Nuclear security legislation in Hungary - Overview of the national response plan to events with nuclear and other radioactive material out of regulatory control

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**Abstract.** A governmental decree entitled ‘Physical protection of nuclear facilities, nuclear material, radioactive sources and radioactive waste and the related licensing and control system’ came into force on 4th of October 2011 regulating the process of developing physical protection systems of a nuclear facility, physical protection of nuclear and other radioactive materials during storage, application and transport, as well as the preparation of the physical protection plan.

The aim of the physical protection of nuclear facilities and nuclear materials, radioactive sources and the radioactive waste in Hungary is to deter, detect and respond to

* the sabotage resulting unacceptable radiological consequences;
* unauthorized removal of the nuclear material, radioactive sources and radioactive waste;
* the unauthorized acquisition of classified data and information

in the nuclear facilities and during the use, storage and transport of nuclear materials, radioactive sources and radioactive waste.

The governmental decree described above is based on the recommendation of Nuclear Security Series No. 13 and No. 14. Additionally, the National Response Plan to event with nuclear and other radioactive material out of regulatory control has been reviewed according to the Nuclear Security Series No. 15. The new regulation is to be issued in 2014 as a governmental decree. The regulation applies a “graded approach” through the application of diferent levels of response to a nuclear security event.

In this paper the relevant features of the Hungarian nuclear security regulatory framework, the details of the relevant legislation and the role of nuclear forensics will be discussed including the experiences collected during the licensing period from 4th of October 2011. Special attention will be paid to the introduction of the details of the National Response Plan to an illicit trafficking event regulated by the new draft governmental decree.

**1. Introduction (Hungary's commitments)**

Hungary signed and ratified every relevant legal instrument in the field of nuclear safety, security and non-proliferation.

The internationally accepted basis of physical protection of nuclear facilities in Hungary is the Law-Decree 8 of 1987, which promulgated the Convention on Physical Protection of Nuclear Materials approved by the IAEA in 1979 and the Act LXII of 2008, which promulgated the Modification of the Convention signed on 8 July 2005 in a diplomatic conference organized by the IAEA. Hungary also ratified the International Convention for the Suppression of Acts of Nuclear Terrorism by Act XX of 2007. Hungary complies with the stipulation of UN Security Council resolution 1540 and submits the required national reports to the 1540 Committee.

Hungary, as a member state of the European Union, adapts its acqui communautaire. The Council Directive 2003/122/EURATOM on the control of high-activity sealed radioactive sources and orphan sources requiring the establishment and maintenance of a national register of high activity sealed sources (almost identical with Category 1-3 sources according to the IAEA) is adapted into the national legislation. The Council Regulation (Euratom) No 1493/93 of 8 June 1993 on shipments of radioactive substances between Member States that regulates the intercommunity transport of radioactive sources and wastes shall be directly applicable in Hungary. The Hungarian Atomic Energy Auhtority (HAEA) plays the role of the competent authority for both instruments.

Hungary is also party to each mode-specific international transport agreement. Hungary supports both the IAEA Code of Conduct on the Safety and Security of Radioactive Sources and the IAEA Guidance on Export and Import. The import and export related provisions of the IAEA Code of Conduct on the Safety and Security of Radioactive Sources are implemented in the national legislation, typically as binding regulations. Nevertheless, the explicit enforcement provisions for individual shipments are missing from the specific legislation; however they are covered by the act on regulatory procedures. The provisions of the IAEA Guidance are applied to Category 1&2 sources.

Due to the international obligations and commitments, the revision of the regulatory system for nuclear security in Hungary was necessary, which started in 2008 and resulted in new national legal instruments that entered into force by the end of 2011. In the following sections the peaceful use of atomic energy and the corresponding new physical protection requirements will be introduced and the regulatory experinces in the new licensing procedures discussed.

***2.1. Act on atomic energy***

The uppermost level of domestic application of the obligations undertaken in the international convention is represented by the Act CXVI of 1996 on Atomic Energy (hereinafter referred to as: Atomic Act) [1]. The Atomic Act contains the basic concepts of nuclear security and establishes the basis for detailed regulation of physical protection.

According to the definition of the Atomic Act the use of atomic energy means such activities that correspond to nuclear or other radioactive materials, to such facilities which serve for the use of nuclear or other radioactive materials, and equipment which generate ionizing radiation without a radioactive source. The basic objective of regulatory oversight is that the use of atomic energy, thus the ionizing radiation generated during the use, shall not cause any harm to the people and to the environment in any way, while the regulatory activity does not unjustifiably limit the operation of the facilities or equipment or the pursued activity causing the threat. Moreover, it is a basic interest and obligation of the states operating nuclear facilities and using radioactive materials that the integrity and safe use of nuclear facilities operated and of the nuclear and other radioactive materials used, stored or transported within their territory is protected by due physical protection systems.

Pursuant to the effective provisions of the Atomic Act the nuclear security provides:

* prevention of the unauthorized removal of nuclear and other radioactive materials, unauthorized use (misuse) of radioactive materials, sabotage, malevolent acts and damage to the environment committed with nuclear or other radioactive materials;
* physical protection, based on the current level of threat, against unauthorized removal of nuclear and other radioactive materials in use, storage or transport, as well as against sabotage;
* detection of malevolent acts, damage to environment committed with nuclear and other radioactive materials, as well as of misuse of radioactive materials;
* implementation of urgent and comprehensive measures for the identification of the location of a missing or thieved nuclear or other radioactive material, and if appropriate for regaining the regulatory control;
* mitigation or minimization of the consequences of a sabotage, as well as of malevolent acts, damage to environment committed with nuclear or other radioactive materials.

The physical protection is the complex set of those internal regulations, technical equipment and live response forces, which are applied as part of nuclear security for prevention, deterrence, detection and delay of and response to unauthorized removal and sabotage or other crime committed against nuclear facilities, nuclear and other radioactive materials or against such equipment that generates ionizing radiation but does not contain radioactive materials.

The Atomic Act introduces three basic principles in relation to physical protection:

1. According to the principle of graded approach the threat against the particular material, equipment or nuclear material shall be taken as basis to design and construction of the physical protection system. In order to determine the particular threat and so the respective requirements the attractiveness and potential applicability of the material shall be taken into account.

2. The protection-in-depth concept requires the application of a complex system of principles, administrative measures and technical solution built onto each other to ensure physical protection, where the system guarantees for the realization of the required level of protection by a combination of various independent protection levels applied in a specific sequence.

3. The concept of equal protection means that the physical protection system shall provide approximately equivalent protection against each potential intrusion routes and tactics under any (i.e. environmental, meteorological, lighting) conditions.

The Act also stipulates that the operation of the physical protection system of a nuclear facility, the use, store and transport of nuclear and other radioactive materials, as well as the particular implementation of the deterrence, detection, delay and response physical protection functions shall be described in a physical protection plan.

***2.2. Govt. decree on physical protection***

The Govt. Decree 190/2011. (IX. 19.) Korm. on physical protection requirements for various applications of atomic energy and the corresponding system of licensing, reporting and inspection entered into force on 4 October 2011 based on Paragraphs q) and r) of Section 67 of the Atomic Act. According to Section 31 of the Govt. Decree the HAEA is responsible for licensing and inspection of construction, operation and modification of the physical protection system of nuclear facilities, interim storage or final repository of radioactive wastes and nuclear materials, radiation sources and radioactive wastes with the involvement of the National Police Headquarters as special authority [2].

The Govt. Decree describes a performance based requirement system for nuclear facilities (with the exemption of the training reactor) and a prescriptive system for all other users. The minimum compulsory security requirements depend on the category of the nuclear material and the ratio of the isotope specific activities to the D values of radioactive materials. Four physical protection levels are established and the physical protection requirements are prescribed according to these four levels (e.g. Level A is the most stringent and it applies to the use, storage and transport of nuclear materials in Category I).

The physical protection system for the use, storage and transport of nuclear material, radioactive sources and radioactive waste must ensure: (i) the prevention of sabotage and unauthorized removal (A-level), (ii) reducing the opportunity of sabotage and unauthorized removal (B level), (iii) reducing the opportunity of unauthorized removal (C-level) or (iv) application of basic protection measures, i.e. prudent management, (D-level).The physical protection system must ensure the effective combination of deterrence, detection, delay and response as physical protection functions. The detailed requirements for implementing deterrence, detection, delay measures according to the security levels (A, B, C, D) are prescribed in the Govt Decree. The required physical protection levels (i.e. A, B, C and D) are related to categories of nuclear and other radioactive materials. The materials are categorized according to CPPNM and Code of Conduct on the Safety and Security of Radioactive Sources.

The scope of the Govt. Decree also covers the fix and mobile equipment that generate ionizing radiation but does not contain radioactive material. The capabilities corresponding to such equipment is limited, but the provision of a due protection is required also in this case, and accordingly, the respective requirements should be determined. The concept of a graded approach does not justify the obligation of the concerned licensees to develop a physical protection plan.

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| *Table I. Security levels for nuclear and other radioactive materials* |  |
| **Material category** | **Security level** |
| **Cat 4, 5 radioactive source *(use, storage and transport )*** | **D** |
| **Cat 4 radioactive waste (*processing, storage and transport)*** |
| **Non-categorized nuclear material *(use, storage and transport )*** |
| **Cat 2, 3 radioactive source *(use, storage and transport )*** | **C** |
| **Cat 2, 3 radioactive waste (*processing, storage and transport)*** |
| **Cat III nuclear material *(use, storage )*** |
| **Cat 1 radioactive source *(use, storage and transport )*** | **B** |
| **Cat 1 radioactive waste *(processing, storage and transport)*** |
| **Cat II nuclear material *(use, storage and transport )*** |
| **Cat III nuclear material *(transport )*** |
| **Cat I nuclear material *(use, storage and transport )*** | **A** |

***2.3. Ministerial decree on police tasks in relation to the application of atomic energy***

The Ministerial decree 47/2012. (X.4.) BM on the police tasks in relation to the application of atomic energy established those aspects that are to be considered by the Police Headquarters during the licensing of physical protection plans, as well as during the inspection of licensees. The Ministerial decree also determines the police tasks in relation to transport of nuclear materials.

***2.4. New regulation of nuclear and other radioactive material out of regulatory control***

The response measures regarding found and seized radioactive and nuclear materials are regulated in Hungary by the Gov. decree 17/1996. (I.31.) Korm. on “Measures Related to Found or Seized Radioactive or Nuclear Materials”. This decree prescribes the tasks and duties of the different organizations involved from the reporting of detection through the accurate identification, until the storage of the subject nuclear and radioactive materials. In 2008 an illicit trafficking exercise was organized, which was a step of a comprehensive national review of the Hungarian nuclear and radiological non-proliferation provisions [3]. As a field exercise it focused on the response actions to be made. The one day exercise took place on the site of the Budapest Research Reactor on the 15th of May, 2008. The exercise simulated the case of an abandoned foreign plated car found in a forest near Budapest by a passer-by. There two packages left in the boot and the front seat of the car. In the boot there was a radioactive source of 11,8 GBq 60Co placed into a depleted uranium container with a radioactive sign. The other package on the front seat was a glass jar in which low enriched (2,6 %) uranium pellets.

In the exercise several national authorities participated. The scenario of the exercise followed the provisions of the Government Decree, complemented with some elements of the Draft model action plan for seized/found radioactive or nuclear material of the Nuclear Smuggling International Technical Working Group. The evaluation of the exercise highlighted some week points of National Response Plan, which initiated its revision.

The revision of the National Response Plan to event with nuclear and other radioactive material out of regulatory control started in 2012. A draft of the new regulation has been prepared and the negotiation process has been started involving all competent authorities. In this section the main feature of the new regulation is discussed, which is planned to be issued in 2014 as a governmental decree.

During the revision of the National Response Plan several non-compliance to the international guidelines (e.g. Nuclear Security Series No. 15, „graded approach”) and two-fold competencies in case of on-site response and secure storage of the materials were identified. Moreover, in case of an incident within the territory of a site the responsibility was not regulated clearly.

The new regulation applies the recommendation of “graded approach” through the application of three levels of response to a nuclear security event, as follows:

* Strategic level: In case of radiological emergency the response is determined in the National Emergency Preparedness Plan (NEPP), which defines the role and responsibility of all competent authorities.Tactical level: If the incident doesn’t fall under the scope of the NEPP, the response is defined in the new governmental decree.Operational level: In case of an incident within the territory of a site the response is the responsibility of the licensee, to which – upon request – the competent authority provides support.

Moreover, the response to an event with nuclear and other radioactive material out of regulatory control may differ based on the type of incident e.g.

• Missing: incidents involving the disappearance of material including theft or loss.

• Discovery: incidents involving discovery/detection of any type or quantity of material which is out of regulatory control (uncontrolled, e.g. orphan source) inside or outside of a site.

• Seizure: as a last step of discovery, the material can be seized by the competent authority.

• Confiscation: in case of unauthorized possession the material can be confiscated by the competent authority.

According to the revised National Response Plan in case of “Discovery”, “Seizure” and “Confiscation” the nuclear and other radioactive material is transported to a dedicated nuclear forensics laboratory operated by the Hungarian Academy of Sciences Centre for Energy Research (HAS CER). The HAS CER is responsible not only for the secure storage of the material but also for carrying out a detailed nuclear security investigation if it is requested by a competent authority. In contrast to the past the experts of the Ministry of Health are involved into the process only if unacceptable radiological exposure can not be excluded.

***2.5. Regulatory guidelines***

The methods how the requirements determined in the laws should be complied with are described in the guidelines that constitute the next level of the regulatory system. The guidelines are issued by the director general of the HAEA, and they are regularly reviewed and reissued based on the accumulated experience. So as to proceed smoothly and duly the authority encourages the licensees to take into account the recommendations of the guidelines to the extent possible. The following guidelines are available at the website of the HAEA:

PP-1 Categorization of nuclear materials, radioactive sources and radioactive wastes

PP-2 Detailed requirement levels for the systems, structures and components of the deterrence physical protection function

PP-3 Detailed requirement levels for the systems, structures and components of the detection physical protection function

PP-4 Detailed requirement levels for the systems, structures and components of the delay physical protection function

PP-5 Determination of physical protection zones

PP-6 Security culture

PP-7 Design of the physical protection system of nuclear materials, radioactive sources and radioactive wastes in use or store against unauthorized removal and sabotage

PP-8 Design of the physical protection system of nuclear facilities (with the exemption of those operating with a reactor having less than 1 MW thermal power) and radioactive waste temporary storage and final disposal facilities

PP-9 Evaluation of the effectiveness of the physical protection system of nuclear facilities (with the exemption of those operating reactor having less than 1 MW thermal power), and radioactive waste temporary storage and final disposal facilities

*PP-10 Development of the DBT (not public - provided to the relevant organizations only)*

PP-11 Preparation and submittal of physical protection license applications

PP-12 Physical protection related reporting system

PP-13 Protection against insiders

PP-14 Operation, maintenance and testing of physical protection systems and components

PP-15 Preparation of the physical protection plan required for the transport of nuclear and other radioactive materials 18

PP-16 Detailed requirement levels for the realization of the response physical protection function

PP-17 Physical protection requirements for new NPP units (draft, under issuance)

PP-18 Protection of IT and ITC systems (draft, under preparation)

**3. Regulatory experiences**

The HAEA and the National Police Headquarters are responsible for licensing of physical protection plans and inspecting their implementation. The license holders are responsible for the implementation of the system described in their approved physical protection plans.

The inspections are based on a risk informed approach: their frequency is adapted with the category of the materials and the number of security related events. The frequency of inspections is laid down in the inspection plan, which is established in each quarter on the basis of risk-informed considerations. Inspections are either announced or unannounced or conducted as a follow-up action in case of a suspicious situation. The investigation and assessment of any events affecting security that have occurred during operation and the identification of the causes and the taking of corrective actions and measures in order to prevent their occurrence is primarily the task of the licensee.

Until the end of 2013 375 physical protection licenses were issued for use and storage and 155 for transport (including 5 lincenses for both applications) by the Hungarian Atomic Energy Authority. The license document includes the approved physical protection plan. The physical protection plan is valid for 5 years, with the exemption of the transport of Category 1-2 sources, where it is valid for the specific transport only.

To facilitate the introduction of the new nuclear security reguratory system and to explain the new requirements, HAEA in cooperation with the National Police Headquarters organised several seminars for the material holders on the development of the physical protection plan. There was a huge interest whereby around 80% of the total licensees participated in one of these seminars. As a result only 2 % of the material holders failed to apply for physical protection license on time. In these cases HAEA initiated administrative procedures, which resulted in all cases in the promt application for the license. There was only one case, where the associated risk justified the fining the material holder by the HAEA for failing to apply for license on time.

Based on the annual inspection plan 150 physical protection systems were inspected annually. Additionaly, in 10 and 19 cases targeted inspections were carried out in 2012 and 2013, respectively. Based on the experiences of physical protection inspections some typical shortcomings were identified and corrective actions initiated.

**5. Conclusion**

The main pillar of the new nuclear security regulatory framework in Hungary is the Govt. Decree 190/2011. (IX. 19.) Korm. on physical protection requirements for various applications of atomic energy and the corresponding system of licensing, reporting and inspection, which entered into force on 4 October 2011.

The Govt. Decree describes a performance based requirement system for nuclear facilities and a prescriptive system for all other users. The uniqness of this new regulation is the consolidated minimum security requirements specified for each of the four security levels. The required security level depends on the category of the nuclear material and/or the categorization of the radioactive materials and/or the radioactive waste.

To facilitate the new licensing procedures, HAEA in cooperation with the National Police Headquarters organised several seminars for the material holders on the development of the appropriate physical protection plan. Due to the success of these seminars, only 2 % of the material holders failed to apply for physical protection license on time. This was a great achievments in raising nuclear security awareness.

HAEA in cooperation with the National Police Headquaters, carried out 329 physical protection inspections in 2012-2013, whereby minor non-compliances could be detected and corrective actions enforced.

However, continuous efforts are needed to sustain the appropriate level of nuclear security especially in the field of the security of radioactive materials, where some of the users are less confident that higher level of physical protection of their materials is indeed necessary. For this reason HAEA is planning to establish a national nuclear security centre by 2014-2015 which could provide the licensees and the staff of the compenent authorities with training, scientific and technical assistance.

The revised regulation of nuclear and other radioactive material out of regulatory control correct and simplify several point of the previous National Response Plan, e.g. non-compliancies to the international guidelines, two-fold competencies in case of on-site response and secure storage of the materials. Moreover, the responsibility of the nuclear forensic investigation is also regulated.

**REFERENCES**

[1] Act CXVI of 1996 on Atomic Energy (for unofficial English translation visit:

<http://www.oah.hu/web//v2/portal.nsf/att_files/jogszabalyok/$File/atomtv_en.pdf> )

[2] Decree 190/2011. (IX. 19.) Korm. on physical protection requirements for various applications of atomic energy and the corresponding system of licensing, reporting and inspection (for unofficial English translation visit: <http://www.oah.hu/web//v2/portal.nsf/att_files/jogszabalyok/$File/gd190.pdf> )

[3] Á. Vincze, G. Rácz and K. Horváth: „Detection and Response to Malicious Use of Nuclear and other Radioactive Materials: Illicit Trafficking Exercise in Hungary”, NATO Advanced Research Workshop (ARW), “Threat Detection, Response and Consequence Management associated with Nuclear and Radiological Terrorism” November 17–20, 2008, Brussels