25 YEARS OF THE HUNGARIAN SUPPORT PROGRAMME

Hungarian Atomic Energy Authority

CONTENT

1 INTRODUCTION

The document “Nuclear non-proliferation activities in Hungary 1999-2009” published in 2009 aimed at commencing a series of documents, which regularly overview the Hungarian activities performed in connection with the international activities relating to the non-proliferation of nuclear weapons. This document is the continuation of the summary document published in 2009 for the 10 years anniversary of the Hungarian ratification of the Additional Protocol belonging to the comprehensive safeguards agreement concluded with the International Atomic Energy Agency (IAEA). This document gives an overview of those internationally recognised measures that are performed, in addition to the performance of routine safeguards activities undertaken in international treaties, on State and facility levels in Hungary to further strengthen the system guaranteeing the peaceful application of nuclear materials.

The 25 years anniversary of the Hungarian Support Programme to the IAEA safeguards system was celebrated in 2016. During this quarter of a century Hungary provided voluntary support to the IAEA safeguards system, which had to comply with several challenges occurred internationally. During these 25 years, the Hungarian support programme was in line with the nuclear verification tasks challenging the international safeguards system; Hungary provided support in the field of trainings, development of guidance documents, development of nuclear material verification methods, and testing of surveillance systems serving for strengthening the verification system. This document provides examples of these support tasks as well.

2 NUCLEAR SAFEGUARDS CULTURE IN HUNGARY

2.1 INTRODUCTION OF COMPREHENSIVE SAFEGUARDS INSPECTIONS

Hungary, in compliance with its international non-proliferation obligations, maintains its state system of nuclear material accountancy, data provision and control; the HAEA is responsible for the performance of the related tasks. The state system of accountancy for and control of nuclear material is well established and reliable only if the local accountancy and data provision systems of the organisations possessing nuclear material perform properly. Even the most carefully designed local safeguards system may weaken, if the internal procedures required for their operation and maintenance do not exist or are incomplete, or if these procedures are not fulfilled within the organisation.

An effective facility nuclear safeguards system is characterised by the compliance of the organisation possessing nuclear material with the relevant government and ministerial decrees, as well as their implementing regulations. The existence of internal procedures supporting the operation of the local safeguards system is essential for the continuous (non-random) compliance with the legal requirements. A characteristic of the adequate facility level nuclear safeguards culture is that the relevant procedures are kept up-to-date by the responsible organisation, and all persons and organisational units participating in their application are aware of the importance of the adherence thereto.

Additionally, the safeguards culture may be strengthened by the managers of the organisation with management practices, and the recognition of the importance of the nuclear material accountancy and data provision system operating within the organisation. The safeguards culture involves the personal commitment towards and accountability for the operation of the safeguards system and the personal. An essential condition is that each and every employee of the organisation, including top managers, who directly or indirectly perform

safeguards tasks should be aware of his/her obligations and the importance of his/her duties.

In 2011, the HAEA introduced a comprehensive safeguards inspection system to strengthen the safeguards culture. The goal of the comprehensive safeguards inspections is the periodic review, assessment and further development of the safeguards measures maintained by organisations possessing nuclear material.

During a comprehensive safeguards inspection, the HAEA, as the national competent authority responsible for the operation of the system reviews whether

- the safeguards system of the organisation being subject to the inspection operates in compliance with the effective legislation and guidance,
- the internal procedures adequately regulate the activities, which are implemented by the organisation in order to operate the facility level safeguards system in compliance with the legislation,
- measures do exist for the maintenance and further development of the safeguards system.

The areas of comprehensive inspections:

During a comprehensive inspection, the HAEA, on the basis of the answers given to an orientation questionnaire provided in advance, assesses the management commitment of the organisation. Additional inspection areas are connected to the safeguards systems, including:

1) The Safeguards Organisation,

2) The operation of the safeguards system,

3) The nuclear material accountancy and data provision system.

The conduct of a comprehensive safeguard inspection consists of three timely separated stages:

a.) As preparation for the inspection, the HAEA requests the organisation possessing nuclear material to submit those strategic documents, organisational and operational rules, internal procedures, etc., which regulate the performance of the safeguards related tasks of the organisation. The documents submitted by the organisation are assessed by the HAEA.

b.) The HAEA conducts on-site inspections with the use of question lists, in smaller working groups, with the involvement of the management of the organisation and its employees responsible for nuclear safeguards. At the end of the on-site inspection, the HAEA presents its major observations taken regarding the operation of the system established for the fulfilment of the safeguards obligations of the organisation.

c.) The HAEA sends its inspection report to the organisation possessing nuclear material that should develop an action plan, including deadlines, on the basis of the regulatory recommendations and suggestions. The HAEA approves the action plan, or requests its modification and/or completion. After the implementation of the action plan, the organisation notifies the HAEA, who approves it, as appropriate.

The HAEA, in its reports on comprehensive safeguards inspections, besides the outcomes of the inspections, identifies the good practices, deficiencies and areas of potential improvement. The good practices are procedures or methods effectively applied and tested for several years, which can be efficiently maintained, developed and documented in the field of nuclear safeguards.

Deficiencies are those issues, which should be solved by the licensee according to the recommendations of the HAEA, in the mirror of relevant national and/or international legislation and guidance.

In such cases, when the improvement possibilities are based on the good practice approved in the area, the HAEA provides suggestions.

2.1.1 Lessons learned from the comprehensive safeguards inspections in the period of 2011-2014

In 2011, as the first step of the introduction of the comprehensive safeguards inspection system, the HAEA conducted an inspection in order to review the safeguards activities of the Public Utility for Radioactive Waste Management Non-profit Ltd. (PURAM) performed at the Spent Fuel Interim Storage Facility. In 2012, another important nuclear facility, namely the Paks Nuclear Power Plant Co. (Paks NPP Co.) was inspected. In 2013, comprehensive safeguards inspection was conducted at the Training Reactor operated by the Institute of Nuclear Techniques of the Budapest University of Technology and Economy (BME NTI), while in 2014 at the Research Reactor and the Central Isotope Storage Facility operated by the Centre for Energy Research of the Hungarian Academy of Sciences.

In the summary report on the outcomes of the comprehensive inspections conducted in the period of 2011-2014, the HAEA identified 25 good practices, 16 recommendations and 23 suggestions.

Major areas of good practices are:

Management

An important aspect of the comprehensive inspections was the assessment whether the accountability for the performance of safeguards tasks is determined within the scope of responsibilities of the head of the organisation or a member of the management.

The guidance of the European Commission on the application of the nuclear material accountancy and control system by operators of nuclear facilities (11.02.2009.) prescribes that

…." Senior management should ensure that responsibilities and authorities are defined and communicated within the organisation. A member of the management should be appointed who, irrespective of other responsibilities, should have responsibility for annually assuring the chief executive officer, in writing, that the entire NMAC system is fit for purpose."..

Several good practices were identified during these four years, which guaranteed that the safeguards related tasks were represented at a high level at the facilities.

One example for such good practices is the organisational and operational rules of the HAS Centre for Energy Research, which determine that the facility safeguards officer reports directly to the director general.

Keeping the management continuously informed on the safeguards related tasks of the facility, any issues rising in their performance, and the development of the safeguards system is ensured, if the safeguards officer participates in a management meeting and provides information on his/her work. A good example is the Institute of Nuclear Techniques of the BME, where any question regarding the operation of the safeguards system can be discussed by the Teacher-Researcher Meeting or the Management Meeting, if the safeguards officer thinks that appropriate. Similarly, a nuclear safeguards related issue can be discussed by the Departmental Teacher-Researcher Meeting or the

Departmental Group Leaders' Meeting. The safeguards officer, who is at the same time the safety engineer, attends each meeting and reports on the tasks performed. Accordingly, nuclear safeguards related questions and tasks can be subject to the agenda of and can be discussed in any meeting.

Organisational level safeguards culture

The guidance of the European Commission on the application of the Nuclear material accountancy and control system by operators of nuclear facilities (11.02.2009) also prescribes that the tasks of the top management should include „Ensure appropriate awareness of the legal obligations concerning safeguards."

In the course of the comprehensive safeguards inspections the HAEA observed several such good practices, which provided information to a large scope of facility employees about the importance of the nuclear material accountancy and data provision obligations of the facility, as well as about tasks to be performed during the preparation for and conduct of the national regulatory and international inspections. Different forms of information provision exist in Hungarian facilities, as the internal training programme or information leaflets.

The facility level safeguards culture at the Paks NPP is enhanced by the good practice that the internal training programme of the nuclear power plant includes the education of basic safeguards information to every employee. Additionally, the awareness of nuclear safeguards and the enhancement of nuclear safeguards culture were aimed by a series of articles on the nuclear safeguards system in the local journal of the nuclear power plant.

The HAS Centre for Energy Research provides training on safeguards tasks to the operators and assistant operators, in order to prepare them for an unannounced inspection, to be able to properly substitute the safeguards officer (if absent) and

ensure the conditions for the inspection (access authorization, documentation, etc.).

The workers at the Spent Fuel Interim Storage Facility get information on the nuclear safeguards surveillance and control measures applied in the hall. Warning signs are placed at locations, where the safety of the operation may be affected (e.g. electrical network connection of the surveillance system).

The scope of the annual refresher training of the workers at the Institute of Nuclear Techniques of the BME covers information on changes in relevant legislation, including the legislation relating to safeguards obligations. Special attention is paid to the tasks related to the movement of nuclear materials and hosting of international inspectors within the refresher training programme. The newcomer training also includes the provision of information on the safeguards system of the facility.

Synergy of nuclear safety, security and safeguards at facility level

At Paks Nuclear Power Plant, the Safety Directorate is tasked with safeguards tasks, together with the areas of nuclear safety and physical protection. The safeguards system is represented by the Safety Director in top management meetings. The internationally suggested synergy of nuclear safety, security and safeguards (3S) is facilitated by the organisational arrangement that a single directorate is responsible for all the three areas.

On the basis of the experience gained during comprehensive inspections, the HAEA initiated the modification of the relevant regulation. Paragraphs 13 and 31 of the Ministerial decree 7/2007. (III. 6.) IRM on the rules of accountancy for and control of nuclear material were modified as follows

Section 13 (1) The leader of the organization is legally responsible for fulfilling the prescriptions of this decree and for executing the tasks prescribed in this decree. The

leader of the organization shall provide that the responsibilities and competences related to the execution of the decree are determined. He/she shall designate a person who, in addition to his/her other tasks, is responsible to ensure the leader in writing that the safeguards system operates as planned and the procedures guaranteeing the operation are developed.

Section 31 The objective of site inspections performed by the Authority of Nuclear and Radioactive Materials is

… inspect all processes and activities of the organization related to nuclear safeguards based on the effective national and international legal requirements and recommendations

With the above modifications, the measures enhancing the safeguards culture of nuclear facilities are regulated in a binding legislative instrument, what guarantees that these measures shall not be performed only on an ad-hoc basis.

2.2 INTRODUCTION OF THE INDICATOR SYSTEM ASSESSING THE NUCLEAR SAFEGUARDS PERFORMANCE

In 2015, the HAEA introduced, as a trial, the nuclear safeguards performance indicator system, which aims to facilitate the evaluation of the annual performance of a facility nuclear safeguards system, the timely observation of potentially occurring changes and of deviations from the optimal operation, and the timely identification of issues, in order to provide the possibility to prevent more serious deviations and timely response.

Such indicators were developed for the assessment of the performance, which are easily accessible and collectable on the basis of inspections, licensing procedures and submitted reports, are in harmony with the daily practice, and are in relation with operation of the safeguards system and the level of safeguards culture within the organisation.

The indicator system consists of four levels: evaluation main area, sub-areas, indicators and characteristics.

MAIN AREA OF EVALUATION	Commitment to the application of safeguards
SUBAREAS OF EVALUATION (INDICATORS, CHARACTERISTICS)	Safeguards organisation ▪ **Staff number** ▪ **Training** Operation of the safeguards system ▪ **Accountancy systems (reports)** - *Correctness of submitted data (incorrect rows, correction rows)* - *Keeping of accountancy deadlines (late line)* ▪ **Data provision system (BTC, Additional Protocol)** - *Correctness of submitted data (need for completions, corrections)* - *Keeping of data provision deadlines* ▪ **Experience of inspections** - *Assurance of inspection conditions (access control, access to nuclear material)* - *Non-compliances during inspections (observed deviations)* Safegaurds procedures ▪ **Regulatory actions/decision** ▪ **Keeping of deadlines determined by the regulator**

The HAEA evaluates the safeguards characteristics in the Lotus Notes Database 'Safeguards Indicator System V1".

Four evaluation fields indicated by different colours are defined, together with the associated behaviours.

	Appropriate (green)	The green field of the safeguards characteristic extends to the limit value qualified as appropriate by the HAEA.
	Warning (yellow)	The boundaries of the warning, yellow field warn of deviation from the optimum value, within the range qualified as acceptable by the HAEA. The characteristics within the yellow range should be more extensively monitored.
	Unacceptable (red)	The lower boundary of the unacceptable, red range of the safeguards characteristics is the limit value defined in legislation or regulation, as appropriate.
	Unknown (white)	The nuclear safeguards indicator system is unified for each Hungarian nuclear facility. However, certain characteristics may not be available in the case of every licensee.

The boundaries of each range of the four-level scale are determined individually for every characteristic. The indicator gets the evaluation of the weakest qualified one among the associated characteristics. If the indicator is not in the green range, then the licensee shall develop an action plan. The characteristics and the associated indicator can be red, only if the associated activity is not in compliance with the legislation or regulation.

The Safeguards Indicator System is operated and the Subareas of Safeguards Procedures are evaluated on the basis of data received regularly (reports) and occasionally (applications submitted for licensing) by the HAEA, and of the experience gained during on-site inspections. In general, the HAEA does not have to use additional resources or collect additional information, only the available data and their circumstances have to be assessed and analysed. Nevertheless, the number of staff working in connection with safeguards and their

qualification, as well as the quantity and quality characteristics of the safeguards organisation of the licensee require a more complicated assessment.

In order to support the objective evaluation of these latter characteristics, the HAEA developed a questionnaire, which is filled in by employees working in connection with safeguards on an annual basis.

2.3 SAFEGUARDS CONSULTATION WITH THE REPRESENTATIVES OF THE HUNGARIAN NUCLEAR FACILITIES

As of 2012, the HAEA holds an annual meeting with the managers and employees, who are responsible for safeguards in the Hungarian nuclear facilities. During the meetings, one or two such areas are discussed, which can be utilised during the operation of the safeguards systems in each nuclear facility.

The meetings provide the facility representative with the possibility to share their safeguards related experience with each other, and to ask their questions directly from the representatives of the HAEA.

The meetings aim to provide an expert level forum for the professionals, who are committed to the peaceful use of nuclear energy.

3 25TH ANNIVERSARY OF THE HUNGARIAN SAFEGUARDS SUPPORT PORGRAMME

In 2016, the Hungarian support programme to the safeguards system of the International Atomic Energy Agency (IAEA) reached its 25 years anniversary. Hungary celebrated this anniversary together with the 35 years old support programme of the European Commission and the 40 years support programme of the United States of America. The Hungarian support programme may seem young comparing to the others' programmes celebrating together, but Hungary is proud of it, since as a small country provided 25 years support to the International Atomic Energy Agency in its very important mission to prevent the proliferation of nuclear weapons and to enhance the peaceful use of nuclear energy.

The Hungarian safeguards support programme is coordinated by the Nuclear Security, Non-proliferation and Emergency Management Department of the Hungarian Atomic Energy Agency. The role of the Hungarian facilities and research centres are essential in the implementation of the programme, including provision of venues for training and expertise for the participation in research and development tasks.

The Hungarian support programme is mainly financed in the framework of the Technical Support Activity of the Hungarian Atomic Energy Agency aiming at supporting the state system of nuclear material accountancy and control.

Three main areas can be highlighted in the 25 years old history of the Hungarian support programme, where effective support was provided to the IAEA in the maintenance and development of the international safeguards system.

3.1 SUPPORT TO THE TRAINING ACTIVITY OF THE IAEA

The Hungarian nuclear facilities and organisations possessing nuclear material provided venue for the practical training from the commencement of the Hungarian support programme in order to support the implementation of the training programme of the IAEA. The Hungarian expertise and venues were offered for different trainings of the IAEA, including the contribution to the development of training scenarios, organisation of training, and to further improve the expertise of international nuclear safeguards inspectors. The target audience of the training were, besides the existing and new inspectors of the IAEA, the professionals of developing countries. The offered venues extend from nuclear facilities, research and training reactors, decommissioned critical systems, research organisations possessing nuclear material, locations of nuclear material exempted from safeguards, enterprises manufacturing and exporting nuclear equipment, etc.

As of 1991, altogether 27 different training courses were supported.

3.2 SUPPORT TO TESTING NEW INSTRUMENTS AND EQUIPMENT

During the past 25 years, facility conditions were provided for such newly developed surveillance systems and innovative technologies, which served for the surveillance of nuclear material and associated activities both under traditional safeguards verification, and based on the new concept, under the integrated safeguards system. Among the cameras used in the traditional safeguards system, besides the 8 mm Minolta camera performing real surveillance at the Paks Nuclear Power Plant, such newly developed systems

were tested, which were applied later by the IAEA as surveillance systems. These systems were:

- Modular Integrated Video System (MIVS), 1993-1995
- Gemini, digital based surveillance system, 1995-1998
- Digital Image Surveillance (DIS), 1997-1998
- Secure Satellite Communication and Remote Monitoring System in the Spent Fuel Interim Storage Facility, 2007-2009

3.3 SUPPORT TO DEVELOP EQUIPMENT AND TECHNOLOGIES

The last 25 years brought several challenges to the Hungarian regulatory inspection system and required the development of equipment and measurement methods to be adapted to the specific features of the Hungarian facilities. The methods developed for the Hungarian circumstances facilitated the international safeguards inspectors to perform their verification activity at the Hungarian facilities and also in similar nuclear facilities operated in other countries.

Such challenges included the verification of irradiated fuel assemblies spent for a long time (6-7 years) and irradiated fuel assemblies having very low burn-up (a few 10 MWday/tU) in the spent fuel pool of the Paks Nuclear Power Plant. In such cases the verification using an instrument measuring on the basis of Cerenkov radiation was impossible. The Isotope Research Institute of the former Chemistry Centre developed a portable attribute tester, which instrument was based on a CdZnTe detector gamma spectrometer. The measurement method is based on the theory that the fissile isotopes accumulated in the irradiated nuclear fuel emit gamma radiation that characterises the irradiated nuclear material. The spent nuclear fuel assemblies stored in vertical position, under the water, in the spent fuel pool of the reactor could be individually measured by a CdZnTe

detector located above or inside a properly designed collimator tube, and thus the existence of the nuclear material was verifiable. This instrument is still in use under certain conditions by the inspectors of the IAEA and the HAEA.

In addition to the above mentioned three areas, the Hungarian safeguards support programme focused on the development of new safeguards measures that aimed at the harmonisation of the verification activities performed in a State with its capabilities and possibilities (State Level approach). Accordingly, at the request of the IAEA, Hungary, together with other countries, participated in the task to develop such a methodology and software, which analyses the diversion pathways in a given country, so those ways allowing the diversion of nuclear material from the peaceful use to a military application. In the framework of the task the Hungarian support programme provided the prototype of the methodology analysing the potential diversion pathways.

As of 2012, Hungary is a party of that support programme, in which the IAEA requested the collection and analysis of nuclear trade related information for further strengthening the safeguards system.

The International Atomic Energy Agency launched its “Nuclear Trade Analysis” programme in 2006. The programme aimed at collecting information on the trade of nuclear and nuclear dual use items, with the contribution of the member states. In the frame of the programme, on April 3, 2013, the nuclear trade analyst of the International Atomic Energy Agency and the section head of the Export Control Section of the Hungarian Trade Licensing Office (recently the Government Office of Budapest) Military Engineering and Export Control Authority provided presentations to the representatives of the Hungarian enterprises manufacturing or trading nuclear dual use products and technologies. During the seminar, the expert of the International Atomic Energy Agency provided information on the details of the programme, the recognition of

proliferation suspicious requests, and the importance of the role of enterprises manufacturing or trading nuclear dual use products and technologies in the fight against nuclear proliferation.

3.4 THE HUNGARIAN SAFEGUARDS SUPPORT PROGRAMME 2010-2015

3.4.1 Trainings

In the period of 2010-2015, Hungary provided support to the IAEA's training activities with the organisation of several different training course and practical training events.

3.4.1.1 Additional Protocol Complementary Access (APCA)

During the training simulating a practical inspection, the task of the inspectors is to confirm that the R&D activities performed in Hungary are in harmony with the actual nuclear fuel cycle and the nuclear development activities declared towards the IAEA. An additional task is to confirm that no undeclared activities are performed in the uranium mine declared as closed to the IAEA.

In the frame of the training, in order to summarize the lessons learned during the inspection exercise, the participants prepare their reports on the inspections in the same way as they should prepare reports at the IAEA, for the use of the competent section of the IAEA for the comprehensive state evaluation reports

together with the information collected by the IAEA from open sources and reports of other countries.

Accordingly, the goal of the inspection under the Additional Protocol is to confirm that there is no any undeclared activity performed in Hungary in association with the nuclear fuel cycle.

In the period of 2010-2015, Additional Protocol (INFCIRC/540) inspections (extending the scope of the effect of the Comprehensive Safeguards Agreement INFCIRC/153) were conducted four times in Hungary. In the framework of the training, the experienced inspectors of the IAEA conducted two-day long on-site inspections within the campus of the HAS Centre for Energy Research, and the Mecsek Environmental Protection and Research Base of the PURAM (recently Mine Asset Utilisation Non-profit Ltd. Mecsek Environmental Protection Base) in Kővágószőlős.

3.4.1.2 Comprehensive Inspection Exercise (CIE)

This training aims at simulating nuclear material inspections under the Comprehensive Safeguards Agreement (INFCIC/153) to be performed by newly recruited inspectors of the IAEA at a nuclear power plant.

The Comprehensive Inspection Exercise was organised once in Hungary in the period of 2010-2015. On the first day of the training, the IAEA inspectors were provided with an overview of the technical features of the Paks NPP, its radiation protection rules, nuclear material accountancy and control system, and safeguards strategic points. The inspectors performed physical inventory verification in the subsequent days to confirm the technical parameters declared in advance, measure and verify the inventory of fresh and irradiated nuclear fuel assemblies, check and maintain cameras and seals, and to verify the inventory of other nuclear materials.

This inspection, on the contrary of the inspection conducted under the effect of the Additional Protocol, aims at verifying the accuracy of the data and information declared by Hungary

3.4.1.3 Traineeship Programme for nuclear professionals from developing countries

The IAEA provides biannual training for nuclear professionals from developing countries, who are selected for a nine month training programme financed by the IAEA. During these nine months the professionals will be aware of facilities in the different stages of the nuclear fuel cycle, their safeguards systems and measurement techniques.

In the frame of the support programme, Hungary provides an overview, at the end of the nine month training (at the end of October or in November), on the state and facility level regulations that guarantee and strengthen nuclear non-proliferation, and on national strategies regarding nuclear waste management, nuclear energy generation, etc.

In the course of the training, the HAEA professionals provide information on regulatory rules and procedures in the field of accountancy for and control of nuclear and other radioactive material and their physical protection, control of nuclear export and import, and their practical implementation. Additionally, the participants obtain information on the safeguards related arrangements at the HAS Centre for Energy Research, Paks Nuclear Power Plant, Interim Spent Fuel Storage Facility operated by the Public Utility for Radioactive Waste Management Ltd., the Mecsek Environmental Protection and Research Base and the National Radioactive Waste Repository, as well as on the radioactive waste management technology of the latter one.

In the period of 2010-2015, Hungary provided support three times to the IAEA training programme for nuclear professionals from developing countries.

3.4.2 Contribution to the development of IAEA publications

Upon request of the IAEA, Hungary has been contributing to the development of the Guidance on Safeguards Implementation Practices since 2013. So far, four guidance documents were developed that include Hungarian experience regarding the establishment and maintenance of national accountancy systems, on-site inspection activities, provision of data on nuclear material, Additional Protocol related activities, export-import control, and Hungarian lessons learned from cooperation in this field. The guidance documents aim at facilitating the embarking countries, as well as the experienced and newcomer professionals working in this area in the states operating existing safeguards systems in performing their safeguard activity on a high quality level. The guidance on cooperation possibilities in the field of safeguards was published in 2015, while the guidance on provision of safeguards related data in 2016.

3.4.3 Hungarian Support Programme - Summary

In 2015, eleven active tasks were being performed in the frame of the Hungarian support programme, under the coordination of the HAEA.

In the last 25 years, the success of the Hungarian support programme was greatly facilitated by the serious commitment of the HAEA to nuclear non-proliferation. A condition and major element of this success was the support provided by the Hungarian partner organisation during the implementation of the programme. The HAEA acknowledges the support received from the HAS Centre for Energy Research (and its legal predecessors), the Institute of Nuclear Techniques of the Budapest University of Technology and Economy, the Paks Nuclear Power Plant Co., the Public Utility for Radioactive Waste Management Non-profit Ltd. (and its legal predecessors), the Ganz Engineering and Energetic Equipment Manufacturing Ltd., as well as many other organisations.

4 NUCLEAR SAFEGUARDS EVENTS/ACTUALITIES 2010-2015

4.1 PUBLICATION OF SAFEGUARDS GUIDANCE ON THE FULFILMENT OF REQUIREMENTS FOR SAFEGUARDS OF NEW NUCLEAR POWER PLANT UNITS

On July 3, 2015, the HAEA published the Guideline Sg-2 "Fulfilment of requirements for safeguards of a new nuclear power plant unit" on its website. The guideline summarizes those legal requirements for the facility level safeguards system, which should be taken into account during the design.

The nuclear safeguards licensing aims at preventing, timely detection and responding to further proliferation of nuclear weapons and materials, techniques and technologies needed for the development of nuclear weapons, and the non-peaceful application of nuclear material.

On facility level, the prevention can be performed via the application of proliferation resistant technical solutions facilitating the prevention of nuclear proliferation, the rigid accountancy for nuclear material, data provision obligations and regulatory inspection of adherence thereto; thus, the diversion and/or unlicensed activity can be deterred by the high probability of timely detection.

Additionally, the consideration of safeguards requirements during the design of the facility may not only reduce the costs of the application of the future, unplanned surveillance and control measures, but increase the transparency of the investment towards the international organisations (IAEA and EURATOM).

Consequently, the publication of this guideline was an important milestone of the Hungarian nuclear safeguards regulatory activity, which strongly supports the adherence of new nuclear power plant units to be constructed to the international and national safeguards requirements.

4.2 AMENDMENT TO THE MINISTERIAL DECREE 7/2007 (III.6.) IRM ON THE RULES OF ACCOUNTANCY FOR AND CONTROL OF NUCLEAR MATERIAL

The main reason to review the Ministerial decree 7/2007 IRM on the rules of accountancy for and control of nuclear material was that more than 8 years spent after its issuance. On the second hand, an important goal was to extend the nuclear safeguards regulatory system over nuclear facilities being under construction. The deficiencies identified during the review of the decree justified the following revisions:

- Extension of the nuclear safeguards related data provision over the organisations not yet possessing nuclear material, but establishing a nuclear facility, as well as further specification of the requirements for preliminary data provision.
- Other modifications providing basis for the enhancement of the Hungarian nuclear safeguards culture, i.e. shorter deadlines, increase of the accountabilities of managers for nuclear safeguards related tasks, provision of direct authorisation for the review of nuclear safeguards related internal procedures/regulations during regulatory inspections.

A cause of the modification of the legal requirements in 2015 was that the expenses could be significantly reduced in the case of new facilities, if the nuclear safeguards related aspects (e.g. establishment of surveillance and control measures) are taken into account, in agreement with the HAEA, during the design. One of the initial steps of this process is the preliminary data provision. Another important reason of the modification was to enhance the level of nuclear safeguards culture at the facilities.

4.3 REPATRIATION OF HIGHLY ENRICHED FUEL ELEMENTS OF THE BUDAPEST RESEARCH REACTOR TO THE RUSSIAN FEDERATION

The repatriation of the first shipment of the spent fuel elements of the HAS Centre for Energy Research was completed in 2008. The legal basis for the repatriation was the Govt. decree 204/2008. (VIII. 19.) Korm. on the promulgation of the agreement on the cooperation of the repatriation of the spent fuel elements of the Budapest Research Reactor to the Russian Federation concluded between the Government of the Russian Federation and the Government of the Republic of Hungary.

The repatriation of high enriched uranium under the agreement was completed on November 4, 2013; this was the date when the last shipment of high enriched uranium fuel left the Hungarian facility. The completion of this task was the result of a multiyear international cooperation among Hungary, the United States of America, the Russian Federation and the International Atomic Energy Agency. In total 239.1 kg high enriched uranium was transported from Hungary in the frame of the project. The repatriation is a significant contribution to the initiatives on global terrorist threat reduction. The transition of the reactor to operation with low enriched fuel elements was also completed; as of 2013, the reactor operates exclusively with low enriched fuel elements. With the completion of the repatriation, Hungary had no more reactor fuel containing high enriched uranium, which is the most attractive type of fissile material from nuclear proliferation point of view. Consequently, Hungary greatly contributed to the international non-proliferation goals and the fight against nuclear terrorism.

4.4 ESTABLISHMENT OF A NEW MATERIAL BALANCE AREA IN THE HUNGARIAN SAFEGUARDS SYSTEM

On November 1, 2012, the Radioactive Waste Processing and Storage Facility operated by the Public Utility for Radioactive Waste Management Non-profit Ltd (PURAM) at Püspökszilágy, with the agreement of the European Commission, became a separate Material Balance Area.

The basic elements of the Hungarian safeguards system are the so-called material balance areas, in which the quantity of nuclear material can be determined in the case of every sending from and receipt in the material balance area and the inventory of the actual inventory of the nuclear material can be determined, as required, according to the requirements, in order to implement nuclear safeguards measures. Prior to November 1, 2012, the Radioactive Waste Processing and Storage Facility was a part of the Material Balance Area containing all the locations outside facilities, whose safeguards related obligations are performed by the HAEA.

The establishment of the new material balance area was justified by the preliminary estimations that the quantity of nuclear material stored in the facility will exceed beyond one effective kilogram, which is the limit value beyond which a location shall not belong to locations outside facilities. After this rearrangement of the safeguards system the Radioactive Waste Processing and Storage Facility sends its regular reports on change in the inventory of nuclear material directly to the European Commission, and the annual nuclear material inventory verification is made independently of the locations outside facilities. Consequently, the number of Hungarian material balance areas was increased to nine.

4.5 Acceptance of the Particular Safeguards Provisions of both installations of the Paks Nuclear Power Plant

In 2012, on the basis of the requirements established in Article 6 of the Euratom decree 302/2005 of the European Commission, in agreement with the HAEA, the European Commission and the MVM PA Co., the Particular Safeguards Provisions (PSP) of the WHUE (Units 1 and 2 of the Paks NPP) and WHUF (Units 3 and 4 of the Paks NPP) independent material balance areas were elaborated and approved.

With this arrangement, the Hungarian nuclear power plant units are the first ones among those operating in countries belonging to the EURATOM that hold an approved PSP document, since PSP documents were available only for a few nuclear facilities at that time. The PSP is such a document, which summarizes each nuclear safeguards relevant characteristic of the facility, including the type of applied nuclear material, the system of key measurement points within the facility (material balance area), the methods used for the determination of the quantity of nuclear material, etc.

4.6 Safeguards aspects of drying fuel stored in canisters (2013)

In April 2003, during a cleaning process made on Unit 2 of the Paks Nuclear Power Plant, an incident occurred due to the failure of the French sub-contractor, and 30 fuel assemblies were damaged and the unit had to be shut down. The unit could be restarted in May, 2004; however, the removal of the damaged fuel assemblies and their placement in canisters were completed only in January, 2007. Prior to the shipment to Russia, the fuel in the canisters was dried out and sealed in order to make the canisters prepared for the transportation. The shipment was completed in the first half of 2014, after obtaining every necessary license from the Hungarian, Ukrainian and Russian competent authorities and

the consent from the Euratom Supply Agency (the competent organisation of the EU).

The professionals of the HAEA participated in the specification of the nuclear safeguards aspects of the pre-shipment steps, especially of drying and sealing of the canisters. The most important requirements set during the regulatory procedure were, as follows:

- The planned date of the implementation of the work programme of drying, sealing and storing in the spent fuel pool had to be indicated in the annual schedule of nuclear safeguards activities of the Paks Nuclear Power Plant, which had to be submitted for approval to the Hungarian Atomic Energy Authority, the International Atomic Energy Agency and the European Commission.
- The conditions for establishing complementary surveillance and control systems, as requested by the IAEA or the EURATOM, had to be ensured prior to commencement of the activity.
- The conduct of announced or unannounced inspections by nuclear safeguards inspectors had to be made possible during the entire period of the activity.
- The traceability of the nuclear material batches had to be ensured during the activity, the unique identification of the batches shall not fail.
- The changes in the quantity of nuclear material had to be monitored.

5 LICENSING AND INSPECTION ACTIVITY IN RELATION WITH THE PEACEFUL USE OF NUCLEAR MATERIAL IN THE PERIOD OF 2010-2015

5.1 NUCLEAR SAFEGUARDS LICENSING AND INSPECTION

The safeguards registration procedures are part of the Hungarian safeguards system established for the fulfilment of the obligations undertaken in international treaties in relation with the verification of nuclear material. During the safeguards registration procedures, the HAEA assesses in advance whether the safeguards measures to be implemented by the organisation possessing nuclear material are applicable to meet the requirements, support the effective regulatory oversight activity and support the goals of on-site inspections.

The following Figure (Figure 1) shows the numbers of nuclear safeguards registration procedures conducted and safeguards inspections performed in the period of 2010-2015.

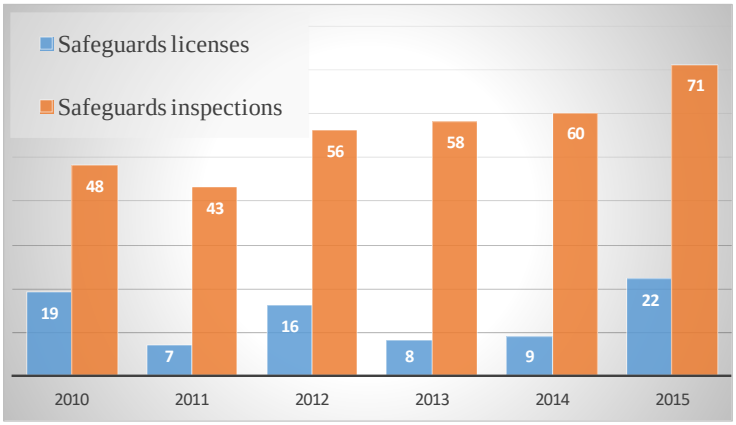

Figure 1: Nuclear safeguards licensing and inspection activity in the period of 2010-2015

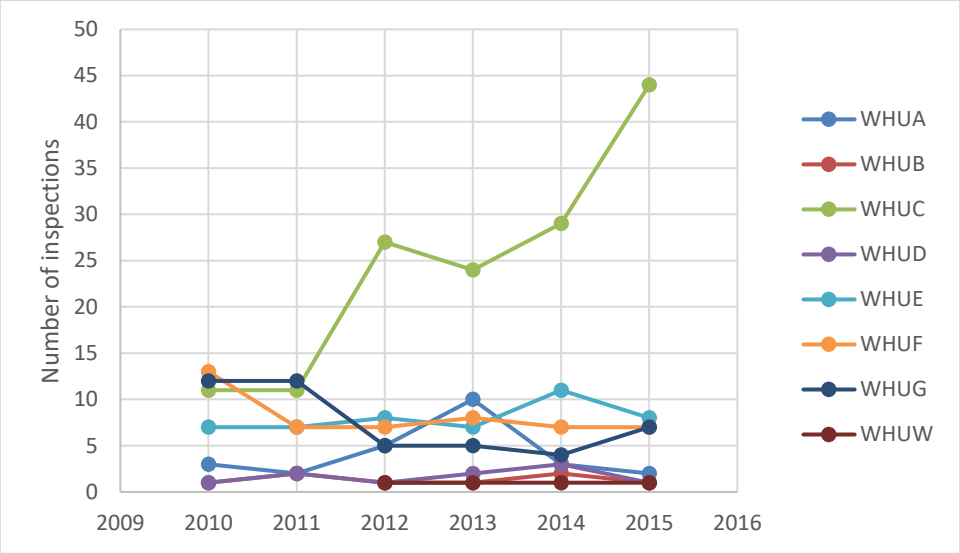

Figure 2: Nuclear safeguards inspections in the Hungarian Material Balance Areas

(One inspection was conducted in the WHUH Material Balance Area in the period of 2010-2015, in 2012.)

Material Balance Areas	Name
WHUA	Hungarian Academy of Sciences, Centre for Energy Research, Research Reactor
WHUB	Budapest University of Technology and Economy, Institute of Nuclear Techniques, Training Reactor
WHUC	Locations outside facilities possessing small quantities of nuclear material
WHUD	Isotope stores and laboratories (HAS ERC site)
WHUE	MVM Paks Nuclear Power Plant Units 1 and 2
WHUF	MVM Paks Nuclear Power Plant Units 3 and 4
WHUG	PURAM Spent Storage Interim Storage Facility
WHUH	Mine Asset Utiliser Non-profit Ltd. Mecsek Environmental Protection Base
WHUW	PURAM Puspokszilagy Radiative Waste Processing and

	Storage Facility

Table 1: Hungarian Material Balance Areas

5.2 LICENSING AND INSPECTION IN RELATION TO THE EXPORT AND IMPORT OF NUCLEAR AND NUCLEAR DUAL USE ITEMS

An important element of the non-proliferation activity is the control of the export of dual use products and technologies. The control of relevant products and technologies may prevent that the products and technologies used for peaceful purposes be accessed by such States, which may use them for proliferation purpose, or by such organisation, which may use them for terrorist acts or military purpose.

Accordingly, the export and import of nuclear and nuclear dual use items are subject to licensing in Hungary, requiring the co-authority consent of the HAEA. The licensing authority is the Hungarian Trade Licensing Office (as of January 1, 2017 the Government Office of Budapest Capital).

In addition to nuclear material and equipment, the dual use equipment, material and knowledge applicable to manufacture nuclear material and equipment are also subject to licensing.

The number of HAEA regulatory decisions and of the connecting inspections in relation with the export and import of nuclear and nuclear dual use items in the period of 2010-2015 are shown in the following Figure.

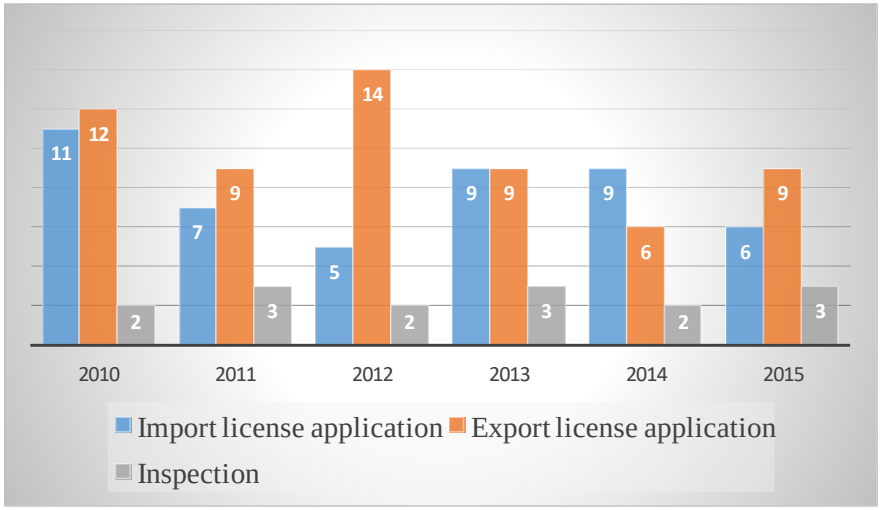

Figure 3: Licensing and inspection activity in relation to export and import of nuclear and nuclear dual use items in the period of 2010-2015