

TRANSPORT REGULATIONS FOR RADIOACTIVE MATERIAL IN GERMANY

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ABSTRACT

The transport of radioactive material in Germany is regulated by the dangerous goods transport regulations and the regulations of the Atomic Energy Act and the Radiation Protection Ordinance.

For radioactive material shipments by road, rail, sea and air the modal regulations on the transport of dangerous goods for class 7 of the ADR, RID, ADN, IMO and ICAO are implemented in Germany and have to be applied.

In parallel to this the Atomic Energy Act requirements and the requirements of the Radiation Protection Ordinance concerning the transport of radioactive material have to be met. They contain provisions regarding the reliability of transport organisations and persons, training of persons involved in transport, nuclear liability insurance, physical protection and public interest in addition to the requirement to fulfil the dangerous goods transport regulations. According to these requirements shipment approvals are necessary for nuclear material, large sources and other radioactive materials, which will be presented by the paper. Based on this some practical implications for radioactive material shipments will be discussed as well as some aspects of the future development. The paper gives also an overview of the responsibilities for approval and inspection of radioactive material shipments in Germany.

INTRODUCTION

The safe transport of radioactive materials in Germany is ensured by compliance with the dangerous goods transport regulations of class 7 and with the regulations of the Atomic Energy Act and Radiation Protection Ordinance. The purpose of this paper is to give an overview of these regulations in Germany including responsibilities for transport. Some aspects of the future development, in particular the new concept of spent fuel shipments will be described, based on the agreement between the German government and the nuclear power industry to terminate the use of nuclear power.

LEGAL FRAMEWORK FOR RADIOACTIVE MATERIAL TRANSPORT

The transport of radioactive material in Germany is regulated by two legal areas:

- the area of the dangerous goods transport law and the dangerous goods transport regulations for which the Federal Ministry of Transport, Building and Housing (BMVBW) is responsible for,

and

- the area of the Atomic Energy Act with the Radiation Protection Ordinance for which the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has the responsibility.

Transport of radioactive material has to be performed in Germany within this legal framework. That means that for a specific transport the requirements of the dangerous goods transport regulations of class 7 have to be met as well as the requirements of the Atomic Energy Act or the Radiation Protection Ordinance.

There is a link between these two areas in so far as the transport provisions of the Atomic Energy Act and the Radiation Protection Ordinance contain the requirement that the transport must comply with the dangerous goods transport regulations. In addition to this they contain other provisions regarding the reliability of transport organisations and persons, the qualification and training of persons involved in transport, the nuclear liability insurance, the physical protection and the public interest which have to be fulfilled by the applicant to get a shipment approval.

In this way the legal framework in Germany applicable to radioactive material transport takes into account the provisions of the dangerous goods transport regulations as well as provisions resulting from the Atomic Energy Act and the Radiation Protection Ordinance.

DANGEROUS GOODS TRANSPORT REGULATIONS FOR CLASS 7

The IAEA Regulations for the Safe Transport of Radioactive Material have been applied in Germany through the implementation of the dangerous goods transport regulations for class 7 of the International Modal Organisations. Therefore for radioactive material shipments by road, rail, sea and air the dangerous goods transport regulations for class 7 of the international modal regulations

- ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road
- RID - Agreement for the International Carriage of Dangerous Goods by Rail
- IMDG-Code - International Maritime Dangerous Goods Code
- ICAO-TI - Technical Instructions for the Safe Transport of Dangerous Goods by Air
- ADNR - Agreement Concerning the Carriage of Dangerous Goods on the River Rhine

have to be applied in Germany. The Federal Ministry of Transport, Building and Housing is responsible for the implementation of these regulations. They have been implemented for the different modes of transport by the following German Regulations:

- Road: GGVS, Gefahrgutverordnung Straße
- Rail: GGVE, Gefahrgutverordnung Eisenbahn
- Sea: GGVSee, Gefahrgutverordnung See
- Inland waterway: GGVBinsch, Gefahrgutverordnung Binnenschifffahrt
- Air: Luftverkehrs-Zulassungs-Ordnung.

The introduction of the new restructured dangerous goods regulations based on the IAEA Regulations TS-R-1 (ST-1, Revised) [1] is as follows:

- for the sea mode the new IMDG Code has been applicable since January 1, 2001 with a transitional period of one year up to December 31, 2001
- for the land modes ADR and RID have been applicable from July 1, 2001 with a transitional period of half a year up to December 31, 2001
- for the inland water ways ADNR will be applicable from January 1, 2003 with a transitional period of 6 month
- for the air mode ICAO has been applicable from July 1, 2001 without a transitional period.

There are the following responsibilities for the inspection of radioactive material shipments in Germany according to the dangerous goods transport regulations:

- for sea or inland waterway shipments by the Federal States
- for road shipments by the Federal States
- for rail shipments by the Federal Railway Office (Eisenbahnbundesamt), and
- for air shipments by the Federal Aviation Office (Luftfahrtbundesamt).

The Federal Office for Radiation Protection (BfS) is the competent authority for package design approvals and shipment approvals. The Federal Institute for Material Research and Testing (BAM), Berlin, is responsible for special form approvals and will be the competent authority for Low Dispersible Material (LDM) approvals and Type H(U)/H(M) package design approvals for UF6 packages.

ATOMIC ENERGY ACT AND RADIATION PROTECTION ORDINANCE

Based on the Atomic Energy Act and the Radiation Protection Ordinance shipment approvals are necessary for fissile materials (nuclear fuels) and other radioactive materials including large sources.

The shipment of fissile materials (nuclear fuels) has to be approved according to para 4 of the Atomic Energy Act [2]. For other radioactive material shipments including large source shipments approval provisions apply according to paras 16 and 18 of the Radiation Protection Ordinance [3].

The Radiation Protection Ordinance was revised according to the European Basic Norm [4] and came into force on August 1, 2001.

From the transportation point of view the following main changes in the revised Radiation Protection Ordinance have to be mentioned:

- 1) The revised Radiation Protection Ordinance contains the same nuclide specific exemption limits as the IAEA Basic Safety Standards and the European Basic Norm. That means that now harmonized exemption limits exist in both legal areas, the dangerous goods transport regulations and the new Radiation Protection Ordinance.
- 2) The shipment of other radioactive materials without shipment approval is extended to radioactive material with an activity per package of not more than 10^7 times the exemption limit.

There are exemptions from these shipment approval requirements according to para 17 of the Radiation Protection Ordinance for such cases like

- the shipment of fissile materials (nuclear fuels) and other radioactive materials in quantities and activities not exceeding the exemption limits given in Annex III of the Radiation Protection Ordinance,
- the shipment of other radioactive materials in excepted packages,
- the shipment of other radioactive materials with an activity not exceeding certain activity limits, and
- the shipment of other radioactive materials, except large sources, in compliance with the dangerous goods regulations for sea transport or air transport.

According to para 2 of the Atomic Energy Act fissile materials (nuclear fuels) are defined as follows:

- a) plutonium-239 and plutonium 241;
- b) uranium enriched with the isotopes uranium-235 or uranium-233;
- c) any material containing one or more of the materials given in a) and b); and
- d) materials of such kind as to enable a continuous self-sustaining chain reaction to be maintained in a suitable installation (reactor) and which are defined in a legal degree.

Materials (other than solidified highly radioactive fission product solutions from the reprocessing of nuclear fuels) containing the isotopes uranium-233, uranium-235, plutonium-239 and plutonium-241 in such quantities that the total quantity of all these isotopes is not more than 15 g or the concentration of all these isotopes in total is not greater than 15 g per 100 kg are considered to be other radioactive material with respect to the application of shipment approval provisions.

According to para 23 (2) of the Atomic Energy Act a large source is defined as radioactive material with an activity exceeding 1000 TBq per package.

The Federal Office for Radiation Protection (BfS) is the competent authority for shipment approvals for fissile materials (nuclear fuels) and also for large sources for all modes of transport. In case of the remaining other radioactive materials the authorities of the Federal States are responsible for shipment approvals by road and the Federal Railway Office is the competent authority for shipment approvals by rail. Responsible for the inspection in this field is the Federal Railway Office for the rail mode and the Federal States for all other modes.

A shipment approval for fissile material (nuclear fuel) or for large sources and other radioactive material will be granted if the applicant can demonstrate to fulfil the approval requirements according to para 4 of the Atomic Energy Act or para 18 of the Radiation Protection Ordinance. The main approval requirements are:

a) Reliability

The reliability of companies and persons involved in transport has to be demonstrated. Specific applications must be submitted to BfS. As a result of this process a list of authorized companies and persons is issued which becomes part of the shipment approval or single companies or persons will be named in the approval.

b) Qualification and training

Persons involved in transport have to demonstrate their qualification and training in respect to their functions. For drivers e.g. the ADR certificate for class 7 is necessary. For other responsible persons e.g. it is requested to demonstrate their participation in special radiation protection courses.

c) Compliance with the dangerous goods transport regulations

The shipment has to be performed according to the applicable requirements of the dangerous goods transport regulations of the mode of transport used (see section "Dangerous goods transport regulations for

d) Nuclear liability insurance

Based on the cover funds determined by BfS the applicant has to submit an appropriate nuclear liability insurance contract. In the case of nuclear material the Paris Convention is applied.

e) Physical protection measures

In case of fissile material (nuclear fuel) and large sources special physical protection measures concerning constructional, technical, administrative and personal aspects have to be demonstrated in compliance with special guidelines for physical protection during road and rail transport as well as during air and sea transport. These German regulations are based on the Convention on the Physical Protection of Nuclear Material [5].

f) Emergency precautions

In the case of large source shipments with an activity exceeding the exemption limit by the factor 10^{10} special emergency precautions in association with specially equipped utilities are requested.

g) Public interest

Preponderant public interests may not be opposed to the kind, time and route of shipment.

STATUS AND FUTURE DEVELOPMENT OF SPENT NUCLEAR FUEL SHIPMENTS IN GERMANY

The spent nuclear fuel shipments are subject to the approval requirements of para 4 of the Atomic Energy Act. These shipments as well as the shipments of vitrified high level radioactive waste from France to Germany were stopped in May 1998 by the BMU when it became known that contamination limits had massively been exceeded. The main requirement for the resumption of these shipments therefore was to be demonstrated by the applicant that the limits for non-fixed surface contamination can be met. This demonstration is in particular necessary to fulfil the approval requirement of para 4 of the Atomic Energy Act regarding the compliance with the dangerous goods transport regulations. Only when such a demonstration was available and accepted and all the other approval requirements according to para 4 of the Atomic Energy Act were fulfilled a shipment approval could be granted by BfS to resume these shipments.

Based on the criteria catalogue of the BMU and on intensive and comprehensive studies and expertises by Gesellschaft für Anlagen- und Reaktorsicherheit (GRS), Köln, and Öko-Institut, Darmstadt, many measures were taken to meet the requirements for non-fixed surface contamination. They contain detailed procedures for the loading, handling, transport, transfer and unloading of casks to prevent contamination, to improve decontamination methods as well as contamination detection and contamination measurements, to get complete and uniform documentations and to ensure the duty of notification if contamination limits are exceeded.. Those measures are laid down in the shipment approval depending on the concrete shipment application.

Experience has shown up to now that these measures are effective. The resumption of transport of vitrified high level radioactive waste from France to Germany took place at the end of March 2001 with full compliance with the contamination requirements. The first shipment of spent nuclear fuel to France (COGEMA) was performed on April 10, 2001 and to the UK (BNFL) on April 24, 2001. Since then 31 spent nuclear fuel casks were shipped to France and the UK until August 1, 2001. In all cases non-fixed surface contamination was clearly below (by about a factor of 10) the permissible limits.

Concerning the future development of spent nuclear fuel shipments within Germany and to the reprocessing facilities in France and the UK there is a new concept on the basis of the agreement between the German government and the nuclear power industry (from June 11, 2001) to limit the future use of the nuclear power plants in Germany.

The essential points of this agreement affecting transport are:

- 1) The transport of spent nuclear fuel for reprocessing will end on July 1, 2005.
- 2) Interim storage facilities for spent nuclear fuel shall be built at the nuclear power plant sites (decentralized storage) and the spent nuclear fuel shall be stored there until a final repository for spent nuclear fuel is available about 2030.

By this concept the number of shipments of spent nuclear fuel and vitrified high level radioactive waste can be minimized in the future.

The interim storage approval procedures for all nuclear power plant sites in Germany (except Muelheim-Kaerlich as special case) are already under way [6].

All essential points of the above mentioned agreement will be implemented by the current revision process of the Atomic Energy Act.

SUMMARY

The transport of radioactive material in Germany is regulated by the dangerous goods transport regulations of class 7 in compliance with the IAEA Transport Regulations as well as with the dangerous goods transport regulations of the International Modal Organisations and in parallel to these regulations by the regulations of the Atomic Energy Act and the Radiation Protection Ordinance. In practice the appropriate requirements of both the dangerous goods transport regulations and the regulations of the Atomic Energy

Act and the Radiation Protection Ordinance have to be fulfilled for a certain shipment. In particular the shipment approval requirements of the Atomic Energy Act and the Radiation Protection Ordinance must be observed.

The role of different competent authorities is defined in the dangerous goods transport law and in the Atomic Energy Act.

Based on the demonstration of compliance with the dangerous goods transport regulations and the shipment approval requirements of the Atomic Energy Act shipments of spent nuclear fuel and vitrified high level radioactive waste could be resumed in March 2001. Experience with all shipments up to August 1, 2001 has shown that the measures taken to meet the requirements for non-fixed surface contamination are effective so that in all cases the measured contamination levels were clearly below the permissible limits.

The agreement between the German government and the nuclear power industry to limit the future use of nuclear power plants, in particular the agreed points to end the shipments of spent nuclear fuel to reprocessing facilities on July 1, 2005 and to build decentralized interim storage facilities at the nuclear power plant sites will result in a minimization of the future number of shipments of spent nuclear fuel and vitrified high level radioactive waste in Germany.

REFERENCES

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