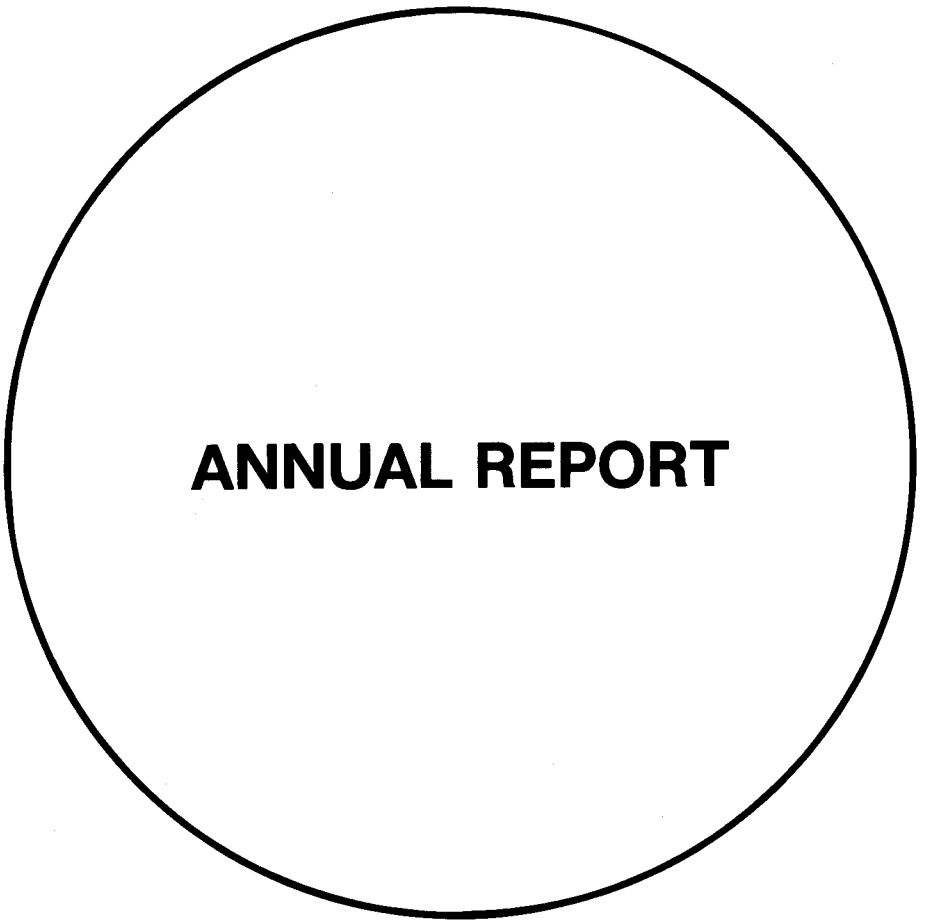
EURATOM
SUPPLY AGENCY



1981

This publication is also available in the following languages:

DE ISBN 92-825-3083-3
FR ISBN 92-825-3085-X

A bibliographical slip can be found at the end of this volume

Luxembourg: Office for Official Publication of the European Communities 1982

ISBN 92-825-3084-1

Catalogue number: CB-35-82-465-EN-C

Printed in Belgium

TABLE OF CONTENTS

		Page
I.	MAIN ACTIVITIES OF THE AGENCY	5
1.	The supply of nuclear fuel	6
2.	Conclusion of supply contracts	7
3.	Chapter "Supply" of the Euratom Treaty	8
II.	THE DEVELOPMENT OF NUCLEAR ENERGY IN THE COMMUNITY	11
1.	Trends and prospects	11
2.	Developments in the Member States	12
	- Belgium	12
	- Denmark	13
	- Germany	14
	- France	15
	- Ireland	16
	- Italy	16
	- Netherlands	17
	- United Kingdom	17
3.	Community	18
4.	Nuclear fuel requirements	19
III.	THE SUPPLY OF NUCLEAR FUEL IN THE COMMUNITY	23
1.	Natural uranium sector	23
	- General assessment	23
	- Conclusion of contracts	28
2.	Special fissile materials sector	30
	- General survey	30
	- Eurodif	34
	- Urenco	34
	- US Department of Energy	36
	- Prices	37
	- Export Licences	38
	- Supply of highly enriched uranium	39
	- Plutonium	41
	- New contracts and other activities	42

IV. SUPPLY OF NUCLEAR FUEL AND NON-PROLIFERATION..... 43

1. Activities in the framework of IAEA..... 43

a) International plutonium storage (IPS)..... 44

b) Committee for assurance of supply (CAS)..... 45

2. Community agreements with supplier countries..... 46

- Australia/Euratom..... 46

- Canada/Euratom..... 48

- USA/Euratom..... 49

3. The industry's view..... 50

V. ADVISORY COMMITTEE OF THE SUPPLY AGENCY..... 51

A P P E N D I C E S

APPENDIX 1:

Page

A. Nuclear reactors in service in the Community end 1981... 53

B. Reactors under construction in the Community end 1981 (excluding those ordered in 1981)..... 56

C. Reactors under construction ordered in 1981..... 58

D. Advanced Projects in the Community end 1981 (reactors not under construction)..... 59

APPENDIX 2:

Recommendation of the Advisory Committee of the Supply Agency concerning levels of uranium fuel held in reserve.... 60

I.

MAIN ACTIVITIES OF THE AGENCY

In pursuance of the tasks assigned to it by the Euratom Treaty, the Agency has, as in the past, concentrated its efforts on the following activities:

(a) Maintenance of its continuous review, taking into account among others the studies made by the Advisory Committee, of the supply and demand for nuclear fuels in the Community and observation of developments in markets outside the Community; this includes a study of effects of government policies on the supply situation, such as those concerning the expansion of nuclear energy, raw materials and exports; and conditions governing access to and use of nuclear material.

(b) Participation in the conclusion of contracts on the supply of nuclear fuels from countries in and outside the Community in accordance with the procedures developed by the Agency from an interpretation of the provisions of the Euratom Treaty. In addition to advice on specific matters, generally not connected with pure commercial questions, this includes the evaluation of contracts in relation to the supply situation in the Community and verifying that they accord with the basic principles of the Euratom Treaty and also with the commitments undertaken by the Community in agreements with third countries.

(c) Advice and assistance to undertakings on procedures for obtaining export licences from third countries and on applying for re-transfer authorizations.

(d) Liaison with the appropriate Commission departments in the negotiation and implementation of agreements between the Community and supplier countries in which the outline conditions are laid down for access to and use of nuclear material.

1. The supply of nuclear fuel

It can be generally said of the supply situation in the Community that there have been no problems in the procurement of nuclear fuel. Deliveries were generally made in accordance with the contracts concluded between the parties, no particular delays being caused by governmental interventions.

Observations made in previous years were once more confirmed; namely, that as far as the availability of nuclear fuel is concerned, the market for natural uranium and low-enriched uranium, including enriching services, continues to offer adequate conditions for the assurance of satisfactory supply and to permit diversification of the sources.

In particular 1981 was marked by an abundant supply of natural uranium, which had a considerable impact on prices, brought about the closure of some mines and reduced the preparedness of industry to engage in further prospecting efforts and investment programs. Care needs to be taken, however, that such a situation does not lead in some years from now to a tightening of the market due to the conjunction of a reinforced development of new nuclear programmes and of a decline in the rates of increase in uranium production.

Similar considerations apply to the enrichment market where there prevails equally a situation of overcapacity. In that context the question of security of supply, however, is not foremost, since the Community possesses enrichment technology and has the capability to add further capacity as and when required. For the enrichment plant operators the concerns are more a question of the profitability of their investment, while for users the preoccupations are about the high cost of stocks arising from the high rates of interest that have been payable on the capital tied up.

This situation of imbalance between supply and demand certainly needs closely watching: it may perhaps be necessary to include the questions arising therefrom in the reflections on a possible strengthening of the Community supply policy.

2. Conclusion of supply contracts

The Agency's activity in the conclusion of contracts for the supply of nuclear fuels can be summed up as follows:

(a) In view of the trend in the construction of nuclear power stations and the supply situation in general, not many new long-term contracts for the supply of natural uranium were entered into. On the other hand, an appreciable number of short-term contracts were recorded.

(b) For the same reasons and as, indeed, since 1975, no new long-term enrichment contracts were concluded, but some contracts were modified in order to better adjust them to requirements.

(c) The conclusion of other contracts for the supply of special fissile material and NBS standards proceeded at the normal pace. There was a substantial increase in contracts for the supply of plutonium in the light of the planned commissioning of Superphénix in 1984.

(d) For the rest, conclusion and implementation of contracts was marked by an increase in shorter term transactions on the basis of exchanges and loans of natural and slightly-enriched uranium. Substitutions of nuclear fuel appear to be being considered more and more frequently to be necessary in order to ease the constraints imposed by provisions governing nuclear fuel from certain countries in order to meet the imperatives of economic management without affecting the objectives of such regulations.

(e) Altogether, the Agency was involved in the conclusion of 155 contracts for the supply of natural uranium (63) and enriching services or special fissile materials (92) in 1981.

3. Chapter "Supply" of the Euratom Treaty

At the beginning of 1982 the Commission sent to the Council of Ministers a Communication on nuclear energy with the request, on the basis of that document, to hold a political discussion in depth on the prospects for the use of nuclear energy in the Community and to approve the broad lines of the approach envisaged by the Commission with regard to the Community's role in this field.

The communication is closely linked with the policy of developing an energy strategy for the Community, whose objectives can be summarised as an effort to reduce dependence on oil by means of a more rational use of energy and a greater diversification of supplies. In the view of the Commission no real diversification can be achieved up to the year 2000 except by having recourse to coal and nuclear power.

The aim of the present communication is to examine the conditions for a more widespread recourse to nuclear power and to outline the action to be taken at community level in order to tackle the specific problems posed by this energy source.

In the communication of the Commission an extensive and important section is devoted to questions of supply of nuclear fuels and the problems of Chapter VI of the Euratom Treaty.

The Commission indicates that it has made a comprehensive new assessment of the questions associated with supplying nuclear fuel to the Community. Bearing in mind developments in the peaceful uses of nuclear energy, the Commission considers it necessary to valorize further the role of the Community in guaranteeing real security of supply to all those concerned while respecting the principle of non-discrimination.

With regard to the present application of Chapter VI, in particular in so far as it is concerned with the trading monopoly of the Supply Agency, the Commission has reached the conclusion that it is necessary to undertake a modification and, as far as supply is concerned, to reach agreement on a new system whose essential points would be:

- replacement of the principle of equal access to the sources of supply by the principle of non-discrimination;

- the Euratom Supply Agency would, in particular, be responsible for verifying, under the supervision of the Commission, that transactions were in accordance with Community law and Community obligations (in particular, non-discrimination); for evaluating supply and demand; and for participating, at the request of users who so desired, in the negotiating and/or concluding of contracts;

- optimum utilisation of Community powers with regard to external relations in the nuclear field;

- the principle of Community solidarity would be applied, in particular by pursuing a stock policy adopted to circumstances and by the preference given to Community production in case of a surplus;

- the possibility of Community participation in prospecting operations would be extended to non-Community countries;

- the application of rules of competition analogous to those in the EEC Treaty, adapted as necessary.

In the view of the Commission a system set up on the basis described above would not require that the exclusive right of purchase and sale conferred at present on the Supply Agency be maintained. It would enable the Community to accomplish the task assigned to it under Article 2d of the Euratom Treaty, namely to "ensure that all users in the Community receive a regular and equitable supply of ores and nuclear fuels." In the communication the Commission announced that after new consultations, it will, before June 1982, place before the Council a proposal containing a precise definition of the system sketched out above.

In accordance with Article 76 of the Euratom Treaty the provisions of Chapter VI may be amended if the Council, acting unanimously on a proposal from the Commission and after consulting the European Parliament, so decides.

II

THE DEVELOPMENT OF NUCLEAR ENERGY IN THE COMMUNITY

1. Trends and prospects

The outlook for nuclear energy rather improved in 1981, as the need to develop this form of energy seems more and more evident in most of the industrialised countries.

In the year under review there was a considerable increase in the installed nuclear power capacity in the western world: 19 units with a capacity of 17.6 GWe commenced commercial production in 1981. More than 40% of that new capacity was commissioned in France; four reactors came into operation in the USA. The perspectives for 1982 are also promising: about 27 units (totalling to about 23.400 MWe) in 13 different countries in the Western world, among them four Member States of the Community, are expected to commence operation in the coming year. As regards the ordering of new stations, however, only France among the Member States, ordered new reactors in 1981. Nevertheless, even that country has revised downwards its nuclear programmes in the longer term with the result that its programme of new plant commitments for 1982-83 has been reduced by three units. This reserved attitude towards new nuclear investments is largely due to the current economic situation and to the supply and demand situation for electricity. On the other hand, during 1981 several countries, including some with no large nuclear programmes, the need became evident to take the first concrete steps towards the realisation in due time of a sufficiently large nuclear power capacity to ensure a reliable and economic source of energy.

The Commission of European Communities considers that up to the year 2000 the use of coal and nuclear power is essential to ensure an adequate diversification of energy sources away from oil. The Commission considers that in 1990 the contribution of these resources to electricity production should range between 70% and 75%. In electricity production this will allow both an increase of the proportion of the value added inside the Community and the reduction of production costs.

2. Developments in the Member States

BELGIUM

At the end of 1981 three nuclear power stations (Tihange 1, Doel 1 and 2) were in service in Belgium, representing a total net capacity of 1665 MWe. Four power stations (Tihange 2, 3 and Doel 3, 4), representing a total net capacity of 3760 MWe, are currently under construction.

The Doel 3 and Tihange 2 nuclear power stations are due to come on stream in 1982, followed by Doel 4 and Tihange 3 in 1984.

There were no new projects in Belgium during 1981, and the relaunching of the power station construction programme has not yet been approved by the competent authorities.

In 1981 electricity production in Belgium stood at 48.086 GWh (- 5.7% compared with 1980). Nuclear production in Belgium in 1981 accounted for 12.178 GWh (+ 2.3%), representing 25.3% of the total.

DENMARK

The Danish Government maintains its view that the bleak outlook for the Danish energy supply situation in the years to come and for many decades makes it essential for Denmark to utilize every energy source - including nuclear power - that can contribute significantly to its energy supply, provided this can be done in a manner that takes proper account of the safety of the population and the protection of the environment. The necessary investigations into the questions of nuclear safety and the disposal of radioactive waste are expected to be ready before the end of 1982.

Considering the forecasts of the electricity demand and the installed capacity as well as the priority given to the development of combined heat and power production, the Government sees no need to make a decision on the introduction of nuclear power within the next few years.

When the necessary basis for a decision has been established, the Danish Government will decide whether to advocate the use of nuclear power as an energy source in Denmark. If the Government decides in favour of the use of nuclear power, the question of principle regarding the use of nuclear power will be submitted to the Parliament by tabling a bill on the Entry into Effect of the Act on Safety and Environmental Factors in Connection with Nuclear Installations. If the bill is passed by the Parliament, the matter will be subject to a referendum.

GERMANY

In the Federal Republic of Germany the reactor of the 1300 MWe nuclear power plant Grafenrheinfeld reached criticality and power operation in December 1981. While a letter of intent for a 1300 MWe unit number two of the Isar nuclear power station (KKI- 2) was given to KWU already in January 1980, the construction licence has not yet been granted.

Considering these facts the situation at the end of 1981 was the following:

- 11 power plants in operation (1980: 10) with a gross capacity of more than 300 MWe each, with in addition four experimental reactors, giving a total of 9.85 GWe net power (1980: 8.6 MWe).

- 9 power plants under construction with a total capacity of 9.4 GWe net including Brokdorf but not yet Wyhl (KWS - 1) whose construction has not yet commenced owing to pending legal proceedings.

- In addition at the end of 1981 there were seven advanced projects for new plants (Biblis-C, Neckarwestheim-2, Lingen/Emsland, Ohu/Isar-2, Borkem, Hamm, Neupotz-A). Licences for all these plants are pending. Pfaffenhofen is an alternative site for the former Rehling project.

The gross production of all nuclear power stations and experimental plants in the Federal Republic of Germany in 1981 was 52.5 TWh alternating current and 1.15 TWh direct current for the Federal Railway System. The total of 53.7 TWh means an increase of 23 percent with respect to 1980 (43.7 TWh).

The share of nuclear power of the total production of electricity was 14.6% (1980: 11.9%).

FRANCE

Following the commissioning during 1981 of Tricastin 3 and 4, Dampierre 2, 3 and 4, Gravelines 3 and 4 and Blayais 1 the position at the end of 1981 was that the nuclear units in service in France numbered 28, representing a total net capacity of 19.8 GWe. Two units (Saint-Laurent B.1 and B.2) have been linked to the grid and are due to come on stream in 1982

Commitments for 1981 related to 1 unit of the 900 MWe class (Chinon B.3) and 3 units of the 1300 MWe class (Belleville 1 and 2, Nogent 1), due to come on stream between 1986 and 1987. Work has already begun on these 4 units. Commitments planned for 1982 and 1983 relate to 1 unit of the 900 MWe class (Chinon B.4) and 5 units of the 1300 MWe class, due to come on stream between 1987 and 1989.

At the end of 1981 the nuclear units being constructed under the pre-1981 programme numbered 23 with a combined capacity of 24.5 GWe. To these must be added the 4 units under the 1981 programme with a combined capacity of 4.7 GWe (not including the Creys-Malville Superphénix 1200 MWe fast reactor). No decision has been taken on possible commitments after 1983.

During 1981 nuclear electricity production amounted to 99.6 TWh out of a total electricity production of 264 TWh.

Nuclear electricity therefore accounts for 37.7% of the total electricity produced in France, as against 23.5% in 1980, i.e. an increase of 72% in nuclear TWh.

IRELAND

It is very difficult to give any realistic forecast about nuclear power in Ireland. There is very little happening mainly because of the effect of the recession on the growth in electricity demand.

It would require a sustained period of growth before planners would give serious consideration to building a nuclear power plant.

In the light of this, one can put forward a forecast of one 650 MWeLWR in 1993 followed by another 650 MWeLWR in 1995/96.

ITALY

The Caorso nuclear power station began commercial operation on December 1, 1981, and is operating at full power. Two 1000-MW BWR units are being built at Montalto di Castro.

The recently approved national energy programme provides for commissioning of six 1000 MWe PWR units within 1990 (besides Montalto di Castro units), and states that all the necessary measures are to be taken for the construction of four further units that should begin commercial operation after 1990. Furthermore, a 40 MWe prototype heavy-water reactor (Cirene) is being built; its commissioning is expected in 1984.

As for the power generated in Italy in 1981, the data are the following:

Overall Italian power production	181.7	TWh
ENEL overall power production	143.8	TWh
Overall Italian nuclear power production, i.e. 1.5% of the total, with an increase in nuclear generation by about 22% as compared to 1980.	2.7	TWh

NETHERLANDS

The official public enquiry started in September 1981 with phase 1, the information phase. During this phase all interested organisations and individuals are invited to send their opinions on the energy problem (and all related problems) to the Steering Committee of the public enquiry. This Committee will prepare a summary report on all these opinions in their "intermediate report", which will be the basis for the real discussion in phase 2. That phase will be completed by the end of 1983.

The net electricity production for the public supply system in 1981 was 55.067 GWh, with a nuclear share of 3.430 GWh, i.e. 6.23% of the total.

The contribution of nuclear electricity has been less than in 1980 due to the fact that Borssele had no fuel reload during the year 1980.

UNITED KINGDOM

As a consequence of the Advanced Gas Reactor (AGR) at Windscale being shut down at the end of the year 1981, there were in the U.K. 32 units in service with a total net capacity of 6.5 GWe. No new power stations were commissioned in 1981. But the power of Hinkley Point AGR was increased again by 40 MWe.

At the end of the year 1981, there were 10 AGR units under construction at four different sites (2 units at Dungeness, 2 units at Hartlepool, 2 units at Torness Point and 4 units at Heysham) for a total net power of 6.25 GWe. Their commissioning is expected between 1982 and 1989. A decision concerning the installation of one PWR unit at Sizewell, Suffolk, with a capacity of 1200 MWe is still pending; a public inquiry for this plant has been set for January 1983.

No new orders were passed or projects finalised in the U.K. during the year 1981.

The total electricity production in 1981 has been of 240 TWh, of which 32.64 TWh were nuclear (13.6%), i.e. + 0.6% with respect to 1980.

3. Community

For the Community as a whole the situation at the end of 1981 was as follows:

- 84 nuclear units in operation with an aggregate net effective capacity of 39.8 GWe, 9 of which were taken into commercial operation during the year 1981 with a net capacity of 8.5 GWe; compared with 1980 this represents an increase of 27%.

- 54 nuclear units under construction with an aggregate capacity of 51.7 GWe, 4 of which were ordered in 1981, with a total capacity of 4.7 GWe.

- 24 power units with a total capacity of 27.6 GWe being at different stages of project development; most of them should be in operation by 1990.

In 1981, according to the provisional statistics of the Community, the total electricity production amounted to 1202.9 TWh, of which 200.5 TWh were of nuclear origin, representing 16.6% of the total. Compared with 1980 nuclear electricity increased by 34.2%.

This substantial increase arose mainly in France, where the nuclear electricity production jumped from 57.9 TWh in 1980 to 99.6 TWh, i.e. by 72%. In that country nuclear energy reached 37.7% of total electricity production, as against 23.5% in 1980. Belgium remains in second place, with 25.3% (1980: 23.3%). In Germany the electricity production from nuclear power plants increased by 23% to 53.7 TWh,

representing 14.6 % of total electricity production compared with 11.9 % in 1980.

The electricity production of the 39.8 GWe presently in operation amounted to 200.5 TWh, with an average load factor of 57.5 % (a low figure, but it should be remembered that 27 % of this power was installed only in 1981). This represents an oil saving of approximately 45 million metric tons. (*) Assuming an installed power of 75 GWe and a load factor of 65 %, the oil saving in 1985 would amount to 96 million metric tons. In 1990 oil savings would range between 140 million metric tons and 160 million metric tons depending on the installed power (100 - 125 GWe).

4. Nuclear fuel requirements

In the European Community the current requirements for reloads plus those for first cores of nearly completed reactors amounted in 1981 to 4500 tons of separative work units and to 9000 metric tons of natural uranium. These figures assume a 0.25 % tails assay.

Estimated requirements for 1985 amount approximately to 7400 tons separative work units and to 13,900 metric tons of natural uranium for an installed power of the order of 75 GWe.

If one assumes that in 1990 the installed power will be 110 GWe and if one does not take into account the requirements for first cores of reactors not yet planned, the annual requirements will amount to 10 900 tons of separative work units and 20 100 metric tons of natural uranium.

(*) The conversion factor is 1 TWh = 225,000 toe (ton oil equivalent; 1 toe = 1,43 ton coal equivalent).

NUCLEAR INSTALLED POWER IN THE COMMUNITY - END 1981

NET POWER IN GWe

	In operation			Under construction		To be built			TOTAL
	End 1980	Added 1981	81/80	Ordered before 1981	Ordered 1981	already ordered	advance project	planned (*)	
Belgium	1.7			3.8					5.5
Germany	8.6	1.3	+15%	9.4		2.5 (ó)	7.0	3.7	32.5
France	12.6	7.2	+57%	25.6(+)	4.7		7.2		57.3
Italy	1.4			2.0				6.0	9.4
Netherlands	0.5								0.5
U. Kingdom	6.5			6.2				1.2	13.9
Community	31.3	8.5	+27%	47.0	4.7	2.5	14.2	10.9	119.1
	39.8			51.7		27.6			119.1

(+) including St. Laurent B1 and B2, connected to the grid in 1981 for which commercial operation will begin in 1982, and Creys-Malville

(ó) Ohu/Isar 2 (letter of intent of 1980) and Wyhl/KWS1 (licence pending before law court)

(*) Partial information

NUCLEAR INSTALLED POWER IN THE COMMUNITY - END 1981

NUMBER OF UNITS

	In operation		Under construction		To be built			TOTAL
	End 1980	Added 1981	Ordered before 1981	Ordered 1981	already ordered	advance project	planned (*)	
Belgium	3		4					7
Germany	14	1	9		2ó	6	3	35
France	20	8	24 +	4		6		62
Italy	4		3				6	13
Netherlands	2							2
United Kingdom	32		10				1	43
European Community	75	9	50	4	2	12	10	162
	84		54		24			162

\+ Including St. Laurent B1 and B2, connected to the grid in 1981 for which commercial operation will begin in 1982, and Creys-Malville

ó Ohu/Isar 2 (letter of intent of 1980) and Wyhl/KWS1 (licence pending before law court)

* Partial information

TOTAL ELECTRICITY PRODUCTION AND NUCLEAR ELECTRICITY PRODUCTION

IN THE COMMUNITY IN 1981

(TWh = 10^9 kWh)

	B	DK	D	F	IRL	I	LUX	NL	UK	GR	Community (*)
Total electricity production 1981	48.1	18.1	368.8	264.0	10.9	181.7	1.2	61.3+	240	21.6	1,202.9
81/80	-5.7%	-28.9%	0%	+7.1%	+0.2%	-2.2%	+10%	-1.2%	-2.4%	+1.5%	-0.4%
Nuclear electricity production 1981	12.2		53.7	99.6		2.708		3.4	32.6		200.5
81/80	+2.3%		+23%	+72%		+22%		-10%	+0.6%		+34.2%
Nuclear electricity as percent of the total	25.3%		14.6%	37.7%		1.5%		5.6%	13.6%		16.6%

(*) Due to difference of sources totals do not necessarily match

(+) This represents the total production as opposed to page 17.

III

SUPPLY OF NUCLEAR FUEL IN THE COMMUNITY

1. Natural Uranium Sector

General Assessment

Deliveries of natural uranium contracted by users in the Community have this year also been made on time by suppliers both within and outside the Community.

The obvservations put forward in the 1980 report remain valid concerning:

- the situation of the Community's dependence on external supply sources for the coverage of a substantial part of its requirements of natural uranium;

- the need for diversification of sources - which in general has been achieved - and the imperatives of security and stability of supply;

- the fact that the demand during the first part of the present decade will relate more to enrichment commitments than the real needs or reactors, which, in practice, will be lower;

- the fact that the demand for natural uranium resulting from enrichment commitments is covered until 1985, and that even beyond that date demand arising from the real needs of Community undertakings is already largely covered by long-term contracts;

- stocks of natural uranium and enriched uranium (reserves and working stocks) which, in total, currently represent more than three years' consumption.

The total production (in tons of U) of the principal supplier countries in 1981 is given below and compared with those for the three preceding years.

Country	1978	1979	1980	1981	81/80
Australia	516	705	1.561	2.860	+83,2%
Canada	6.803	6.817	7.145	7.746	+ 8,3%
France	2.180	2.360	2.634	2.555	- 3,0%
Gabon	1.022	1.101	1.033	1.022	- 1,1%
Namibia	2.697	3.800	4.037	3.968	- 1,7%
Niger	2.060	3.615	3.880	4.405	+13,5%
South Africa	3.961	4.782	5.109	4.936	- 3,5%
United States	14.220	14.410	16.810	14.320	-14,8%

The Uranium Institute in April 1981 published a new report "The Balance of Supply and Demand 1980-1995". The following considerations are summarised therefrom and largely support those developed in the Agency's report for 1980.

In spite of numerous uncertainties which continue to weigh on the nuclear industry, the basic outlook for the supply and demand of uranium until the middle of the decade is relatively foreseeable, partly because of the long lead-time needed to put into production both mines and reactors. Annual supply, for instance, will probably exceed consumption until 1985.

Beyond 1985, a reduction of stocks of enriched uranium could open the way to a progressive increase in production capacity towards the end of the present decade or the beginning of the next. However, the extent to which demand will encourage increasing production remains uncertain. In the Agency's view, however, the following considerations must be taken into account.

A sizeable part of the demand for deliveries after 1990 is not yet covered by contracts; the opening of new mines, as well as sometimes the rate of exploitation of existing mines, depends partly on the signature of the contracts, but equally on other factors such as difficulties of supply in other energy sources and the general economic situation; despite the apparent likelihood of a substantial number of the projects currently under evaluation - in particular in Australia, Canada and Niger - being put into production towards 1990, it will be a few years before it will be possible to have a clear view of the outline of the trends in the mining capacity for the 1990s.

How quickly this production will come on stream will depend, yet again, on how quickly the development of the nuclear industry in the majority of countries is resumed, on the various stockpile policies of users and on the extent to which production capacities may have been affected by delays, reductions and closures.

It is important to note that, if necessary, many of these projects could probably be put into production at least as quickly as the new nuclear power stations could be planned and constructed, allowing for the fact that operating deadlines for mines, just as for power stations, are affected by environmental-protection problems. There are other flexibilities within the market which stem from changes in the rate of tails assay by enrichment facilities, the use of stocks and the expansion of existing mines.

All things considered, the Agency shares the Uranium Institute's view that there is no reason to depart from the conclusion of the report of February 1979 according to which the uranium production industry should have the capacity to satisfy likely demand up to at least 1990.

Future events will be determined by demand and the expected price of uranium in relation to the costs of production during the course of the present decade. These prices will have to be sufficiently remunerative so as to allow the level of expenditure on prospecting and mining development to be sufficient to assure an adequate security of supply beyond the latter years of the 1980s.

The practice - largely followed by the electricity producers in the Community - of entering into long term commitments is also a factor which encourages prospecting activities and the development of deposits by the mining industry.

The report of the Uranium Institute concludes that the present problem is one of an excess of supply and supply capacity rather than shortage during the 1980s; the forecasts suggest that during the second half of the present decade and the first half of the next, there should be no fundamental factors which would prevent supply and demand from attaining a reasonable balance, assuming, however, that reasonable economic incentives will exist to ensure both the continuation of a high level of prospecting and the timely development of mines, which together are essential.

The security and stability of supply for the users in the Community, which are essential to the Community depending as it does on external sources for a substantial part of its natural uranium requirements, seems thus able to be assured in reasonable conditions; this implies however that any conditions which may be imposed by the public authorities of the producer countries, on contracting parties - notably concerning minimum prices - should be as limited as possible, clearly defined in advance and not subject to frequent changes.

Turning to the subject of prices and taking account of the great variety of formulae and levels, the average price (weighted by quantity) paid by Community users under medium

and long-term (*) contracts fell somewhat during 1981. Nevertheless, this price is still higher than the spot-market "indicators", essentially American, of which certain producers, in numerous international meetings where the subject has been discussed, underlined that if such indicative prices should be reflected in the prices of their medium and long term contracts, they would be capable of jeopardizing their future production capabilities. Nevertheless, in the view of the Agency the prices seen during 1981 expressed the state of the market and the perceptions of those participating as to the development of the market.

One cannot deny, in this connection, the unavoidable influence of the spot market on the market for medium and long term contracts, although there tends to be a certain time-lag here. Accordingly, the present low level of the spot-market indicators - linked to the substantial quantities available to date on the US market, in particular - has resulted in a certain decline in the prices of medium and long-term contracts expressed in constant (and even current) dollars, notably in respect of deliveries due in 1983-84.

Although this is true one must bear in mind the marginal character of the spot market and its spot transactions which, in 1981, accounted for less than 10% of all deliveries to the Community.

One of the aims of long-term contracts should be to alleviate, as far as possible, excessive cyclical price fluctuations in the interests, quite clearly, both of producers and users and in a bid to ensure greater security of supplies. The Agency is therefore of the opinion that, although a tendency to an increasing role of the spot prices may be observed at present,

---

(*) The expression medium and long term contract should be understood to mean for the purpose of this report a contract for which the time between the date of signature and the date of delivery exceeds one year.

it is not advisable to tie the pricing of medium and long-term contracts too closely to developments on a market which is not representative of structural economic trends and which at times is difficult to comprehend in statistical terms.

Conclusion of contracts

The number of natural (and depleted) uranium supply contracts concluded in accordance with the procedures of the Agency between 1.1.1981 and 31.12.1981 amounted to 63, signed by 24 companies in the Community with suppliers from 9 countries. Of the 63 contracts for the supply of uranium 35 related to "spot" transactions, that is contracts with a maximum duration of 1 year between the date of signature and the date of delivery. The other transactions related to 6 long term contracts, 1 medium term contract, 1 short term contract as well as 9 swap contracts, 5 leasing contracts and 6 contracts for the purchase of depleted uranium.

Concerning the volume of trade there were 27 purchase and lease contracts whose quantities exceeded 10 tonnes of uranium. Uranium purchase contracts concluded in 1981 as known to the Agency, covered approximately 12.000 tonnes to be delivered between 1981 and 2000.

Virtually all the quantities covered by these purchase contracts originate in non-Community countries.

Natural uranium deliveries made during 1981 under contracts known to the Agency for the account of companies in the Community amounted to about 13 000 tonnes. (As already mentioned, the deliveries made during 1981 under "spot" contracts known to the Agency represented less than 10% of total deliveries to the Community in 1981).

In the current situation regarding contracts of which the Agency is aware, deliveries should amount to approximately 11 700 tonnes in 1982 and 10 750 tonnes in 1983. The bulk of these deliveries (80%) will come from five countries, with no single country supplying more than a third of the total.

With regard to the price formulae adopted in new contracts, the trend towards leaving a greater margin for annual negotiation, already noted in 1979 and 1980, was confirmed in 1981. Given the fact that for most of the time the parties abide by an arrangement to keep to the "market price" and that only in rare cases is the long-term market price specified, this leads to increased reliance, as already mentioned, on prices pertaining in the spot market. In certain cases even recent long-term contracts provide for formal linkage to spot-market prices. The "spot price indicators" or the price on the spot market itself then cease to be reference points for the negotiation but become determining elements for the price of long term contracts. Furthermore, even when the prices negotiated are enclosed in a system of floor or ceiling prices, the latter are not rigid limits but rather are designed to lessen excessively wide fluctuations resulting from the link with the spot market.

Again, the recourse to "experts" for price questions (leaving aside the usual arbitration clauses), according to different formulae, in default of an agreement between the parties on the "negotiated price" continues to be provided for in recent contracts. The Supply Agency, however, is not aware of any cases where it was necessary for a price to be determined by experts in 1981.

Prices "non-spot" paid in the Community for deliveries made in 1981 and known to the Agency were in the majority of cases the result of the application of the "negotiated price" formulae and its variations. The average price (weighted by quantity) was on the basis of the rates of exchange applied by the users,

US $ 33.25/lb U_3O_8. Of these transactions, 90% were in the range US $ 27.5 - US $ 43.0. According to information published by US Department of Energy, the average price in the United States was US $ 30.95.

The average price of material supplied in 1981 under spot contracts signed by the Agency amounted to some US $ 28/lb, although the average price according to the NUEXCO "transaction value" indicator was only US $ 25.2. It should be pointed out that the majority of these contracts were concluded during the second half of 1980 and the first half of 1981, at a time when prices were higher and the transaction value was higher than its average value for 1981.

2. Special Fissile Materials Sector

General Survey

The past year has seen no significant changes concerning the supply of enriched uranium; since basic requirements are already covered by long-term contracts, users had very little scope for concluding new contracts or modifying existing ones.

For Community supplies there is a growing tendency to make use of internal sources at the expense of US DOE and Techsnabexport (1).

---

(1) The percentage supply from Community sources rose to 65.0% in 1981.

An examination of the production capacities in the Community (Eurodif and Urenco) and the requirements of Community users for enriched uranium - and hence separative work - underlines this tendency and shows clearly that in this area the Community is no longer dependent on imports, but on the contrary has the capacity to be a net exporter of enrichment services.

ENRICHMENT
COMMUNITY BALANCE
(t SWU)

	Production	Requirements	Balance
1978	-	1.400	- 1.400
1979	2.600	3.200	- 600
1980	6.000	3.900	+ 2.100
1981	6.700	4.500	+ 2.200
	Capacity		
1984	11.800	7.000	+ 4.800
1985	11.800	7.400	+ 4.400

It can be added that the individual portfolios of contracts concluded between Eurodif and Urenco and users in the Community appear to have tended to follow the national participationsin these two undertakings. In this connection, however, it should be noted that the general lack of demand has meant that an essential condition for a mutual penetration of the market was missing.

Viewing briefly the development of enrichment services capacities, one should note that certain countries, in particular, Japan and Brazil, who up to now have been in the market as buyers, have decided to construct national enrichment plants and have started to make the necessary investments. Even if in the first place these installations are intended to cover internal requirements, they will have an influence on the world market.

Furthermore, it should be noted that Australia, a substantial producer of natural uranium, has anounced its intention to upgrade locally produced uranium to the maximum and that detailed studies are under way on the possible construction of a plant for isotopic separation. From the point of view of consumer countries this policy poses serious problems if they are required to buy the product in an advanced form, especially if the conditions for such upgrading are more favourable elsewhere on the world market. It must be added that in the field of nuclear fuel supply many users prefer, for reasons of security of supply, to separate the purchase of natural uranium from the purchase of enrichment services; in the event that a user intended to buy enriched uranium, he would in any case wish to be free to negotiate the terms. The policy of upgrading uranium could thus be prejudicial to the producers of the countries concerned.

The following table, compiled from information currently available, shows trends in world enrichment capacities.

THE PROJECTED WORLD ENRICHMENT CAPACITY (t SWU)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
EURODIF (France)	6.500	10.000	10.800	10.800	10.800	10.800	10.800	10.800	10.800	10.800	10.800
URENCO	450	550	750	1.100	1.450	1.750	2.100	2.300	2.700	3.000	3.300
DOE Diffusion (USA)	26.200	26.900	27.100	27.300	27.300	27.300	27.300	27.300	27.300	27.300	27.300
DOE Centrif. (USA)	-	-	-	-	-	-	-	-	1.100	2.200	2.200
Techsnabexport (URSS)	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
PNC (Japan)	-	-	-	-	-	-	100	100	250	250	250
UCOR (South Africa)	-	-	-	-	-	-	-	-	100	100	100
NUCLEI (Brazil)							100	200	200	200	200
COREDIF (France)	-	-	-	-	-	-	-	-	-	2.500	2.500
TOTAL	36.150	40.450	41.650	42.200	42.550	42.850	43.400	43.700	45.450	49.350	49.650

Eurodif

In 1981 the construction of the Tricastin uranium separative plant was completed with the installation of the fourth and last enrichment unit. The present capacity is of 10,000 tons swu/year. The beginning of the operation of the last parts of the plant will occur during the first months of 1982.

According to Eurodif, the operation of the enrichment cascade continued under quite satisfactory conditions and allowed the realisation of the different production programmes as scheduled. In particular, products for which delivery was requested during the year amounted to approximately 6300 tons swu.

Notwithstanding the fact that the plant is still in the starting up period, the financial balance has been positive.

The structure of the capital of the company has undergone a slight modification as a part of the shareholdings of CNEN and AGIP Nucleare has been transferred to COGEMA. In consequence, the Italian share has decreased from 25% to 16.25%, while the consolidated share of COGEMA becomes now 51.55%.

Urenco

For Urenco 1981 is considered a year of further steady progress. Construction work on the buildings and services of 1000 tonnes centrifuge enrichment plants at Almelo and Capenhurst was completed and the installation of centrifuges is proceeding. Uranium hexafluoride was introduced into the Almelo plant in October 1981 and commissioning of the first tranches of enrichment capacity at both plants will be completed early in 1983.

As reported last year, Urenco Deutschland is responsible for the development of the site at Gronau, Germany, and at the end of 1981, an important step was achieved with the granting, by the Ministry of Work, Health and Social Affairs, Northrhine-Westphalia of a licence for the opening of the site and the construction of buildings; subsequent licences, including the operating licence, are expected in 1982 and 1984. The first phase of 400 tonnes SWU/year is scheduled for completion in 1986. A centrifuge assembly plant is already in operation on the Gronau site.

Further contracts for enrichment services were obtained during the year, both within the countries participating in the Urenco enterprise and elsewhere; about 20% of the contracts held by Urenco are with electricity utilities outside these countries.

Production of separative work during the year amounted to 450 tonnes of which 400 tonnes were delivered under contract.

During the period under review the early pilot plants at Capenhurst and Almelo were closed down after many years of successful operation. The longest running centrifuges have now logged more than eleven years of continuous operation.

Urenco is reported to maintain its policy of matching capacity to the delivery requirements of firm contracts. The two 200 tonnes plants at Capenhurst and Almelo continue to operate at 99% capacity. Centrifuge failures, as in previous years, have been well below 1%.

US Department of Energy (DOE)

One short-term contract was negotiated with the US DOE in 1981, but no new long-term contracts were concluded (as has been the position since 1975).

Since one requirements contract was cancelled in 1981, the present situation is as follows: there are 24 contracts in force, 11 of which are requirements contracts; two of the five long term fixed commitment (LTFC) contracts have been changed into adjustable fixed commitment (AFC) contracts, increasing the number of AFC contracts to six, four of which run for not less than ten years from the first delivery. There is also one short term fixed commitment (STFC) contract, deliveries under which are planned for 1982, and three permissible deferred payment inventory (PDPI) contracts covering deliveries up to 1983-85. In 1981 there were spot purchases on the American market. These are possible through either the sale of swu by a customer of US DOE to a Community party or the assignment of a contract between US DOE and one of its customers in favour of another party. The difference between the two methods lies in the fact that only in the latter case is a direct contractual link established between US DOE and the acquiring party. In these transactions reductions on the US DOE prices were granted.

In 1981 low-enriched uranium deliveries by US DOE amounted to some 165 tonnes, containing about 890 tonnes of separative work units, corresponding to about 10 - 11% of total enriched uranium deliveries in the Community in 1981.

Prices

As in the past the US DOE's charges for enrichment services have continued to rise. In particular, the requirements price per separative work unit rose by 27.4% from US $ 110.75/swu at 1st January 1981 to $ 141.14/swu at 1st January 1982, while the fixed commitment price rose by 18.9% from US $ 110/swu to $ 130.75/swu.

The ceiling price for requirements contracts reached a provisional figure of US $ 138.57 swu at 1.1.1982 ($ 127.59 at 31st December 1981) against $ 119.63/swu at 1st January 1981, an increase of 15.8%. DOE has already announced a further rise in its prices in 1982. It should be borne in mind, however, that the above mentioned prices apply only to contracts concluded with US DOE, which entail a firm commitment to purchase and deliver at a price stipulated by the producer, that is to say the American administration.

The prices for deliveries made under contract, with Techsnabexport (USSR) have been based, as in the past, on American prices.

Other suppliers of enrichment services conclude more traditional commercial contracts containing a basic price formula with an indexing clause agreed between customer and supplier; consequently these are not published. This method is considered more advantageous by many parties because it allows account to be taken of the particularities of each requirement and any special relationship between the producer and the customer. Moreover, the basic price formula with an indexing clause gives long term predictability as to the prices to be paid.

A general review of the cost of enrichment services in the framework of the cost of the "front-end" of the fuel cycle shows that because of on the one hand general increases, which are particularly high when expressed in ECU (1), both of US DOE prices and those of Techsnabexport, and because of on the other hand the stagnation of natural uranium prices, the incidence of enrichment on the cost of operations at the front end of the fuel cycle has increased and now exceeds 40%. At the same time the natural uranium component has for the first time fallen below 40% of this cost. As a result, once users have built up strategic reserves they prefer to keep the uranium in the form of natural uranium rather than to have it enriched as they make a considerable saving on the amount of capital tied up. If this practice continues in the coming years, it could cause difficulties in the rate of utilization of plants as the enrichment services capacities already exceed real needs. Also, some users who have more enriched uranium available than they really need in the short and medium term might be tempted to offer it on the market, and this would cause disturbances.

Export Licences

As last year, no difficulties were experienced in obtaining export licences and the tendency for applications to be processed more quickly continued, with obvious advantages for Community customers.

---

(1) 1 ECU (European currency unit) was worth $ 1.31 at the end of 1980 and $ 1.10 at the end of 1981.

There was also an increase in multiple reload licences covering deliveries over several years (from two to five), which were up from one in 1980 to four in 1981.

Better long-term fuel management is thus possible.

Supply of highly enriched uranium (HEU)

As in previous years all the Community's requirements were covered by deliveries from the United States (1), which has in practice a monopoly. What is more, deliveries are very dependent on the smooth progress of authorization procedures, which follow from the policy of the supplier country. However, in 1981 the procedure was simplified somewhat under the new administration. In particular, Presidential consent is no longer required for exports equal to or above 15 kg U-235 in HEU.

During 1981 a total of 12 export authorization procedures covering 365 kg were initiated, mainly for reactors in the Community; eight of these licences covered a total of 156 kg at an enrichment of 93% and six a total of 209 kg at enrichments of 20 to 45%. Two licences covered enriched uranium at 93% and at the same time uranium enriched at between 20% and 45%. During the same year 27 licences (4 applied for in 1981) were granted, 20 for a total of 341 kg at an enrichment of 93% and 7 for a total of 200 kg at enrichments between 20 and 45%.

---

(1) In the Community HEU is required for research reactors, including high-flux-reactors, high-temperature gas reactors and the fabrication of fuel elements for customers in non-member countries. Average annual requirements in recent years have been about 500 kg.

As far as the use of highly enriched uranium is concerned, it is still the policy of US DOE to reduce the enrichment level; even though this is accepted in principle by those concerned, technical and budgetary difficulties (1) are increasingly being encountered. In this context the Agency has maintained its contacts with the American authorities in order to assure supplies of highly enriched uranium for the Community in some cases beyond 1985 to allow for the fact that some of the planned modifications will take longer than originally foreseen. The future policy towards the reprocessing of irradiated fuel from research reactors, which until now and through 1982 is being handled under contracts with the Savannah River Operations Office of US DOE, has not yet been decided by the American Authorities; that is to say no decision has yet been taken whether from 1983 onwards the reprocessing of fuel originally containing highly enriched uranium and coming from customers in the civil sector outside the USA will be undertaken. For its part the Agency has initiated contracts aimed at seeking a decision favourable to the interests of users in the Community in view of the value of the irradiated fuel (re-use of recovered enriched uranium) and the need to close the cycle.

---

(1) In particular, the development of high-density silicon fuels is coming up against additional difficulties especially as regards reprocessing in view of the increase in the cost of the research programme and the budget cuts at US DOE.

Plutonium

A considerable development in this sector took place in comparison with the activities of the previous year. In 1981 the Agency concluded 11 intra-Community sales contracts and one extra-Community contract for a total of 870 kg, and one loan agreement for a large amount, the plutonium in question coming from the reprocessing of fuel elements from several light water reactors in the Community and one reactor in a non-Community country, the reprocessing for which was undertaken by COGEMA at La Hague.

Plans are that the plutonium in question will be used entirely in the Superphénix (Creys Malville) and SNR 300 (Kalkar) fast reactors, thus virtually completing the loading of the first core of the two reactors.

Prices are continuously being pushed down (1), largely because of the high costs of storage after reprocessing and the relative abundance of plutonium on the market.

Looking at possible future developments and taking account only of the reprocessing contracts which have been concluded (leaving aside the question of whether the plutonium will actually be extracted as planned), it seems that in the years to come the supply of plutonium will exceed that required by the fast reactors' programmes. This coupled with the cost and technical problems associated with the storage of plutonium may lead to a long lasting continuation of the present trends which are becoming apparent towards increased recycling of plutonium in light water reactors, and on a scale going well beyond that of the trials of mixed oxide fuel elements which have been made so far in several reactors.

---

(1) The range of prices is normally from US $ 10 to US $ 4 per gramme Pu fissile.

New contracts and other activities

More sales contracts for special fissile materials were concluded in 1981 than in the previous year (68 against 50); about two thirds related to Community transactions.

There were also four loan contracts, two covering Community transactions and two imports; some additional contracts covered the supply of isotopes and standards of the US National Bureau of Standards. Further, several hundred nuclear standards were procured under a contract already concluded in 1980, for the Central Bureau of Nuclear Measurements (Geel) and mostly for transmission to Community customers.

There were 24 applications for authorization to transfer materials of American origin to or from other countries (the MB 10 procedure) in 1981 but by the end of the year only 13 authorizations had been granted; however, 12 authorizations were granted from procedures started the previous year.

IV.

SUPPLY OF NUCLEAR FUEL AND NON-PROLIFERATION

For the year under review no general developments in the area of non-proliferation and assurances of supply can be reported. As became evident after the conclusion of INFCE in 1980 and the failure of the second NPT-review-conference in August 1980, further work on problems of non-proliferation and assurance of supply has been mainly pursued in bilateral negotiations between supplier and receiver states. Although in parallel the issue has been under discussion in international fora too, the only results in terms of establishment of legal instruments were achieved in the field of bilateral relations.

Accordingly, as already noted by INFCE Working Group 3, international nuclear trade at present depends on an "intricate network of international treaties, agreements, instruments and practices". Attempts towards simplification and harmonization in this area will prove a difficult and time-consuming process. It is not realistic to expect that the existing system can immediately be superseded by a new, comprehensive and binding multilateral arrangement. There seems to be widespread agreement among governments participating in international discussions on this issue that improvement, if it is to be achieved will be evolutionary rather than revolutionary. It is in this context that the rather slow development in multilateral discussions should be seen.

1. Activities in the framework of IAEA

In the year under review the following activities continued in the framework of the IAEA. :

a) International Plutonium Storage (IPS)

The group of experts held two meetings in which participants tried to resolve the difficult questions of the procedures and conditions governing deposit of plutonium with and release of it from the IPS system and to finalise the basic documents.

At the end of the year progress in the work of the group was reported, and expectations were expressed that a text could be submitted to the Board of Governors of the IAEA for its meeting in February 1983. Whether the scheme, then, will be really set up and put into effect independently of parallel progress in other areas of ongoing multilateral non-proliferation discussions will have to be seen.

There have been at least some voices expressing the view that the acceptance of a commitment to an additional international safeguards instrument, such as the IPS, should be balanced by a considerable easing of conditions related to the reprocessing of spent fuel and the subsequent use of plutonium, as currently laid down in bilateral agreements.

It is further premature to comment on the impact the IPS system may have on the industry. The actual status of the discussions in the expert group seems to allow the conclusion that the utilities as holders of plutonium will not be concerned with its physical storage - this being concentrated on a few places only such as the reprocessing installations and the sites of fabricators; they will, of course, be involved in the procedures for the deposit of the material in the IPS system and its release, because they will have to demonstrate whether there is use for the material in question.

b) Committee for Assurance of Supply (CAS)

The Committee held three sessions in 1981. On average, about 50 IAEA Member States were represented, and three international organisations attended as observers. In accordance with its mandate

"to consider and advise the IAEA Board of Governors on :

(1) Ways and means in which supplies of nuclear material, equipment and technology and fuel cycle services can be assured on a more predictable and long-term basis in accordance with mutually acceptable considerations of non-proliferation; and

(2) The Agency's role and responsibilities in relation thereto",

the Committee determined its work programme.

The Committee agreed that it would adopt a flexible, open-ended approach to its work programme, and it decided to start by considering "Principles of international cooperation in the field of nuclear energy in accordance with the mandate of the CAS" and also "Emergency and back-up mechanisms". The choice of these two items allows the Committee to consider a wide range of problems concerning non-proliferation and supply assurance in a comprehensive manner and to tackle at the same time more general questions of principles and very concrete mechanisms related to supply assurance. Other subjects remain to be discussed, and the Committee has agreed to leave open its list for further possible additions.

At its fourth session the Committee decided to establish two working groups to carry forward, between sessions, its work on these two topics.

It is certainly too early to comment on the work of CAS. The questions to be treated are very difficult and of considerable complexity. However, it is probable - and this became evident during the discussions last year - that the achievements of CAS will be of importance for international trade in nuclear materials. The industry, therefore, will have to follow this with attention.

2. Community agreements with supplier countries

The position at the end of the period under review with regard to agreements concluded or negotiated by the European Community determining conditions for access to and use of nuclear material can be summed up as follows :

AUSTRALIA / EURATOM

After about two years of negotiation the agreement between Australia and Euratom was signed in September 1981 (*). This agreement concerns transfers of nuclear material from Australia to the Community and sets out agreed conditions for such transfers and subsequent retransfers. Those conditions include prohibition of explosive and military use, application of a system of safeguards applied by Euratom and the International Atomic Energy Agency (IAEA) pursuant to the provisions of the Euratom Treaty and the three Verification Agreements concluded by Euratom, its Member States and the IAEA. There are further provisions providing for fall back safeguards and adequate physical protection measures.

(*) Following an exchange of diplomatic notes it entered into force on 15th January 1982.

Of particular importance for the industry are those provisions in the agreement that concern the so-called sensitive fuel cycle operations, such as reprocessing, plutonium storage and enrichment beyond 20%. As regards reprocessing the agreement provides that nuclear material subject to the agreement shall only be reprocessed according to conditions agreed between the parties. They are set out in an Annex to the Agreement. Based on the "programmatic approach", that is in the context of declared nuclear programmes, a long lasting, general and generic agreement on reprocessing and plutonium use and storage has been reached between the parties, and there will be no case by case procedures. With regard to re-transfers of Australian origin material the agreement provides also a generic consent concerning transfers to third countries which have an agreement in force with Australia concerning nuclear transfers (*) for conversion, enrichment up to 20% fuel fabrication and reprocessing, and for use, storage or final disposal. Such transfers will be notified to Australia. Transfers of nuclear material subject to the Agreement enriched beyond 20% in the isotopes uranium 233 and uranium 235 and plutonium from the Community to third countries can take place only in accordance with conditions agreed upon in writing between the parties.

The Euratom/Australia-Agreement, which, of course, covers the whole Community so that material can flow freely within it, will remain in force for a period of 30 years. As was stated in the Commission's press release on the occasion of the signature of the Agreement, "it provides the Community with a further diversification of its nuclear supplies and marks a substantial step forward in the development of relations between the Community, its Member States and Australia".

(*) At the end of the year Australia had agreements in force with the U.S.A., Sweden, Finland, Philippines, Canada and the two Euratom Member States France, UK. Negotiations were being conducted with Japan and Switzerland.

CANADA / EURATOM

Negotiations were undertaken during the year between the Community and the Government of Canada culminating in the signature, on 18 December 1981, of an agreement, in the form of an exchange of letters, on the reprocessing of Canadian origin nuclear material, plutonium storage and enrichment beyond 20%.

This agreement replaces the "Interim Arrangement concerning enrichment, reprocessing and subsequent storage of nuclear material within the Community and Canada" which was part of the Exchange of Letters between Euratom and Canada concluded in January 1978. That Exchange of Letters had been negociated between the parties following a request of the Canadians to adapt the 1959 "Agreement between the Government of Canada and the European Atomic Energy Community for co-operation in the peaceful uses of atomic energy" to the new requirements of the Canadian non-proliferation policy.

With regard to the so-called sensitive operations - enrichment beyond 20%, reprocessing, plutonium and HEU storage - the 1978 Exchange of Letters provided that these operations should take place "only according to conditions agreed upon in writing between the parties". Such conditions were first laid down in the Interim Arrangement of the same year. The parties agreed further to replace that arrangement "by other arrangements which will take into account, inter alia, any results of the INFCE studies in relation to the operations in question". The new exchange of letters which entered into force on the date of its signature (i.e. 18 December 1981) does now determine, on a long term basis, the conditions under which nuclear material subject to the Canada/Euratom agreement shall be enriched beyond 20% or reprocessed, and plutonium derived from such material be stored.

In future, the reprocessing of and storage of plutonium derived from Canadian origin material are no longer subject to notification and consultation on a case by case basis. Both operations are agreed to by Canada, in the new exchange of letters, on a long term and generic basis. This agreement is subject only to the following conditions:

- that the Community maintains its commitment to non-proliferation as set out in the 1978 Exchange of letters (para. c).

- that the Community continues to consult with the Government of Canada, as provided for by the 1959 Agreement, with a view to up-dating the nuclear energy programmes in the Community, as described in the new exchange of letters, and informing the Government of Canada on any significant changes.

With regard to enrichment beyond 20% of material of Canadian origin and the storage of such material, the new exchange of letters does not set out the conditions for these operations. Instead, it is provided that Euratom and the Government of Canada will consult within 40 days of the receipt of a request from either party to consider proposals for such conditions to be agreed upon in writing.

USA / EURATOM

No new developments have to be reported for 1981 as regards the Agreement for Cooperation between the Government of the United States and Euratom concerning peaceful uses of atomic energy and the Additional Agreement for Cooperation of 11 June 1960. The continuity of supplies from the USA to the Community was assured by the decision of the US authorities

to exempt supplies to the Community for a further year from the application of certain of the export criteria established by the Nuclear Non-Proliferation Act.

3. The industry's view

The Uranium Institute published in September 1981 a paper on "Bilateral Agreements and the Evolution of the International Safeguards System". The purpose of this paper is, as the authors describe it, to offer some industry views on how such bilateral agreements can be made to contribute better to their objectives without hampering international trade in nuclear materials. The paper is based on the understanding that the international regime for non-proliferation and nuclear trade will "in the near future" continue to include bilateral agreements. The problems resulting from this partly overlapping network of bilateral agreements, such as, for example, re-transfer procedures, origin tracking and double labelling need in fact urgent solution. The members of the Uranium Institute hope that their views, "springing as they do from day-to-day experience within the nuclear industry, will be found useful as an input to discussions now being undertaken by governments".

This corresponds fully with the opinion given by the Advisory Committee of the Supply Agency expressing the industry's viewpoint on non-discrimination - this opinion was published as an annex to the report of the Agency for 1980.

ADVISORY COMMITTEE OF THE SUPPLY AGENCY

Before the expiry of its biennial term of office in March 1981 the Advisory Committee completed work on two topics. The first took the form of a statement entitled "The industry's view on non-proliferation and the nuclear fuel market". This statement was published in the Agency's annual report for 1980. The second concerned levels of uranium fuel reserve. Following its earlier review of the Community's supply situation, the Committee came to the conclusion that the situation then pertaining to the uranium market was favourable for the purchase of uranium for reserve purposes and recommended that all utilities should hold or have access to uranium fuel reserves of at least 2 years future consumption. The Agency accepts this recommendation which it has submitted to the Commission and issued to the nuclear industry in the Community. It will, however, be for the utilities to decide on any appropriate action. A copy of the recommendation is

The Council of Ministers appointed the Committee for a new 2 year term of office on 28 September 1981. With the accession of Greece the membership of the Committee has been increased from 33 to 36.

The Committee elected Mr. P. Goldschmidt as Chairman and Mr. A. Noé and Mr. G. von Klitzing as Vice-Chairmen for this period. A fresh programme of work has been agreed, which will include a new review of the Community's supply situation. The Committee confirmed the terms of reference of the Working Party of which the presidency will be assumed by Mr. A. Petit, Chairman, and Mr. M. Palandri and Mr. M. Townsend, Vice-Chairmen.

Director General of the Euratom Supply Agency	J.B. Mennicken
Assistant to the Director General	J.C. Blanquart
Division Natural Uranium and General Affairs	J.C. Blanquart
Secretariat of the Advisory Committee Budget and Finance	D.S. Ennals
Statistics, Information	G. Nastri
Special Fissile Materials Sector	J. Jaspert

Advisory Committee of the Supply Agency

Chairman	P. Goldschmidt
Vice-Chairmen	A. Noé G. von Klitzing
Working Party	
Chairman	A. Petit
Vice-Chairmen	M. Palandri M. Townsend

Address for correspondence: Euratom Supply Agency
Rue de la Loi, 200
B - 1049 Brussels

Office: rue de Luxembourg, 46

Tel.: 02/235.11.11
Telex: 21877 COMEU B

APPENDIX 1

A. NUCLEAR REACTORS IN SERVICE IN THE COMMUNITY END 1981

Reactor +	Country	Type (x)	Commencement of operation	Net installed power MWe	
				Projected	Effective
Calder Hall (BNFL)	UK	GG	1956 - 59	200	200
Chapelcross (BNFL)	UK	GG	1959 - 60	200	192
G3 Marcoule (CEA)	F	GG	1960	40	40
VAK (Kahl)	D	BWR	1961	15	15
Berkeley (CEGB)	UK	GG	1962	275	276
Bradwell (CEGB)	UK	GG	1962	300	245
Latina (ENEL)	I	GG	1963	200	152
Windscale (UKAEA) ++	UK	AGR	1963	0	0
Hunterston A (SSEB)	UK	GG	1964	320	300
Garigliano (ENEL)	I	BWR	1964	150	154
Trino Vercel. (ENEL)	I	PWR	1964	247	260
Chinon 2 (EDF)	F	GG	1965	200	180
Chinon 3 (EDF)	F	GG	1967*	480	360
Hinkley Point A (CEGB)	UK	GG	1965	500	430
Trawsfyndd (CEGB)	UK	GG	1965	500	390
Dungeness A (CEGB)	UK	GG	1965	550	410
Sizewell A (CEGB)	UK	GG	1966	580	420
MZFR (Karlsruhe)	D	HWR	1966	51	51
BR 3 (Mol)	B	PWR	1966	10	10
SENA (Chooz)	F	PWR	1967	305	305
Winfrith (UKAEA)	UK	HWR	1967	92	92
EL 4 (Monts d'Arrée)	F	HWR	1967	70	70
Oldbury-on-Servern A (CEGB)	UK	GG	1967	600	416
AVR (Jülich)	D	HTR	1967	13	13
KWO (Obrigheim)	D	PWR	1968	328	328
GKN (Dodewaard)	NL	BWR	1968	52	52
St. Laurent A 1 (EDF)	F	GG	1969	480	390
St. Laurent A 2 (EDF)	F	GG	1971	515	450
Wylfa (CEGB)	UK	GG	1971	1 180	840
KWW (Würgassen)	D	BWR	1972	640	640
KKS (Stade)	D	PWR	1972	630	630

\+ Some reactors consist of more than one unit.

* Date of commercial operation.

++ Reactor shut down in 1981

Reactor	Country	Type (x)	Commencement of operation	net installed power MWe	
				Projected	Effective
KNK II (Karlsruhe)	D	FBR	1977	19	19**
Bugey (EDF) Rhône	F	GG	1972	540	540
KEC (Borssele)	NL	PWR	1973	450	447
Phénix (Marcoule)	F	FBR	1973	233	233
PFR Dounraey (UKAEA)	UK	FBR	1974	250	200
Biblis A - RWE (Rhein)	D	PWR	1974	1 146	1 146
Doel 1 (Schelde)	B	PWR	1974	390	395
Tihange (Meuse)	B	PWR	1975	870	870
Doel 2 (Schelde)	B	PWR	1975	390	395
Hinkley Point B 1	UK	AGR	1976	625	500
Hunterston B 1	UK	AGR	1976	625	550
Biblis B - RWE (Rhein)	D	PWR	1976	1 178	1 240
GKN 1 Neckarwestheim	D	PWR	1976	810	785
KKB Brunsbüttel	D	BWR	1976	770	744
Hinkley Point B2	UK	AGR	1976	625	540
Fessenheim 1	F	PWR	1977	890	890
Hunterston B 2	UK	AGR	1977	625	550
Fessenheim 2	F	PWR	1978 *	890	890
KKI Ohu (Isar)	D	BWR	1977	870	870
Enel 4 (Caorso) (Po)	I	BWR	1977	840	840
Bugey 2	F	PWR	1978	925	920
KWU Unterweser	D	PWR	1978	1 230	1 230
Bugey 3	F	PWR	1979 *	925	920
Bubey 4	F	PWR	1979	905	900
Philippsburg 1	D	BWR	1979	864	864
Bugey 5	F	PWR	1980 *	905	900
Gravelines 1	F	PWR	1980	925	920
Tricastin 1	F	PWR	1980	925	920
Dampierre 1	F	PWR	1980	905	900
Tricastin 2	F	PWR	1980	925	920
Gravelines 2	F	PWR	1980	925	920
Tricastin 3	F	PWR	1981	920*	920
Tricastin 4	F	PWR	1981	920	920

** Since 1977 equipped with a fast core

* Date of commercial operation.

Reactor	Country	Type (x)	Commencement of operation	net installed power MWe	
				Projected	Effective
Dampierre 2	F	PWR	1981 *	900	900
" 3	"	"	1981	900	900
" 4	"	"	1981	900	900
Gravelines 3		"	1981 *	920	920
" 4	"	"	1981	920	920
Le Blayais 1	"	"	1981	920	920
KKG (Grafenrheinfeld)	D	"	1981	1230	1230
				41.648	39.799

(x) GG = Gas Graphite
BWR = Boiling water reactor
HTR = High temperature reactor
FBR = Fast breeder
AGR = Advanced gas cooled reactor
PWR = Pressurised water reactor
HWR = Heavy water reactor

* Date of commercial operation

B. REACTORS UNDER CONSTRUCTION IN THE COMMUNITY END 1981

(EXCLUDING THOSE ORDERED IN 1981)

Reactor	Country	Net Power MWe
ADVANCED GAS REACTORS (AGR)		
Dungeness B (CEGB)	UK	1 200
Hartlepool (CEGB)	UK	1 250
Heysham (CEGB) A + B + C + D	UK	2 500
Torness (SSEB) A + B	UK	1 250
TOTAL AGR	UK	6 200
BOILING WATER REACTORS (BWR)		
KKK (HEW/NWK Krümmel/Elbe	D	1 260
KRB II B (RWE/Bayern W) Gundremmingen/Donau	D	1 249
KRB II C (RWE/Bayern W) Gundremmingen/Donau	D	1 249
ENEL 6 (Montalto di Castro)	I	982
ENEL 8 (Montalto di Castro)	I	982
TOTAL BWR		5 722
PRESSURISED WATER REACTORS (PWR)		
Tihange 2/Meuse	B	900
Tihange 3/Meuse	B	980
Doel 3/Schelde	B	900
Doel 4/Schelde	B	980
Mulheim/Kärlich (RWE)/Rhein	D	1 154
KBR (NWK/HEW) Brokdorf	D	1 294
KWG (Preag/GWK Weser) Grohnde/Weser	D	1 294
KKP 2 (Baden W/EVS) Rhein Philippsburg	D	1 281
Gravelines 5 (EDF) Nord	F	920
Gravelines 6 (EDF) Nord	F	920

Reactor	Country	Net Power MWe
Le Blayais 2 (EDF) Gironde	F	920
Le Blayais 3 (EDF) Gironde	F	920
Le Blayais 4 (EDF) Gironde	F	920
St. Laurent B 1 (EDF) Loire	F	880 (+)
St. Laurent B 2 (EDF) Loire	F	880 (+)
Paluel I (EDF) Seine-Maritime	F	1 285
Paluel II (EDF) Seine-Maritime	F	1 285
Paluel III (EDF) Seine-Maritime	F	1 285
" IV " " "	F	1 285
St. Alban I " "	F	1 285
" " II " " "	F	1 285
Flamanville I (EDF) Manche	F	1 285
" II " "	F	1 285
Chinon B 1 (EDF) Loire	F	875
Chinon B 2 (EDF) Loire	F	875
Cruas I (EDF) Ardèche	F	880
Cruas II (EDF) Ardèche	F	880
Cruas III (EDF) Ardèche	F	880
Cruas IV (EDF) Ardèche	F	880
Cattenom I (EDF) Moselle	F	1 270
" II " "	F	1 270
TOTAL PWR		33 233
HIGH TEMPERATURE REACTOR (HTR)		
THTR 300 (HKG Uentrop/Schurehausen)	D	300
FAST BREEDER REACTORS (FBR)		
SNR 300, Kalkar, Niederrhein	D	282
Superphenix (Creys-Malville Rhône)	F	1 200
TOTAL FBR		1 482

(+) Connected to the grid in 1981. Commercial operation in 1982.

Reactor	Country	Net Power MWe
HEAVY WATER REACTOR (HWR)		
Cirene (CNEN), Latina	I	40
REACTORS UNDER CONSTRUCTION END 1981		
(except those ordered in 1981) RECAPITULATION		
AGR		6 200
BWR		5 722
PWR		33 233
HTR		300
FBR		1 482
HWR		40
T O T A L		46 977

C. REACTORS UNDER CONSTRUCTION ORDERED IN 1981

Type	Plant	Country	Net Power MWe
PWR	Chinon B 3	F	875
"	Belleville 1	F	1 270
"	" 2	F	1 270
"	Nogent/Seine 1	F	1 270
T O T A L			4 685

D. ADVANCED PROJECTS IN THE COMMUNITY END 1981

(REACTORS NOT UNDER CONSTRUCTION)

Reactor	Country	Net Power MWe	
PRESSURISED WATER REACTORS (PWR)		Individual	By Group
Biblis - C (RWE) Rhein	D	1 240	
GKN 2 Neckarswestheim	D	810	
KK Ems (VEW/El. MARK) Lingen	D	1 230	
KWB (Preag) Borken	D	1 240	
KKH Hamm (VEW/Elektromark)	D	1 232	
Neupotz (Pfalz /RWE) A Rhein	D	1 230	6,982
KWS-1, Wyhl (BAG/EVS) (°)	D	1 250	
Isar 2, Ohu (Bayernwerk)(°)	D	1 230	2,480
Chinon B 4 (*)	F	875	
Nogent 2 (*)	F	1 270	
Cattenom 3 (*)	F	1 270	
Golfech 1 (*)	F	1 270	
Chooz B 1 (*)	F	1 270	
Penly 1 (*)	F	1 270	7,225
T O T A L		16 687	16,687

(°) Reactors ordered before 1981 but not under construction

(*) Probably investment programmes 1982 and 1983

RECOMMENDATION CONCERNING LEVELS OF URANIUM FUEL HELD IN RESERVE

Statement by the Advisory Committee of the Euratom Supply Agency

(March 1981)

The Advisory Committee recently undertook an assessment of the Community's uranium supply situation. It is clear from this assessment that some significant reserves of uranium fuel have been built up in the Community. The Advisory Committee recognises that there has been a change in the market since the previous occasion in 1977, when it considered the advisability of building up uranium fuel reserves. Whereas at that time uranium fuel reserve purchases could have had an adverse effect on a tight market, the present situation is reversed. As a result thereof the Committee now considers that the market lends itself to additional purchases for reserve purposes.

In the light of prevailing circumstances and as part of a strategy for security of long-term supply the Committee recommends that:

> the nuclear industry should maintain or have access to uranium fuel reserves as indicated below, and that while present market conditions continue operators should use the opportunity to build up such reserves and to bring them at least to the minimum indicated below if such levels have not already been achieved or beyond that level if they so consider fit.

Specifically, the Committee recommends that:

- all utilities operating nuclear reactors in the Community should maintain or have access to reserves of uranium fuel sufficient to cover in any case not less than 2 years future consumption;

- at any given moment, "reserve" is understood to mean all material (U3O8, UF6, enriched UF6, assemblies), readily available in the Community in excess of the "working stock" for the various stages of the fuel cycle, i.e. in excess of the quantities needed at that moment for the input in each of these stages within the contractual time limits;

- reserves of fuel be held in the form of uranium or enriched uranium;

- reserves of fuel be of material allowing maximum flexibility of use to the extent possible

- if a broad diversification of supply sources is not available to a utility, specific consideration be given to increasing uranium fuel reserves beyond the minimum recommended level;

- necessary measures taken to build up and maintain uranium fuel reserves should not be financially disadvantageous to those making them.

It is suggested that utilities and other organisations needing to hold uranium fuel reserves should attempt to achieve at least the minimum recommended level as soon as possible and that the Supply Agency keep the situation under permanent review.

The Advisory Committee further suggests that the Agency issue this recommendation to the nuclear industry in the Community and at the same time submit it to the Commission with the request to consider that it be transmitted to Member States Governments.

Euratom Supply Agency

Annual Report for 1981

Luxembourg: Office for Official Publications of the European Communities

1982 — 61p. — 21 x 29,7 cm

DE, EN, FR

ISBN 92-825-3084-1

Catalogue number: CB-35-82-465-EN-C

Price (excluding VAT) in Luxembourg

ECU 1,77 BFR 80 IRL 1,30 UKL 1 USD 2

The Report examines the activities of the Euratom Supply Agency in 1981:

— continuous review of the supply and demand for nuclear fuels in the Community and observation of developments in markets outside the Community

— participation in the conclusion of contracts on the supply of nuclear fuels in accordance with the procedures developed by the Agency in interpreting the provisions of the Euratom Treaty.

— advise and assistance to undertakings for obtaining export licences from third countries and retransfer authorizations.

— liaison with the appropriate Commission departments in the negotiation and implementation of agreements between the Community and supplier countries regarding access to and use of nuclear material.

The Report reviews the trends and prospects of development of nuclear energy in the various Member States of the Community, as well as the resulting nuclear fuel requirements. It analyses the situation of the Community supply (general survey, conclusion of contracts, prices), on the one hand in the natural uranium sector, and, on the other hand in the special fissile materials sector. In a chapter "supply of nuclear fuel and non-proliferation" it deals with relevant activities within the framework of the International Atomic Energy Agency, and with the Community agreements with Australia, Canada and the U.S.A. It finally mentions the activities of the Advisory Committee of the Agency.

Salgs- og abonnementskontorer · Vertriebsbüros · Γραφεῖα πωλήσεως · Sales Offices · Bureaux de vente · Uffici di vendita · Verkoopkantoren

Belgique — België

Moniteur belge — Belgisch Staatsblad

Rue de Louvain 40-42 — Leuvensestraat 40-42
1000 Bruxelles — 1000 Brussel
Tél. 512 00 26

Sous-dépôts — Agentschappen :

Librairie européenne — Europese Boekhandel
Rue de la Loi 244 — Wetstraat 244
1040 Bruxelles — 1040 Brussel

CREDOC

Rue de la Montagne 34 - Bte 11
Bergstraat 34 - Bus 11
1000 Bruxelles — 1000 Brussel

Danmark

Schultz Forlag

Møntergade 21
1116 København K
Tlf. (01) 12 11 95

Underagentur :

Europa Bøger
Gammel Torv 6 — Postbox 137
1004 København K
Tlf. (01) 15 62 73

BR Deutschland

Verlag Bundesanzeiger

Breite Straße — Postfach 10 80 06
5000 Köln 1
Tel. (0221) 20 29-0
(Fernschreiber : Anzeiger Bonn 8 882 595)

Greece

G.C. Eleftheroudakis S.A.

International bookstore
4 Nikis street
Athens (126)
Telex 219410 elef gr

Sub-agent for Northern Greece :

Molho's Bookstore
10 Tsimiski Street
Thessaloniki
Tel. 275 271
Telex 412885 limo

France

Service de vente en France des publications des Communautés européennes

Journal officiel

26, rue Desaix
75732 Paris Cedex 15
Tél. (1) 578 61 39

« Service de documentation »

D.E.P.P. — Maison de l'Europe
37, rue des Francs-Bourgeois
75004 Paris
Tél. 887 96 50

Ireland

Government Publications

Sales Office
G.P.O. Arcade
Dublin 1

or by post

Stationery Office

Dublin 4
Tel. 78 96 44

Italia

Libreria dello Stato

Piazza G. Verdi, 10
00198 Roma — Tel. (6) 8508
Telex 62008

Nederland

Staatsdrukkerij- en uitgeverijbedrijf

Christoffel Plantijnstraat
Postbus 20014
2500EA 's-Gravenhage
Tel. (070) 78 99 11

United Kingdom

H.M. Stationery Office

P.O. Box 569
London SE1 9NH
Tel. (01) 928 69 77. ext. 365

Sub-agent :

Alan Armstrong & Associates
8 Queen Victoria Street
Reading, Berks. RG1 1TG
Tel. (01) 258 37 40
(01) 723 3902

España

Mundi-Prensa Libros, S.A.

Castello 37
Madrid 1
Tel. (91) 275 46 55

Portugal

Livraria Bertrand, s.a.r.l.

Rua João de Deus — Venda Nova
Amadora
Tél. 97 45 71
Télex 12 709 — litran — p.

Schweiz - Suisse - Svizzera

Librairie Payot

6, rue Grenus
1211 Genève
Tél. 31 89 50

Sverige

Librairie C.E. Fritzes

Regeringsgatan 12
Box 16356
103 27 Stockholm
Tél. 08-23 89 00

United States of America

European Community Information Service

2100 M Street, N.W.
Suite 707
Washington, D.C. 20 037
Tel. (202) 862 95 00

Canada

Renouf Publishing Co., Ltd.

2184 St. Catherine Street West
Montreal, Quebec H3H 1M7
Tel. (514) 937 3519

Grand-Duché de Luxembourg

*
**

Andre lande · Andere Länder · Ἄλλες χῶρες · Other countries · Autres pays · Altri paesi · Andere landen

Kontoret for De europæiske Fællesskabers officielle Publikationer · Amt für amtliche Veröffentlichungen der Europäischen Gemeinschaften · Ὑπηρεσία Ἐπισήμων Ἐκδόσεων τῶν Εὐρωπαϊκῶν Κοινοτήτων · Office for Official Publications of the European Communities · Office des publications officielles des Communautés européennes · Ufficio delle pubblicazioni ufficiali delle Comunità europee · Bureau voor officiële publikaties der Europese Gemeenschappen

L-2985 Luxembourg - 5, rue du Commerce - Tél. 49 00 81

Price (excluding VAT) in Luxembourg:
ECU 1,77 BFR 80 IRL 1,30 UKL 1 USD 2

OFFICE FOR OFFICIAL PUBLICATIONS
OF THE EUROPEAN COMMUNITIES

L-2985 Luxembourg

ISBN 92-825-3084-1