

TRANSPORT OF RADIOACTIVE MATERIALS IN EUROPE AND THE ROLE OF THE EUROPEAN ECONOMIC COMMUNITY

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Abstract

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There are several important dates in the recent history of the transport of dangerous goods in Europe. The first date, 1879, marks the beginning of work in Europe on the drafting of international regulations for the transport of dangerous substances on the Rhine. The paper outlines the nature and origins of European transport organizations and their connections with transport organizations with worldwide responsibilities. Special emphasis is given to the role of the European Economic Community (EEC) and, in particular, the role of the Commission of the European Communities Special Permanent Working Party for the Transport of Radioactive Materials, which was created in 1982. Reference is made to recent studies financed by the EEC supporting the harmonized implementation of transport in Europe.

1. INTRODUCTION

In a serious shipping accident on the Rhine in 1876, a vessel carrying highly toxic arsenic foundered. Serious consideration was given to evacuating the population from the affected area. Just a few years later (in 1879), and as a direct consequence of that accident, regulations for the transport of explosive, flammable, caustic and poisonous substances on the Rhine were issued. These were virtually the first regulations for the transport of dangerous goods in Europe. Independent of this, work was begun in 1878 on an international agreement on rail transport in Europe. Ten European states put this agreement into effect on 1 January 1890. Its Annex 1 contained regulations concerning objects acceptable for transport only under certain conditions. These regulations at that time covered six-and-a-half pages but did not, of course, apply to radioactive materials, which had not yet been discovered.

Demands for greater safety, and the arrival on the scene of new types of carriers (e.g. aircraft and road transport motor vehicles), made it necessary, by

the 1950s, to pay closer attention to the transport of dangerous goods. Whereas only one page of regulations was devoted in 1879 to inland waterway shipping and only six-and-a-half pages in 1893 to rail traffic, today a single country, the Federal Republic of Germany, devotes 3000–4000 pages of regulations just to these forms of transport. Virtually everything that has to do with the transport of a range of dangerous goods, from explosive materials to caustic substances, is subject to regulation.

Dangerous goods are divided into categories according to their properties. For example, explosive materials, which are assigned to danger category 1a, are differentiated from caustic materials, which belong to danger category 8. The breakdown into danger categories is at present based on the recommendations of the United Nations, drawn up by the UN Committee of Experts on the Transport of Dangerous Goods. Category 7 of these danger categories covers radioactive materials, and was added only towards the end of the 1950s. Originally, it was lack of knowledge which caused radioactive materials to be assigned to a sub-category of toxic materials, the reason being that radioactivity was considered to be a type of toxicity. It was only when new information was provided by United Nations experts that radioactive materials were transferred in the mid-1960s to this new category, 7.

2. EUROPEAN TRANSPORT ORGANIZATIONS

Originally, all carriers drew up regulations for their own specific areas of interest, unfortunately often independently of each other, with the result that there were no harmonized regulations that applied equally to all. Listed below are the various transport organizations in Europe.

2.1. CCNR (for inland waterway shipping on the Rhine)

The Rhine became an international waterway in 1868, with all States along the Rhine being required to guarantee free passage for shipping on the river. However, safety also had to be guaranteed for those States themselves. For this purpose, a Central Commission for Navigation on the Rhine (CCNR) was set up in Strasbourg which, in addition to dealing with questions of customs and safety, also dealt with the transport of dangerous goods. These first general regulations for the transport of dangerous goods were established in 1879, after an accident involving poisonous substances and were part of the general police laws. The regulations were continuously developed and amended, but it was not before 1960 that the specific Agreement on the Transport of Dangerous Goods on the Rhine (ADNR) came into effect. These regulations, as developed over the years, today guarantee a high level of safety for the transport of dangerous goods on the Rhine which, it should be said, has the heaviest traffic of any inland waterway in

the world. Though hardly any radioactive materials are carried on the river at present, the transport of high-activity wastes is scheduled to begin in 1988.

2.2. ECE (for European inland waterway traffic)

The Economic Commission for Europe (ECE) of the United Nations, located in Geneva, drew up a recommendation for the transport of dangerous goods on European inland waterways, abbreviated as ADN from its French original title of *Accord européen relatif au transport international des marchandises dangereuses par voie de navigation intérieure*. This agreement is to apply to all European inland waterways. Work on the ADN was interrupted for some time, but was renewed in 1985 and is still continuing. Whether the ADN will become a European convention or will continue purely as a set of recommendations is not as yet clear.

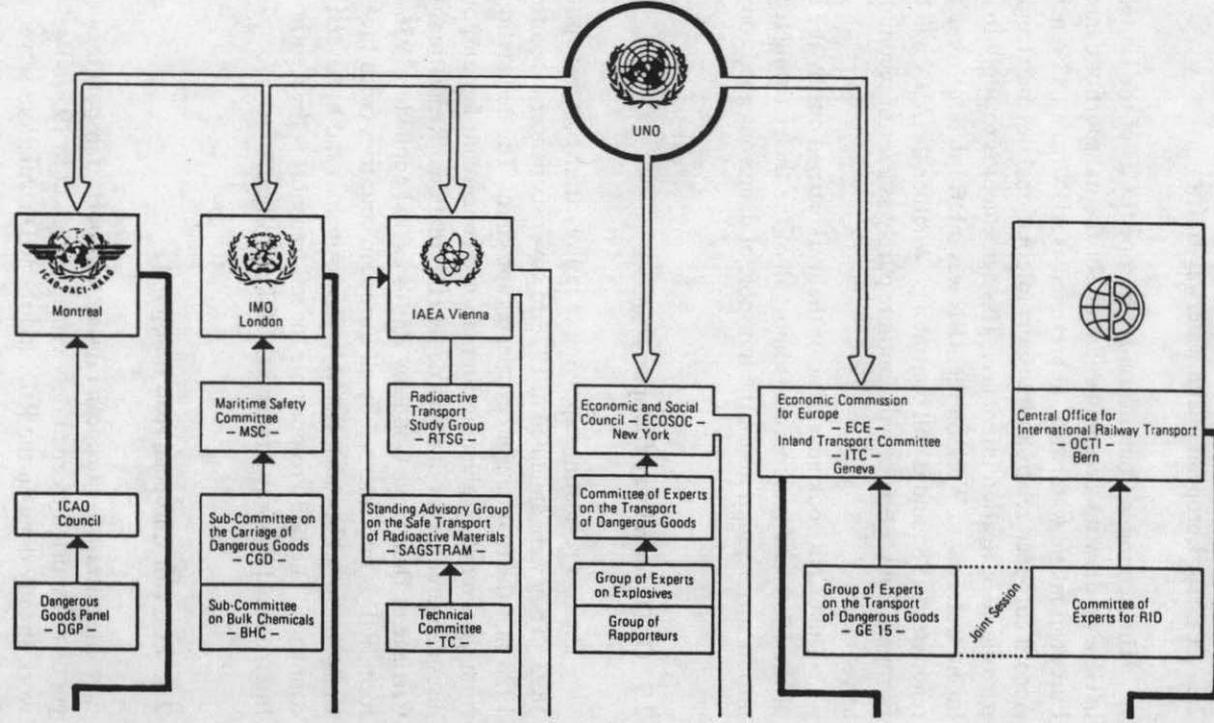
The CCNR took advantage of the work carried out by the ECE at the end of the 1960s and incorporated almost all of the then existing recommendations into its own regulations on the transport of dangerous goods on the Rhine.

2.3. OCTI (for railway transport)

The first regulations applying to railway transport were put into effect in 1893. They were amended in 1928 to cover six danger categories. It was also in 1928 that the first danger certificates appeared. The designation RID, derived from the French *Règlement international concernant le transport des marchandises dangereuses par chemins de fer* (International Regulations Concerning the Carriage of Dangerous Goods by Rail) was first applied in 1956. In its present form, RID is implemented by all European countries (with the exception of the Union of Soviet Socialist Republics and Albania) and by several Mediterranean countries. The body responsible for rail transport is the Central Office for International Railway Transport (OCTI), in Bern.

2.4. ECE (for European road transport)

In contrast to European railway transport, transport regulations for dangerous goods transported by road only came into effect in 1957. Use was made of the work already done on the RID, and the RID regulations served as a basis for a European Agreement Concerning the International Carriage of Dangerous Goods by Road, abbreviated to ADR from its original French title of *Accord européen relatif au transport international des marchandises dangereuses par route*. At the present time, 19 European countries are parties to this agreement.



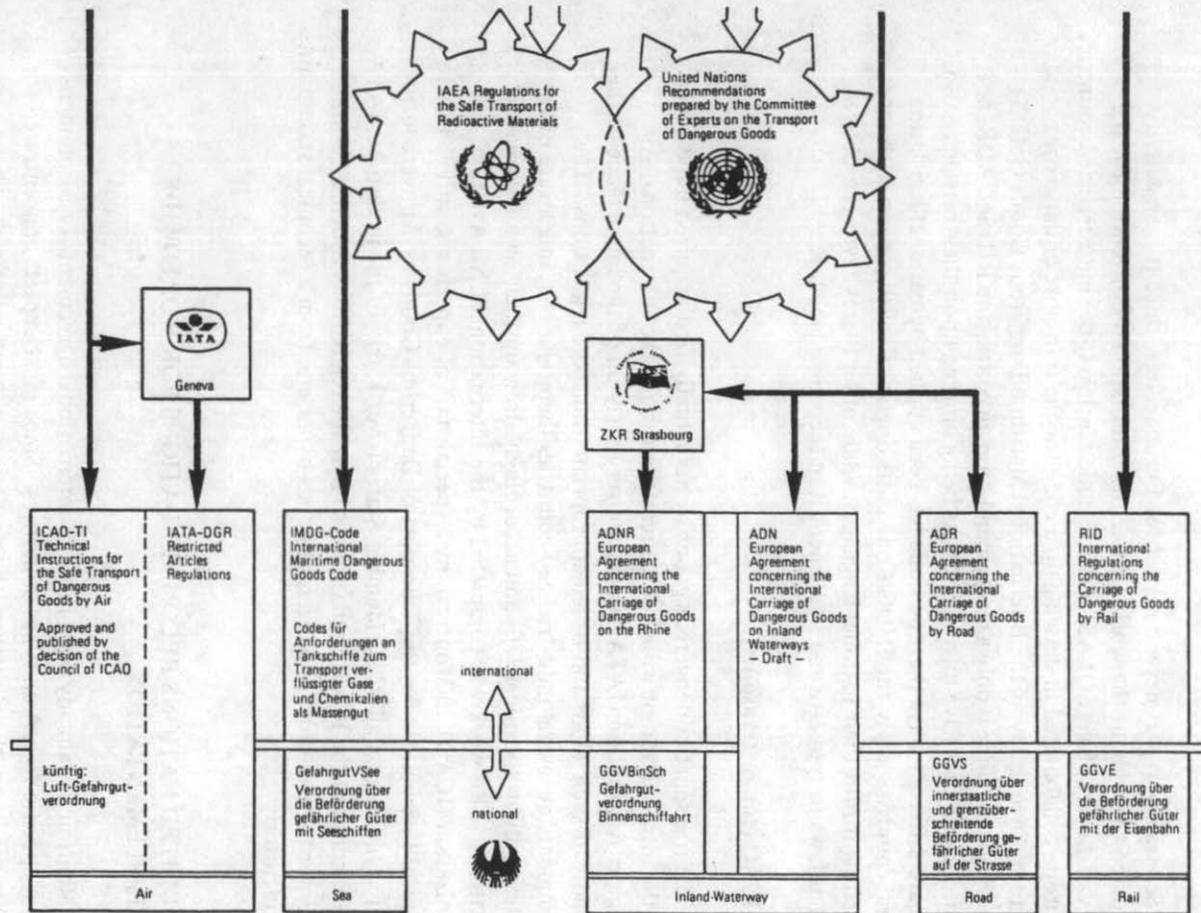


FIG. 1. The transport of dangerous goods: organizations concerned and relevant provisions [1].

3. TRANSPORT ORGANIZATIONS WITH WORLDWIDE RESPONSIBILITIES (Fig. 1)

3.1. International Maritime Organization (for sea transport)

Sea transport was never a matter for Europe alone, since it is an activity conducted throughout the world. After the International Convention for the Safety of Lives at Sea (SOLAS) was concluded in 1964, the industrialized countries of Europe collaborated in drawing up a code for the transport of dangerous goods in ships, known today as the International Maritime Dangerous Goods (IMDG) Code. Since the Code is only a recommendation, in contrast to RID and ADR, not all European States have introduced it as being binding upon their carriers. Also, there are different ways that the Code has been applied by national legislation. Several countries apply the IMDG Code in its original English version without translating it into their national languages, while other States have been obliged by their laws to translate and implement it in their own languages.

3.2. ICAO (for air transport)

The transport of dangerous goods by air actually first acquired importance with the introduction of wide-body aircraft, although the International Air Transport Association (IATA) was aware very early on of the importance of the transport of such goods and issued appropriate transport regulations. The governments of several industrialized countries themselves became aware of the problem only in the mid-1970s and accordingly drew up their own national regulations. This work was completed by the International Civil Aviation Organization (ICAO), in Montreal, by a special staff of experts and in 1984 these Technical Instructions for the Transport of Dangerous Goods by Air were introduced as binding on all ICAO Member States (over 150). In the meantime, IATA has also adopted the ICAO regulations, so that the regulations issued by both bodies for the transport of dangerous goods by air are, from a technical standpoint, now identical.

4. UNITED NATIONS RECOMMENDATIONS FOR WORLDWIDE IMPLEMENTATION

Mention has already been made of international agreements or recommendations specific to certain types of carriers. Since most experts concentrated for decades solely on 'their' carriers, the regulations naturally diverged. There were – and to some extent still are – insurmountable difficulties in attempting to transpose regulations from one type of carrier to another. As a result, special groups of experts from the Economic and Social Council of the United Nations, the

Group of Experts on the Transport of Dangerous Goods and the Group of Experts on Explosives, were set up to deal with questions concerning the transport of dangerous goods which were of equal significance to all types of carriers. These experts began their work in 1985 and have produced recommendations that are recognized throughout the world as setting the standards for the transport of dangerous goods. As has already been stated, however, they are only 'recommendations' which must still be transformed into agreements and national regulations through legislation. These recommendations are amended every two years and the new versions are issued in a publication with an orange cover, generally called the 'Orange Book'.

5. IAEA REGULATIONS FOR RADIOACTIVE MATERIALS

Only conventional dangerous goods were dealt with initially, since there was hardly any need to transport radioactive materials up to the mid-1950s. However, transport regulations applying to such materials were included in RID as early as 1959. Independent of this, a group of experts from the IAEA was also dealing with the same subject and for the first time drew up regulations, which were issued in 1961 as Safety Series No. 6, Regulations for the Safe Transport of Radioactive Materials. Much new ground had been broken here and, indeed, all international transport organizations adhere to the IAEA Regulations in matters concerning the transport of radioactive materials.

In contrast to everything that had been done so far, the IAEA Group of Experts was entering completely uncharted territory. The conditions laid down for the transport of radioactive materials were justified on scientific grounds. They were based on the principle that transport containers had to be absolutely accident-proof, and this had to be demonstrated by testing. Where packagings that were not accident-proof were used, the contents had to be restricted in such a way that, in the event of a release, it was virtually impossible for persons and the environment to be harmed: this is a unique philosophy which is still applicable and scientifically justified today.

6. NATIONAL REGULATIONS

Although most European countries implement the existing international regulations in the case of international transport, the same cannot be said of transport operations within the countries themselves. It has been found in such cases that each State often applies its own laws.

7. THE COMMISSION OF THE EUROPEAN COMMUNITIES

7.1. Special Permanent Working Party for the Transport of Radioactive Materials

The Directorate-General for Energy of the Commission of the European Communities (CEC), located in Brussels, organized discussions, in the early 1980s, on the transport of radioactive materials within the Member States of the European Economic Community (EEC). Of particular interest were certain aspects of the nuclear fuel cycle. It was necessary in this connection to ensure that it would be possible, under all circumstances, to transport radioactive materials, for example from a nuclear power station to a reprocessing plant, without difficulty.

In 1982, in response to a resolution of the European Parliament, the CEC set up a special permanent working party with experts from Member States for the purposes of advising it in the preparation of proposals for EEC activities and of studying all of the problems associated with the transport of radioactive materials. The CEC which, moreover, chairs and provides the secretariat services for this special working party, thus now possesses a permanent and official consultation body which has so far met nine times.

The CEC pointed out at the first meeting of the special working party that it did not plan to duplicate the work of the IAEA or to take any measures that fell solely within the competence of the Member States. It stated that, on the contrary, the objectives of its activities were:

- (1) To speed up the process of bringing the national laws of the EEC Member States into line with IAEA Regulations.
- (2) To ensure consistency of laws and administrative practices within the EEC in order to make possible the functioning of an effective 'common market' in the transport of radioactive materials.
- (3) To further stimulate, co-ordinate and support the work of the Member States in revising IAEA Regulations, in particular those sectors that are only partly covered or not covered at all by those regulations.

The CEC's activity has so far taken the following principal forms:

- (a) Presenting to the Council of Ministers and the European Parliament two communications on the situation regarding the transport of radioactive materials within the EEC [2] and the radiological protection aspects of the transport of radioactive materials.
- (b) Performance of studies, through some 51 contracts concluded with specially qualified bodies and firms, covering certain technical, administrative and regulatory aspects of the transport operations under consideration.

In the first communication mentioned above, transmitted to the European Parliament and the Council in 1984, it emerges that consolidated and substantially uniform requirements concerning the transport of radioactive materials are in force

in all the EEC countries [1]. The common basis of the regulations in force in the Member States of the EEC is Safety Series No. 6, issued by the IAEA. In view of the difficulties encountered in implementing international recommendations at the national level, the results achieved are undoubtedly excellent.

The status of national regulations with respect to IAEA Regulations was examined in a study carried out in 1980 under the sponsorship of the CEC [3]. It appeared — as indicated in the communication — that certain problems, mainly administrative, could be tackled jointly for the benefit of all the countries concerned. The 1985 edition of the IAEA Regulations and the transport regulations based on them, such as ADR, RID, ADNR, etc., will provide for a more general harmonization. The Special Permanent Working Party will continue a close watch on the situation. Moreover, it must be pointed out that there is a substantial measure of agreement between the IAEA Regulations and the provisions of the European Atomic Energy Community Directive on the health protection of the general public and workers against the danger of ionizing radiation.

The above-mentioned communication will be periodically updated by means of supplementary communications describing the main events that have occurred since the previous issue, for example, developments in legislation, the improvement of technical knowledge, comments on any accidents that have occurred, etc. The next communication should appear towards the end of 1986.

With regard to studies, an appropriation of 2 500 000 European currency units granted by the budgetary authorities for the period 1980–86 to fund the CEC's work on the transport of radioactive materials has made it possible to finance 51 study contracts divided into five categories. The following are the five categories covering the studies during the seven financial years in question (Table I):

- Category I. Work which may possibly lead to the adoption of measures (recommendations, directives, etc.) at EEC level.
- Category II. Work in support of the competent authorities of the Member States involved in the project for revision of the IAEA Regulations.
- Category III. Benchmark work on the verification of calculation methods in the design of transport containers for which design approval is required by the competent authorities.
- Category IV. Work relating to aspects of transport covered only partly by the IAEA Regulations.
- Category V. Work of a general nature requested by the Member States of the EEC.

In the context of the CEC's activity related to study contracts, 65% of the appropriation has so far been devoted to experiments — tests on various types of packages, with a view to improving the present IAEA Regulations; tests on the stowing of packages, in order to pave the way for new, complementary requirements; reference experiments (benchmark work) on the verification of calculation methods.

TABLE I. STUDIES FINANCED BY THE CEC DIRECTORATE-GENERAL FOR ENERGY

STUDIES FINANCED IN 1980

Contract number	Contractor	Topics	Category	Status of the final reports
XVII/322/80/1	TRANSNUCLEAIRE (F)	Gamma shielding benchmark experiment on a package containing irradiated fuel coming from light water reactors.	III	EUR 8017 FR, Mf, 1982
XVII/322/80/2	CEA-FONTENAY-AUX-ROSES (F)	Study on interactions between crush conditions and fire resistance for type B(U) packages less 500 kg intended for the transport of radioactive materials.	II	available, not published
XVII/322/80/3	BAM (FRG)			
XVII/322/80/4	TRANSNUBEL (B)	Stowing of packages containing radioactive materials on conveyances. Phase 1	IV	EUR 8057 EN, Mf, 1982
XVII/322/80/5	UKAEA-SRD (UK)	Criticality safety hazards arising from the transport of fissile materials.	II	EUR 8345 EN, Mf, 1983
XVII/322/80/6	RADIOCHEMICAL CENTRE (UK)	The specification and testing of radioactive sources designated as "Special Form" under the IAEA regulations.	II	EUR 8053 EN, Mf, 1982
XVII/322/80/7	UKAEA-SRD and CEBG (UK)	IAEA 9m drop tests and impact with materials likely to be encountered in an accident.	II	available, not published.
XVII/322/80/8	TRANSNUKLEAR (FRG)	Determination of the temperature distribution in spent light water reactor fuel elements during transport and intermediate storage. Phase 1	III	available, not published.
XVII/322/80/9	CNEN (I)	Proposal of standardisation of certificates for transporting radioactive materials.	I	available, not published
XVII/322/80/10	CNEN (I)	Ability of type A packages to withstand regulatory tests.	II	EUR 8030 EN, Mf, 1983.
XVII/322/80/11	I.I.N. Pisa (I)			
COMMISSION OF THE EUROPEAN COMMUNITIES		Catalogue of facilities in Member States of the European Communities for testing the packagings of radioactive materials. Compilation of information provided.	V	EUR 8254 EN, 1983

STUDIES FINANCED IN 1981

XVII/AV/81/140	M. SELLING, Ministerie van volksgezondheid (NL)	Mutual emergency assistance in the event of accident during transport of radioactive materials within the Member states of the European Community.	I	EUR 9133 EN, Mf, 1984
XVII/AV/81/141	Mr. G.A. HOLDER (UK)	Analysis of qualifications required and the training of workers taking part in the transport of radioactive materials in the Member States of the European Community.	I	available, not published.
XVII/AV/81/142	CNEN (I)	Risk assessment during the transport of irradiated fuel.	V	
XVII/AV/81/309.1 XVII/AV/81/309.2	TRANSNUBEL (B) CEA-FONTENAY-AUX-ROSES (F)	Stowing of packages in normal and accidental conditions. Phase 2	IV	EUR 9103 Fr, Mf, 1985
XVII/AV/81/455	CEA-FONTENAY-AUX-ROSES (F)	Analysis of different practices concerning the quality assurance as applied to casks for the transport of radioactive materials within Member States of the European Community.	IV	EUR 9379 Fr, Mf, 1984
XVII/AV/81/456	TRANSNUKLEAR (FRG)	Evaluation of temperature distribution in spent LWR fuel assemblies during transport and intermediate storage. Phase 2	III	
XVII/AV/81/458.1 XVII/AV/81/458.2	CEA-Centre d'Etudes de Valduc (F) UKAEA-SRD (UK)	Criticality safety hazards arising from the transport of irradiated fuel elements. Part 1	II	EUR 9212 EN, Mf, 1985.

STUDIES FINANCED IN 1982

XVII/AV/82/466.1 XVII/AV/82/466.2	CEA-Fontenay-aux-Roses (F) TRANSNUBEL (B)	Stowing of packages in normal and accidental conditions. Phase 3. Experience.	IV	EUR 9195 EN-FR, Mf, 1984.
XVII/AV/82/592	TRANSNUKLEAR (FRG)	Evaluation of temperature distribution in spent LWR fuel assemblies during transport and intermediate storage. Phase 3 (experience)	III	available, not published.

TABLE I. (cont.)

STUDIES FINANCED IN 1983

Contract number	Contractor	Topics	Category	Status of the final reports
XVII/AV/83/274	ENEA (I)	Ability of large A packages to withstand regulatory tests for transportation of liquid waste and low level waste.	II	
XVII/AV/83/275	ENEA (I)	Assessment of the environmental impact resulting from the transport by rail of irradiated fuel under accident conditions.	V	
XVII/AV/83/272 XVII/AV/83/273	CEA-CENTRE D'ETUDES DE VALDUC (F) UKAEA-SRD (UK)	Benchmark experiments on a lead reflected system and calculations on the geometry of the experimental facility using most of the commonly available nuclear data libraries.	III	EUR 9993 EN, Mf, 1985
XVII/AV/83/494	CEA-FONTENAY-AUX-ROSES (F)	Programme of experiments to supplement the qualification of the computer codes used in criticality calculations on irradiated fuel coming from LWR. Part 1 : Programme feasibility study.	III	EUR 9992 FR, Mf, 1985
XVII/AV/83/493	TRANSNUBEL (B)	Survey of existing literature in the field of shock-absorbing materials with a view to subsequent adaptation of plastic deformation codes.	IV	EUR 10107 EN, Mf, 1985
XVII/AV/83/663	BAM (FRG)	Development of EC guidelines - Quality assurance for packages for the transport of radioactive materials.	IV	available, not published.

STUDIES FINANCED IN 1984

XVII/AV/84/160 XVII/AV/84/161	CEA-FONTENAY-AUX-ROSES (F) TRANSNUBEL (B)	Stowing of packages containing radioactive materials in normal and accidental conditions. Phase 4. Experience.	IV	EUR 10348 FR, Mf, 1985
	CEA-FONTENAY-AUX-ROSES (F) TRANSNUBEL (B)	Executive report of phases 1, 2, 3 and 4 concerning the stowing of packages containing radioactive materials in normal and accidental conditions.	IV	to be published in 1986.
XVII/AV/84/162 XVII/AV/84/163	UKAEA-SRD (UK) CEA-CENTRE D'ETUDES DE VALDUC (F)	Criticality safety hazards arising from the transport of irradiated fuel elements. Part 2	II	
84/B/7015/11/005/17	CEA-FONTENAY-AUX-ROSES (F)	Overall approach to a transport system for radioactive materials. Case study : the radiopharmaceutical products.		to be published in 1986

STUDIES FINANCED IN 1985

85/B/7015/11/006/17	TRANSNUKLEAR (FRG)	Impact of the new IAEA transport regulation for the safe transport of radioactive materials on package design and transport.	II
85/B/7015/11/003/17 85/B/7015/11/004/17 85/B/7015/11/005/17	AEE-WINFRITH (UK) UKAEA-SRD (UK) CEA-FONTENAY-AUX-ROSES (F)	Benchmark experiment to simulate a nuclear transport flask loading accident with fuel elements of unequal reactivity.	III
85/B/7015/11/007/17 85/B/7015/11/008/17	TRANSNUBEL (B) CEA-FONTENAY-AUX-ROSES (F)	Development of a large capacity container for transporting large contaminated but non-irradiated components arising from the dismantling of nuclear installations in general. Phase 1	
85/B/7015/11/009/17	UKAEA-SRD (UK)	Study of the impact behaviour of packages containing intermediate level radioactive waste coming from nuclear installations.	

STUDIES FINANCED IN 1986

	NRPB (UK)	Feasibility study of a data bank at Community level relating to the risks incurred and the agreement, procedures and arrangements to be put into effect in the event of accidents during the transport of radioactive materials. Phase 1	V
	TRANSNUBEL (B) CEA-FONTENAY-AUX-ROSES (F)	Techniques for securing packages of radioactive materials during maritime transport. Phase 1	IV
	CEA-CENTRE D'ETUDES DE VALDUC (F) UKAEA-SRD (UK)	Study of an accidental criticality excursion which could occur during the handling, transport and storage of uranium dioxide in the form of powder. Phase 1.	III
	CEA-CENTRE D'ETUDES DE VALDUC (F) UKAEA-SRD (UK)	Phenomenology of an accidental criticality excursion which could occur during the transport or storage of fissile materials in the form of a solution. Phase 1	III
	TRANSNUBEL (B) CEA-FONTENAY-AUX-ROSES (F)	Development of a large capacity container for transporting large contaminated but non-irradiated components arising from the dismantling of nuclear installations in general. Phase 2	

Since its inception about five years ago, the CEC's programme of action has produced results, but it must be pointed out that its budget is modest and is determined on a pragmatic basis from year to year, after technical consultations with the industrial and scientific circles concerned and after discussion in the Special Permanent Working Party. Its most significant contribution has been the publication of the general communication mentioned earlier [1]. This communication is an information and reference document for EEC institutions and may, of course, be used freely by the mass media and the sectors concerned. The activity within the programme which had the most impact was the commissioning of studies, the results of which were passed along to the IAEA and were of assistance in preparing the 1985 edition of the IAEA Regulations. The more important studies were on the following subjects:

- dynamic crush test on small, lightweight Type B packagings
- additional requirements for special-form radioactive sources
- the standardization of transport certificates
- the quality assurance programme.

Other studies have focused on:

- Transport analysis from the standpoint of safety (criticality benchmark experiments, gamma and neutron-shielding benchmark experiments, package stowing tests, etc.);
- Transport analysis from the standpoint of health protection (personnel qualifications and emergency services).

As regards the latter subject, the CEC is at present preparing a communication to the Council of Ministers and the European Parliament relating to the following aspects:

- The training and briefing of personnel assigned to the transport of radioactive materials;
- The formulation of criteria for technical and medical assistance in the event of abnormal or accident situations.

The final reports on a considerable number of study contracts have been published in the Euratom collection (EUR reports). A list of these, with their reference numbers, is presented in Table I.

Concerning the rather more distant future, the CEC's attention and activities will be directed in particular toward the following subjects:

- A country-by-country analysis of the administrative and structural aspects of the transport of radioactive materials;
- An analysis of operational problems associated with the transport of radioactive materials, in particular intra-EEC transport.

In 1980, the CEC financed an analysis of Member States' laws and regulations governing the transport of radioactive materials. That document, which

has proved to be extremely useful, will serve as a reference until the national provisions have been amended in line with the 1985 edition of the IAEA Regulations. Generally speaking, this will be done in the Member States of the EEC by 1988. Apart from these regulatory texts, however, there is, in each country, a set of administrative provisions and/or practices which guide the industrial and commercial activities of carriers and are likely to affect the very structure of that sector. Before unjustified barriers to intra-EEC transport can be removed, they must first be identified. The following subjects could be dealt with:

- Authorization to act as a carrier
- Recommendations concerning the construction and equipment of road vehicles for the transport of radioactive materials (stowage platform) which can easily be decontaminated, the possibility of fitting shielding screens, electrical fire-fighting equipment, etc.
- Axle load problems
- Training of personnel assigned to transport
- Formalities in advance of transport (model of declaration for dispatch), notification, approval and execution of transport
- Traffic restrictions
- Transit formalities
- Nuclear insurance.

Whether or not the unjustified barriers to intra-EEC transport of radioactive materials are removed, such transport operations are conducted in accordance with procedures which, apart from the time necessary for the actual movement, require additional time and effort. There are those who believe that some of these procedures are likely to give rise to risk factors over and above those which are inherent in the movement of radioactive materials. Very often, when there is a public controversy on the subject of the cross-frontier transport of radioactive materials, it is the slowness of formalities and the risk factors that are the targets of criticisms generally levelled at questions of transport safety.

For anyone who is unconnected with the international transport of radioactive materials, it is almost impossible to obtain an objective picture of the situation. For this reason, the CEC is endeavouring, through study contracts, to have such a picture projected by the carriers themselves — or at least by some of them. The idea is to obtain actual and typical 'case histories' concerning various types of transport: fresh and irradiated fuel, plutonium and radioactive wastes, movement by road and rail, by air and sea, through and above the various countries and along their coasts. The description of a case would begin with the first step in the transport operation in question and end with the moment when the carrier is fully relieved of responsibility. This description would cover the types of procedures and formalities and the time needed for their completion, the types of movements and other operations or physical handling required,

including holdups, and the time spent on them. There would, of course, be no question of attempting to cover all possible cases, but it would be necessary to compile enough case histories to enable an attentive reader to obtain a realistic idea of the magnitude of the operational problems that can arise in the international transport of radioactive materials.

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