofisk C	Oil	
2/04-K-03	335	56 33 55.98	85.11.02	Phillips	Water inj	
	018	03 12 23.11	00.00.00	Dyvi Beta		
2/04-K-06	987	56 33 55.86	94.12.19	Phillips	Water inj	5,311 m
	018	03 12 22.64	95.04.16	Ekofisk K	Water inj	
2/04-K-08 A	1043	56 33 55.80	95.08.13	Phillips	Water inj	4,893 m
	018	03 12 22.28	95.09.10	Ekofisk K	Water inj	
2/04-K-14	1011	56 33 56.02	95.04.19	Phillips	Water inj	5,249 m
	018	03 12 22.19	95.10.30	Ekofisk K	Susp. at TD	
2/07-A-04 A	1041	56 22 36.42	95.07.12	Phillips	Oil prod	5,121 m
	018	03 15 58.02	95.09.16	Mærsk Guardian	Oil	
2/07-A-05 A	1026	56 22 36.38	95.05.01	Phillips	Oil prod	5,497 m
	018	03 15 57.85	95.06.20	Mærsk Guardian	Oil	
2/07-A-07 B	992	56 22 36.49	94.12.27	Phillips	Oil prod	5,188 m
	018	03 15 57.97	95.02.10	Mærsk Guardian	Oil	
2/08-A-02 A	1048	56 16 40.89	95.07.09	Amoco	Oil prod	3,221 m
	006	03 23 44.00	95.07.30	Valhall	Oil	
2/08-A-04 B	988	56 16 41.05	95.05.11	Amoco	Oil prod	4,420 m
	006	03 23 43.43	95.07.05	Valhall	Oil	
2/08-A-08 A	1057	56 16 41.14	95.08.27	Amoco	Oil prod	2,653 m
	006	03 23 43.99	95.09.18	Valhall	Oil	
2/08-A-25 A	997	56 16 40.80	95.01.18	Amoco	Observation	5,213 m
	006	03 23 43.83	95.02.13	Valhall	Plugged	
2/08-A-25 B	1018	56 16 40.80	95.03.30	Amoco	Oil prod	5,784 m
	006	03 23 43.83	95.05.11	Valhall	Oil	
2/08-F-01	1093	56 16 35.69	95.12.11	Amoco	Oil prod	
	006	03 23 47.14	00.00.00	Mærsk Guardian		
2/08-F-02	1094	56 16 35.65	95.12.08	Amoco	Oil prod	
	006	03 23 46.96	95.12.24	Mærsk Guardian	Susp.at 13 3/8"	
2/08-F-03	1095	56 16 35.70	95.12.13	Amoco	Oil prod	
	006	03 23 47.03	00.00.00	Mærsk Guardian		
2/11-A-08	1076	56 10 35.44	95.09.26	Amoco	Observation	3,712 m
	033	03 27 36.47	95.10.26	Mærsk Guardian	Plugged	
2/11-A-08 A	1089	56 10 35.44	95.10.26	Amoco	Oil prod	4,611 m
	033	03 27 36.47	95.11.15	Mærsk Guardian	Susp. at TD	
7/12-A-02 A	963	57 06 41.40	95.12.08	BP	Observation	3,892 m
	019	02 50 50.73	95.12.20	Ula	Susp. at TD	
7/12-A-05 A	1020	57 06 41.14	95.03.23	BP	Oil prod	5,853 m
	019	02 50 50.96	95.07.03	Ula	Susp. at TD	
7/12-A-16 A	1047	57 06 41.14	95.08.16	BP	Oil prod	4,522 m
	019	02 50 50.57	95.10.01	Ula	Susp. at TD	
9/02-A-05	1013	57 49 07.48	95.03.06	Statoil	Water/gas inj	
	114	04 31 10.74	95.04.16	Mærsk Giant	Susp. at 9 5/8"	
15/09-A-02	1063	58 22 02.69	95.08.29	Statoil	Gas prod	
	046	01 54 29.70	00.00.00	Sleipner A		
15/09-A-08	1028	58 22 02.78	95.04.20	Statoil	Gas prod	3,650 m
	046	01 54 29.99	95.05.28	Sleipner A	Susp. at TD	
15/09-A-12	1045	58 22 02.74	95.07.08	Statoil	Gas prod	3,310 m
	046	01 54 30.12	95.08.06	Sleipner A	Gas	
15/09-A-15	1003	58 22 02.63	95.01.12	Statoil	Gas prod	4,333 m
	046	01 54 30.18	95.03.11	Sleipner A	Gas	
15/09-A-19	1036	58 22 02.00	95.05.28	Statoil	Gas inj	4,852 m
	046	01 54 29.00	95.07.08	Sleipner A	Gas inj	
15/09-A-20	1014	58 22 02.16	95.03.12	Statoil	Gas prod	2,963 m
	046	01 54 32.01	95.04.20	Sleipner A	Gas	
15/09-A-21	954	58 22 02.01	94.11.11	Statoil	Gas prod	3,699 m
	046	01 54 32.20	95.01.12	Sleipner A	Gas	

Well	Permit Prod.lic	Position	Spudded Completed	Operator Installation	Classification Status	TD (RKB)
15/09-B-05	1100	58 25 04.49	95.11.26	Statoil	Gas prod	
	046	01 43 04.38	00.00.00	West Epsilon		
15/09-B-10	1064	58 25 04.54	95.09.02	Statoil	Gas prod	3,920 m
	046	01 43 04.23	95.10.22	West Epsilon	Susp. at TD	
15/09-B-14	1086	58 25 04.46	95.10.23	Statoil	Gas prod	3,888 m
	046	01 43 04.31	95.11.25	West Epsilon	Susp. at TD	
25/05-A-02 A	1073	59 44 03.38	95.09.10	Elf	Water inj	4,590 m
	102	02 33 27.86	95.10.09	Mærsk Gallant	Water inj	
25/05-A-06 A	994	59 44 50.16	94.12.22	Elf	Oil prod	3,840 m
	102	02 33 28.05	95.01.25	Mærsk Gallant	Oil	
25/05-A-07	995	59 44 03.60	95.01.26	Elf	Water inj	4,760 m
	102	02 33 27.86	95.07.21	Mærsk Gallant	Oil	
25/05-A-08	1083	59 44 03.44	95.10.10	Elf	Oil prod	4,589 m
	102	02 33 27.73	95.11.28	Mærsk Gallant	Susp. at TD	
25/05-A-09	1054	59 44 03.57	95.07.24	Elf	Water inj	3,750 m
	102	02 33 27.73	95.08.25	Mærsk Gallant	Water inj	
25/05-A-10	1103	59 44 03.51	95.11.28	Elf	Water inj	
	102	02 33 28.30	00.00.00	Mærsk Gallant		
30/03-A-07 A	1102	60 46 57.92	95.12.20	Statoil	Observation	
	052	02 53 52.06	00.00.00	Veslefrikk		
30/03-A-20	1008	60 46 57.87	95.02.03	Statoil	Oil prod	6,085 m
	052	03 53 51.96	95.02.04	Veslefrikk A	Oil	
30/03-A-22	1049	60 46 57.77	95.07.08	Statoil	Observation	4,125 m
	052	02 53 52.59	95.08.23	Veslefrikk A	Plugged	
30/03-A-22 A	1058	60 46 57.77	95.08.24	Statoil	Gas inj	4,930 m
	052	02 53 52.59	95.09.20	Veslefrikk A	Susp. at TD	
30/06-B-51 H	1027	60 31 59.32	95.04.17	Hydro	Observation	3,836 m
	053	02 44 23.27	95.05.30	Treasure Saga	Susp. at TD	
30/06-C-06 A	1022	60 36 29.56	95.04.03	Hydro	Observation	3,732 m
	053	02 46 33.51	95.04.09	Oseberg C	Plugged	
30/06-C-06 B	1031	60 36 29.56	95.04.09	Hydro	Oil prod	4,146 m
	053	02 46 33.51	95.05.05	Oseberg C	Oil	
30/06-C-10 A	1075	60 36 29.42	95.09.14	Hydro	Observation	3,433 m
	053	02 46 33.60	95.11.08	Oseberg C	Plugged	
30/06-C-10 B	1087	60 36 29.42	95.11.10	Hydro	Oil prod	5,176 m
	053	02 46 33.60	95.12.04	Oseberg C	Susp. at TD	
30/06-C-16	1035	60 36 29.31	95.05.18	Hydro	Observation	6,056 m
	053	02 46 33.51	95.07.02	Oseberg C	Plugged	
30/06-C-16 A	1044	60 36 29.31	95.07.02	Hydro	Oil prod	7,304 m
	053	02 46 33.51	95.08.18	Oseberg C	Oil	
30/06-C-19	1004	60 36 29.31	95.02.02	Hydro	Oil prod	6,693 m
	053	02 46 33.26	95.03.19	Oseberg C	Oil	
30/06-C-26 A	990	60 36 29.18	94.12.20	Hydro	Oil prod	9,327 m
	053	02 46 33.01	95.02.01	Oseberg C	Oil	
30/09-B-16	1024	60 29 36.27	95.04.30	Hydro	Observation	3,240 m
	079	02 49 42.89	95.06.07	Oseberg B	Susp. at TD	
30/09-B-34	991	60 29 36.01	94.12.25	Hydro	Water inj	8,080 m
	079	02 49 43.00	95.04.30	Oseberg B	Water inj	
31/02-B-03 H	956	60 46 39.93	94.09.02	Hydro	Gas inj	2,090 m
	054	03 26 12.04	95.01.13	Polar Pioneer	Gas inj	
31/02-D-02 H	1108	60 51 30.48	95.12.19	Hydro	Oil prod	
	054	03 26 43.53	00.00.00	Polar Pioneer		
31/02-D-08 H	989	60 51 18.84	95.01.14	Hydro	Observation	1,889 m
	054	03 26 43.68	95.01.27	Polar Pioneer	Plugged	
31/02-D-08 A H	1007	60 51 18.84	95.01.27	Hydro	Oil prod	3,400 m
	054	03 26 43.69	95.03.21	Polar Pioneer	Oil	
31/02-D-09	1082	60 52 19.55	95.10.11	Hydro	Observation	1,760 m
	054	03 26 14.29	95.10.27	Polar Pioneer	Plugged	
31/02-E-01 H	1040	60 48 01.25	95.06.02	Hydro	Observation	2,100 m
	054	03 26 36.66	95.06.11	Polar Pioneer	Plugged	
31/02-E-01 A H	1042	60 48 01.25	95.06.12	Hydro	Oil prod	3,919 m
	054	03 26 36.66	95.07.13	Polar Pioneer	Oil	
31/02-E-04 H	1016	60 47 56.20	95.03.23	Hydro	Oil prod	4,000 m
	054	03 26 31.84	95.05.04	Polar Pioneer	Oil	
31/02-F-05 H	1051	60 46 00.20	95.07.25	Hydro	Oil prod	2,373 m
	054	03 25 26.90	95.08.07	Polar Pioneer	Oil	

Well	Permit Prod.lic	Position	Spudded Completed	Operator Installation	Classification Status	TD (RKB)
31/02-F-06 A H	1033	60 46 28.14	95.05.05	Hydro	Oil prod	3,916 m
	054	03 26 16.63	95.06.02	Polar Pioneer	Oil	
31/02-G-03 H	916	60 45 19.16	94.05.15	Hydro	Oil prod	3,420 m
	054	03 26 27.75	95.08.16	Polar Pioneer	Oil	
31/02-G-06 H	1066	60 45 08.70	95.08.24	Hydro	Oil prod	3,969 m
	054	03 26 36.00	95.10.07	Polar Pioneer	Susp. at TD	
31/04-A-12	998	60 32 33.00	95.01.06	Hydro	Observation	2,921 m
	055	03 02 51.03	95.01.28	Brage	Plugged	
31/04-A-12 A	1006	60 32 33.00	95.01.29	Hydro	Water inj	4,195 m
	055	03 02 51.03	95.02.16	Brage	Water inj	
31/04-A-18	986	60 32 33.09	94.11.27	Hydro	Water inj	4,350 m
	055	03 02 51.03	95.01.06	Brage	Water inj	
31/04-A-21	1012	60 32 33.42	95.02.21	Hydro	Oil prod	4,870 m
	055	03 03 50.86	95.05.05	Brage	Oil	
31/04-A-27	1055	60 32 33.09	95.09.19	Hydro	Oile prod	4,296 m
	055	03 02 50.52	95.11.01	Brage	Susp. at TD	
31/04-A-28	1019	60 32 33.25	95.03.15	Hydro	Water inj	5,976 m
	055	03 02 51.03	95.08.21	Brage	Susp. at TD	
31/04-A-40	1091	60 32 33.47	95.11.06	Hydro	Oil prod	
	055	03 02 50.46	00.00.00	Brage		
31/05-H-05 H	1037	60 42 52.25	95.06.02	Hydro	Observation	2,127 m
	085	03 30 24.52	95.06.26	Treasure Saga	Susp. at TD	
31/05-H-05 A H	1098	60 42 52.25	95.11.17	Hydro	Oil prod	4,241 m
	085	03 30 24.52	95.12.17	Polar Pioneer	Susp. at TD	
31/05-H-06 H	1046	60 42 46.85	95.06.27	Hydro	Observation	2,600 m
	085	03 30 33.96	95.07.23	Treasure Saga	Plugged	
31/05-H-06 A H	1053	60 42 46.85	95.07.23	Hydro	Oil prod	4,444 m
	085	03 30 33.96	95.08.28	Treasure Saga	Susp. at TD	
31/06-A-07	1068	60 38 44.83	95.09.24	Shell	Gas prod	1,538 m
	085	03 43 35.23	95.10.21	Troll A	Susp.at 10 3/4"	
31/06-A-11	1069	60 38 44.90	95.11.09	Shell	Gas prod	
	085	03 43 35.38	95.11.24	Troll A	Susp.at 10 3/4"	
31/06-A-15	1070	60 38 44.90	95.10.23	Shell	Gas prod	
	085	03 43 35.53	95.11.08	Troll A	Susp.at 10 3/4"	
33/09-A-06 A	1060	61 15 20.92	95.08.23	Statoil	Oil prod	4,525 m
	037	01 51 15.08	95.10.01	Statfjord A	Susp. at TD	
33/09-A-15 A	1001	61 15 20.81	95.01.21	Statoil	Oil prod	4,901 m
	037	01 51 14.82	95.04.02	Statfjord A	Oil	
33/09-A-35 A	1079	61 15 19.81	95.10.26	Statoil	Oil prod	
	037	01 51 13.78	00.00.00	Statfjord A		
33/09-C-18	1005	61 17 47.88	95.01.25	Statoil	Oil prod	7,189 m
	037	01 54 11.33	95.05.10	Statfjord C	Oil	
33/09-C-22	1038	61 17 46.98	95.05.28	Statoil	Oil prod	4,019 m
	037	01 54 10.04	95.07.11	Statfjord C	Oil	
33/09-C-28 A	1080	61 17 46.86	95.10.25	Statoil	Oil prod	2,779 m
	037	01 54 10.27	95.10.26	Statfjord C	Susp. at TD	
33/09-C-28 B	1084	61 17 46.86	95.10.27	Statoil	Oil prod	2,751 m
	037	01 54 10.27	95.11.14	Statfjord C	Susp. at TD	
33/09-C-41	1092	61 17 46.68	95.11.14	Statoil	Oil prod	
	037	01 54 09.95	00.00.00	Statfjord C		
33/09-D-01 H	1029	61 26 50.13	95.04.20	Statoil	Water inj	4,166 m
	037	01 54 50.24	95.06.10	Treasure Prospect	Susp. at TD	
33/09-D-02 H	1085	61 26 50.51	95.11.01	Statoil	Water inj	3,139 m
	037	01 54 51.05	95.12.19	Treasure Prospect	Susp. at TD	
33/09-E-02 H	968	61 26 03.56	94.10.28	Statoil	Oil prod	3,285 m
	037	01 55 30.60	95.01.12	Treasure Prospect	Oil	
33/09-E-03 H	1106	61 26 03.40	95.12.22	Statoil	Oil prod	
	037	01 55 31.04	00.00.00	Treasure Prospect		
33/09-F-01 H	1065	61 26 40.59	95.08.25	Statoil	Oil prod	4,061 m
	037	01 57 22.75	95.10.31	Treasure Prospect	Susp. at TD	
33/09-F-02 H	1002	61 26 40.70	95.02.19	Statoil	Oil prod	3,291 m
	037	01 57 23.37	95.04.15	Treasure Prospect	Oil	
33/12-B-10 A	1052	61 12 25.15	95.08.19	Statoil	Oil prod	5,847 m
	037	01 49 52.14	95.10.23	Statfjord A	Oil	
33/12-B-33	982	61 12 23.94	94.12.06	Statoil	Oil prod	4,626 m
	037	01 49 51.19	95.02.02	Statfjord B	Oil	

Well	Permit Prod.lic	Position	Spudded Completed	Operator Installation	Classification Status	TD (RKB)
33/12-B-36	1023	61 12 23.94	95.04.20	Statoil	Oil prod	5,016 m
	037	01 49 50.85	95.06.25	Statfjord B	Oil	
34/07-A-08 H	984	61 29 21.34	94.11.21	Saga	Oil prod	4,709 m
	089	02 13 34.51	95.05.16	Scarabeo 5	Oil	
34/07-C-02 H	1090	61 22 49.91	95.11.26	Saga	Oil prod	
	089	02 06 11.80	00.00.00	Scarabeo 5		
34/07-I-02 H	981	61 16 33.36	94.11.22	Saga	Observation	3,524 m
	089	02 07 10.86	95.02.19	Vildkat Explorer	Plugged	
34/07-I-02 A H	1030	61 16 33.36	95.06.02	Saga	Oil prod	3,650 m
	089	02 07 10.86	95.07.20	Scarabeo 5	Oil	
34/07-I-04 A H	1062	61 16 32.84	95.09.01	Saga	Oil prod	3,938 m
	089	02 07 00.30	95.11.24	Scarabeo 5	Susp. at TD	
34/07-P-11	1010	61 26 57.08	95.06.07	Saga	Oil prod	5,880 m
	089	02 08 36.55	95.09.25	Snorre P	Susp. at TD	
34/07-P-24	1061	61 26 57.72	95.09.05	Saga	Oil prod	4,990 m
	089	02 08 36.54	95.12.06	Snorre P	Susp. at TD	
34/07-P-32	1104	61 26 58.11	95.12.06	Saga	Water inj	
	089	02 08 36.53	00.00.00	Snorre P		
34/07-P-31 A	996	61 26 57.99	94.12.31	Saga	Oil prod	4,790 m
	089	02 08 37.61	95.05.12	Snorre P	Oil	
34/10-A-17 A	1099	61 10 33.93	95.12.01	Statoil	Water inj	
	050	02 11 23.14	00.00.00	Gullfaks A		
34/10-A-43	1021	61 10 34.94	95.03.14	Statoil	Oil prod	4,330 m
	050	02 11 21.40	95.05.07	Gullfaks A	Oil	
34/10-B-32	978	61 12 11.19	94.12.15	Statoil	Oil prod	4,805 m
	050	02 12 04.78	95.03.13	Gullfaks B	Oil	
34/10-B-33	1032	60 12 09.98	95.05.09	Statoil	Water inj	5,050 m
	050	02 12 06.45	95.06.30	Gullfaks B	Susp. at TD	
34/10-B-34	1050	61 12 10.96	95.07.05	Statoil	Oil prod	3729 m
	050	02 12 04.66	95.08.10	Gullfaks B	Susp. at TD	
34/10-B-35	1088	61 12 10.92	95.10.13	Statoil	Water inj	5,900 m
	050	02 12 04.86	95.10.29	Gullfaks B	Susp. at TD	
34/10-B-36	1081	61 12 10.01	95.10.29	Statoil	Oil prod	2,534 m
	050	02 12 06.22	95.11.18	Gullfaks B	Plugged	
34/10-C-24	980	61 12 53.60	94.11.24	Statoil	Oil prod	4,575 m
	050	02 16 27.81	95.02.02	Gullfaks C	Oil	
34/10-C-25	1000	61 12 54.55	95.01.24	Statoil	Oil prod	2,721 m
	050	02 16 26.67	95.03.15	Gullfaks C	Oil	
34/10-C-26	1015	61 12 53.53	95.03.15	Statoil	Oil prod	2,232 m
	050	02 16 27.90	95.04.05	Gullfaks C	Oil	
34/10-C-27	1025	61 12 54.61	95.04.06	Statoil	Oil prod	4,930 m
	050	02 16 26.21	95.05.21	Gullfaks C	Oil	
34/10-C-28	1039	61 12 53.57	95.05.22	Statoil	Oil prod	2,620 m
	050	02 16 28.04	95.06.14	Gullfaks C	Oil	
34/10-C-29	1059	61 12 54.69	95.08.09	Statoil	Observation	4,665 m
	050	02 16 26.50	95.10.13	Gullfaks C	Susp. at TD	
34/10-C-30	1077	61 12 53.49	95.10.13	Statoil	Oil prod	3,642 m
	050	02 16 27.75	95.11.25	Gullfaks C	Susp. at TD	
34/10-C-31	1101	61 21 54.62	95.11.27	Statoil	Water inj	
	050	02 16 26.59	00.00.00	Gullfaks C		
6407/09-A-03	1097	64 21 11.42	95.11.11	Shell	Oil prod	2,200 m
	093	07 46 57.37	95.12.21	Draugen A	Susp. at TD	
6407/09-A-05	1078	64 21 11.42	95.09.20	Shell	Oil prod	
	093	07 46 57.37	95.11.09	Draugen A	Susp.at 18 5/8"	
6507/07-A-14	983	65 19 32.99	94.12.15	Conoco	Oil prod	2,904 m
	095	07 19 03.01	95.01.06	Transocean 8	Susp. at TD	
6507/07-B-01 H	1017	65 18 45.63	95.03.05	Conoco	Water inj	3,268 m
	095	07 15 46.09	95.03.24	Transocean 8	Susp. at TD	
6507/07-B-02 H	1009	65 18 46.25	95.02.19	Conoco	Water inj	3,321 m
	095	07 15 45.80	95.03.04	Transocean 8	Water inj	
6507/07-B-03 H	999	65 18 46.25	95.01.19	Conoco	Water inj	3,825 m
	095	07 15 45.80	95.02.19	Transocean 8	Water inj	

Table 7.4.c
Development wells drilled from mobile units 1995
H=sub-sea completed, A/B/C=side drilled new well, X=junked well

Well	Permit Prod.lic	Position	Spudded Completed	Operator Installation	Classification Status	TD (RKB)
2/07-A-04 A	1041 018	56 22 36.42 03 15 58.02	95.07.12 95.09.16	Phillips Mærsk Guardian	Oil prod Oil	5,121 m
2/07-A-05 A	1026 018	56 22 36.38 03 15 57.85	95.05.01 95.06.20	Phillips Mærsk Guardian	Oil prod Oil	5,497 m
2/08-F-01	1093 006	56 16 35.69 03 12 23.11	95.12.11 95.12.13	Amoco Mærsk Guardian	Oil prod Susp. at 20"	
2/08-F-02	1094 006	56 16 35.65 03 23 46.96	95.12.08 95.12.11	Amoco Mærsk Guardian	Oil prod Susp. at 20"	
2/08-F-03	1095 006	56 16 35.70 03 23 47.03	95.12.13 00.00.00	Amoco Mærsk Guardian	Oil prod	
2/11-A-08	1076 033	56 10 35.44 03 27 36.47	95.09.26 95.10.26	Amoco Mærsk Guardian	Observation Plugged	3,712 m
2/11-A-08 A	1089 033	56 10 35.44 03 27 36.47	95.10.26 95.11.15	Amoco Mærsk Guardian	Oil prod Susp. at TD	4,611 m
9/02-A-05	1013 114	57 49 07.48 04 31 10.74	95.03.06 95.04.16	Statoil Mærsk Giant	Water/gas inj Susp. at 9 5/8"	
15/09-B-05	1100 046	58 25 04.49 01 43 04.38	95.11.26 00.00.00	Statoil West Epsilon	Gas prod	
15/09-B-10	1064 046	58 25 04.54 01 43 04.23	95.09.02 95.10.22	Statoil West Epsilon	Gas prod Susp. at TD	3,920 m
15/09-B-14	1086 046	58 25 04.46 01 43 04.31	95.10.23 95.11.25	Statoil West Epsilon	Gas prod Susp. at TD	3,888 m
25/05-A-02 A	1073 102	59 44 03.38 02 33 27.86	95.09.10 95.10.09	Elf Mærsk Gallant	Water inj Water inj	4,590 m
25/05-A-07	995 102	59 44 03.60 02 33 27.86	95.01.26 95.07.21	Elf Mærsk Gallant	Water inj Oil	4,760 m
25/05-A-08	1083 102	59 44 03.44 02 33 27.73	95.10.10 95.11.28	Elf Mærsk Gallant	Oil prod Susp. at TD	4,589 m
25/05-A-09	1054 102	59 44 03.57 02 33 27.73	95.07.24 95.08.25	Elf Mærsk Gallant	Water inj Water inj	3,750 m
25/05-A-10	1103 102	59 44 03.51 02 33 28.30	95.11.28 00.00.00	Elf Mærsk Gallant	Water inj	
30/06-B-51 H	1027 053	60 31 59.32 02 44 23.27	95.04.17 95.05.30	Hydro Treasure Saga	Observation Susp. at TD	3,836 m
31/02-D-02 H	1108 054	60 51 30.48 03 26 43.53	95.12.19 00.00.00	Hydro Polar Pioneer	Oil prod	
31/02-D-08 H	989 054	60 51 18.84 03 26 43.68	95.01.14 95.01.27	Hydro Polar Pioneer	Observation Plugged	1,889 m
31/02-D-08 A H	1007 054	60 51 18.84 03 26 43.69	95.01.27 95.03.21	Hydro Polar Pioneer	Oil prod Oil	3,400 m
31/02-D-09	1082 054	60 52 19.55 03 26 14.29	95.10.11 95.10.27	Hydro Polar Pioneer	Observation Plugged	1,760 m

Well	Permit Prod.lic	Position	Spudded Completed	Operator Installation	Classification Status	TD (RKB)
31/02-E-01 H	1040 054	60 48 01.25 03 26 36.66	95.06.02 95.06.11	Hydro Polar Pioneer	Observation Plugged	2,100 m
31/02-E-01 A H	1042 054	60 48 01.25 03 26 36.66	95.06.12 95.07.13	Hydro Polar Pioneer	Oil prod Oil	3,919 m
31/02-E-04 H	1016 054	60 47 56.20 03 26 31.84	95.03.23 95.05.04	Hydro Polar Pioneer	Oil prod Oil	4,000 m
31/02-F-05 H	1051 054	60 46 00.20 03 25 26.90	95.07.25 95.08.07	Hydro Polar Pioneer	Oil prod Oil	2,373 m
31/02-F-06 A H	1033 054	60 46 28.14 03 26 16.63	95.05.05 95.06.02	Hydro Polar Pioneer	Oil prod Oil	3,916 m
31/02-G-06 H	1066 054	60 45 08.70 03 26 36.00	95.08.24 95.10.07	Hydro Polar Pioneer	Oil prod Susp. at TD	3,969 m
31/05-H-05 H	1037 085	60 42 52.25 03 30 24.52	95.06.02 95.06.26	Hydro Treasure Saga	Observation Plugged	2,127 m
31/05-H-05 A H	1098 085	60 42 52.25 03 30 24.52	95.11.17 95.12.17	Hydro Polar Pioneer	Oil prod Susp. at TD	4,241 m
31/05-H-06 H	1046 085	60 42 46.85 03 30 33.96	95.06.27 95.07.23	Hydro Treasure Saga	Observation Plugged	2,600 m
31/05-H-06 A H	1053 085	60 42 46.85 03 30 33.96	95.07.23 95.08.28	Hydro Treasure Saga	Oil prod Susp. at TD	4,444 m
33/09-D-01 H	1029 037	61 26 50.13 01 54 50.24	95.04.20 95.06.10	Statoil Treasure Prospect	Water inj Susp. på TD	4,166 m
33/09-D-02 H	1085 037	61 26 50.51 01 54 51.05	95.11.01 95.12.19	Statoil Treasure Prospect	Vann inj Susp. at TD	3,139 m
33/09-E-03 H	1106 037	61 26 03.40 01 55 31.04	95.12.22 00.00.00	Statoil Treasure Prospect	Oil prod	
33/09-F-01 H	1065 037	61 26 40.59 01 57 22.75	95.08.25 95.10.31	Statoil Treasure Prospect	Oil prod Susp. at TD	4,061 m
33/09-F-02 H	1002 037	61 26 40.70 01 57 23.37	95.02.19 95.04.15	Statoil Treasure Prospect	Oil prod Oil	3,291 m
34/07-C-02 H	1090 089	61 22 49.91 02 06 11.80	95.11.26 00.00.00	Saga Scarabeo 5	Oil prod	
34/07-I-02 A H	1030 089	61 16 33.36 02 07 10.86	95.06.02 95.07.20	Saga Scarabeo 5	Oil prod Oil	3,650 m
34/07-I-04 A H	1062 089	61 16 32.84 02 07 00.30	95.09.01 95.11.24	Saga Scarabeo 5	Oil prod Susp. at TD	3,938 m
6507/07-B-01 H	1017 095	65 18 45.63 07 15 46.09	95.03.05 95.03.24	Conoco Transocean 8	Water inj Susp. at TD	3,268 m
6507/07-B-02 H	1009 095	65 18 46.25 07 15 45.80	95.02.19 95.03.04	Conoco Transocean 8	Water inj Water inj	3,321 m
6507/07-B-03 H	999 095	65 18 46.25 07 15 45.80	95.01.19 95.02.19	Conoco Transocean 8	Water inj Water inj	3,825 m

Figure 7.4.a
Development wells on the Norwegian continental shelf 1973-1995

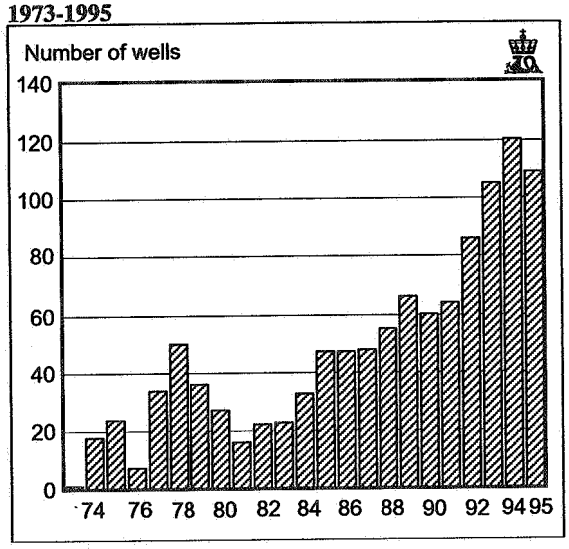


Figure 7.4.b
Development wells per field

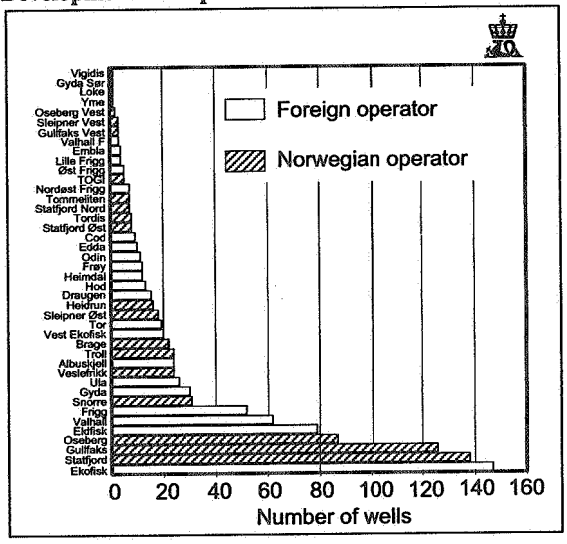


Figure 7.4.c
Development wells per operator

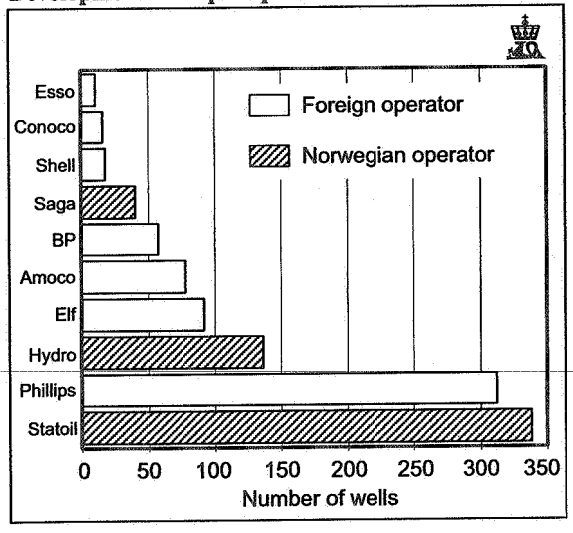


Figure 7.4.d
Development wells drilled in 1995 by installation

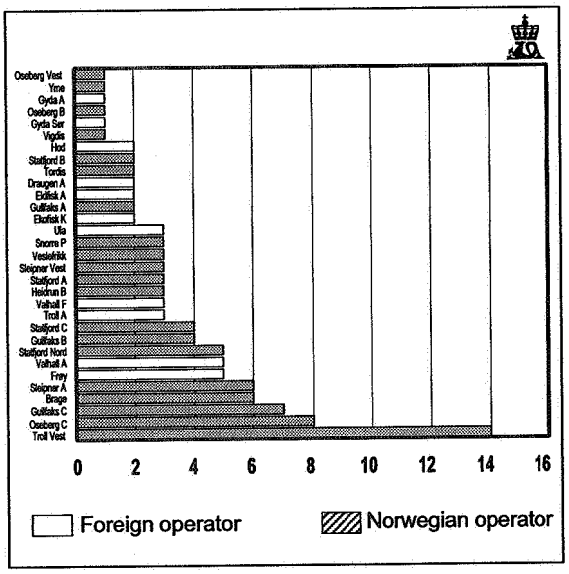
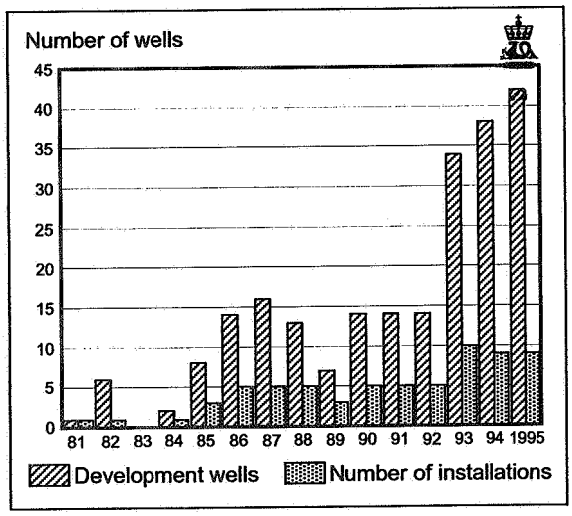


Figure 7.4.e
Development drilling by mobile installations



7.5 UNITS OF MEASUREMENT FOR OIL AND GAS

Oil and gas are often measured in volumetric units under certain defined ISO standard conditions (temperature = 15°C and pressure = 1,01325 bar). Oil volumes are stated in million standard cubic meters (10^6 Sm^3) and gas volumes in billion standard cubic meters (10^9 Sm^3).

Conversion from volume units to oil equivalents for oil and gas volumes is used for the purpose of totalling or comparing oil and gas resources, and when exact quantities are not required.

Conversion to *oil equivalents* is based on the amount of energy released during combustion of oil and gas. Based on a closer examination of the combustion values of known oil and gas compositions on the Norwegian shelf, the Norwegian Petroleum Directorate has arrived at the conclusion that the average quantity of energy is equivalent to the quantity of energy contained in 1 Sm^3 of oil.

As from 1 January 1995, the Norwegian Petroleum Directorate states the total petroleum resources in *Sm^3 oil equivalents* (Sm^3 o.e.). Consequently, when adding up or comparing oil and gas volumes we will use the following conversion formula as from 1 January 1995:

1,000 Sm^3 gas equals:	1 Sm^3 o.e.
1 Sm^3 oil equals:	1 Sm^3 o.e.

Conversion from the NGL unit of weight to Sm^3 oil equivalents is somewhat more complicated, since the composition of the light hydrocarbons components can vary considerably from one field to another. The Norwegian Petroleum Directorate has chosen to use a constant conversion factor of 1.3 from tonnes NGL/condensate to Sm^3 o.e. This is based on a quantity of energy in 1 tonne of an average NGL/condensate mixture from the Norwegian shelf being equal to the quantity of energy in 0.769 Sm^3 of oil.

This formula for conversion of oil and gas to Sm^3 *oil equivalents* has clear advantages. Firstly, the stated numerical values for oil (million Sm^3) and gas (billion Sm^3) can be added directly. NGL estimates must be converted, but this generally applies only to fields. Secondly, it will be easier to compare the Norwegian Petroleum Directorate's total resource estimates with other estimates.

7.6 PRODUCTION OF OIL AND GAS

Production of oil and gas on the Norwegian continental shelf amounted to 192.9 x 10^6 Sm^3 o.e. in 1995. Production in 1994 was 180.3 x 10^6 Sm^3 o.e.

Table 7.6 and Figures 7.6.a and 7.6.b describe the production in greater detail. For the Statfjord, Frigg and Murchison fields, Table 7.6.a shows the Norwegian share of the production.

Table 7.6
Prodution in million Sm^3 oil equivalents (Sm^3 o.e.)

	PRODUCTION ⇒			CONSUMPTION⇒		MARKETABLE PRODUCTS ⇒		
				Gas	Gas			
1995	Oil	Gas	Cond.	Flared	Fuel	Oil/ NGL	Gas/ cond.	Total
Brage	6,324	0,514		0,019	0,054	6,349	0,225	6,574
Draugen	6,971	0,367		0,018	0,039	6,971		6,971
Ekofisk area	17,361	9,887		0,009	0,979	17,039	7,916	24,955
Embla	1,334	0,415				1,322	0,388	1,710
Frigg area	0,938	1,779	1,004	0,019	0,029	1,309	1,753	3,062
Gullfaks	27,450	3,106		0,059	0,287	27,663	1,930	29,593
Gullfaks Vest	0,641	0,064				0,641		0,641
Gyda (incl. Gyda Sør)	3,938	0,758		0,004	0,042	3,689	0,500	4,189
Heidrun	1,056	0,122		0,068	0,005	0,904		0,904
Heimdal		3,258	0,521		0,045	0,468	3,434	3,902
Hod	0,553	0,126		0,001	0,010	0,546	0,118	0,664
Murchison	0,226	0,036		0,003	0,012	0,207	0,005	0,212
Oseberg	28,938	4,951		0,031	0,251	28,858		28,858
Oseberg Vest	0,134	0,452		0,001		0,127		0,127
Sleipner Øst (incl. Loke)		7,034	4,964	0,015	0,126	1,720	8,231	9,951
Snorre	11,271	1,181		0,025	0,077	11,793	0,685	12,478
Statfjord	25,879	7,180		0,095	0,429	26,641	3,108	29,749
Statfjord Nord	2,548	0,165				2,573	0,119	2,692
Statfjord Øst	3,212	0,458				3,268	0,144	3,412
Tommeliten Gamma	0,351	0,957				0,283	0,883	1,166

	PRODUCTION ⇒			CONSUMPTION⇒		MARKETABLE PRODUCTS ⇒		
				Gas	Gas			
1995	Oil	Gas	Cond.	Flared	Fuel	Oil/ NGL	Gas/ cond.	Total
Tordis	4,146	0,407		0,008	0,032	4,251	0,289	4,540
Troll area	2,871	2,226	0,046	0,012	0,052	2,856		2,856
Ula	3,966	0,333		0,003	0,060	3,965	0,234	4,199
Valhall	3,661	0,845		0,007	0,066	3,620	0,788	4,408
Veslefrikk	4,462	0,569		0,015	0,045	4,622	0,422	5,044
Total 1995	158,232	47,192	7,537	0,410	2,641	161,684	31,172	192,858
Total 1994	147,674	45,392	4,588	0,364	2,630	150,775	29,491	180,267
Total 1993	133,770	41,576	1,280	0,340	2,544	135,241	25,562	160,803
Total 1992	125,936	42,444	0,573	0,309	2,449	127,036	26,166	153,202
Total 1991	110,513	39,717	0,563	0,356	2,257	111,547	25,302	136,849
Total 1990	96,844	37,065	0,521	0,556	2,132	97,673	25,767	123,440
Total 1989	88,266	39,320	0,547	0,474	2,013	89,038	29,010	118,048
Total 1988	66,882	36,302	0,588	0,336	1,818	67,774	28,581	96,355
Total 1987	58,538	34,499	0,577	0,434	1,443	59,524	28,399	87,923
Total 1986	50,579	33,924	0,355	0,258	1,311	51,160	26,331	77,491
Total 1985	47,339	34,102	0,030	0,304	1,190	46,665	26,259	72,924

Figure 7.6.a
Oil and gas production on the Norwegian shelf 1971-1995

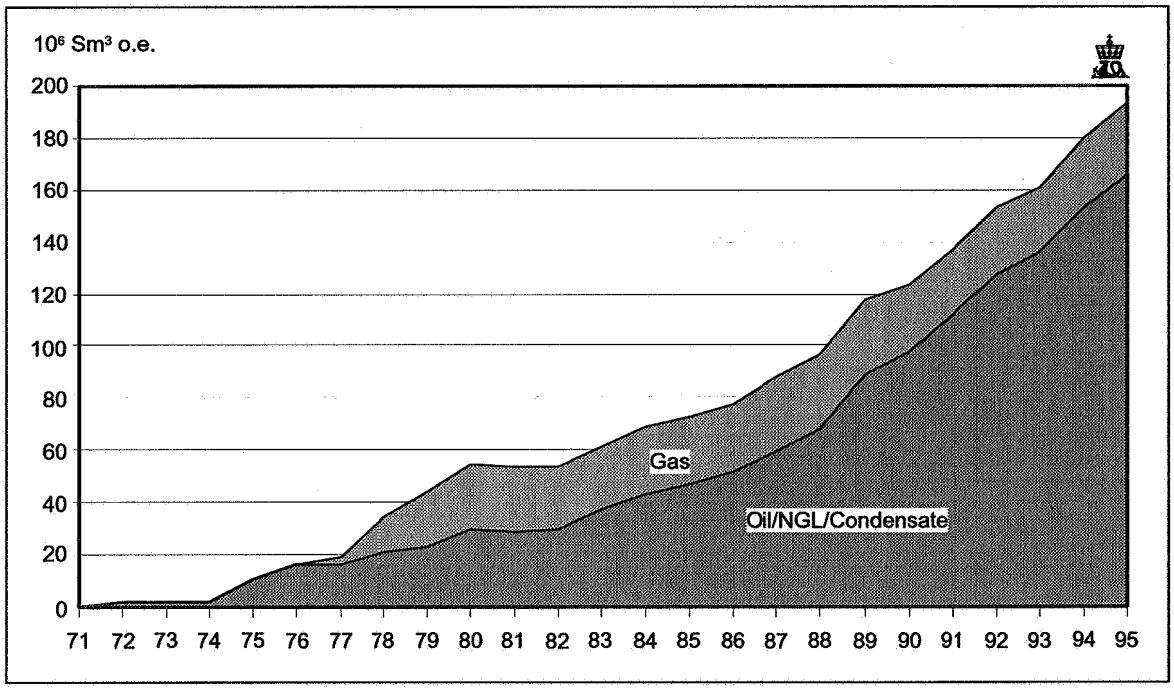
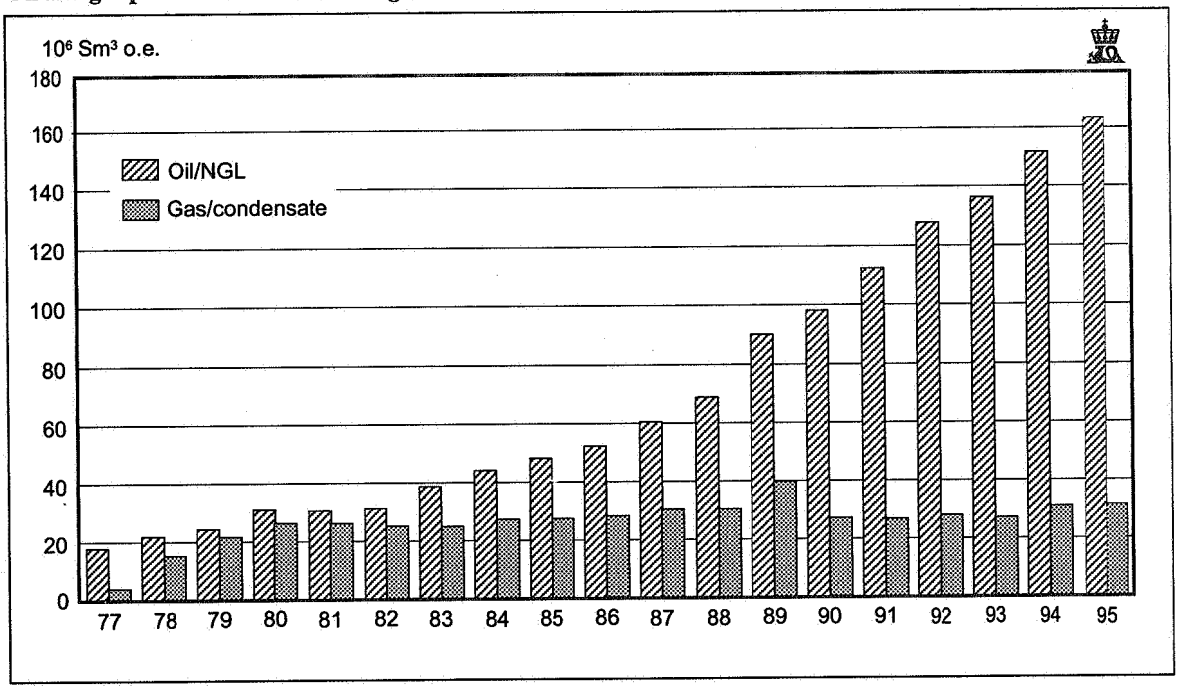


Figure 7.6.b
Oil and gas production on the Norwegian shelf 1977-1995



7.7 NORWEGIAN PETROLEUM DIRECTORATE PUBLICATIONS IN 1995

Acts, regulations and guidelines

- Acts, regulations and provisions for the petroleum activities in 1995.
  An updated compendium of the statutory framework of acts, regulations and guidelines applicable to the Norwegian continental shelf. Issued 1 January 1995.
- Regulations relating to drilling and well activities and geological data collection in the petroleum activities, with guidelines
- Regulations relating to lifting appliances and lifting gear in the petroleum activities, with guidelines
- Regulations relating load-bearing structures in the petroleum activities, with guidelines
- Regulations to Act relating to petroleum activities
- Act relating to petroleum activities
- Act relating to worker protection and working environment, etc.
- Regulations relating to the collection of environmental data, etc., with guidelines
- Regulations relating to emergency preparedness in the petroleum activities, with guidelines
- Regulations relating to process and auxiliary facilities in the petroleum activities, with guidelines
- Regulations relating to safety and communication systems on installations in the petroleum activities, with guidelines
- Regulations relating to explosion and fire protection of installations in the petroleum activities, with guidelines
- Regulations relating to marking of installations in the petroleum activities, with guidelines
- Regulations relating to manned underwater operations in the petroleum activities, with guidelines
- Regulations relating to electrical installations in the petroleum activities, with guidelines
- Regulations relating to fiscal measurement of oil and gas, etc. with guidelines
- Regulations relating to measurement of fuel and flare gas for calculation of CO_2 tax in the petroleum activities, with guidelines
- Regulations relating to systematic follow-up of the working environment in the petroleum activities, with guidelines
- The arrangement of regulatory supervision relating to safety and the working environment in the petroleum activities
- Provisions relating to digital transmission of geological and reservoir technical data in connection with the final report.

Studies - Reports

- Bell diving
- Deep Water Drilling Project - Phase II
- Evaluation of accident risk among offshore personnel - summary report
- Evaluation of accident risk among offshore personnel - final report

Other publications

- List of publications issued by the Norwegian Petroleum Directorate
- Well Data Summary Sheets, Vols. 20 and 21
- Norwegian Petroleum Directorate Annual Report 1994 (Norwegian and English versions)
- Licenses, Areas, Area-coordinates, Exploration Wells
- Borehole list
- Borehole list - Exploration Drilling
- Development Wells
- Newsletter (IOR)
- Report from diving data base - DSYS 1994
- Well Data published by Norwegian Petroleum Directorate
- Petroleum resources on the Norwegian continental shelf (Norwegian and English versions)
- PROFIT Project summary reports.

7.8 ORGANISATION CHART