

Natural Gas and Oil of the Netherlands 1981 Annual Review

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

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Copies of the report are obtainable from
the Information Section of the Ministry

(photo) reel ship laying a pipeline



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PREFACE

Last year an English translation of this Review was issued for the first time, in view of the growing interest which it has been receiving both from abroad and from foreign undertakings in the Netherlands. There was such a demand for the first English edition that it was decided to repeat the exercise, and even increase the number of copies printed.

The present review is confined to customary topics such as the state of affairs concerning exploration and production licences, a discussion of the operations undertaken and statements on production figures and reserves.

Aspects relating to legislation and environmental and physical planning will this year be highlighted in a brochure of their own, which the Ministry of Economic Affairs plans to publish this summer on the occasion of the production of the one billionth (10^{12}) cubic metre of natural gas. The purpose of this brochure, which will be a once-only publication, is to inform a broader audience about the production of minerals in the Netherlands and the role played by the Government.



1.1 Onshore

In the course of the year under review one licence for exploratory drilling for oil and natural gas was issued under Section 2 of the Minerals Exploration Act, namely the "Rotterdam-Zuid" drilling licence of Nederlandse Aardolie Maatschappij B.V. (NAM). This licence had not yet come into force on 1st January 1982, because the period of appeal was still running.

As at 1st January 1982, 15 drilling licences were in force (see Annex 12). The existing "Zuid-IJsselmeer" drilling licence of Amoco c.s. was extended by about 26,294 hectares. No change took place in the size of the areas covered by current applications for drilling licences. However, two existing applications were split, bringing the total number of applications running at the end of the year under review to 12. Not all of the applications are yet under formal consideration, because some of them lack sufficient supportive geological data. The applicants concerned are first required to submit additional seismic data. In the course of the year under review an application was also accepted relating to an inventory of coal reserves in South-Limburg to be compiled by the State itself.

The number of hydrocarbon production concessions remained unchanged in 1981. Two concession areas were extended, namely the "Drenthe" concession of NAM by about 738 hectares and the "Akkrum" concession of Chevron Oil Company of the Netherlands and Texaco Netherlands Inc. by about 816.5 hectares. The latter extension represents a partial recognition of the application for a concession by the name of "Donkerbroek". In the

course of 1981 Petroland c.s. filed an application for a concession, comprising the area of the "Oosterend" drilling licence, under the same name. With regard to the application for the "Zuidwal" concession submitted in 1971 by the same group of companies, a draft Royal Decree refusing the application was produced in 1981 and is currently under consideration by the Council of State. Under Section 28 of the Mining Act 1810, the applicant has lodged an appeal with the Council by the customary procedure in the case of administrative disputes.

With regard to the production of natural gas on the island of Ameland in the "Noord-Friesland" concession of NAM and Mobil, the municipal council of Ameland has now finalised the land utilisation plan with a view to integration of the location. At the council's request, the provincial authorities of Friesland subsequently gave its approval to the plan, thereby making it possible to anticipate the coming into force of the plan for the outlying areas of Ameland, to enable the requisite construction permit to be issued. An application by the National Association for the Preservation of the Waddenzee was submitted to the President of the Justice Division of the Council of State requesting that the provincial decision be suspended until the citizens' appeal lodged by the Association had been settled, but the application was turned down.

1.2 Offshore

In the year under review seven licences to explore for oil and natural gas were granted to the following companies. The blocks to which the licences relate are shown on the map in Annex 16.

Company	blocks	granted on
Nederlandse Aardolie Maatschappij B.V.	- E17, E18	2nd February 1981
Nederlandse Aardolie Maatschappij B.V./ DSM	- E7, D6, D9, D15 - E5, E8 - D3, E1, E6	2nd February 1981
Petroland B.V. Cofraland B.V. Corexland B.V. Eurafrep Nederland B.V. Thetis Aardolie Maatschappij B.V. Total Marine Exploitatie Maatschappij B.V.	- E4, E16	2nd February 1981
Pennzoil Nederland Company Amax Petroleum Corporation Billiton Exploratie Maatschappij B.V. Caland Exploratie B.V. Delfzee B.V. Estel Delfstoffen B.V. Falcon Seabord Inc. Noordzee Selection B.V.	- D12, E13, E14	2nd February 1981
Placid International Oil Ltd.	- E10b, E11	3rd February 1981
Union Oil Company of the Netherlands B.V./Nedlloyd Energie B.V.	- B16b, E3, F1b	20th May 1981
B.P. Exploratie Maatschappij Nederland B.V./Gulf Oil Corporation	- F14b	15th June 1981

This brought the total number of exploration licences to 76 (see also Annex 14). The total area covered is 38,559 km². As at 1st January 1982 a further seven applications for exploration licences were under consideration.

Two production licences were granted in 1981, one to NAM for block K7 and the other to Petroland c.s. for part of block L4. The latter was only granted at the end of the year under review, and had not yet come into force on 1st January 1982. In

the course of 1981 a further four new applications for production licences were submitted. Annex 15 lists all the production licences granted and applied for. In addition, the map in Annex 18 shows all the exploration and production licences currently in force.

2. EXPLORATION

2.1 Onshore

The number of exploration wells drilled onshore, including Netherlands territorial waters, since 1959 are summarised year by year in the following table. A distinction is made between wildcats and wells drilled for the appraisal of gas- and/or oil-bearing structures already discovered.

EXPLORATION WELLS

Year	wild-cats	result		apprai-sal well	result		Total	result		remarks
		gas/oil	dry		gas/oil	dry		gas/oil	dry	
1959	9	2	7	1	-	1	10	2	8	
1960	3	2	1	1	1	-	4	3	1	1 oil
1961	3	1	2	1	1	-	4	2	2	
1962	1	1	-	-	-	-	1	1	-	
1963	2	2	-	-	-	-	2	2	-	
1964	23	2	21	2	1	1	25	3	22	
1965	38	16	22	3	1	2	41	17	24	1 oil
1966	9	1	8	1	1	-	10	2	8	1 oil
1967	1	1	-	3	3	-	4	4	-	
1968	7	3	4	4	2	2	11	5	6	
1969	13	2	11	3	2	1	16	4	12	
1970	14	3	11	1	1	-	15	4	11	
1971	12	3	9	4	3	1	16	6	10	
1972	10	3	7	2	-	2	12	3	9	
1973	4	2	2	1	1	-	5	3	2	
1974	2	-	2	5	4	1	7	4	3	
1975	8	3	5	7	5	2	15	8	7	
1976	7	2	5	12	12	-	19	14	5	
1977	7	3	4	13	12	1	20	15	5	2 oil
1978	6	2	4	20	20	-	26	22	4	
1979	6	4	2	15	13	2	21	17	4	2 oil
1980	5	3	2	22	18	4	27	21	6	3 oil
1981	15	4	11	14	12	2	29	16	13	7 oil
Total	205	65	140	135	113	22	340	178	162	

The number of wildcats drilled on Dutch territory in the course of 1981 was three times as high as in the preceding year, and this means that it is now

back at the same level as ten years ago. NAM operations account for the major part of this increase in the exploration effort. Three wildcats were drilled by Chevron Oil Company of the Netherlands and two by Petroland B.V.. The number of 15 wildcats includes two wells for which, although they were completed in 1980, the results only became known in 1981. One of those wells, at Grolloo in NAM's "Drenthe" concession, struck a new gas reservoir. The other, at Finsterwolde in the "Groningen" concession east of the Groningen gas field, proved to be a dry hole.

An exploration well being drilled near Veelerveen, which had been temporarily stopped in 1980 by agreement between NAM and the municipality in order not to disturb a flock of geese wintering in the vicinity of the location, was given up as a dry hole in 1981. Two wildcats completed by NAM before 1st January 1982 are not included in table 1 because they have not been tested yet.

Of the 15 wildcats within Netherlands territory, four were completed in recently granted drilling permit areas. This is a remarkable difference as compared with previous years, when all the wildcats were drilled within the existing production concession areas. The success ratio deteriorated substantially in 1981: only four of the 15 wildcats struck hydrocarbons as against three out of five in 1980, which means a fall from 60% to 27%. In addition to the above-mentioned new gas reservoir near Grolloo, another new gas accumulation was discovered likewise by NAM, near Kollumerland in the north-eastern part of the "Tietjerksteradeel"

concession. Two further NAM wells, near Stadskanaal in the "Groningen" concession and near Gieterveen in the "Drenthe" concession, struck oil. At the former location the oil was struck in a side track; however, it is not yet certain whether a new reservoir has been discovered. This will have to be established by means of appraisal wells and formation tests.

The wildcats completed by Chevron in central Friesland, two of which were in the "Donkerbroek" drilling permit, and those completed by Petroland B.V. in the province of Noord-Holland, one of which was in the "Kolhorn" drilling permit near Kreil (municipality of Barsingerhorn), all failed to discover hydrocarbons. NAM also drilled dry holes in northern Friesland near Wanswerd, at Kloosterhaar in the "Tubbergen" concession, and in the "Baarlo" drilling permit in the northern part of Overijssel province.

A total of 14 appraisal wells were drilled onshore in 1981 for the evaluation of geological structures in which the presence of natural gas or oil had been discovered by previous drilling. This number is eight fewer than in 1980, representing a decrease of 36%. Of these 14 appraisal wells, seven yielded gas and five yielded oil. The five oil wells confirmed the Berkel reservoir in NAM's "Rijswijk" concession. Two of these had been completed before 1981, but were only tested in the year under review. A sixth Berkel well comes into the same category, but failed to yield any positive result.

Of the gas appraisal wells, two had already reached their final depth before January 1981. Data becoming available in the course of the year under

review showed that these wells, located in NAM's "Groningen" concession, had yielded positive results. In NAM's "Schoonebeek" concession, two wells confirmed the gas-bearing structure of Coevorden and one that of De Wijk. A second well in the sixth cluster of NAM's "Tietjerksteradeel" concession yielded gas. An appraisal well drilled into a structure near Oldenzaal in NAM's "Twenthe" concession, where the presence of recoverable natural gas had been previously proven, was negative. The only appraisal well on Netherlands territory that was not drilled by NAM, confirmed that the gas reservoir in the "Leeuwarden" concession of Petroland B.V. extends into the "Oosterend" drilling permit area of the same company.

The locations of the exploration and appraisal wells drilled in 1981 are shown on the map in Annex 16. Annexes 2 and 3 give a picture of exploration activities as from 1959.

In 1981 the number of oil and gas reservoirs proven onshore, including Netherlands territorial waters, increased by three to 96.

Two new natural gas reservoirs were discovered by NAM, near Grolloo in the "Drenthe" concession and near Kollumerland in the "Tietjerksteradeel" concession. In the same year one more oil reservoir was added, bringing the total number to 16 as at 1st January 1982. The new oil strike was also made by NAM, with the Gieterveen-Oost 1 well in the "Drenthe" concession. The subsequent production tests also yielded natural gas. As a matter of fact, in most cases associated gas is co-produced with oil; technically speaking there is no question of this gas originating from separate gas reservoirs.

In addition to isolated or adjacent reservoirs, the stated number of oil and gas reservoirs also includes those overlying reservoirs which are separated by impermeable rock layers.

The locations of the oil and gas reservoirs are shown on the map in Annex 19.

2.2 Offshore

Table 2 below shows the number of exploration wells drilled for oil and gas on the Netherlands section of the North Sea continental shelf. A distinction is again made between wildcats and appraisal wells.

EXPLORATION WELLS DRILLED

Year	wild-cats	result		appraisal wells	result		total	result		remarks
		gas/oil	dry		gas/oil	dry		gas/oil	dry	
before 1962	-	-	-	-	-	-	-	-	-	
1962	3	-	3	-	-	-	3	-	3	NAM "Triton"
1962 /67	-	-	-	-	-	-	-	-	-	
1968	7	2	5	-	-	-	7	2	5	
1969	15	2	13	1	-	1	16	2	14	
1970	14	7	7	-	-	-	14	7	7	1 oil
1971	18	3	15	1	1	-	19	4	15	1 oil
1972	16	10	6	1	-	1	17	10	7	
1973	17	4	13	2	1	1	19	5	14	
1974	16	8	8	1	1	-	17	9	8	1 oil and gas
1975	15	6	9	3	1	2	18	7	11	
1976	16	5	11	3	3	-	19	8	11	1 oil
1977	23	3	20	5	4	1	28	7	21	1 oil
1978	18	4	14	5	3	2	23	7	16	1 oil
1979	17	8	9	4	3	1	21	11	10	1 oil
1980	26	10	16	5	4	1	31	14	17	6 oil
1981	15	4	11	17	11	6	32	15	17	6 oil
Total	236	76	160	48	32	16	284	108	176	

During 1981, the overall level of drilling operations for the exploration and appraisal of gas- and oil-bearing geological structures on the continental shelf continued much as it had been in 1980, albeit that the emphasis shifted more towards appraisal.

The number of wildcats fell by eleven, representing a relative decrease of 42%. At the end of the year under review there were indications that this offshore exploration activity was heading for a period of renewed expansion. Of the 15 wildcats, three struck gas and one oil, which meant that the success ratio fell further from 38% in 1980 to 27% in 1981. The commercial recoverability of the oil find - made by NAM in the north east of block F3 - and one of the gas finds - made by Placid International Oil Ltd. in the west of L11a - had not yet however been established in the year under review. The two other new gas reservoirs were found under existing exploration licences: one by Petroland B.V. in block L4 and the other by Pennzoil Nederland Company in block K10a. Applications for production licences have been filed in each case.

Of the eleven wells with negative results, two were drilled in production licence areas: one by Union Oil in Q1 and another by NAM in K11. Three other dry holes were drilled, by Pennzoil in K10a, by NAM in L15 and by Placid in K12. The other wildcats were drilled under the exploration licences covering A11 (Placid), F8 (Bates Oil Corporation), F15 (BP/Petroland), K10b (Pennzoil), L16 (Amoco/Union Oil) and S5 (NAM).

The number of appraisal wells more than tripled in comparison with 1980. Six of the 17 wells in this category were drilled in the Q1 Union Oil production licence area, five of which were appraisal wells to evaluate oil-bearing geological structures. Three of the latter five wells failed to produce any oil or gas. One well, drilled in the eastern part of block Q1, confirmed a gas-bearing structure already discovered in 1975 but which was found to have a very low production, so that commercial recovery of this gas may be considered to be extremely doubtful for the present.

Of the three wells drilled to appraise an oil reservoir already discovered in 1970 in the western part of block F18 two indeed found oil. These appraisal wells were drilled by Agip Nederland B.V., co-licence-holder with BP in the first round exploration licence for block F18a (see Annex 14). It is as yet by no means established whether this oil reservoir is commercially producible.

Further, two appraisal wells for oil were drilled by Continental Netherlands Oil Company in block K18, and application for a production licence has been filed. The first of these wells failed to reach the intended reservoir because of technical difficulties, but the second well, drilled from practically the same location, not only confirmed the oil accumulation to be appraised, which had been discovered in 1980, but also encountered another overlying oil reservoir. The initial formation tests indicated a commercially producible accumulation, the precise size of which will have to be determined by further wells.

An initial well in block F6, drilled by NAM in partnership with among others Petroland and Union Oil, yielded light oil and associated gas in the same reservoir as that in which oil and gas had previously been found in the adjacent parts of blocks F2 and F3.

An application for a production licence for this reservoir has been filed by the three companies concerned and is being considered.

Two wells were drilled by NAM from a single surface location just inside the exploration licence area for block M9, in order to appraise the Ameland-Noord gas reservoir. The first well failed to reach the intended reservoir because of drilling problems, after which a second deviated hole was drilled which succeeded in penetrating the gas-bearing part of the accumulation. Three other appraisal wells, all drilled by NAM, yielded gas in reservoirs discovered previously, namely in the production licence areas for blocks K8 (in the northern spur of the K8-FA reservoir) and K7 and in the production licence area under application for block K17.

The locations of these wells are shown on the map in Annex 16. Annexes 3 and 5a give a picture of exploratory drilling operations for oil and gas over the past 20 years.

A total of 32 exploration and appraisal wells were drilled on the continental shelf in 1981 for the purpose of evaluating the reserves in gas- and oil-bearing geological structures.

Drilling operations in the K and L blocks, in which most gas has been found to date, accounted for 44%

in 1981 (14 wells), which brought it slightly below the 1980 level (which was 48%; in 1979 it had been over 80%).

Seven wells were drilled in the northern F blocks; two were drilled in block M9. One exploration well was drilled at the northern point of the continental shelf (by Placid in block A11) and one at the southernmost point, off the coast of Zeeland (by NAM in block S5). The remaining seven wells were drilled to explore and appraise oil- and gas-bearing structures in block Q1.

The total number of oil- and gas-bearing reservoirs in the Netherlands section of the continental shelf increased by four in 1981, to reach 76. The corresponding increase in 1980 was nine. Two new gas reservoirs were found: one by Petroland B.V. in L4 and the other by Pennzoil in K10a; in each case a production licence has been applied for. The two oil strikes were also made in blocks for which production licence applications are pending, namely F3 by NAM c.s. and K18 by Continental Oil.

At 1st January 1982 the number of known offshore oil reservoirs was ten, which represents an increase of 20% by comparison with the previous year. Both of the new gas reservoirs are small in size. The oil deposit struck in F3 by NAM in 1981 is probably insignificant; it is dead oil, without gas. The oil reservoir discovered in K18 may be slightly more significant, but as was mentioned above further evaluation is required in order to determine the exact extent, because of the complexity of the geological structure of the area.

The map in Annex 19 shows the locations of the various oil and gas reservoirs.

3.1 Onshore

3.1.1 Development of oil fields

Nederlandse Aardolie
Maatschappij B.V.

In the eastern Netherlands, the RW-2 steam injection plant was completed and started up. As part of the RW-2 project, two oil wells, two steam injection wells and three water injection wells were drilled and completed in the "Schoonebeek" concession. Besides repair work on production and injection wells, 21 wells no longer producing were abandoned. A total of 30 kms. of oil transmission pipeline was laid to replace old pipelines or to connect new wells.

In the western Netherlands, seven wells were drilled in the "Rijswijk" concession, one at Ridderkerk and the others at IJsselmonde. Here, too, a number of old pipelines were replaced by stainless-steel lines for the purpose of upgrading the pipeline system.

At the Loolaan Crude Oil Storage Facility at The Hague, the tanker loading equipment was revamped. Revampwork commenced on the De Lier Storage Facility. At the Brienoord Storage Facility a number of modifications were made in order to reduce noise level.

3.1.2 Development of gas fields

Nederlandse Aardolie
Maatschappij B.V.

In each of the "Groningen", "Tietjerksteradeel", "Drenthe" and "Schoonebeek" concession areas one new production well was drilled and completed.

Construction of the gas-drying installations at the Dalen-3/7 and Emmen-11 installations was completed, and the latter was connected to the Gasunie pipeline network. At the Wanneperveen-1/7 location a gas compression installation was built. The Scheemderzwaag 1 and 2 clusters underwent a revamp. Preparations were made to revamp the Tusschenklappen, Nieuw Scheemda and Roden clusters. In the western Netherlands, a number of gas transmission pipelines were replaced.

Petroland B.V. c.s.

In the "Leeuwarden" concession area three new production wells were drilled and completed.

Amoco Netherlands
Petroleum Company

Construction of a gas compressor station began at the gas drying installation at Koedijk in the Alkmaar concession area. At the same time the installation was revamped, special attention being paid to reducing noise level.

Chevron Oil Company
of the Netherlands

Two production wells were drilled and completed in the "Akkrum" concession area. Extension of the "Goudtse poel" gas treatment station was completed, and the installation was started up.

3.2 Offshore

3.2.1 Development of oil fields

Union Oil Company of
the Netherlands

The Helm well head jacket was installed in 1981 in support of oil production in the Q1 block. Drilling of the first production well began; construction of the Helm and Helder production platforms also commenced.

3.2.2 Development of gas fields

Nederlandse Aardolie
Maatschappij B.V.

Four new wells were drilled from the wellhead jacket of the K7-FA-1 platform. The K7-FA-1 production platform is under construction and is scheduled for completion in 1982. At the same time an 18" gas pipeline is to be laid from K7-FA-1 to the existing K8-FA-1 platform.

Pennzoil Nederland
Company c.s. (Noord-
winninggroep)

No new production wells were drilled during the year under review. In block K10 the wellhead jackets of the future K10-B and K10-C platforms were put into place, as was the jacket of the K10-B production platform. In 1982 it is hoped to bring both platforms into production. For this purpose, a 10" gas pipeline and a 2" methanol pipeline between platforms K10-C and K10-B, as well as a 20" gas pipeline between K10-B and K13-C will be laid.

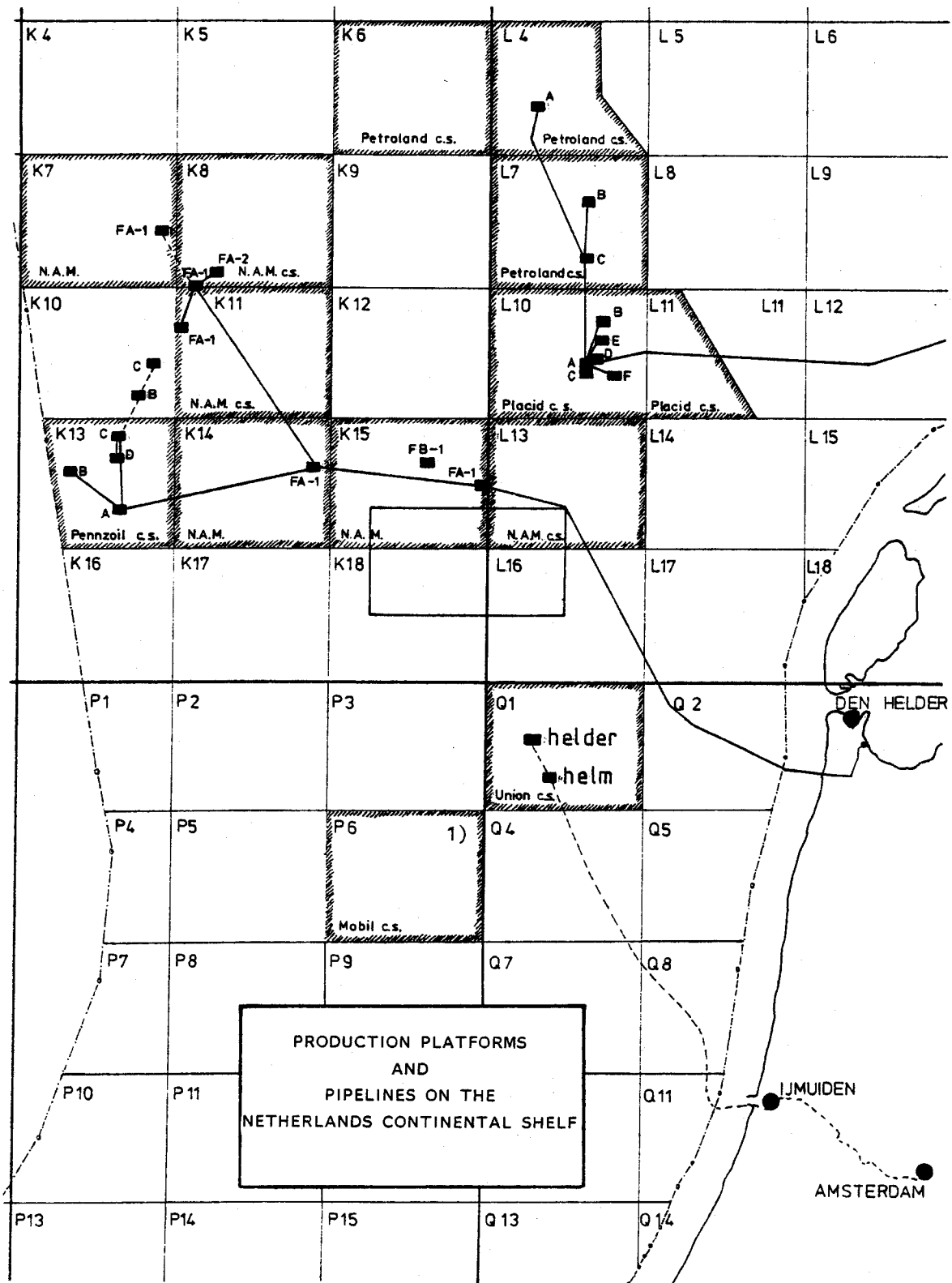
Petroland B.V. c.s.

No new production wells were drilled in 1981. With a view to the development of the L4-A gas field, the jacket for the future eight-legged production platform L4-A was placed over the L4-2 exploration well.

For the purpose of transporting the future L4-A gas production to the L7-C platform, a 12" gas pipeline and 3" glycol pipeline were laid between the two platforms (see cover photo).

Placid International
Oil Ltd.

One well was drilled and completed from each of the L10-BB and L10-F platforms. The latter started production in early 1981. During the same year the compressors on the L10-A platform were connected and started up.



1) Granted after 1-1-1981.

3.3 1981 Production figures

PRODUCTION

Oil production in 1981; Onshore:

	"Schoonebeek" Concession	"Rijswijk" Concession	Total
Oil production in 1981 (in tonnes)	760,135	554,927	1,315,062
Cumulative oil production through 1981 (in tonnes)	29,086,970	22,702,733	51,789,703
	1 ton = 1.10 m ³	1 ton = 1.07 m ³	

No oil has been produced to date on the Netherlands portion of the continental shelf

Natural gas production in 1981; Onshore:

Concessionholder	10 ⁶ m ³ ₁₅	35,17 MJ/m ³ ₀ (10 ⁶ m ³)
Amoco ("Bergen" concession)	1,661.2	1,784.4
Chevron ("Akkum" concession)	509.4	465.3
NAM (all concessions)	67,773.7	64,751.4
Petroland ("Leeuwarden" and "Slootdorp" concessions)	984.0	932.5
Total,	70,928.3	67,933.6

Natural gas production in 1981; Continental shelf

Concession-holder/ operating company	10^6 m^3_{15}	35.17 MJ/m^3_0 (10^6 m^3)
NAM (K8, K11; K14, K15, L13)	5,424.4	5,835.4
Pennzoil (K13)	2,562.4	2,717.0
Petroland (L7)	1,355.5	1,438.9
Placid (L10)	2,456.0	2,624.7
Total	11,798.3	12,616.0
Total Netherlands	82,726.6	80,549.6

4.1 Introduction

Reserves of natural gas and/or oil (hydrocarbons) are primarily calculated 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 by far 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 11 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 3 summarises onshore gas reserves, including those in Netherlands territorial waters, as

at 1st January 1982, stated in billions (10^9) of cubic metres at 0 °C and 1.01325 bar (= 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 11.

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

At 1-1-1982	Total			Proven			Unproven		
	0 °C	15 °C	35.17 MJ	0 °C	15 °C	35.17 MJ	0 °C	15 °C	35.17 MJ
by									
"Groningen" concession:	1532.8	1617.7	1537.9	1231.2	1299.4	1234.7	301.6	318.3	303.2
Other and applied-for concessions:	267.2	281.4	283.8	120.5	126.3	129.1	146.7	155.1	154.7
Drilling permits	0.3	0.3	0.3	0.1	0.1	0.1	0.2	0.2	0.2
Total	1800.3	1899.4	1822.0	1351.8	1425.8	1363.9	448.5	473.6	458.1

4.2.2 Offshore

Table 4 shows the reserves in the Netherlands section of the North Sea continental shelf at 1st January 1982, likewise expressed in billions (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 m³ and 0 °C and 1.01325 bar absolute.

Table 4: Offshore gas reserves (in 10⁹ m³)

At 1-1-1982	Total			Proven			Unproven		
	0 °C	15 °C	35.17 MJ	0 °C	15 °C	35.17 MJ	0 °C	15 °C	35.17 MJ
Production licences, current: applied for:	152.2	160.5	166.8	72.4	75.9	79.3	79.8	84.6	87.5
	88.0	92.9	100.0	36.6	38.6	41.9	51.4	54.3	58.1
Exploration licences	20.7	21.6	22.3	9.4	9.8	10.1	11.3	11.8	12.2
Total	260.9	275.5	289.1	118.4	124.3	131.3	142.5	150.7	157.8

4.3 Oil reserves

4.3.1 Onshore

The following table summarises onshore oil reserves, including those in Netherlands territorial waters, at 1st January 1982, expressed in millions (10⁶) of cubic metres at a pressure of 1.01325 bar (= 1 atmosphere absolute) and a temperature of 15.6 °C. This includes a sub-division for the two concessions held by Nederlandse Aardolie Maatschappij B.V., which are the only two Dutch onshore concessions where recoverable oil deposits have been proven.

Table 5:

Onshore oil reserves at 1/1/1982
in 10^6 m³ at 1.01325 bar abs. and 15.6 °C:

Concession	Total	Proven	Unproven
Schoonebeek	29.0	7.6	21.4
Rijswijk	10.3	3.7	6.6
Total:	39.3	11.3	28.0

4.3.2 Offshore

The oil reserves in the Netherlands section of the North Sea continental shelf at 1st January 1982 are summarised in Table 6, grouped in the same way as the figures for natural gas shown in Table 4. Offshore oil reserves are expressed in the same units as those used for onshore reserves (see Table 5).

Table 6:

Offshore oil reserves
(in 10^6 m³ at 1.01325 bar abs. and 15.6 °C)

At 1-1-1982	Total	Proven	Unproven
Production licences, current:	7.9	3.9	4.0
applied for:	10.2	5.5	4.7
Exploration licences:	1.8	0.6	1.2
Total:	19.9	10.0	9.9

4.4 Development of reserves

4.4.1 Natural gas

Table 7 below summarises the development of total Netherlands natural gas reserves for the period 1st January 1968 to 1st January 1982 as at the report dates.

Table 7:

Development of gas reserves over the 1968-1982
period (in 10^9 m³)

Date	Netherlands onshore			Netherlands offshore			Netherlands Total		
	0 °C	15 °C	35.17 MJ	0 °C	15 °C	35.17 MJ	0 °C	15 °C	35.17 MJ
1/1/1968	2301.8	2429.6	not available	not known	not known	not available	2301.8	2429.6	not available
1/10/1971	2228.5	2352.4	ditto	98.8	104.2	ditto	2327.3	2456.6	ditto
1/1/1974	2125.2	2242.9	ditto	199.8	211.0	ditto	2324.8	2453.9	ditto
1/1/1976	2025.9	2137.2	ditto	322.4	340.1	ditto	2348.3	2477.3	ditto
1/1/1977	1923.6	2029.5	ditto	348.5	367.4	ditto	2272.1	2396.9	ditto
1/1/1978	1892.0	1996.4	1907.7	344.4	362.7	392.0	2236.4	2359.1	2299.7
1/1/1979	1827.4	1928.2	1844.0	326.4	343.1	367.1	2153.8	2271.3	2211.1
1/1/1980	1917.0	2022.7	1936.5	288.2	304.2	325.3	2205.2	2326.9	2261.9
1/1/1981	1850.8	1953.1	1869.6	282.2	297.7	315.5	2133.0	2250.8	2185.1
1/1/1982	1800.3	1899.4	1822.0	260.9	275.0	289.1	2061.2	2174.4	2111.1

The fall in total Netherlands gas reserves as a result of production, which had progressed at a remarkably constant rate since 1976, was interrupted in 1979 but resumed in 1980 and 1981. The reduction in 1981 was 76.4 milliard m³ (at 15 °C and 1.01325 bar), which puts it in the same order of magnitude as the figure for the preceding year. The relative decline was 3.4%.

At 1st January 1982 the reserves of the Groningen gas field represented 72% of total Dutch gas reserves (at 1st January 1981: 72%; 1st January 1980: 73%; at 1st January 1979 around 69%). In 1981, annual production from the Groningen field accounted for over 70% of overall gas production in the Netherlands, including the continental shelf

(1980: over 72%; 1979: around 75%; 1978: around 84%).

Netherlands onshore gas reserves fell by 53.7 milliard m³ (at 15 °C and 1.01325 bar) in 1981, representing a drop of over 2.7% in comparison with the reserves in the same area at 1st January 1981 (1980: 3.4%).

Annual gas production from the Netherlands onshore reservoirs amounted to 70.9 billion m³ (at 15 °C and 1.01325 bar) in 1981, which is 7.3 milliard m³, or 9.3%, lower than in 1980. Almost one quarter of the 1981 production of natural gas was compensated by the aggregate effect of new gas finds and re-evaluation of known reservoirs (the Groningen field was not re-evaluated in 1981; this was last done in 1979 and reported in that year). This addition to reserves, disregarding production, is 17.2 billion m³ (at 15 °C and 1.01325 bar), the larger part of which is due to re-evaluation.

Natural gas reserves in the Netherlands section of the continental shelf fell by 22.7 milliard m³ (at 15 °C and 1.01325 bar) in 1981, representing a fall by over 7.6% on the reserves as at 1st January 1981.

Reinterpretation of existing gas reservoirs following further appraisal and new offshore finds together resulted in a reduction in reserves, disregarding production, of 10.9 milliard m³ (at 15 °C and 1.01325 bar). This year, therefore, there was no compensation for the annual offshore production of 11.8 milliard m³ (at 15°C and 1.01325 bar), in contrast to 1980, a year which as a matter of fact was no exception to the overall trend.

4.4.2 Oil

Table 8 below summarises the development of oil reserves in the Netherlands over the period from 1st January 1970 to 1st January 1982.

Tabel 8:

Development of oil reserves from 1970 to 1982
(in 10^6 m³ at 15.6 °C at 1.01325 bar abs.)

Date Jan. 1	Netherlands onshore			Offshore	Netherlands Total
	Schoonebeek	Rijswijk	Total		
1970	27.0	9.0	36.0	-	36.0
1971	26.0	8.1	34.1	-	34.1
1972	25.2	7.2	32.4	-	32.4
1973	22.6	6.4	29.0	-	29.0
1974	20.8	5.7	26.5	-	26.5
1975	30.1	10.2	40.3	14.1	54.4
1976	41.3	9.5	50.8	14.1	64.9
1977	40.4	8.8	49.2	15.9	65.1
1978	34.6	10.9	45.5	7.3	52.8
1979	33.7	10.5	44.2	9.3	53.5
1980	32.9	9.9	42.8	11.2	54.0
1981	29.8	10.8	40.6	14.5	55.1
1982	29.0	10.3	39.3	19.9	59.2

So far, oil has been produced only from the "Schoonebeek" and "Rijswijk" concessions operated by NAM, but this will change in the near future when the recently discovered offshore oil reservoirs come into production. These include the oil in block Q1 of Union Oil and block K18 of Continental Oil, as well as the more northerly blocks F2, F3 and F6, for which Union, NAM and Petroland respectively have filed applications for production licences.

The fluctuations in onshore oil reserves, quite apart from the drop due to production, are caused by the combined effects of the results of appraisal wells to evaluate known oil-bearing structures in the two producing concessions and resultant reinterpretations, by analysis of the production history and correlated reservoir behaviour, and also by extrapolating the expected results of secondary and tertiary recovery projects, such as cold- and hot-water injection and steam injection in order to enhance oil recovery from the reservoirs.

The latter effect, in which economic considerations obviously play a decisive role, is very important for Schoonebeek in particular, both at present and in the recent past.

The changes in offshore oil reserves are due only to reinterpretations on the basis of appraisal wells and additional seismic surveying, and to new finds. No oil has yet been produced from the Netherlands section of the North Sea continental shelf.

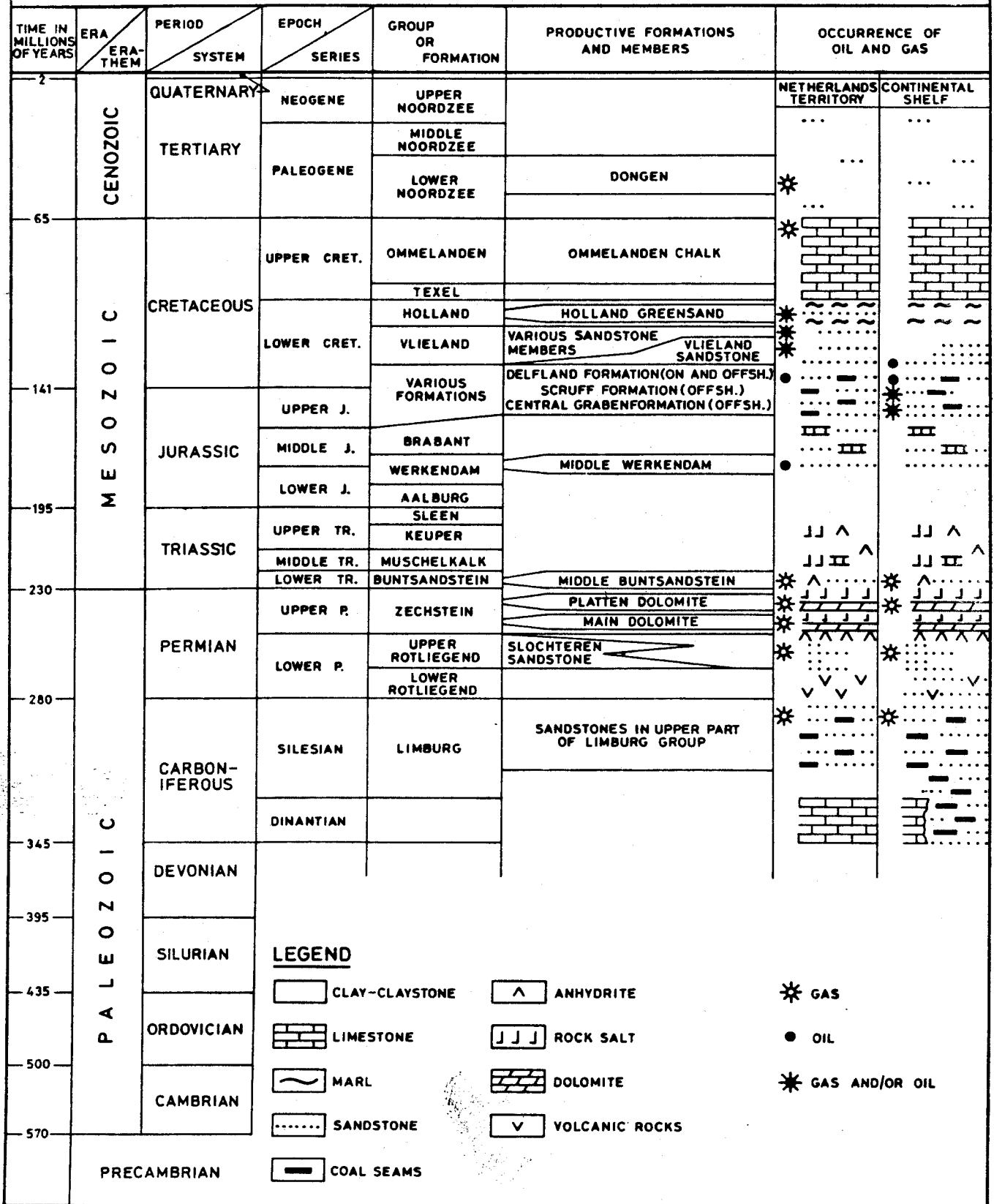
4.3.3 Final remark

As a result of the fact that this report had to be drawn up on the basis of provisional reserves for a number of recently proven gas and oil reservoirs, full data on which were either not yet available or still undergoing interpretation, part of the compensatory effect upon the decline in reserves has been left out of account. The figures stated for reserves, therefore, should be regarded as likewise provisional, and they will certainly be revised in the near future.

ANNEXES

1. Composite stratigraphic column of the Netherlands and the Continental Shelf.
 2. Exploratory activity (seismic surveys) 1963-1981.
 3. Exploratory activity (drilling results) 1959-1981.
 4. Drilling activity (No of wells) 1960-1981.
 5. Number of metres drilled: onshore.
 - 5a. Number of metres drilled: offshore.
 6. Oil production 1960-1981
 - 6a.
 7. Cumulative oil production 1959-1981.
 - 7a.
 8. Gas production 1960-1981.
 - 8a.
 9. Cumulative gas production 1959-1981
 - 9a.
 10. Natural gas: reserves, production and ratio 1959-1981.
 11. Gas reserves: units, categories and definitions.
 12. Onshore production drilling licences granted.
 13. Onshore production concessions granted.
 14. Offshore exploration licences granted.
 15. Offshore production licences, granted and applied for.
- Survey maps:
16. The Netherlands and the Netherlands part of the continental shelf: activities and changes during 1981.
 17. The Netherlands onshore: concessions and drilling permits.
 18. The Netherlands offshore: exploration and production licences.
 19. The Netherlands and the Netherlands part of the continental shelf: gas and oil reservoirs and pipelines.

COMPOSITE STRATIGRAPHIC COLUMN OF THE NETHERLANDS AND THE CONTINENTAL SHELF

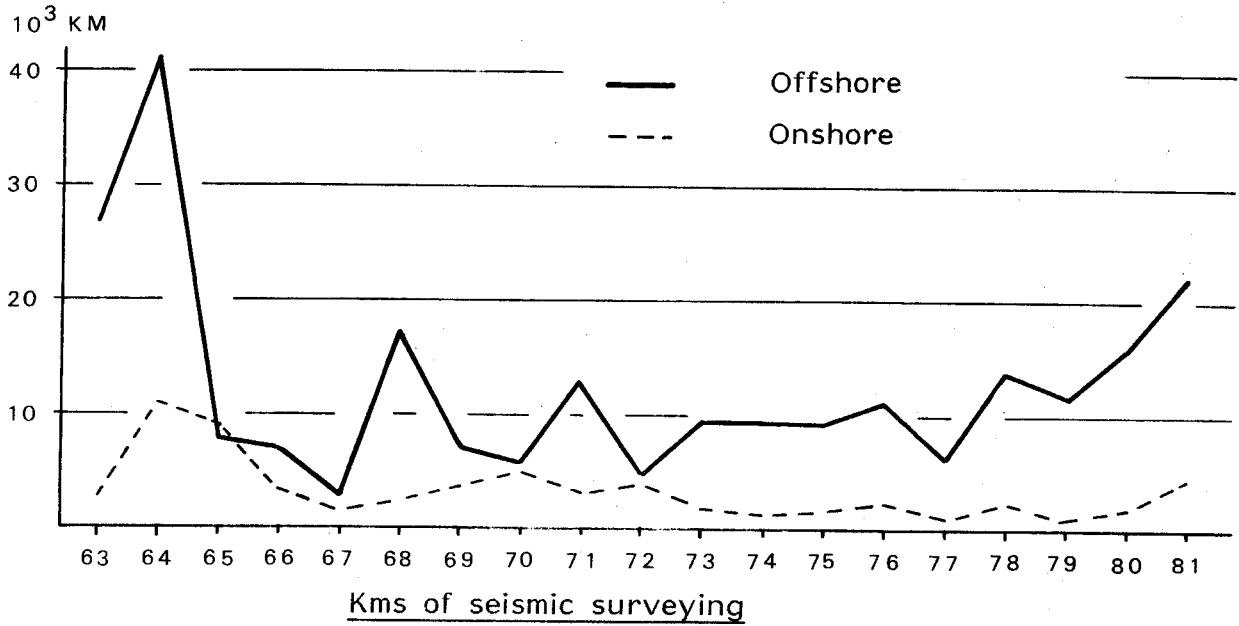




EXPLORATORY ACTIVITY

1963 - 1981

Kms of seismic surveying



	Offshore	Onshore	Total
1963	26 778	2 860	29 638
64	41 136	10 992	52 122
1965	7 707	8 885	16 592
66	6 939	3 510	10 449
67	3 034	1 673	4 707
68	17 349	2 541	19 890
69	6 846	3 857	10 703
1970	5 780	5 113	10 893
71	12 849	3 252	16 101
72	4 716	4 034	8 750
73	9 708	1 783	11 491
74	9 536	1 422	10 958
1975	9 413	1 706	11 119
76	10 963	2 318	13 281
77	6 184	948	7 132
78	13 568	2 466	16 044
79	11 575	986	12 561
1980	15 497	2 017	17 964
81	22 192	4 627	26 819

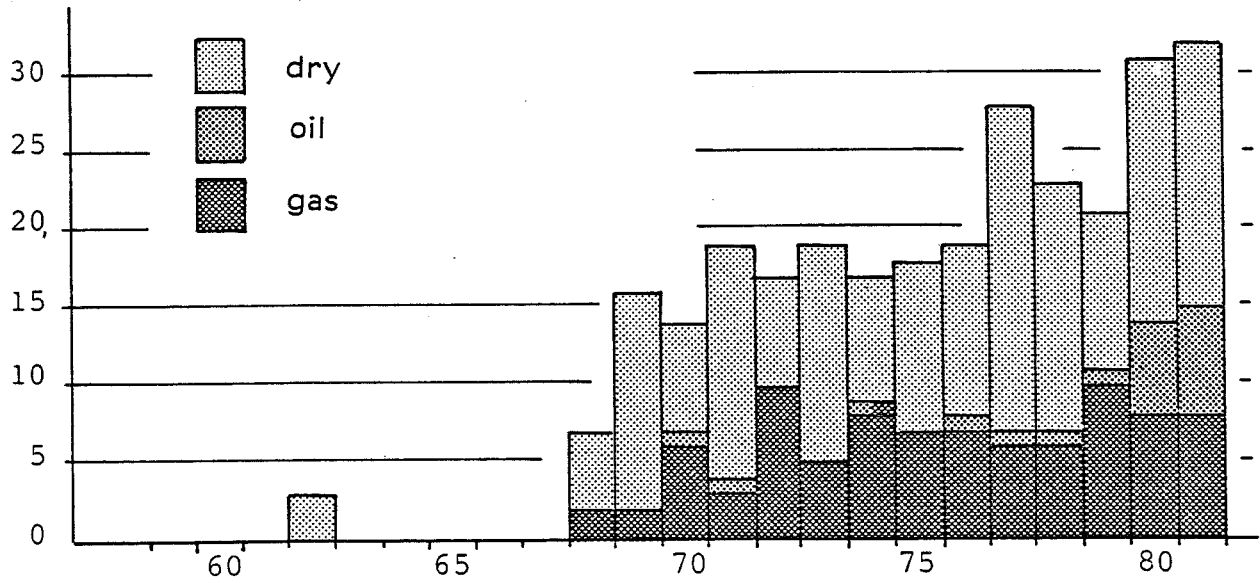


EXPLORATORY ACTIVITY

1959 - 1981
Drillings + results
(wildcats + appraisal)

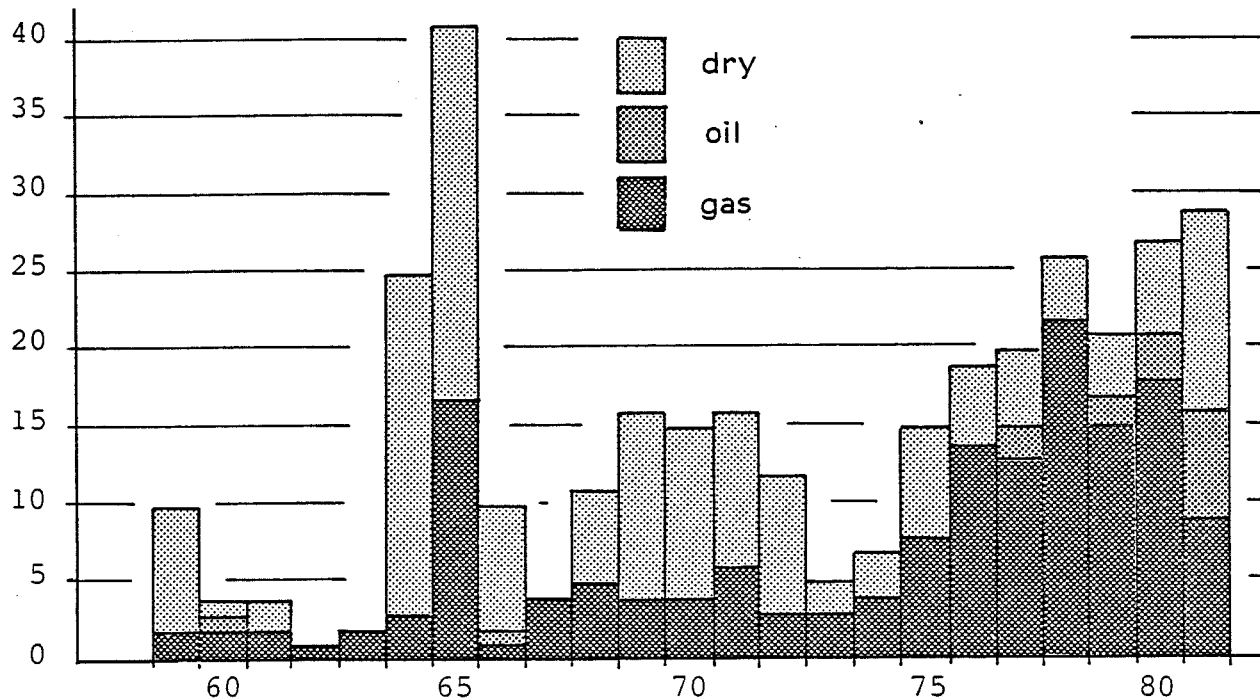
Offshore

Wells drilled



Onshore

Wells drilled

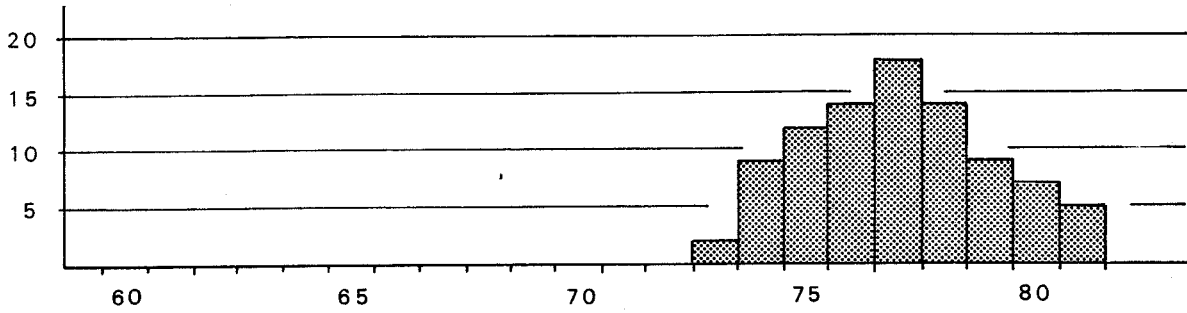


PRODUCTION ACTIVITY

1960 - 1981
Number of Wells

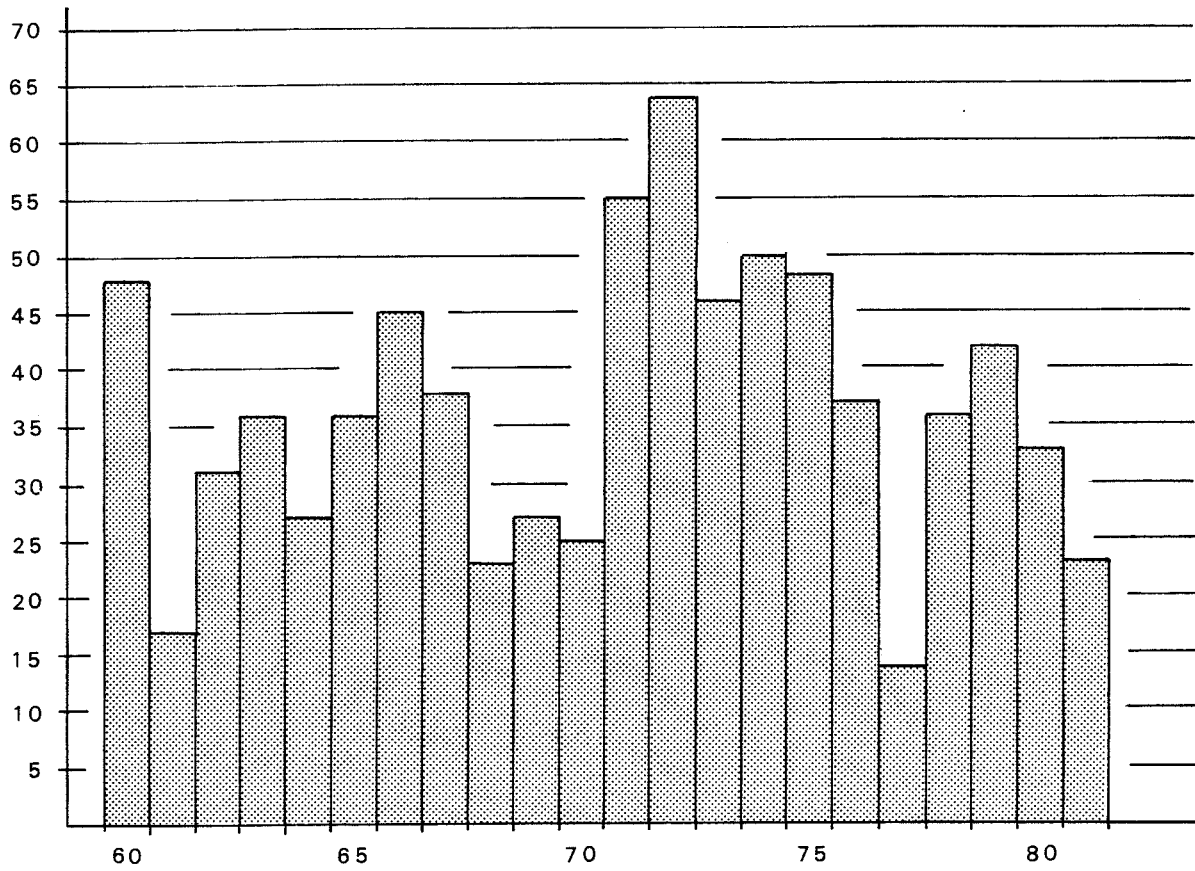
Offshore

Wells drilled



Onshore

Wells drilled

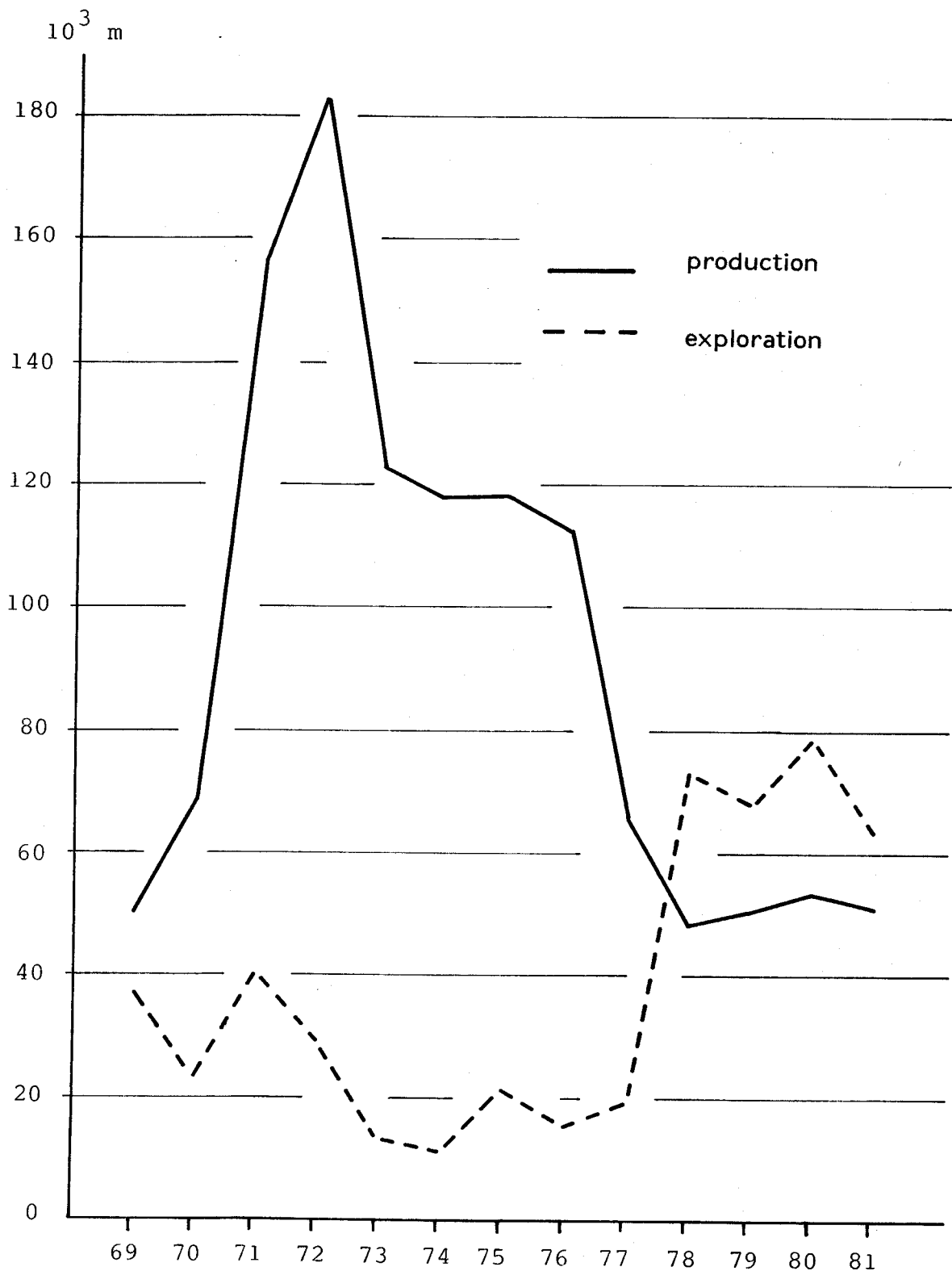


DRILLING ACTIVITY

1969 - 1981

Number of metres

Onshore

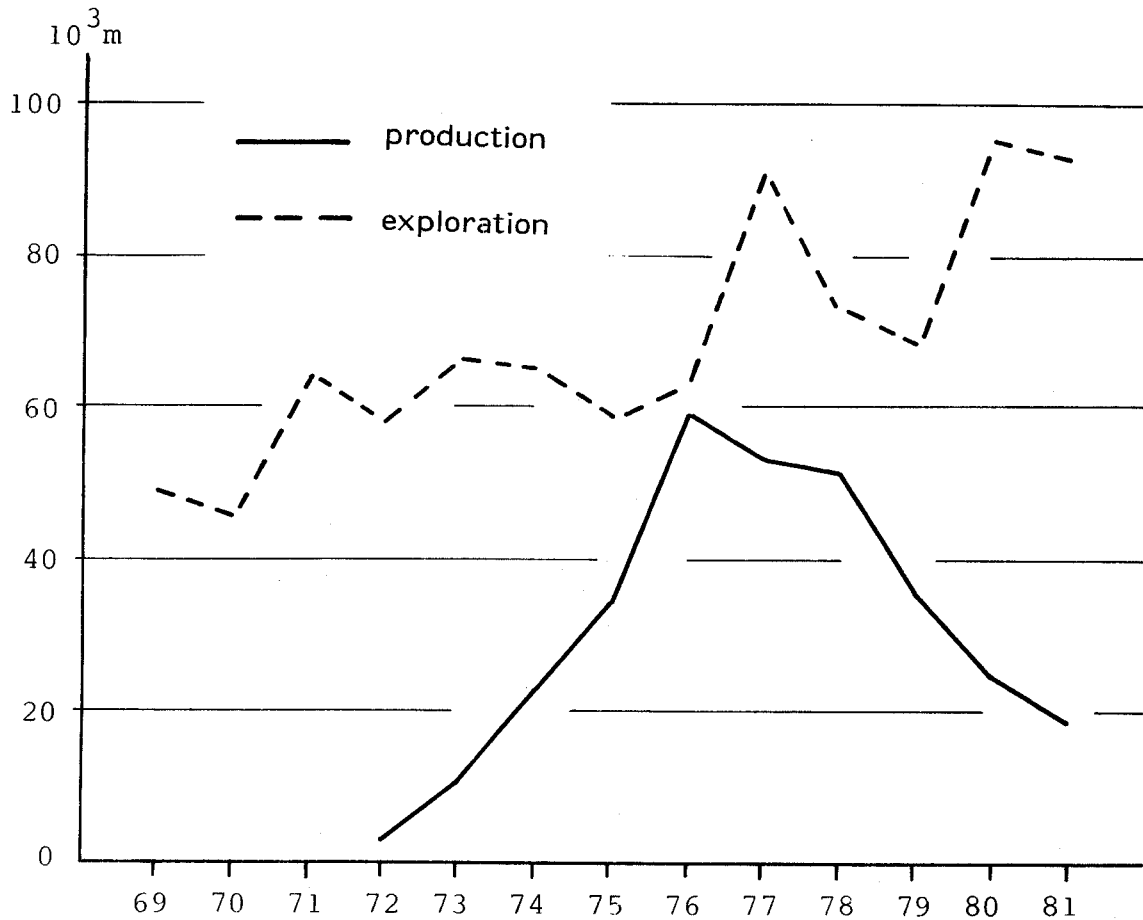


DRILLING ACTIVITY

1969 - 1981

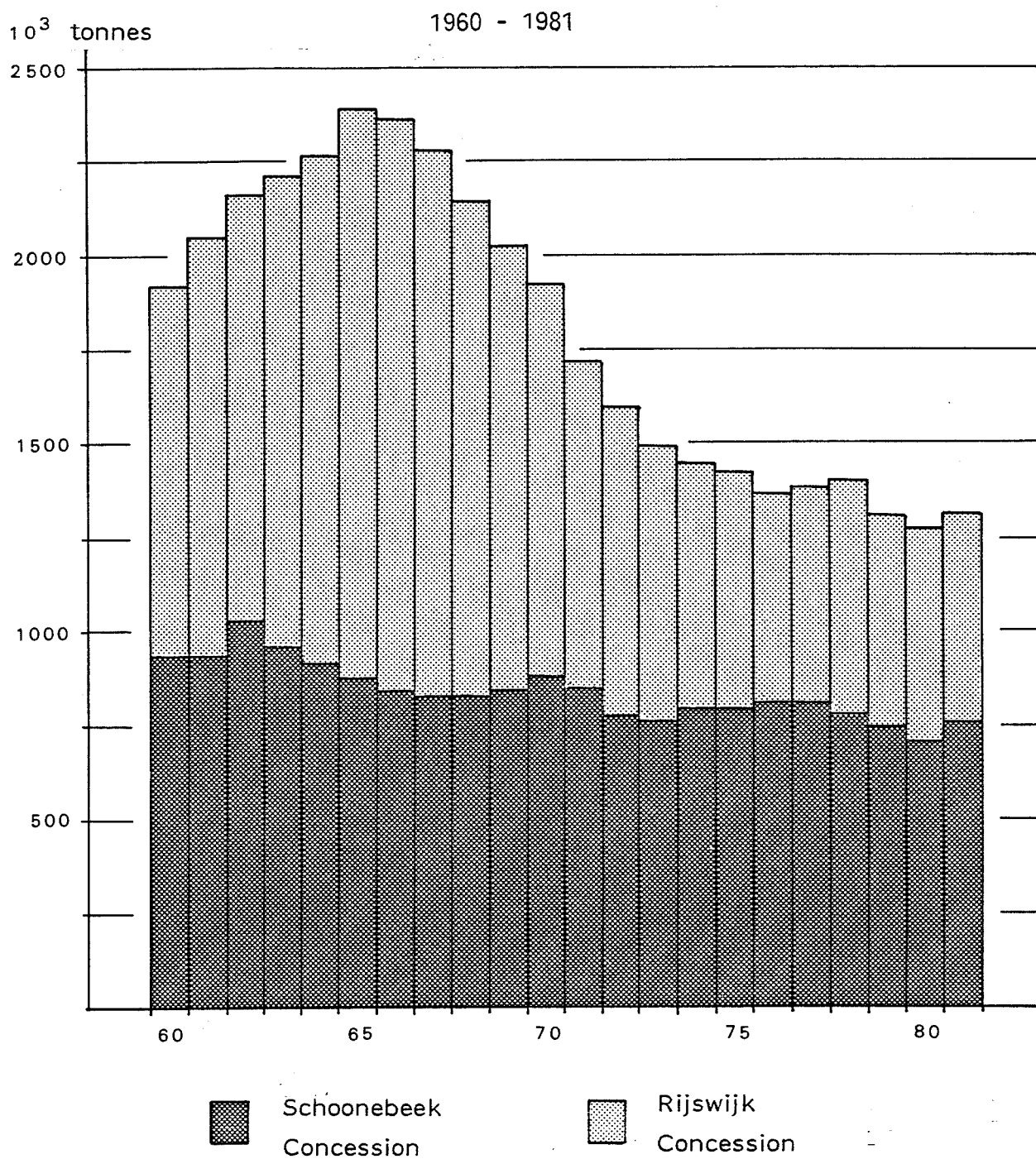
Number of metres

Offshore



	Onshore		Offshore		Total		Metres
	production	exploration	production	exploration	production	exploration	
1969	50 215	37 410	-	49 224	50 215	86 634	
1970	68 270	23 146	-	45 838	68 270	68 984	
71	156 419	40 621	-	63 979	156 419	104 600	
72	182 787	29 334	2 966	58 176	185 753	87 510	
73	122 838	13 414	10 616	66 425	133 454	79 839	
74	118 046	11 728	23 045	65 051	141 091	76 779	
1975	118 399	21 697	34 320	58 632	152 719	80 329	
76	112 264	15 481	59 335	63 483	171 599	78 964	
77	65 835	19 392	53 490	91 010	119 325	110 402	
78	48 053	72 974	51 344	73 410	99 397	146 384	
79	50 500	68 100	35 600	68 700	86 100	136 800	
1980	53 564	79 363	24 861	95 702	78 425	175 065	
81	51 005	63 852	18 674	93 245	69 679	157 097	

OIL PRODUCTION



tonnes	Schoonebeek Concession	Rijswijk Concession	Total
1981	760 135	554 927	1 315 062
cumulatively through	29 086 970	22 702 733	51 789 703
	1 tonne = 1,10m ³	1 tonne = 1,07m ³	

OIL PRODUCTION

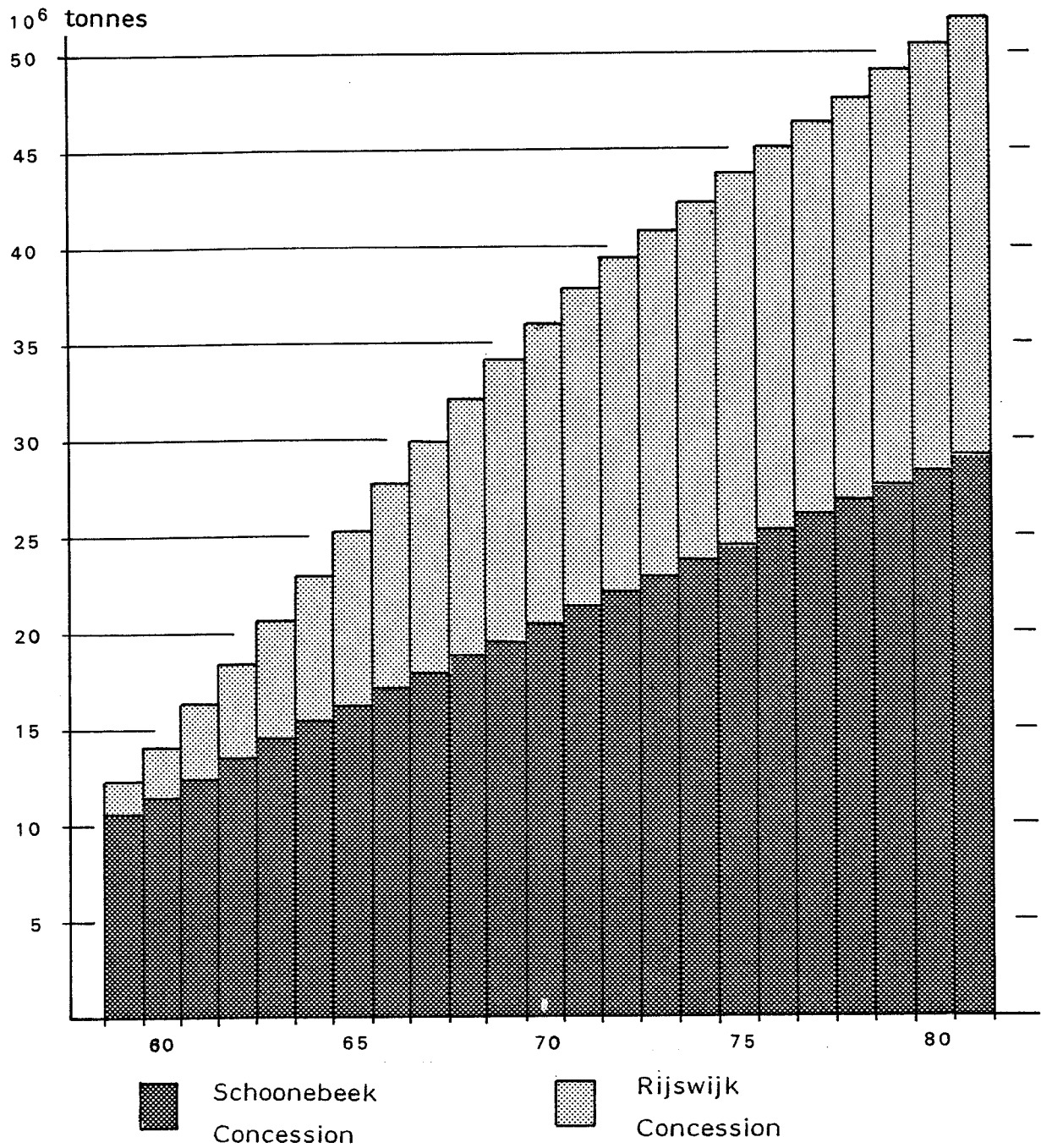
1960 - 1981

in tonnes

	Schoonebeek concession	Rijswijk concession	Total
1960	933 898	983 770	1 917 668
61	933 092	1 113 450	2 046 542
62	1 022 559	1 131 929	2 154 488
63	957 829	1 255 936	2 213 765
64	915 568	1 352 934	2 268 502
1965	871 928	1 523 472	2 395 400
66	844 345	1 521 732	2 366 077
67	827 396	1 437 857	2 265 253
68	827 813	1 319 673	2 147 486
69	845 458	1 174 358	2 019 816
1970	884 071	1 034 566	1 918 637
71	852 039	862 144	1 714 183
72	775 665	821 478	1 597 143
73	759 260	732 454	1 491 714
74	795 332	665 607	1 460 939
1975	794 374	624 664	1 419 038
76	807 855	563 020	1 370 875
77	806 915	574 672	1 381 587
78	781 080	621 174	1 402 254
79	743 123	572 664	1 315 787
1980	705 488	574 612	1 280 100
81	760 135	554 927	1 315 062

CUMULATIVE OIL PRODUCTION

1959 - 1981

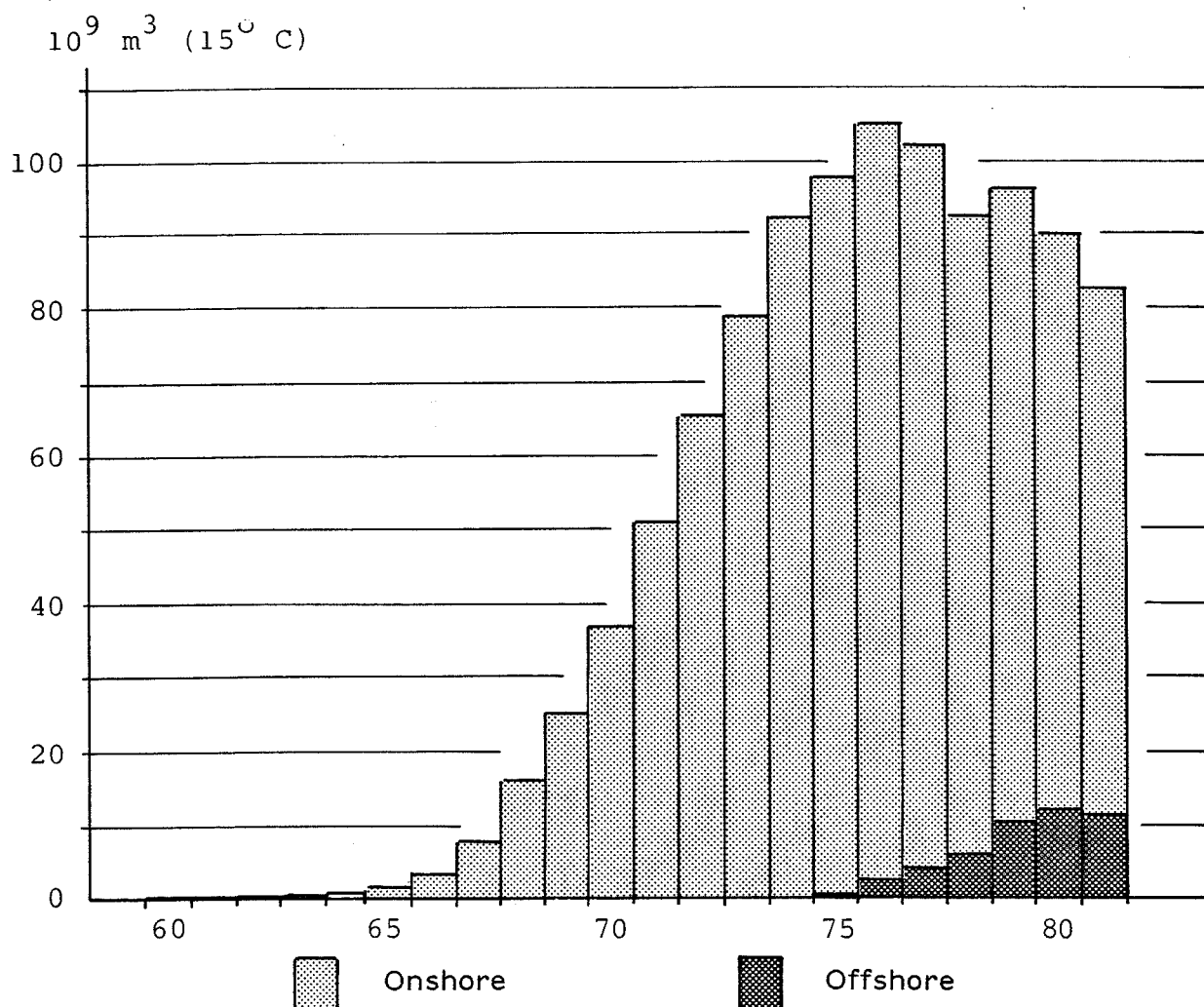


CUMULATIVE OIL PRODUCTION10³ tonnes

	Schoonebeek concession	Rijswijk concession	Total
1959	10 642	1 685	12 327
1960	11 576	2 669	14 244
61	12 509	3 782	16 291
62	13 531	4 914	18 445
63	14 489	6 170	20 659
64	15 405	7 523	22 928
1965	16 277	9 046	25 323
66	17 121	10 568	26 689
67	17 948	12 006	29 954
68	18 776	13 326	32 102
69	19 622	14 500	34 122
1970	20 506	15 535	36 040
71	21 358	16 397	37 754
72	22 134	17 218	39 352
73	22 893	17 950	40 843
74	23 688	18 617	42 304
1975	24 482	19 241	43 723
76	25 290	19 804	45 094
77	26 097	20 379	46 476
78	26 878	21 001	47 879
79	27 621	21 573	49 194
1980	28 327	22 148	50 475
81	29 087	22 703	51 790

GAS PRODUCTION

1960 - 1981



Concession/licence-holder	1981 10 ⁶ m ³ (15 °C)	cum. through 1981 10 ⁶ m ³ (15 °C)
Amoco	1 661.2	13 287.6
Chevron	509.4	3 279.6
NAM	67 773.7	944 382.0
Petroland	984.0	6 413.3
Onshore total	70 928.3	967 362.5
NAM	5 424.4	15 715.8
Pennzoil	2 562.4	11 777.1
Petroland	1 355.5	5 867.7
Placid	2 456.0	17 328.3
Offshore total	11 798.3	50 688.9
Netherlands total	82 726.6	1 018 051.4

GAS PRODUCTION

1960 - 1981

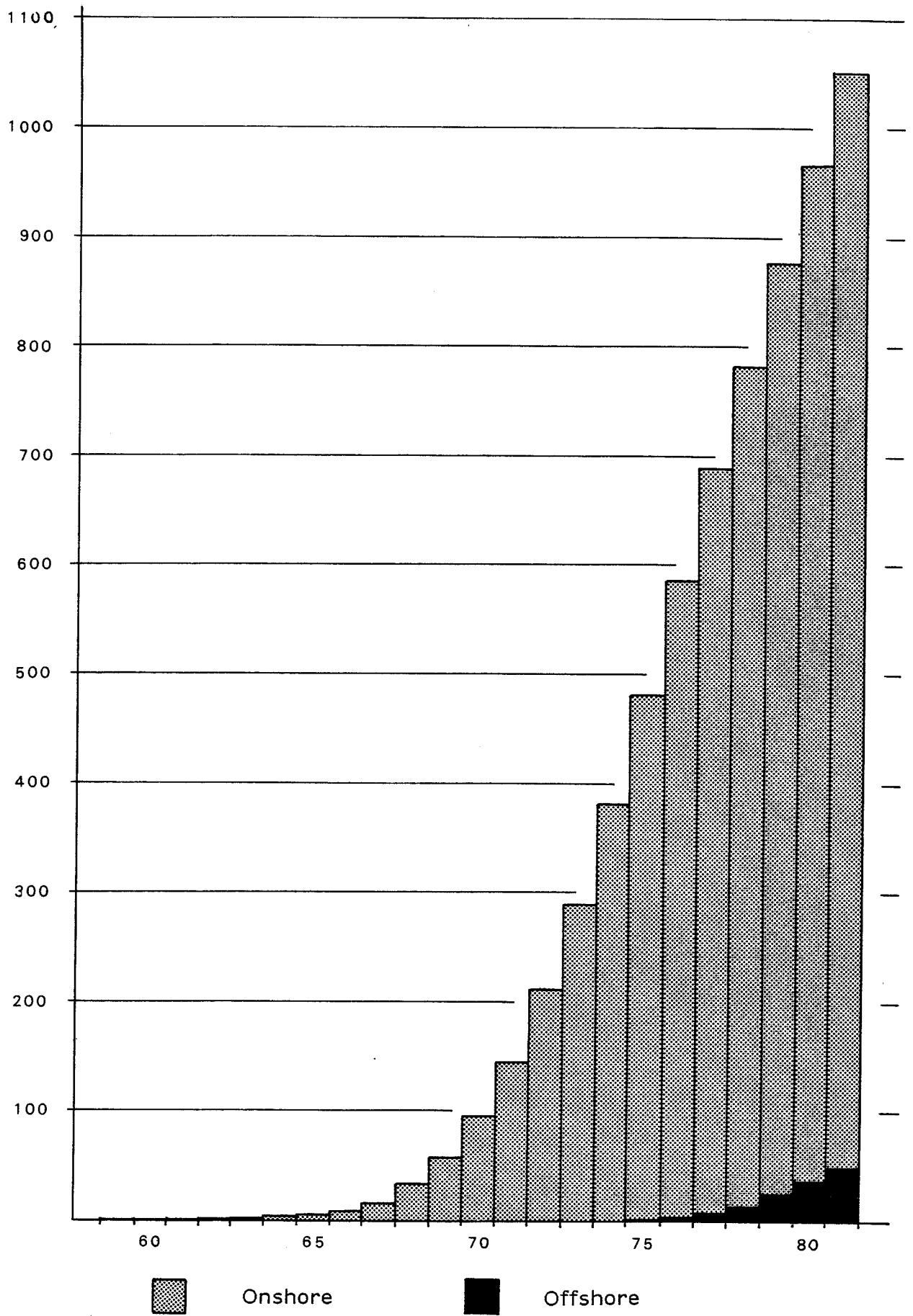
 10^6 m³ (15 °C)

	Onshore	Offshore	Total
1960	383.9	-	383.9
61	476.4	-	476.4
62	538.1	-	538.1
63	602.7	-	602.7
64	875.8	-	875.8
1965	1 817.6	-	1 817.6
66	3 585.0	-	3 585.0
67	7 888.2	-	7 888.2
68	16 076.1	-	16 076.1
69	25 263.4	-	25 263.4
1970	37 196.0	-	37 196.0
71	51 102.1	-	51 102.1
72	65 877.2	-	65 877.2
73	78 085.1	7.4	78 029.5
74	92 730.6	10.4	92 741.0
1975	97 057.6	960.9	98 018.5
76	101 981.6	3 092.3	105 073.9
77	97 682.1	4 825.8	102 507.9
78	86 058.2	6 293.5	92 351.7
79	85 367.2	10 925.4	96 292.6
1980	78 208.9	12 102.0	90 310.9
81	70 928.3	11 798.3	82 726.6

CUMULATIVE GAS PRODUCTION

1959 - 1981

$10^9 \text{ m}^3 (15^\circ\text{C})$



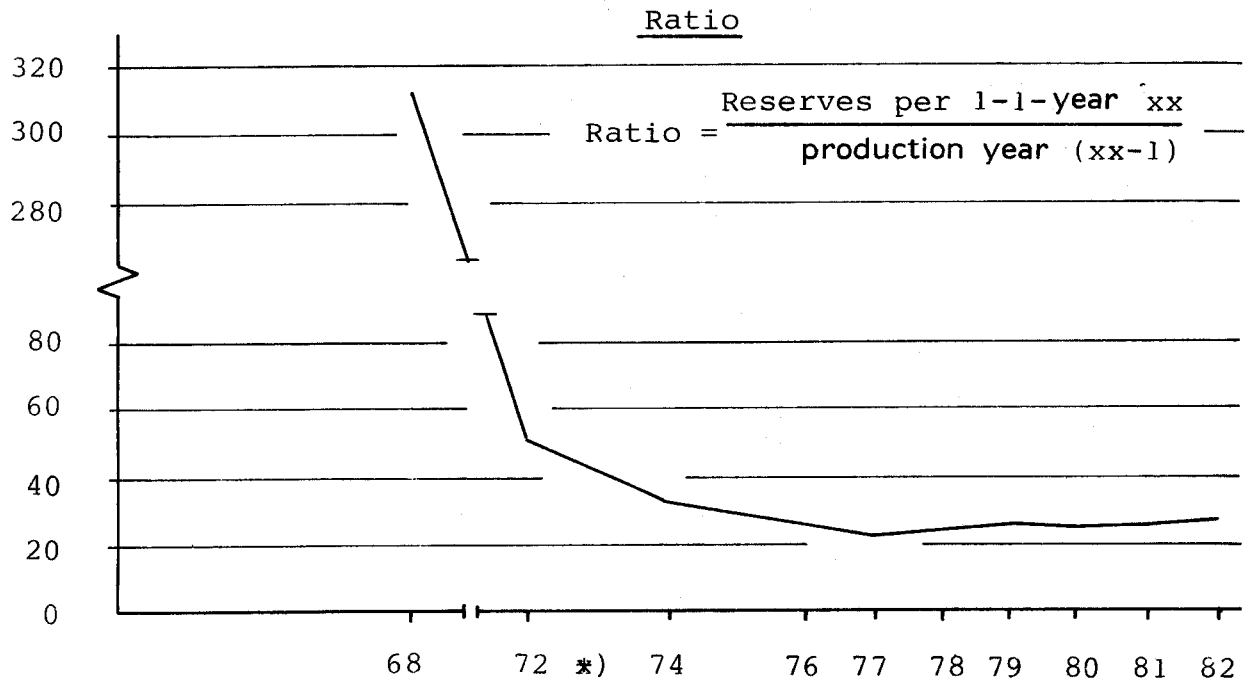
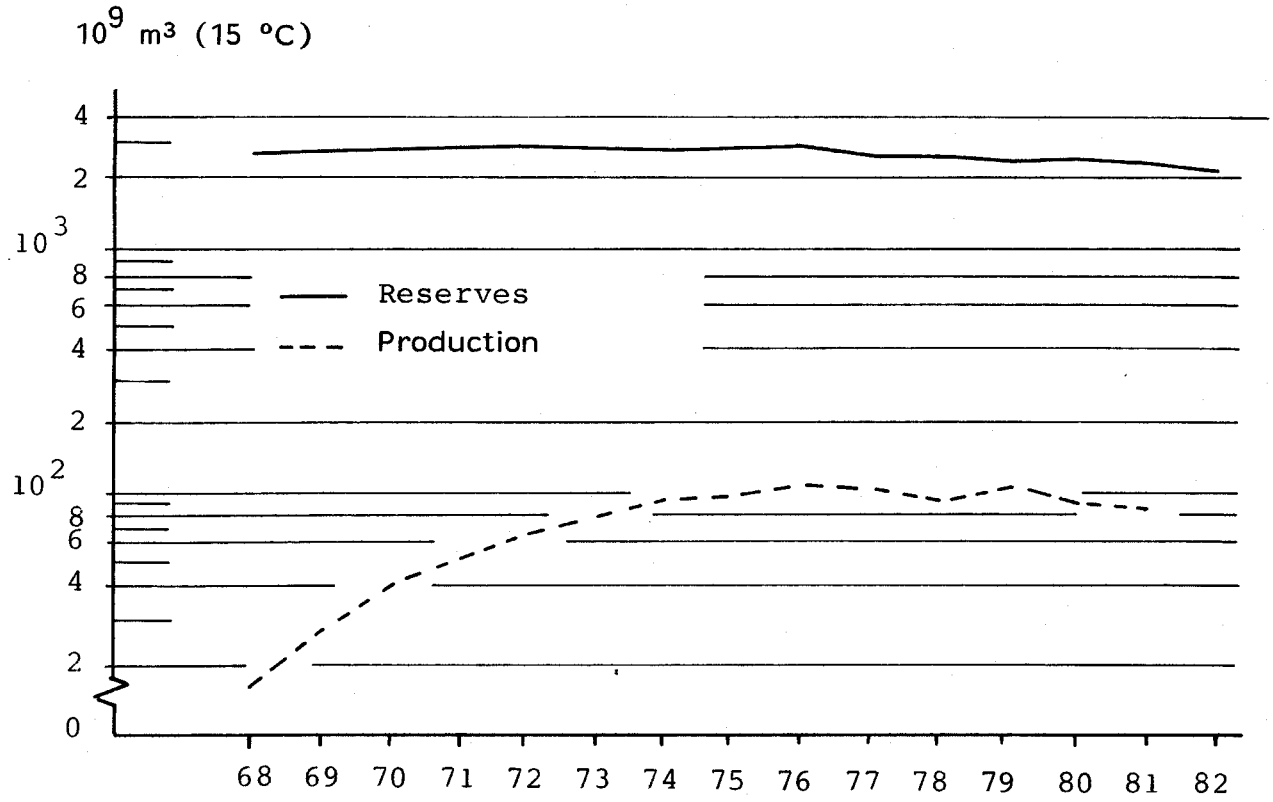
CUMULATIVE GAS PRODUCTION *)10⁶ m³ (15 °C)

	Onshore	Offshore	Total
1959	1 445.6	-	1 445.6
1960	1 829.5	-	1 829.5
61	2 305.9	-	2 305.9
62	2 844.0	-	2 844.0
63	3 446.7	-	3 446.7
64	4 322.5	-	4 322.5
1965	6 140.1	-	6 140.1
66	9 725.1	-	9 725.1
67	17 613.3	-	17 613.3
68	33 680.4	-	33 680.4
69	58 943.8	-	58 943.8
1970	96 139.8	-	96 139.8
71	147 241.9	-	147 241.9
72	213 119.1	-	213 119.1
73	291 204.2	7.4	291 211.6
74	383 934.8	17.8	383 952.6
1975	480 992.4	978.7	481 971.1
76	582 974.0	4 071.0	587 045.0
77	680 656.1	8 896.8	689 552.9
78	766 714.3	15 190.3	781 904.6
79	852 081.5	26 115.7	878 197.2
1980	930 290.4	38 217.7	968 508.1
81	1 001 218.7	50 016.1	1 051 234.8

*) Cumulative totals do not agree with figures of annex 8 because of test production from exploration wells.

RESERVES, PRODUCTION AND RATIO

1959 - 1981



*) reserves at Oct. 1, 1971.

Units, categories and definitions

Natural gas and oil consist largely of hydrocarbons, that is to say combustible chemical compounds of the elements carbon and hydrogen. Hydrocarbons is also the inclusive term for natural gas and oil, together with the other constituents such as carbon dioxide, nitrogen and sulphur compounds; it does not, however, include water with dissolved salts.

Units

Natural gas reserves are stated in terms of m³ volume at 1.01325 bar (= 1 atmosphere absolute) pressure and at 0 °C and 15 °C. Amounts of natural gas are not only stated in these units of volume, but also in units representing the calorific value of the gas. For this purpose the volumes of gas from various wells producing various qualities of gas are converted in terms of combustion heat, to the (notional) volumes which would be measured if all the wells produced gas of the same quality as that of the Groningen reservoir, which has a gross calorific value of 35.17 MJ/m³ (= 8.400 kcal/m³) at 0 °C and 1.01325 bar. This standard is used by N.V. Nederlandse Gasunie among others, and is based on the average combustion heat of natural gas from the Groningen reservoir.

Oil reserves are also stated in m³ at the same pressure, but at a temperature of 15.6 °C (= 60 °F) in accordance with the internationally recognised standard of the American Petroleum Institute (API).

In order to render the units comparable with other fuels in drawing up and using energy balances etc., a number of conversion figures are given below:

- 1 ton of oil equivalent = $41.9 \cdot 10^9$ Joule = 1191 m³ of natural gas
(0 °C; 35.17 MJ)
- 1 milliard (10⁹) m³ of natural gas = 0.84 million tons oil-equivalent, usually
written as: 0.84 MTOE
- 1 ton of coal equivalent = $2.93 \cdot 10^{10}$ Joule = 833 m³ natural gas
(0 °C; 35.17 MJ)
- 1 milliard (10⁹) m³ of natural gas = 1.20 million tons coal equivalent.

This report distinguishes between three categories of reserves.

1. Reserves at reporting date The quantity of hydrocarbons which is present in a reservoir and assumed to be recoverable with current technology considering the geological and reservoir data, but which cannot as yet be said with certainty to be commercially producible in full. The total volume of hydrocarbons produced from each reservoir up to the end of the year under review is subtracted from the original volume. This estimate of the reserves can be regarded as the most realistic estimate: the probability that the stated expectations will be exceeded can be regarded as approximately equal to the probability that they will not be attained.
2. Proven reserves The quantity of hydrocarbons that has been proven to be present in one and the same reservoir by means of one or more wells. The

total quantity produced from each reservoir up to the end of the year under review is subtracted from the original volume. The probability that the proven reserves will be equal to or exceed the estimates may be put at approximately 90%.

3. Unproven reserves

The quantity of hydrocarbons whose presence in one and the same reservoir has not yet been proven by means of wells, and whose commercial producibility is uncertain. Unproven and proven reserves together constitute the figure for reserves at reporting date.

The reserves considered in this review are found in geological structures which can be classified in two groups:

- a. Structures in which the presence of hydrocarbons has actually been proven by one or more wells. As a rule these structures contain unproven reserves in addition to proven reserves.
- b. Geophysically identified but as yet undrilled structures offering conditions favourable to the accumulation of hydrocarbons. Reserves assumed to be present in these structures are included in the unproven reserves category, and in this review are limited to those offshore blocks for which production licences have been granted or applied for. In order to express the probability that hydrocarbons are indeed present in

these structures, a discount value with an appropriate value for each case is applied to the estimate of unproven reserves.

The data given in this review do not warrant the drawing of any conclusion as to the total volume of ultimately recoverable hydrocarbons in Netherlands onshore and offshore areas.

Methods for calculating hydrocarbon reserves

The volumetric method of calculating oil and gas reserves requires the following basic data or parameters.

1. The gross rock volume of the reservoir. This is obtained from interpretation of geophysical (mainly seismic) exploration data, from which the shape of the reservoir structure can be derived. The upper boundary is formed by the base of the sealing cap rock, while the lower boundary of the hydrocarbons accumulation is the gas/water contact or the oil/water contact, also called the water table.
2. The net thickness of the reservoir. This is an important parameter because production from the accumulation will only take place from those parts which are sufficiently gas- or oil-permeable.
3. The porosity of the reservoir rock. This is the percentage of the rock volume occupied by the interconnected pores.
4. Gas or oil saturation. This is the percentage of the rock pore volume which

is occupied by gas or oil. For the rest it contains water.

5. The volume ratio of a given weight quantity of gas or oil under standardised measurement conditions at the surface, compared with the pressure and temperature conditions in the reservoir. Determining factors are the reservoir pressure and temperature and the standard pressure and temperature. In the case of natural gas, the volume ratio is called expansion factor, which is also influenced by the gasdeviation factor of the gas under aforementioned conditions. The deviation factor indicates the extent to which the gas deviates in behaviour from an ideal gas. The standard pressure used is 1.01325 bar absolute (= 1 atmosphere absolute), and both 0 °C and 15 °C are used as standard temperature.

The volume ratio for oil is affected by the quantity of gas dissolved in the oil at the reservoir pressure and temperature, and which is released as associated gas under standard conditions. In the case of oil, the same standard pressure of 1.01325 bar is used, and the standard temperature is 15.6 °C (60 °F), based on the internationally recognised standard of the American Petroleum Institute (API).

The depth of the water table, the net/gross thickness ratio, the porosity and gas or oil saturation can all be found by interpretation of petrophysical well logs, from data obtained from rock samples, and by means of flow tests.

The latter data also allow the reservoir pressure and temperature to be calculated. The composition of the gas enables the deviation factor to be calculated. The oil volume ratio is also determined by the composition of the oil itself.

Once a new hydrocarbon accumulation has been discovered, the parameters are established which are needed to calculate the reserves, on the basis of the data yielded by the initial discovery well. At this stage it is still uncertain whether those parameters will in fact be applicable to the entire reservoir. As exploration of the reservoir progresses and more data become available, the estimate of the reserves becomes increasingly accurate. For that reason these estimates have to be re-evaluated at regular intervals. This may result in upward or downward readjustments.

During the initial stage in the discovery of a field, the probability of hydrocarbons being present in part of the reservoir located further away from the discovery well, or that is geologically somewhat isolated in relation to this

well, can be expressed by applying a discount factor in calculating the reserves; this factor is assigned an individual value from case to case. In addition to the distance from the discovery well and "geological" position in relation to that well, this value is also determined inter alia by the development in the quality of the reservoir rock which may, geologically speaking, be reasonably expected, and by the nature and availability of exploration data in the immediate vicinity.

The material balance method, as used for certain producing gas accumulations, is based on comparison between the volume of natural gas withdrawn from the reservoir over a certain period from the first beginning of production, and the volume of gas remaining in the reservoir after that period. Extrapolation of the reservoir pressure, which decreases as production progresses, to a pressure at which commercial gas production is no longer possible, indicates the total volume of gas recoverable from the reservoir. This extrapolation takes account of the changing gas deviation factor as reservoir pressure falls. The quality and quantity of the relevant data on gas reservoirs which have been in production for a considerable period are often such that accurate determination of the rate of decline of the average reservoir pressure during the production history of the gas field can be difficult in this method of estimating

reserves. Other factors which can be a problem when using this method of estimating reserves are the complex structural make-up of the reservoirs and the inhomogeneous nature of the reservoir rock itself. Consequently, this method is usually not used by itself for the purpose of calculating reserves, but more as a back-up for the volumetric method and as an aid in evaluating the resultant calculations; to make this possible, however, it is necessary for sufficient gas to have been produced since gas first began to be withdrawn from the reservoir. Constant feedback with the volumetric procedure is practised.

Application of the material balance method to oil reservoirs is a good deal more complicated and requires considerably more data. This method has not been used here for the purpose of calculating oil reserves.

In estimating oil reserves by analysing the production history as explained in the previous section, the reservoir behaviour is predicted on the basis of the correlation between the production rate and cumulative production. The basis of this technique is extrapolation of trends in the production rate. This analysis also takes into account the gas/oil production ratio and the water/oil production ratio. The effect on the production performance of techniques designed to enhance production, such as for example water and steam injection,

is estimated using the results of field tests and enhanced recovery projects already completed or still in progress. Application of these secondary and tertiary recovery techniques also mean an increase in proven oil reserves.

ONSHORE DRILLING LICENCES GRANTED
and
NAMES AND ADDRESSES OF THE OIL COMPANIES
AT JANUARY 1, 1982

Licence-holder	drilling licence	+	area in ha.	in force as from	Off. Gaz.
1. Amoco Netherlands Petroleum Company Koningin Julianaplein 10 P.O.Box 11550 2502 AN THE HAGUE tel.: 070-824241	Overflakkee	14	928	30- 8-'80	175
2. Amoco Netherlands Petroleum Company Petroland B.V. Koningin Julianaplein 10 P.O.Box 11550 2502 AN THE HAGUE tel.: 070-824241 - Dyas B.V. - Veba Oil Nederland B.V. - Thetis Aardolie Maat- schappij B.V. - Eurafrep Nederland B.V. - Corexland B.V. - Cofraland B.V.	Zuid IJsselmeer	2	140.444	12- 8-'74	163
3. British Petroleum Exploratie Maatschappij Nederland B.V./Gulf Oil Corporation Catsheuvel 61 2517 KA THE HAGUE tel.: 070-514661	Centraal Neder- land	11	133.812	20- 6-'80	129
4. Chevron Oil Company of the Netherlands/ Texaco Netherlands Inc. Conradkade 178 P.O.Box 944 2501 CX THE HAGUE tel.: 070-614471	Donkerbroek	10	7.772	7- 9-'79	185

Licence-holder	drilling licence	+	area in ha.	in force as from	Off. Gaz.
5. Chevron Oil Company of the Netherlands/ Texaco Netherlands Inc./Nederlandse Aard- olie Maatschappij B.V. Conradkade 178 P.O.Box 944 2501 CX THE HAGUE tel.: 070-614471	Zuid-Friesland II	8	72.760	30- 6-'79	202
6. Nederlandse Aardolie Maatschappij B.V. Schepersmaat 2 P.O.Box 28 9400 AA ASSEN tel.: 05920-69111	Utrecht II	1	87.237	29- 8-'71	175
	Terschelling West	6	329	26- 6-'78	20 ('80)
	Overijssel Noord II	9	18.245	12- 6-'80	129
	Noordoost Overijssel	12	16.117	3- 7-'80	135
	Noordoostpolder	13	61.090	5- 7-'80	135
	Rotterdam Zuid		23.517		
7. Nederlandse Aardolie Maatschappij B.V./DSM Schepersmaat 2 P.O.Box 28 9400 AA ASSEN tel.: 05920-69111	Brouwershaven- sche Gat	5	6.990	30-10-'77	227
	Zeeland	15	196.142	22- 1-'81	27
8. Petroland B.V. de Horst 4 P.O.Box 93280 2509 AG THE HAGUE tel.: 070-824001 - Thetis Aardolie Maat- schappij B.V. - Eurafrep Nederland B.V. - Corexland B.V. - Cofrland B.V.	Oosterend	3	9.100	13- 8-'77	174
	Kolhorn	4	95.400	30- 5-'78	113
	Gorredijk	7	71.000	29- 9-'79	215

*) Numbers refer to survey map in annex 17

ONSHORE CONCESSIONS GRANTED
and
NAMES AND ADDRESSES OF THE OIL COMPANIES
AT JANUARY 1, 1982

Concession-holder	Concession	*	area in ha.	awarded	Off. Gaz.
1. Amoco Netherlands Petroleum Company Koningin Julianaplein 10 P.O.Box 11550 2502 AN THE HAGUE tel.: 070-824241 - Dyas B.V. - Veba Oil Nederland B.V.	Bergen	XIII	25.240	1- 5-'69	94
2. Chevron Oil Company of the Netherlands/ Texaco Netherlands Inc. Conradkade 178 P.O.Box 944 2501 CX THE HAGUE tel.: 070-614471	Akkrum	V	21.916,5	17- 2-'69	46
3. Nederlandse Aardolie Maatschappij B.V. Schepersmaat 2 P.O.Box 28 9400 AA ASSEN tel.: 05920-69111	Schoonebeek	VII	93.000	3- 5-'48	110
	Tubbergen	VIII	17.700	11- 3-'53	80
	Rijswijk	XIV	206.500	3- 1-'55	21
	Rossum de Lutte	X	4.614	12- 5-'61	116
	Groningen	II	297.000	30- 5-'63	126
	Drenthe	VI	228.428	4-11-'68	234
	Tietjerkster- adeel	III	35.995	17- 2-'69	47
	Middelie	XII	68.152	1- 5-'69	94
Twente	IX	27.584	27- 1-'77	26	

Concession-holder	Concession	*	area in ha.	awarded	Off. Gaz.
4. Nederlandse Aardolie Maatschappij B.V./ Mobil Producing Netherlands Inc. Schepersmaat 2 P.O.Box 28 9400 AA ASSEN tel.: 05920-69111	Noord-Friesland	I	59.424	17- 2-'69	47
5. Petroland B.V. de Horst 4 P.O.Box 93280 2509 AG THE HAGUE tel.: 070-824001 - Thetis Aardolie Maat- schappij B.V. - Eurafrep Nederland B.V. - Corexland B.V. - Cofraland B.V. - Total Marine Exploitatie Maatschappij B.V.	Leeuwaarden	IV	61.360	17- 2-'69	46
	Slotdorp	XI	16.170	1- 5-'69	94

*) Roman numerals refer to the survey map in annex 17.

OFFSHORE EXPLORATION LICENCES GRANTED
and
NAMES AND ADDRESSES OF OIL COMPANIES
AT JANUARY 1, 1982

	Area in sq. km.	in force as from/ relinquishment	Off Gaz.
1. <u>Amoco Netherlands Petroleum Company</u> Koningin Julianaplein 10 - P.O.Box 11550 2502 AN THE HAGUE - tel.: 070-824241 4th round: P18a en P18b	201	21.12.77	9('78)
2. <u>Amoco Netherlands Petroleum Company c.s. I</u> Koningin Julianaplein 10 - P.O.Box 11550 2502 AN THE HAGUE - tel.: 070-824241 - Dyas B.V., Exploratie- en Produktie- maatschappij; - Veba Oil Nederland B.V. 1st round: a) B10	177	19.03.68	62
3. <u>Amoco Netherlands Petroleum Company c.s. II</u> Koningin Julianaplein 10 - P.O.Box 11550 2502 AN THE HAGUE - tel.: 070-824241 - companies named in 2, and - Pennzoil Nederland Company c.s. I (see under 27). 1st round: b) K10a, P9a, P9b, Q10a en Q13a	843	19.03.68/.78	62/50
4. <u>Amoco Netherlands Petroleum Company c.s. III</u> Koningin Julianaplein 10 - P.O.Box 11550 2502 AN THE HAGUE - tel.: 070-824241 - Union Oil Company of the Netherlands; - DSM N.V. - Dyas B.V., Exploratie- en Produktie- maatschappij; - NedLloyd Energy B.V.; - Veba Oil Nederland B.V. 4th round: L16b en P11	595	10.07.79	140

	Area in sq. km.	in force as from/ relinquishment	Off Gaz.
5. <u>Amoco Netherlands Petroleum c.s. IV</u> Koningin Julianaplein 10 - P.O.Box 11550 2502 AN THE HAGUE - tel.: 070-824241 <ul style="list-style-type: none"> - BP Exploratie Maatschappij Nederland B.V.; - Bricomin Exploration Company Ltd.; - Dyas B.V., Exploratie- en Produktie- maatschappij; - Enserch Netherlands Inc.; - Ethyl Development Corporation; - GAO North Sea Ltd.; - GAO North Sea Exploration Ltd.; - Hudbay Oil Netherlands Inc.; - Pacific Lighting Exploration Company; - Veba Oil Nederland B.V. 4th round: P15c, Q10b, Q10c, Q13b	499	26.11.80	247
6. <u>Bates Oil Corporation</u> Koninginnegracht 84 - tel.: 070-551687 2514 AJ THE HAGUE <ul style="list-style-type: none"> - Houston Oil and Minerals of the Netherlands Inc.; - Pogo Netherlands Inc. 4th round: F8	399	01.12.78	2('79)
7. <u>Bow Valley Industries Ltd c.s. I</u> Mr. L.H.W. van Sandick - Blaak 101 3011 GB ROTTERDAM - tel.: 010-147555 <ul style="list-style-type: none"> - C en K Nederland Corporation; - Holland Sea Search N.V.; - Saga Petroleum Nederland B.V.; - Sceptre Oils Ltd.; - Sunningdale Oils Ltd.; - Vonk B.V. 2nd round: Q14a	13	14.10.70/.80	209/209
8. <u>Bow Valley Industries Ltd c.s. II</u> Mr. L.H.W. van Sandick - Blaak 101 3011 GB ROTTERDAM - tel.: 010-147555 <ul style="list-style-type: none"> - Kerr-McGee Corporation. 4th round: Q11b	77	13.11.80	230

	Area in sq. km.	in force as from/ relinquishment	Off Gaz.
9. <u>B.P. Exploratie Maatschappij Nederland B.V./ Gulf Oil Corporation</u> Catsheuvel 57-61 - 2517 KA THE HAGUE tel.: 070-514661			
1st round: a) B13a en B16a	409	29.03.68/.78	68/50
4th round: c) F14b	201	26.06.81	131
10. <u>B.P. Exploratie Maatschappij Nederland B.V./ Gulf Oil Corporation c.s. I</u> Catsheuvel 57-61 - 2517 KA THE HAGUE tel.: 070-514661			
- Aminoil (Netherlands) Petroleum Company			
1st round: b) P13a, Q4a en Q8	563	29.03.68/.78	68/50
11. <u>B.P. Exploratie Maatschappij Nederland B.V.</u> Catsheuvel 57-61 - 2517 KA THE HAGUE tel.: 070-514661			
4th round: a) F7 en F10	800	26.09.79	200
b) F13 en F16	807		
12. <u>B.P. Exploratie Maatschappij Nederland B.V.</u> c.s. I Catsheuvel 57-61 - 2517 KA THE HAGUE tel.: 070-514661			
- Agip Nederland B.V. (alleen 1e ronde);			
- Bricomin Exploration Company Ltd.;			
- Enserch Netherlands Inc.;			
- Ethyl Development Corp.;			
- GAO North Sea Ltd.;			
- GAO North Sea Exploration Ltd.;			
- Highbay Oil (Netherlands) Ltd.;			
- Pacific Lighting Exploration Company;			
- Scurry Rainbow Oil Ltd. (Alleen 2e ronde);			
- Van Dyke Netherlands Inc.			
1st round: b) B17a, F1a en F5	608	10.04.68/.78	77/50
2nd round: K4a, L1a en L1b	424	02.11.70/.80	220/205

	Area in sq. km.	in force as from/ relinquishment	Off Gaz.
13. <u>B.P. Exploratie Maatschappij Nederland B.V.</u> <u>c.s. II</u> Catsheuvel 57-61 - 2517 KA THE HAGUE tel.: 070-514661 companies named in 12 and - Amoco Netherlands Petroleum Comp. c.s. I (see under 2) 1st round: d) P2a, P15a en P15b	436	10.04.68/.78	77/69
14. <u>B.P. Exploratie Maatschappij Nederland B.V.</u> <u>c.s. III</u> Catsheuvel 57-61 - 2517 KA THE HAGUE tel.: 070-514661 companies names in 12, and Petroland B.V. - Cofraland B.V.; - Corexland B.V.; - Eurafrep Nederland B.V.; - Total Marine Exploitatie Maatschappij B.V. 1st round: c) F12a, F15a en F18a	629	10.04.68/.78	77/50
15. <u>B.P. Petroleum Development Ltd.</u> Catsheuvel 57-61 - 2517 KA THE HAGUE tel.: 070-514661 2nd round: Q16a	85	22.09.70/.80	191/190
16. <u>Continental Netherlands Oil Company</u> Bucaillestraat 8 - Voorburg - tel.: 070-865471 P.O.Box 93197 - 2509 AD THE HAGUE - Cities Service Neth. Petroleum Corporation; - Den Norske Stats Oljeselskap A.S.; - LL and E Netherlands Petroleum Company; - Nederlandse Aardolie Maatschappij B.V.; - Participatie-maatschappij Oranje-Nassau B.V. (PON); - Petroland B.V. c.s. (see under 29). 1st round: b) K18a, K18b en L16a	431	18.04.68/.78	79/57

	Area in sq. km.	in force as from/ relinquishment	Off Gaz.
<u>17. Mobil Producing Netherlands Inc.</u>			
Kon. Julianaplein 30 - "Babylon"			
tel.: 070-470144 - P.O.Box 11630			
2502 AP THE HAGUE			
4th round: a) F15b, F15c en G13			
	572)	12.06.79	127
	1.205)		
	525	25.10.79	221
b) G11, G14, G15 en G17			
c) B14 en B17b			
<u>18. Mobil Producing Netherlands Inc. c.s. I</u>			
Kon. Julianaplein 30 - "Babylon"			
tel.: 070-470144 - P.O.Box 11630			
2502 AP THE HAGUE			
- Bow Valley Industries Ltd.;			
- General Crude Oil Company International Ltd.;			
- Pan Ocean Petroleum Netherlands Ltd.;			
- Sceptre Oils Ltd.;			
- Sunningdale Oils Ltd.			
3rd round: P4			
	162	19.12.72	2('73)
<u>19. Mobil Producing Netherlands Inc. c.s. II</u>			
Kon. Julianaplein 30 - "Babylon"			
tel.: 070-470144 - P.O.Box 11630			
2502 AP THE HAGUE			
- Holland Sea Search N.V.;			
- Adobe Holland Inc.;			
- CanDel Oil Ltd.;			
- Kewanee Industries Inc.;			
- Newmont Oil Company International;			
- St. Joe Petroleum Holland Inc.;			
- Tanks North Sea Ltd.;			
- Tanks Oil and Gas Ltd.			
1st round: b) P6, P8a en S2			
	1.052	08.03.68/.78	54/46
4th round: P2b en P5			
	616	23.11.78	248
<u>20. Nederlandse Aardolie Maatschappij B.V.</u>			
Schepersmaat 2 - P.O.Box 28			
9400 AA ASSEN - tel.: 05920-69111			
1st round: a) B18 en F3			
	594)		
	846)	08.03.68/.78	54/50
	414)		
b) F11a, F17a en L2			
c) K17			

	Area in sq. km.	in force as from/ relinquishment	Off Gaz.
2nd round: a) L3a, L5a, L6a, L 6b en G16a b) P1	552 208	21.09.70/.80	191/177
3rd round: a) A14 en A18 b) J9, K1, K3 en L15a	788 916	11.12.72	250
4th round: a) L9 b) E9, E12 en E15 c) S1, S4 en S8 d) O18a en R3a e) D18, K2 en K5b f) E17 en E18	409 1.203 979 238 807 808	14.06.78 11.10.78 08.06.79 19.02.81	128 211 117 47
21. <u>Nederlandse Aardolie Maatschappij B.V./</u> <u>Mobil Producing Netherlands Inc.</u> Schepersmaat 2 - P.O.Box 28 9400 AA ASSEN - tel.: 05920-69111			
1st round: M8a, M9a, M11 en N7a	636	08.03.68/.78	54/46
22. <u>Nederlandse Aardolie Maatschappij B.V./</u> <u>Naamloze Vennootschap DSM</u> Schepersmaat 2 - P.O.Box 28 9400 AA ASSEN - tel.: 05920-69111			
4th round: a) J3 b) S3a, S5 en S6 c) A9 en A12 d) P3 e) D6, D9, D15 en E7 f) E5 en E8 g) D3, E1 en E6	143 620 529 415 859 797 776	02.11.76 20.12.78 24.02.81	223 4('79) 47
23. <u>Nederlandse Aardolie Maatschappij B.V. c.s. I</u> Schepersmaat 2 - P.O.Box 28 9400 AA ASSEN - tel.: 05920-69111			
- Holland Sea Search N.V. ; - Adobe Holland Inc. ; - CanDel Oil Ltd. ; - Newmont Oil Company International ; - Oxoco International Inc. ; - Pan Canadian Petroleum Ltd. ; - St. Joe Petroleum Holland Inc. ; - Tanks North Sea Ltd. ; - Tanks Oil and Gas Ltd. ; - Zapata (Netherlands) Exploration Company			
1st round: d) Q7	419	08.03.68/.78	54/46

	Area in sq. km.	in force as from/ relinquishment	Off Gaz.
24. <u>Nederlandse Aardolie Maatschappij B.V. c.s. II</u> Schepersmaat 2 - P.O.Box 28 9400 AA ASSEN - tel.: 05920-69111 - Aminoil (Netherlands) Petroleum Company; - Clam Petroleum Company; - Participatie-maatschappij Oranje-Nassau B.V. (PON). 1st round: L12a	343	12.03.68	54
25. <u>Nederlandse Aardolie Maatschappij B.V. c.s. III</u> Schepersmaat 2 - P.O.Box 28 9400 AA ASSEN - tel.: 05920-69111 - Bow Valley Industries Ltd.; - C en K Nederland Corporation; - Pan Ocean Petroleum Netherlands Ltd.; - Saga Petroleum Nederland B.V. 1st round: Q11a	85	28.03.68/.78	74/50
26. <u>Nederlandse Aardolie Maatschappij B.V. c.s. IV</u> Schepersmaat 2 - P.O.Box 28 9400 AA ASSEN - tel.: 05920-69111 - Aminoil (Netherlands) Petroleum Company; - Clam Petroleum Company; - DSM, N.V. 4th round: L12b en L15b	187	13.04.78	84
27. <u>Pennzoil Nederland Company (Noordwinning- groep) c.s. I</u> Mauritskade 35 - P.O.Box 13410 2501 EK THE HAGUE - tel.: 070-924351 - Amax Petroleum Corporation; - Billiton Exploratie Maatschappij B.V.; - Caland Exploratie B.V.; - Delfzee B.V.; - Estel Delfstoffen B.V.; - Falcon Seaboard Inc.; - Noordzee Selection B.V. 1st round: a) M10 en E10a b) K5a 1st round: b) P12 2nd round: L8a 4th round: D12, E13 en E14	423 204 420 213 1.051	27.03.68/.78 21.03.68/.78 29.09.70/.80 02.03.81	66/50 62/50 197/177 50

	Area in sq. km.	in force as from/ relinquishment	Off Gaz.
28. <u>Pennzoil Nederland Company (Noordwinning- groep) c.s. II</u> Mauritskade 35 - P.O.Box 113410 2501 EK THE HAGUE - tel.: 070-924351 - companies named in 27, and - Amoco Netherlands Petroleum Company c.s. (see nr. 2)			
4th round: K10b	180	25.09.79	200
29. <u>Petroland B.V. c.s.</u> De horst 4 - P.O.Box 93280, 2509 AG THE HAGUE - tel.: 070-824001 - Cofraland B.V.; - Corexland B.V.; - Eurafrep Nederland B.V.; - Thetis Aardolie Maatschappij B.V.; - Total Marine Exploitatie Maatschappij B.V.			
2nd round: F6 en L4	805	12.10.70	204
3rd round: A16	294	29.12.72	13 ('73)
4th round: a) M7	409	24.09.79	200
b) O15a, O15b, P13b en P16a	496	10.04.80	85
c) F9	399	28.08.80	174
d) E4 en E16	802	25.02.81	50
30. <u>Placid International Oil Ltd.</u> Koningin Julianaplein 15 - P.O.Box 11727 2502 AS THE HAGUE - tel.: 070-814581			
1st round: b) F14a	202	03.04.68/.78	71/50
3rd round: A15	393	23.01.73	27
4th round: a) A8 en A11	771	01.06.78	114
b) A5	90	02.04.79	74
c) E10b en E11	601	01.04.81	77
31. <u>Placid International Oil Ltd. c.s. I</u> Koningin Julianaplein 15 - P.O.Box 11727 2502 AS THE HAGUE - tel.: 070-814581 - Arco Netherlands Inc.; - Canadian Superior Oil (Nederland) B.V.; - Netherlands North Sea Superior Oil Ltd.; - Sinclair Netherlands Oil Company.			
1st round: K12	411	01.04.68	71

	Area in sq. km.	in force as from/ relinquishment	Off Gaz.
32. <u>Placid International Oil Ltd. c.s. II</u> Koningin Julianaplein 15 - P.O.Box 11727 2502 AS THE HAGUE - tel.: 070-814581 - Boele's Scheepswerven en Machinefabriek N.V. ; - Eason Netherlands Inc. ; - Gas and Oil Acreage Ltd. ; - Golden Eagle (Netherlands) B.V. ; - Hunter Douglas Olie- en Gasexploratie N.V. ; - KTI Resources Ltd. ; - Sceptre Oils Ltd. 1st round: K9a en K9b	211	03.04.68/.78	73/50
33. <u>Placid International Oil Ltd. c.s. III</u> Koningin Julianaplein 15 - P.O.Box 11727 2502 AS THE HAGUE - tel.: 070-814581 - Eason Netherlands Inc. ; - KRC of Holland Inc. ; - Nederlandse Aardolie Maatschappij B.V. ; - Sceptre Oils Ltd. 2nd round: L14	412	15.10.70	209
34. <u>Placid International Oil Ltd. c.s. IV</u> Koningin Julianaplein 15 - P.O.Box 11727 2502 AS THE HAGUE - tel.: 070-814581 - Eason Netherlands Inc. ; - Gas and Oil Acreage Ltd. ; - Golden Eagle (Netherlands) B.V. ; - Hunter Douglas Olie- en Gasexploratie N.V. ; - KTI Resources Ltd. ; - Sceptre Oils Ltd. 4th round: K9c	198	30.05.80	114
35. <u>Union Oil Company of the Netherlands</u> <u>NedLloyd Energy B.V.</u> Scheveningseweg 56 - 2517 KW THE HAGUE tel.: 070-520591 1st round: a) F2a en F4a b) K16 2nd round: L11b en L17a 4th round: a) K18c en P9c b) B16b, E3 en F1b	620 267 224 515 764	09.04.68/.78 11.02.71/.81 21.06.79 04.06.81	77/50 39/31 127 118

	Area in sq. km.	in force as from/ relinquishment	Off Gaz.
36. <u>Union Oil Company of the Netherlands c.s./</u> <u>Mobil Producing Netherlands Inc/Holland</u> <u>Sea Search N.V. c.s.</u> Scheveningseweg 56 - 2517 KW THE HAGUE tel.: 070-520591			
- NedLloyd Energy B.V.;			
- Adobe Holland Inc.;			
- CanDel Oil Ltd.;			
- Kewanee Industries Inc.;			
- Newmont Oil Company International;			
- St. Joe Petroleum (Netherlands) Corporation;			
- Tanks North Sea Ltd.;			
- Tanks Oil and Gas Ltd.			
4th round: Q4b	284	19.09.79	192
	<u>38.559</u>		
	=====		

Nederlandse Olie en Gas Exploratie en Produktie
 Associatie (NOGEPa)
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 Gebouw Babylon
 2595 AA THE HAGUE
 Telephone: 070-855634.

OFFSHORE PRODUCTION LICENCES GRANTED
and
NAMES AND ADDRESSES OF THE OIL COMPANIES
AT JANUARY 1, 1982

	block	round ex- ploration licence	area in sq. km.	in force as from	Off. Gaz.	
1. Nederlandse Aardolie Maatschappij B.V. Schepersmaat 2 - P.O.Box 28 9400 AA ASSEN - Tel. 05920-69111	K14	1	412	16.01.75	18	
	K15	2	412	14.10.77	214	
	K 7	1	408	08.07.81	140	
2. Nederlandse Aardolie Maatschappij B.V. c.s. A Schepersmaat 2 - P.O.Box 28 9400 AA ASSEN - Tel. 05920-69111 - Aminoil (Neth.) Petroleum Comp.; - Clam Petroleum Comp.; - Participatie-mij. Oranje-Nassau B.V. (PON)	K 8) K11)	1	409) 411)	26.10.77	223	
	L13	1	412	26.10.77	223	
3. Pennzoil Nederland Company c.s. A (Noordwinninggroep) Mauritskade 35 - P.O.Box 13410 2501 EK THE HAGUE - Tel. 070-924351 - Amax Petroleum Corp.; - Billiton Exploratie Mij. B.V.; - Caland Exploratie B.V.; - Delfzee B.V.; - Estel Delfstoffen B.V.; - Falcon Seaboard Inc.; - Noordzee Selection B.V.	K13	1	324	03.10.73	203	
4. Petroland B.V. c.s. A De horst 4 - P.O.Box 93280 2509 AG THE HAGUE - Tel. 070-824001 - Cofraland B.V.; - Corexland B.V.; - Eurafrep Nederland B.V.; - Thetis Aardolie Mij. B.V.; - Total Marine Exploitatie Mij. B.V.	K 6) L 7)	1	407) 409)	20.06.75	126	
5. Placid International Oil Ltd. Kon. Julianaplein 15 - P.O.Box 11727 2502 AS THE HAGUE - Tel. 070-814581	L10) L11a)	1 (spont.)	411) 185)	13.01.71	20	

	block	round ex- ploration licence	area in sq. km.	in force as from	Off. Gaz.
6. Union Oil Company of the Netherlands/ NedLloyd Energy Q/1 B.V. Scheveningseweg 56a 2517 KW THE HAGUE - Tel. 070-520591	Q 1	1	415	11.07.80	138

PRODUCTION LICENCES APPLIED FOR

	block	round ex- ploration licence		Off. Gaz.
- Placid International Oil Ltd. c.s. I	K12	1	25.05.77	100
- Nederlandse Aardolie Maatschappij B.V.	K17	1	13.03.78	51
- Nederlandse Aardolie Maatschappij B.V. c.s. I	L12a	1	13.03.78	51
- Mobil Producing Netherlands c.s. II	P 6	1	17.04.79	74
- Petroland B.V. c.s.	L 4a	2	02.01.80	1
- Nederlandse Aardolie Maatschappij B.V.	F 3	1)		
- Union Oil Company of the Netherlands/))		
- NedLloyd Energy B.V. }	F 2	1 }	23.09.80	184
- Petroland B.V. c.s.	F 6a	2 }		
- Nederlandse Aardolie Maatschappij B.V.	P 1	2	08.10.80	195(corr.)
- Placid International Oil Ltd. c.s. III	L14	2	20.10.80	203
- Pennzoil Nederland Company/Amoco c.s II	K10a	1	11.11.80	219
- Nederlandse Aardolie Maatschappij B.V.	L15a	3	15.01.81	9
- Nederlandse Aardolie Maatschappij B.V. c.s. IV	L12b/-			
	L15b	4	15.01.81	9
- Union Oil Company of the Netherlands/)				
- NedLloyd Energy B.V. }	L11b	2	12.03.81	49
- Continental Netherlands Oil Company	K18a+b	1	02.09.81	167

