

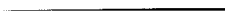
# Natural Gas and Oil of the Netherlands 1982 Annual Review

A review of hydrocarbon exploration and production in the Netherlands and on the Netherlands sector of the North Sea continental shelf.

Ministry of Economic Affairs  
The Hague, May 1983

(Photo)  
the first offshore oil  
production and land-  
fall from block Q1 of  
Union Oil Company of  
The Netherlands c.s.

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## ANNEXES

### 1.1 Onshore

On 1st January 1982, there were 17 licences in force for onshore exploratory drilling for oil and natural gas (see Annexes 14 and 20). During the year under review one new licence, namely the "Haulerwijk" drilling licence, was granted to Nederlandse Aardolie Maatschappij B.V. The existing "Centraal Nederland" drilling licence held by British Petroleum Exploratie Maatschappij Nederland B.V. and Gulf Oil Corporation was enlarged by over 24,000 ha. This enlargement had not yet taken effect on 1st January 1983. A one-year extension was granted to the term of the "Zuid-IJsselmeer" licence held by Amoco Netherlands Petroleum Company/Petroland B.V. c.s. and the "Gorredijk" licence held by Petroland B.V. The State was granted a drilling licence for the purpose of an inventory of coal reserves in South Limburg to be compiled by the Geological Survey of the Netherlands (RGD).

At the end of the year under review the number of current applications for drilling licences to explore for oil and gas totalled 11.

The number of hydrocarbon production concessions remained unchanged in 1982 (see Annexes 15 and 20). The Inspector-General of Mines, the Geological Survey of the Netherlands and the Provincial Authority of Friesland issued their recommendations with regard to the "Oosterend" concession applied for by Petroland B.V. c.s. No objections have been lodged against the concession application. It is expected that formal consideration of the application should be completed in the course of 1983.

No definitive decision has yet been taken on the "Zuidwal" concession application filed by the same group. In the course of 1982 the Council of State issued its recommendation on a draft Royal Decree refusing the application. The subsequent definitive decision on the application will be considered by the Council of Ministers.

## 1.2 Offshore

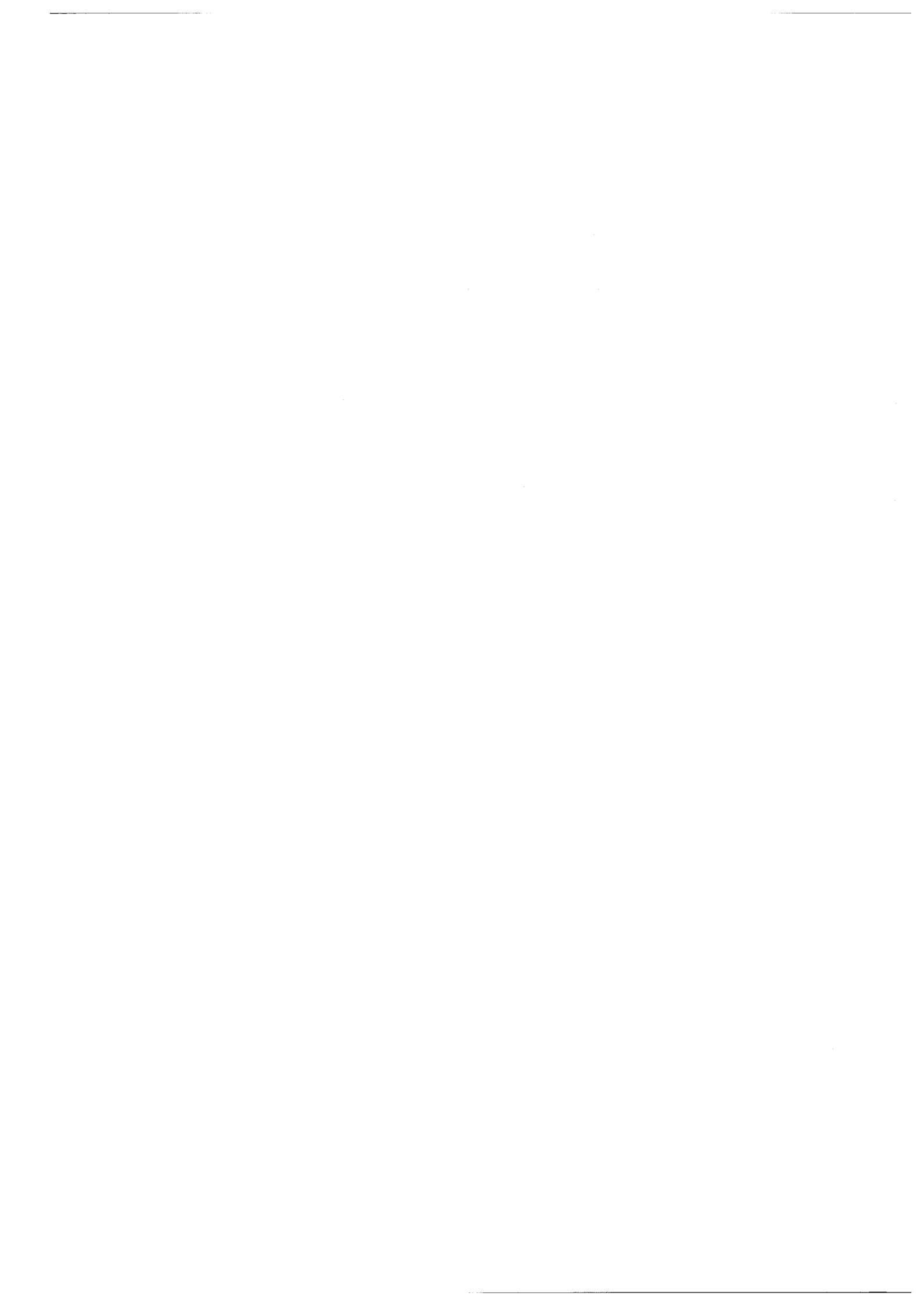
In the year under review five hydrocarbon exploration licences were granted to the following operators. The blocks and block segments to which the licences relate are shown on the map in Annex 18a.

Operator	blocks	effective	Off. Gazette
Placid International Oil Ltd.	L11-c	17-3-'82	67
British Petroleum Exploratie Maatschappij Nederland B.V./Gulf Oil Corporation	Q2-a, Q5-a,b	25-2-'82	48
Nederlandse Aardolie Maatschappij B.V	G18, H16	26-3-'82	74
Union Oil Company of the Netherlands/Nedlloyd Energy B.V.	L1-c	19-5-'82	110
Amoco Netherlands Petroleum Company - Exploratie- en Produktiemaatschappij Dyas B.V. - Veba Oil Nederland B.V.	L5-b, L8-b	26-5-'82	110

The total number of exploration licences effective as at 1st January 1983 was 80 (see also Annex 16), altogether covering an area of 36,535 sq.km. At the same date a further nine applications for exploration licences were under consideration.

Five production licences were granted in 1982, namely to Mobil Producing Netherlands Inc. c.s. for block P6 and to Union Oil Company of the Netherlands/Nedlloyd Energy B.V., Nederlandse Aardolie Maatschappij B.V. and Petroland B.V. c.s. for blocks F2a, F3 and F6 respectively.

One new production licence was applied for, namely for block segment L16a by Continental Netherlands Oil Company c.s. A list of the production licences granted and applied for is given in Annex 17. Annex 18 shows all the exploration and production licences currently in force.





### 2.1 Onshore

2.1.1 Geophysical exploration In the open areas, no seismic activities were undertaken during 1982 for oil and gas exploration purposes. On the other hand, in the priority areas of Roosendaal (Amoco), Eindhoven (BP), De Betuwe (Petroland), Kampen and IJsselmeer (both NAM) a total of 1503 km of regional two-dimensional (2-D) seismic surveying was carried out. In the drilling licence areas Overijssel Noord II and Noordoostpolder (both NAM), Gorredijk and Kolhorn (both Petroland), Centraal Nederland (BP) and Donkerbroek (Chevron) a total of 1047 km of 2-D seismic reflection profile was recorded. The greater part of the seismic surveys was undertaken in the concession areas, partly in support of production. In the Akkrum, Drenthe, Groningen, Middelie, Rijswijk, Schoonebeek, Tubbergen and Twente concession areas a total of 1813 km of seismic surveying took place.

Worthy of note is the increased application of the three-dimensional seismic acquisition method developed during the past few years and called 3-D for short. This modern, and also expensive, seismic acquisition method allows the geological structure of the sub-surface to be mapped three-dimensionally by computerized data processing.

3-D surveying finds application in more detailed investigation for the purpose of appraising and developing of hydrocarbon accumulations. This method is usually reported in terms of surface area covered (sq.km).

In the Drenthe, Groningen and Tietjerksteradeel concession areas a total of 172 sq.km was covered by the 3-D technique.

2.1.2 Exploration wells  
(wildcats)

The number of wildcats drilled onshore, including Netherlands territorial waters since 1959, are summarised year by year in the table on the next page; the results are also stated.

Table 1: Exploration wells drilled on Dutch territory

year	number	result		
		oil	gas	dry
1959	9	-	2	7
1960	3	1	1	1
1961	3	-	1	2
1962	1	-	1	-
1963	2	-	2	-
1964	23	-	2	21
1965	38	-	16	22
1966	9	1	-	8
1967	1	-	1	-
1968	7	-	3	4
1969	13	-	2	11
1970	14	-	3	11
1971	12	-	3	9
1972	10	-	3	7
1973	4	-	2	2
1974	2	-	-	2
1975	8	-	3	5
1976	7	-	2	5
1977	7	-	3	4
1978	6	-	2	4
1979	6	-	4	2
1980	5	1	2	2
1981	15	2	2	11
1982	14	-	5	9
TOTAL	219	5	65	149

Table 1a following summarises in alphabetical order the exploration wells completed on Dutch territory, stating the operator concerned and the result achieved.

The number of exploration wells drilled in 1982 remained at the same level as in the preceding year. More than half of these wells were drilled for NAM's account. Of the eight NAM exploration wells, three (marked with an \* in table 1a) had been completed in 1981, but were not actually tested before 1982. Accordingly, these wells are attributed to 1982. Conversely, the Monster 2 exploration well in NAM's "Rijswijk" concession, although it was completed before 31st December 1982, has not been included for 1982 because the definitive result is not yet known and the well will only be tested in the course of 1983. NAM drilled one of its eight exploration wells in a drilling licence area (indicated as "dla" in table 1a) and the other seven in its concessions.

Table 1a: Exploration wells on Dutch territory completed in 1982

No. *)	Name of well	Concession/ Drilling licence area	Operator	Result
1	Assen 1	Drenthe (conc.)	NAM	gas
2	Blaricum 1	Zuid-IJsselmeer (dla)	Petroland	dry
3	Bozum 1	Oosterend (dla)	Petroland	gas
4	Buinen 1*	Drenthe (conc.)	NAM	dry
5	Emmen 13	Drenthe (conc.)	NAM	dry
6	Gaag 2	Rijswijk (conc.)	NAM	gas
7	Heiloo 2	Bergen (conc.)	Amoco	gas
8	Kortgene 1	Zeeland (dla)	NAM	dry
9	Lekerveer 1	Kolhorn (dla)	Petroland	dry
10	De Lier 45	Rijswijk (conc.)	NAM	dry
11	Peins 1	Leeuwarden (conc.)	Petroland	dry
12	Rustenburg 2*	Middelie (conc.)	NAM	gas
13	Sloten 2	Zuid-Friesland II (dla)	Amoco	dry
14	Vledder 1*	Drenthe (conc.)	NAM	dry

\*) Ref. annex 19.

Petroland B.V. completed four exploration wells, of which three were located in drilling licence areas. The two other non-NAM exploration wells were drilled with Amoco as operator. One of these wells was drilled in Amoco's "Bergen" concession. The other well, Sloten 2, was undertaken by Amoco in the "Zuid-Friesland II" drilling licence area of Chevron Oil Company of the Netherlands, Texaco Netherlands Inc. and NAM. This gave Amoco a 50% farm-in on this licence.

The proportion of exploration wells drilled in drilling licence areas in relation to the total number of exploration wells completed in 1982 within Netherlands territory rose slightly by comparison with the preceding year: five out of 14 compared with four out of 15 in 1981. Of the 14 exploration wells, five struck hydrocarbons. This took the success ratio back up from 27% to 36% (1980: 60%). All five wells struck natural gas, three drilling into new reservoirs: Assen 1, Gaag 2 and Rustenburg 2, all of which are in NAM concession areas (for their location see annex 19). The Heiloo 2 exploration well drilled by Amoco failed to find any hydrocarbons in the geological structure to be explored, but it did so in an overlying reservoir where the presence of gas had been previously confirmed. The hole was completed as a gas well for subsequent production at a later date. The Bozum 1 well drilled by Petroland struck gas in the same geological formation as that from which gas is produced in the adjacent "Leeuwarden" concession, and there are indications that the gas reservoir struck here in the "Oosterend" drilling licence area may communicate with at least a part of this "Leeuwarden" reservoir.

In 1982 no oil was struck by exploration wells drilled inside Netherlands territory. As regards the other exploration wells where the result was a dry hole, reference is made to table 1a and annex 19.

### 2.1.3 Appraisal wells

Table 2 lists the appraisal wells drilled since 1959 for the purpose of determining the reserves in accumulations where the presence of hydrocarbons had previously been confirmed. The table is constructed in

the same way as that showing the wildcats. It is noteworthy that during the past six years oil has played a more important role than previously, except for the year under review, in which not a single oil well was completed in this category as against five in 1981. The total number of appraisal wells declined slightly by comparison with the years immediately preceding, and by about 29% in relation to 1981 (in 1981 the relative decline was 36%).

Table 2 summarizes the appraisal wells undertaken and completed onshore, including territorial waters, stating the name, concession area, operator and the result. All wells drilled in this category are NAM wells in its concessions. Of the ten appraisal wells, two were dry holes, the other eight struck gas in gas-bearing geological structures or parts of reservoirs previously discovered. In further respects the table speaks for itself.

The Emmen 14, De Wijk 21 and De Wijk 22 wells were completed in 1982, but the definitive result is not yet known. These wells have not been included in the figures.

Table 2: Onshore appraisal wells

year	number	result		
		oil	gas	dry
1959	1	-	-	1
1960	1	-	1	-
1961	1	-	1	-
1962	-	-	-	-
1963	-	-	-	-
1964	2	-	1	1
1965	3	-	1	2
1966	1	-	1	-
1967	3	-	3	-
1968	4	-	2	2
1969	3	-	2	1
1970	1	-	1	-
1971	4	-	3	1
1972	2	-	-	2
1973	1	-	1	-
1974	5	-	4	1
1975	7	-	5	2
1976	12	-	12	-
1977	13	2	10	1
1978	20	-	20	-
1979	15	2	11	2
1980	22	2	16	4
1981	14	5	7	2
1982	10	-	8	2
TOTAL	145	11	110	24



Table 2a: Onshore appraisal wells completed in 1982

No. *)	Name of well	Concession	Operator	Result
15	Coevorden 25	Schoonebeek	NAM	gas
16	Coevorden 26	Schoonebeek	NAM	gas
17	Dalen 9	Drenthe	NAM	gas
18	Drouwenermond 1	Drenthe	NAM	gas
19	Emmen 15	Drenthe	NAM	dry
20	Emmen 16	Drenthe	NAM	gas
21	Heiligerlee 1	Groningen	NAM	gas
22	Oldenzaal 7	Twenthe	NAM	gas
23	Tietjerksteradeel 502	Tietjerksteradeel	NAM	gas
24	Ureterp 103	Tietjerksteradeel	NAM	dry

\*) Ref. annex 19.

#### 2.1.4 New reservoirs

In 1982 the number of oil and gas reservoirs proven onshore, including Netherlands territorial waters, rose by three to 83. All these new finds concerned gas-bearing geological structures drilled by NAM. At Maasdijk, the Gaag 2 exploration well struck gas in a geological formation where no hydrocarbons had yet been found in the "Rijswijk" concession. The Rustenburg 2 well struck gas in the De Schermer polder near the villages of Ursem and Schermerhorn. West of the provincial capital of Drenthe, at Kloosterveen, a gas-bearing structure was identified by the exploration well Assen, named after the capital.

In addition to isolated or adjacent reservoirs, the stated number of oil and gas reservoirs also includes

those reservoirs overlying each other and separated by impermeable rock layers.

The locations of the oil and gas reservoirs are shown on the map in annex 21.

## 2.2 Offshore

2.2.1 Geophysical exploration During the year under review, a total of 140 km of seismic reflection profiles was recorded in the exploration licence blocks L6 and M4 on behalf of Mobil and Petroland respectively. Western Geophysical Inc. initiated a regional seismic survey programme on a speculative basis, covering the entire Netherlands offshore area.

In exploration licence blocks some 7549 km of two-dimensional seismic exploration was conducted, 2270 km of which took place in blocks for which a production licence has been applied for. In addition, 40 km<sup>2</sup> (line length 1454 km) of three-dimensional seismic exploration was carried out in block K18, for which a production licence application by Conono c.s. is under consideration. The remaining exploration effort was focussed on the search for oil. In B,P,Q and F blocks a total of 2309 km of seismic survey was shot, and 2970 km of seismic profile line was recorded in the other blocks.

Particularly with a view to production, the greater part of the seismic exploration was carried out in blocks for which a production licence was held. Another noteworthy fact in offshore activities is the application of three-dimensional seismic exploration. The total area covered in 1982 using this modern surveying technique was 294 km<sup>2</sup> (line length 8131 km)

in blocks F3 and K14 of NAM and K10 and K13 of Pennzoil. In addition, 1963 km of conventional two-dimensional seismic exploration was conducted in those blocks.

#### 2.2.2 Exploration wells (wildcats)

Table 3 shows the number of wildcats drilled for oil and gas over a series of years. In common with table 1 showing onshore activities, this analysis of offshore wells distinguishes between oil and gas where the well struck hydrocarbons.

Table 3a lists all the offshore exploration wells completed in 1982, stating the name, operator and result achieved.

Table 3: Offshore exploration wells

year	number	result		
		oil	gas	dry
before 1962	-	-	-	-
1962	3	-	-	3
1962 to 1967	-	-	-	-
1968	7	-	2	5
1969	15	-	2	13
1970	14	1	6	7
1971	18	-	3	15
1972	16	-	10	6
1973	17	-	4	13
1974	16	1	7	8
1975	15	-	6	9
1976	16	-	5	11
1977	23	-	3	20
1978	18	-	4	14
1979	17	1	7	9
1980	26	4	6	16
1981	15	1	3	11
1982	35	7	6	22
TOTAL	271	15	74	182

Table 3a: Offshore exploration wells completed in 1982

No. *)	Name of well	Operator	Result
1	A14-1	NAM	dry
2	B10-2	Amoco	dry
3	B18-3	NAM	oil
4	F2-3	Union	dry
5	F3-8	NAM	gas
6	F5-2	BP	dry
7	F11-3	NAM	dry
8	F14-3	Placid	dry
9	F17-3	NAM	oil
10	F17-4	NAM	oil
11	J3-1	NAM	dry
12	K8-9	NAM	dry
13	K12-6	Placid	gas
14	K16-3	Union	dry
15	K18-3	Conoco	dry
16	L11-9	Placid	dry
17	L14-4	Placid	dry
18	L16-5	Conoco	dry
19	L16-6	Conoco	oil
20	M7-2	Petroland	dry
21	M8-1	NAM	dry
22	M10-2	NAM	dry
23	M11-1	NAM	gas
24	P2-4	BP	gas
25	P5-3	Mobil	dry
26	P8-2	Mobil	oil

No. *)	Name of well	Operator	Result
27	P9-2	Amoco	oil
28	P12-3	Pennzoil	gas
29	P15-3	Amoco	oil
30	Q4-3a	BP	dry
31	Q7-3	NAM	dry
32	Q7-4	NAM	dry
33	Q8-4	BP	gas
34	Q11-2	NAM	dry
35	Q13-3	Amoco	dry

\*) Ref. annex 18a.

The level of exploration drilling for hydrocarbons offshore rose sharply in 1982: the number of wells drilled was almost 2½ time as large as in the preceding year. One direct reason for this was that, early in 1983, the oil companies will become confronted with the expiry of first-round exploration licences, and they will therefore have to make as many hydrocarbon finds as possible to give them a basis for filing an application for a production licence. By filing such a licence application, the expiry date of the exploration licence is deferred until the Minister has decided on that application.

Of the 35 offshore exploration wells completed in 1982, seven struck oil and six gas. This brought the success ratio practically back to the level of two years previously: in 1980 it was 38%, in 1981 27%, and in the year under review the success ratio climbed back to 37%. In this respect, however, it should be noted that

one of the gas strikes, namely by NAM in block M11, concerns an accumulation which must be regarded as being commercially doubtful. A further gas strike by NAM, with well F3-8, took place in a production licence area granted in the course of 1982. With well K12-6, Placid International Oil Ltd. confirmed a commercial gas reservoir in the southern part of block K12, for which a production licence was granted early in 1983. Part of this new gas reservoir extends into the adjacent K15 production licence area of NAM, and will in due course be produced for joint account. Pennzoil Nederland Company found gas in well P12-3. There are also indications suggesting the presence of a separate oil reservoir, which however could not be confirmed by a production test because of technical difficulties. From the drilling rig, which has not been moved, a second well is currently being drilled in order to appraise this probable oil accumulation. The other gas strikes were made by British Petroleum Maatschappij Nederland B.V. (BP) in blocks P2 and Q8.

NAM confirmed oil in two geological structures in its F17 exploration licence. NAM also encountered a small-sized oil reservoir in the south of its block B18, adjacent to its production licence area F3.

Major oil finds were made by, consecutively, Amoco Netherlands Petroleum Company in its block segment P9a and by Mobil Producing Netherlands Inc. in its block segment P8a. These finds may relate to one and the same oil reservoir, which extends partly into the

adjacent exploration licence area P9c of Union Oil Company of the Netherlands/Nedlloyd Energy B.V.

An oil strike which led to the filing of an application for a production licence was made by Continental Netherlands Oil Company (Conoco) in the south east of block L16a.

In conclusion, Amoco confirmed the presence of oil in its first exploration well drilled in block P15a.

The exploration well Q13-3, also drilled by Amoco, yielded indications of oil and gas, but since they were not in producible quantities this well was abandoned as a dry hole. For the other exploration wells which remained unsuccessful, reference is made to table 3a in which these holes are designated "dry" in the "result" column. For the location of the wells drilled during the year under review, reference is made to the map of offshore activities in 1982, shown in annex 18a.

### 2.2.3 Appraisal wells

Table 4a summarises the appraisal wells completed in 1982 for the evaluation of geological structures in which the presence of hydrocarbons had previously been confirmed. In 1982, the number of appraisal wells declined by over 40% in comparison with the preceding year. Of the total of ten wells drilled in this category, three were in production licence areas. They were NAM's K8-10 well and Placid's L10-23 and L11-8. The latter failed to strike hydrocarbons.



Table 4: Offshore appraisal wells

year	number	result		
		oil	gas	dry
before 1962	-	-	-	-
1962	-	-	-	-
1962 to 1967	-	-	-	-
1968	-	-	-	-
1969	1	-	-	1
1970	-	-	-	-
1971	1	1	-	-
1972	1	-	-	1
1973	2	-	1	1
1974	1	-	1	-
1975	3	-	1	2
1976	3	1	2	-
1977	5	1	3	1
1978	5	1	2	2
1979	4	-	3	1
1980	5	2	2	1
1981	17	6	5	6
1982	10	1	6	3
TOTAL	58	13	26	19

The well L10-23 confirmed a gas accumulation that had originally been struck by the first well carried out in the north of block L10, in 1969/1970. The above-mentioned NAM well struck gas. The NAM well K17-8

confirmed a gas reservoir in block K17 that had previously been proven. In block L15, for which NAM has filed an application for a production licence, a gas accumulation was confirmed which extends into the adjacent block L12b, for which a production licence has similarly been applied for. This accumulation was first struck by NAM in 1979. The appraisal well to confirm one of the oil accumulations in the exploration licence area F17 struck by NAM in the year under review, failed to find the reservoir rock concerned.

The well L2-7 confirmed a gas reservoir that had already been discovered by NAM in 1968 with its exploration well L2-1. On initial formation testing, the appraisal well showed a fairly large productivity. With its well Q8-3, BP confirmed a gas reservoir which it had found in 1976 with its first exploration well in this block.

In 1982 Conoco drilled an outstep well to assess the size of the oil accumulation in the south-east of block segment L16-a which it had discovered in that same year and for which a production licence application is under consideration. This well found only minor oil shows in the sandstone layer concerned. The well P15-4 confirmed the oil reservoir struck by Amoco in its exploration licence area P15a in the year under review.

Tabel 4a: Offshore appraisal wells completed in 1982

No. *)	Name of well	Operator	Result
36	F17-5	NAM	dry
37	K8-10	NAM	gas
38	K17-8	NAM	gas
39	L2-7	NAM	gas
40	L10-23	Placid	gas
41	L11-8	Placid	dry
42	L15-4	NAM	gas
43	L16-7	Conoco	dry
44	P15-4	Amoco	oil
45	Q8-3	BP	gas

\*) Ref. annex18a.

#### 2.2.4 New reservoirs

In 1982, growing interest in oil was clearly manifested by the oil companies in their exploration activities in the Netherlands sector of the North Sea continental shelf. This is most clearly illustrated by the fairly spectacular relative rise in the number of newly discovered oil reservoirs by six, to a total of sixteen oil reservoirs as at 1st January 1983.

By comparison with the preceding year this represents a 60% increase.

In quantitative terms, the most important oil strike in 1982 was that made by Amoco and Mobil in blocks P8a and P9a. According to the available data, this is a discovery that is most certain to raise the volume of expected oil reserves in the Netherlands sector of the

North Sea continental shelf. Wells to be drilled in the near future by the licence-holders, which include Union Oil, will be able to further appraise the extent of this oil accumulation.

During the year under review, the most prospective areas in B and F blocks and in P and Q blocks, in terms of oil exploration, received the bulk of attention from the companies operating on the continental shelf. Of the offshore wildcats drilled in 1982, 63% were focussed on these areas. In the Central North Sea Graben region (B and F blocks) three new oil accumulations and one new gas reservoir were struck. In the P and Q block areas, besides the above-mentioned P8-P9 oil reservoir, Amoco discovered the oil accumulation in P15. Furthermore, three new gas reservoirs were struck in the latter area: one by BP in P2, another by Pennzoil in P12, and in Q8 again by BP (see also table 4a).

In the area of K and L blocks, the oil reservoir struck by Amoco in block L16 is worthy of mention. As stated above, Conoco found it worthwhile to apply for a production licence for block segment L16a, for which a first round exploration licence is currently held. The most important gas find on the continental shelf is that by the Placid well K12-6. As has been mentioned before, the geological structure concerned extends into the production licence area K15 of NAM, and the reservoir will be produced jointly.

### 3.1 Onshore

#### 3.1.1 Development of oil fields

Nederlandse Aardolie  
Maatschappij B.V.

In the "Schoonebeek" concession, 29 wells no longer producing were abandoned. A total of 35 injection wells were repaired, completed and brought back into operation. No new production wells were drilled during the year under review.

About 20 km of pipeline, varying from 2" to 8", was laid to replace old pipelines. Altogether 60 well locations were revamped and new locations constructed. In the water treatment plant, the six slob fields were given a new cement cover. During the year under review, construction of the new regional office at Schoonebeek was completed. In the western Netherlands, three new production wells were drilled and completed in the Zoetermeer field within the "Rijswijk" concession. In the Wassenaar field, two wells were drilled and completed as cold-water injection wells. In the IJsselmonde field, three wells drilled in 1981 were taken into production. In addition to repairs and maintenance work on wells and locations, about 28 km of existing pipeline was replaced in this concession. Revamping of the De Lier crude-oil terminal was completed.

### 3.1.2 Development of gas fields

Nederlandse Aardolie  
Maatschappij B.V.

In the "Groningen" concession one new production well was drilled and completed. A number of wells were subjected to an acid treatment to boost production, while two wells were abandoned because they were found to be salt-squeezed.

Revamp work on the Tussenschenklappen and Nieuw Scheemda clusters was completed. Similar work commenced on the Oude Statenzijl 1 and 2 clusters.

In the "Drenthe" concession one new production well was drilled and completed. Construction of the gas treatment plant at the Roden 1 cluster was concluded.

In the "Schoonebeek" concession area two new production wells were drilled and completed.

In the other concession areas, regular repair and maintenance work was carried out.

Petroland B.V. c.s.

In the "Slootdorp" concession area, work was confined to annual maintenance. In the "Leeuwarden" concession area five wells were drilled; one failed to strike gas and was abandoned. Construction of the second compressor building on the site of the gas-treatment at Garijp was completed. The first of three compressors was installed in the course of the year under review.

Amoco Netherlands  
Petroleum Company

Construction of the gas compressor station on the site of the gas-drying installation at Koedijk in the "Bergen" concession was completed. No new wells were drilled in this concession area. One well was successfully repaired at the Bergermeer site. With a

view to boosting gas production, one well at the Bergermeer location and one at the Bergen location were reperforated with good results.

Chevron Oil Company  
of the Netherlands

During the year under review no new production wells were drilled in the "Akkrum" concession area. A gas-drying installation and a gas-metering station were installed at the Ak-13 location. Although the station is only scheduled for full completion in 1983, in consultation with Gasunie the metering installation became operational in December.

The well Ak-13 was brought into production after a gas transmission pipeline had been laid between the Ak-13 and the Gasunie grid.

### 3.2 Offshore

#### 3.2.1 Development of oil fields

Union Oil Company of  
the Netherlands

In the course of 1982, the Helm and Helder production platforms and the Helder wellhead production platform were installed in block Q1. Four wells were drilled and completed from the Helm platform. At the Helder platform, six new wells were drilled and completed; drilling of the seventh well began.

In order to carry the Q1 oil to be produced, a 20" pipeline was laid from Q1 block via IJmuiden and along the North Sea Canal to the oiltanking storage facility

at the America Dock in Amsterdam. The first oil produced from the Netherlands part of the continental shelf was landed through this pipeline in the autumn of 1982.

Exactly two years passed between the start-up of the Q1 project by the licencees Union Oil Company of the Netherlands and Nedlloyd Energy B.V. in the second half of 1980 and its completion. Meanwhile work has begun on the construction of a third drilling and production platform.

Nederlandse Aardolie-  
maatschappij B.V.

The construction of a two-phase oil and gas pipeline is planned in order to carry the hydrocarbons produced from block F3 c.a. to Eemshaven, at the northernmost point of the coast. In mid December 1982 the Cabinet took a decision on the route to be chosen across the Wadden Zee to the east of Schiermonnikoog, with landfall on the Groningen coast and from there to Eemshaven. The Physical Planning working committee is to draw up strict conditions governing the precise details of the route to be followed and the method of pipeline construction.

### 3.2.2 Development of gas fields

Nederlands Aardolie-  
maatschappij B.V.

The K7-FA-1 production platform was completed and installed. At the same time, an 18" pipeline was laid between the K7-FA-1 and K8-FA-1 platforms. At the K7-FA-1 platform five wells were completed and came into production in October. The accommodation module was put into place on the previously installed



K15-FB-1 platform. Construction of the gas-treatment installation began, and the six previously drilled wells were completed prior to the laying of a 24" pipeline to Den Helder via Callantsoog. The landfall of this pipeline at Callantsoog received Government approval in the course of the year under review. In order to allow this gas, which has a different, low-calorific analysis, to be received in Balgzand near Den Helder, work began on enlarging the existing gas-treatment installation there.

Pennzoil Nederland  
Company c.s.

In 1982, a 10" gas pipeline and a 2" methanol pipeline between platforms K10-B and K10-C and a 20" gas pipeline between platforms K10-B and K13-C were laid. Five production wells were drilled from the K10-B drilling platform. This platform is scheduled to come onstream early in 1983, while the K10-C platform is to follow later in the same year.

From the K13-C platform two production wells were drilled and brought into production. After unsuccessful attempts to repair it, another well was abandoned. Finally, two Solar Centaur compressor units were installed on the K13-C platform. These compressors are to be started up in 1983.

Petroland B.V. c.s.

In view of the falling reservoir pressure in block L7, the compressor platform L7PK was installed and hooked-up alongside the central complex in that block. Two compressors were also installed.

In block L4 two production wells, which had been spudded in 1981, were completed in 1981. The L4A production and drilling platform was put into place on

the jacket installed in 1982 and the hook-up with the gas and glycol pipeline to L7P was established. The platform is expected to go onstream early in 1983.

Placid International  
Oil Ltd.

One well was drilled and completed from the L10-D platform. Plans have been submitted, following the grant of a production licence for block K12, for the installation of a platform for the production of the gas confirmed in wells K12-2 and K12-3.

Mobil Producing  
Netherlands Inc.

For the purpose of gas production in block P6, in 1982 the jacket with deck sections of the future production platform P6-A was put into place over the previously drilled P6-5 well. In 1983 the drilling of a number of production wells will commence from this location, and at the same time a 20" gas transmission pipeline will be laid from P6-A to Placid's L10-A production platform.

### 3.3 1982 production figures

#### PRODUCTION

Oil production: in 1982; onshore:

	"Schoonebeek" concession	"Rijswijk" concession	Total
Oil production in 1982 (in tonnes)	894,837	581,665	1,476,502
Cumulative oil produc- tion through 1982 (in tonnes)	29,981,807	23,284,398	53,266,205
	1 tonne = 1.10 m <sup>3</sup>	1 tonne = 1.07 m <sup>3</sup>	

Oil production: in 1982; offshore

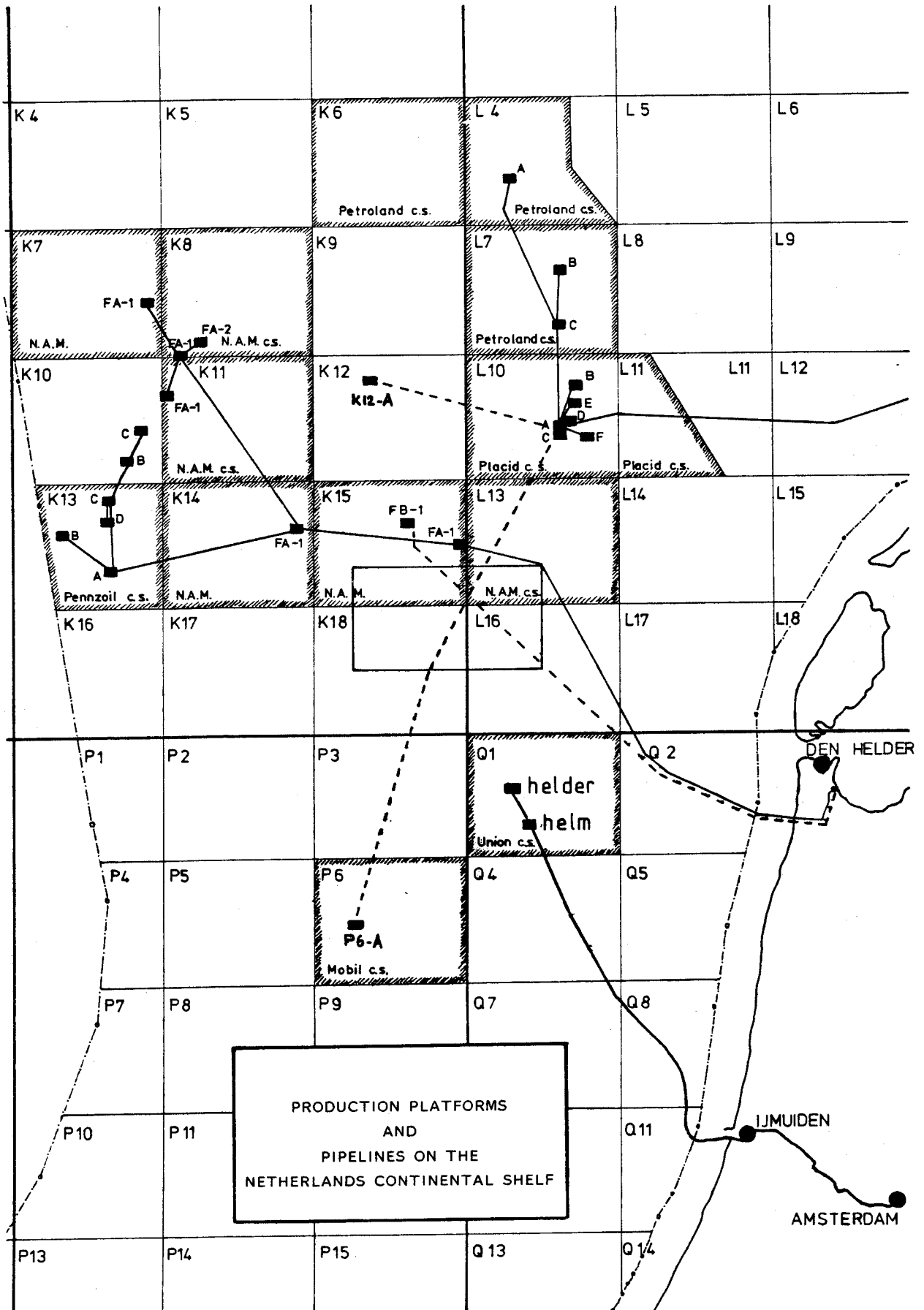
Licence holder	1982 (in tonnes)	cumulative through 1982 (in tonnes)
Union (Q1)	148,923	148,923
	1 tonne = 1.07 m <sup>3</sup>	

Gas production: in 1982; onshore

Concession-holder	10 <sup>6</sup> m <sup>3</sup> <sub>15</sub>	10 <sup>6</sup> m <sup>3</sup> 35.17 MJ/m <sup>3</sup> <sub>0</sub>
Amoco ("Bergen" concession)	1,400.0	1,520.0
Chevron ("Akkrum" concession)	711.6	650.0
NAM (all concessions)	57,033.5	54,550.0
Petroland ("Leeuwarden" and "Slootdorp" concessions)	859.2	810.0
Total	60,004.3	57,530.0

Gas production: in 1982; Continental Shelf

Concession-holder (operator)	10 <sup>6</sup> m <sup>3</sup> <sub>15</sub>	10 <sup>6</sup> m <sup>3</sup> 35.17 MJ/m <sup>3</sup> <sub>0</sub>
NAM (K8, K11, K14, K15, L13, K7)	5,235.0	5,680.0
Pennzoil (K13)	2,430.8	2,580.0
Petroland (L7)	1,159.0	1,230.0
Placid (L10)	2,242.4	2,410.0
Union (Q1)	6.1	7.0
Total	11,073.3	11,907.0
Total Netherlands	71,077.6	69,437.0



#### 4.1 Introduction

Reserves of natural gas and/or oil (hydrocarbons) are calculated, under the responsibility of the Geological Survey of the Netherlands, primarily by the volumetric method, because it is the only practicable method for fields which have scarcely any production history. Most of the Netherlands offshore fields come into this category. In addition, the material balance method has been used to supplement the volumetric estimate in incidental cases where gas production has been continuing for an extended period.

For oil reservoirs which have been in production for a considerable period, such as those in the NAM "Schoonebeek" and "Rijswijk" concessions, analysis of the production history has also been taken into account for the purpose of determining the reserves. Annex 12 examines in detail the methods for calculating hydrocarbon reserves; the units used and the categories and definitions of the reserves are also explained.

Estimates of the volumes of gas or oil technically recoverable from each reservoir are based on geological and reservoir data and the outcome of interpretation of those data. The question of whether a deposit is commercially producible or not is disregarded.

For a number of reservoirs, a provisional estimate only was made of the reserves. Structures in which merely gas or oil shows were found are not included in the estimate of recoverable reserves.

#### 4.2 Gas reserves

##### 4.2.1 Onshore

Table 5 summarises onshore gas reserves, including those in Netherlands territorial waters, as at

1st January 1983, stated in milliards ( $10^9$ ) of cubic metres, at 0 °C and 1.01325 bar absolute (= 1 atmosphere absolute) and at 15 °C and the same pressure and also at the standard gross calorific value of 35.17 megajoules (= 8,400 kcal) per  $m^3$  at 0 °C and 1.01325 bar (= 1 atmosphere absolute), which is the gross calorific value of natural gas of Groningen-field quality. Use of the above-mentioned standard for all gas qualities yields figures which do not as a rule represent actual volumes, but the volumes that would be obtained if all the gas qualities had the same calorific value per cubic metre. See also Annex 12.

Table 5: Onshore gas reserves (in  $10^9 m^3$ )

At 1-1-1983	Reserves			Proven		
	0°C	15°C	35.17 MJ	0°C	15°C	35.17 MJ
"Groningen" concession	1491	1573	1496	1189	1254	1193
Other concessions	236	249	248	102	108	108
Concessions applied for and Drilling permits	22	23	25	12	12	13
<b>Total onshore</b>	<b>1749</b>	<b>1845</b>	<b>1769</b>	<b>1303</b>	<b>1374</b>	<b>1314</b>

#### 4.2.2 Offshore

Table 6 shows the reserves in the Netherlands sector of the North Sea continental shelf at 1st January 1983, likewise expressed in milliards ( $10^9$ ) of cubic metres at 0 °C and 1.01325 bar (= 1 atmosphere absolute) and 15 °C and the same pressure, and at the standard gross calorific value of 35.17 megajoules (= 8,400 kcal) per  $m^3$  and 0 °C and 1.01325 bar absolute.

Table 6: Offshore gas reserves (in  $10^9$  m<sup>3</sup>)

At 1-1-1983	Reserves			Proven		
	0°C	15°C	35.17 MJ	0°C	15°C	35.17 MJ
Production licences, current:	189	199	211	102	108	114
applied for:	45	47	47	21	22	22
Exploration licences	25	26	26	11	11	11
Total onshore	259	272	284	134	141	147

#### 4.3 Oil reserves

##### 4.3.1 Onshore

The following table summarises onshore oil reserves, including those in Netherlands territorial waters, at 1st January 1983, expressed in millions ( $10^6$ ) of cubic metres at a pressure of 1.01325 bar (= 1 atmosphere absolute) and a temperature of 15.6 °C (60 °F). This includes a sub-division for the two concessions held by Nederlandse Aardolie Maatschappij B.V.

Table 7: Onshore oil reserves at 1/1/1983 in  $10^6$  m<sup>3</sup> at 1.01325 bar absolute and 15.6 °C

Concession	Reserves	Proven
Schoonebeek	28	7
Rijswijk	10	3
Total onshore	38	10

#### 4.3.2 Offshore

The oil reserves in the Netherlands sector of the North Sea continental shelf at 1st January 1983 are summarised in Table 8, grouped in the same way as the figures for natural gas shown in Table 6. Offshore oil reserves are expressed in the same units as those used for onshore reserves (see Table 7).

Table 8: Offshore oil reserves (in  $10^6$  m<sup>3</sup> at 1.01325 bar absolute and 15.6 °C)

At 1-1-1983	Reserves	Proven
Production licences, current:	13	8
applied for:	7	3
Exploration licences:	29	16
Total offshore	49	27

#### 4.4 Development of reserves

##### 4.4.1 Natural gas

Table 9 below summarises the development of total Netherlands natural gas reserves for the period 1st January 1968 to 1st January 1983 as at the report dates.