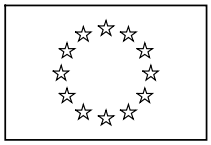

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REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

Operation of Euratom Safeguards in 2002

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1. EXECUTIVE SUMMARY

2002 was a pivotal year for Euratom Safeguards. During 2001 the Commission had appointed a High Level Experts Group (HLEG) to examine the mission and the means of the former Euratom Safeguards Office. On the basis of their final report the Commission adopted a new Mission Statement for the former Office and instructed that it be fully integrated within DG TREN. To this end on 26 June 2002 two new Directorates were created: Directorate H Nuclear Safety and Safeguards, and Directorate I Nuclear Inspection.

The adoption of the new Mission Statement will entail significant changes in the approaches employed for the execution of Euratom Safeguards controls. Therefore structures were created to provide new concepts and guidance in order to progress the introduction of new approaches. Internally, working groups of experienced personnel from H and I were set up. Externally, an advisory group of senior experts from the Safeguards community, SAGES, was established.

In March 2002, the proposed new Regulation on the application of Euratom Safeguards was adopted by the Commission and submitted to the Council for approval. The new Regulation is intended to update the currently in force Regulation 3227/76 in line with legal and technical developments, in particular the Additional Protocol to the Agreements between the Member States, the Community and the International Atomic Energy Agency, modern data transmission techniques and a consistent Safeguards policy on waste. Discussions with the Council have progressed reasonably well and it is hoped that the new Regulation will enter into force at the end of 2003.

The Additional Protocols to the Safeguards Agreements between the Community, Member States and the IAEA had been ratified by 11 of the 15 Member States by the end of 2002. In the meantime exercises were arranged together with the IAEA and some Member States to investigate the practicalities of implementation and to develop the necessary implementation procedures. A dedicated database is being developed for follow up of the Additional Protocols when they are in force.

In order to increase transparency, a Stakeholders' seminar attended by 110 representatives of Member States and nuclear installations was held to brief participants on the implementation of the new Regulation and the Additional Protocols as well as upon the new missions of Euratom Safeguards. In a similar spirit of greater transparency, all the major nuclear installations of the European Union were invited to complete a questionnaire on their perception of the image and quality of Euratom Safeguards. The generally positive replies are considered as encouraging.

It is expected that enlargement will not pose any major practical difficulties. The project to prepare software and hardware tools for nuclear material reporting for the enlargement states had entered its final phase by the end of 2002.

At the end of 2002 the total amount of Plutonium under Euratom Safeguards was 569 tonnes, an 11 tonne increase compared with the end of 2001. Similarly the total amount of Uranium under Euratom Safeguards increased to 318 710 tonnes. Despite the increase in the amounts of material under control, careful streamlining and prioritisation of inspection activities allowed a 5% reduction in inspection-days compared to 2001.

Reports made by the operators of installations on flows and inventories of nuclear materials in accordance with Regulation 3227/76 were processed and checked. In total more than 1 million lines of data were received, mostly in electronic format. All errors and inconsistencies detected were satisfactorily corrected by the operators concerned. In turn Euratom Safeguards furnished the IAEA with the accountancy reports which the Community supplies in fulfilment of its obligations under the Safeguards Agreements with the IAEA. All reports were supplied on time and correctly formatted.

A number of discrepancies and inconsistencies were detected by inspection activities during 2002. However, subsequent investigation led to the conclusion that no diversion of nuclear material had taken place. Similarly, data analysis performed at Headquarters revealed no evidence for the diversion of nuclear materials. The Safeguards Implementation Report of the IAEA for 2002 concluded that there was no evidence of diversion of nuclear material or misuse of facilities or equipment under IAEA Safeguards.

2. LEGAL BASIS OF EURATOM SAFEGUARDS

The task of Euratom Safeguards is to ensure that within the European Union nuclear material is not diverted from its intended use and that safeguarding obligations assumed by the Community under an agreement with a third state or an international organisation are complied with. Chapter VII of the Treaty establishing the European Atomic Energy Community, commonly called the Euratom Treaty, and the implementing Euratom Regulation No. 3227/76, as amended, constitute the legal basis of Euratom Safeguards[1].

3. MISSION AND FUNCTIONING OF EURATOM SAFEGUARDS

3.1. High Level Experts Group Report and level of implementation

In order to review the operations of the now former Euratom Safeguards Office (ESO), the Commission (in June 2001) mandated a High Level Expert Group (HLEG)[2] to prepare a report on the matter. The report was finalized at the beginning

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1 For further details, see chapters 2 and 3, of the 1999-2000 Annual Report (COM(2001) 436 final).

2 The group was composed of Messrs. Christopherson, Eliat and Pellaud.

of 2002 and submitted to the Commissioner responsible for energy and transport matters, Vice-President Mme de Palacio in February 2002. The findings of the HLEG and the recommendations made were guiding elements for the Commission decision of 26 June 2002[3] whereby the nuclear services of DG TREN were re-organized and a new mission statement for Euratom Safeguards was adopted.

In its decision of 26 June 2002, the Commission took note of the findings of the HLEG report, adopted the mission statement as contained in the report, and approved the creation of a Scientific Advisory Group on Euratom Safeguards (SAGES[4]) to advise the Commission on implementing the new mission statement, in particular re-defining the generic Safeguards approaches.

The first steps concerning the evaluation and implementation of the HLEG recommendations had already been pursued by the Commission decision of 26 June 2002, namely the re-integration of ESO into DG TREN, the adoption of the new mission statement and the creation of the SAGES. With regard to the other recommendations made, it is clear that more time will be needed to assess and, as appropriate, implement them to the extent necessary.

A detailed analysis of the requirements and general characteristics of new safeguards approaches for all types of nuclear installations has been initiated in the form of several internal working groups dedicated to the subject. A re-examination of the Commission's co-operation modalities with nuclear operators, and with the IAEA, can only be started once a general outline of a new concept has been prepared internally.

3.2. Reorganisation and new Mission Statement

3.2.1. Reorganisation

In the light of the fragmented nature of the services dealing with nuclear matters, the Commission, in 1999, started an exercise to group together and streamline its activities in the nuclear field. With this objective in mind, the re-organization decided on 26 June 2002 resulted in the creation of two new directorates within DG TREN, one dealing with nuclear safety and safeguards (Directorate H)[5], the other one with nuclear inspections (Directorate I).

3.2.2. New Mission Statement

The new mission statement, which was also adopted by the same Commission decision of 26 June 2002, sets out the basic orientations for the Commission's activities in the nuclear inspection field. It emphasizes the need to redirect existing practice, which is based on carrying out almost exclusively independent verification activities, to a situation where the quality and performance of nuclear operators' measurement and control systems will be taken into account when making a

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3 Minutes of the 1773rd meeting of the Commission, PV(2002) 1573 final

4 The SAGES group is composed of Messrs. Pellaud, Loos, Schenkel

5 As a further step, a unit dealing with radio-protection matters was integrated into Directorate H as of 16 February 2003.

judgement on the safeguards effort that should be spent in a nuclear facility. Furthermore, the mission statement asks for a re-definition of the co-operation modalities with the IAEA in order to avoid duplication of effort and to achieve efficiency gains.

3.3. Preparation of new Regulation

3.3.1. State of Play – Discussion in the Council

As stated in last year's report, the draft new Regulation on the Application of Euratom Safeguards was approved by the Commission on 22 March 2002 under the number COM(2002)99. On the same date it was forwarded to the Council for approval. In a number of discussions in the Council the following issues were identified and compromise solutions were sought:

- The security and confidentiality of data provided by the operator to the Commission.
- The extent of information on Nuclear Material in records kept by the operators.
- The extent and detail of reporting of nuclear material in waste.
- The length of the transitional period granted to the operators for them to adapt their accountancy systems to the new reporting format.
- The mechanism of exemptions for non-nuclear users of Nuclear Material in its end-use form.

The state of progress in the discussions at the Council allows optimism as to the approval of the new Regulation by the Council in good time before the entry into force of the Additional Protocols and before the EU enlargement.

3.3.2. Seminar for Stakeholders

At the request of the Danish Presidency, the Commission held an information seminar centred around two subjects:

- Technical issues and the timetable for the implementation of the new Euratom Regulation COM(2002)99, and the preparation of the Commission for the implementation of the Additional Protocols.
- The new missions of Euratom Safeguards following the HLEG report and the development of new Safeguards approaches.

The seminar was held in Luxembourg on the 12 and 13 December 2002. It was attended by 110 representatives of nuclear installations and national authorities across the EU Member States.

An important part of the seminar was the provision of hands-on-sessions, during which the participants could run the software under development by the Commission, allowing reporting under the new Regulation of Accountancy and Additional Protocol data.

At the concluding session of the seminar it was mentioned that the Commission will afford operators as much assistance as possible to facilitate the implementation of the new Regulation. It was also indicated that the operators' perceptions of Euratom activities will be taken into account when considering the re-orientation of safeguards methods and approaches in nuclear installations. During the concluding session it was also stated that quality assurance approaches comprising auditing of the accountancy system of the operator as well as a risk analysis to avoid unnecessary inspections would be further considered.

4. EURATOM VERIFICATION ACTIVITIES

4.1. Nuclear Material Accountancy

The European Union area contains the full range of nuclear fuel cycle activities, although they are not evenly dispersed throughout the Member States. The nuclear material inventories in the installations under safeguards are constantly growing. For example, plutonium stocks during the last decade increased from 203 tonnes in 1990 to about 569 tonnes at the end of 2002. Plutonium stocks hold a special interest for safeguards because of their sensitive nature. During the same period, the total Uranium inventory in the European Union increased from 200 400 tonnes to about 319 000 tonnes at the end of 2002 (table no. 1).

The operators of nuclear installations report all nuclear material inventories and flows to the Euratom Safeguards Office. These reports amounted to more than 1 million accountancy lines for the year, the large majority of which was received by electronic means. All these data were checked for internal and external consistency and for compliance with the provisions of the Euratom Agreements with third countries.

All clerical mistakes and inconsistencies revealed during 2002 were corrected after consultation with the operators involved.

Accountancy reports were sent to the IAEA in fulfilment of the obligations undertaken by the European Union in the framework of its Safeguards Agreements with the IAEA. During the period covered by this report, the quality and the timeliness of the reports met with the satisfaction of the IAEA.

4.2. Inspection effort and results

In 2002 inspection activities conducted by Euratom Safeguards inspectors amounted to 7 288 person-days: a reduction of about 5% in comparison with 2001.

This evolution results mainly from streamlining and prioritisation of inspection activities as outlined below. These savings set free inspection resources for new facilities becoming operational in the reporting period.

An approximate distribution of the inspection effort, according to the major types of installations, shows that about 30% of the effort was spent in reprocessing facilities (see 4.2.1 below) and associated stores, 45% in enrichment and fabrication facilities (see 4.2.2 to 4.2.4) and another 25% in power reactors, research reactors (see 4.2.5) and other nuclear facilities (see 4.2.6).

The main concerns and/or results achieved in the course of the inspection activities for each type of installations under control are summarised below.

4.2.1. Reprocessing facilities[6]

Modern nuclear fuel reprocessing installations, **THORP** at Sellafield, UK, and **UP2/UP3** at La Hague, France are characterised by a high throughput[7] and highly automated and contained processes. The current safeguards approaches foresee high frequency inspections and automated unattended safeguards systems to verify the nuclear material flows, a significant part of which is fresh Plutonium. At the site of each of these two large reprocessing plants a Euratom on-site laboratory performing verification measurements is being operated by analysts of DG JRC-ITU.

With the exception of a planned shutdown period from mid-March 2002 until the beginning of June 2002, **THORP** was in normal production. In June 2001 an apparent bias of the operator's input sample results was detected. Knowing the principal causes and aware of the circumstances of the issue, the operator was allowed to continue production until the planned inventory in the chemical separation plant in April 2002. Extensive test work done by the operator and investigations substantially supported by the Euratom On-Site Laboratory (OSL), showed that the data, which indicated an apparent material loss were biased and had to be corrected. The revised values are in agreement with internationally recognised standards. The annual Physical Inventory and the Material Balance presented by BNFL were accepted. Proper action was taken by the operator to avoid recurrence of this problem. Since then, the installed safeguards system has not revealed any further problem of this kind.

The results of the inspection activities in the **Magnox reprocessing facilities** and related facilities at Sellafield were satisfactory. The annual Physical Inventory Verification showed that the Material Unaccounted For (MUF) values for all nuclear materials to lie within internationally accepted limits. In particular the results for the Fuel Handling Plant-Decanners were an improvement when compared to those of previous years. At the end of the year the Special Nuclear Material Store 9 Extension was actively commissioned and put into operation. The introduction of the first Plutonium Oxide cans took place in November.

At La Hague, the **UP2/800** reprocessing plant was in operation from April 2002 to the end of the year following the commissioning of the new plutonium finishing line (R4). The **UP3** reprocessing plant was in operation from January to December 2002 and the COGEMA operator trained Japanese trainees in reprocessing techniques throughout the year. Mini-campaigns of shearing and reprocessing with 'debriefing periods' alternated with commercial reprocessing campaigns.

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6 At reprocessing facilities, spent fuel assemblies received from power reactors are processed chemically to separate uranium and plutonium from the highly radioactive fission products. The separated nuclear materials can be re-introduced in the fuel cycle.

7 The total annual throughput of these three facilities adds up to over 3000 tonnes of fuel containing more than 20 tonnes of plutonium.

Routine verifications made on all Plutonium input and output flows allowed the confirmation of COGEMA declarations. However, as in previous years, considerable delays by the operator in making declarations of some analysis results were noted.

The Physical Inventory in the UP3 chemical process revealed a rather high "Material Unaccounted For (MUF) of U and U235. A MUF of similar magnitude but opposite sign was observed at the UP2-800 plant, what could link its origin to the systematic transfers of Uranyl Nitrate liquid from UP2-800 to UP3. The investigation by COGEMA into the potential causes is still ongoing. All activities were performed in a spirit of good co-operation with the operator and with the support of the analyst inspectors from the LSS run by DG JRC-ITU.

Efforts were undertaken to further rationalise inspection activities via concentration on strategically important materials, namely Plutonium input and output streams. As in 2001, uranium outputs were not routinely checked and other controls on Uranium with a lower priority were not performed.

The decommissioning plan for the **Dounreay** (UK) reprocessing facility aims, in the long run, at the complete removal of nuclear material from a number of areas on the site. This plan requires *inter alia* the re-starting of some existing facilities as well as the construction of new ones e.g. for waste handling. As long as fissile material is present in these facilities nuclear safeguards have to be applied. During the last year weekly routine inspections were performed by our inspectors and two Physical Inventory Verifications (PIV) were carried out. All these activities were conclusive in the sense that they led to a confirmation of the declarations made by the plant operators.

4.2.2. Installations for the Fabrication of Mixed Oxide Fuels (MOX) [8]

At the **Sellafield MOX Plant (SMP)**, Plutonium commissioning was started in April after receipt of Nuclear Installations Inspectorate (NII) consent and a successful "pre-Plutonium" Physical Inventory Verification. Since then the production of MOX pellets has continued and the first MOX rods have been produced.

The commissioning of the Safeguards instrumentation is almost completed. To coincide with the start of MOX production, a continuous weekly inspection scheme was started. The inspections consist of verifying operational data, which are received daily via a link on the operators site network, against signals from the installed Safeguards instrumentation. At the moment these checks are performed by manual signal review, however, software tools are under development which will automate these activities. Discussions on data transfer between the site and Euratom Headquarters at Luxembourg, which could further rationalise the inspection effort, have been continued.

For the **MOX Demonstration Facility (MDF)** at Sellafield, the operator received the license to operate the plant as a support facility and as a testing laboratory for SMP purposes. Some material processing re-started in the summer.

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[8] In MOX Fuel Fabrication Plans, the plutonium oxide produced in reprocessing installations is used in a mixture with uranium oxide to fabricate MOX fuel elements for subsequent use in nuclear power plants.

All routine interim verifications, the routine monthly Interim Inventory Verifications and the Physical Inventory Verification in February were successfully completed.

The methods and technical means applied at the **MELOX plant** in Marcoule continued to be highly satisfactory. In close co-operation with the operator, inspectors determined the implementation of additional surveillance measures to cover a new storage facility recently set up inside the plant. The annual Physical Inventory Verification (PIV) of the plant was conducted in July with satisfactory results.

The annual Verification of the Physical Inventory of the **COGEMA-Cadarache** plant in France found an unacceptable amount of Material Unaccounted For (MUF) on the plutonium materials.

The operator has identified the possible causes of the MUF and he is presently revising his internal procedures for the accounting and follow-up of the stored material, re-measuring the batches of materials that are involved in the MUF and re-evaluating the accuracy of his measuring system.

The involved materials will remain in the installation allowing a re-establishment of the attributed quantities.

The Commission received a preliminary report on the subject and inspectors are closely monitoring the progress made by the operator.

The **Belgonucléaire MOX fuel plant** at Dessel, in Belgium, is safeguarded by Euratom and the IAEA according to the New Partnership Approach (NPA). The inspections during the year 2002 have confirmed the operator's declarations and the year ended with a successful Physical Inventory Verification. The unattended measurement system for received material has been modernised and on-site unattended equipment has been linked to the inspector offices. Due to the failure of the Belgium authorities to grant export licenses for the transfer of Plutonium samples to DG JRC-ITU, Euratom Safeguards has been unable to perform destructive analysis since March 2001.

The **FBFC MOX fuel assembly plant** at Dessel, in Belgium, continues to supply principally German and Swiss reactors. To cover the borrowing scenario the annual Physical Inventory Verification (PIV) took place at the same time as the PIV at Belgonucléaire.

The Safeguards objectives for the installations in the Hanau area in Germany have been achieved. The Safeguards approach for the decommissioning of **Siemens MOX facility** was agreed upon and is being implemented successfully. The nuclear material at **BfS Hanau** has all been moved to the new purpose built storage. The Safeguards measures to firstly verify these movements and then to maintain continuity of knowledge worked satisfactorily.

4.2.3. Enrichment Facilities[9]

All three **Urenco centrifuge enrichment plants** at Almelo, the Netherlands, Gronau in Germany and Capenhurst in UK, are safeguarded by Euratom working together with the IAEA. Capenhurst is on a list of installations drawn up by the UK as part of the voluntary offer, and designated by the IAEA for the application of Safeguards.

Throughout 2002 the rapid build-up of enrichment capacity set in motion in recent years has continued unabated. The total installed capacity to date at all three plants is estimated at more than 6000 tonnes separative work per year.

For reasons of commercial sensitivity as well as proliferation risk, access to centrifuge cascade areas is highly restricted. A combination of High Performance Trace Analysis/Environmental Sampling (HPTA/ES), permanently installed cascade-pipe monitors, portable NDA requirement, Containment and Surveillance (C/S) and Limited Frequency Unannounced Access (LFUA) are used to confirm that high enriched uranium is not being produced. During 2002, sample collection for HPTA/ES has become a feature of inspections.

There is one Physical Inventory Verification, as well as 11 intermittent routine inspections per year and a number of additional routine inspections to verify feed or product. The conclusion of these activities is that operator declarations in 2002 of nuclear material flow and inventory at all plants were acceptable.

EURODIF at Pierrelatte, France, a gas-diffusion enrichment plant, was subject to weekly high frequency inspections throughout 2002. The yearly inventory verification was successfully carried out in the first week of March. Up to mid-June 2002, all the low-enriched uranium output declared to be subject to safeguards was verified during the weekly inspections; the input of natural uranium and the tails were verified on a random basis. From mid-June on, due to a reduction in inspection effort, the verification of enriched Uranium also fell below 100%. As a consequence, not all enriched material exported from EURODIF outside the European Union was verified and sealed.

The conclusion reached as a result of these inspection activities was that in 2002, there was no evidence that nuclear material declared to be subject to safeguards was diverted from its intended use. However, the "particular status"[10]of the installation continues to limit the safeguards assurance and needs to be addressed.

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9 Modern Light Water Reactors need fuel with about 3 to 5 percent of the fissionable uranium isotope U235. As natural uranium contains only 0.7 percent of this nuclide, an enrichment process is needed to achieve the desired concentration. In the European Union, two companies offer this service for civil customers: URENCO and EURODIF.

10 Due to the presence of nuclear material not subject to safeguards at EURODIF.

4.2.4. LEU and HEU Fuel Fabrication Plants, Conversion Facilities[11]

At the **FBFC LEU fabrication plant** at Dessel, Belgium co-operation with the IAEA under the NPA agreement continues. A successful annual Physical Inventory Verification was carried out in July with in-field measurement support by DG JRC-ITU.

At **BNFL Springfields,** a large uranium conversion and fuel fabrication plant in the UK, a weekly inspection regime was maintained because of the size and diversity of the plant and the continuous nature and high frequency of imports and exports. Additionally, all exports from the EU are sealed.

A survey of the Springfields site was carried out by experts from the European Commission's Radiological Health and Safety service in order to assess the risks of radiation and contamination to which inspectors are exposed. This was a useful exercise to raise inspector awareness of the relative risks over the large variety of conditions and types of material that exist here. It was recommended that such an exercise be performed at every major installation where inspectors are present.

The specifications of the project to install an NDA station in the inaccessible drum store at the Oxide Fuel Complex were concluded. Once the financial terms are proposed by the operator, a decision on implementation will be taken. Discussions took place with the operator on possible alternatives to the current inspection regime.

At the **LEU fabrication plant** of **FBFC** in Romans-sur-Isère (France) the annual physical inventory was carried out in August with in-field measurement support by DG JRC-ITU. There was no evidence of diversion, however a number of shortcomings were detected and had to be corrected by the operator. The shortcomings consisted of items declared in the List of Inventory Items by the operator but not found by our inspectors at the Verification of the Inventory and also of other items that were not declared by operator but found during the verification activities.

An unattended measuring station (UMS) was installed in July and training on its use has been provided both to the operator and the Euratom inspectors. The UMS has been developed by JRC-Ispra and it is intended to measure on-line the outgoing flow of finished fuel assemblies.

The annual physical inventory verification at the **CERCA HEU Fabrication plant** in Romans-sur-Isère (France) was carried out in November and was globally satisfactory. It was possible to perform it for the first time on the basis of a List of Inventory Items provided in a computer readable form, allowing the inspectors to validate satisfactorily the declared data. A new and re-engineered version of a gamma-scanner has been installed by the JRC-Ispra in the plant. The measuring device is used for non-destructive assays of fuel elements fabricated for research reactors.

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[11] At LEU Fuel Fabrication Plants, fuel assemblies are produced from low enriched uranium (LEU) for subsequent use in nuclear power plants. In HEU Fuel Fabrication Plants, fuel elements for research reactors using high-enriched uranium (HEU) are manufactured.

All verifications at **ENUSA** at Juzbado, in Spain, **Westinghouse Atom AB** at Västerås, in Sweden and **ANF-Lingen** in Germany, were performed with satisfactory results with measurement support by DG JRC-ITU. Due to their level of achievement in material accountancy, these installations are often used as benchmarks. In Juzbado and Västerås, Euratom inspectors successfully use advanced tools for on-site verification and evaluation.

4.2.5. Nuclear Power and Research Reactors[12]

A successful Physical Inventory Verification was performed at the **Dodewaard Reactor** (NL) that was shut down in 1997. Shipments of spent fuel will continue into 2003.

During the annual Physical Inventory Verification of the Magnox power reactor at **Wylfa** (UK) the absence of an irradiated fuel element became evident. The report of a technical investigation panel came to the conclusion that the element must have been inadvertently dispatched to Sellafield. The report also makes a number of recommendations aimed at preventing the recurrence of such events. The operator's attention has however been drawn to the fact, that there is no definitive corroboration of their conclusion until Sellafield is in a position to confirm the receipt of the missing element.

In April the operator at **Bradwell** (UK) informed Euratom of an apparent fuel element accountancy discrepancy involving elements being shipped to Sellafield. Another incident of this kind involving the discovery of an unirradiated element was reported again in December from the same power station. Following a full investigation, Euratom has satisfied itself that the necessary corrective actions have been taken.

A shortfall in accounting procedures was also noted at **Sizewell** in UK in November. At the instigation of Euratom, the operator has introduced steps to prevent a recurrence.

Routine inspections at **nuclear power reactors** in Finland and Sweden were completed without major safeguards relevant incidents. Euratom Safeguards, as far as possible, tries to avoid performing core control inspections because of the high level of inspection effort that they require. Nonetheless they were not always avoidable and the usual planning problems were experienced due to changes to dates made at short notice. Changes in the IAEA responsibility for Finnish reactors led to a change in the IAEA's approach and considerable confusion for the operator. Euratom Safeguards will propose the drafting of facility specific NPA papers for these cases.

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12 Most of the nuclear power reactors operated in the European Union are of the Light Water Reactor type (LWR), i.e. the reactors are cooled and moderated with normal water. In addition, the UK operates MAGNOX and Advanced Gas Cooled Reactors (AGR) which are moderated with graphite and cooled with CO_2 gas. The operation of LWRs using LEU is characterised by long periods (12-18 months) of continuous operation. These periods, when the in-core fuel is inaccessible, are followed by outages typically lasting 2-4 weeks when about one third of the (used) core fuel is exchanged for fresh fuel from Fuel Fabrication Plants. LWRs are inspected during this outage period when all the fuel is accessible for verification.

Though the reactor **Barsebäck 1** (Sweden) is free of nuclear material, the operator wants to maintain it in an operational status as an experimental site for new handling procedures in **Barsebäck 2** which is of identical design. Therefore we kept the surveillance system installed and running.

French reactors were regularly inspected whenever refuelling outages took place at one of the units at a reactor site. These inspections did not give rise to any remarks.

The work environment in some reactors in Spain led to technical reliability problems with permanently installed surveillance systems so that during the refuelling period additional temporary surveillance systems had to be installed. Intrusive measures (ion fork) had to be applied in **Vandellos** after a communications breakdown between Euratom Safeguards and the operator led to a loss of continuity of knowledge of the core material.

The **loading of spent fuel casks (CASTOR)** continued in a number of German and Belgian power plants and started at Trillo, Spain. In view of the envisaged medium to long term storage of these containers at the reactor sites their contents were measured by Euratom before loading and subsequently brought under multiple containment and surveillance systems. Due to recurring technical problems during the loading, drying, and closing process, the CASTOR related inspections turned out to be resource consuming and difficult to plan. Moreover, it appears that the licensing policy of some German Länder authorities does not aid inspection planning. A gradual improvement of the situation is expected as unattended measurement stations are installed in all concerned reactors.

Another type of inspection requiring considerable human resources is that of **reactors using MOX fuel** in the Non Nuclear Weapon States. The installation of a special core camera system at the reactors of Gundremmingen, Germany helped to alleviate the burden at this site.

Inspections at **research reactors** do in general not give rise to any Safeguards relevant remarks in the framework of this annual summary. The tendency is for a decrease due to the denuclearisation policy in many member states. The only new project in this area is the FR2 reactor in Germany.

After an unscheduled and temporary shutdown the **High Flux Reactor** at Petten, in the Netherlands obtained a license to restart again in March. Audits on safety culture and safety management concluded that the safe operation of the reactor was not at risk. Provisional planning in order to safeguard an increased inventory of fresh fuel, did not have to be activated.

4.2.6. Other installations and facilities

The **storage ponds for LWR irradiated fuel assemblies** at La Hague, in France are inspected jointly with the IAEA. Verification activities performed in this area did not reveal any discrepancies. However, a loss of continuity of knowledge, which occurred late 2001, was recovered at the beginning of 2002 but not in a timely manner.

With a view to reducing their presence in France (a Nuclear Weapons State), the IAEA has started to consider a possible revision of their safeguards implementation procedure in these LWR ponds but no concrete output has been seen so far.

During 2002, two new **intermediate storage facilities** were put into operation in the European Union. The move towards storage of irradiated fuel close to the reactor is particularly favoured in Germany, as well as in some other countries too. As a consequence, Safeguards activities at intermediate storage facilities will be expanded in 2003, and new Safeguards approaches for this type of installation are under discussion.

At **Cadarache** (F), the operator (CEA) intends to build a new store, to replace an existing one. It will include reconditioning of significant quantities of nuclear material. Euratom expressed its wish to be involved during the design phase in order to develop and install the appropriate equipment and to minimise the manpower needs and dose uptake. Euratom has asked to the operator to separate the flows of civil and defence materials as much as possible.

During the last decade, a large number of installations at **the Research Centre of Karlsruhe** in Germany, have ceased nuclear activities. Euratom performed inspections to verify the Basic Technical Characteristics and the status (closed down or decommissioned facility) of 17 Material Balance Areas during the last quarter of 2002. These inspections were made in close collaboration with the IAEA in order to establish that the nuclear material had been shipped and that structures and equipment had been dismantled and/or removed. The results obtained were satisfactory, and confirm that most of these installations need not be inspected anymore.

The unloading activities of irradiated fuel assemblies from the reactor core of the fast flux reactor **Superphenix** at Creys-Malville, France, to the spent fuel pond continued through 2002. It is expected that these activities will be finalised in June 2003, such that the reactor core will then be empty. The fresh fuel assemblies are still stored in a dry store on-site and are subject to regular Safeguards inspections. Safeguards were implemented and follow-up was appropriate.

During the annual physical inventory in December 2002 at the **Joint Research Centre Ispra** in Italy**,** a new software package (IP3) was used for stratification, selection of items to be measured, and other inspection verification work. From the final results, it can be concluded that the tool was successfully implemented during this PIV. The IAEA participated at this exercise.

At the **Interim Storage Lingen-Emsland** (Germany) the first Castor container with irradiated fuel assemblies was transferred from the Emsland reactor to the intermediate on-site store in December 2002. This is in line with the German approach to store irradiated assemblies at on-site stores.

The **Interim Storage facilities from GNS** (Ahaus and Gorleben) in Germany, are not expecting to receive any irradiated fuel assemblies from German reactors in the coming years.

In 2002, 6 containers with spent fuel assemblies from the BR3 research reactor were transferred to the new **SCK-Belgoprocess intermediate store** at Dessel, in Belgium. The BR3-MBA has been completely emptied.

At the **Interim Storage Greifswald** in Germany**,** CASTOR loading proceeded at a reduced rate throughout the year, due to several technical problems due mainly to concerns over the primary lid sealing arrangement. A total of six CASTORs were loaded in Block 2 and shipped to the interim storage. The remaining material in Block 1 was verified by Ion Fork and loaded to a KRB MOX flask in preparation for being shipped to the interim storage.

Safeguards arrangements in the wet store at Greifswald continue to provide cause for concern with the current approach resulting in an almost permanent loss of continuity of knowledge due to the movement of partially filled flasks. An IAEA proposal to consider a zone approach has yet to be realised.

At the closed down **Rheinsberg** reactor in Germany, only one inspection was performed during the year and this was in order to provide baseline sampling for the hot cells. The installation has zero inventory.

4.2.7. Global evaluation of the safeguards activities

During the reporting period of 2002, the global evaluation of safeguards activities focussed mainly on the evaluation of Material Unaccounted For (MUF), the cumulative MUF, which is the algebraic sum of the MUF for a Material Balance Area over time, and Shipper-Receiver Differences[13]. MUF can be described as the difference between the physical inventory and the book inventory. The evaluation was only carried out for bulk-handling facilities (Reprocessing Plants, Fuel Fabrication Plants, and Gas Centrifuge Enrichment Plants), where the MUF is expected to be different from zero due to measurement uncertainties and the nature of processing the nuclear material.

The entire evaluation was performed on data from the Euratom Safeguards accountancy database. That means the French bulk-handling Material Balance Areas (MBAs) from which we do not have declarations were excluded from evaluation. Small bulk-handling MBAs with a physical inventory or throughput less than two significant quantities[14] were also excluded from evaluation as were bulk-handling MBAs which were being decommissioned during the reporting period of 2002.

Based on the evaluation there is no evidence that in bulk-handling MBAs of the EU, source materials and special fissile materials were diverted from their intended uses as declared by the operators into MUF or into Shipper-Receiver Differences. The measurement systems of all the bulk-handling MBAs in the EU comply with the most recent international standards. There was still evidence that there are biases in

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13 'Shipper-receiver difference' means the difference between the quantity of nuclear material in a batch as stated by the shipping material balance area and as measured at the receiving material balance area.

14 Significant quantities are used in establishing the quantity component of the Safeguards inspection goal, e.g. 8 kg Pu, 25 kg High Enriched Uranium and 75 kg Low Enriched Uranium.

the cumulative MUF for some bulk-handling MBAs. Therefore, investigation of the biases must be carried out and corrective actions must be undertaken.

5. SAFEGUARDS ACTIVITIES UNDER THE NPA

5.1. The IAEA Safeguards Implementation Report

The Safeguards Implementation Report (SIR) of the IAEA covering the joint activities on the territory of the EU in 2001 was made available to ESO in May 2002.

A meeting at the IAEA headquarters took place in the first half of June to review the findings and discuss details relating to nuclear installations in the EU.

All in all, the SIR 2001 concluded that there was no evidence of diversion of nuclear material or misuse of equipment or facilities placed under Safeguards in the European Union.

The SIR 2001 acknowledged that collaboration with ESO and Member State support programmes made it possible to reach significant advances in Safeguards technology and verification procedures. Trials were carried out in various EU installations in the areas of surveillance systems, short notice random inspections and remote monitoring. As part of the New Partnership Approach arrangements and in order to save resources, the IAEA and ESO continued to share the purchase and operational and maintenance cost of the equipment installed in facilities under IAEA safeguards.

As in the SIR 2000, the IAEA stressed the importance of working closely with State and regional systems of accounting and control of nuclear materials to increase verification effectiveness and cost efficiency. In this context, an Agency/Euratom working group has been established for the Additional Protocol implementation preparations in the EU. A new seminar on the New Partnership Approach, jointly developed by the Agency and Euratom, was held for the first time in 2001. Many of the routine training courses were attended by inspectors of the ESO and conversely, IAEA inspectors attended courses given by the ESO, thus maintaining the co-operation on training between both organisations.

The IAEA also reported on the substantial progress made in Integrated Safeguards as the conceptual framework was completed. It comprises the Safeguards concepts, approaches, guidelines and criteria that govern the design, implementation and evaluation of Integrated Safeguards.

In addition to its global conclusions, the SIR 2001 made recommendations for improvement in specific areas. These recommendations may be summarised as follows:

- Whenever possible shipment of partially filled or empty transport containers should not take place during the open core period in LWRs. Outside this period an advanced notification for movement of empty or partially filled containers should be requested by ESO and information transmitted to the IAEA in good time to facilitate inspection activities.

- Problems occur due to the IAEA mechanistic system when nuclear material remains in closed shipping containers over long periods or when nuclear materials

at reactors are present in the form of rods in closed containers, rendering them not easily accessible. In the European Union, this has been the case due to the restriction of movements because of licensing problems and because of a ban on transports due to the outbreak of foot and mouth disease. The IAEA also intends to investigate the possibility to either extend the area under surveillance or to seal these flasks before their removal.

- The generic problem associated with plutonium production in large research reactors will be eliminated after the installation of power monitors at the facilities concerned, subject to a satisfactory outcome of the vulnerability test of the equipment.

- Corrective actions need to be taken during or soon after a Containment and Surveillance failure is detected. The IAEA considers it important to further install protective covers on seals and back-up open core surveillance systems. The IAEA should fully bear the cost of this redundant equipment not needed by ESO.

It is foreseen that improvements in the way in which the NPA will be implemented in the future shall contribute further to a more even cost sharing between the two inspectorates and better consistency between conclusions drawn in the SIR and those resulting from safeguards activities conducted by the ESO.

5.2. Additional Protocol and Integrated Safeguards

The aim of the Additional Protocols is to increase the IAEA's capabilities to detect undeclared nuclear material and activities that are in violation of the NPT (Non Proliferation Treaty) provisions.[15]

Euratom plays a key role in the implementation of the Additional Protocol in the European Union. As the nuclear fuel cycle in Europe shows a number of specific European issues due to the phasing out of nuclear activities over the years Euratom has developed a generic approach for the areas of major concern:

- Former nuclear research centres today may have a diverse range of activities. The buildings in these centres no longer necessarily house nuclear fuel cycle related activities.

- There are hundreds of locations in the EU that once contained nuclear material, which was declared to the IAEA, and which have completely different activities today or which are in the process of being completely dismantled. Safeguards will have come to an end when the nuclear material was removed and consequently the Commission and the IAEA need to clarify the current status of these locations.

- In addition there are many places where nuclear material is only used for non-nuclear fuel cycle related purposes, which in line with the requirements of the Additional Protocol should not be subject to a declaration under the Additional Protocol.

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[15] The areas covered by the Additional Protocol and the responsibility of the Community are described in the Annual report 2001 "Operation of the Euratom Safeguards office in 2001"

Euratom undertook therefore to negotiate with the IAEA a harmonised approach for all these cases, which on one hand is in line with the spirit of the Additional Protocol and on the other hand does not impose an unnecessary burden on operators that have never had or no longer have a functional relationship with the nuclear fuel cycle.

The corresponding procedures developed jointly with the IAEA have been tested and will now be systematically implemented in the EU. Furthermore, a number of dedicated site visits have been executed to assist operators in the NNWS in the site definition of complicated sites, where the activity program have changed over the years.

With these measures, Euratom used the time until all Member States have ratified the Additional Protocol, which is a pre-condition[16] for its entry into force, to prepare for a smooth implementation of the Additional Protocol in the EU. For the same purpose, two field trials (JRC at Petten and VTT in Helsinki) have been carried out in order to test the modalities for the information flow required by the IAEA, the delimitation of nuclear sites and the arrangements for complementary access.

By the end of 2002, 11 of the 15 Member States had ratified the Additional Protocol, the remaining four are expected to do so during 2003.

Euratom has prepared two papers for every Member State: the "Arrangements for the implementation of the Additional Protocol in…(Member State)" and the corresponding "Information Flow under the Additional Protocol in …(Member State)", subject to discussion during the bilateral meetings with the Member States. Furthermore, the Commission developed reporting software for the future users, which has been subject to discussions and testing in dedicated user group meetings, and made preparations for the development of a dedicated Additional Protocol database.

The preparations of both the Commission and the Member States are such that the entry into force of the Additional Protocol in 2004 seems now realistic. To this end the Commission and the Member States will, under the terms of the Additional Protocol, provide the IAEA with written notification that their respective (internal) requirements for the entry into force have been met. Date of entry into force will then be the date such notification is received by the IAEA.

6. TOWARDS AN IMPROVED AND REVISED EURATOM SAFEGUARDS SYSTEM

6.1. Steering Groups for new safeguards approaches

A number of steering groups were established to redefine inspection objectives and to make proposals on new safeguards approaches following the recommendations

[16] Article 102 of the Euratom TREATY asks for: "Agreements or contracts concluded with a third State, an international organisation or a national or a third State to which, in addition to the Community, one or more Member States are parties, shall not enter into force until the Commission has been notified by all Member States concerned that those agreements or contracts have become applicable in accordance with the provisions of their respective laws."

made in the HLEG report. The steering groups were established and co-ordinated by the sector for methodology of the unit Safeguards & Non-Proliferation but included members both from other sectors of this unit as well as from the units responsible for logistics and inspections of Directorate I.

The first step was to perform an "inventory" of current practices. The groups exchanged information and experiences from in-field operations and reviewed the current requirements of the EIGs (Euratom Inspections Guidelines) and the NPA (New Partnership Approach) papers.

The planning of the next steps was started. The aims being both to provide suggestions for possible short term changes to cope with the challenges of the near future, e.g. EU enlargement without additional resources, and to propose innovative approaches which improve the overall efficiency without jeopardising the effectiveness of the system. The first results, of a very general nature, were presented at the beginning of December to the SAGES, who agreed to the proposed working method but suggested that for the next consultation concrete proposals should be presented. The current thinking was also presented in the "Seminar for Stakeholders" in December 2002.

6.2. Survey of operators

The Quality Survey on Euratom Safeguards activities is one of the first measures adopted by the Commission in order to put into practice two of the main HLEG[17] recommendations, which were, that the European Commission should introduce a much higher transparency in its Safeguards activities and modify its relations with nuclear operators. In practice, this means that the Commission should consequently define ways to strengthen collaboration and the exchange of views with the facility operators, who are considered as partners and not only as inspectees. The overall purpose of the survey was to evaluate the image and the performance of Euratom safeguards activities as seen by the operators of the nuclear installations.

In total 72 questionnaires were sent in July 2002 to all major nuclear installations and to a representative sample of all the other nuclear installations of the EU. The evaluation of the findings of the survey is the subject of a classified Technical Report ("Evaluation of results of quality survey on Euratom Safeguards activities in nuclear installations", March 2003) and will be summarized in the next annual activity report for 2003.

6.3. Progress in Safeguards technology

In 2002, work continued on the development of a new safeguards seal based upon transponder technology. This will facilitate in-field verification and eventually replace the existing copper brass device for most applications within the next 2 to 3 years.

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[17] HLEG (HIGH LEVEL EXPERTS GROUP)

The first new digital surveillance systems of the latest technology that incorporate video motion detection and image data treatment on the fly were successfully installed in nine installations and have been operating reliably.

New software was developed and implemented for the on-site collection and evaluation of operators' data provided in computer-readable form.

7. INSTITUTIONAL ISSUES

7.1. European Parliament (EP)

On 2 July 2002, the European Parliament adopted a Resolution on the Report from the Commission to the Parliament and to the Council on the operation of the Euratom Safeguards Office during 1999-2000[18]. The *rapporteur* being Mr. Rübig.

In its resolution, the European Parliament values the quality and the results of the activities of the Euratom Safeguards Office for the period 1999-2000 and considers it positive that no diversion of nuclear materials within the European Union was detected in the period 1999-2000.

The EP made also recommendations concerning nuclear safety and physical protection, which will be considered for implementation.

7.2. Enlargement

The project set up to facilitate the implementation of the Euratom Nuclear Material Accountancy System in the Accession States, via software tools and the required hardware entered in its final phase. Representatives of the applicant countries actively contributed to the project through their participation in a steering committee, which also ensures that the tool is tailor-made to their needs.

The steering committee meetings were also used as an opportunity to discuss with some candidate countries their questions concerning the implementation of Euratom Safeguards after accession.

7.3. Member States

Contacts with the Member States addressed mainly the Additional Protocol (AP) and the New Euratom Safeguards Regulation (implementation of Article 79 Euratom). Several meetings took place to prepare for the implementation of the AP. The new regulation was subject to lengthy discussions with the Member States and their experts in the Atomic Questions Group of the Council.

7.4. Euratom Agreements

During 2002 the three Community nuclear co-operation agreements currently in force, with the United States of America, Canada and Australia respectively, were

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[18] Rapport sur le fonctionnement de l'Office du Contrôle de Sécurité d'Euratom - COM(2001) - 436 – final

implemented to the satisfaction of all Parties involved. In a bilateral technical working Group meeting between Euratom and Canada that took place in Ottawa in November 2002, the good relations between the parties were acknowledged, and technical proposals towards the solution of the long standing problem of shipment of Canadian obligated tails to Russia were discussed. A positive solution is expected next year.

Stagnation was observed in the negotiation of the agreements with Japan and China. The first could not be concluded because of difficulties raised during the draft approval procedure in Japan, while for the second the negotiation mandate to the Commission by the Council is still pending[19].

8. EURATOM SAFEGUARDS RESOURCES

8.1. Budget appropriations

Article 174 of the Euratom Treaty specifically mentions the necessity to include appropriations in the Commission's budget for operational expenditure related to the activity of nuclear Safeguards.

Founded on this legal basis Safeguards activities are financed by two types of budget appropriations:

(1) A general "functioning" appropriation involving the costs of Euratom Safeguards overheads such as general IT equipment, telecommunications, etc. (Part A of the Budget, chapters A-70 and A-24), as well as a specific appropriation for the medical survey and the radiation protection of the inspectors (Part A of the Budget, line A-1420);

(2) Specific "operational" appropriations allocated for expenditure which is, directly related to nuclear safeguards such as mission costs, rental of offices on site (including on site laboratories), purchase of technical equipment and samples taking and analysis, contracts for services (i.e. maintenance and repairs), transportation of equipment and samples, training, etc., necessary for Euratom Safeguards activities (Part B of the Budget, chapter B4-20).

For 2002, the specific operational appropriations in the EU Budget for the Euratom Safeguards represented € 19.1 Mio. From that amount € 18.9 Mio (99.1%) were actually committed. The distribution of the expenditure was as follows:

- Inspection mission costs (travel means, daily allowances): € 4.2 Mio (22%)
- Rental of offices for the inspectors on inspected sites (and related equipment costs): € 0.6 Mio (3.2%)

[19] In the meantime, the negotiation mandate has been obtained.

- Purchase, installation, maintenance and repairs of equipment on sites, including informatic means, analysis of samples, related costs such as transport, consumables, spare parts, etc.: € 5.7 Mio (29.9%)

- Investments made in large scale plutonium bulk handling plants and related maintenance, operation and logistics: € 7.9 Mio (41.4%)

- Administrative and technical assistance, training for inspectors, and other expenses (including special insurance coverage): € 0.5 Mio (2.6%)

The number of inspections on site, after a stabilization in the last 3 to 4 years, has been reduced in 2002, in parallel with an increase of stand by equipment and remote controlled systems in the installations.

Major investments related to large Plutonium bulk handling installations have already been completed. The costs of those plants still represent an important part of the expenditures. Out of the € 7.9 Mio annual costs, more than 50% currently represent maintenance and technical support on the existing equipment.

Budget appropriations allowing the implementation of Safeguards activities were managed by Euratom Safeguards Office from January 1 to July 31, 2002. From August 1, 2002, further to the reorganization of the Directorate-General of Energy and Transports, the responsibility of Euratom Safeguards budgetary management was shared between Directorate A (General Affairs and Resources), Directorate H (Nuclear Safety and Safeguards) and Directorate I (Nuclear Inspections).

8.2. Human and other Resources

8.2.1. Staff Resources and Utilisation

The former ESO which, since 1.8.2002 is fully integrated into DG TREN, counted a total of 265 officials of whom 195 were Nuclear Inspectors.

Two Directorates were created in the re-organisation of the former ESO: Directorate H, Nuclear Safety and Safeguards, and Directorate I, Nuclear Inspection. At the 31st of December 2002 there were a total of 275 officials in the two Directorates.

In total the two directorates contain 191 nuclear inspectors.

8.2.2. Safeguards Equipment

The safeguards equipment utilised by the inspectors falls into two principal categories, that for Non Destructive Assay (NDA) measurements and that for Containment and Surveillance (C & S).

The NDA measurements, based upon neutron and gamma techniques, are used by the inspectors to assure themselves that the physical quantities of nuclear material in the facilities correspond to the notified accountancy values. These measurements can be performed either manually or automatically dependent upon the facility and equipment configuration.

The C & S measures are in the form of video surveillance and seals to ensure the continuity of knowledge on identified material.

During 2002 as part of the continuing process of rationalisation and standardisation the work on upgrading the range of NDA instrumentation was completed and steps were taken to identify the next generation of data acquisition PCs for the portable instruments. The software suite of programmes for data analysis of both neutron and gamma measurements, in unattended mode applications, was extended.

8.2.3. Support by the JRC

The Commission Joint Research Centre provides support to the Euratom inspectorate for both routine activities and related development work for future improvements to safeguards activities through the Commission Research and Development programme. In the Fifth Framework Programme for the year 2002, the support included provision for 58 person/years and a specific credit of € 1.72 Mio distributed principally between ITU (Karlsruhe) and IPSC (Ispra).

Co-operation between the former ESO and the JRC continued to be mainly focussed on the following areas:

- ITU Karlsruhe: On-Site Laboratories, Sample Analysis, High Performance Trace Analysis, and Nuclear Forensic Analysis;

- IPSC Ispra Institute: General Scientific and Technical Support in the areas of Health Physics, Equipment and instruments; technical training and calibration; measurement and counting support, assistance in the development of new sealing techniques.

- IRMM Geel: Analytical Activities in the domain of quality control and reference materials (radioactive sources).

For the operation of the On Site Laboratories at La Hague and Sellafield, an administrative arrangement entered into force between the ESO and ITU, Karlsruhe, to provide the necessary appropriately trained staff (20 persons) for the running of the laboratories throughout the year. The cost of this arrangement € 1.7 Mio corresponds to a total of 340 mission weeks per annum.

9. OTHER ACTIVITIES WITH THE INVOLVEMENT OF EURATOM SAFEGUARDS

9.1. ESARDA conference

In 2002 the ESARDA meeting held in Luxembourg on 28-30 May 2002 took the form of a Workshop on 'R & D responses to the New Safeguards Environment'. The meeting was split into five working groups covering technologies, data treatment, fuel cycle aspects, and socio-political aspects. All groups reported their conclusions and recommendations in the final plenary session in order to orientate the needs for R & D in the new safeguards environment.

9.2. Nuclear Safety, Physical Protection and illicit trafficking

In the light of recent developments, Euratom Safeguards has assessed the safety and physical protection of its own radioactive materials and is in the process of bringing technical means and procedures in line with the latest international standards.

In the area of illicit trafficking, Euratom Safeguards continued to participate in the work of the Nuclear Smuggling International Technical Working Group (ITWG) of the Non-Proliferation Experts Group (NPEG) of the G8. In particular Euratom Safeguards and the US Department of Energy jointly co-ordinated international inter-laboratory comparison exercises which were intended to build knowledge and exchange experience in the analysis of seized nuclear materials. During a seminar held in Luxembourg in June, the results of the second exercise were presented and discussed.

Euratom Safeguards continues to maintain close co-operation with agencies such as Europol and the IAEA and to keep track of incidents concerning illicit trafficking of nuclear materials or radioactive materials via the IAEA's database. Eight incidents concerning radioactive materials were reported within the territory of the EU during 2002. However, none involved nuclear materials (Uranium, Plutonium, or Thorium).

Euratom Safeguards also participated and actively contributed to the success of the International Conference on Advances in Destructive and Non-destructive analysis which had been organised jointly by the Joint Research Centre (ITU) and the IAEA in October in Karlsruhe.

10. OVERALL CONCLUSIONS

10.1. Global Evaluation of Verification Activities undertaken by Euratom Safeguards during 2002

As a result of the verification activities undertaken by Euratom Safeguards in the framework of Chapter 7 of the Euratom Treaty no evidence was found to suggest that nuclear materials were diverted from their intended uses.

Nor was any evidence found to suggest non-compliance with provisions relating to particular safeguards provisions assumed by the Community under agreements concluded with third states.

10.2. Concerning the treatment and evaluation of data from nuclear material accountancy

Over 1 million lines of incoming data from nuclear installations were checked for internal and external consistency. All mistakes and inconsistencies detected by these checks were corrected after consultation with the concerned operators. In turn, Euratom Safeguards furnished all reports that it is obliged to transmit to the IAEA on time and correctly formatted.

No evidence for the diversion of nuclear materials was found by the systematic evaluations of the MUF reported by installations.

10.3. Concerning inspection activities at specific installations

Discrepancies of some consequence came to light during 2002 (see section 4 of the report). In all cases appropriate follow-up was given and the issues were satisfactorily resolved.

ANNEXES

Table no. 1 - Quantities of nuclear material under Euratom Safeguards (t)

	End 1990	End 1995	End 2001[1)]	End 2002[1)]
Plutonium	203	406	548	569
Uranium				
Total	200 400	269 100	314 610	318 710
HEU[2)]	13	11	10	10
LEU[3)]	32 000	46 700	57 000	58 500
NU[4)]	44 000	51 400	52 700	47 700
DU[5)]	124 400	171 000	204 900	212 500
Thorium	2 600	4 600	4 500	4 500

1) Quantities based on final reported data
2) High Enriched Uranium
3) Low Enriched Uranium
4) Natural Uranium
5) Depleted Uranium

Table no. 2 - Inspection activities of Euratom Safeguards

Person days of inspection in:	1999	2000	2001	2002
Non Nuclear Weapon States	2412	2113	2328	2348
France	3492	3426	2934	2539
UK	2871	2895	2399	2404
Total	8775	8434	7661	7291

Table no. 3 – Euratom Safeguards Budget 2002

Expenditures committed for the specific appropriations

Table no. 3 A

Line B4-2000: Safeguard inspections, training and retraining of inspectors

Topics	Expenditures (Thousand €)
a) Studies, convocation of experts, publications	9
b) Mission Costs	3,591
c) Transportation for staff and equipment	600
d) Rental of offices and special services on sites	600
e) Internships and Training	260
f) Special insurance	40
TOTAL	**5,100 (out of 5,100)**

Table no. 3 B

Line B4-2020: Sampling and analyses, equipment, specific work, provision of services and transport

Topics	Expenditures (Thousand €)
a) Administrative and technical assistance	203
b) Purchase of surveillance equipment	981
c) Purchase of measurement equipment	485
d) Purchase of equipment for seals	712
e) Purchase and maintenance of computing equipment directly linked to inspections	128
f) Costs for destructive analysis	-
g) Equipment spares, repairs, accessories and maintenance	413
h) Consumable items, purchase of sources, transport of radioactive materials	188
i) Monitoring (warning system based in Luxembourg)	76
j) Software (Accountancy program, Management and IT Firewall)	2,731
TOTAL	**5,917 (out of 6,100)**

Table no. 3 C

Line B4-2021: Specific safeguards for large-scale plutonium processing plants

Topics	Expenditures (Thousand €)
a) Sellafield – BNFL (THORP, MOX)	425
b) La Hague – COGEMA (UP3, UP2)	466
c) Cadarache – COGEMA	13
d) Marcoule – MELOX	130
e) Dessel – BELGONUCLEAIRE	35
f) On site laboratories (initial investments and operations)	3,848
g) Software (on sites)	407
h) Maintenance & repairs (Equipment, hardware and software support)	1,870
i) Software development (new applications, new equipment)	706
TOTAL	**7,900 (out of 7,900)**

Table no. 3 D

Line A0-1420: Health checks for staff exposed to radiation

Topics	Expenditures (Thousand €)
a) Gamma spectrometry and Toxicological analysis (non standard)	5
b) Measurement equipment (dosimeters)	80
c) Maintenance and calibration	6
d) Material, services and other contamination controls	40
e) Mission costs (for body-counter)	30
f) Other running expenses	20
TOTAL	**181 (out of 230)**

Table no. 4 – ESO's Budget 1991-2002 (Mio €)

Evolution of expenditure for the specific budget appropriations

Budget Line	1991	1995	2002
Safeguard inspections, training and retraining of inspectors **(B4-2000)**	2.5	4.2	5.1
Sampling and analyses, equipment, specific work, provision of services and transport **(B4-2020)**	2.3	3.2	6.1
Specific safeguards for large-scale plutonium processing plants **(B4-2021)**	2.6	10	7.9
Health checks for staff exposed to radiation **(A0-1420)**	0.1	0.3	0.2
TOTAL	**7.5**	**17.7***	**19.3**

*In addition, 1.8 Mio € were spent for the co-operation with Russia.