

The need of a Member State's Commitment to prevent denial of shipments of radioactive material worldwide

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Abstract

Radioactive sources are used globally in a wide range of beneficial applications in the health care industry, in industrial applications, manufacturing, exploration and development, as well as in basic scientific research. In fact, some 45 % of the world's medical disposable products are gamma sterilized using cobalt-60, in processing plants located around the world. Other vital applications such as cancer treatment, nuclear medicine, oil exploration and industrial radiography routinely and extensively use radioactive sources. In addition, radionuclides and radiopharmaceuticals are used tens of millions of times every year in the diagnosis and treatment of disease in patients globally, or even for everyday uses in smoke detectors and some types of lighting. The ability to use such radioactive materials in these sectors is dependent on their safeness and secure transport, both within and between countries, to ensure that all countries have access to this technology in a timely and cost effective manner. This paper analyzes the issue of denial of shipment and the need of a Member State's commitment, to facilitate the transportation of radioactive material for society's benefit.

Resumen

Las fuentes radiactivas se utilizan ampliamente en múltiples aplicaciones benéficas en el mundo, en el cuidado de la salud, en las aplicaciones industriales, en la fabricación de materiales, en procesos de exploración y desarrollo así como en la investigación científica básica. Por ejemplo, más del 45 % de los productos utilizados en medicina son esterilizados con una fuente radiactiva de cobalto-60 en muchas plantas localizadas en todo el mundo. Otras aplicaciones vitales, tales como el tratamiento del cáncer, la medicina nuclear, la exploración de petróleo y la radiografía industrial requieren un uso intensivo de fuentes radiactivas. Adicionalmente, diversos radionucleídos y radiofármacos son utilizados por decenas de millones de casos cada año, en el diagnóstico y tratamiento de enfermedades de pacientes a nivel mundial e inclusive en el uso diario en detectores de humo y en iluminación. La capacidad de utilizar tales materiales en los diferentes sectores depende de la seguridad de su transporte tanto dentro como entre países, para asegurar que todos los países tengan acceso a esta tecnología de una manera oportuna y rentable. Este artículo analiza los casos de rechazos de expediciones de material radiactivo y la necesidad de un mayor compromiso de los Estados Miembros para facilitar su transporte para beneficio de la sociedad.

1. Introduction

Radioactive material is used throughout the world for many applications that benefit human kind, encompassing agriculture, industry, medicine, electric power generation and research purposes. In almost all cases, the materials are generated in locations other than those where they are needed and so require transport. Most transport is one-way, from producer to user, however some applications require the return transport of disused sources at the end of their useful life e.g. from sterilization plants, medical radiotherapy or industrial applications.

1.1 Societal needs

- Radioactive materials (RAM) are used in many applications in our modern societies, mostly medical and industrial applications.
- Medical applications are mostly tracers for diagnosis of a disease; less so for medical treatment and sources for radiotherapy.
- International transport of RAM is vital for the medical diagnosis and treatment of cancers and other humanitarian needs.
- For some people the safe and secure delivery of radioactive material for diagnostic and treatment procedures can mean the difference between life or death.

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– According to statistics of developing countries: 4 million of the 6 million deaths due to cancer in the year 2000 occurred in developing countries lacking radiotherapy machines, in fact some parts of Africa and Asia cannot carry out any diagnosis. Globally, deaths from cancer are expected to rise from 6 million in 2000, to 9 million in 2015, to 12 million in 2030[1].

– Industrial applications include gauges for quality control and equipment maintenance, where other solutions are not possible.

– A number of consumer products are treated with radiation to improve their properties, such as computer hard disks and non-stick frying pans [2]– obviously this does not make them radioactive.

– Some consumer products contain small amounts of radioactive material for their function such as some types of smoke detectors, photocopiers and lamps.

– Some industrial sources are used for sterilizing a variety of items, including food such as grain, fruit or spices, as well as medical equipment and cosmetics.

– Despite forming a minority of RAM transport, often radioactive material is regarded as nuclear fuel material associated with the civil nuclear power programs in many Member States.

-. Radioactive sources are also used in research for agriculture and the environment, in studying plants and understanding soil and water dynamics.

-. Some naturally radioactive minerals are transported to extract non-radioactive elements for everyday applications, in consumer electronics, optics, aerospace engineering and medical implants [3].

2. Methodology

2.1 Transport regulation

The transportation of radioactive material places it outside of controlled facilities, in the public domain, and often entails movement between countries. As the peaceful uses of radioactive material grew, the international community recognized early on that rigid and uniform standards were needed to ensure the safety of handlers, the public and the environment.

Transport of radioactive material is governed by national and international regulations

which are based on the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material (Publication Safety Standards Series No. TS-R-1 (2009), to be replaced by Specific Safety Requirement SSR-6 (2012). The Regulations are developed by a committee of experts from dozens of Member States of the IAEA and ensure high standards of safety.

The IAEA transport regulations form the basis for the United Nations (UN) Model Regulations (commonly referred to as the ‘orange book’) which covers all types of dangerous goods (*i.e.* all Classes from 1 to 9) and by all modes of transport. Separate UN agencies for modal transport, *e.g.* the International Maritime Organization for transport by sea, issue modal regulations that cover all dangerous goods. These modal regulations for air, sea or land apply to international transport. For regulation of domestic transport, individual countries generally implement the IAEA transport regulations directly, some without any modification but unfortunately most countries apply some form of variation or additional regulation, which means that the transport regulations in each country are different and not harmonized. Further levels of administration within a country in the form of regions, municipalities or port authorities sometimes add further proscriptions or requirements that serve to hinder the transport of radioactive materials. Countries that add this multiplicity of requirements do this despite that they have experts involved in the development of the common set of IAEA Transport Regulations.

2.2 Denial and delay of shipments

Despite this careful regulation, there are increasing numbers of instances of denial and delay of shipment of radioactive material even when complying with regulations. This problem is due to a variety of factors such as:

- Apprehension and negative perception on the part of carriers and public authorities about radiation. This is due, in part, to lack of information, awareness and understanding.
- A misunderstanding that radioactive materials are nuclear fuel waste; much less than 5 % of transports [4] are part of the nuclear fuel cycle and only a part of these are waste. Most radioactive material transports

are for urgent medical treatment.

- Concerns about extent and cost of training. This is because the carriers have been under the impression that extensive training had to be given to those involved in transport, in particular, their personnel who manage and handle radioactive material. It is not necessarily so. For this purpose, expert consultants have devised a half day training program each for cargo personnel, handlers and managers and for public officials.
- Multiplicity of regulations and regulators within a State and lack of harmonization between nations. There is limited interaction among the various regulatory authorities within a given State. This situation can cause duplicative, overlapping or even contradictory regulatory requirements and actions.
- Additionally, some ports (or even countries) apply an outright ban on transit or transshipment of Class 7, or an application procedure or practical requirements so onerous that they are tantamount to a ban.
- Carriers of goods, particularly maritime carriers whose ships call at multiple ports of different countries along their routes, often find it impossible to comply with the different and potentially conflicting regulations that apply in the various countries; consequently they have no choice but to turn down bookings for Class 7 transport.
- Lack of awareness and public outreach about (a) the need to use and transport radioactive material and (b) the safety standards that exist in practice.

2.3 Consequences of denial and delay of shipments

In particular, delays in and denials of shipments of radioactive material for medical use can result in hardships to patients undergoing diagnosis and treatment with radioactive material and to others, who rely on products sterilized by radiation. We can say that the growing problem of refusal by carriers, ports and handling facilities to transport radioactive material are generating both social and economic problems and not only needs to be addressed with a lot of attention but also requires a quick solution[5].

The issue of denial of shipments is not just

for specialists but affects the lives of millions of people around the world. The majority of the radioactive material shipped every day is used in hospitals for diagnostics and treatment of several illnesses. Any delay or denial of shipment may render the isotopes useless for their intended application. Because of their short half-lives, denial and delay of transport of radionuclides like fluorine-18 or iodine-131 has a strong and negative impact on health care.

Unfortunately delay and denial of shipments of radioactive material occur in all modes of transport, whether air, land or sea. For that reason, the transport of radioactive materials is vital to the use of such materials in medicine, general industry and in the nuclear fuel cycle.

2.4 International Steering Committee (ISC)

An International Steering Committee on Denials of Shipments of Radioactive Material was constituted in November 2006 to tackle the issue of denial of shipment. In the IAEA's 51st General Conference Resolution GC(51)/RES/11 operative paragraph 14, the 2007 General Conference welcomed the formation of the International Steering Committee and urged the IAEA Secretariat to actively facilitate the Steering Committee's work including the further development of the action plan and a database on incidents of denials and encourages Member States to cooperate with the Steering Committee and its work, and further called upon Member States to facilitate transport of such radioactive material when it is carried in compliance with the IAEA's Regulations for the Safe Transport of Radioactive Material (the transport regulations) and get National Focal Points nominated by the end of 2007. Since then recurrent IAEA General Conference resolutions have continued to urge the IAEA Secretariat to actively facilitate the Steering Committee's work and encouraged Member States to cooperate with the Steering Committee and its work.

At its first meeting the Steering Committee developed and adopted an Action Plan, which includes the actions to be taken, the member who would take the action and the date by which the action would be accomplished.

The Action Plan is based on six areas of work and can be seen in Table 1 [6].

Table 1. Action Plan of the ISC.

No.	Area of work	Description
1	Awareness	Institute a database to record all denials (all modes and all geographies)
2	Training	Improve awareness and understanding of transportation supply chain and stakeholders regarding transport safety regulations and experience
3	Communication	Improve the integration and transparency between producers, shippers, users, carriers, authorities, regulators and the public
4	Promotion/ Lobbying	For marketing, outreach and promotion of industries shipping radioactive materials and for promoting a positive image regarding these materials
5	Economics	Mitigate deleterious and burdensome costs associated with shipping denials and delays
6	Harmonisation	International and national regulations and standards, of Port and Port Authority requirements, of carrier requirements and of denial report process

2.5 Awareness - Database

An analysis has been made taking as a reference a database of the past cases of denial. Based on this, the actions developed at an international level by the IAEA and international organizations involved in the transportation of radioactive material continue to evolve.

2.5 The new organizational structure

In its 5th meeting in February 2010, the International Steering Committee (ISC) was challenged to decide who should be the committee members, how the ISC should be managed and to “accept working toward a goal of making sure denials and delays of shipment of radioactive material would be reduced to a level not worthy of reporting by 2013” [5].

The structure including the ISC, regional networks and national groups was reviewed and a more cohesive approach was agreed. A body was created composed of national, regional and international government nominated representatives, to which other representatives from transport industry, suppliers and other relevant associations would be added [7].

The need for continuous cooperation between all involved parts was recognized. The diversity of participants was understood as essential to fulfill all of the required actions. In this regard, the relationship among the various actors and stakeholders must be optimized. Communication has proven to be a key factor in this process and the most valuable tool in solving Denials and Delays problems.

Facilitation rather than coordination is the main role of the ISC. The identification of the need, scope and expected products of meetings is the responsibility of the Management Team. Regional Coordinators and members of the Management Team will work closely in guiding and supporting National Focal Points.

National Focal Points and Regional Coordinators are entrusted to initiate and maintain respectively their national and regional networks, and to share knowledge, to facilitate the solving of instances of denials/delays of shipment and to encourage reporting.

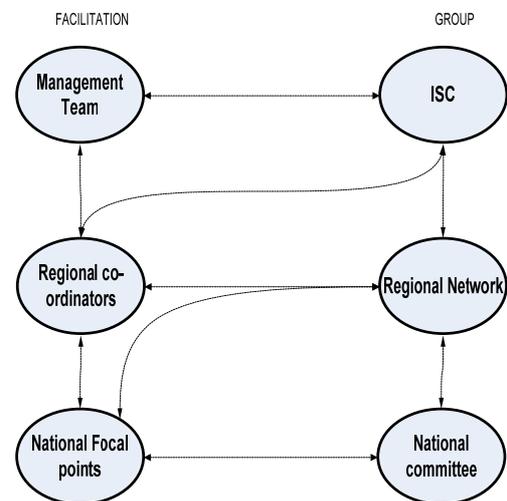


Figure 1. New organizational structure.

In this new organizational structure, individuals (National Focal Point, Regional Coordinator and member of the Management Team) are supported by groups (National network/committee, regional network and International Steering Committee) in their facilitation action, as described in the figure

1, respectively at national, regional and global levels.

The Denial Secretariat, which includes secretariats of IMO, ICAO and IAEA, serves as the interface between all individuals and networks to support the global structure, to maintain the new organizational structure and to provide tools such as the database, handbook and communication tool kit. The individuals of the new organizational structure are the National Focal Points, the Regional Coordinators and the members of the Management Team, respectively for the national, regional and global levels respectively.

In order to facilitate the ease of communication between the Steering Committee and Member States, the Steering Committee identified the need for a National Focal Point (NFP) to be nominated by each Member State. Most of NFPs that have been nominated by Member States belong to competent authorities.

Five regions have been identified:

- America (as a whole), including North America, Latin and South America, and Caribbean region);
- Mediterranean region;
- Europe;
- Asia Pacific;
- Africa.

The ISC is headed by the members of the Management Team, i.e. a Chair and two Deputy Chairs, one IAEA representative and the former ISC Chairs. Each ISC Chair will serve a term of one year, at which point the person will become a 'former' ISC Chair and be replaced by the Deputy Chair. At the same time, a new Deputy Chair will be elected from the ISC membership. The Management Team has for task of driving and coordinating the complete process of facilitation.

3. Results and discussions

We can mention some results taking in account the seventh International Steering Committee meeting:

A working group developed, for air and marine modes, a matrix which would allow reporting without concern over confidentiality.

The IAEA is developing a Self Assessment Tool (SAT) to assist Member States in carrying out self assessments. Twelve modules have been developed thus far to cover transport and it has been suggested that a further module be developed to cover transport in the area of denial of shipment. It was developed a draft set of questions for further review within the IAEA. Includes questions on ports / carriers that accept Class 7 [8].

It has been developed a better strategy to improve a communication action plan. These actions should consider different stakeholders and segments of population. It is necessary to emphasize the concept that a denial or delay case can make the difference between life or death.

IAEA has requested all Member States (MS) to nominate a National Focal Point (NFP). As of February 2011 there were approximately 80 MS which have made their respective designation. In this case, it is necessary a higher commitment of MS through the designation and participation of NFP to prevent denial and delay cases of shipments of RM. At the IAEA's 56th General Conference held in Vienna, a number of the MS attending were engaged in discussion regarding the existence of DOS in their country or region and the need to appoint an NFP if this had not already been done.

For sustaining the work of ISC, International Civil Aviation Organization (ICAO) has suggested an Inter-Agency Committee for Transport (IACT) with UN bodies (International Atomic Energy Agency (IAEA), International Maritime Organization (IMO), International Civil Aviation Organization (ICAO), World Health Organization (WHO), and United Nations Economic Commission for Europe (UNECE)/Economic and Social Council (ECOSOC)) comprising the core team. Primary focus would be transportation of all Dangerous Goods and Denials and Delays would be an ongoing topic of involvement.

4. Conclusions

A regional network allows participants to share their experiences and lessons learned as well as identify and disseminate best practice. It is essential for resolving problems. The

regional work permits the exchange of information among senior specialists and this has already led to important findings that can be submitted to the IAEA's policy-making.

Successful communication and strong cooperation between a range of partners is another essential activity for avoiding or reducing denials. There is a need for better communication among carriers, consignors, competent authorities and local and World organizations like International Maritime Organization, International Civil Aviation Organization, International Air Transport Association and International Federation of Airline Pilots Association. In that sense, it is a key action to implement communication in regional and national networks.

It is essential that all stakeholders related to the transportation of dangerous goods in a Member State, are integrated into a national network to identify strengths and weaknesses of the respective strategy against denials. For instance, Brazil has created a National Committee on Denial of Shipments where stakeholders have contributed to solve many problems.

IAEA should support in a short time, as soon as possible, a new meeting for NFP of the region to analyze and discuss the results obtained in the implementation of an updated action plan according to the recommendations of the ISC and Management Team.

The MS regulators should identify the additional regulations in their country and advise the IAEA, with the aim of either integrating them into the common IAEA transport regulations or eliminating the mal together. Industry should continue to report instances of DOS in a timely fashion submit reports to their NFP (or RC if there is no NFP) or the IAEA directly. In order to sustain the safe and secure transport of radioactive materials, transport regulations should be harmonized [9].

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