

# **"Safety & Security in Transportation of Nuclear and Other Radioactive Materials"**

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In recent years most of the problems concerning the Nuclear Energy Industry in the Republic of Bulgaria are related to the fast and safe de-commissioning of the "Kozloduy" Nuclear Power Plant Units 1 to 4. As a result of this a number of by-products and nuclear waste have emerged as an issue of safety relocation, transportation and storage.

In order to meet specific requirements for Nuclear Safety Transportation of those kinds of materials a large list of prerequisites in terms of action points, planning and analysis must be observed such as:

- Planning, Production, Servicing/Repair of Packing kits.
- Analysis and Planning of Transportation (e.g. technology, technical means, schedules),
- Assignment of transportation to a contractor, loading/unloading of materials, as well as temporary storage while in transit. Last but not least an important item is the acceptance and verification at end location of all radioactive materials as well as their packing/transportation kits.

Transportation of radioactive materials on the territory of the Republic of Bulgaria (or transit of such materials) is conducted after special Transportation Permit/License is issued which is signed and approved by the Chairman of the Nuclear Regulatory Agency in accordance with the National Act on Safe Use of Nuclear Energy in the Republic of Bulgaria. Transportation of radioactive materials can take place several times after PERMIT/License have been issued (no need for separate approval/permit is required) as long as the parameters of the specific transportation co-respond to the parameters defined in the Original Permit/License.

Very important and specific issue is the fact that any kind of transportation of Nuclear Material can only take place after the approval of the Chairman of the Nuclear Regulatory Agency, and for every specific transportation event, the Chairman of the Nuclear Regulatory Agency issues a separate Permit.

In every transportation event of radioactive materials, the Sender, the Carrier and the Recipient must prepare relevant programs/scenarios for Nuclear and Radioactive Safety and Protection. Those programs are submitted for approval to the Nuclear Regulatory Agency. The specifics of these programs must meet specific criteria relevant to the nature and level of risk assessment for every specific transportation event, as well as criteria concerning the environment protection, population and personnel radiation exposure safety. The Sender presents to the Nuclear Regulatory Agency, the Carrier and the Recipient complete data relevant to the specific radioactive materials that will be relocated. A specific schedule is prepared to accommodate and optimize all exposure doses to all subjects involved in the transportation so that the number of possible and probable exposure doses to be kept to the lowest possible levels, taking into consideration all aspects of economical and social factors. All individual exposure doses must not exceed the levels set out in the national Act on Safe Use of Nuclear Energy in the Republic of Bulgaria

All personnel involved in the transportation/relocation of radioactive materials must be professionally qualified, instructed, educated and trained on a regular basis for improvement in relation to safety and precaution measures towards optimal radiation protection in normal circumstances as well as emergency events while transporting nuclear and other radioactive materials.

The Nuclear Regulatory Agency and the Ministry of Public Health monitor constantly the adherence to the national Act on Safe Use of Nuclear Energy in the Republic of Bulgaria, by issuing periodic data on exposure doses on and after transportation event of nuclear and radioactive materials. For that purpose a personal dose meter is attached to every person involved in the transportation event and a number of dose meters are distributed among the population around the relocation/transportation areas.

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While in transit the packages are located to one another in a way that exposure to personnel and population is limited as much as possible. Those parameters (distance, position etc.) are selected based upon the limit of maximum exposure dose of **5mSv** per year (for personnel) and **1mSv** per year (for the public sector).

In the event of an incident while transporting nuclear and other radioactive materials, procedures according to the National Plan for Conducting Rescue, Repair, Disaster and Damage Control are followed. Also the Nuclear Regulatory Agency has strict prescriptions enforced. When transporting nuclear and other radioactive materials the Sender, the Carrier and the Recipient develop contingency plan with action points in the event of an accident and this plan accompanies all documentation along the way of transportation.

All programs and special plans for provisioning of quality and safe transportation of radioactive materials in the Republic of Bulgaria are based on National and International standards. Those requisites are enforced and applied in all aspects of planning, documentation preparation, production, testing, usage, technical servicing, repairs, transportation, transit, storage and other operations that take place. The Manufacturer, the Sender, the Carrier and the Recipient develop program for ensuring quality and reliability of transportation by confirming technical specifications and parameters which meet the safety levels.

The Nuclear Regulatory Agency jointly with the Ministry of Transport and Communications ensures that requirements are met while transportation of nuclear and radioactive materials takes place. Means for ensuring these are for example Monitoring Programs, QC inspections, Field tests, especially to low level dispersive radioactive materials. Materials that practically cannot meet all requirements of the Ministry of Transport and Communications for safety transportation and relocation can be transported ONLY if approved by the Nuclear Regulatory Agency. The agency may allow for transportation and relocation of such material only under special conditions of transportation and after the agency is convinced that all safety regulations and requisites are met, by applying alternative measures that would compensate and guarantee for the safety and security while in transaction of the materials.

### **Conclusion:**

What was presented so far in this paper presents part of the specifics and the requirements of safe transportation and relocation of nuclear and other radioactive materials in the Republic of Bulgaria. A special characteristic of our country is that Bulgaria is situated on the crossroad of Europe and Asia. Naturally as a bridge for all goods and services that pass between Europe and Asia, this in turn leads to our country borders being perceived by the criminal world as a major distribution / logistics point for all sorts of materials including illegal trafficking of nuclear and other radioactive materials.

Therefore, transportation operations of nuclear and other radioactive materials must be conducted under strict and severe security measures since those could be of a great interest to a Terrorist organisations as an opportunity to steal, disperse/contaminate the environment and population in an act of terrorism seeking to inflict damage to society, environment as well as to stir up destabilisation processes among the population.