RADIATION PROTECTION PROGRAMME – SOME ASPECTS FROM THE VIEWPOINT OF THE COMPETENT AUTHORITY

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ABSTRACT

One of the most important provisions of the IAEA Regulations for the Safe Transport of the Radioactive Material No. TS-R-1 (ST-1, Revised) is the establishment of a Radiation Protection Programme. The Radiation Protection Programme is an essential element to incorporate the requirements of the IAEA "International Basic Safety Standards for Protection Against Ionizing Radiation and for the Safety of Radiation Sources (BSS)" into the IAEA Transport Regulations. The BSS in line with the 1990 ICRP Recommendations provides an appropriate standard of protection and safety for workers, property and the environment against ionising radiation.

Also the relevant competent authorities have duties within this framework, e.g. for assessing of radiation doses to persons and for inspection of the Radiation Protection Programmes of the applicant (consignor, shipper). In this case, the competent authorities are responsible for assuring compliance with all relevant requirements and standards including optimisation of protection and safety in transport of radioactive material. It is also important, that the various competent authorities which may be involved in this process have a cooperation in national as well as international shipments. The paper will discuss those aspects in more detail and will give some recommendations for practical work.

INTRODUCTION

The need for a Radiation Protection Programme was for the first time established in the IAEA-Regulations for the Safe Transport of Radioactive Material, 1985 Edition [1], namely for special use vessels, dedicated to the purpose of carrying radioactive material (para 716d)). The Radiation Protection Programmes for shipments by special use vessels required competent authority approvals.

From the 1996 Edition of the IAEA-Regulation for the Safe Transport of Radioactive Material [2] on the establishing for a Radiation Protection Programme for the transport of all radioactive material was introduced. Through this way the main elements of the "International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources" [3], which are based on the ICRP-Publications No. 60 [4], especially the optimisation and limitation of radiation doses, could be incorporated in the IAEA-Regulations for the Safe Transport of Radioactive Material. In particular, the possible maximum dose rates on the surface of the packages of 2 mSv/h (even 10 mSv/h under exclusive use conditions) catched the radiation protection officer's eyes. Although world-wide assessments of the radiation exposure as well as for transport worker and the public delivered little values, the mentioned dose rate limits are high in comparison

e.g. to the 10 µSv per year as the basic for exemptions or 1 mSv as a regulatory limit for the yearly public exposure.
To ensure the fulfilment of all the radiation limits the Radiation Protection Programme could be a very efficient element in this direction, but also for compliance assurance purposes.

TASKS OF THE COMPETENT AUTHORITIES

Concerning the IAEA Regulations for the Safe Transport of Radioactive Material [2], which were adopted by most of the national and international Organisations for all modes of transport, there are two main functions for the competent authorities in respect to the Radiation Protection Programme, namely:

- inspection of the Programme documents (para 301 of [2])
- periodic assessments of the radiation doses to persons due to the transport of radioactive material, to ensure that the system of protection and safety complies with the Basic Safety Standards [3] (para 304 of [2]).

In addition to that the competent authorities have also to inspect or even approve the necessary quality assurance programmes (para 310 of [2]) and are responsible for assuring compliance with the transport regulations (para 311 of [2]).

In the various countries, the tasks and/or the functions of the competent authorities are different. In some countries only one authority has to do the whole work: it is responsible for package approvals, shipment approvals, validations, special arrangements etc. and also for inspections/supervisions. In other countries two or more competent authorities in the field of the safe transport of radioactive materials exist. E.g. in Germany, due to the federal system, several regulatory bodies have tasks in this field: two Federal Ministries, some Federal Offices/Institutes and the Federal States itself.
The amount of the inspections of the Radiation Protection Programme depends on the nature and magnitude of the transport operations, the expected radiation exposure and the degree of hazards associated with the radioactive contents. It is up to each competent authority to choose which elements of Radiation Protection Programme to which extent it will inspect (see [5]).

According to the Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material [6], para 304.1., the competent authorities have to assess the effective optimization of radiation protection: “This is to ensure that doses to workers and members of the public are below regulatory limits and kept as low as reasonably achievable and will help to achieve and maintain public confidence.” To fulfil the task for periodic assessment of the radiation doses to workers and members of the public the information should be collected and reviewed (para 304.2 of [6]). In this regard the Radiation Protection Programmes provided useful information because dose assessments for specific transport operations are part of it.

On behalf of the German competent authorities the Gesellschaft für Anlagen- und Reaktorsicherheit (GRS), Köln, partly in co-operation with other research organisations, performs dose assessments and makes radiation measurements for various shipments of radioactive materials, e.g. in [7] and [8].

EXAMPLES FOR RADIATION DOSE ASSESSMENTS IN GERMANY

The GRS investigated normal and accident conditions of transport. In [7] the shipments of radioactive wastes and spent nuclear fuels in the region of Gorleben are analysed and the expected radiation exposure to the critical group of transport workers and the critical group of the public were estimated. The Figures 1 and 2 show the maximum annual radiation exposure for the public and the transport worker in this region. From other studies of selected routine transport practices in Germany and other European countries [9] the GRS found typical transport worker and public radiation exposures: see Table 1. The Table shows that the driver/handler in the field of radioisotope supply and distribution are the mostly exposed persons. Further studies are needed to analyse, how the radiation exposure can be reduce. In all other areas the dose rates are very low, often less than 1 mSv per year for the transport worker. Such information about the amount on radiation exposure to workers and the public resulting from a specific transportation praxis are one of the main elements for the establishment of an effective Radiation Protection Programme.

SUMMARY

The newly established Radiation Protection Programmes into the IAEA Regulations for the Safe Transport of Radioactive Material and also into the modal regulations on the transport of dangerous goods for class 7 “Radioactive Material” represent a useful and necessary task in the field of the optimisation and the limitation of radiation exposure of transport workers and the public. It is also a challenge as well as for the consignor, shipper and consignee on the one hand and for the authorities on the other hand, because all parties involved have no experience which such a Radiation Protection Programme. Therefore a good co-operation between the parties involved is necessary.

REFERENCES

[1] Regulations for the Safe Transport of Radioactive Material, Safety Series No. 6, 1985 Edition, Vienna

[2] Regulations for the Safe Transport of Radioactive Material, IAEA Safety Standards Series No. ST-1, 1996 Edition, Vienna

[3] International Basic Safety Standards for Protection against Ionising Radiation and for the Safety of Radiation Sources, IAEA No. 115, 1996

[4] International Commission on Radiological Protection (ICRP), ICRP Publication No. 60

[5] M.T. Lizot et al.: Survey of Radiation Protection Programmes for Transport; Final Report EC Contract No. 4.1020/D/99-005; July

[6] Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (1996 Edition), IAEA Safety Standards Series No. TS-G-1.1,2001,Vienna

[7] G. Schwarz et al.: Sicherheitsanalyse zur bestimmungsgemäßen Beförderung von estrahlten Brennelementen in der Region Gorleben, Bericht GRS-A-2814, August 2000

[8] F. Lange et al.: Assessment of the Radiological Risks of Road Transport Accidents involving Type A Package; RAMTRANS, Vol. 12., Nr. 1, pp. 5 – 23 (2001)

Table 1: Typical worker and public radiation exposures arising from selected transport practices

Transport practices	Transport mode	Maximum occupational and public radiation exposures	
		Transport worker	Public*
Radioisotope supply and distribution	road	handler/driver: < 15 mSv/y	< 0,02 mSv/y
Non-irradiated fuel cycle material (Front-end)	road/rail	handler/driver: < 1 mSv/y	n.a.**
Irradiated fuel cycle material (Back-end)***	road/rail sea	handler/driver: < 2 mSv/y crew members: < 1 mSv/y	< 0,1 mSv/y Not applicable
Radiographic and gauging radiation sources****	road	Likely less than 6 mSv/y	n.a.**

* Critical group individuals
** n.a. = Currently not available
*** Low-/intermediate-/high-level radioactive waste and spent nuclear fuel
**** Licensed radiographers in Germany

Figure 1: Projected Maximum Annual Radiation Dose to the Public arising from Routine Transport of Radioactive Waste/Spent Fuel in the Gorleben Region (Study Period 2000 - 2010)

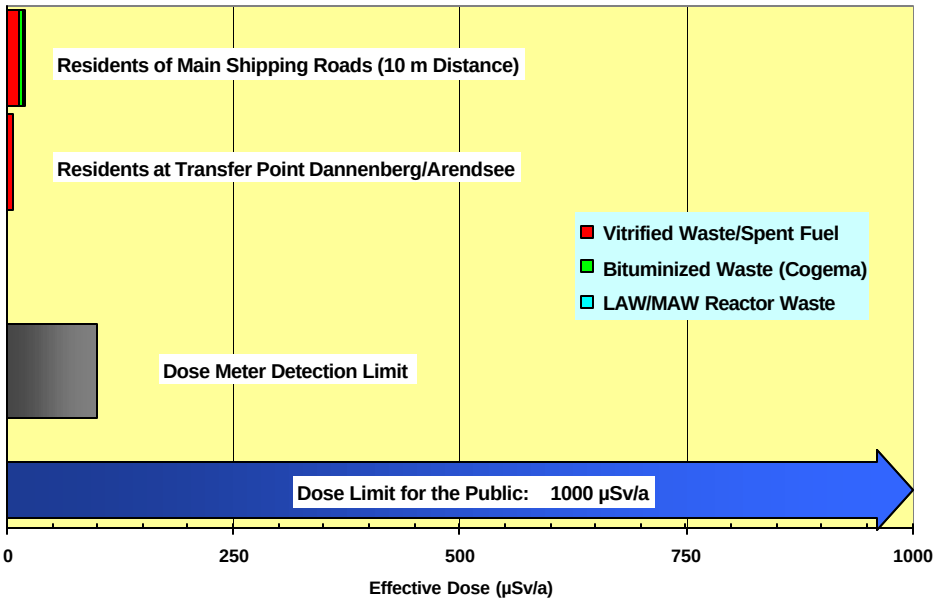

Figure 2: Projected Maximum Annual Occupational Radiation Dose arising from the Transport and Handling of Radioactive Waste/Spent Fuel Shipments in the Gorleben Region (Study Period 2000 - 2010)