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**Implementation of the latest EURATOM Council
Directive (Basic Safety Standards for Radiation Protection)
with regard to the transport of radioactive material in Germany**

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Abstract

The Safety Standards “Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards” (BSS) of the International Atomic Energy Agency (IAEA) and other international organizations, based on the recommendations of the International Commission on Radiation Protection (ICRP) No. 103, were published in 2011. On the basis of these BSS the EURATOM Countries developed their own Council Directive (2013/59/EURATOM), published on 5 December 2013. It has to be implemented and put into force by the Member States until 6 February 2018.

Since the transport of radioactive material is within the scope of the new Directive as an “activity” and the transport is also defined as a “practice”, all applicable provisions of the directive have to be fulfilled also for the transport of radioactive material. Such provisions will be described.

The paper will discuss in particular the following new elements of the Directive:

- Three new types of situations of exposure (planned, emergency and existing exposure situations),
- The new system of notification and authorization,
- The roles of the radiation protection expert and the radiation protection officer.

Medical surveillance is discussed as well.

In particular, the new exemption and clearance values are discussed with the focus on keeping them harmonized with the exemption values of the IAEA Transport Regulations SSR-6, Edition 2012. A set of exemption values harmonized between the use and the transport of radioactive material is an important issue in terms of practical application.

Finally, the paper summarises experiences from implementing the necessary provisions in Germany.

Introduction

The International Atomic Energy Agency (IAEA) published in 2011 the Interim Edition of the Safety Standards “Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards” (BSS) [1] which are based on the recommendations of the International Commission on Radiation Protection (ICRP) No. 103. On the basis of this international BSS the EURATOM Countries developed their own “Council Directive 2013/59/EURATOM of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation” (EURATOM Directive) [2]. Finally, in July 2014 the IAEA published the common edition of the “BSS” [3] together with seven other international organizations.

It is very important for all countries, not only for the European, to implement into the national or regional legislation the main recommendations from the ICRP, the IAEA and the other international organisations regarding the principles of radiation protection.

According to article 106 “Transposition” of the EURATOM Directive the Member States of EURATOM shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 6 February 2018. Germany decided to implement the provisions of the EURATOM Directive into a new Radiation Protection Law.

New provisions for the transport in the EURATOM Directive

In the EURATOM Directive the following is defined:

In Article 2 “Scope”:

2. This Directive applies in particular to:

(a) the manufacture, production, processing, handling, disposal, use, storage, holding, transport, import to, and export from the Community of radioactive material;

and

in Article 4 “Definitions”:

(65) "practice" means a human activity that can increase the exposure of individuals to radiation from a radiation source and is managed as a planned exposure situation;

This means that the transport is included in the scope and is also a “practice”, and all the relevant articles of the EURATOM Directive relating to a practice have to be implemented for the transport of radioactive material also. On the other hand among the provisions relating to a practice there are such which are not relevant for the transport of radioactive material, e.g. such for the “controlled area” defined for facilities.

The next section of this paper describes the new necessary provisions for the practice “transport” in comparison to the International BSS of 1996.

New elements in the latest BSS and the EURATOM Directive

The BSS [3] identify three new types of situations of exposure:

- a) Planned exposure situations; e.g. use, storage and transport of radioactive material,
- b) Emergency exposure situations that may arise during operation or use in a planned situation, and
- c) Existing exposure situations, i.e. situations that already exist before a decision control is taken, e.g. naturally occurring radioactive material.

The BSS also include the new system of notification and authorization (registration and licensing). A graded approach to regulatory control exist in the system, commensurate with the magnitude and likelihood of exposures. The EURATOM Directive adopted these provisions of notification and authorisation from the 2011 Edition of BSS. This implies, that also for the transport of radioactive material, in addition to the dangerous goods regulations, a special notification or authorization is necessary.

In addition, for all practices a “radiation protection expert” and a “radiation protection officer” as well as the “medical surveillance” is necessary:

Article 4 “Definitions” of the EURATOM Directive states the following:

(73) “ radiation protection expert ”

means an individual or, if provided for in the national legislation, a group of individuals having the knowledge, training and experience needed to give radiation protection advice in order to ensure the effective protection of individuals, and whose competence in this respect is recognised by the competent authority

and

(74) “radiation protection officer”

means an individual who is technically competent in radiation protection matters relevant for a given type of practice to supervise or perform the implementation of the radiation protection arrangements.

That means for the practical implementation, that these experts/officers are also to be established for the transport of radioactive material.

Furthermore, the medical surveillance of the transport worker also applies to the transport of radioactive material as a “practice”:

Article 45 of the EURATOM Directive “Medical surveillance of exposed workers” describes the following:

2. The medical surveillance of category A workers shall be undertaken by the occupational health service.

Although the Section III of the “IAEA Regulations for the Safe Transport of Radioactive Material SSR-6” [4] contains special provisions for radiation protection, this surveillance aspect is not mentioned explicitly. It should be considered for the next revision process of the IAEA Transport Regulations SSR-6 and also for the associated Advisory Material SSG-26 [5].

Implementation in Germany

As stated above, Germany decided to implement the provisions from the EURATOM Directive into a new Radiation Protection Law.

It is not decided yet, which kind of authorization or notification will be applied. It is decided, that the radiation protection expert/radiation protection officer is to be established for the transport as a practice. For the qualification of personnel Germany has set into force training requirements according to the radiation protection provisions in special qualification guidelines for all practices other than (until now) the transport of radioactive material.

On the other hand, there exist many provisions for the training in the regulations for the safe transport of dangerous goods (including radioactive material) for all modes: IMDG-Code and ICAO-TI worldwide, ADR, RID and ADN in Europe, especially for the “safety adviser”. The training requirements are regulated in special rules for the transport of all classes of dangerous goods, however, no class specific topics are defined in these training materials. Insofar it is necessary to implement an additional part for the transport of radioactive material either in the training material according to the Radiation Protection Law or in the Dangerous Goods Regulations. Also a follow-up training needs to be introduced.

Furthermore, the medical surveillance of the transport worker also applies to the transport of radioactive material as a “practice” and needs to be introduced.

Exemption and clearance values

Annex VII of the EURATOM Directive contains the exemption and clearance criteria as referred to in Articles 24, 26 and 30 which may lead to exemption from a regulatory control. The criterion of 10 μSv per year remains unchanged from the BSS of 1996.

The Table A of the Annex VII of the EURATOM Directive contains activity concentration values for exemption or clearance of any amount and any type of solid material (for artificial and naturally occurring radionuclides), the Table B contains total activity values for exemption and exemption values for activity concentration for moderate amounts of any type of material (Excerpt of Tables A and B: see below). The exemption values in the IAEA transport regulations SSR-6 (Table 2 of [4]) correspond essentially to the Table B of the EURATOM Directive.

In 1996, when the new BSS exemption radionuclide specific values were developed, Francois et al. made also calculations with regard to special transport scenarios (see [6]). Due to the fact that the deviations of the transport specific exemption values to that exemption values from the BSS were very insignificant and for harmonization purposes the IAEA Transport Regulations adopted the BSS values of 1996.

Furthermore, in preparation of the 2012 Edition of the IAEA Transport Regulations a research project was carried out to verify the exemption values for naturally occurring radioactive material (NORM). The results confirmed the current exempt values for NORM in the IAEA Transport Regulations, namely 10 times of the values in table 2 of [4], provided, that the radionuclides are in secular equilibrium.

The IAEA SAFETY GUIDE No. RS-G-1.7 “Application of the Concepts of Exclusion, Exemption and Clearance” [7] refers for the exemptions in the transport of radioactive material explicit to the IAEA Transport regulations as follows:

“However, requirements on activity concentrations as limits for material in transport are established in the IAEA Transport Regulations and not in this Safety Guide.”

And states explicitly:

“1.8. The values of activity concentration provided in this Safety Guide do not apply to the following:

- ...
- *Material in transport in accordance with the IAEA Transport Regulations.”*

Because of this recommendations and of the fact, that the exemption values for transport respect the general criterion of a maximum effective dose for a person of the public of 10 μSv per year (see also in [6] for a common methodology in use and transport),

the following is recommended:

- Table A, Part 1 and 2 of the EURATOM Directive should not be used for transport as currently. The exemption of Table A should occur according to Article 26 and Annex VII 3.(b), (d) and/or (e).
- Table B of the EURATOM Directive is (nearly) identical to Table 2 of SSR-6 and should be used for transport.

Excerpt of Table A of [2]

TABLE A					
Activity concentration values for exemption or clearance of materials which can be applied by default to any amount and to any type of solid material					
TABLE A PART 1					
Artificial radionuclides					
Radionuclide	Activity concentration (kBq kg ⁻¹)	Radionuclide	Activity concentration (kBq kg ⁻¹)	Radionuclide	Activity concentration (kBq kg ⁻¹)
H-3	100	K-43	10	Mn-56	10
Be-7	10	Ca-45	100	Fe-52 (*)	10
C-14	1	Ca-47	10	Fe-55	1 000
F-18	10	Sc-46	0,1	Fe-59	1
Na-22	0,1	Sc-47	100	Co-55	10

TABLE A PART 2	
Naturally occurring radionuclides	
Values for exemption or clearance for naturally occurring radionuclides in solid materials in secular equilibrium with their progeny:	
Natural radionuclides from the U-238 series	1 kBq kg ⁻¹
Natural radionuclides from the Th-232 series	1 kBq kg ⁻¹
K-40	10 kBq kg ⁻¹

Table A, Part 1 and 2 should not be valid for transport as currently.

Excerpt of Table B of [2]

Radionuclide	Activity concentration (kBq kg ⁻¹)	Activity (Bq)	Radionuclide	Activity concentration (kBq kg ⁻¹)	Activity (Bq)
H-3	1 × 10 ⁶	1 × 10 ⁹	Ni-65	1 × 10 ¹	1 × 10 ⁶
Be-7	1 × 10 ³	1 × 10 ⁷	Cu-64	1 × 10 ²	1 × 10 ⁶
C-14	1 × 10 ⁴	1 × 10 ⁷	Zn-65	1 × 10 ¹	1 × 10 ⁶
O-15	1 × 10 ²	1 × 10 ⁹	Zn-69	1 × 10 ⁴	1 × 10 ⁶

Table B is (nearly) identical to Table 2 of SSR-6 and should be used for the transport.

Conclusions

The new Basic Safety Standards for Radiation Protection allow worldwide an improvement of the previous provisions. All countries should implement the new BSS provisions into their national or regional legislation in a harmonized manner to guarantee a common worldwide transport of radioactive material without denial and delays of shipment.

Experts from both sides (radiation protection specialists and transport specialists) should look together for recommendations within the next IAEA revision process of the IAEA Transport Regulations SSR-6 and also for the associated Advisory Material SSG-26. As one example, the above mentioned aspect for the introduction of medical surveillance should be taken into account.

The harmonization of the exemption values for the use and the transport of radioactive material is also a very important issue in terms of practical application and should be achieved as described above

References

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