

The IAEA's Role in International Information Exchange

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INTRODUCTION

In carrying out its mission to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world the International Atomic Energy Agency strives to foster the exchange of scientific and technical information concerning peaceful nuclear applications. In the transport safety area, this is achieved through a work programme comprising the development and maintenance of Safety Series No. 6, the Regulations for the Safe Transport of Radioactive Material (IAEA, 1961-1990), the implementation of those *Regulations*, and finally, co-ordinated research programmes supporting the first two activities.

Under the implementation aspect of its transport safety programme the IAEA takes advantage of the increased availability of mass storage media and the equipment to access them to use databases for information exchange. Being in a unique position to facilitate information exchange, the IAEA initiated data collection activities on the recommendation of Member States through representation at SAGSTRAM, the Standing Advisory Group on the Safe Transport of Radioactive Material. SAGSTRAM convenes approximately every 18 months to advise the IAEA's Director General on the subject area and, in this way, influences the IAEA's work programme.

Information is collected in the areas of national competent authorities, package design certificates, events in radioactive material transport, research and development, shipments, and exposure data. The main purposes of the data collection activities include:

- To serve as regulatory aids to the national competent authorities responsible in the Member States for the transport of radioactive material, both internationally and nationally;
- To foster the exchange of information among said competent authorities and international modal organizations;
- To support the continuous review and revision process of the transport *Regulations* and their supporting documents; and
- To assist in answering public concerns.

REGULATORY IMPLEMENTATION

National Competent Authorities Responsible for Approvals and Authorizations in Respect of the Safe Transport of Radioactive Material

Since 1967 the IAEA has compiled data on the designated national competent authority within its Member States and their respective postal and telegraphic addresses. The information is updated and published annually in the form of a directory (IAEA-NCAL-23, 1992) in a handy DIN A5 format. List No. 24 is scheduled for distribution in January 1993. The booklet is distributed automatically on publication to the IAEA's Member States, the offices listed therein and other registered interested parties. For data verification purposes, information for the booklet is only accepted from either the national competent authority or the respective foreign ministry.

The Database on National Competent Authorities' Approval Certificates for Package Design, Special Form Material and Shipment of Radioactive Material (PACKTRAM)

The IAEA maintains PACKTRAM, a database on package approval certificates that contains information on such particulars about packages approved for radioactive material transport as identification marks, period of validity, dimensions, description and permitted contents.

The database is fully menu-driven. Its system programs, developed in co-operation with Canadian expertise, are available to Member States and registered users on diskette and are provided together with an accompanying User Guide (IAEA, PACKTRAM, 1991). Depending on the volume of their input, Member States submit information either by diskette, using a data input form or by merely sending a copy of their certificates to the Agency. In return, they receive electronic copies of updated data files together with an annual report, which is published in the form of a technical document (IAEA-TECDOC-662, 1992).

The format of the annual report was established at consecutive meetings of SAGSTRAM. In it, information is presented in tables which group certificates according to whether they are current or expired, and whether they are validated by other Member States or not. A fifth table presents package dimensions and descriptions and allowed contents of all certificates in the database. In addition there is a listing of certificates by Member State. Certificates that expired prior to the last full calendar year are archived and thus not reported. To ensure quality of data, information for PACKTRAM is only processed if submitted by or through the issuing competent authority.

Because of the clear way in which information is presented, users can easily consult the annual report for the salient aspects of any certificate provided that the identification mark of the package is known, and that the certificate has been reported to the data base. The publication is therefore useful not only to competent authorities, but also to manufacturers and shippers of radioactive material. The latter occasionally use the annual report to search for packages that are suitable for radioactive material that they wish to transport.

The IAEA continues its efforts to encourage active participation in PACKTRAM from as wide a reporting base as possible. Its usefulness is proportionately enhanced by the degree of completeness to which package approval certificates are provided by issuing competent authorities. The following Member States currently participate: Argentina, Austria, Belgium, Canada, Denmark, France, Germany, Hungary, India, Italy, Japan, Netherlands, Russia, Spain, Sweden, Switzerland, United Kingdom and USA.

RADIOLOGICAL IMPACT OF RADIOACTIVE MATERIAL TRANSPORT

In the 1980s an attempt was made to review the radiation exposure of workers and the public resulting from the transport of radioactive material. Data provided by a number of Member States was analysed, which

resulted in the publication of a technical document (IAEA-TECDOC-398, 1986) that concluded that the exposures of most workers and of the public during normal conditions of transport were low. It further indicated that the risk to workers and the public due to potential accidents and incidents in transport were also low. It had to be emphasized, however, that the conclusions could only be treated as an interim assessment as they were based on then available data, which was by no means complete.

To enable a more meaningful assessment of the radiological impact of radioactive material transport, it became clear that certain research needed to be undertaken and, parallel to that, comprehensive and consistent data especially pertaining to international experience needed to be collected. Thus SAGSTRAM recommended that the IAEA obtain information regarding shipments, radiation exposures and accidents/incidents. Priority was assigned to the third subject.

The Database on Accidents and Incidents in Radioactive Material Transport (EVTRAM)

Effort was made to collate information from national competent authorities about their respective practices in incident reporting. It was learned that although many Member States have reporting systems for accidents/incidents involving hazardous materials, it was not cost-effective for some Member States to implement these for radioactive material because of the relatively low rate of occurrence and consequences involved. In some Member States there is no legal requirement for such events to be reported. The extent of detail required by national reporting forms also varied greatly.

It required the combined efforts of many consultants over a number of years to develop a standardized data input form with the appropriate accompanying instructions. The current form incorporates a seven-point severity scale developed in France particularly for radioactive material transport. It is divided into two parts, the first asking for information on the event being reported on; and the second part requiring information on packages involved in the event, allowance having been made for the possibility of events involving different types of packages and/or contents. Because of the time that it can take for an event to be fully investigated, Member States are requested to submit information in the September of the second year after which an event has occurred. Thus, information applicable to 1990 will fall due in September 1992.

In order to ensure data consistency, it was agreed that no modifications to the form will be applied for at least five years. In order to achieve a wide reporting base information is requested for events dating back to 1984. It is left to the discretion of the reporting competent authority, however, to decide which events are appropriate to include in the database, especially considering those objectives of data collection that pertain to Regulations development and maintenance.

With the support of Japanese expertise computer programmes to automate data management are being prepared while the Canadian government is assisting with statistical analysis. Although some data is available to undertake initial testing, there is insufficient basis for even preliminary assessments.

Member States report difficulties in providing data because of often limited resources. However, the advantages that accrue from maintaining an events database far outweigh the disadvantages, and include:

- it is the only truly international transport accident database,
- it will encourage compatible event reporting systems within Member States,
- analysis of world-wide data will be available to competent authorities,
- lessons learned will be available to other Member States, and
- data on radiological consequences will become available.

*The Database on Shipments of Radioactive Material (SHIPTRAM) and
The Database on Radiation Exposures Resulting from Radioactive Material Transport (EXTRAM)*

Two areas in which the IAEA also attempts to collect information are on radioactive material shipments and associated radiation exposure. Analysis of such data together with events data would complete the basis for assessing the radiological impact of transporting radioactive material.

An attempt in the early 1980s to collect shipment data revealed this to be potentially the most difficult information to obtain in any meaningful form. Therefore, it was recommended that shipment data be collected on a modest scale initially and that the system be developed gradually. It was further deemed useful to limit the required information to the nuclear fuel cycle for a single year and to take a five-year reporting cycle.

For 1990, Member States were asked to provide respective data on:

- the total number of shipments
- the total number of packages shipped
- the number by package type, and
- the number by mode of transport

and to further categorize the data for irradiated fuel, non-irradiated fuel, uranium from reprocessing and wastes.

Twenty-two Member States responded to the IAEA survey, and of these 15 provided data summaries. Of those countries providing actual data, only 7 belong to a group of approximately 20 Member States that contribute 90-95% of radioactive material packaging and transport activities. One reason for that concentration of effect is the relatively limited number of countries with nuclear power generating capability.

It was learned that the low rate of response could be attributed to several reasons. A primary cause was found to be that national reporting programmes do not coincide with the IAEA calendar for data acquisition. Additionally, the objectives for data collection differ between the national and international levels and the resources necessary to undertake the activity are often limited. The responses also indicated that terms were not always being interpreted in harmony with definitions found in Safety Series No. 6.

Nevertheless, data submitted by Argentina, Czechoslovakia, Egypt, Finland, France, Germany, Hungary, India, Poland, Spain, Switzerland, and the United Kingdom was summarized. The four ensuing tables show the number of shipments by mode of transport and content, and the number of packages by package type and content. Although certain recognizable trends can be demonstrated, the IAEA refrains from drawing conclusions at this time because the data is not complete.

Table 1. NUMBER OF SHIPMENTS BY MODE OF TRANSPORT

MODE OF TRANSPORT	NUMBER OF SHIPMENTS (in %)			
	Within borders of Member State	Imported into Member State	In-transit	Exported from Member State
Air		7	4	12
Sea		33	89	27
Rail	31	7	2	14
Road	69	53	5	47
Total	100	100	100	100

Table 2. NUMBER OF SHIPMENTS BY TYPE OF MATERIAL

TYPE OF MATERIAL	NUMBER OF SHIPMENTS (in %)			
	Within borders of Member State	Imported into Member State	In-transit	Exported from Member State
Non-irradiated material	41	81	95	85
U from reprocessing	3			2
Irradiated material	21	19	5	12
Waste	35			1
Total	100	100	100	100

Table 3. NUMBER OF PACKAGES BY TYPE

PACKAGE TYPE	NUMBER OF PACKAGES (in %)			
	Within borders of Member State	Imported into Member State	In-transit	Exported from Member State
Excepted	1		1	1
Industrial	84	14	4	9
Type A	10	79	95	88
Type B(U)	4	6		2
Type B(M)	1	1		
Total	100	100	100	100

Table 4. NUMBER OF PACKAGES BY TYPE OF MATERIAL

TYPE OF MATERIAL	NUMBER OF PACKAGES (in %)			
	Within borders of Member State	Imported into Member State	In-transit	Exported from Member State
Non-irradiated material	18	98	99	98
U from reprocessing	3			
Irradiated material	2	2	1	1
Waste	77			1
Total	100	100	100	100

When consistency and completeness is achieved, shipment data is also envisaged for use as input for INTERTRAN, a computer code aimed at facilitating risk assessment studies in the transport safety area.

For the database on radiation exposures, Member States were requested to provide information for 1990. It was asked that the main sources of radiation exposure during transport for workers be identified, and to estimate the collective dose due to all transport operations for members of the public. Similar problems regarding data collection are being experienced as those just discussed for shipment data. Table 5 summarises information provided by some Member States; where data is available, collective dose is well within prescribed limits. Again, however, the IAEA refrains from relating available exposure and shipment data to draw more definite conclusions.

Table 5. SUMMARY OF RESPONSES FOR EXTRAM DATABASE

MEMBER STATE	MAIN EXPOSURE SOURCE		COLLECTIVE DOSE FOR PUBLIC	
	Material	Transport operation	Nuclear fuel cycle	RAM transport
Finland	Spent fuel	-	0.002 manSv	-
Hungary	-	Loading, unloading, driving	-	1 manSv
India	Ir-192, Co-60	-	-	1.5 manSv
Poland	-	-	0.0023 manSv	-
Switzerland	-	Handling	-	0.8 manSv
U.K.	Tc generator	-	-	0.54 manSv

RESEARCH AND DEVELOPMENT

The Database on Research and Development (REDTRAM)

The IAEA inaugurated a new service by making available in 1991 a compilation of Transport Safety Research Abstracts (IAEA, TSRA-1, 1991). TSRA-1 patterns its format after similar collations in other programme areas in the IAEA, namely, Waste Management Research Abstracts and Health Physics Research Abstracts, which are distributed world-wide.

TSRA-1 contains abstracts reported by 6 Member States and 1 international organization. A special feature of that first issue is the presentation of results of the recently concluded IAEA Research Co-ordination Programme (CRP) on the Radiation Protection Implications of Transport Accidents involving Radioactive Material. The CRP was undertaken in two phases each lasting three years. It was participated in by Argentina, France, Germany, Japan, the United Kingdom and the United States of America. The subjects covered a wide range of work of current interest in transport safety:

- Accidents in uranium hexafluoride transport;
- The use of INTERTRAN, a computer code for probabilistic safety assessment (itself the subject of another research programme co-ordinated by the IAEA);
- Aspects of IAEA test standards for Type B packages;
- The consequences of accidents involving multiple Type A packages;
- The benefits of immobilizing waste for shipment, and
- The risks associated with the air transport of plutonium oxide in powder form.

The CRP confirmed the validity of the accident basis for package design and test requirements specified in the transport *Regulations*.

In comparison with experience with the collation of research abstracts in other subject areas, it is expected that the reporting base for TSRA will widen with succeeding publications. Indeed, to encourage this, data management and output production for IAEA programme areas that publish research abstracts will be taken over by INIS, the IAEA's International Nuclear Information System. That system, in operation since 1970, announces scientific literature published worldwide on the peaceful uses of nuclear energy. Because INIS is a bibliographic database some adjustments to existing procedures and protocols will be necessary to implement a Research-in-Progress Database. Input from Member States and interested international organizations will be possible in various types of machine-readable form or on worksheets. Output products will be in electronic and printed form.

The IAEA has just issued an invitation to all its Member States to participate in this activity by providing information on current research. Worksheets with appropriate instructions were circulated. Data is expected to be made available by the end of 1992, in time for the next edition of TSRA in 1993. Current plans are to update TSRA biennially thereafter. The results of other co-ordinated research programmes in the transport safety area will be reported as they are concluded.

CONCLUSIONS

Although it is recognized that there is a difference in objectives between national and international reporting systems, the latter have an advantage drawing from their wider scope. Information representing international transport experience provides the factual basis so indispensable to the development and maintenance of the *Regulations*. The strong spirit of international co-operation that pervades in the transportation and packaging area is the driving force that makes possible the harmonious implementation of those *Regulations* worldwide. The public is expressing an increased awareness in safety matters that makes imperative a joint effort by those in this industry to answer concerns raised.

To continue the tradition of uniformly implemented *Regulations* and to be able to answer the concerns raised by the public, it is vital that information exchange be encouraged. As the co-ordinator of international efforts to develop and maintain the transport *Regulations*, the IAEA can be instrumental in providing the forum for information exchange. Success, however, derives from the availability of information and is thus critically dependent on the active participation of all members of the transport and packaging industry, whether they are regulatory bodies, research institutes or industrial establishments.

REFERENCES

INTERNATIONAL ATOMIC ENERGY AGENCY, *Regulations for the Safe Transport of Radioactive Material*, Safety Series No. 6, IAEA, Vienna (1961, 1967, 1973, 1985, 1990).

INTERNATIONAL ATOMIC ENERGY AGENCY, *Assessment of the Radiological Impact of the Transport of Radioactive Materials*, IAEA-TECDOC-398, IAEA, Vienna (1986).

INTERNATIONAL ATOMIC ENERGY AGENCY, *Working Material, The PACKTRAM Database, National Competent Authority Package Approval Certificates, User Guide, Rev. 1*, IAEA, Vienna (1991).

INTERNATIONAL ATOMIC ENERGY AGENCY, *Transport Safety Research Abstracts*, IAEA-TSRA-1, IAEA, Vienna (1991).

INTERNATIONAL ATOMIC ENERGY AGENCY, *National Competent Authorities Responsible for Approvals and Authorizations in respect of the Transport of Radioactive Material*, List No. 23, IAEA-NCAL-23, IAEA, Vienna (1992).

INTERNATIONAL ATOMIC ENERGY AGENCY, *Directory of National Competent Authorities' Approval Certificates for Package Design, Special Form Material and Shipment of Radioactive Material*, 1992 Edition, IAEA-TECDOC-662, IAEA, Vienna (1992).

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