CONTROL OF THE TRANSPORTATION OF RADIOACTIVE MATERIALS IN THE GERMAN DEMOCRATIC REPUBLIC

A view of the competent authority

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Abstract

CONTROL OF THE TRANSPORTATION OF RADIOACTIVE MATERIALS IN THE GERMAN DEMOCRATIC REPUBLIC: A VIEW OF THE COMPETENT AUTHORITY.

The paper presents an overview of the regulations, practices and experiences, as well as the systems of surveillance, in the transportation of radioactive materials in the German Democratic Republic (GDR), including considerations on the relationship of this issue to overall aspects of the transport of dangerous goods. The national transport regulations in the GDR are discussed, as are their development and relation to the IAEA Regulations and to international agreements, the administrative system for approvals and surveillance in the GDR and the transport experience in this field.

1. INTRODUCTION

In the German Democratic Republic (GDR), the National Board for Atomic Safety and Radiation Protection (Staatliches Amt für Atomsicherheit und Strahlenschutz (SAAS)), acts as the competent governmental authority responsible for protecting against the risks from the use of atomic energy [1, 2]. This function includes regulation, licensing and surveillance, and comprises radiation protection, nuclear safety, environmental protection, nuclear material safeguards and physical protection as applied to nuclear facilities and radiation devices, as well as to the handling of radioactive materials. It thus also includes the transport of radioactive materials and nuclear fuels. The transport of these materials is, however, integrated into the broader field of the transport of dangerous goods and is handled in co-operation with the Ministry of Public Transport and other national authorities [3].

In acting as the competent authority for the transport of radioactive materials, the major tasks of the SAAS can be stated to be:

(1) Establishing and revising safety regulations;
(2) Issuing approvals for the design of packages and special form radioactive material and for shipments subject to authorization;

(3) Controlling compliance with regulations for transport and packaging;
(4) Advising users on the implementation of regulations, especially in the manufacture of packagings subject to authorization.

2. REGULATIONS

In the GDR, the legal basis for the transport of radioactive materials was established in the mid-1960s, after international experience had first been gained with the IAEA Regulations for the Safe Transport of Radioactive Material (Safety Series No. 6), and their incorporation into international agreements for the carraige of dangerous goods. Because of the novel and specific character of the subject, and also because of the relatively large number of these regulations, it appeared appropriate at that time to issue *national* regulations, rather than to refer to international documents. Table I gives an overview of the different national regulations now in force in this field and their links to international recommendations and regulations.

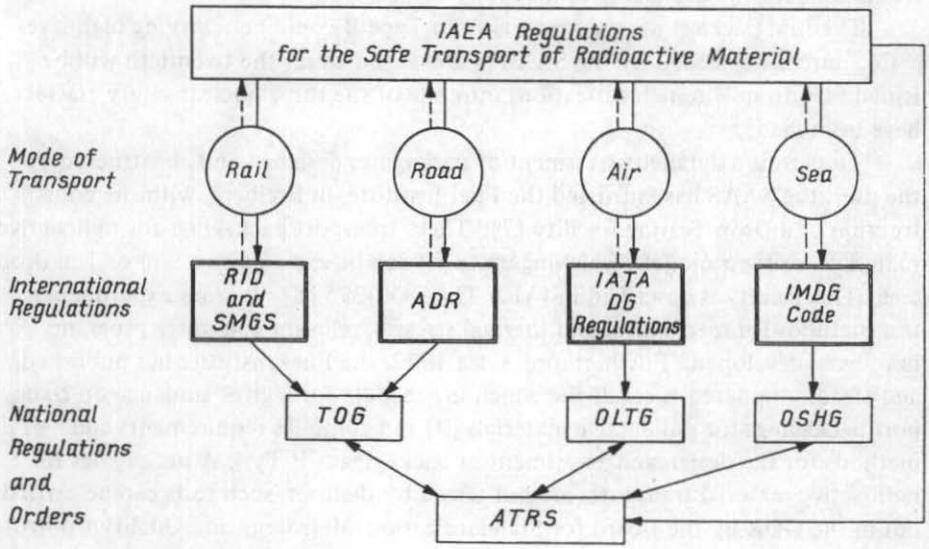
The first, Order on the Transport of Radioactive Materials (ATRS), was prepared by the SAAS and published in the GDR in 1967. ATRS also contained provisions for package testing and was in compliance with IAEA Safety Series No. 6, 1961 Edition. So far, ATRS has been revised twice, in 1971 and 1978, taking into account national and international developments and experience, as well as experience from the transport of other dangerous goods. The 1978 Edition, still in force at present [4], is based on the 1973 Revised Edition of Safety Series No. 6 [5]. It is planned to incorporate the regulations of the 1985 Edition of Safety Series No. 6 into the national regulations and to have them take effect in 1990. It should, however, be mentioned that the question of whether it is better to issue comprehensive *national* regulations or to stipulate mandatory reference to the IAEA Regulations has not yet been resolved.

In parallel to the ATRS, there are a number of other national orders in the GDR regulating the carriage of dangerous goods by the various different modes of transport (road, rail, air, sea and mail):

Order on the Transport of Dangerous Goods by Rail, Road and Inland Waterways (TOG);
Order on the Air Transport of Dangerous Goods (OLTG);
Order on the Sea Transport and Handling of Dangerous Goods in Port (OSHG);
Order on Postal Service.

Within these regulations, specific requirements concerning the different modes of transport, as well as some related additional requirements on the packaging, are contained in the rules for class 7 substances (Radioactive Materials). ATRS (in the cases of transport by road or rail) and international regulations developed by such organizations as the International Air Transport Association or the International

TABLE I. RELATION BETWEEN INTERNATIONAL AND NATIONAL REGULATIONS FOR THE TRANSPORT OF RADIOACTIVE MATERIALS



Maritime Organization cover the basic requirements for all modes of transport (e.g. regulations for test and approval procedures).

The various national orders mentioned above are prepared by the Commission of the Transport of Dangerous Goods, set up by the Ministry of Public Transport. Representatives from the SAAS participate in this commission and are responsible for drawing up and revising the class 7 provisions. In addition, contributions have been made to the revision of various international regulations for the transport of dangerous goods, such as the Regulations Concerning the Carriage of Dangerous Goods by Rail (RID), the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR), the regulations of the Council for Mutual Economic Assistance (CMEA) and the CMEA Agreement on the International Transport of Goods by Rail (SMGS). Within the framework of the CMEA, regulations for the transport by rail of spent nuclear fuel from nuclear power plants of the member states have been elaborated [6] taking into account the IAEA Regulations, while for sea transport the rules are still under preparation.

3. STATE CONTROL OF RADIOACTIVE MATERIAL TRANSPORT

The licensing activities of the SAAS in the field of radioactive material transport extend to examining applications for approval and issuing package design approvals for Type B packages and packages under nuclear safety classes I–III, as

well as design approvals for special form materials and approvals for shipments subject to authorization (including approvals for exceptional cases where the regulations for the packaging cannot fully be observed).

The first package design approval for a Type B container carrying high level ^{60}Co sources was issued by the SAAS in 1971. This year the twentieth will be issued. Up to now ten classifications into one of the three nuclear safety classes have been made.

To permit a detailed assessment of packagings designed and constructed by the user, the SAAS has entrusted the Fuel Institute, in Freiberg, with the construction of a Drop Testing Facility [7]. There transport packagings for radioactive materials, or their models, weighing up to 5 t can be exposed to a 9 m or 1 m drop test. This facility is described in IAEA-TECDOC-295 [8]. Besides experimental test methods for mechanical and thermal stresses, relevant computer programs have been developed. Furthermore, since 1972, the Fuel Institute has published, and steadily updated, a catalogue which in schedule form gives guidance on transport packagings for radioactive materials [9] and compiles requirements and methods for the design and assessment of packagings. If Type A packagings for radioactive material transports are not tested by the user, such tests can be carried out in the GDR by the Board for Standardization, Metrology and Quality Control.

Control of compliance with the regulations for radioactive material transport is ensured by the clearance of packagings subject to authorization, by inspections of selected shipments and, in general, of packages approved by the SAAS, as well as by random checks of users, manufacturers and suppliers of radioactive materials (in connection with inspections related to the licence given to these institutions to handle radioactive materials) and at junctions with increased trans-shipments of packages containing radioactive material.

4. TRANSPORT PRACTICE

In the GDR, radioactive material transports occur as a result of activity in the following sectors:

(1) Radioactive materials originating from the manufacture, distribution and application of radionuclides and radiation sources. This includes a variety of radionuclides of different activity levels, mostly requiring the use of Type A containers. At present there are about 50 000 shipments per year, a large part of which is carried by road in combination with air and rail transport. This is mostly undertaken by a special company (Isocommerz GmbH) established for centralizing the trade with radioactive materials in the GDR.

(2) Fissile materials to provide nuclear power plants and research reactors with fresh fuel from the Soviet Union.

(3) Redelivery of spent fuel from power plants in the GDR to the Soviet Union (transport of high level and fissile materials).

(4) Radioactive wastes from the waste producer to the central repository of the GDR.

Between 1972 and 1978, a container transport system was developed for wastes from nuclear power plants and radionuclide production and use. It was examined by the SAAS and was incorporated into the licensing procedure for central collection and disposal of radioactive wastes in the GDR. In accordance with the provisions for materials of low specific activity (LSA), low and medium level wastes are packed in 200 L drums and in other transport containers for liquid and solid wastes designed and constructed in the GDR. They are carried as full loads in large containers in a combined rail and road transport system from the waste supplier to the central repository for radioactive wastes of the GDR [10].

Spent fuel from the Rheinsberg power plant was transported to the USSR in a heavy container weighing about 80 t and mounted on a railway wagon. This device was developed especially for this purpose and was made complete by the addition of two escort carriages to form a special train. The transport container – which was designed and constructed before the first set of IAEA Regulations for the transport of radioactive material were published – was later reviewed and approved in accordance with the procedures given in the IAEA Regulations. It was approved as a special arrangement and has been repeatedly employed.

For the reshipment of spent fuels from nuclear power plants with WWER-440 reactors, the USSR makes available a similar, but further developed, special transport train [11]. The container and the special train as a whole, as well as the shipments, were subject to multilateral approval (see also Ref. [6]).

5. RADIATION PROTECTION AND THE REQUIREMENTS OF THE ATRS

When the limits for surface contamination fixed in the radiation protection legislation of the GDR for objects which are allowed to be removed from radiation protection areas for further use (for β-emitters: 5 kBq/m^2, for α-emitters: 0.5 kBq/m^2) are compared with the hitherto permissible limits for surface contamination of packages (including excepted packages), means of transport and cargo rooms, it can be seen that the values of the ATRS are about ten times higher. In the framework of the rail transport regulations of CMEA countries, this discrepancy was resolved for the transport of mixed cargo as early as 1974, when the limits for surface contamination for β-emitters were set at 4 kBq/m^2 and for α-emitters at 0.4 kBq/m^2. The new IAEA Regulations now require the low limits only for "excepted packages".

As regards the permissible external dose rate on the surface of packages and means of transport, it appears from the practice in the GDR that the limit of 2mSv/h at the surface can so far be considered not to be too high. An analysis of the radiation exposure of transport workers showed that during the last ten

years the group of workers most exposed to external radiation (drivers at Isocommerz GmbH) received doses of up to 8.5 mSv/year (on an average 3.5 mSv/year). A rough assessment of the radiation exposure of the general public along the transport routes yielded a value of $\leqslant 10$ μSv/year, i.e. a very low one.

On the other hand, taking into account the radiological situation when handling packages very frequently, or when using large transport containers repeatedly *within* a facility, it became necessary to provide for additional shielding and instructions to limit the radiation exposure of personnel. In these cases, the designer or the user cannot automatically base the design or the operational instructions on the permissible limits of the ATRS.

As regards unusual events that happened during the transport of radioactive materials (e.g. transport accidents, damage to packages, loss or recovery of radioactive materials) over the last 20 years, the analysis showed, on average, three events/year. In no case, however, did impermissible exposures of persons or releases into the environment occur. Seventy per cent of incidents were due to man-made errors and only approximately 30% were due to technical failures.

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