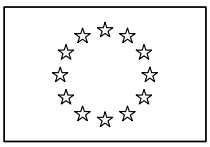

COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 7.1.2005
COM(2004) 861 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

Euratom Safety and Security - Activities in 2003

1. INTRODUCTION

The Euratom Treaty, which was signed at the same time as the European Economic Community Treaty, provides the primary basis in European Union law for the Commission's activities in nuclear and radiological safety and security. This communicationdescribes the activities undertaken by the Commission DG Transport and Energy (DG TREN) in relation to Title II, chapters 3 and 7 of the Euratom Treaty. Other activities under the Euratom Treaty, e.g. research, is not covered in this report.

2. MISSION, LEGAL BASIS AND SCOPE OF EURATOM SAFETY AND SECURITY

2.1. Health and safety (Title II, Chapter 3, Euratom Treaty)

The main task for Euratom under Chapter 3 of the Euratom Treaty is to lay down the basic safety standards for protecting workers and the general public against the dangers arising from ionising radiation. Chapter 3 also gives the Commission extended powers to ensure that the basic safety standards are properly applied.

The Court of Justice[1] explicitly recognised the Community's power to legislate in the field of nuclear safety under Chapter 3 of Title II of the Euratom Treaty. In particular, the Court ruled that the Community has legislative competence to establish, for the purpose of health protection, an authorisation system which must be applied by the Member States in addition to the basic standards.

2.2. Security (Title II, Chapter 7, Euratom Treaty)

The task of the Commission in the area of nuclear security is to ensure that within the European Union nuclear material is not diverted from its intended use and that safeguard obligations assumed by the Community under an agreement with a third state or an international organisation are complied with. Chapter VII of the Euratom Treaty, and the implementing Euratom Regulation No 3227/76, as amended, constitute the legal basis of Euratom safeguards[2].

3. REORGANISATION

On 16 February 2003, the Radiation Protection Unit was transferred from DG Environment to DG Transport and Energy (DG TREN). Furthermore, two units of DG TREN, dealing with legal and technical questions and international relations in the nuclear field, were moved from Brussels to Luxembourg. Two DG TREN Directorates, Nuclear Energy (H) and Nuclear Safeguards (I), are now responsible for all of the safety and security activities that the Commission carries out under the Euratom Treaty, including those of the former European Safeguards Office (ESO).

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1 Judgement in Case C-29/99 of 10 December 2002, European Court Reports [2002] I-11221.

2 For further details, see Chapters 2 and 3 of COM(2001) 436 final.

4. HEALTH AND SAFETY - NUCLEAR SAFETY

4.1. Nuclear package

On 30 January 2003 the Commission adopted two proposals for Council Directives on nuclear safety and radioactive waste management after consulting the Article 31 Group and the European Economic and Social Committee.

The first proposal for a Directive setting[3] out the basic obligations and general principles on the safety of nuclear installations, aims at ensuring that health protection against ionising radiation will be provided throughout the life-cycle of a nuclear installation – from design right through to decommissioning. The Directive would take basic obligations and general principles contained in the pertinent international conventions and give them the force of Community law. To ensure the credibility of the system, the proposal envisages a system of Peer Review by the safety authorities from other Member States. This initiative also seeks to ensure that adequate financial resources are available to cover the cost of decommissioning of nuclear installations.

The objective of the second proposal, for a Directive[4] on the management of spent nuclear fuel and radioactive waste, is to oblige Member States to adopt national programmes for the management of radioactive waste, to adopt common deadlines for the disposal of radioactive waste, and to give priority to the solution of deep geological disposal. The proposal also seeks to encourage cooperation between Member States in research and technological development concerning handling of spent fuel and disposal of radioactive waste.

The proposed Directives were sent on 2 May 2003 to the Council, which, in accordance with the Euratom Treaty, forwarded them to the European Parliament for its opinion. The discussion in the Council of the proposals, which also received support from the European Parliament, led to a revision of the documents.

4.2. Regulatory working groups

The CONCERT Group and the Nuclear Regulators' Working Group (NRWG) bring together senior representatives of the nuclear regulatory authorities from the European Union, Central and Eastern Europe, and the former Soviet Union. In 2003, a number of documents dealing with the early closure of nuclear power plants, non-destructive testing of nuclear components and the effects of economic regulations on the nuclear industry were discussed and finalised.

4.3. Radioactive waste and decommissioning

In April 2003, the Commission published the Fifth Situation Report on radioactive waste management in the European Union showing the position in the enlarged EU. The report shows, as one major achievement, that production of waste continues to decline as a result of waste minimisation practices in the low-level categories.

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3 COM(2003) 32 final.

4 COM(2003) 32 final.

In the area of decommissioning, DG TREN has increased its involvement in the activities of the International Decommissioning Funds (IDFs) in advance of the transfer of responsibility for the management of the funds for Ignalina in Lithuania and Bohunice in Slovakia to DG TREN after enlargement in May 2004.

DG TREN also continued to participate in the work of a number of international organisations and their committees (in particular the IAEA and the OECD/NEA) in the areas of radioactive waste and decommissioning. Of particular importance was the work on safety requirements for the geological disposal of radioactive waste.

4.4. Radioactive transport and SURE programme

The main activity during 2003 was the preparation of the fifth report by the Standing Work Group (SWG) on the transport of radioactive materials and the preparation of a Communication to the European Parliament and the Council based on this report. The report's objective is to describe the situation regarding transport of radioactive materials in the EU identifying any specific problems and, if necessary, to propose measures to improve the operation of the sector and increase the levels of safety.

In addition, three final reports were reviewed, dealing with nuclear transport statistics, the improvement of IAEA Transport Regulations for LSA/SCO materials and the evaluation of nuclear criticality safety data and limits for actinides in transport. Two interim reports from SURE projects were reviewed as well, focusing on the certification methodologies of Member States and the accession countries and aerosol-borne releases of radioactive materials from transport accidents.

5. HEALTH AND SAFETY - RADIATION PROTECTION

5.1. General development

The synergies arising from the transfer of the Radiation Protection Unit from DG ENV to DG TREN are expected to free resources. While only one verification under Article 35 was carried out in 2003, preparatory actions were taken to permit a substantial programme of verifications during 2004.

Although the legislative programme suffered some delay, the Commission nevertheless succeeded in having two important acts adopted by the end of the year, namely a Commission Recommendation harmonising the reporting of discharges from nuclear installations[5], and a Council Directive on the control of high-activity sealed sources[6].

5.2. Implementation of legislation

Transposition into Member States' legislation

Correct and complete implementation of Community legislation was ensured by means of the instruments provided for in the Euratom Treaty, namely

[5] OJ L 2, 6.1.2004, p. 36.
[6] OJ L 346, 31.12.2003, p. 57.

recommendations, verifications, opinions, and infringement procedures. Particular efforts focused on the implementation of the recent Directives on basic safety standards[7] and medical exposure[8], which were to be transposed before 13 May 2000.

Article 33 of the Treaty obliges Member States to submit draft national legislation to the Commission. Four such submissions were received, giving rise to comments by the Commission in two cases. The Commission's services prepared 11 opinions on plans for the disposal of radioactive waste, submitted under Article 37. Under Article 141, a total of 26 infringement procedures were dealt with. The Commission decided to bring two cases concerning Article 37 and the Directive on the Information of the Public before the Court of Justice. A total of 10 cases were closed, two of them after the Court declared that the Member State had failed to communicate the transposing measures for the Basic Safety Standards Directive and the Medical Exposure Directive. At 31 December 2003, 16 infringement cases were still open.

5.3. Operational guidance

Operational guidance, concerning uniform basic standards to protect the health of workers and the public against the dangers arising from ionising radiation, is provided by the Group of Scientific Experts referred to in Article 31 of the Euratom Treaty. In 2003, the group agreed a draft document on Dose Constraints. Final adoption is expected for 2004. A scientific seminar, organised by the Commission, led to an agreement on future actions in the area of occupational over-exposure in the medical field and potential added risks from new technologies in medicine.

Further initiatives concerned the radiation exposure of air crew (EURADOS project), a European survey on occupational radiation exposure (ESOREX 2000), the evaluation of the "Outside Workers Directive Operational Implementation" and the "Initiation of a European Education and Training Platform".

5.4. Legal developments

A Council Directive on the control of high activity sealed sources and orphan sources (the HASS Directive) was adopted in December 2003[9]. The Directive states that authorisation of any practice involving a high activity source requires prior investigation to ensure that arrangements have been made not only for the safe use of the source, but also for its proper management when it is no longer used. The Directive also contains provisions relating to record keeping, holding and transfer of sources, and responsibility for "orphan" sources.

For guidance purposes two Commission Recommendations were issued regarding the radiological consequences of the Chernobyl accident[10], and standardised

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7 Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation, OJ L 159, 29.6.1996, p. 1.

8 Council Directive 97/43/Euratom of 30 June 1997 on health protection of individuals against the dangers of ionising radiation in relation to medical exposure, OJ L 180 , 9.7.1997, p. 22.

9 Council Directive 2003/122/Euratom, OJ L 346, 31.12.2003, p. 57.

10 Commission Recommendation 2003/274/Euratom of 14 April on the protection and information of the public with regard to exposure resulting from the continued radioactive caesium contamination of

information on radioactive discharges into the environment from nuclear power reactors and reprocessing plants[11].

Following the judgement of the European Court of Justice of 10 December 2002 on the Euratom competencies in the area of radiation protection, the Council adopted a Decision amending the wording of the declaration of competencies made by Euratom pursuant to Article 30(4)(iii) of the Nuclear Safety Convention[12].

5.5. Emergency preparedness

The Radiation Protection Unit maintained its 24-hour stand-by service known as ECURIE in order to be able to initiate the exchange of information in the event of a radiological emergency. Technical improvements were made to the ECURIE communication systems and regular test exercises were organised.

In order to activate an immediate response in case of an emergency, the ECURIE system maintains close operational links with the Monitoring and Information Centre (MIC), which is operated by DG ENV in the framework of the Community Civil Protection Mechanism.

In May an ECURIE training course was organised for the accession States and candidate countries. Bulgaria, Hungary and Lithuania formally joined the ECURIE system in the autumn. Other accession States and candidate countries have been involved in the ECURIE community and are preparing for membership, although in some accession States the technical implementation of the ECURIE communication system has not been as smooth as anticipated.

6. HEALTH AND SAFETY - NUCLEAR LIABILITIES

The Paris Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy lays down requirements concerning the third party liability of nuclear operators and the rules on compensation in the event of a nuclear accident. An amending Protocol provides for a more than thirty-fold increase in the amount of liability that a nuclear operator must bear, increasing it to a minimum of €700 million. It also extends the geographical scope of the Convention to provide compensation for victims in States which are not parties to the Convention and broadens the material scope of application to cover damage to the environment and the cost of safeguard measures. As the amending Protocol affects Community rules on jurisdiction, the signing and ratification process required Council decisions and European Parliament consultations, which took place in 2003.

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certain wild food products as a consequence of the accident at the Chernobyl nuclear power station, OJ L 99, 17.4.2003, p. 55.

[11] Commission Recommendation 2004/2/Euratom of 18 December on standardised information on radioactive airborne and liquid discharges into the environment from nuclear power reactors and reprocessing plants in normal operation, OJ L 2, 6.1.2004, p. 36.

[12] Adopted on 15.12.2003. See also Commission Decision 2004/491/Euratom of 29.4.2004, L 172, 6.5.2004, p. 7.

7. NUCLEAR SECURITY – EURATOM SAFEGUARDS

7.1. General developments

In 2002 the Commission adopted a new mission statement for the departments conducting its control activities in the field of safeguards ("Euratom Safeguards") and requested the Directorates concerned to redefine the generic approaches to monitoring by type of installation and to modify the inspection procedures accordingly. The Commission also appointed the Scientific Advisory Group on Euratom Safeguards (SAGES) to provide expert advice in this respect. In 2003, joint meetings between the SAGES and Commission staff discussed revised approaches for a number of facility types and an overarching strategy paper. The proposals represent a departure from traditional safeguards. Concepts such as timeliness will have less importance than in the past. Greater emphasis will be given to ensuring that operators adequately control and supervise the nuclear materials in their possession. Techniques used outside the world of safeguards such as systems auditing will be introduced. The extent and timing of the controls made by the Commission will be made less predictable for the operators. Inspections will be planned taking account of the inter-relationships between the different stages of the nuclear fuel cycle.

Discussions on a draft new Safeguards Regulation (COM(2002)99), coping with technical developments in safeguards and providing the appropriate legal basis for the implementation of the Additional Protocols to the Safeguards Agreements with the IAEA, continued in the Council's Atomic Question Group (AQG). The discussions led to a number of explanations, understandings and agreements between the Commission and the Member States delegations, consolidated in a document entitled "Guidelines for the application of COM(2002)99" which will be published in the form of a Commission Recommendation providing operators with non-binding guidance. The Council is expected to approve the Regulation by early 2004.

Bilateral meetings were held with the Member States concerned to discuss issues arising from the revised Regulation's provisions on waste and the details of the implementation of the AP. All Member States were invited to a meeting held in Luxembourg in December 2003 to discuss implementation issues, in particular in the area of common Euratom/IAEA operations in European nuclear facilities. The positive feedback from this event suggests that such meetings could also be useful in the future and it is therefore planned to organise one or two every year from now on.

The detailed results of a 2002 quality survey on Euratom Safeguards are given in Annex 1. Overall, operators expressed satisfaction with the image and the performance of Euratom Safeguards in their installations.

Work continued on the development and implementation of new safeguards technologies. Details are given in Annex 2.

In view of the forthcoming enlargement of the EU, special attention was paid to preparatory work to allow a rapid start of safeguards inspection work in these States. The nuclear industries of the accession States are mostly limited to power reactors and storage facilities. Missions to the individual States were performed to establish working level contacts and to convey the context of future inspection work. An enlargement working group met in November with representatives of the IAEA to

prepare future inspection activities. A programme of fact-finding and technical missions was set up and will be carried out in the first quarter of 2004.

7.2. Safeguards verification activities

The operators of nuclear installations reported all their inventories and flows of nuclear material to the Commission. More than one million lines of accountancy data were received during the year, mostly by electronic means. All data were checked for internal and external consistency (transit matching) and for compliance with the provisions of the Cooperation Agreements with third countries. All clerical mistakes and inconsistencies found were corrected, after consulting the operators concerned. Accountancy reports were also sent to the IAEA in fulfilment of the EU's obligations under its Safeguards Agreements with the IAEA.

In 2003 inspection activities conducted by Commission safeguards inspectors amounted to 6366 person-inspection days, almost 13% less than in 2002. This fall mainly resulted from further streamlining and prioritisation of inspection activities. The main concerns and/or results achieved in the course of the inspection activities for each type of installation under control are summarised in Annex 3.

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 particular safeguards provisions assumed by the Community under agreements concluded with non-EU States.

8. NUCLEAR SECURITY – COOPERATION WITH THE IAEA

The Commission co-operates with the International Atomic Energy Agency (IAEA), which is responsible for worldwide safeguards under the Non-Proliferation Treaty (NPT) to which all European Union Member States have adhered. Details of this co-operation are provided in Annex 4.

9. NUCLEAR SECURITY – ILLICIT TRAFFICKING

The Commission continued to participate actively in the work of the Nuclear Smuggling International Technical Working Group (ITWG) of the Non-Proliferation Experts Group (NPEG) of the G8. Three cases of illicit trafficking of nuclear materials occurred in the European Union during 2003, involving depleted uranium shieldings and articles containing thorium. In addition, there were ten cases of illicit trafficking involving radioactive sources.

10. NUCLEAR SECURITY – COOPERATION WITH OTHER REGIONAL ORGANISATIONS

As part of the EU-Russia "Energy Dialogue", the Fourth Progress Report was tabled at the EU-Russia summit of November 2003 in Rome, in the presence of Mr Prodi and Mr Putin. The report included a statement to the effect that the EU and Russia intend to establish a programme of cooperation on accounting and control of nuclear materials with a view to collaborating more closely in the field of nuclear security.

The Commission's nuclear safeguards specialists have been in preliminary discussions with their Russian counterparts to draw up a joint programme of cooperation. A working programme has been outlined, including the establishment of inspection procedures for reprocessing and fabrication plants, the joint development of computer applications dedicated to the follow-up of containment of nuclear materials or other similar tools for data management in the field of safeguards, joint training programmes and the organisation of a conference in Russia on the subject of nuclear security.

11. NUCLEAR SECURITY – PHYSICAL PROTECTION

Euratom is a party to the 1979 Convention on the Physical Protection of Nuclear Materials (CPPNM), which mainly concerns the physical protection of nuclear materials during international transport. In March 2003, a dedicated working group finalised a report proposing a revision to strengthen the provisions of the Convention. The proposed amendment would strengthen the physical protection regime by broadening the scope of the Convention to cover nuclear material during domestic use, storage and transport, as well as to cover the protection of installations against sabotage. The proposed amendment confirms that primary responsibility for physical protection lies upon the individual state. Moreover, it is also proposed to introduce a legal commitment to apply the fundamental physical protection objectives and principles as endorsed by the IAEA Board of Governors. No decision on an amendment conference had been taken by the end of 2003.

12. INTERNATIONAL COOPERATION

During 2003 the nuclear cooperation agreements with the United States of America, Canada and Australia were implemented to the satisfaction of all parties. Bilateral consultations between the Commission and Canada as well as the USA confirmed the good relations established between the parties.

Some progress was made in negotiating agreements with Japan and China. Although the Japanese agreement could not be concluded because of difficulties raised during the draft approval procedure in Japan, there is optimism that a compromise text can be agreed in 2004. The negotiating mandate to the Commission from the Council for a nuclear cooperation agreement with China was adopted and the start of the negotiations is imminent.

13. RESOURCES

Article 174 of the Euratom Treaty specifically mentions the necessity to include appropriations in the Commission's budget for operational expenditure related to nuclear safeguards activity. For 2003, specific operational appropriations in the EU budget for Euratom Safeguards came to €18.8 million. Of that amount, €13 million (70%) was actually committed. Details are provided in Annex 5.

At the end of 2003, an overall total of 302 officials were working in the field of nuclear safety and security, of which 182 were Nuclear Inspectors. Details of staff resources and utilisation are also given in Annex 5.

14. OVERALL CONCLUSIONS

2003 was an important year for the restructuring of the Commission's activities in the nuclear domain, expected to lead to significant operational synergies which, for example, will allow the Commission to increase the number of verifications made of nuclear Member State's facilities.

When adopted, the major legislative initiative of the year, the nuclear package, will lead to a uniform high level of safety standards at nuclear installations throughout the enlarged EU and will also ensure that adequate provision is made for decommissioning nuclear installations and for the management of spent nuclear fuel and radioactive waste. The adoption of the Directive on the management of highly active sealed sources will help to ensure that potentially harmful sources are correctly recorded, managed and disposed of. The Commission also actively ensured that Member States correctly transposed Community legislation into national law.

The Commission actively participated in international fora dealing with nuclear safety, waste management, safeguards, radiation protection, and radioactive transports. It continued to be a key player in the Community arrangements for dealing with a major radiological emergency.

As to Euratom safeguards, the Commission made good progress towards the practical implementation of the new mission statement for Euratom safeguards. The revision of the Regulation on safeguards moved forwards in discussions with the Council. The Commission also made great headway with the practical preparations for the implementation of the Additional Protocol. A survey of operators' perceptions of Euratom safeguards indicated that operators were generally satisfied with the manner in which the Commission applies safeguards.

Based upon the inspections carried out and the evaluation of accountancy reports provided by holders of nuclear material, no evidence was found to suggest that nuclear materials were diverted from their intended uses as declared by the users in the European Union during 2003. Nor was any evidence found to suggest that the safeguards provisions of international agreements were not complied with. Statistical evaluation of accountancy reports indicates that the nuclear material accountancy systems of all the large operators met international standards.

The efforts made during 2003 constitute a sound base for TREN to further develop its actions in the nuclear field. They will help to keep the nuclear option open, leading to a sustainable energy mix, less dependence on energy imports and protection of the environment through the reduction of the overall CO_2 emissions.

ANNEXES

ANNEX 1

Euratom Safeguards Performance – Detailed evaluation of the survey of operators 2002

The survey contained 29 questions, divided into five groups (general safeguards issues, transmission of data to Euratom Safeguards, quality of Euratom Safeguards' information on inspections, evaluation of inspection issues, and wider issues).

A total of 72 questionnaires were sent to all the major nuclear installations as well as to a representative sample of all the other nuclear installations in the European Union (EU). 84% of the questionnaires were returned and between 82% and 100% of the individual questions were answered. Thus, the size of the response permits conclusions to be drawn about the image and performance of the Euratom Safeguards authorities. Overall, operators noted their satisfaction concerning the image and the performance of Euratom Safeguards in their installations.

The costs to the operators of a safeguards infrastructure to meet Euratom requirements compared to the costs of meeting other statutory obligations were felt to be not very high.

Operators expressed reservations concerning remote transmission of real-time accountancy data, surveillance images, and non-destructive assay results from their facilities to Euratom Safeguards headquarters in Luxembourg.

With regard to the quality of information on inspections, operators appear to be very satisfied with communication with Euratom Safeguards inspectors during inspections, and most operators welcome the follow-up letters sent after inspections. Nonetheless, the evaluation indicated that communication channels outside inspections need to be improved.

Regarding the evaluation of inspection issues, the answers revealed that the majority of operators of power reactors, enrichment plants and reprocessing plants are not satisfied with coordination/cooperation between Euratom Safeguards and the International Atomic Energy Agency (IAEA). This is an important finding which needs to be followed up. On the other hand, there is reasonably good continuity in the approaches followed during two consecutive inspections conducted by Euratom Safeguards inspectors. The replies concerning the professional abilities of Euratom inspectors confirmed their knowledge and thorough understanding of their working environment.

The balance between cost and effectiveness in the way in which inspections are organised and conducted is rated as medium. However, operators did not suggest measures to increase the effectiveness and efficiency of inspections, nor did they identify ways to improve the balance between cost and effectiveness. Most operators were not very enthusiastic about providing more support to Euratom Safeguards in exchange for a less intrusive inspector presence.

As to the wider framework, operators were opposed to the inclusion of safety, security, physical protection, and radiological protection in the tasks of the Euratom Safeguards inspectors. The views were somewhat divided on the question of whether or not the Euratom Safeguards system contributes to improving the quality of the nuclear accountancy system, the commercial relations/image, and the quality control system of the operators. The consensus view was that two to three years would be a suitable interval between future quality surveys.

ANNEX 2

Progress in Safeguards Technology

In 2003, work continued on the development and implementation of new safeguards technologies including the new digital surveillance systems. These systems have motion detection and image data treatment applications already incorporated in the delivered systems. These advanced features provide valuable assistance and they save time when viewing or reviewing images. The installation of one of these units at the Trillo nuclear power plant (Spain) was the first in the presence of the IAEA. This was an important step on the path to approval of the equipment for routine use by the IAEA.

With regard to existing equipment, development work has continued on the improvement of hand-held instruments and associated software for measuring gamma radiation.

A special instrument for the measurement of fresh, highly enriched fuel elements was developed in 2003 and installed at the FRM2 reactor in Munich.

In terms of new equipment, the Commission participated in a demonstration of a Digital Cerenkov Device for viewing irradiated nuclear fuel stored under water at the Ringhals power plant in Sweden. The device has the potential to view irradiated fuel with a cooling time in excess of 20 years or a low burn-up.

The Commission has also been exploring the possibility of using Virtual Private Networks over the telephone network to provide a secure means of data transmission. Following a workshop held in Luxembourg in March 2003 the requirements and boundary conditions were established for secure data transmission from nuclear sites to Luxembourg.

ANNEX 3

Euratom Safeguards: Detailed inspection findings

In 2003 inspection activities conducted by Commission Safeguards inspectors amounted to 6366 person-inspection days, down by almost 13% in comparison with 2002. This fall mainly resulted from further streamlining and prioritisation of inspection activities.

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

Reprocessing facilities[13]

The nuclear fuel reprocessing installations at THORP, Sellafield, UK, and at UP2/UP3, La Hague, France are characterised by their high throughput[14], automation, and limited access to the process areas. The current safeguards approach for these plants comprises high frequency inspections and automated unattended instrumentation to verify the nuclear material flow, a significant part of which is plutonium. Both sites have on-site laboratories, operated by analysts from DG JRC-ITU, in which verification measurements are performed.

THORP was in normal production mode throughout 2003 with the exception of a planned shutdown during the months of October and November. Investigations continued on the apparent bias of the operator's input sample results from 2001 with particular emphasis on the calibration of the material used for verification of input solutions. The annual Physical Inventory and the Material Balance presented by BNFL were accepted.

Apart from a few short technical shut-down periods, the **Magnox reprocessing facilities** at Sellafield were in operation at a high throughput during the year. The first plutonium was introduced in the new Store 9 Extension in November 2002. Verification activities in these plants and in other Magnox related facilities on the Sellafield site were satisfactorily concluded. Some reservations however, had to be made in respect of some old plutonium stores where access is restricted due to radiological conditions, as well as in respect of some very old plants being decommissioned.

The UP2/800 reprocessing plant was in operation during the whole of 2003. Efforts were made to optimise inspection activities. In particular, a revised safeguards approach was successfully tested in the irradiated fuel storage ponds; this will halve the inspection manpower needed to safeguard these ponds. The annual physical inventory verifications were successful in the plutonium stores. With respect to the UP2/800 chemical process, the verifications performed confirmed a problem concerning high values of Material Unaccounted For (MUF) for uranium and uranium 235 which had already been detected in 2002. The issue is still under investigation by COGEMA. The cumulative "Shipper-Receiver Difference" declarations for the unit for recycling of aged separated plutonium are higher than expected and might represent a new problem. This issue is also being examined by COGEMA.

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13 At reprocessing plants, irradiated 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 into the fuel cycle.

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

The **UP3** reprocessing plant was in operation from January to December 2003. The annual physical inventory carried out in August 2003 was satisfactorily completed. The installed instrumentation to verify the plutonium product input and output was upgraded and updated satisfactorily. The operator announced the start of reprocessing of research reactor fuel in 2005; this will have an impact on the safeguards strategy for the plant as it will involve handling highly enriched uranium.

Enrichment facilities[15]

At the three **Urenco centrifuge enrichment plants** at Almelo (NL), Gronau (D) and Capenhurst (UK), sample taking for subsequent High Performance Trace Analysis (HPTA) is now routinely used to confirm that only low-enriched uranium is produced. The analysis of the samples started in 2003.

Meetings were held between Urenco, the Member States involved, the IAEA and the European Commission to prepare for the implementation of the Additional Protocol in the Urenco plants at Almelo, Gronau and Jülich (D).

The diffusion enrichment plant, **Eurodif Production** at Pierrelatte, France, was subjected to weekly import and export verifications throughout 2003. The operator cooperated with the Commission's request concerning the presentation of product for verification and sealing before export from the European Union.

The annual inventory verification was carried out in the first week of February 2003. Additional verification activities in two other installations were required before the annual inventory verification could be successfully concluded.

Constraints placed by France on the inspectors due to the "*particular status*"[16] of the installation remain in force, which create unsatisfactory verification conditions.

Within the limits set by these constraints, no evidence of diversion of nuclear material under safeguards was found.

Installations for the Fabrication of Mixed Oxide Fuels (MOX)[17]

At the **Belgonucléaire MOX fuel fabrication plant** at Dessel, Belgium, there is an apparent trend in the cumulative MUF. Although the individual MUF figure for the year 2003 was statistically acceptable, the quantities of nuclear material established during all recent annual physical inventory takings were systematically higher than the declared book figures. The operator is conducting a joint investigation with DG TREN to identify the possible cause for this trend.

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15 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.

16 Due to the presence of material not under safeguards in the material balance area of EURODIF Production S.A.

17 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.

Active commissioning of the **Sellafield MOX Plant (SMP)** in the UK continued. However, operational problems caused production delays throughout the year. These problems were one of the causes of the higher than expected MUF. The operator has started remedial work and has planned improvements of the concerned systems. Progress has been made in discussions with the operator and UK national authorities on data transfer to Luxembourg for evaluation.

The decommissioning of the **Siemens Mixed Oxide fuel fabrication plant** in Hanau, Germany is progressing well and is expected to lead to a reduction of the inspection frequency there in 2004.

The results of the annual Physical Inventory Verification (PIV) at the **COGEMA MOX fabrication plant** at Cadarache in France were not entirely satisfactory owing to the high values of MUF. There is, however, no evidence that safeguarded nuclear material has been diverted from its intended use. The operator has made a commitment to re-measure all materials identified as being a potential source of the discrepancies.

LEU and HEU Fuel Fabrication Plants, Conversion Facilities[18]

At **BNFL Springfields in the** UK, a large natural and low-enriched uranium conversion and fuel fabrication plant, the annual Physical Inventory Verification revealed shortcomings in the stocktaking arrangements for a limited area of the plant. A task force was set up by the operator to improve the nuclear material management.

At **Fabbricazione Nucleare LEU fabrication plant** in Bosco Marengo, Italy, the operator has finished the repackaging of the low enriched and natural uranium oxide which remained in the installation after fabrication activities were stopped. The material was verified and sealed; it will be kept contained for a long period of time.

At the **FBFC LEU fabrication plant Romans**, France, a systematic error was discovered in the declared tare weights of uranium powders shipped to FBFC in Dessel, Belgium. The accountancy declarations have since been corrected accordingly.

Following evaluation, satisfactory explanations were also found for a series of positive MUF values at the **FBFC LEU fabrication plant** at **Dessel** in Belgium.

Nuclear Power and Research Reactors[19]***, other installations and facilities***

The formal status of Unit 1 of the **Gundremmingen** power plant in Germany was changed from closed down to decommissioned as was the status of the **Zwentendorf project** in Austria, which was abandoned before Austria became an EU member. Both power plants are

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[18] 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 that use high-enriched uranium (HEU) are manufactured.

[19] 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 CO2 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.

still being decommissioned but inspection visits confirmed that massive reconstruction would be needed before the plants could be made usable.

Initiatives are underway to remove the **Dodewaard** reactor in the Netherlands from the list of safeguarded plants, the remaining action being the final shutdown of the facility and the subsequent shipments of the remaining nuclear material, accompanied by the necessary inspections.

During a check of the spent fuel pond at the **Oskarshamn Power Plant** in Sweden the operator found that a fuel rod appeared to be missing from a storage cassette. The matter was treated seriously and it took concurrent investigations by the Commission and the IAEA to clarify the situation which goes back to the time before Sweden joined the EU.

In **Finland** the start of inspection work in two power plants was delayed because of plant security not accepting the inspector's passport as a valid document. In both cases, the matter could only be resolved by negotiation and through the intervention of the Finnish State Authority (STUK). Inspectors also experienced difficulties in gaining access to facilities in **France** where an operator's health physics service refused to accept the inspector's radiation protection passport, even though it was properly in order and up to date.

Operators' uncertainty with respect to the progress/handling of verification requests led to growing pressure for clarification. This was specifically felt in plants in Belgium: **Doel, Tihange,** and **Belgonucléaire**.

At the **BR2 reactor** in Mol, Belgium, an Advanced Thermal Power monitor was installed by the IAEA to verify the declaration of the operating history and guarantee the absence of undeclared production of plutonium. The BR2 reactor is the first research reactor in the EU to be equipped with such a monitor. The device is still being tested.

Inspections to verify **the transfer of spent fuel to CASTOR casks** continued to be of particular concern. In view of the envisaged medium to long term storage of these containers at reactor sites in **Germany, Belgium and Spain**, their contents were measured by DG TREN I before loading and subsequently brought under multiple containment and surveillance systems. Due to recurring technical problems during the loading, drying and closing of the CASTOR flasks, inspections proved to be difficult to plan. As the above countries have to empty their reactor ponds for operational purposes, these activities required more human resources than expected.

A new store for spent fuel and plutonium (MAGENTA) is to be constructed at **Cadarache** in France and is expected to be operational in 2009. The French authorities and the plants' management presented the project to the Commission at an early stage in order to allow DG TREN's requirements to be met.

Anticipating the entry into force of the Additional Protocol, the IAEA insisted on visiting a large number of locations containing small quantities of nuclear material (**Locations Outside Facilities - LOF**). This caused a substantial additional inspection burden for DG TREN. However, on occasions these inspections led to unexpected findings, for example at the University of Vienna a small sample of highly enriched uranium, which had not been recorded as such, was found.

Material Balance Evaluation of Bulk-Handling Facilities

In bulk handling facilities (Conversion Plants, Enrichment Plants, Fuel Fabrication Plants, and, Reprocessing Plants) nuclear material is mostly processed in loose forms, such as powders or liquids. Measurement uncertainties and particularities of the process lead to differences between the book inventory and the physical reality (known as **M**aterial **U**naccounted **F**or, MUF). The MUF is established at the operator's own annual physical inventory taking. It is verified by the inspectors of DG TREN, who do their own verifications and measurements.

In 2003, the Material Balance Evaluation focused on

- the evaluation of differences between operators' declarations and inspectors' measurement results obtained by Destructive Analysis (DA),
- evaluation of the MUF declared by the facility,
- evaluation of the cumulative MUF, which is the algebraic sum of the MUF for a Material Balance Area (MBA) over time, and
- Shipper-Receiver Differences (SRD)20.

The entire evaluation of MUF, cumulative MUF and SRD was based on data collected from the Euratom Safeguards accountancy database which means that the French bulk-handling MBAs for which no declarations exist were excluded from the evaluation. Small bulk-handling MBAs with a physical ending or a throughput less than two significant quantities[21], as well as those plants decommissioned in 2003, were excluded from the evaluation.

No evidence was found to suggest that, in the bulk-handling facilities of the EU, source materials or special fissile materials were diverted from their intended uses as declared by the operators. It found that, without exception, operators' measurement systems comply with the most recent international standards. Nevertheless, some problems were revealed. At the large BNFL uranium conversion and fuel fabrication plant at Springfields in the UK, the MUF cannot be explained by measurement uncertainties alone. In addition, there was still evidence of biases in the cumulative MUF for some bulk-handling facilities, which have to be further investigated to identify the required corrective actions.

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20 '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.

21 Significant quantities are used in establishing the quantity component of the safeguards inspection goal, e.g. 8 kg plutonium, 25 kg high enriched uranium and 75 kg low enriched uranium.

ANNEX 4

CO-OPERATION WITH THE INTERNATIONAL ATOMIC ENERGY AGENCY

The IAEA Safeguards Implementation Report (SIR)

The SIR 2002 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 2002 acknowledged that collaboration with Euratom and Member State support programmes made it possible to achieve 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 were field tests on implementing the Additional Protocol (research centres in Finland and in the Netherlands). A workplan for Flowsheet Verification (FSV) of neptunium was discussed and agreed with the ITU at Karlsruhe and the implementation of FSV measures is expected to begin shortly.

In line with the New Partnership Approach arrangements and in order to save resources, the IAEA and Euratom Safeguards continued to share the purchase, operational and maintenance costs of equipment installed in facilities under IAEA safeguards.

A seminar on the New Partnership Approach, jointly developed by the Agency and Euratom, was held in Vienna. Many of the IAEA's routine training courses were attended by inspectors from DG TREN and conversely, IAEA inspectors attended courses given by DG TREN, thus maintaining cooperation on training.

In addition to its global conclusions, the SIR 2002 made recommendations for improvement in specific areas. These recommendations may be summarised as follows:

- Problems occurred when nuclear material remained in closed shipping containers at reactors over long periods. The practicalities of extending the area under surveillance and of sealing the shipping containers before their removal are being investigated.

- The issue of verifying that there has been no undeclared production of plutonium in the EU's three large research reactors will be settled once power monitors are installed at the reactors concerned. Indeed, the first power monitor was installed in 2003 at the BR2 reactor in Belgium.

- Corrective actions need to be taken as soon as possible after a Containment and Surveillance (C/S) failure is detected. The IAEA intends to install a newer generation of C/S equipment, improve equipment reliability, and provide backup measures for C/S applied to reactor cores (particularly during open core periods).

Several meetings of Working Groups and the Liaison Committee took place to discuss these and other topics. Because the Euratom Safeguards Office underwent extensive reorganisation, which will lead to changes in the implementation of safeguards with the IAEA, the New Partnership Approach (NPA) arrangements need to be reviewed to reflect these changes and to seek new efficiency and enhanced cooperation. The IAEA has called for a meeting to discuss forthcoming changes and their potential impact.

Additional Protocol and integrated safeguards

The aim of the Additional Protocols is to increase the IAEA's capabilities to detect undeclared nuclear materials and activities in violation of the Non-Proliferation Treaty (NPT). In 2003, Euratom Safeguards continued to play a key role in preparing for the implementation of the Additional Protocol in the European Union, on issues such as harmonising and standardising reporting under the Additional Protocol[22], arrangements for users with small quantities of nuclear material for non-fuel cycle related activities and joint visits with the IAEA to confirm the status of decommissioned facilities. Dedicated reporting software[23], developed by the Commission, was supplied to all the Member States for trials. The conceptual work on site definitions, developed jointly by DG TREN H and the EU Member States, is now reflected in the revised IAEA Guidelines for reporting and can be considered as the international standard on site definition.

By the end of 2003, all EU Member States had ratified the Additional Protocol and the majority had put the corresponding implementing arrangements in place. In line with Annex III of the EU-NNWS (non-nuclear Weapons States) Additional Protocol, known as the "Side Letter", the Commission the Commission agreed to accept the transfer of certain activities which are the responsibility of the Member States. Provision for the acceding Member States to become parties to the EU-NNWS Additional Protocol[24] was made in close cooperation with the Commission's Legal Service and the IAEA.

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22 The implementation paper for the so-called Side Letter and non-Side Letter Member States has been merged as the differences turned out to be of only minor relevance.

23 CAPE, Commission Additional Protocol Editor.

24 The Additional Protocol does not provide for its own accession clause, but the Safeguards Agreement does.

ANNEX 5

RESOURCES

Budget Appropriations for Nuclear Safeguards

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

On this legal basis, safeguards activities are financed from two types of budget appropriations:

- A general "administrative" 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);

- Specific "operational" appropriations allocated for expenditure 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 2003, specific operational appropriations in the EU budget for Euratom Safeguards came to €18.8 million. Of that amount, €13 million (70%) was actually committed. The expenditure was broken down as follows:

• Inspection mission costs (travel, daily allowances)	€3.8m	(29.2%)
• Rental of offices for the inspectors on inspected sites (and related equipment costs)	€0.5m	(3.8%)
• Purchase, installation, maintenance and repair of equipment on site, including IT, analysis of samples, and related costs such as transport, consumables, spare parts, etc.	€2.0m	(15.4%)
• Investments made in large scale plutonium bulk handling plants and related maintenance, operation and logistics	€6.0m	(46.2%)
• Administrative and technical assistance, training for inspectors, and other expenses (including special insurance coverage)	€0.7m	(5.4%)

Staff Resources and Utilisation

As of 31 December 2003, 95 officials were working in Directorate H (Nuclear Safety and Security), and 189 officials in Directorate I (Nuclear Inspection). In addition, the office of the deputy Director General, charged with the coordination of nuclear matters, comprised 5 persons. In addition, a total of 13 officials of Directorate A in Luxembourg were allocated to a number of administrative tasks related to both Directorates.

Thus, an overall total of 302 officials were working in the field of nuclear safety and security, of which 182 were Nuclear Inspectors.

In addition, the work of both Directorates was supported by a total of 19 external personnel.

ANNEX 6

Table 1 - Quantities of nuclear material under Euratom safeguards (t)

	End 1990	End 1995	End 2001[1)]	End 2002[1)]	End 2003[1)]
Plutonium	203	406	548	569	590
Uranium					
Total	200 400	269 100	314 610	318 710	325 510
HEU[2)]	13	11	10	10	10
LEU[3)]	32 000	46 700	57 000	58 500	59 700
NU[4)]	44 000	51 400	52 700	47 700	42 600
DU[5)]	124 400	171 000	204 900	212 500	223 200
Thorium	2 600	4 600	4 500	4 500	4 400

1) Quantities based on final reported data

2) High enriched uranium

3) Low enriched uranium

4) Natural uranium

5) Depleted uranium

Table 2 - Inspection activities of Euratom Safeguards

Person days of inspection in:	1999	2000	2001	2002	2003
Non-Nuclear Weapon States	2412	2113	2328	2348	1990
France	3492	3426	2934	2539	2266
UK	2871	2895	2399	2404	2110
Total	8775	8434	7661	7291	6366

Table 3 – Euratom Safeguards budget 2003
Expenditure committed for the specific appropriations

Table 3A: Line B4-2000
Safeguard inspections, training and retraining of inspectors

Topics	Expenditure (€ '000)
a) Studies, convocation of experts, publications	50
b) Mission costs	3,744
c) Transportation for staff and equipment	640
d) Rental of offices and special services on sites	456
e) Internships and training	30
f) Special insurance	40
TOTAL	**4,960 (out of 5,700)**

Table 3B: Line B4-2020

Sampling and analyses, equipment, specific work, provision of services and transport

Topics	Expenditure (€ '000)
a) Administrative and technical assistance	135
b) Purchase of surveillance equipment	463
c) Purchase of measurement equipment	118
d) Purchase of equipment for seals	
e) Purchase and maintenance of computing equipment directly linked to inspections	109
f) Costs for destructive analysis	
g) Equipment spares, repairs, accessories and maintenance	282
h) Consumable items, purchase of sources, transport of radioactive materials	47
i) Monitoring (warning system based in Luxembourg)	52
j) Software (accountancy program, management and firewall)	794
TOTAL	**2,000 (out of 5,500)**

Table 3C:

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

Topics	Expenditure (€ '000)
a) Sellafield – BNFL (THORP, MOX)	294
b) La Hague – COGEMA (UP3, UP2)	205
c) Cadarache – COGEMA	10
d) Marcoule – MELOX	30
e) Dessel – BELGONUCLEAIRE	15
f) On site laboratories (initial investments and operations)	3,563
g) Software (on sites)	223
h) Maintenance & repairs (equipment, hardware and software support)	1,129
i) Software development (new applications, new equipment)	531
TOTAL	**6,000 (out of 7,400)**

Table 3D

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

Topics	Expenditure (€ '000)
a) Gamma spectrometry and toxicological analysis (non-standard)	5
b) Measurement equipment (dosimeters)	29
c) Maintenance and calibration	15
d) Material, services and other contamination controls	46
e) Mission costs (for body-counter)	35
f) Other running expenses	20
TOTAL	**150 (out of 215)**

Table 4 – DG TREN Safeguards budget 1991-2003 (€ million)

Evolution of expenditure for the specific budget appropriations

Budget Line	**1991**	**1995**	**2003**
Safeguard inspections, training and retraining of inspectors **(B4-2000)**	2.5	4.2	5.7
Sampling and analyses, equipment, specific work, provision of services and transport **(B4-2020)**	2.3	3.2	5.5
Specific safeguards for large-scale plutonium processing plants **(B4-2021)**	2.6	10	7.4
Health checks for staff exposed to radiation **(A0-1420)**	0.1	0.3	0.2
TOTAL	**7.5**	**17.7***	**18.8**

*In addition, €1.8 million was spent on cooperation with Russia.