EURATOM SUPPLY AGENCY

ANNUAL REPORT

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SUMMARY

In 1997 the net nuclear electricity generated in the European Union amounted to 813.5 TWh representing approximately 35.6% of the total electricity produced, amounting to 2 285.5 TWh[1].

This report for 1997, as in previous years, concentrates on the nuclear fuel market and the supply of nuclear fuels to users in the European Union. The supply of the nuclear power stations of the European Union has been satisfactory. In the natural uranium market, in particular, the depletion of user inventories is not yet reflected in prices, which remained low. The uranium supply from Russia and other New Independent States has been followed closely. In order to ensure an adequate diversity of supply sources and to avoid overdependence on a single source of supply, the policy has been maintained for utilities in the European Union not to cover more than a certain share of their needs with supplies of material originating in any of the New Independent States. The introduction on the market of blended High Enriched Uranium from the military cycle has not yet had a significant impact but is attracting much attention.

The recognition of the need to limit fossil fuel burning because of its climatic effects, as discussed in Kyoto in December 1997, provides a strong argument for some countries to maintain and increase the nuclear contribution to the total energy mix. In the European Union only France had new reactors connected to the grid in 1997. Only one reactor was under construction in the European Union in 1997, again in France, for commissioning in 1998.

With regard to new initiatives, and arising from the co-operation between Framatome, Siemens, EdF and German utilities, the basic design phase of the European Pressurised Water Reactor has been completed. Siemens and German utilities were also active in the development of the new concept Boiling Water Reactor BWR-1000.

Decisions to close, or not to continue to operate reactors, have been taken in France (Superphenix) and in Sweden (Barsebäck) but have, in both cases, met great opposition from trade unions and industry representatives. At the time of the completion of this report, the future of the Mülheim-Kärlich nuclear power plant, following the ruling of the Federal Administrative Court of January 1998, is very uncertain.

Member States with and without nuclear power are engaged in the disposal of Low Level Waste and Intermediate Level Waste. Some Member States also have long term projects for the disposal of High Level Waste. The Member States concerned are at different stages of deciding, licensing, creating, extending or exploiting underground laboratories for the evaluation of geological repositories.

The fabrication of MOX fuel for Japan, which will take place in Belgium, has been covered by an exchange of diplomatic notes between the European Commission and Japan in February 1997. A significant advantage of the use of Mixed Oxide Fuel, a technology in which Member States of the European Union have the lead, is the reduction of the plutonium inventories.

Two international agreements entered into force in 1997 with relevance in the nuclear area, namely the Partnership and Co-operation Agreement with Russia and the Nuclear Co-operation Agreement with Argentina.

[1] Source : Eurostat.

ZUSAMMENFASSUNG

Im Jahre 1997 wurden in der Europäischen Union 813,5 TWh Elektrizität aus Kernenergie erzeugt, was ungefähr 35,6% der gesamten Stromerzeugung (2.285,5 TWh) entspricht[1].

Wie schon in den Vorjahren konzentriert sich dieser Bericht auf den Kernbrennstoffmarkt und die Versorgung der Verbraucher der EU mit Kernbrennstoffen. Die Versorgung der Kernkraftwerke in der EU verlief zufriedenstellend. Was insbesondere den Markt für Natururan angeht, so hat sich der Abbau der Lagerbestände bei den Verbrauchern noch nicht in den Preisen widergespiegelt, die niedrig blieben. Die Uranversorgung aus Rußland und den Neuen Unabhängigen Staaten wurde genau beobachtet. Um eine angemessene Streuung der Versorgungsquellen zu gewährleisten und einer zu großen Abhängigkeit von einzelnen Versorgungsquellen vorzubeugen, wurde weiterhin eine Politik verfolgt, mit der erreicht werden soll, daß die Verbraucher in der EU nicht mehr als einen bestimmten Anteil ihres Bedarfs mit Lieferungen mit Ursprung in den Neuen Unabhängigen Staaten decken. Die Vermarktung der Komponenten des hoch-angereicherten Materials aus militärischen Beständen hatte noch keinen spürbaren Einfluß, ist jedoch Gegenstand erhöhter Aufmerksamkeit.

Die Erkenntnis, daß der Einsatz fossiler Brennstoffe wegen seiner klimatischen Auswirkungen eingeschränkt werden muß, ist in den Augen einiger Länder ein wichtiges Argument dafür, den Beitrag der Kernenergie zum Energiemix insgesamt aufrechtzuerhalten und auszuweiten. In der EU hat lediglich Frankreich zwei neue Kernkraftwerke ans Netz genommen. Nur ein Reaktor, wiederum in Frankreich, war 1997 im Bau und soll 1998 in Betrieb genommen werden.

Hinsichtlich neuer Initiativen wurde – ausgehend von einer Zusammenarbeit zwischen Framatome, Siemens, EdF und deutschen EVU – die Designphase für den Europäischen Druckwasserreaktor (EPWR) abgeschlossen. Siemens und deutsche EVU waren auch in der Entwicklung des neu konzipierten Siedewasserreaktors BWR-1000 engagiert.

Entscheidungen, Kernkraftwerke stillzulegen oder nicht weiterzubetreiben, sind in Frankreich (Superphenix) und in Schweden (Barsebäck) getroffen worden, sind aber in beiden Fällen Gegenstand lebhaften Widerstands von Gewerkschaften und Industrievertretern. Zum Zeitpunkt des Abschlusses dieses Berichts war die Zukunft des Kernkraftwerks Mülheim-Kärlich nach der Entscheidung des Bundesverwaltungsgerichts von Januar 1998 noch völlig unklar.

Mitgliedstaaten mit und ohne Kernenergie sind in der Frage der Beseitigung schwach- und mittel-radioaktiven Abfalls engagiert. Einige Mitgliedstaaten verfügen auch über langfristige Vorhaben zur Beseitigung hoch-radioaktiver Abfälle. Die Verfahren betreffend Entscheidungsfindung, Lizensierung, Errichtung, Ausbau, Erweiterung und Nutzung unterirdischer Laboratorien für die Beurteilung geologischer Lager befinden sich in den betreffenden Mitgliedstaaten in unterschiedlichen Stadien.

Die Fabrikation von MOX-Brennelementen für Japan in Belgien wurde im Februar 1997 durch einen Austausch diplomatischer Noten zwischen der Europäischen Kommission und Japan abgedeckt. Ein bedeutsamer Vorteil des Einsatzes von MOX-Brennelementen – einer Technologie, in der die Mitgliedstaaten der EU eine führende Rolle spielen – ist die Reduzierung der Plutonium-Bestände.

[1] Quelle : Eurostat.

Zwei internationale Abkommen mit Bezug zur Kernenergie sind 1997 in Kraft getreten : das Partnerschafts- und Kooperationsabkommen mit Rußland und das Nukleare Kooperationsabkommen mit Argentinien.

RESUME

L'énergie électrique d'origine nucléaire nette produite en 1997 dans l'Union Européenne s'est montée à 813,5 TWh, soit approximativement 35,6% de l'électricité totale produite qui s'est élevée, elle, à 2.285,6 TWh[1].

Comme par le passé, le rapport 1997 se concentre sur le marché des combustibles nucléaires et sur l'approvisionnement des utilisateurs de l'Union européenne. L'approvisionnement des réacteurs nucléaires de puissance de l'Union européenne s'est déroulé de manière satisfaisante. Pour ce qui concerne particulièrement le marché de l'uranium naturel, l'appauvrissement des stocks des utilisateurs ne s'est pas reflété dans les prix qui sont restés bas. Les fournitures d'uranium en provenance de Russie et des Etats Nouvellement Indépendants ont fait l'objet d'un suivi serré. En vue d'assurer une diversification appropriée des différentes sources d'approvisionnement et d'éviter une sur-dépendance vis-à-vis d'une source unique, on a poursuivi la politique visant à éviter que les électriciens de l'Union Européenne ne couvrent plus qu'une certaine partie de leurs besoins au moyen d'approvisionnement en matières provenant d'un quelconque de ces Etats Nouvellement Indépendants. La mise sur le marché des mélanges à partir d'uranium hautement enrichi provenant du cycle militaire n'a pas encore eu d'impact significatif, bien que suscitant beaucoup d'intérêt.

La reconnaissance de la nécessité de limiter l'utilisation de combustibles fossiles en raison des effets climatiques induits, ainsi qu'il en a été discuté à Kyoto en décembre 1997, fournit un argument de poids, selon certains pays, pour le maintien et l'augmentation de la part du nucléaire parmi leurs sources d'énergie. En 1997, seule la France, au sein de l'Union Européenne, a vu deux nouveaux réacteurs couplés au réseau. Un seul réacteur, lui aussi en France, était en construction dans l'Union européenne en 1997 pour mise en service en 1998.

Pour ce qui est des nouvelles initiatives, et suite à l'accord de coopération entre Framatome, Siemens, EdF et certains électriciens allemands, la première phase du projet de « Réacteur Européen à Eau Pressurisée » a été menée à bien. Siemens ainsi que des électriciens allemands ont collaboré activement au développement du Réacteur à Eau Bouillante BNR-1000 de conception nouvelle.

La France (Superphenix) et la Suède (Barsebäck) ont décidé de fermer ou de ne pas poursuivre l'exploitation de ces réacteurs, mais, dans les deux cas, cette décision a rencontré une importante opposition des syndicats et des industriels. Au moment de la finalisation du présent rapport, le futur du réacteur nucléaire de puissance de Mülheim-Kärlich était très incertain à la suite de la décision de la Cour Administrative Fédérale de janvier 1998.

Les Etats membres, nucléaires ou non, se sont engagés sur le terrain du stockage des déchets moyennement ou faiblement radioactifs. Certains ont aussi des projets à long terme pour le stockage des déchets hautement radioactifs. Les Etats membres concernés en sont à différents stades pour ce qui regarde la décision, la licence, la création, l'agrandissement ou l'exploitation des laboratoires souterrains pour l'évaluation des sites géologiques.

La future fabrication, en Belgique, de combustibles MOX pour le Japon a été couverte par un échange de notes diplomatiques entre la Commission Européenne et le Japon, en février 1997. L'utilisation de MOX, technologie pour laquelle les Etats membres occupent une position de pointe, présente l'avantage significatif de réduire les stocks de plutonium.

[1] Source : Eurostat.

Deux accords internationaux concernant le secteur nucléaire sont entrés en vigueur en 1997, à savoir l'accord de partenariat et de coopération avec la Russie ainsi que l'accord de coopération nucléaire avec l'Argentine.

CHAPTER I

GENERAL DEVELOPMENTS

FOREWORD

The third conference of the Parties to the United Nations Framework Convention on Climate changes held in Kyoto adopted a protocol on 11 December 1997 by which a majority of industrialised countries have taken the commitment to reduce the greenhouse emissions (in particular CO_2) by the year 2010. The European Union and its Member States are parties to the Kyoto protocol, which will enter into force once it has been ratified. The conference provided, in the view of some countries, a unique opportunity for the nuclear industry to present its case and to emphasize that *nuclear power deserves full consideration as one of the means of curbing CO_2 emissions, as it is the only fully developed non-fossil electricity generating option with the potential for large scale development*[1].

In order to achieve the emission limits agreed in principle at the Kyoto conference, it seems probable that nuclear energy will continue to be required to generate a large proportion of the European Union's electricity. Maintaining the present level might not be sufficient to achieve these limits and an increase of nuclear generation capacity might be needed. Furthermore, nuclear power can contribute to the diversification of electricity production capacity which may be required for political, economic or strategic reasons.

These ideas and proposals are coming forward, however, at a time of deregulation of the electricity markets (Directive 96/92/EC[2]). Implementation of the Directive could affect the utilities long term strategy concerning electricity production capacity and fuel procurement. Deregulation is likely to increase competition among utilities leading them to reduce costs and to implement shorter term strategies.

In order to enable the nuclear power industry to fulfil what may be an increasingly significant role, a regular supply of nuclear fuels must be assured. In this respect, the objectives of the Euratom Treaty with regard to security of supply and viability of the basic nuclear industries remain, in the Supply Agency's opinion, very important, as was recently confirmed by the European Communities' Courts in their rulings on the rights and obligations of the Agency.

SUPPLY SITUATION

NATURAL URANIUM

As in previous years, the supply of natural uranium concentrates to the European Union (EU) users in 1997 was mainly covered by long term contracts. Deliveries under "spot" contracts amounted only to 12%. of the total. Russia was the largest supplier, followed by Niger, Australia and Canada. After rising steadily for the past several years the market share of Russia and the other uranium exporting republics of the former Soviet Union is tending to stabilise (see below).

The Supply Agency maintained its recommendation that users should hold sufficient stockpiles and cover their future needs primarily by long term contracts. EU utilities' stockpiles are, in general, considered adequate. Excessive

[1] Uranium Institute "Cleaning the Air: Nuclear Power and Climate Change". Statement by the nuclear power industry to the Third Conference of the Parties to the UNFCCC in Kyoto, published in http://www.uilondon.org/airclear.html 3 December 1997 and UI Core Issues Feb-Mar 1998.

[2] OJ L27 of 30.1.1997.

inventories have been drawn down, and deregulation of the electricity markets, which almost certainly will bring pressure to lower costs, may, in future, lead to even more stockpile reductions.

Most of the EU reactor requirements in the short to medium term are already covered by long term contracts. As a result potential demand is expected to be limited in 1998 and in 1999. However this may vary substantially depending on the exercise of options, which will be decided according to market conditions. In 1997, 13 long term contracts with primary producers for a total of more than 8 000 tU were signed by EU users and concluded by the Agency.

The Supply Agency's average price for natural uranium deliveries in 1997 under long term purchasing contracts stabilised while the average price for natural uranium delivered under spot purchasing contracts increased substantially (see Chapter 2).

Preliminary figures[1] indicate that total World production remained almost at the same level (35 800 tU in 1997 compared with 35 200 tU in 1996[2]). Western world production was some 29 200 tU in 1997 (compared with 28 700 tU in 1996[3]), while production in the rest of the world (China, NIS, Central and Eastern Europe) was in the order of 6 600 tU (compared with 6 700 tU in 1996). Within the EU, production remained very low, covering only a small fraction of the Community's needs, but EU companies continued producing abroad through their subsidiaries.

As in the last few years, World production fell well short of consumption, estimated[4] at some 64 500 tU in 1997. Therefore a large proportion of the requirements continued to be covered by use of inventories and sources other than primary production. As many of the mines currently in operation will be exhausted in the near to medium term, and excess stockpiles are being drawn down, new sources of supply will be needed. A supply shortage resulting from the gap between the World needs and the available supply (traditional and non-traditional) is not excluded; it could even be accentuated by delays of new mining projects in Canada and Australia. However, non-traditional sources, such as High Enriched Uranium (HEU) from disarmament (see below), and new mines may adequately cover future needs.

The argument about a possible shortage of natural uranium has been going on for several years but such a situation does not appear to be about to materialise in the near future. The Agency is of the opinion that security of future supplies can only be achieved if prices are at sufficient levels to sustain current production and to provide an incentive to the primary producers to start new mining projects on time. It is important also that new mining investments should not be endangered by disruptive supplies from non-traditional sources. The Agency recommends EU users to maintain a portfolio of diversified, long term contracts at equitable terms with primary producers. Deregulation of the electricity market may bring about a reduction of electricity prices and force the industry to reduce production costs; however changes to procurement and stockpile policies should be considered in the light of long term supply security imperatives.

CONVERSION, ENRICHMENT, FABRICATION

As in previous years conversion, enrichment and fabrication facilities in the EU provided adequate coverage for its needs. The market remained relatively stable, and current world-wide capacity is sufficient to meet current requirements.

In 1997 the conversion market was still in balance, but for the near future observers expect oversupply due to sales of uranium inventories, which include conversion, in particular of Russian origin in the case of material derived from the military HEU (contrary to the situation on the natural uranium

1 Sources : Uranium Institute News Briefings, UX Weekly and Urangesellschaft.

2 This figure slightly differs from the preliminary figure published in our Report for 1996.

3 See previous footnote.

4 Source : Uranium Institute Market Report 1996.

market, there are no restrictions on the sale of Russian conversion). The perception of a coming excess of supply has created already a downward pressure on prices for conversion.

Almost all enrichment supply continued to take place under multiannual contracts. Spot market activity remained very low world-wide. Price indicators showed a decrease, which could be attributed to competition amongst suppliers for reduced near term demand and possibly to favourable exchange rates for the EU enrichers. However, deliveries under some old long term contracts continued to take place at prices much above current levels, which lead to dissatisfaction among the utilities concerned and to litigation (see below).

The licensing process for the construction of a new enrichment plant by Louisiana Energy Services (LES) in the United States, using Urenco technology, advanced. However, a number of key issues need to be resolved before the US Nuclear Regulatory Commission (NRC) may take a final decision on the LES application. Separately, preparations for the privatisation of the United States Enrichment Corporation (USEC) also made progress, but the privatisation process could not be launched in 1997[1].

Talks have been announced between British Nuclear Fuels (BNFL) and Siemens with a view to establishing a joint venture for their respective fuel procurement, conversion and fabrication activities, as well as reactor construction; BNFL's reprocessing activities and its participation in Urenco are not affected.

REPROCESSING AND USE OF MIXED-OXIDE FUELS (MOX)

Reprocessing of spent fuel continued normally in France and the United Kingdom. The use of reprocessed uranium and mixed-oxide (MOX) fuels is progressing and additional fabrication capacity in the EU is due to become operational in the near future (see Chapter III).

With regard to the use of MOX in the USA, the Department of Energy published its industrial MOX strategy in July 1997. A draft call for tenders was issued in November 1997 concerning the construction of a MOX fabrication plant – which could use European technology – scheduled to start activities in 2007, and the irradiation of MOX fuel in three to eight US civil reactors between 2007 and 2022 containing 33 tons of plutonium derived from disarmament of nuclear weapons.

Bilateral co-operation between, on the one hand, France and Russia and, on the other hand, Germany and Russia in order to transform approximately 1.3 tons of plutonium per year into MOX fuel, started in 1992. In the framework of the Franco-German-Russian co-operation, an agreement between the three parties has been reached to carry out project work for the conception of a fabrication plant of MOX-DEMOX fuel. This project has received the support of the G7 countries.

Through the use of MOX, the civil nuclear industry adds an efficient contribution to the management of plutonium derived from the disarmament of nuclear weapons in the US and Russia and thus helps the disarmament process in compliance with non-proliferation objectives while contributing to electricity production.

[1] Following US government clearance the privatisation process was officially started in January 1998.

SUPPLY OF MATERIAL FROM THE NEW INDEPENDENT STATES (NIS)

POLICY WITH REGARD TO NIS SUPPLIES

As a group of countries, the New Independent States (NIS)[1] of the former Soviet Union remained the main source of the EU's supplies for natural uranium. Deliveries of natural uranium equivalent of NIS origin to EU utilities under purchasing contracts amounted to 3 900 tU, and a further 1 100 tU were acquired as a result of exchanges. The total acquisitions of natural uranium from NIS were therefore some 5 000 tU representing about 33% of total deliveries to EU utilities under purchasing contracts in 1997 (43% in 1996) or 28% of the total amount of fuel loaded in EU reactors.

Of the newly concluded contracts, those for NIS supplies represented only a moderate, though not negligible, share. Deliveries under older contracts, concluded in the early 1990s and contracts concluded before accession of new Member States, account for the high market share of the NIS deliveries, in particular those from Russia.

The NIS also maintained their market share at a stable level on the US market, where strict quotas apply but where some flexibility was allowed through the "matched sales" programme[2]. The breakthrough on the Japanese natural uranium market, which was expected by some, did not materialise in 1997.

Supply of Russian enrichment to EU end-users was comparable to that in previous years representing some 20% of the total delivered to the EU utilities in 1997. Additional quantities of separative work were delivered to EU companies following the re-enrichment of tails to 0.711% U235 (natural uranium equivalent) and above. Contracts were in place for the blending down of Russian HEU with EU reprocessed uranium, which contributed also to the acquisition of natural uranium feed and separative work of Russian origin, however the quantities involved are so far very limited.

The Agency continued to apply a flexible and pragmatic supply policy, which aims, in general, at ensuring security of supply for the EU users through the diversification of sources and the avoidance of over-dependence on any single one. The legality of this policy and of its enforcement through individual decisions on the conclusion of supply contracts, has been confirmed by the Court of First Instance in the Kernkraftwerke Lippe Ems (KLE) case (see below).

It is recalled that in the case of NIS supplies of natural uranium, the policy aims at maintaining the maximum dependency of the EU users at approximately one quarter of total net requirements, and at ensuring trade at "market related prices". The policy is applied on a utility by utility basis and allows for some flexibility to take care of special cases or situations, e.g. a utility with very small requirements, "combined purchases" of Community production together with NIS material or rearrangement of delivery schedules (advancing deliveries under some contracts). The principles of the policy apply also to enrichment with somewhat lower quantitative limitations.

By virtue of Article 105 of the Euratom Treaty, contracts concluded by users of new Member States before their accession to the EU may continue to be implemented without restrictions; NIS deliveries under such contracts may therefore result in the above mentioned dependence level being exceeded, but such deliveries will be taken into consideration when the utilities concerned enter into new contracts for NIS supply.

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1 Referred to in previous reports as CIS (Commonwealth of Independent States); these countries are, notwithstanding their close ties, legally fully independent but they are dealt with together for essentially historical and geographical reasons. In practice the following republics are relevant with respect to natural uranium production : Russia, Ukraine, Kazakhstan, Uzbekistan, and, to a much lesser extent, Kyrgystan and Tajikistan.

2 The United States authorities continued to impose strict quotas on nuclear material from the NIS countries which are implemented and administrated on the basis of "Suspension Agreements". For Russia, limited amounts can be imported into the USA on the condition that they are matched with equivalent amounts of newly produced US material.

The Agency encourages parties to discuss with it in advance their draft contracts and their contractual intentions, in order to achieve a mutual understanding, and to avoid formal negative decisions possibly at a very late stage of negotiations.

PHYSICAL IMPORTS OF NIS ORIGIN MATERIAL

Physical imports from the NIS of natural uranium or feed contained in Enriched Uranium Product (EUP) amounted to some 12 100 tU in 1997 according to notifications from the EU operators, while the deliveries to the EU end-users were only 5 000 tU.

For the period 1992-1997 imports of natural uranium or feed contained in EUP from NIS amounted to a cumulative total of 75 600 tU. These quantities exceed by far the deliveries to the EU end users (some 26 900 tU over the same period); they include material in storage, in transit for final use outside the EU and a small amount of non-NIS origin uranium returned to EU after enrichment in Russia.

SUPPLIES DERIVED FROM DISARMAMENT OF NUCLEAR WEAPONS

Low Enriched Uranium (LEU) resulting from the blending down of military High Enriched Uranium (HEU), according to the 1994 agreement between Russia and the US, continued to be delivered to the United States Enrichment Corporation (USEC). Some 16 tHEU containing 4 800 tU feed equivalent and 3 200 t Separative Work (SW) were delivered in 1997. The enrichment component may be marketed freely in the US by USEC, but the ownership of the natural uranium component has to be returned to the Russians.

The way in which the above natural uranium feed component will be sold is not entirely clear and, in view of the quantities involved, remains one of the major factors affecting the natural uranium market in the future. A group of western companies had reached an agreement in principle with the Russian sellers over the marketing of that material, but the agreement was not concluded, reportedly because the guarantees which the Western companies were seeking could not be provided. At the end of the year the Russians announced that they would instead market the material through companies under their control. It is recalled that this material is subject to restrictions both in the EU (see above) and US[1].

LEGAL DEVELOPMENTS

In 1997 two landmark judgements were handed down by the Community courts in cases relating to nuclear supplies. Other legal matters are mentioned elsewhere (see “enrichment overpricing case” and “Mülheim Kärlich case”).

COURT OF FIRST INSTANCE JUDGEMENT IN THE KLE CASE

On 25 February 1997 the Court of First Instance handed down its judgement[2] in the case of the German user Kernkraftwerke Lippe Ems (KLE) versus the Commission of the European Communities.

KLE made two claims. The first was a claim for annulment against the Commission’s decision of 4 February 1994 in which the Commission accepted that the Agency needed to know the origin of the material concerned, before the time period for a decision on the conclusion of the contract could be held to have started. The second was an annulment action against the Commission’s decision of 21 February 1994 which supported the Agency’s decision not to conclude the contract if the material concerned was to come from the NIS,

[1] This material is subject to a special quota defined in the USEC Privatisation Act of 1996. This quota allows for the consumption in the USA of 769 tU/year in 1998 and increases yearly by 769 tU/year until 2009, remaining at the level of 7692 tU/year thereafter. The quantities above the quota must be re-exported (they are deemed to be of Russian origin and bear US safeguards obligations); alternatively these quantities may be sold jointly with newly produced US material (“matched sales”), if available, under certain limitations (see previous footnote).

[2] Joined cases T-149/94 and T-181/94, Kerndraftwerke Lippe-Ems/Commission, [1997] EcR, II 161.

and a compensation action for damages resulting from the allegedly illegal Commission decision.

As far as the first claim is concerned, the Court held that it is essential that the Agency knows the geographical origin in order to assure reliability of supply. In this case, the Court was of the opinion that the origin was at least implicitly agreed by the parties, and that therefore a later communication of the origin was not possible. The Court concluded that the Agency's decision, taken the tenth day after receipt of the information on the origin, was within a reasonable lapse of time and did not infringe Article 5bis (f) of the Agency Rules of 1960 and 1975 concerning the manner in which demand is to be balanced against supply. Therefore the first claim had to be rejected.

In support of its second claim (the annulment action against the Commission decision of 21 February and the compensation action), KLE submitted several pleas, mainly based on an interpretation of the Treaty whereby the exercise of the Agency's exclusive right to conclude contracts can not derogate from market forces and that therefore conclusion of the contract could not have been refused.

With reference to its judgement of 15 September 1995 in the Empresa Nacional del Uranio (ENU) case, subsequently confirmed on appeal (see below), the Court of First Instance considered the system of Chapter VI of the Euratom Treaty in the light of the aims of the Community, essentially the task of guaranteeing reliability of supplies, in accordance with the principle of equal access to resources. For that purpose the Supply Agency was established, which has a right of option and the exclusive right to conclude contracts. The simplified procedure did not deprive the Agency of this exclusive right, and therefore the Agency has the right to object to a contract which might prejudice the achievement of the Treaty objectives.

In general, the Agency has to observe the principle of balancing supply and demand, but the Treaty provides for one specific exception. Under Article 61, paragraph 1, the Agency is only obliged to meet all orders "unless prevented from so doing by legal or material obstacles". In the KLE case three such obstacles were identified, namely one deriving from the policy of diversification of external sources of supply, one relating to the low, not "market related", price level and one from the obligation of equal access, i.e. the requirement not to allow a privileged position for certain users.

As to the first obstacle, the Court considered, again with a reference to its ENU judgement, that the Agency has a discretion to bar certain imports of uranium which would reduce the diversification of external sources of supply. In particular, the Court admitted that security of supply could be jeopardised if NIS imports were permitted in unlimited quantities and were to replace traditional supplies, without any guarantee of continuity of supplies in the long term (point 94 of the judgement).

With respect to the second obstacle, the Court first established, with reference to the Court of Justice's Ruling in the physical protection case (ruling 1/78), that Article 14 of the Trade Agreement between the USSR and the Community, which provides that trade is to take place at market related prices, is part of Community law. After analysing the price data, in particular noting that the contract in question was designed to cover medium term needs and that the proposed price was well below the Agency's average long term prices, and even below the Agency's average spot prices, the Court concluded that the price in the contract was not market related, and that therefore the second obstacle was proven.

Finally, concerning the third obstacle the Court admitted that, if supplies from a certain source are to be limited, the application of a permissible threshold of dependence fixed at a maximum percentage of individual users needs is justified, and that the establishment by the Agency of the permissible degree of dependence at a maximum of 25% falls within the bounds of its broad discretion. The third obstacle was therefore also accepted.

In more general terms, the Court stated that it is in the Community's interest that dependence on a particular source should not become too great, and that trade with other countries should also be developed. The Court also rejected KLE's plea that the contract involved only two companies within the Community, and observed that BNFL, the other party to the contract, acted only as an intermediary. The Court rejected the argument of lack of transparency by referring to the published information (the Council 1986 resolution on energy policy, in which geographical diversification is a key policy objective, the Trade Agreement with the USSR, the provisions of the Euratom Treaty, as well as the indications published in the Agency's annual report) and observed that, although the 25% threshold had not been published at the time of the Commission decision, this figure was not a strict rule but a flexible internal assessment criterion. As to complaints concerning an alleged breach of the principle of equal treatment, the Court observed that KLE had not established such a breach. As less restrictive actions (establishment of stockpiles, determination of origin at equal conditions), would not have been able to solve the problem, the Court rejected the argument of proportionality. The Court also considered the Commission's reasoning to be sufficient.

Consequently, the Court rejected the annulment action as unfounded. It also rejected the action for damages, without having to examine its receivability.

On 23 April 1997 KLE appealed[1] against the judgement of the Court of First Instance to the Court of Justice. This case is still pending before the Court and a judgement is not expected before the end of 1998.

JUDGEMENT OF THE COURT OF JUSTICE IN THE ENU CASE

On 11 March 1997[2] the Court of Justice rejected the appeal by Empresa Nacional del Uranio (ENU) against the judgement of the Court of First Instance of 15 September 1995[3].

ENU's original suit before the Court of First Instance consisted in an annulment action against the Commission's decision of 19 July 1993 which rejected claims for Community preference and for a "special cause of action" for Portuguese uranium as well as for compensation. In its judgement of 15 September 1995 the Court of First Instance had rejected both original actions. ENU appealed this judgement.

In support of its appeal, ENU invoked in essence three pleas, namely, first that the Court had changed the object of the actions, secondly that it had not examined the validity of the "simplified procedure" and thirdly that the "special cause of action" had not been interpreted as a binding commitment (points 27-29). In his conclusions of 5 December 1996 the Advocate General recommended the Court to reject the appeal in part as irreceivable and in part as unfounded.

The Court rejected the first of the pleas by stating that the Court of First Instance had rightly interpreted ENU's request, concerning the full application of Chapter 6 in conjunction with the Agency's implicit refusal to exercise its option right, as a request to guarantee the purchase of the Portuguese production.

As far as the second plea was concerned, the Court confirmed the absence of a "community preference" for uranium production, and approved therefore the Commission's refusal to force the Agency to exercise its right of option. The Court confirmed that Article 66 of the Treaty does not imply that as long as domestic supplies are available at "not unreasonable prices" all imports are prohibited. This article provides only for an exception, under very specific conditions and subject to a Commission decision, to the Agency's

[1] Case C-161/97 P Kernkraftwerke Lippe-Ems/Commission, for a summary of the arguments see OJ C212 of 12.7.1997, p. 10.

[2] Case C-337/95 P ENU/Commission, [1997] ECR, I 1329.

[3] Joined cases T-458/93 and T-523/93, ENU/Commission, [1995] ECR, II 2459.

exclusive right to conclude contracts. Without having to examine in detail the validity of the Rules on the "simplified procedure", the Court observed that this procedure is not contrary to the Treaty, as the Agency has the possibility to refuse the conclusion of contracts (point 50).

Concerning the third plea the Court only stated that the Court of First Instance had accepted as a fact (which can not be challenged in the appeal) that the letter from the Commissioner responsible on the "special cause of action" was not more than a political orientation, without any binding effect.

The annulment action had thus rightly been rejected by the Court of First Instance. Lacking any illegal action by the Commission, the Court rejected, without examining the receivability, the compensation action as well.

The broad interpretation of the rights and powers of the Supply Agency as expressed in the Court of First Instance's initial judgement of this case were not questioned on any ground by the Court of Justice. For the Agency this interpretation is therefore now final.

TREATY OF AMSTERDAM

Contrary to what some expected during the Intergovernmental Conference, the Treaty of Amsterdam, which will come into force after ratification by the Member States, did not integrate the Euratom Treaty into one single treaty with the EC Treaty.

Two minor changes made in articles relevant for supply, namely articles 76 and 105. The Treaty of Amsterdam provides that *in article76, second paragraph, the words "after the entry into force of this Treaty" shall be replaced by "after 1 January 1958"*

and that *Article 105 shall be amended as follows : (a) in the first paragraph the words "concluded before its entry into force by a Member State" shall be replaced by "concluded before 1 January 1958 or, for acceding States before the date of their accession, by a Member State". At the end of that paragraph the words "the entry into force of this Treaty" shall be replaced by "the aforesaid dates"; (b) in the second paragraph, the words "concluded between the signature and the entry into force of this Treaty" shall be replaced by "concluded between 25 March 1957 and 1 January 1958 or, for acceding states, between the signature of the instrument of accession and the date of their accession".*

OTHER DEVELOPMENTS

ADOPTION OF ILLUSTRATIVE NUCLEAR PROGRAMME OF THE COMMUNITY (PINC)

On 25 September 1997 the Commission adopted[1], after broad consultations (including the Agency's Advisory Committee – see below), the fourth Illustrative Nuclear Programme of the Community (known under its French Acronym PINC). The final programme is very similar to the draft adopted last year (see previous report). This document, prepared in accordance with Art. 40 of the Euratom Treaty, provides an overview of nuclear energy in the European Union and the main issues confronting it and indicates the importance which the European Commission attaches to nuclear power in the energy mix and economy of the EU.

ENRICHMENT OVERPRICING

A number of utilities, including two from the EU, entered into litigation with the US Department of Energy (DOE) over the price being charged by USEC under their enrichment contracts. The US Court of Appeals for the Federal circuit in its judgement of 31 July 1997 rejected the appeal against a judgement of the US Court of Federal Claims in favour of DOE and USEC's pricing policy on the basis, inter alia, that the contracts provided the US Government with "broad discretion" to decide the "pricing policy".

[1] Commission document COM(97)401; see also Economic and Social Committee opinion, OJ C206 of 7.7.1997.

The Agency and the Commission expressed their deep concerns to the US government about the treatment of the two EU companies in this case.

RESEARCH REACTORS FUEL CYCLE

The Agency continued to provide its support to research reactor operators and the industry and followed closely the supply of fresh fuel and the disposal of spent fuel.

The acceptance by the US Department of Energy of spent fuel of US origin for final disposal provided most reactor operators with a solution for fuel irradiated up to 2006. Cogema offered contracts for reprocessing and waste conditioning of spent research reactor fuels at its plant at La Hague. One reactor operator confirmed its option for direct disposal of its spent fuel in the Community.

Technical solutions are yet to be implemented in the EU for the reprocessing and conditioning of some types of low enriched uranium fuels. Final disposal of fuels or reprocessing waste irradiated after 2006 continues to give cause for serious concern, particularly for those countries which do not have a nuclear power generation programme of their own.

Long term security of supply of high enriched uranium poses some problems, but the on-going operation of the reactors requiring this type of fuel continued to be assured.

The European Nuclear Society organised for the first time an international meeting in Bruges, Belgium on research reactor fuel management covering supply, fabrication, operation and fuel safety and back-end options. A similar conference will be held in 1998 with the aim of providing a forum where progress reports can be presented and strategies for the back-end of the fuel cycle can be discussed.

CHAPTER II

SUPPLY OF NUCLEAR MATERIALS AND ENRICHMENT SERVICES IN THE EUROPEAN UNION

REACTOR NEEDS/NET REQUIREMENTS

During 1997, 2 900 t LEU of fresh fuel were loaded in EU reactors containing the equivalent of 18 200 t of natural uranium and 11 000 t Separative Work (SW) - most tails assays were in the range of 0.25-0.35%.

Future EU reactor needs and net requirements for uranium and separative work, based on data supplied by EU utilities, rounded to the nearest 100 tU and 100 tSW respectively, are estimated as shown in Table 1.

Table 1 - Reactor needs and net requirements for uranium and separative work

Year	Natural Uranium (tU)		Separative Work (tSW)	
	Reactor needs	Net require-ments	Reactor needs	Net require-ments
1998	21 700	18 800	12 000	10 300
1999	21 800	20 300	12 100	11 000
2000	21 200	19 900	11 900	10 900
2001	21 600	20 600	12 200	11 300
2002	22 200	20 800	12 500	11 500
2003	21 100	19 800	11 900	11 000
2004	22 300	21 100	12 600	11 600
2005	21 900	20 900	12 400	11 500
2006	21 100	20 100	12 200	11 200
2007	21 400	20 300	12 300	11 300
TOTAL	216 300	202 600	122 100	111 600
Average	21 600	20 300	12 200	11 200

Net requirements are calculated on the basis of reactor needs less the contributions from currently planned uranium/plutonium recycling, and taking account of inventory management as communicated to the Agency by utilities.

Average reactor needs for natural uranium over the next 10 years will be 21 600 tU/year, while average net requirements will be about 20 300 tU/year. Compared to last year's report, these figures show an increase in reactor needs of 900 tU/year and an increase in net requirements of 1 800 tU/year.

Average reactor needs for enrichment over the next 10 years will be 12 200 tSW/year, while average net requirements will be in the order of 11 200 tSW/year.

NATURAL URANIUM

CONCLUSION OF CONTRACTS

The number of contracts and amendments relating to ores and source materials (essentially natural uranium) which were dealt with in accordance with the Agency's procedures during 1997 is shown in Table 2.

Transactions involving natural uranium totalled 20 900 tU, some 10 500 tU of which were the subject of new purchase contracts by EU utilities. Some 10 400 tU transacted related to purchases by producers or intermediaries, as well as exchanges, loans, etc. In comparison with the figures reported in 1996, the total amounts contracted for have increased by 27%, the new purchases by utilities by 21% and the other contracts by 43%.

Table 2 - Natural uranium contracts concluded by the Supply Agency

Contract Type	Number	Quantity (tU) *(1)*
Purchase (by a EU utility/user)		
– multiannual *(2)*	13	8 269
– spot *(2)*	11	1 618
Sale (by a EU utility/user)		
– multiannual	0	0
– spot	9	616
Purchase-sale (between two EU utilities/users)		
- multiannual	1	-
– spot	2	-
Purchase-sale (intermediaries)*(3)*		
– multiannual	2	-
– spot	10	3 045
Exchanges *(4)*	43	5 378
Loans	1	-
TOTAL	92	20 932
Including contracts of less than 10t	8	30
CONTRACT AMENDMENTS	4	2 488

Notes

(1) In order to maintain confidentiality the quantity has been indicated only when there were at least 3 contracts of each type, but all quantities have been included in the total.

(2) "Multiannual" contracts are defined as those providing for deliveries extending over more than 12 months, whereas "spot" contracts are those providing for either only one delivery or deliveries extending over a period of a maximum of 12 months, whatever the time between the conclusion of the contract and the first delivery.

(3) Purchases/sales contracts between intermediaries - both buyer and seller are not EU utilities/end users.

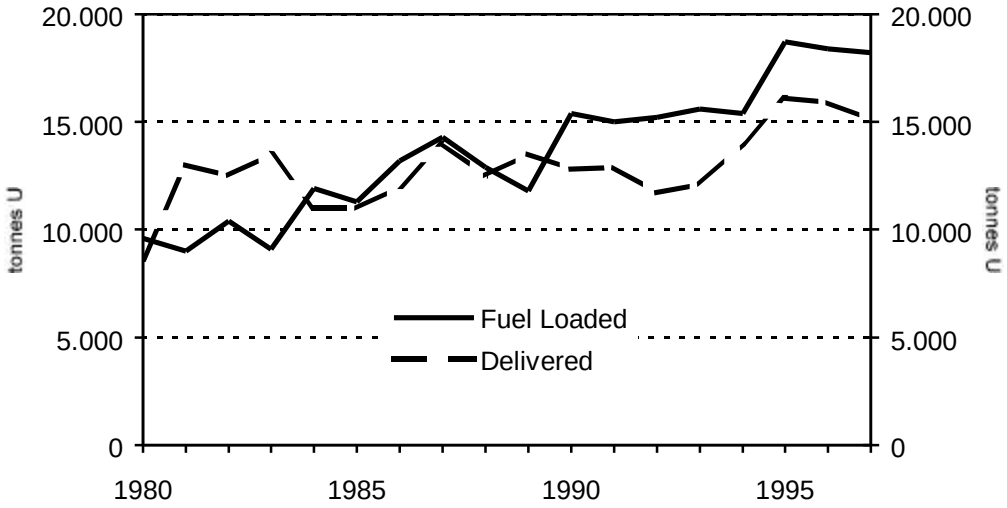
(4) This category includes exchanges of ownership and U_3O_8 against UF_6. In contrast with previous Annual Reports, exchanges of safeguards obligation codes and international exchanges of safeguards obligations are not included.

VOLUME OF DELIVERIES

During 1997, natural uranium deliveries under existing purchasing contracts amounted to approximately 15 100 tU compared to 15 900 tU in 1996. Deliveries under spot contracts represented about 12% of the total (4% in 1996).

The deliveries taken into account are those made under purchasing contracts to the EU electricity utilities or their procurement organisations; they include also the natural uranium equivalent contained in enriched uranium purchases. Deliveries under purchasing contracts and fuel loaded into reactors by EU utilities since 1980 are shown in Graph 1. The corresponding table is in Annex 1. The difference between deliveries and the amount of fuel loaded can be explained by the use of reprocessed uranium, MOX and drawdown of inventories.

Graph 1 **Natural uranium feed contained in fuel loaded into EU reactors and natural uranium delivered to utilities under purchasing contracts (in tU)**



AVERAGE PRICES OF MULTIANNUAL CONTRACTS

Prices for deliveries under multiannual contracts were expressed in 5 different currencies. To calculate the average price, the original contract prices were converted into ECU and then weighted by quantity. For the conversion into ECU the Agency uses the average annual exchange rate of the respective currency as published by Eurostat . A very small number of contracts where it was not possible to establish reliably the price of the natural uranium component (e.g. in some cases of enriched uranium deliveries) were excluded from the price calculation.

The average price for 1997 rounded to the nearest ¼ ECU was as follows.

ECU 34.75/kgU contained in U_3O_8
(ECU 32.00 in 1996)

AVERAGE PRICES OF SPOT CONTRACTS

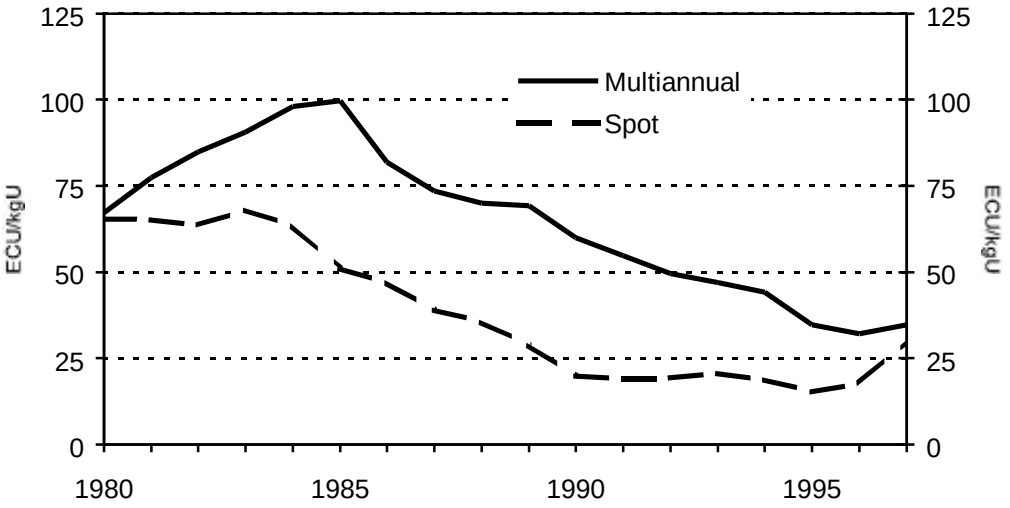
The 1997 average price, calculated according to the same principles, of material delivered under spot contracts was as follows:

ECU 30.00/kgU contained in U_3O_8
(ECU 17.75 in 1996)

COMPARISON OF PRICES

Graph 2 shows prices for deliveries under multiannual as well as spot contracts since 1980, expressed in ECU. For ease of reference, historical data on prices published in previous Annual Reports and variations in exchange rates are presented in Annex 2.

Graph 2 **Average price for natural uranium delivered under spot and multiannual contracts (ECU/kgU)**

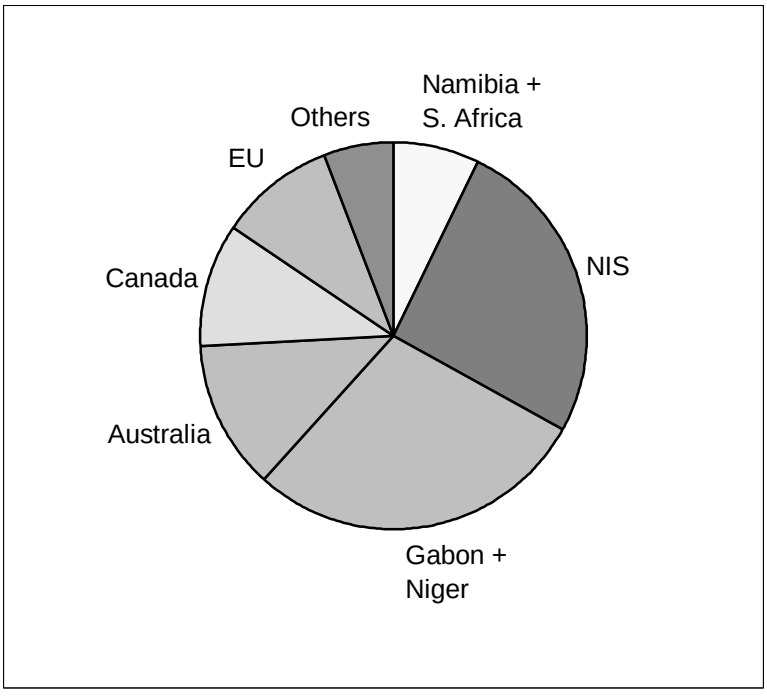


ORIGINS

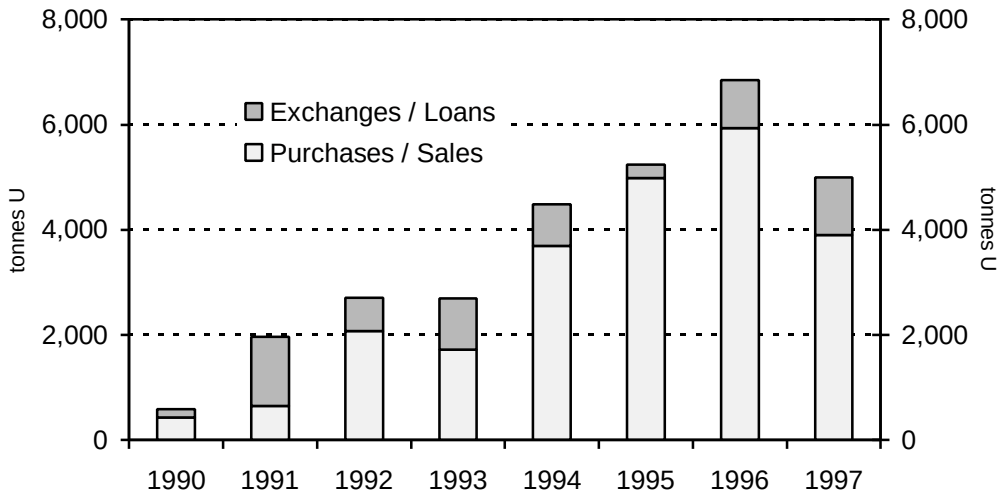
EU utilities or their procurement organisations obtained in 1997 approximately 92% of their supplies from 11 countries outside the EU (Graph 3). The largest single supplier was the Russian Federation, which represented some 25% of external supply under purchasing contracts and 23% of total supply under purchasing contracts.

Acquisitions of NIS origin natural uranium by EU utilities since 1990 are shown in Graph 4, which is provided for reference purposes and brings together information already published in previous Annual Reports.

Graph 3 Origin of the natural uranium delivered to EU utilities under purchasing contracts



Graph 4 Acquisitions of NIS origin natural uranium by EU utilities (in tU)



SPECIAL FISSILE MATERIALS

CONCLUSION OF CONTRACTS

The number of contracts and amendments relating to special fissile materials (enrichment, enriched uranium and plutonium for power and research reactors) which were dealt with during 1997 in accordance with the Agency's procedures is shown in Table 3.

DELIVERIES OF LOW ENRICHED URANIUM (LEU)

In 1997, supply of enrichment services to EU utilities totalled approximately 10 100 tSW, delivered in 2 000 t of LEU which contained the equivalent of some 15 800 t of natural uranium feed. Some 74% of this separative work was provided by EU companies (Eurodif and Urenco). Some 5% of deliveries of separative work took place under spot contracts.

ENRICHED URANIUM FOR RESEARCH REACTORS

Enriched uranium for research reactors is normally supplied in two enrichment assays: just under 20% (LEU) and about 90% (HEU).

Although the quantities involved represent a minor amount in terms of EU needs for enriched uranium, HEU supply is very important to the scientific community and is of high political significance.

Supply of LEU to research reactors continued unhindered. Reactor requirements for HEU were met, but the source of future supplies continued to be the object of considerable attention (see also Chapter I). The Supply Agency continued to provide support to reactor operators in the procurement of fuels.

PLUTONIUM

In 1997, transactions involving plutonium were again mainly related to its use for MOX fuel fabrication, and the Agency concluded 8 such contracts.

Table 3 - Special fissile material contracts concluded by the Supply Agency

Contract Type *(1)*	Number
I. Special Fissile Materials	
Purchase (by a EU utility/user)	
- multiannual	4
- spot	11
Sale (by a EU utility/user)	
- multiannual	4
- spot	20
Purchase-sale (between two EU utilities/users)	
- multiannual	0
- spot	6
Purchase-sale (intermediaries)	
- multiannual	2
- spot	14
Exchanges (swaps)	11
Loans	5
TOTAL, including *(2)*	77
- Low enriched uranium	61
- High enriched uranium	11
- Plutonium	10
CONTRACT AMENDMENTS	3
II. Enrichment Contracts *(3)*	
- multiannual	8
- spot	1
CONTRACT AMENDMENTS	14

Notes

(1) See explanations under Table 2, as appropriate.

(2) Some contracts may involve both LEU and plutonium or HEU and plutonium.

(3) Contracts with primary enrichers only.

COMMISSION AUTHORISATIONS FOR EXPORT

Under the provisions of Article 59(b) of the Euratom Treaty (and Article 62.1(c) in the case of special fissile materials), the authorisation of the Commission is required for the export of nuclear materials produced in the Community. Requests for these authorisations are introduced to the Commission by the Supply Agency.

During 1997, 3 authorisations for export were granted by the Commission for a total amount of 132.5 t LEU with enrichments below 5%. A further authorisation was granted for the export of LEU for a research reactor with enrichment below 20%.

CHAPTER III

NUCLEAR ENERGY DEVELOPMENTS IN THE EUROPEAN UNION MEMBER STATES

BELGIQUE/BELGIË – BELGIUM

ENERGY POLICY

The law of 15 April 1994 concerning the protection of the population and the environment against the dangers of ionizing radiation and the creation of a Federal Agency for Nuclear Control is being gradually implemented by means of the following steps :

- putting some articles into force;
- nominating the Governing Board and the Government Commissioner of the Agency;
- promulgating in part the Royal Decree concerning the general rules of protection against ionizing radiation, especially the parts dealing with the transportation of radioactive materials and medical applications of ionizing radiation in order to translate into Belgian law several European directives;
- authorising the personnel of several ministerial departments and scientific institutions with activities in the nuclear field to ask for their transfer to the Agency.

The programme law of 12 December 1997 authorises Ondraf/Niras (the Federal Agency for the management of nuclear waste in Belgium) to establish an inventory of all nuclear installations and all sites containing radioactive materials. This inventory must include the location and the condition of these installations and sites, an estimate of their dismantling and rehabilitation costs and the evaluation of the existence of sufficient provisions for the financing of these operations.

NUCLEAR ELECTRICITY GENERATION

In 1997 Belgium's nuclear power stations (including the French share of Tihange 1) generated about 45.1 TWh. This is 9.6% more than in 1996. It represents about 60% of the country's total electricity production in 1997, which is almost 3.7% higher than in 1996. This positive development demonstrates the excellent performance of the Belgian nuclear power plants.

The Belgian electricity producers have a 25% participation in the two nuclear units of the Chooz power station in France. This station has a power rating of 2x1 452 MWe, of which the Belgian share is one quarter. The two units were connected to the grid in 1996 and 1997 respectively.

FUEL CYCLE DEVELOPMENTS

Belgium produced 27 tonnes of natural uranium in 1997, derived from imported phosphates.

The production of MOX fuel by Belgonucléaire in its Dessel plant amounted to 36 tonnes in 1997, to be used in German, Japanese and Swiss nuclear power plants.

The recommendations of the resolution of Parliament, adopted on 22 December, 1993, concerning the use of MOX fuel in Belgium's nuclear power plants and the suitability of reprocessing spent fuel, have continued to be carried out as in previous years. In this context the following developments took place in 1997 :

- the drafting of the report to be submitted to Parliament in 1998 comparing the reprocessing and non-reprocessing options was initiated;

- the execution of the reprocessing contract between Synatom and Cogema continued. The transport of spent fuel to La Hague took place according to schedule;

- 20 MOX fuel elements were loaded in 1997 in units Doel 3 (8 elements in March) and Tihange 2 (12 elements in June), which brings the total to 56;

- in the framework of Synatom's R&D programme for the encapsulation of spent fuel for direct disposal, the third phase, which is the conceptual design of the spent fuel conditioning plant, was almost finalised;

- the R&D programme on geological disposal of High-Level, Medium-Level and Long-Lived waste from spent fuel, mainly carried out by the Nuclear Research Centre at Mol, but co-ordinated and managed by Niras/Ondraf, continued. The excavation works for the extension of the underground laboratory for the research on the disposal of radioactive waste in clay started (collaboration between SCK/CEN and Niras/Ondraf within the Praclay Economic Interest Grouping). The drafting of the report SAFIR II, which will give an overview of the results presently obtained and indicating future orientations for the work, was initiated.

During the year 1997, 184 spent fuel elements were placed in 7 dry storage containers in the interim storage building constructed on the site at Doel. This brings the total to 296 spent fuel elements placed in 11 containers. At Tihange a new wet storage building has been put into operation. 77 spent fuel elements were placed there 1997.

On the site of Belgoprocess (100% subsidiary company of Niras/Ondraf), the part of the building where the high level waste glass canisters will be stored was maintained in good operating condition. The part which is to receive the other types of reprocessing waste was completed in 1997.

Around the middle of the year Niras/Ondraf presented to the government its report on low-level and short-lived waste. In this report a comparison is made between the different options for the long term management of this waste category. The aspects of safety and price are compared. The options considered in the report are :

- a provisional solution consisting of a prolonged storage for at least 100 years,

- a definitive solution consisting of one of the two following possibilities : near surface disposal or deep disposal in geological formations.

The report recommends that first of all a strategic choice be made between the provisional and definitive solution. If this latter is retained, a choice will rapidly have to be made between the two disposal types.

Finally, it has been decided that the remaining fuel elements of the prototype reactor BR3 at CEN/SCK will be stored using a dry method in a small building adjacent to the existing reprocessing waste storage of the Belgoprocess site.

RESEARCH REACTORS

After a thorough refurbishment, the Nuclear Research Centre at Mol (CEN/SCK) restarted its materials testing reactor BR2. It is now working under a reduced operating regime which will gradually be increased in the future, in order to become more attractive for certain research projects. A contract for the removal and processing of spent BR2 fuel elements has been signed with Cogema.

DANMARK – DENMARK

RADIOACTIVE WASTE

Denmark has no nuclear power plants and the amount of radioactive waste is therefore small. At Risø National Laboratory there are two reactors in operation: a research reactor, DR3, and a small homogeneous reactor, DR1, used for education. DR3 is operated at 10 MW and used for basic research, silicon doping and isotope production. Spent fuel is sent by ship to the United States according to the US policy for research reactor fuel

of US origin. There are no plans for disposal of high level waste in Denmark.

Low-Level Waste (LLW) and Intermediate-Level Waste (ILW) are collected, treated and stored in two intermediate storage facilities on the site of Risø. A storage facility for LLW receives about 100-120 200L-drums per year. Two-thirds of the amount is produced by Risø National Laboratory, the rest comes from hospitals, industry, laboratories and other users of radioactive isotopes in Denmark. At the moment about 4 500 drums are stored in this facility, which has a total capacity of 5 000 drums. A storage facility for ILW receives about 0-5 drums per year. The amount is decreasing after the hot cell facility was closed in 1994. At the moment about 130 m^3 of long-lived LLW is stored in this facility.

Solid LLW is compacted in drums and liquid LLW is treated in an evaporator and a bituminization plant. The waste, embedded in bitumen, is then stored in drums. The ILW is not treated but stored in stainless steel containers or drums.

At the moment Denmark has no plans for construction of a repository for final disposal of LLW and ILW.

DEUTSCHLAND – GERMANY

NUCLEAR ENERGY GENERATION

Germany's nuclear power plants generated about 169 TWh of electricity, 5.4% more than in the previous year. Nuclear power's share in electricity generation in Germany reached almost 35%.

Nuclear electricity generation has thus reached a new peak, beating that of 1996, since the commencement of commercial nuclear generation in Germany. This positive result is due, on the one hand, to the excellent level of availability of the nuclear power plants and, on the other hand, to the fact that their operation was not hampered by politically motivated interruptions.

Of Germany's 20 commercial power plants, 19 were connected to the grid, as in the previous year. Ever since September 1988, the Mühlheim-Kärlich nucler power plant has been out of operation for legal reasons. The appeal introduced by the operator RWE Energie AG against the revocation of the newly formulated first partial permit was the subject of a hearing in the Federal Administrative Court at the end of 1997. In early January 1998 the Federal Administrative Court, in a surprising ruling, confirmed the revocation of the first partial permit which, in the Court's opinion, had been granted without sufficient examination of the site's seismic suitability. As a consequence, the closure and dismantling of the Mühlheim-Kärlich nuclear power plant cannot be excluded.

DEVELOPMENT OF REACTOR TYPES

The completion of the basic design phase for the European Pressurized Water Reactor (EPR) provided in October 1997 the opportunity to inform a broad spectrum of the interested public of its development and the perspectives for this new type of reactor. The Franco-German common project was launched in 1992; it is being undertaken, on the German side, by the power plant operators and Siemens, and, on the French side, by Electricité de France (EdF) and FRAMATOME. The project is aimed at demonstrating the ability to respect the very strict safety standards introduced into the German Atomic Law in 1994 while at the same time generating electricity at costs comparable to those of a coal-fired station. The project developed during the basic design phase will be discussed, in the coming 18 months, with the authorities and their experts in order to prove the licensability of the project.

In parallel, but with a certain time difference, the utilities involved in nuclear power and Siemens are co-operating in the development of the BWR-1000, an innovative boiling water reactor project. It is intended that the required safety objectives will be met through the introduction of passively working components and systems to control failures and breakdowns.

FUEL CYCLE DEVELOPMENTS

Wismut produced in the order of 40 tU arising from mine decomissioning and clean-up activities.

The URENCO uranium enrichment plant in Gronau continues to operate at nearly 100% capacity and without interruption. With the start-up of additional cascades, the facility reached a capacity of 960 000 SWU/year in September. On 31 October 1997, URENCO Germany obtained the necessary licence for a capacity extension from 1 000 t - 1 800 tSW/year.

Siemens AG KWU covers its European fuel fabrication market share through the ANF facility at Lingen. In March, ANF obtained a licence to process an additional quantity of 250 t U/year in the form of fuel pellets for the purpose of fabrication of fuel rods and final assembly of fuel elements. The maximum processing capacity amounts to 650 t U/year

The usage situation of the interim storage facility in Ahaus (305 THTR/AVR Castor containers stored) remained unchanged in 1997. In November the operator obtained the licence for a capacity extension of the existing container storage from 1500 to 3960 t Heavy Metal. Earlier in March, three Castors V/19, one Castor 1c, all loaded with spent fuel elements, and two Castors HAW 20/288 containing vitrified waste blocs from reprocessing in France were placed in the identically constructed interim storage facility at Gorleben. That store now holds 8 full containers.

The pilot conditioning installation at Gorleben is approximately 85% completed. The “cold commissioning” operation has begun. An operating licence is expected for 1999.

Between the restart of the operation of the Morsleben final waste disposal facility on 13 January 1994 and the end of 1997, some 16.000m³ of low and intermediate level waste have been deposited there. The licensing procedures for the planned Konrad final disposal site are reaching their final stage. The exploratory work on the suitability of the saliferous rock at Gorleben as a final disposal site for all kinds of radioactive waste went according to plan. The infrastructural areas on the exploratory floor (840 m depth) have been further developed. In November, the shaft Gorleben 1 reached 933 m, its final depth.

In the decommissioning of the Karlsruhe reprocessing plant, the first part of the dismantling work has been completed through manual disassembly operations. In a second step, certain units within the hot cells will be dismantled through teleguided operations. In October, the first permit for the relevant preparatory work was obtained.

The decommissioning of Siemens AG KWU’s fuel element fabrication plant in Hanau has made progress. The programme of uranium removal from the uranium processing section of the plant has been completed. Dismantling of the production installation will be the next step. The "evacuation" of the Mox-processing section requires the installation of comprehensive additional equipment in the plant. The conversion of the Pu-Nitrate-solution was launched in October.

ELLAS – GREECE

Greece has no nuclear power plants. Electricity is produced by plants fueled with lignite or oil and by hydroelectric plants. At the National Centre for Scientific Research (NCSR) “Demokritos”, GRR-1, a 5 MW Research Reactor is in operation for basic and applied research, radioisotope production and other applications.

Two subcritical assemblies are used for education at the Athens Polytechnic University and at Thessaloniki University. Spent nuclear fuel is sent by sea to the US according to the policy of acceptance of research reactor fuel of US origin for permanent disposal.

Low-Level and Intermediate-Level Waste are treated and stored at NCSR “Demokritos” site. Greece’s nuclear policy objectives place a strong

emphasis on radiation protection and emergency preparedness.

ESPANA – SPAIN

NUCLEAR ELECTRICITY GENERATION

Gross production of electrical energy of nuclear origin in Spain during 1997 was 55.3 TWh, which represents approximately 32% of total national production. As in recent years, the performance of the nuclear park has been highly satisfactory, as reflected in the average load factor of 83.6%.

The following are the most significant developments which took place in 1997.

NUCLEAR INSTALLATIONS

The vessel lid of the reactor of the José Cabrera nuclear plant was replaced;

The work programme related to the replacement of the steam generators and turbines of unit 1 and 2 of the Almaraz nuclear power plant and of Asco, which started in 1995, was completed in the first quarter of 1997. These changes have optimised the output of the two plants increasing their electrical power by 175 MWe (by 122.1 MWe in 1997) without having to increase the thermal power generated by the reactors.

In October, the Ministry of Industry and Energy authorised the Cofrentes plant to increase its thermal power from 102% to 104.2% of the nominal power which translates into a 63 MWe thermal power increase.

The preparatory work for the extraction and pre-processing of radioactive waste in the Vandellos 1 nuclear power plant was completed. The Nuclear Safety Council has already given the mandatory favourable report for the dismantling of the plant, and the Ministry of Environment has issued the Environmental Impact Report (in co-ordination with the Nuclear Safety Council). It is expected that the Ministry of Industry and Energy will be able to authorise simultaneously the dismantling of the plant as well as the transfer of ownership from HIFRENSA, which has operated the plant, to ENRESA which is in charge of the dismantling. This will be the first nuclear plant dismantling authorised in Spain.

The programme retained for the dismantling includes a first phase during which the buildings and structures of the plant, except the reactor vessel, will be dismantled and demolished. The reactor vessel will be completely insulated and all its fuel channels will be sealed. The environmental and radiological conditions inside the reactor vessel will continue to be monitored.
After the completion of the first phase approximately 80% of the plant's site will be available for other uses, and a waiting period of around 30 years will have to elapse before commencement of the second phase during which the remaining elements of the plant will be dismantled. Eventually the so-called level 3 will be reached and the former site of the plant could then be used without any limitations.

FUEL CYCLE

On 25 April 1997, the Ministry of Industry and Energy granted the Empresa Nacional del Uranio S.A.. (ENUSA) the final official authorisation for the operation of the Quercus uranium concentrates production plant located in Saelices el Chico (Salamanca). During 1997, Quercus, which continues to operate below design capacity, produced 300.2 tonnes of U_3O_8 (255 tU as U_3O_8).

The Juzbado (Salamanca) fuel fabrication plant, owned by ENUSA, continued to manufacture PWR and BWR fuel elements both for Spanish nuclear plants and for various European countries. Its production in 1997 was 756 elements containing 230 t of U, of which 201 elements are for Spanish PWR, 192 for Spanish BWR and 363 for export to Germany, Sweden, France, Belgium and Finland.

The intermediate and low-level solid radioactive waste storage facility of the Empresa Nacional de

Sierra Residuos Radioactivos (ENRESA) at Siera Albarrana (El Cabril) continued to operate satisfactorily. By 31 December 1997, 22.4% of the storage capacity had been filled. It is scheduled that the storage capacity will be completely filled up around the middle of the next decade.

With regard to the intermediate storage of spent fuel, the work to change the spent fuel pools in the Trillo, Vandellos 2 and Cofrentes plants was completed in 1997. The same work in the Jose Cabrera and Santa Maria de Garona plants is expected to be completed during 1998. It is scheduled that the capacity of the spent fuel pool at the Trillo plant will be filled in 2002, while the capacity of other spent fuel pools is expected to be filled after 2013. At Trillo, an additional building is planned for the storage of spent metal fuel containers.

The work on the dismantling and closure of ENUSA's Lobo G uranium ore processing plant at La Haba (Badajoz) was completed by mid 1997. The approval of the control and surveillance programmes related to the implementation of the plant dismantling is expected to take place in 1998. These programmes will come to an end with the official closure of the plant installation.

FRANCE

HIGHLIGHTS

At 31 December 1997, the French nuclear facilities numbered 57 pressurized water reactors in operation (thirty four 900MW PWR, twenty 1 300MW PWR and three 1 450MW PWR) and two fast reactors (Phénix and Superphénix). The closure of Superphénix was announced by the French Prime Minister in July.

One reactor of 1 450 MWe is under construction for commissioning during 1998. Regarding the reprocessing-recycle programme, the MELOX plant reached its maximum licensed capacity.

Investigations with a view to setting up underground research laboratories continued in 1997. Following the outcome of this work, the French government authorised the National Radioactive Waste Management Agency (ANDRA) to file three documented applications for authorisation to set up and operate underground laboratories in the Gard and the Vienne departments and in eastern France (on the border between the Meuse and the Haute-Marne departments).

ELECTRICITY GENERATION, CONSUMPTION AND NUCLEAR POWER

The total net production of electricity amounted to 481 TWh, i.e. 1.8% less than in 1996. 376 TWh were produced by nuclear power stations, representing approximately 78% of national production. Thermal production from fossil fuels was 38 TWh. Hydroelectric production decreased by 4.2% compared with 1996 and amounted to 67 TWh.

The gross national consumption of electricity amounted to 410.5 billion TWh, a decrease of 1.1% compared with 1996.

Industrial consumption was up by 1.1% compared with 1996. Tertiary industries and domestic consumption decreased by 3.9%. The export balance decreased also compared with 1996 and amounted to 65.3 TWh.

As regards nuclear operation in 1997 availability levels remained stable at 82.6% compared with 82.7% in 1996.

Two reactors were connected to the grid, namely CHOOZ B2 on 2 May 1997 and CIVAUX on 24 December 1997. CHOOZ B2 reached full power on 18 September 1997.

The daily peak of domestic consumption amounted to 68.9 GW which is close to the record of 70 GW reached on 4 January 1993.

The Creys-Malville Fast Breeder Reactor (FBR) did not operate this year.

The programme of testing and removing vessel heads was continued. Since 1994, 24 vessel heads out of the 54 in operation have been replaced. Also, 5 removals of steam generators have been completed since 1995.

At the end of 1997, 13 reactors were operating with MOX fuel.

URANIUM MINING

Uranium production in France amounted to 733 tU in concentrates, around 21% down as compared with 1996.

Production came mostly from SMJ (Société des Mines de Jouac) in Limousin and from the mining division of Hérault where uranium was extracted for the last year.

In Canada the first production of the McClean project originally scheduled for the third quarter of 1997 was delayed due to administrative authorisations. It is now expected to be launched around mid 1998.

In Niger, production reached 3 497 tU in concentrates, a slight increase from the 1996 level.

In Gabon, the closure of COMUF facilities within the next two years has been announced.

URANIUM CONVERSION

In 1997, the two Comurhex plants of Malvési and Pierrelatte operated very satisfactorily, reaching a good level of production.

URANIUM ENRICHMENT

The Georges Besse facility at Pierrelatte ran extremely well, with seasonal adjustment of the production being made in order to optimise the electricity consumption.

REPROCESSING

The UP2 and UP3 plants operated satisfactorily during 1997. More than 295 spent fuel casks were received for reprocessing. 820 tonnes of oxide fuel were reprocessed in 1997 in UP3 (reaching the nominal capacity of the plant).

UP2 reprocessed 850 tonnes of oxide fuel.

A total of 1 670 tonnes of oxide fuel was reprocessed in 1997 bringing the cumulative quantity to 11 905 tonnes since 1976.

IRELAND

Ireland does not have a nuclear power industry and there are no plans for such. Ireland's nuclear policy objectives place a heavy emphasis on the enhancement of nuclear safety, radiation protection and emergency preparedness world-wide. Ireland remains opposed to the operation and expansion of the nuclear industry. In the implementation of its nuclear policy, the Irish Government is advised and assisted by the Radiological Protection Institute of Ireland.

ITALIA – ITALY

NUCLEAR REACTORS DECOMMISSIONING

ENEL is engaged in decommissioning its four Nuclear Power Plants (NPP) following a strategy which is consistent with that adopted by most countries.

Such a strategy schedules the decommissioning in three phases. At the end of the first phase, the power plant reaches a passively safe condition. During the second phase, which lasts for some decades, the power plant will be held in a passively safe condition requiring a minimum of maintenance on systems and structures. In the third phase, systems and structures still contaminated will be removed in order to release the site unconditionally for non-nuclear purposes.

According to the programme, the first NPP which will reach a safe state by the end of 2000 will be Garigliano power station, followed by Latina and Trino power stations. During 1998, the fuel of Caorso power station will be transferred from the vessel to the plant fuel pools so that also for this plant the first phase of decommissioning will start.

BACK END OF THE FUEL CYCLE AND WASTE MANAGEMENT

ENEL's strategy for the irradiated fuel has changed from reprocessing to interim storage. However ENEL will complete the existing Service Agreement with BNFL by shipping a residual amount of spent fuel. All the remaining fuel currently in Trino and Caorso NPP and in the "Avogadro" independent spent fuel pool will be stored in dry containers.

ENEA is carrying on an action plan on radioactive waste and spent fuel elements still stored in its fuel cycle pilot plants (EUREX, ITREC, Plutonium plant, Hot Cells for post-irradiation examination). The main results achieved in 1997 include :

- treatment and conditioning by cementation of all (approximately 80m^3) low level liquid radiation waste at the ITREC plant,
- start-up of contract for the design and construction of a vitrification unit, based on the new CEA technology of the "cold crucible", for all liquid radioactive waste at the EUREX plant (200 m^3), with the presentation of the Preliminary Safety Report (PSR) to Agenzia Nazionale Protezione Ambiente (ANPA), the national safety authority,
- transfer to the United States DOE of the 150 irradiated MTR fuel elements still stored at the EUREX plant pool.

A second national Conference on Radioactive Waste, following the first one held in 1995, was organised and convened by ANPA in November 1997. It proved to be an important turning point in promoting a governmental policy act defining institutional and financial arrangements as well as a comprenhensive national plan on radioactive waste and spent fuel management, which is expected to be issued in 1998, in the framework of a national Conference on Energy and the Environment.

INTERNATIONAL COOPERATION

Research activity on passively safe reactors will be terminated in 1998.

NEDERLAND – NETHERLANDS

ENERGY POLICY CONSIDERATIONS

No major new developments took place in the Netherlands during 1997 compared with the situation reported for 1996.

At the moment the main objective of the Dutch energy policy is the liberalisation of both the electricity market and the market for natural gas. A new electricity bill is under discussion in Parliament.

No increase in nuclear capacity is expected for the foreseeable future. The governmental policy is that the nuclear option will be kept open in order "to board the train" sometime in the next century whenever that would be desirable. Within this context the Netherlands participates in international nuclear research projects in the field of nuclear safety (including reactor development), decommissioning and nuclear waste. Key words in this respect are : development of nuclear reactors of the second and third generation (passively safe and inherently safe), partition and transmutation of actinides (as a technological contribution to the solution of the radio-active waste problem) and research on advanced materials. Another example of international research co-operation in which the Netherlands is very active is the research of a small High Temperature Reactor (HTR) concept (40MWth), which aims at a more inherently safe reactor concept which also may have attractive economic characteristics.

NUCLEAR ELECTRICITY GENERATION

As was announced in the Annual Report for 1996, the nuclear power station of Dodewaard stopped producing electricity on 26 March. This nuclear power station is a BWR with a capacity of 57 MWe. The decision of the SEP (electricity producers) was taken mainly for economic reasons triggered by electricity market liberalisation. The reactor will be decommissioned.

The nuclear power station of Borssele (PWR, 459 MWe) will stay in operation until the end of 2003. In 1997 major refurbishments were performed in order to improve its performance at a total cost of $ 230 million.

At the end of 1996 the nuclear operator of Borssele (EPZ) obtained a licence to increase the maximum degree of enrichment of the nuclear fuel from 3.3% to 4.6% U-235.

The percentage of total generated electricity through nuclear power in 1997 was 4%.

FUEL CYCLE DEVELOPMENTS

A new building for capacity extension has been erected at the Almelo uranium enrichment plant.

For the handling and storage of high level waste the construction of a naturally cooled storage vault is needed. In this storage vault different types of waste would be stored such as high level waste arising from the reprocessing of the fuel from the nuclear power plants at Borssele and Dodewaard, spent fuel from the research reactors at Petten and Delft and other high level waste originating from research activities. The licence process for this vault is ongoing.

RESEARCH REACTORS

Nuclear Research and Development (R&D) is mainly executed by the Technical University of Delft as well as by the Netherlands Energy Research Foundation (ECN). A reorganisation is being undertaken, as the nuclear units of ECN are being merged with those of the R&D institute KEMA (Arnhem).

The High Flux Reactor (HFR, 45 MWth, MTR type) of Petten which is owned by the European Commission remains a major tool for the Netherlands and the European nuclear research and has become the main supplier of medical radio-isotopes in Europe.

ECN has its own Low Flux Reactor (30 KW) and a Laboratory for Radiation Research (LSO).

ÖSTERREICH – AUSTRIA

ENERGY POLICY PRINCIPLES

The Austrian energy policy, based on the principles of the International Energy Agency of the OECD is laid down in the Energy Report of the Austrian Government, 1996.

The implementation of this policy was continuously pursued giving special attention to changing energy and environment policy requirements, both on the national and international level, and with a view to meeting the following challenges :

- the European integration continues to progress and requires constructive co-operation as well as mutual legal adaptations;
- the anticipated global climate change necessitates CO_2 reduction measures on a national basis;
- the far-reaching changes in the economies of Central and Eastern Europe open up new challenges and co-operation possibilities.

Taking into account these challenges the most important objectives of the Austrian long-term energy policy remain satisfying energy requirements, security of supplies, environmental compatibility, conservation of energy resources, social acceptance, utmost priority to energy efficiency, increased utilisation of renewable energy resources, reduction of oil consumption and

oil import dependency as well as of energy imports in general.

The production of electricity by nuclear fission is prohibited in Austria by a federal law (Law Gazette No 676/1978), as result of a referendum.

ENERGY POLICY ACHIEVEMENTS

The following figures about the development of energy and oil consumption show that Austrian energy policy has proved very successful.

- Energy intensity defined as Primary Energy Supply (PES) per unit of Gross Domestic Product (GDP) expressed in 1 000 Austrian Shillings (ATS) decreased in real terms from 895.1 MJ/1000 ATS GDP in 1980 to 735.2 MJ/1 000 ATS GDP in 1996, i.e. by 17.9%.

- The share of oil in energy supply fell from 49% in 1980 to 38% in 1996. The share of renewable energies increased from 20% in 1980 to 26% in 1996. The overall carbon dioxide emissions stabilised at the level of the early seventies.

- Specific energy demand in industry (industrial energy input per unit of industrial net product) further decreased by about one third in the last 15 years (recent data are not available).

Combined efforts of the Federal Government, the Länder (provinces), the producers and the consumers - the so-called social partners - will ensure that the common energy policy objectives will be achieved also in the future.

RESEARCH REACTORS

Austria has no nuclear power plants. However three research reactors are in operation in Vienna, Seibersdorf and Graz.

RADIOACTIVE WASTE

Austria does not produce large amounts of high level radioactive waste since there is no nuclear power. Therefore there are no plans to build intermediate or final storage facilities. During the next decade, the small quantities of high level waste produced in research reactors will be shipped to the United States, according to the renewed policy for fuel of US-origin.

The overall situation, as already reported in the annual report 1996, remains unchanged.

PORTUGAL

ENERGY POLICY CONSIDERATIONS

The dependence on imported energy remains at a high level, of the order of 90%.

In 1995 the Total Primary Energy Supply (TPES) amounted to 19 165 x 10^3 toe which represented an increase of 6% compared with the previous year.

Imported oil and coal contributed 71% and 18.6% respectively, to the TPES in that year.

In order to diversify energy supply and reduce the growth of CO_2 emissions, Portugal is introducing natural gas which comes from Algeria. The first deliveries took place in early 1997, and since October natural gas is being used to fuel the dual fired power plant of Carregado (6x125 Mwe).

Also, the construction of the gas fired power plant of Tapada de Outeiro (3x330 MWe) is on schedule and the first unit should start operation in March 1998.

NUCLEAR ELECTRICITY GENERATION

Portugal has no plans at present to use this source of energy.

FUEL CYCLE DEVELOPMENTS

Uranium (yellow cake) production remains at a very low level and amounted to 17 tU (20 t of U_3O_8) in 1997.

An increase in production to 45 t in 1998 is expected through the experimental exploitation of a new small deposit, the aim of which is to obtain more data which could be useful to achieving improved efficiency in the future exploitation of the Nisa uranium ore deposit.

SUOMI/FINLAND – FINLAND

ENERGY POLICY CONSIDERATIONS

In June 1997 the Finnish government submitted to the national Parliament a White Book on Energy Policy, "The Finnish Energy Strategy". According to this report "the objective of energy policy is, by utilising economic means of steering and market mechanisms, to create circumstances that support both economic and employment policies. These circumstances should ensure the availability of energy, keep the price of energy competitive, and enable Finland to meet her international commitments with respect to emissions into the environment".

The report also states that a "radical increase in the use of natural gas is an important precondition for Finland's ability to meet her international contractual obligations to restrict the emissions of greenhouse gases without jeopardising the economic and employment objectives. Because of the strict international obligations, Finland should, however, be prepared to consider the option in which the proportion of other forms of energy generation that fulfil the economic, employment and environmental criteria – such as nuclear power – is also increased in the generation of base load power. In particular, this applies to a situation where supply of natural gas would prove inadequate to offset the coal capacity".

NUCLEAR ELECTRICITY GENERATION AND CONSUMPTION

During the year 1997 each of the four nuclear power units was run for several months at a power level exceeding the licensed rate in order to test the modifications needed to make it possible to permanently raise the power level. As a result of the successful modifications made during the annual fuel loading operations, the total amount of electricity (20.0 TWh) produced by these plants in 1997 was 7% higher than in 1996. The production covered 27% of the electricity consumption in Finland.

RADIOACTIVE WASTE POLICY AND DEVELOPMENTS

The construction of a repository for low and medium-level nuclear waste on the site of the Loviisa power plant was concluded, and the preparations for the issuance of an operating licence had already been undertaken by the end of 1997.

Posiva Oy has continued its programme of selecting a site for the final disposal of spent nuclear fuel produced in Finland. At the end of the year the company was completing an environmental impact assessment plan covering four prospective sites.

SVERIGE – SWEDEN

ENERGY POLICY CONSIDERATIONS

On 4 February 1997 an Inter-party Agreement between the Social Democrats, the Centre Party and the Left Party was presented. The three political parties have agreed on a number of measures to reduce electricity consumption and develop new methods of electricity production during the next few years. A new, long-term transformation programme is being started to develop an ecologically sustainable energy system.

The Government Bill 1996/97:84, "En uthållig energiförsörjning" (A sustainable energy supply) is based on the agreement and was adopted in the Parliament on 10 June 1997.

The two nuclear reactors at Barsebäck are to be taken out of service, the first before 1 July 1998,

and the second before 1 July 2001. One condition for the closure of the second reactor is that the electricity production loss can be compensated by new production and a decrease in electricity consumption. A law on the decommissioning of nuclear power plants was passed in December 1997.

According to the Agreement, no final date should be set for the closing down of the last nuclear reactor in Sweden. Thereby, a sufficiently long period is granted for the transformation of the energy system.

The energy policy programme will give rise to state expenditure of SEK nine billion over a seven-year period. The result of the energy policy programme and the consequences of the closure of the Barsebäck plant will form the basis for future decisions on the transformation of the energy system.

ELECTRICITY GENERATION AND CONSUMPTION

The electricity balances for 1995, 1996 and 1997 were:

	1995 (TWh)	1996 (TWh)	1997 (TWh)
Hydro electric power	67.0	50.9	68.1
Nuclear power	67.0	71.4	66.9
Wind power	0.1	0.1	0.2
Combined Heat and Power	9.1	10.1	9.1
Condensing/Gas turbine	0.5	3.6	0.5
Total production	143.1	136.1	144.8
Net export/import	1.7	-6.0	2.4
Net consumption	142.0	142.1	142.2

Balances for all three years are shown because they illustrate well the impact of hydro power on the Swedish electricity balance.

1995 and 1997 could be said to represent rather normal electricity balances (slightly better than mean hydro years) with net exports of about 2 TWh. The 1995 and 1997 balances are almost identical. The year 1996, however, was extremely dry with a hydro production 12.5 TWh lower than in a mean hydro year. The 1996 balance therefore differs very much from those for 1995 and 1997.

NUCLEAR ELECTRICITY

Availability of Swedish reactors was on average 80% in 1997, compared with 84% in 1996.

The difference can be credited to the very long 1997 revision periods of Ringhals 1 and Forsmark 1.

The revision of Ringhals 1 (BWR) lasted 7 months. A large number of tube connections and parts of the primary system of the reactor were exchanged. This was done to avoid future problems. Ringhals 1 also had an outage of about a fortnight in December caused by a damaged fuel element.

The Forsmark 1 (BWR) revision period was extended to 3½ months due to complicated repairs of a crack in a tube and a corroded metal sealing ring in the reactor containment.

The other 10 Swedish rectors had normal availability, the PWRs 87.6% and the BWRs (except Ringhals 1 and Forsmark 1) 85%.

FABRICATION

At the ABB Atom fuel fabrication plant, 440 tonnes of uranium dioxide powder were converted and 260 t of fresh fuel were produced during 1997. About half of the production was for the export market.

In December 1997, ABB Atom received an ISO-14001 certification.

RADIOACTIVE WASTE

Reprocessing at BNFL's THORP plant of 140 t fuel from Oskarshamn started during August 1997 and

is now completed. The contract was signed in 1969 and the spent fuel was shipped to England during the period 1975-1982, before Sweden opted for direct disposal of spent fuel. OKG AB's present plans are to recycle the recovered plutonium as MOX fuel, but this would first require the approval of the Swedish government.

Interim storage of spent fuel and disposal of operational waste is proceeding as planned. Today 2800 t of spent fuel are stored in the CLAB facility.

The fee for "back-end" has been lowered and is today on average 0.01 SEK per kWh corresponding to 5% of the production cost for nuclear electricity or less than 2% of the consumption price of electricity.

The Swedish programme for deep disposal progresses as planned in a rather stable way but needs more time than previously anticipated. The deep disposal method as the accepted option as well as the process for siting was again confirmed by Government decisions in late 1996.

The step-wise siting of the deep repository is the crucial issue. Feasibility studies carried out in two municipalities and another three in process together with the municipalities confirm possibilities from a safety and technical point of view.

A local referendum was held in the mining municipality of Malå on 22 September. The question was whether SKB should be allowed to continue to search for a possible deep repository in Malå. The result was 53% against and 45% in favour. This was not enough to form a stable majority but a significant step forward in building trust. It is likely that only 10-20% of the inhabitants originally supported the study. In an earlier referendum in the municipality of Storuman, the support was 27%.

The programme on siting is now being carried on in three municipalities with nuclear facilities. Decision on the next step - the choice of two and eventually one municipality - will take place at the earliest in 1999.

UNITED KINGDOM

ENERGY POLICY CONSIDERATIONS

The objective of UK energy policy is to ensure secure, diverse and sustainable supplies of energy at competitive prices. The present UK government was elected in May 1997 on a manifesto that saw no economic case for the building of any new nuclear power stations, and it currently sees no justification for using public funds for this purpose. The option to build new nuclear stations remains, but it would be for the private sector to decide on commercial grounds whether or not to do so. Both government and the private sector see a clear advantage in producing electricity from existing nuclear stations for as long as it is safe and economic to do so.

Following the successful privatisation of the UK's seven AGR stations and one PWR station in British Energy plc in July 1996, the six operating and three decommissioning civil magnox stations were retained in the public sector in Magnox Electric plc. The government had announced its intention to merge Magnox and BNFL after the privatisation of British Energy and, following discussions with the companies, the detailed proposals for this merger were announced in December 1997.

The aim of the merger is to improve the arrangements for managing public sector nuclear liabilities by ending the mismatch where BNFL has responsibility for dealing with the majority of magnox liabilities while Magnox meets the costs. The merger is taking place in two key stages, the first of which, transfer of the government's shares in Magnox to BNFL, took place in January 1998. The second stage, full merger of the combined businesses of the two companies, is expected to be completed about twelve months after share transfer, subject to the companies meeting the requirements of the relevant regulators.

NUCLEAR ELECTRICITY GENERATION

The UK's nuclear power stations generated 89 TWh in 1997, some 4% more than in 1996, and representing about 26% of the electricity generated in the UK in 1997.

FUEL CYCLE DEVELOPMENTS

Urenco, the UK based British-Dutch-German centrifuge enricher, continued to increase its order book in 1997 through new and extension contracts. To support its expanding order book Urenco brought the first cascade of its new enrichment plant at Capenhurst into operation during December 1997. Urenco is well on schedule to complete this plant by 1999, when it will represent a 30% increase in site capacity.

British Nuclear Fuels plc (BNFL) began construction of the Sellafield MOX Fuel Plant (SMP), which will fabricate mixed oxide (MOX) fuel from a blend of plutonium and uranium, in April 1994. Operation is expected to commence in 1998 and will have a capability to produce 120 tonnes/year.

The Oxide Fuels Complex (OFC), at BNFL Springfields near Preston, supplied the initial and first reload of fuel for the UK's first PWR at Sizewell B and is currently assembling its first AGR fuel for UK stations. There is a planned gradual closedown programme for the old AGR fuel plants.

BNFL's Thermal Oxide Reprocessing Plant (Thorp) at Sellafield in Cumbria began operation in March 1994. Thorp's commissioning was completed when it received the final consent to operate from the Health and Safety Executive's Nuclear Installations Inspectorate in August 1997. The increase of the plant's throughput continues on schedule – with approximately 1100 tonnes sheared and dissolved as at November 1997. Thorp has an order book valued at £15 billion over 15 years, with 65% of the business from overseas.

In March 1997, the then Secretary of State for the Environment rejected Nirex application to construct an underground rock characterisation facility at the site adjacent to BNFL's Sellafield works which it was investigating for its proposed deep disposal facility for intermediate level radioactive waste. Consideration is currently being given to the consequences of this decision for intermediate level waste disposal policy and its implementation.

The UK currently has one operating civil nuclear research reactor, belonging to Imperial College London. Others await decommissioning, are in the process of being decommissioned, or have been fully decommissioned.

CHAPTER IV

INTERNATIONAL RELATIONS

European Union (EU) operators acquire nuclear materials and services from a number of external supplying countries. Moreover, some EU operators also process materials on behalf of foreign clients. While in the European Union, nuclear materials in the civil fuel cycle are subject to the safeguards provisions of the Treaty establishing the European Atomic Energy Community (Euratom or the Community) and, as appropriate, also to the agreements entered into by the Community, its Member States and the International Atomic Energy Agency. In addition, nuclear materials received from three non-Community countries – Australia, Canada and the USA – are subject to international agreements concluded between the Community and the country concerned. These agreements provide for some additional conditions which apply to such materials. Furthermore, supplies of nuclear materials from some other countries are or may become covered under agreements with the European Community and Euratom of a more general nature.

In accordance with the provisions of the Euratom Treaty, international agreements are negotiated on behalf of the Community by the European Commission in accordance with directives issued by the Council of Ministers. Where these agreements relate to the supply of nuclear materials, the Euratom Supply Agency takes part in the Commission's negotiating team and in any ongoing consultations with the authorities of the countries concerned. Developments in relation to these agreements during the year relevant to nuclear fuel supplies are reported below.

The Agency has compiled a compendium of agreements to which the European Atomic Energy Community is a party and which relate specifically to nuclear fuel supply. This document is published by the Office for Official Publications of the European Communities Luxembourg under reference n° ISBN 92-828-0091-1.

BILATERAL NUCLEAR CO-OPERATION AGREEMENTS

EURATOM/AUSTRALIA

Informal consultations with Australian authorities concerning nuclear transfers under the Euratom/Australia agreement took place during the year. Following these and earlier discussions, an agreement was reached with Australia in October 1997 whereby it grants generic prior consent under certain conditions for retransfers of plutonium obligated to Australia only from Euratom to Japan. The agreement will enter into force through an exchange of letters between the European Commission and the Australian Government expected to take place in early 1998.

Prior generic consent for retransfers from the EU to Japan of plutonium subject to both the Euratom/Australia and Euratom/USA agreements was agreed previously in 1993.

EURATOM/CANADA

Routine contacts took place during the year. The European Commission again requested the Canadian authorities to include Russia on the list of countries for which Canada has given generic prior consent for retransfers of non sensitive materials obligated to it under the Euratom/Canada agreement.

The next round of consultations provided for under Art XIII of the Euratom/Canada agreement is scheduled for the first part of 1998.

EURATOM/USA

The new Euratom/USA agreement came into force on 12 April 1996. The first meeting of the Joint Committee set up by the new agreement under Art XII took place in Washington on 16 and 17 June 1997. Both parties reviewed the first year of operation of the agreement and exchanged views on a variety of issues. These included, inter alia, questions relating to the sale of the natural uranium component of the Low Enriched Uranium (LEU) derived from High Enriched Uranium (HEU) from Russia's military programme and US legislation relating thereto, and also arrangements for transfers of US obligated material to Switzerland once the new nuclear co-operation agreement between the USA and that country enters into force.

Also at that meeting the European Commission and the Supply Agency raised the issue of the pricing of enrichment services under contracts concluded with certain EU companies by the US Department of Energy before the creation of the US Enrichment Corporation (USEC). The Commission side stressed, inter alia, the potential for damage to the good trade relations between the US and Euratom and the reliability of the US as a supplier of enrichment services. In addition the Commission has continued to make representations to the US Government in order to help reach a fair solution between the companies concerned and the US side.

EURATOM/ARGENTINA

An agreement between Euratom and Argentina was signed on 11 June 1996 and entered into force on 30 October 1997. The agreement covers co-operation in such areas as research on reactor safety, radioactive waste management, decommissioning and safeguards, but excludes trade in nuclear materials except within the defined scope of this co-operation.

RETRANSFERS

Under the terms of the Community's agreements with Australia, Canada and the USA, these supplier countries retain the right of consent, albeit often in a long-term programmatic framework, over the retransfer from the Community of nuclear materials subject to those agreements to other countries outside the Community.

Under the Euratom/Canada agreement, simplified procedures relating to retransfers of certain Canadian-obligated nuclear items are in place for most of the Community's nuclear trading partners. In the case of the Euratom/Australia agreement, retransfers from the Community of Australian obligated material can take place, subject to certain notification conditions, to countries with which Australia has a co-operation agreement in place for activities for which Australia has accepted those countries as a destination. Again, this includes most of the Community's nuclear trading partners.

Under the Euratom/US agreement, a mechanism providing for advance generic consent for retransfers of nuclear items subject to the agreement is in place based on a list of destinations outside the EU which includes most of the Community's nuclear trading partners. Advance generic consent for the retransfer to Japan of plutonium, including plutonium contained in mixed oxide fuel, is maintained under this agreement by reference to an exchange of letters of 1988 between the European Commission and the US Mission to the European Communities. The US has agreed to extend a similar mechanism to retransfers of this kind to Switzerland with which it concluded a new nuclear co-operation agreement on 31 October 1997, which is expected to enter into force in mid 1998.

Applications for retransfer consents falling outside the generic consents provided for under the above agreements are handled by the Supply Agency. During 1997, seven such retransfers were approved.

BILATERAL RELATIONS IN THE NUCLEAR FIELD WITH OTHER COUNTRIES

THE RUSSIAN FEDERATION

The Partnership and Co-operation Agreement (PCA) between the European Communities, including Euratom, and their Member States and the Russian Federation came into force on 1 December 1997. The trade provisions which had been in force under the Interim Agreement since February 1996 remained unchanged. Under Art 22 of the PCA the Parties agreed to take the necessary steps to establish an arrangement covering trade in nuclear materials by 1 January 1997. Contacts on this matter between the Commission services and Russian authorities commenced in 1996 and are still ongoing. Meanwhile the provisions of Art. 22 of the PCA continue to cover nuclear matters between Russia and Euratom.

OTHER NEW INDEPENDENT STATES (NIS)

In September 1994 the Commission proposed to the Council directives for the negotiation of nuclear trade agreements between Euratom and the following countries of the New Independent States : Kazakhstan, Kyrgyzstan, Tajikistan, Ukraine and Uzbekistan.

At the end of 1997 these proposed negotiating directives were still before the Council.

The provisions of the Euratom Treaty apply automatically to uranium supplied from the NIS to the EU just as for supplies from any other country.

JAPAN

Further to discussions concerning the fabrication in the European Union of mixed oxide (MOX) fuel for final use in power reactors in Japan, an exchange of diplomatic notes between Japan and the European Commission took place on 10 February 1997 under which nuclear material owned by a Japanese undertaking may be fabricated into MOX fuel in Belgium.

The objective of the exchange of notes was to record the conditions under which these operations may take place in conformity with the international non proliferation framework and the provisions of the Euratom Treaty.

Informal discussions between the European Commission and Japanese officials continued during 1997 with a view to a possible opening of official negotiations of a Euratom/Japan agreement. It is expected, subject to approval by the Council of directives to the European Commission for the negotiation of a Euratom/Japan agreement on the peaceful use of nuclear energy, that negotiations will begin in the course of 1998.

MULTILATERAL AGREEMENTS IN THE NUCLEAR FIELD

ENERGY CHARTER TREATY (ECT)

At the December 97 Conference of the Energy Charter Treaty, 29 Signatories had ratified and deposited their instruments of ratification. The European Communities and 12 Member States deposited their instruments of ratification on 16 December 1997.

The entry into force of the ECT will take place 90 days after 30 signatories have deposited their instruments of ratification. In view of the scheduled deposit of instruments of ratification of Cyprus, Albania and Armenia in early 1998, the ECT is expected to enter into force in the course of 1998[1].

With regard to the supplementary treaty and the trade amendment protocol, their respective final texts were agreed at the 1997 December Conference and are expected to be adopted officially during the 1998 April conference.

[1] The deposit of the 30th instrument of ratification by Cyprus occurred on 16 January 1998, therefore the Energy Charter Treaty will enter into force on 16 April 1998.

The trade amendment protocol provides that trade in nuclear material between the European Union and the New Independent States will be covered by bilateral agreements between trade partners, as stated in the Final Act of the Energy Charter Treaty.

CHAPTER V

ADMINISTRATIVE REPORT

PERSONNEL

The staff establishment of the Agency at the end of 1997 was 24.

FINANCE

The Agency's expenditure amounted to ECU 170 291.58 for 1997. This amount was financed principally from the budget of the Commission, as a result of a Council decision of 1960 to postpone the introduction of a charge on transactions to defray the operating expenses of the Agency as provided for by the Euratom Treaty.

ADVISORY COMMITTEE

The Advisory Committee held two meetings in 1997. The Agency informed the Committee of developments related to supply policy in particular with regard to the disposition of ex-military High Enriched Uranium from Russia and supply from other New Independent States. Useful exchanges of views took place on market developments, levels of production and stockpiles in those countries.

As part of a wide-ranging consultation the Commission Services gave a presentation of its draft Illustrative Nuclear Programme of the Community. An exchange of views followed and points made by members were noted by the Commission.

The Agency briefed the Committee on the judgements of the European Courts concerning the KLE and ENU legal cases (see above – chapter I)

The Committee was briefed by the Commission services and the Agency on the status of and developments relating to existing and potential Euratom international agreements in the area of nuclear fuel supply.

The Agency's Annual Report and accounts for 1996, and its budget for 1998, received favourable opinions from the Committee.

The Committee's term of office routinely expired on 28 March 1997. Members of the Committee were re-appointed/newly appointed for a further two year term of office by the Council on 20 June 1997. No meetings of the Committee were held between that date and the year end.

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ORGANISATIONAL CHART

(AS AT 31 DECEMBER 1997)

EURATOM SUPPLY AGENCY

Director General	M. GOPPEL
Assistant to the Director General	D. MONASSE (a.i.)
• Nuclear fuels supply contracts and research	J.C. BLANQUART J. MOTA A. BOUQUET
• General Affairs; Secretariat of the Advisory Committee	D.S. ENNALS P. MARTINEZ-VARGAS

ADVISORY COMMITTEE OF THE SUPPLY AGENCY (UP TO 28 MARCH 1997)

Chairman	Mr. J.L. GONZALEZ (ENUSA, Spain)
Vice-Chairmen	Mr. S. SANDKLEF (Vattenfall Fuel, Sweden) Mr. B. GRESLEY (Urenco, UK)

WORKING PARTY

Chairman	Mr. R. MOTTA GUEDES (ENU, Portugal)
Vice-Chairmen	Mr. P. GOLDSCHMIDT (Synatom, Belgium) Mr. W. SCHOBER (Bayernwerk, Germany)

ANNEX 1

Natural uranium feed contained in fuel loaded into EU reactors and natural uranium delivered to utilities under purchasing contracts (in tU)

YEAR	FUEL LOADED	DELIVERIES	% SPOT DELIVERIES
1980	9 600	8 600	(4)
1981	9 000	13 000	10.0
1982	10 400	12 500	<10.0
1983	9 100	13 500	<10.0
1984	11 900	11 000	<10.0
1985	11 300	11 000	11.5
1986	13 200	12 000	9.5
1987	14 300	14 000	17.0
1988	12 900	12 500	4.5
1989	11 800	13 500	11.5
1990	15 400	12 800	16.7
1991	15 000	12 900	13.3
1992	15 200	11 700	13.7
1993	15 600	12 100	11.3
1994	15 400	14 000	21.0
1995	18 700	16 100	18.1
1996	18 400	15 900	4.4
1997	**18 200**	**15 100**	**12**
Total	245 400	232 200	

ANNEX 2

ESA average price for multiannual and spot contracts involving natural uranium

YEAR	MULTIANNUAL CONTRACTS		SPOT CONTRACTS		EXCHANGE RATE
	ECU/kgU	US$/lb$U_3O_8$	ECU/kgU	US$/lb$U_3O_8$	US $ PER ECU
1980	67.20	36.00	65.34	35.00	1.392
1981	77.45	33.25	65.22	28.00	1.116
1982	84.86	32.00	63.65	24.00	0.978
1983	90.51	31.00	67.89	23.25	0.890
1984	98.00	29.75	63.41	19.25	0.789
1985	99.77	29.00	51.09	15.00	0.763
1986	81.89	31.00	46.89	17.75	0.984
1987	73.50	32.50	39.00	17.25	1.154
1988	70.00	31.82	35.50	16.13	1.182
1989	69.25	29.35	28.75	12.19	1.102
1990	60.00	29.39	19.75	9.68	1.273
1991	54.75	26.09	19.00	9.05	1.239
1992	49.50	24.71	19.25	9.61	1.298
1993	47.00	21.17	20.50	9.23	1.171
1994	44.25	20.25	18.75	8.58	1.190
1995	34.75	17.48	15.25	7.67	1.308
1996	32.00	15.63	17.75	8.67	1.270
1997	**34.75**	**15.16**	**30.00**	**13.09**	**1.134**