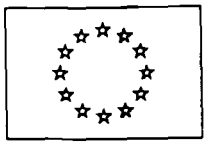

COMMISSION OF THE EUROPEAN COMMUNITIES

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COMMUNICATION FROM THE COMMISSION

CONCERNING THE REPORT OF THE STANDING WORKING GROUP ON THE SAFE TRANSPORT OF RADIOACTIVE MATERIAL IN THE EUROPEAN UNION

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CONCERNING THE REPORT OF THE STANDING WORKING GROUP ON THE SAFE TRANSPORT OF RADIOACTIVE MATERIAL - IN THE EUROPEAN UNION

I. PREAMBLE

The Communication sent in 1996 to the Council and the European Parliament[1] and the attached third report of the Standing Working Group on the Safe Transport of Radioactive Material (TRM) remain valid. They contain comprehensive information on the situation, prospects for further developments and recommendations for a study programme.

This Commission Communication covering the fourth report of the Standing Working Group is mainly intended to update and supplement the information presented one and a half years ago in the previous report and now emphasises:

- the recent changes to the IAEA transport regulations, their prospects of implementation and implications for the future;
- the latest activities conducted or supported by the Commission;
- recent events in the Member States which have had an influence on the public perception of safety in transport operations.

Proposals for further Commission actions within a multi-annual framework are presented in Appendix I, taking into account the recommendations made by the Standing Working Group in its fourth report. This programme is part of the frame work programme for actions in the energy sector, adopted by the Commission in November 1997* and presently examined by the Council and the European Parliament.

II. CHANGES TO INTERNATIONAL TRANSPORT REGULATIONS

The use of radioactive material, in particular by the nuclear power industry, inevitably involves its transport and, over the years, national, Community and international regulations have been developed to ensure that such transport operations are carried out safely.

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[1] COM(96) 11 final of 03.04.1996.

* COM(97) 550 final of 18.11.1997

The fundamental requirement for the safety of nuclear transport operations is that all transport practices meet the basic safety standards. Packages alone, for example, have to meet the same requirements under all circumstances, including severe accident conditions.

To embrace this principle, and in the light of improved knowledge, technical progress and growing experience, international regulations have been changed in ways which will influence future transport practices.

At European Union level, in May 1996, the Council adopted the revised basic safety standards[2] for the protection of the health of workers and the general public against the dangers arising from ionising radiation. The provisions of the Directive have to be transposed into national law by 13 May 2000 at the latest.

At international level the IAEA Board of Governors adopted and then published in December 1996 new Advisory Regulations for the Safe Transport of Radioactive Material (ST-1). The provisions of the Advisory Regulations should be implemented by the different modal organisations and the IAEA Member States on 1 January 2001.

The radioprotection aspects of the ST-1 regulations on transport practices are consistent with the requirements of the revised basic safety standards Directive and should therefore lead, in the Member States of the European Union, to a coherent set of national regulations.

The review of the IAEA transport regulations currently in force[3] led the IAEA to publish, in December 1996, the revised version of ST-1. It is structured in much the same way as before but includes:

- amendments to the activity limits per consignment (including exemption limits) because of the radionuclide-specific approach;
- the introduction of a new type of package (type C) to meet more stringent criteria than those specified for the existing type B packages to be used in particular for the transport by air of certain high activity shipments;
- the extension of type B category of packages to permit transport by air of what is termed as "Low dispersible material" (LDM);
- special provisions for packages containing uranium hexafluoride taking particular account of the chemical hazard of the material;
- the extensive review of criticality safety;
- the incorporation of a new system of UN numbers for packages and conveyances in line with the dangerous goods classification.

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2 Council Directive 96/29 Euratom of 13 May 1996, OJ L159/1 of 29.6.1996

3 INTERNATIONAL ATOMIC ENERGY AGENCY-Regulations for the Safe Transport of Radioactive Materials-Safety Series N°. 6 - 1985 edition (as amended 1990).

The attached report of the Standing Working Group gives a more comprehensive account of these changes.

There has recently been public concern over the proposed new test conditions for type C packages, as well as for packages of type B containing LDM, since:
- the USA appear to impose more stringent test requirements on packages used in the air transport of Plutonium
- and it was felt that the performance characteristics for such packages should be similar to those imposed on Flight Data Recorders (FDRs).

The Commission has consulted the Standing Working Group on this issue; the Group expressed the view that the revised regulations adopted by the IAEA provide substantive additional protection for the transport of radioactive material in EU Member States. No evidence has been put forward that the requirements of the new regulations are inadequate.

The experts assessment is that the IAEA's proposed ST-1 advisory regulations strengthen the existing rules by adding more specific and more stringent requirements and that they will enable stringent uniform transport regulations to be applied in the European Union.

This being said, the concerns expressed and the arguments put forward will continue to be carefully considered by the IAEA's Co-ordinated Research Programmes (CRP), under which air and sea accident severity assessments are being reviewed. The outcome of the studies undertaken by the Commission's action programme on the safe transport of radioactive materials will also provide direct input to the abovementioned CRP and any future revision of the regulations. It is in any case advisable to update the IAEA regulations more frequently than once every ten years (as at present), and this has been advocated by the Commission.

III. IMPLEMENTATION OF THE REVISED REGULATIONS

While the basic ST-1 transport regulations are advisory in nature (based on recommendations) they have, nevertheless, been fully implemented in the past via the regulations governing the transport of class 7 goods (dangerous goods) by the various modes of transport. All the requirements for the transport of radioactive material have been implemented via the ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road), RID (Regulations concerning the International Carriage of Dangerous Goods by Rail), ADN (European Agreement concerning the International Transport of Dangerous Goods by Inland Waterways), IMDG (International Maritime Dangerous Goods Code) and ICAO-TI (International Civil Aviation Organisation - Technical Instructions).

The different modal organisations are expected to integrate the ST-1 advisory regulations over the next few years, with the five abovementioned modal regulations entering into force simultaneously on **1 January 2001**.

Through the application of the Council Directives 94/55/EC[4] for road and 96/49/EC[5] for rail, the amended ADR and RID European agreements implement the ST-1 requirements as binding requirements in the European Community.

IV. RECENT COMMISSION ACTIVITIES

In 1996, the European Parliament authorised the re-opening of the "Transport of radioactive material" budget heading, and allocated to it ECU 2 million. In 1997, the same heading was maintained but with "p.m." entered for commitments.

On the basis of the 1996 decision the Commission organised a public call for proposals which was issued in May 1996[6] in order to implement the actions described in the commentary on the budget heading.

As a result, the Commission evaluated 43 proposals, made a selection and asked the Standing Working Group for its opinion on the selected proposals.

Of these 43 proposals, 24 were selected (15 first priority and 9 second priority). In 1996, contracts were awarded for 18 of these proposals, granting them a Community financial contribution or subsidy. An internal budget transfer of ECU 0,7 million in 1997 recently made it possible to award contracts for the remaining six proposals. Details are annexed to the fourth report of the Standing Working Group.

The initial objective was to spread the available budget over the different issues identified in the commentary on the budget heading. This objective could not be achieved with complete balance. For example, no valid proposal could be financed in the field of the improved safety of nuclear transport in Central and Eastern European Countries (CEEC) and the New Independent States (NIS). Similar difficulties were encountered with regard to the public perception of the transport of radioactive material.

For a number of studies, only the first stage could be financed in 1996/1997, covering an initial period of 12 months. These should be followed by a second stage in order to reap the full benefit of the initiatives undertaken, provided an appropriate programme is launched and the necessary budget made available.

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4 OJ L319 of 12.12.1994, p. 7.
5 OJ L235 of 17.09.1996, p. 25.
6 OJ C136 of 8.5.1996, p.16

V. RECENT EVENTS DURING NUCLEAR TRANSPORT ACTIVITIES

In some regions of the European Union, the public opposed to the use of nuclear energy is also objecting in particular to the transport of nuclear material. In Germany, for example, railway tracks and equipment were recently damaged in an attempt to disrupt the transport of spent fuel and vitrified waste to the Gorleben interim storage facility. Another example is a widespread campaign conducted in the North of England, based on the concerns raised by an increase in shipments of mixed-oxide fuel by air. Letters expressing these concerns were sent to Members of the European Parliament.

Demonstrations and public statements of this type have attracted a lot of public and media attention increasing fears about these transport operations. In reality, the risks associated with the transport of radioactive material are low, and incidents/accidents are few and of little consequence. It is therefore important that radioactive materials be managed and regulated according to their real risk.

Accordingly, greater efforts should be made to inform the public and the emergency services on the safety of transport operations. The message should be that radioactive materials are transported in accordance with strict and internationally agreed safety regulations which are constantly being reviewed and updated in the light of new knowledge acquired through research and of experience gained world wide.

VI. FUTURE COMMISSION ACTION

In order to influence the strategic rather than the tactical direction of future international regulatory developments a longer term view has to be taken by the Commission and the Community. A multi-annual study programme such as that suggested by the Standing Working Group in its fourth report should be supported by the Community in application of Euratom Treaty chapter III (health and safety), especially by implementing the basic safety standards for transport practices, derived from Council Directive 80/836/Euratom as amended by Directive 84/467/Euratom and recently replaced by Council Directive 96/29/Euratom.

There is no risk of duplication between such a programme and the Euratom framework research and training programmes of the Community based on Articles 4 and 7 of the Euratom Treaty, since the transport of radioactive material is not mentioned in Annex 1 to the Treaty.

With regard to the operation of the internal market, the tendency nowadays is to seek harmonisation within the EU Member States on the basis of the existing international conventions, norms and standards and to avoid introducing new provisions where these might lead to unnecessary duplication with existing international regulations.

In the nuclear transport sector, this principle is largely implemented by following the IAEA basic regulations and the various modal regulations (ADR/RID, ADN, IMDG-Code and ICAO-TI) as explained in section III above. Nevertheless, it is till worth harmonising design, construction, packages and administrative procedures in order to facilitate shipments within the EU.

Nuclear transport safety in the CEECs and the NIS also needs to be improved, with specific projects encouraging close cooperation between safety experts in these countries and the Community experts.

Special attention should also be given to public information and communication projects in order to improve the public perception of transport safety in relation to the Community's and the Member States' specific needs.

VII. CONCLUSIONS

In order to implement the recommendations set out in the fourth report of the Standing Working Group, and having identified the areas for future action by the Commission, a multi-annual action plan for the transport of radioactive material should be adopted by the Community.

The following topics should be addressed in such an action plan :

- monitoring and analysis of the present situation and future prospects with regard to nuclear transport practices in Member States, giving particular attention to the analysis of incidents and accidents and to the features of the packages;
- implementation of the IAEA's advisory transport regulations (ST-1) by the international organisations responsible for the various modes of transport and, subsequently, by the Member States of the EU;
- continuous revision and improvement (when needed) of the international regulations in co-ordination with the IAEA and the various modal organisations;
- particular attention to be given to informing the public and training the personnel involved in transport operations, as well as to emergency response planning and the training of emergency service personnel;
- cooperation with Central and Eastern European countries and the NIS in the abovementioned areas.

Implementation of the action plan would, in particular, allow the Commission to study areas where further harmonisation is needed to help the Single Market operate smoothly in the case of class 7 dangerous goods. The topics to be addressed are as follows:

- Competent Authority approval certificates for packages;
- documentation on the compliance of the package design with the requirements (for packages other than type B and C);
- quality assurance procedures and quality control;
- approval and authorisation of carriers and of shipments.

Once the situation in the Member States has been studied, the action plan will allow for practical suggestions to be made on how to achieve the necessary harmonisation measures in the European Union. The possible content of such a multi-annual work programme is given in Appendix 1.

Chapter III of the Euratom Treaty may serve as the legal basis for such a programme to be implemented by the Commission, with the support of its Standing Working Group of experts on the safe transport of radioactive materials.

APPENDIX 1

PROPOSED PROGRAMME OF ACTION ON THE TRANSPORT OF RADIOACTIVE MATERIAL

The plan of action covers a period of five years. It runs from 1998 and will be reviewed year by year to remain in conformity with the description given in the budget heading. Any substantial modification will be an integral part of a Commission communication to the Council and European Parliament on the subject.

The following programme is rather comprehensive and priority choices will have to be made in accordance with the budget available year by year.

1. Operation of the Single Market and Harmonisation Measures

   1.1. Harmonisation of the Competent Authority approval certificate for packages of types A (F), B and C, covering the quality assurance programmes for package design, testing, manufacturing, use, reinspection and transportation.

   1.2. Harmonisation of the documentation on the compliance of the package design with the requirement (ST-1, para. 801) for excepted packages and packages of type IP-1, -2, -3 and Type A.

   1.3. Harmonisation of quality assurance procedures, and guidance on those procedures to be given to package designers, manufacturers, users and consignors.

   1.4. Harmonisation of, and guidance to be given on, quality assurance and quality control (QA / QC) for the conditioning and characterisation of waste produced by LW-NPP and the reprocessing of INF.

   1.5. Harmonisation of the Competent Authority requirements and procedures for the approval and authorisation of carriers and shipments.

2. Implementation of the regulations

   2.1 Survey of the EU Member States' package testing capacities
   2.2 Assessment of the EU Member States' capacity to use computer techniques for package safety analysis

3. Revision of the Regulations

   In-depth investigation of proposals for revising the basic transport regulation (IAEA - ST-1) so as to take account of:

   3.1 new developments;
   3.2 research and industrial experience;
   3.3 investigations into transport incidents and accidents.

4. Investigation of transport events

4.1 Review, analysis and reporting of the radiological consequences of accidents and incidents involving radioactive materials :

- updating the existing database;
- in-depth analysis and classification of events;
- production of training material.

4.2 Further development of guidance and criteria for the uniform reporting of incidents and accidents.

5. Emergency Arrangements and Training

5.1 Organising transport emergency training exercises involving different EU Member States.

5.2 Drawing up a suitable training manual for organisations involved in emergency situations.

5.3 Organising training courses.

6. Assistance to the CEECs and NIS

6.1 Enlarging the Standing Working Group, with the voluntary participation of CEECs.

6.2 Drawing up an action programme to improve radioactive material transport safety.

6.3 Organising training courses for representatives of Competent Authorities and personnel involved in transport operations in the CEECs and NIS (shared cost action with IAEA and/or PHARE / TACIS programmes).

7. Transport safety information and communication

7.1 Improving the existing Public Information Centres (promoting nuclear energy in the Member States) by providing appropriate information on the transport practices used in the different modes of transport.

7.2 Informing the public and the media on the various safety aspects of international transport operations in order to improve the public perception of such transport.

7.3 Developing acceptance and tolerability criteria for the risks arising from the transport of radioactive materials; assessing the real risk with reference to these criteria.

7.4 Demonstrating that transport packages have inbuilt safety margins which go beyond design accident conditions (graceful failure).

APPENDIX II

The Members of the Standing Working Group on the Safe Transport of Radioactive Material in the European Union are designated by the following Departments and/or Institutes

Bundesministerium für Öffentliche Wirtschaft und Verkehr	Östenreich
Ministère des Affaires Sociales, de la Santé Publique et de l'Environnement	Belgique
Organisme National des Déchets Radioactifs et des Matières Fissiles Enrichies (ONDRAF / NIRAS)	Belgique
National Institute of Radiation Hygiene	Danmark
Finnish Centre for Radiation & Nuclear Safety	Finland
Institut de Protection et de Sûreté Nucléaire (IPSN)	France
Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit	Deutschland
Bundesministerium für Verkeh	Deutschland
Bundesamt für Strahlenschutz	Deutschland
Bundesanstalt für Materialprüfung (BAM)	Deutschland
Gesellschaft für Anlagen- und Reaktorsicherheit (GRS)	Deutschland
Greek Atomic Energy Commission*	Ellas
Ministry of Housing, Physical Planning & Environment	Nederland
Energieonderzoek Centrum Nederland (ECN)	Nederland
Radiological Protection Institute of Ireland	Ireland
Agenzia Nationale per la Protezione dell'Ambiente (ANPA)	Italia
Ente per la Nuove Technologie, l'Energia e l'Ambiente (ENEA)	Italia
Direction de la Santé (Div. de la Radioprotection)	Luxembourg
Représentation Permanente du Portugal*	Portugal
Empresa Nacional de Residuos	España
Statens Stralskyddsinstitut (Swedish Radiation Protection Institute)	Sweden
Statens Kärnkraftinspektion (Swedish Nuclear Power Inspectorate)	Sweden
Department Environment Transport Regions (Radioactive Materials Transport Division)	UK
National Radiological Protection Board	UK
International Atomic Energy Agency (Division of Nuclear Safety)	(observer)

* By correspondance

FOURTH REPORT TO THE COMMISSION FROM THE STANDING WORKING GROUP ON THE SAFE TRANSPORT OF RADIOACTIVE MATERIAL IN THE EUROPEAN UNION

NOVEMBER 1997

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SUMMARY

1. The Standing Working Group on the Safe Transport of Radioactive Material was set up in 1982 at the request of the European Parliament.

2. This, the fourth report of the Working Group, updates the report presented to the Council and Parliament on 3 April 1996. Detail presented in that third report is not reproduced here.

3. A major development since the presentation of the third report has been the publication of the 1996 edition of the International Atomic Energy Agency's "Regulations for the Safe Transport of Radioactive Material". This will, in due course, be adopted world-wide for all modes of transport, replacing the 1985 (as amended 1990) edition currently in force.

4. The report describes the major changes in the regulations, the ongoing activities of the IAEA and the responses and contributions of the European Union to these processes. Where activities, past or future, arise from major regulatory issues or public concerns these are summarised.

5. The activities of the Standing Working Group are described in relation to these activities.

Conclusion and Standing Working Group Recommendations

The transport of radioactive material is a safe and well-regulated operation, and work is being undertaken within and outside the European Community to ensure that it remains so. We acknowledge that accidents do occur and that human error cannot be entirely removed: there is no room for complacency.

Whilst Member States will continue to support the work of the IAEA, the EU as a whole has an influence through the attendance of officials at meetings and through the Standing Working Group's study programme. The Commission will co-ordinate with Member States to ensure consistency between the work going on in the Community and at international level, taking into account the new Community legislation on the transport of dangerous goods.

The Standing Working Group's study programme has made a substantial contribution to the development of the international transport regulations, but in order to influence the strategic rather than tactical direction of regulatory development a longer term view needs to be taken. The five year study programme of the Standing Working Group needs to be supported by continued funding.

1 INTRODUCTION

This report was prepared by the Standing Working Group on the Safe Transport of Radioactive Material set up by the Commission in 1982 in response to Parliament's request.[7] This, the fourth report of the Working Group, updates the report presented to the Council and Parliament on 3 April 1996. Details presented in that third report are still valid and are therefore not reproduced here.

The major development since the presentation of the previous report has been the publication of the 1996 edition of the International Atomic Energy Agency's "Regulations for the Safe Transport of Radioactive Material"[8]. This will, in due course, be adopted by the other international bodies that regulate the international carriage of radioactive material, such as the International Maritime Organisation, the International Civil Aviation Organisation, the United Nations Economic Commission for Europe (for road transport) and the Intergovernmental Organisation for International Carriage by Rail, and by Member States in their national legislation.

It looks at the changes in radiation protection, packaging, criticality safety and administrative arrangements introduced by the new IAEA Regulations. It describes the parallel developments in the EU and, in particular, the Basic Safety Standards and the Framework Directives. It describes the major issues arising from the regulatory process and the concerns that have been raised. Information is provided on those areas requiring further research which are the subject of Co-ordinated Research Programmes initiated by the IAEA and/or contracts awarded under the general budget of the European Union -Energy Policy- (budget heading B4-1 0 2 0).

The importance of the EU's work in regulatory development and the long-term contribution that it can make through a stable research programme is emphasised.

2 DEVELOPMENTS SINCE THE THIRD REPORT

2.1 The Revised IAEA Transport Regulations

In December 1996 the International Atomic Energy Agency published the 1996 edition of the Regulations for the Safe Transport of Radioactive Material in a document called ST-1. Member States of the European Union (EU) and representatives of the Commission contributed greatly to the process.

The following sections describe the most significant technical and administrative changes introduced into the 1996 edition of the Regulations.

2.1.1 Radiological protection

General Provisions

In the revised IAEA Regulations (ST-1), the General Provisions on Radiation Protection have been redrafted. Some important changes have been introduced, including the need to establish Radiation Protection Programmes (RPPs) for the transport of radioactive material. RPPs emphasise the importance of the General Provisions which provide the justification for maintaining the current regulatory limits for radiation levels around packages and conveyances. It is important to bear in mind that these limits have led, in general, to low individual and collective doses to both workers and members of the public from transport operations. RPPs should help ensure that this remains so and that individual doses are within the appropriate limits and as low as reasonably achievable.

The provisions are consistent with the Basic Safety Standards (BSS) of both the IAEA and Euratom. (See 2.3.1)

[7] O J C40/44 of 15 February 1982.

[8] Regulations for the Safe Transport of Radioactive Material. 1996 edition. Vienna 1996

Exemption

The IAEA Regulations have always contained criteria defining those materials which are subject to the requirements. For example, the 1985 Regulations defined radioactive material as any material having a specific activity greater than 70 Bq/g. The Basic Safety Standards, however, use a radionuclide-specific approach which leads to exemption values both greater and less than 70 Bq/g and spanning seven orders of magnitude in total. The BSS also present exemption values for total activity quantities (Bq). This approach has been adopted by the 1996 IAEA transport regulations and they include values for both exempt activity concentrations and total activity.

Limits on Package Contents.

New package content limits are prescribed based on the Basic Safety Standards. They incorporate revised radiation protection philosophy, dosimetry and data.

2.1.2 Type C packages

Agreement has been reached on requiring the use of a more robustly-designed package type, called a Type C package, for certain high-activity shipments transported by aircraft. Type C package designs will require unilateral Competent Authority approval unless they contain fissile material which requires multilateral approval by all the countries through or into which the consignment travels.

2.1.3 Packaging requirements for Uranium Hexafluoride

Specific regulatory provisions for the transport of uranium hexafluoride (UF6) have been adopted. The decision to draft regulations for a specific material reflects the importance of UF6 within the nuclear fuel cycle, the very large quantities being shipped and the peculiar physical and chemical properties of the material. The testing package requirements are presented in Appendix I.

The hazard of unenriched UF6 in transport is largely chemical rather than radiological. One particular package is widely used for this transport, the 48Y bare cylinder carrying about 12 tons of UF6. The new IAEA Regulations contain stricter requirements for such packages, especially concerning the thermal behaviour of the package in order to prevent dangerous pressure build-up in the event of severe fires.

2.1.4 Nuclear criticality safety

Changes have been made to the types of radioactive material which are also classified as fissile material, and to the way in which packages containing fissile material are tested, assessed and labelled. Specific requirements for the carriage of fissile material by air and for packages containing fissile uranium hexafluoride have also been introduced.

2.1.5 Administrative arrangements

Creating two package indexes

The transport index (TI), previously used for both radiation protection and criticality control purposes, has been simplified and is now used for radiation protection purposes only. It continues to be based on the radiation level at 1 m from the surface of the package.

A new index, the criticality safety index (CSI), controls the accumulation of packages containing fissile material and is based on the allowable number of packages that can be transported together. Separation of the two indices will allow shipments to be controlled on the basis of the specific value which is of concern. The changes introduce clarity which should improve compliance with the regulations.

New UN numbers

The primary purpose of displaying United Nations numbers on packages, and on conveyances when appropriate, is to key into emergency response procedures in a language-independent way. It was felt that an expanded set of UN numbers would help provide emergency workers with more specific response guidance.

Under the new system, a UN number is assigned to each of the 14 Schedules appended to the Regulations, with an additional set of numbers for packages containing fissile material. UN numbers are retained for uranium hexafluoride because of its importance as a commercial substance and its subsidiary (corrosive) risk. The new UN numbers will facilitate more specific emergency response procedures and help with compliance checks and controls through a numerical link with the Schedules to the Regulations.

Adoption of the IAEA regulations

The 1996 edition of the Regulations for the Safe Transport of Radioactive Material will be incorporated into the modal agreements and conventions governing the transport of radioactive material internationally and into the national regulations of individual states. Efforts are being made at international level to have a uniform implementation date for this of January 1st 2001. A number of changes to the way fissile material is dealt with, particularly, the introduction of a criticality safety index, makes it important that the date of entry into force of the IAEA Regulations is harmonised for international movements. In addition, a single date for all transport modes has been strongly recommended since it is difficult to see how operators undertaking multi-modal international movements would cope without a simultaneous transition from the 1985 to the 1996 Regulations in all modes.

Transitional arrangements will be introduced for the approval of package designs. In particular, packages manufactured to designs approved under either the 1973 or the 1985 IAEA Regulations may continue to be used subject to certain conditions and to the agreement of the Competent Authorities.

All other requirements such as those related to the air transport of Type C packages or packages containing fissile material, will take effect immediately upon implementation.

2.2 The IAEA Co-ordinated Research Programmes

In order to facilitate information exchange and to increase international co-operation in areas where research is needed, the IAEA has initiated a number of co-ordinated research programmes (CRPs). Member states of the European Union have been actively involved, often with financial support from the Community budget,.

2.2.1 Uranium Hexafluoride (UF6)

A co-ordinated research programme has been undertaken to develop accurate, validated analytical codes for calculating the thermal response of standard shipping cylinders containing UF6. The results of the CRP are expected to aid the determination of whether the bare cylinders, particularly the 48Y, can successfully pass the regulatory thermal test.

The Co-ordinated Research Programme will probably reach completion in 1998. Important progress has already been reported about the modelling of the thermal behaviour of UF6 and of the associated internal pressure build up and packaging behaviour. Of particular importance are the results of the Franco-Japanese "Tenerife" programme, being carried out in France with partial support from the European Union and combining large-scale experiments and analytical modelling.

2.2.2 LSA/SCO

The packaging and transport requirements for Low Specific Activity (LSA) material and Surface Contaminated Objects (SCO) were of great interest to a number of Member States during the 1996 revision cycle.

The IAEA is initiating a Co-ordinated Research Programme entitled "development of a radiological basis for the transport safety requirements for low specific activity materials and surface contaminated objects" in order to develop a dose-based approach to requirements. Member States of the EU are involved and their contributions will be largely based on Community-financed work.

2.2.3 Accident severity at sea

A Co-ordinated Research Programme entitled "Accident severity at sea during transport of radioactive material" has been set up to address the consistency of IAEA test requirements with real accidents. This arose from concern expressed at the IMO as to whether the IAEA regulatory tests are as severe as real maritime accidents, and whether, therefore, radioactive material might be released as a result of package failure. A number of Member States of the EU are involved and common studies are supported by the Community budget.

At the first research coordination meeting, held in Vienna in November 1995, the participants presented existing and planned studies on this subject, covering topics such as the probabilistic assessment of accidents at sea (mainly fires and collisions), fire scenarios on board dedicated ships, fire modelling, shipboard fire tests with simulated transport packages and the radiological consequences of a release of radioactive material.

A specialist meeting was held in May 1996 in Cologne to consider in some detail several categories of accidents and to establish probabilities of events.

The second research coordination meeting took place in September 1997 at Sandia National Laboratories - Albuquerque. The new studies performed by individual EU Member States as part of the CRP were presented and discussed.

The CRP should be completed by about 1998, at which time a final report should be available.

2.2.4 Air Transport

Type C package tests were developed using data from various sources on the severity and frequency of aircraft accidents. To support and update these studies, the IAEA is initiating a Co-ordinated Research Programme entitled "Accident Severity During Air Transport of Radioactive Material." It will actively seek the participation of the International Civil Aviation Organization and it is expected that member states of the EU will play a significant role in the programme.

2.3 Developments in the European Community

At European Community level, the technical requirements for the safe transport of radioactive material are implemented via two legislative instruments:

- the Council Directive laying down the basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation (The Basic Safety Standards or BSS) derived from the Treaty establishing the European Atomic Energy Community commonly referred to as the EURATOM Treaty.
- the framework Council Directives on the approximation of the laws of the Member States with regard to the transport of dangerous goods by road and rail based on Article 75 of the Treaty establishing the European Community (EC).

2.3.1 Basic Safety Standards

Radiation protection aims principally to protect the public and workers against the harmful effects of ionising radiation. The International Commission on Radiological Protection (ICRP) founded in 1928, lay down the primary rules and principles governing radiation protection. The recommendations of the ICRP are revised periodically to take account of scientific progress in this field. The current general recommendations of the ICRP were laid down in 1990 (ICRP-60). On the basis of these recommendations the European Commission initiated the process of revising the Basic Safety Standards Directive.

On 13 May 1996, the European Community (EC) adopted Directive 96/29/EURATOM.[9] This Directive is to be transposed within four years (by 13 May 2000) into national law in each Member State of the European Union. The European Community has the general and exclusive competence to adopt basic safety standards in the field of radiation protection. Member States have an executive power to adopt and implement the necessary measures in this field within the framework of the standards laid down at Community level.

Title II, Article 2 (a) of Council Directive 96/29/EUR adopting the Basic Safety Standards stipulates that all practices which involve risks from ionising radiation as the result of the production, handling, use, holding, storage, transport, import to and export from the Community and disposal of radioactive substances must be subject to a regime of reporting and prior authorisation.

Although the IAEA transport regulations (ST-1) are based on the IAEA's own Basic Safety Standards[10] there are no incompatibilities with the Council Directive on Basic Safety Standards in respect of transport.

Two shipment control procedures, directly derived from the Basic Safety Standards, have been introduced for the purpose of supervising transfers between Member States and imports into and exports from the Community. Under these procedures, the Member States, including transit States, are informed, made aware and express their prior written consent before the movement or shipment can take place. The procedures are laid down in:

- Council Directive 92/3/EUR[11] of 3 February 1992 on the supervision and control of shipments of radioactive waste between Member States and into and out of the Community supplemented by the Commission Decision[12] of 1 October 1993 establishing the corresponding standard document. This procedure was derived from the 1980 version of the Basic Safety Standards and is currently being considered for revision;
- Council Regulation 1493/93/EUR[13] of 8 June 1993 on shipments of radioactive substances between Member States.

The Basic Safety Standards and the shipment procedures require the Member States to adopt a strict regime of regulatory control. The application by the Member States of a uniform control regime is fundamental to the harmonisation of transport practices in the European Union.

2.3.2 Community Framework Directives

In order to harmonise the different sets of rules on the transport of dangerous goods, and to ensure not only a high level of safety in the Community but also the smooth operation of the European Single market, "framework directives" have been introduced, implementing the same technical safety standards at international and national level. The legal basis for this is Article 75 of the EC Treaty.

Two Council directives have transposed into European law the technical annexes of the ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road) (Directive 94/55/EC of 21 November 1994[14]), and RID (Regulations concerning the International Carriage of Dangerous Goods by Rail) (Directive 96/49/EC of 23 July 1996[15]). These technical annexes reflect the IAEA transport regulations for radioactive material in class 7 of the dangerous goods classification.

As a further harmonisation measure the Commission has adopted a proposal for a Council Directive on the approximation of the laws of the Member States with regard to the transport of dangerous goods by vessels on inland waterways (COM(97) 367 final)).

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[9] OJ L 159 of 29 June 1996, p. 1
[10] IAEA-Safety Series No. 115-I - International Basic Safety Standards for the protection against Ionising Radiation and for the Safety of Radiation Sources 1996 edition
[11] OJ L 35 of 12 February 1992, p. 24
[12] OJ L 268 of 29 October 1993, p. 83
[13] OJ L 148 of 19 June 1993, p. 1
[14] OJ L 319 of 12 December 1994, p. 7
[15] OJ L 235 of 17 September 1996, p. 25

2.3.3 *Directive on Controls*

Controls are no longer carried out at the internal frontiers of the European Union, their elimination being part of the process of establishing the European internal market; however, compensatory measures are necessary. One such led to the adoption of Directive 95/50/EC of 6 October 1995 on uniform procedures for checks on dangerous goods being transported by road.

The checks must be carried out in accordance with a specified checklist and must be completed within a reasonable period of time. Samples may be taken during the checks. Certain infringements, listed in an Annex to the Directive, result in the journey not being permitted to continue or the vehicle being refused entry into the European Community.

The authorities of the Member States are required to assist one another. Information on the checks is exchanged and Member States send an annual report, also specified in an Annex to the Directive, to the Commission.

2.3.4 *Driver Training*

The training of drivers of vehicles carrying dangerous goods, including radioactive substances, was improved and harmonised on 1 January 1997. Drivers of vehicles subject to registration now have to follow a basic 18 hour training course. Those drivers planning to transport radioactive substances in class 7 not in excepted packages must also attend an additional eight hour course. (This latter requirement does not apply to drivers transporting radioactive substances solely in Type A packages, if the total number of packages containing radioactive substances in the vehicle does not exceed 10 and the sum of the transport indices does not exceed three. In this case appropriate training must be provided by the employer.)

After passing an examination drivers are issued with what is known as an ADR certificate; this is mutually recognised in all ADR States for trans-frontier transport operations, and in Member States of the European Union for national transport operations.

2.4 *Developments at the IMO*

The Code for the safe carriage of Irradiated Nuclear Fuel, Plutonium and high-level radioactive wastes in flasks on board ships (INF Code)[16] was adopted by the 18th Assembly of the International Maritime Organization (IMO) in November 1993 as a voluntary Code of Practice for application by IMO Member States. The INF Code applies in addition to the applicable IAEA Transport Regulations and the requirements of Class 7 of the International Maritime Dangerous Goods (IMDG) Code. It covers principally matters of ship design, construction and equipment.

The Assembly also requested the Organization's Maritime Safety Committee and Marine Environment Protection Committee, in consultation with IAEA, to keep the Code under regular review and amend it as necessary. These committees are currently discussing the subjects of emergency response, notification provided to coastal states, routing of ships carrying INF materials, and liability regimes.

The IMO is considering making both the INF Code and the IMDG Code mandatory.

[16] Resolution A748(18): Code for the Safe Carriage of Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes in Flasks on Board Ships.

3 *MAJOR ISSUES AND CONCERNS*

3.1 Regulatory Issues arising from the 1996 edition of the IAEA regulations

3.1.1 Radiation Protection Programmes

Radiation protection programmes help optimise radiation protection. They provide a structured and systematic approach to keeping the magnitude of individual doses, the numbers of persons exposed and the risk of exposure as low as reasonably achievable, economic and social factors being taken into account.

Transport comprises all operations and conditions associated with and involved in the movement of radioactive materials. Radiation protection measures need to be considered at all stages from design to final receipt of shipments of radioactive materials. All transport operations have a potential impact on the radiation exposure of workers and members of the public. Co-operation between all those involved will enhance safety in the transport of radioactive materials.

Radiation protection programmes (RPPs) will cover many areas of transport but particular attention must be given to package preparation and the arrangements for moving radioactive materials, since members of the public may be in close proximity to such materials during transport. Moving involves consignors, carriers and consignees: all are required to co-operate in ensuring the safe transport of radioactive materials. The type of measures to be employed in RPPs will depend upon the magnitude and likelihood of exposures involved. Many programmes will be small but operations which have the potential for significant exposures can be expected to be the subject of extensive programmes.

The elements of a documented RPP will include :-

- roles and responsibilities of managers and workers,
- radiation dose evaluation and comparison with good practice,
- emergency response,
- training, and
- information.

Radiation Protection Programmes have an important role to play in keeping the radiation exposures of workers and members of the public as low as reasonably achievable.

3.1.2 Exemption Values

The principles and methods for establishing exemption values have been published by the European Commission [17] and endorsed by the International Atomic Energy Agency's Basic Safety Standards and Euratom 96/29. These documents contain, for all practices, radionuclide-specific activity and activity concentration values below which reporting is not required.

But the BSS approach, which leads to radionuclide-specific exemption values, is not compatible with a single activity figure such as the 70 kBq/kg used in the current transport regulations. A preliminary study was therefore undertaken to examine the relevance of the BSS exemption values to the transport regulations. Because no specific transport scenarios were considered in the methodology used by the BSS, this study took into account relevant transport scenarios for selected radionuclides in order to derive transport-specific exemption values using the same basic radiological dose criteria.

[17] Principles and Methods for Establishing Concentrations and Quantities (Exemption values) Below which Reporting is not Required in the European Directive. Radiation Protection 65. M Harvey, S Mobbs, J Cooper, A M Chapuis, A Sugier, T Scneider, J Lochard and A Janssens. Commission of the European Communities 1993

Most results were close to the BSS values and all were within two orders of magnitude. Such a range was considered insufficient to establish transport-specific exemption values different from those of the BSS. Because of the general agreement between the transport-specific exemption values and those of the BSS, it was considered reasonable to adopt, in the 1996 edition of the Transport Regulations, the BSS exemption values below which the transport regulation would not apply. The activity concentration values are applied to a package or, where the material is unpackaged, to a conveyance: for operational convenience, the total activity restrictions are applied to the consignment. Possible problems in the implementation of the new exemption values are being examined in a Community-financed study.

3.1.3 Air Transport

One of the major changes in the 1996 edition of the IAEA Transport Regulations was the introduction of much more stringent safety requirements for the air transport of large quantities of radioactive materials. The Type C package and a new material standard, Low Dispersible Material (LDM), for material carried in Type B packages have been introduced.

The Type C Package.

The Type C package testing requirements are detailed in Appendix I.

One of the very stringent test conditions for Type C packages is a 90 m/s impact onto an unyielding surface. The impact speed has been intensively discussed during the IAEA revision process since 1988. The value of 90 m/s was derived from studies in France (1989), the UK (1980) and the USA (1990) on accident-impact probabilities based on the best accident data available at the time. Discussion of these studies showed that a range of equivalent, perpendicular impact velocities from 85 m/s to 100 m/s onto an unyielding target covered approximately 90-95% of all severe aircraft accidents. Beyond this range, even large increases in impact test velocity produce relatively small improvements in safety. In practice, it was noted that such impact velocities onto an unyielding target covered a much larger range of impact airspeeds due to mitigating factors such as: target hardness, impact angle, energy absorbed by the conveyance and the over-performance and subsequent 'graceful failure' of real packages designed to IAEA standards.

During this process, note was also taken of the US domestic regulation NUREG - 0360 and the criteria for aircraft flight data recorders. There was recognition that NUREG-0360 is more stringent in terms of packaging performance than the requirements contained in the IAEA Regulations. However, NUREG-0360 produces little gain in risk reduction above that provided by the IAEA standards. It should also be noted that NUREG-0360 applies only to plutonium whereas the IAEA standards apply to all radionuclides.

No direct comparison of the impact speed test criteria for a Flight Data Recorder (FDR) and a Type C package can be made. Although both testing regimes are extremely onerous they are designed for different purposes and have different pass/fail criteria. Moreover, the Type C tests establish a standard which is consistent for every size and mass of package whereas the FDR tests do not.

Low dispersible material (LDM)

Since the primary hazards being addressed in Type C requirements are dispersion and radiation levels, provisions have been made for materials which exhibit limited dispersibility, solubility, and radiation levels. These provisions are contained in a material category known as "low dispersible material" (LDM). For radioactive material to qualify as LDM, the radiation level of the unpackaged material must be below a given value and the airborne release of radioactive material in gaseous or particulate form following the same severe test conditions on the material itself as would be applied to a Type C package (impact and thermal test) must also be limited.

In addition, a leaching test which takes into account the damaging effects of the impact and thermal tests on the radioactive material must also lead to limited dissolved aqueous activity. Materials which meet these stringent LDM requirements would not require Type C packaging and could therefore be transported in a Type B package. The test requirements for LDM material are included in the IAEA regulations and summarised in Appendix I. Multilateral Competent Authority approval of the design of the LDM is required.

3.1.4 LSA/SCO

In the course of the revision of the IAEA regulations it was recognised that the regulatory requirements and corresponding justifications for the shipment of Low Specific Activity (LSA) materials and for Surface Contaminated Objects (SCO) should be reviewed and possibly modified. Such materials are mostly radioactive wastes and radioactive materials from the decommissioning of nuclear facilities. The current requirements were drawn up in the 1970s, since when substantial changes have taken place in the characteristics of radioactive wastes. It was therefore concluded that the radiological considerations on which the current requirements are based needed a critical review.

In an initial feasibility study in 1994, funded by the Community, a tentative new system of requirements for LSA/SCO materials was developed by European experts. New material classes based on a comprehensive radiological consequence model were defined with the aim of facilitating compliance with regulatory requirements.

In order to achieve further progress and to promote a harmonised input from the EU to the IAEA Co-ordinated Research Programmes, one of the Community-funded projects evaluates the practicability, benefits and possible drawbacks of the recently-proposed new system. The ongoing IAEA-CRP work uses the radwaste data bases of three EU participating countries.

3.2 Other Issues and Concerns

3.2.1 Perceived and Actual Risks

Each year several million packages containing radioactive materials are safely transported in Member States. Most of these shipments are for medical and general industrial use, only a small fraction being associated with the nuclear fuel cycle. Transport regulations require that packages have built-in safety features such that in the event of an accident the consequences are limited. Additionally the conveyance must comply with set criteria and the driver of a road vehicle must have adequate training including response in the event of an emergency.

Accidents and incidents occur during transport, and considerable attention is devoted to those involving radioactive materials, particularly nuclear fuel cycle materials. Studies of events in Member States[18] have shown that releases of radioactive material are rare and the radiological consequences are fairly insignificant. However, major radiation exposures have been suffered by industrial radiographers who have failed to correctly package their source prior to driving to another location. Improved training has done much to reduce the number of such events.

The routing of shipments depends upon operational and, where relevant, physical protection considerations . In some cases it is necessary to notify and/or seek the approval of the authorities for shipments through or into their country.

All modes of transport are covered by regulations and the safety record is excellent. Accidents do occur but the consequences are limited by design and by operational procedures.

[18] Review, Analysis and Report on the Radiological Consequences Resulting from Accidents and Incidents involving Radioactive Materials during Transport in the Period 1975-1986 by and within Member States of the European Communities. J. Lombard, C Ringot, E. Tomachevsky, J. S. Hughes and K. B Shaw. EUR 12768 EN. Commission of the European Communities 1990.

However, lessons must be learnt from transport incidents and accidents in order to avoid a repetition or a worse event. Minor events have their significance and may be the precursor to more serious incidents or accidents. The Standing Working Group, which meets with the Competent Authorities, the IAEA and (on request) industry, has regular exchanges of information on events which have occurred in transport.

The Competent Authorities should periodically assess the consequences of transport accidents. Emergency planning by the Competent Authorities and other responsible authorities, such as the public health and safety organisations, should take account of these assessments. To facilitate this process, the IAEA has published recommendations on emergency response planning for transport accidents involving radioactive material [19]. This set of recommendations is currently under revision.

Emergencies will occur and it is important to obtain accurate information on the consequences of the event. In order to grade the importance of such incidents and accidents, the Commission has started contract work on developing an event severity scale for transport events,[20] consistent with the existing International Nuclear Event Scale (INES) which is widely accepted and regularly applied to fixed installations[21].

3.2.2 Technical Assistance and Industrial Co-operation with CEEC and NIS

The programme for technical assistance to the New Independent States (NIS) involves two contracts in the field of nuclear transport safety which were started in 1995: first, an engineering assessment of the proposed improvement to the container for transporting VVER spent fuel; secondly, a general assessment of the transport of irradiated nuclear fuel in the NIS.

The objective is not only to make valid proposals to improve safety but also to create a climate of mutual co-operation on technical matters between highly-specialised technical support organisations.

Under the PHARE (Assistance for Economic Restructuring in the Countries of Central and Eastern Europe) and TACIS (Technical Assistance to the Commonwealth of Independent States) programmes, the EU continues to provide the CEECs (Central and Eastern European Countries) and the NIS with technical assistance to improve their nuclear safety. In addition, the Commission intends to set up a framework for industrial co-operation with those countries.

The scope of industrial co-operation is very broad and covers the needs of the transport industry operating in the nuclear fuel cycle in Eastern countries. Industrial co-operation on the transport of radioactive material could lead to the development of pilot projects as a basis for broader co-operation.

With the public call for tenders launched in May 1996,[22] an official appeal was made to the transport industry to make a start on the above schemes. However, no suitable proposals were received and a renewed appeal should be issued along with any future call for tenders.

3.2.3 Quality Assurance

For packages requiring Competent Authority approval and certification, approval will not be granted unless there are adequate quality assurance programmes for package design, testing, manufacture, use, maintenance and transport. This is a well-established practice in all Member States and accounts for the high quality performance of the packages currently in use. For packages not requiring Competent Authority approval, quality assurance programmes are still necessary and the Competent Authority may check their adequacy by carrying out periodic compliance audits or using other appropriate compliance assurance methods.

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[19] Safety Series No. 87 'Emergency Response Planning and Preparedness for Transport Accidents Involving Radioactive Material' - IAEA, Vienna - 1988

[20] Contract work started by 'National Radiological Protection Board' in 1997 with financial contribution of the Community.

[21] INES: The International Nuclear Event Scale IAEA Vienna 1992

[22] OJ C 136 of 8 May 1996, p. 16

In principle, all aspects of the activities relating to the safe transport of radioactive material should be covered by a quality assurance programme. The IAEA has published two booklets[23,24] to provide guidance on quality and compliance assurance programmes. When an incident occurs it is necessary to review the conclusions of the analysis together with all the documents governing the transport practice, including standards, rules, regulations, the quality assurance programmes and the various operational procedures.

However, even a single transport operation may involve several different organisations and it is unlikely that the operation will be covered by a single quality assurance programme. The following are relevant :

- the designer(s) of the package;
- the manufacturer of the package and the laboratory which tests it;
- the user of the package in relation to its different applications,
- the carrier who makes use of different transport organisations and infrastructures.

Quality assurance programmes are tailored to fit specific organisational structures, and an analysis of an incident or accident in relation to the different quality assurance programmes can be extremely complicated. The Commission's Standing Working Group gives particular attention to this aspect with a view to sharing information with other Member States for their mutual benefit.

3.2.4 Illicit Cross-border Movements of Nuclear Material and Radioactive Sources

When the Commission first decided to address the issue of illicit cross-border movements, a dual approach was necessary: one for the illicit trafficking of nuclear material and the other for the inadvertent movement of radioactive sources.

Competent Authorities for the safe transport of radioactive material in the different Member States do not necessarily have the major responsibility since this lies, in the first area, with the authorities concerned with physical protection/safeguards and, in the second, with those responsible for authorisation. Nevertheless, transport authorities are very often the first to be involved if illicit or inadvertent movements are discovered. Consequently, and because these activities often affect several countries, the issue is frequently addressed at meetings of the Standing Working Group.

With regard to the illicit trafficking in nuclear materials, the Commission participates in Interagency Co-ordination Meetings organised by the IAEA on prevention, detection and response measures, in close cooperation with the transport organisations (ICAO, IMO), the Dangerous Goods Transport (rail and road) Division of the UN Economic Commission for Europe, the World Customs Organisations and Interpol and Europol. The principal aim of the meetings is to exchange information and to identify any necessary further action..

The Commission is funding a detection and monitoring feasibility study, to help prevent the illicit trafficking of nuclear material and radioactive sources at sea ports in the EU Member States. The outcome of the study will be presented to the Ship/Shore Interface sub-committee of IMO which has shown particular interest.

Measures to help prevent illicit cross-border movements of radioactive material are still on the agenda of the Standing Working Group. In particular, it is involved with identification, detection and response measures. It will continue to support further action where this is justified if additional resources become available in the coming years.

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[23] Safety Practice No. 113 on 'Quality Assurances for the Safe Transport of Radioactive Material' - IAEA, Vienna - 1994

[24] Safety Practice No 112 on Compliance Assurance for the Safe Transport of Radioactive Material IAEA Vienna 1994

4. *ACTIVITIES OF THE EUROPEAN COMMISSION'S STANDING WORKING GROUP*

4.1 Past activities

A number of projects associated with the safe transport of radioactive material have been completed in recent years for the Commission. In some cases they were either feasibility studies or the initial phases of more extensive projects.

The work covered some of the aspects of transport from design to final receipt of the material. The depth of the projects was often limited by the scale of the work funded. However these studies did provide useful information to Member States, the IAEA and the Commission.

For example, the transport events occurring in Member States over a ten year period were reviewed and analysed. The report concluded that the reporting of data on events was most comprehensive in the nuclear industry and that there had been no major health consequences. In all of the accidents or incidents reviewed in the study it was shown that packages conforming to regulatory standards provided adequate protection.

Another project involved drawing up a handbook [25] of emergency arrangements in Member States, including details of systems, contacts and the emergency equipment available.

4.2 Current programme

A plan of action for the further development of transport studies has been established by the Commission. The programme is divided into seven areas :

- functioning of the single market and the need for harmonisation,
- assessment of the implementation of the regulations,
- revision of transport regulations,
- investigation of transport events,
- transport emergency arrangements,
- assistance to the CEEC and NIS, and
- information and communication with the public.

Work is already under way on the first four of these areas. Care needs to be taken that the other two are not neglected in future programmes. The Commission is providing financing for 24 projects being carried out within various organisations in the Member States. There is extensive co-operation between Member States, and the projects concerned are listed in Table I.

In 1996, with the reopening of the budget heading "Transport of radioactive material in the European Union", the Commission organised a public invitation to tender in accordance with the budget heading description given by the European Parliament. As a result of this invitation to tender, the Commission received 43 proposals. Once the proposals had been assessed by the Commission, the Standing Working Group was asked for its opinion on ranking of the proposals as of first and second priority. Within the constraints of the budget, all 15 first priority proposals and 3 proposals of second priority were the subject of contracts awarded in 1996 (see Table 1). Additional funding in the 1997 budget was made available to cover the remaining second priority proposals together with six additional projects..

[25] Handbook for the CEC Database on Transport Emergencies Involving Radioactive Materials. J S Hughes, J Lombard, F Mathieu and K B Shaw. Commission of the European Communities. October 1992.

Many of the proposals could lead to harmonisation of the regulations within the EU based on the 1996 edition of the IAEA transport regulations.

At the second meeting of the IAEA's Transport Safety Standards Advisory Committee (TRANSSAC) in March 1997, the initiative to fund the Commission's activities in the field of the safe transport of radioactive materials was welcomed and their valuable contribution to the ongoing process of revising the IAEA regulations was recognised. However, a number of EU Member States noted that these efforts will require continuous and regular funding over the next few years to cover all areas of the programme and to build on the initial phases of the longer-term projects.

4.3 Future work

Transport arrangements reflect developments in many different areas, for example materials, processes, conveyances and protection principles. To take sufficient account of such changes there must be an ongoing Community transport programme subject to periodic review. A number of the current projects are initial phases of longer-term studies aimed at major improvements in transport requirements and systems.

IAEA transport regulations are adopted world-wide for all modes of transport: they have been subject to periodic revision since the first edition in 1961. The current edition of these regulations was published in 1996 : the next edition will contain improvements developed during the new revision cycle. Input to the revision process must be supported by adequate justification including relevant technical studies. For example, it is widely accepted that there is room for improvement in the requirements for Low Specific Activity materials and Surface Contaminated Objects. To enable the EU to contribute fully-developed proposals for improving transport requirements, it is essential to have an adequate programme of studies covering a number of years.

A further example concerns the qualification methods for Low Dispersible Material (LDM). According to the Regulations, approval of LDM has to be on a bilateral or multilateral basis. It is therefore vital that the parties concerned work together, economising development efforts and promoting co-operation at an early stage between various institutions of Member States of the EU, including Competent Authorities and test facilities. This has already been initiated by the Commission through a pilot project to develop test procedures to qualify radioactive materials as LDM. Because of the high level of effort required to develop and conduct the tests, it seems probable that a common approach and possibly a common test facility will have to be developed within the European Union. This is a further area were the Commission could support and promote collaboration among Member States.

Transport studies are also important in other respects, for example in providing information on lessons learnt. Accidents and incidents occur during transport and such information may help to avoid similar events elsewhere. Information and communication on transport safety are important and information on the consequences of transport operations can improve public perception. The periodic assessment of radiation doses due to the transport of radioactive material within the EU (ST-1, para 304) should be encouraged. This would produce an overall picture of the situation within the EU and justify the existing regulations or, alternatively, reveal the need for further regulatory action.

Special attention should be given to projects to improve transport safety by implementing the 1996 edition of the IAEA Regulations for the Safe Transport of Radioactive Material in the CEEC and NIS.

APPENDIX I: SUMMARY OF TESTING REQUIREMENTS

Type C Packages.

The appropriate tests are:

- those applicable to Type B(U) packages and, if appropriate, packages for fissile materials (see the third report for details);
- a puncture/tearing test in which either a truncated cone-shaped probe is dropped 3 metres onto the package or the package is dropped onto the probe, depending on the mass of the package specimen;
- an enhanced thermal test, with the same technical specifications as the Type B package thermal test but lasting 60 minutes;
- a 200 m water immersion test;

and an impact speed of 90 m/s for the "drop" test onto an unyielding target, angling it in such a way as to cause maximum damage to the package.

Uranium Hexafluoride.

Packages:-

- must withstand an internal test pressure of at least 1.4 MPa, but cylinders with a test pressure less than 2.8 MPa require multilateral approval;
- must withstand the "Type A" drop test, with graduated heights from 0.3 to 1.2 m, depending on package mass;
- designed to contain 0.1 kg or more but less than 9 000 kg of UF6 must meet the "Type B" thermal test of 800 C for 30 minutes;
- designed to contain 9 000 kg or more must either meet the thermal test requirements or have multilateral approval;

Furthermore, packages containing fissile UF6 must meet the test conditions applicable to fissile packages ("Type B" impact and thermal tests) with no contact between the valve and other normally non-contacting parts of the packaging. There must be no leakage from the valve, and the package must meet other operational requirements before the designer can assume it is watertight for the purposes of the safety analysis.

Low Dispersible Material (LDM)

- The total amount of low dispersible material in a package is limited so that the radiation level at 3 m from the unshielded radioactive material must not exceed 10 mSv/h.
- Following the Type C impact test and enhanced thermal test, the airborne release in gaseous and particulate forms (up to 100 micro meter aerodynamic equivalent diameter) must not exceed 100 times the radionuclide-specific A_2 values.
- In addition, following a leaching (solubility) test consisting of immersion in water for seven days, activity in the water should not exceed 100 A_2. When applying this test, the damaging effects of the tests specified in the second paragraph above must be taken into account.
- Furthermore, a package containing Low Dispersible radioactive Material must be so designed that any features added to the Low Dispersible radioactive Material which are not part of it, or any internal components of the packaging, does not adversely affect the performance of the Low Dispersible radioactive Material.

DIRECTORATE GENERAL FOR ENERGY - DG XVII
STUDIES ON THE TRANSPORT OF RADIOACTIVE MATERIALS - 1996 / 1997
Table 1 : CURRENT PROJECTS receiving a Community financial contribution / subvention

Contract B4-1020/D/96-...	TITLE
001	Evaluation of the safety of vitrified high level waste shipments from the UK to continental Europe by sea
002	Assessment of the radiological risks from transport accidents involving Type A Packages
003	Development of evaluation methods for the qualification of Low Dispersible Material (LDM)
004	Safety assessment of Leaktightness Criteria for Radioactive Material Transport Packages: studies of seal stability and performance under thermal aging processes and resulting potential for material leakage
005	Examination of the existing transport emergency arrangements in the Member States and the discussion of the benefits which result
006	Further development of radiological criteria and requirements for the transport of LSA and SCO material
007	Feasibility study on detection and monitoring systems and procedures to prevent illicit trafficking of radioactive and fissile material at sea ports in the EU Member States
008	Practical implication of the adoption of exemption values in transport

DIRECTORATE GENERAL OF ENERGY - DG XVII
STUDIES ON TRANSPORT OF RADIOACTIVE MATERIALS - 1996

Contract B4-1020/D/96	TITLE
009	Surveys on the events during transport
010	Development of an event severity scale for incidents/accidents
011	Harmonisation of methods for the nuclear criticality safety evaluation of transport packages
012	Qualification experiments on the release behaviour of LSA material in accident conditions with mechanical impact
013	Evaluation of external radiation levels from transport packages to the quantities and units specified by ICRP and ICRU, and in relation to the Basic Safety Standards of the EU
014	Evaluation of the radiation protection options related to the Low Weight Packages - category III yellow
015	Segregation of packages during transport
016	Evaluation of codes for Analysing the Drop Test Performance of Radioactive Material Transport Containers
017	Evaluation of safety of casks impacting different kinds of targets - Real Target Impact Studies
018	Harmonisation of the Qualification of Procedures and Personnel (Guide of practice evaluation of events)

DIRECTORATE GENERAL OF ENERGY - DG XVII
STUDIES ON TRANSPORT OF RADIOACTIVE MATERIALS - 1997

Contract B4-1020/D/97-...	TITLE
001	Harmonisierung der Methoden zur Bewertung der Verpackungssicherheit in Übereinstimmung mit den Vorschriften
002	Risk Assessment for the transport of irradiated nuclear fuel in the NIS
003	Evaluation of the Situation in the EC as regards Safety in the Transport of Radioactive Material and the Prospects for the Development of such type of transport
004	Emergency arrangements in the area of transport
005	Harmonisation of the Performance of the Packages and the Level of intrinsic Safety of the Material "Analysis of Rail Accident Frequencies and Severity for the Assessment of Radioactive Material Transport Risk"
006	Accident analysis of spent fuel shipping casks transported by rail