



**HUNGARIAN ATOMIC ENERGY AUTHORITY**  
**Nuclear Safety Bulletin**  
 H-1539 Budapest, P.O. Box 676,  
 Phone: +36 1 4364-800, Fax: +36 1 4364-883, e-mail: [nsd@haea.gov.hu](mailto:nsd@haea.gov.hu)  
 website: [www.haea.gov.hu](http://www.haea.gov.hu)

## RECENT DEVELOPMENTS IN NUCLEAR SAFETY IN HUNGARY

September 2018

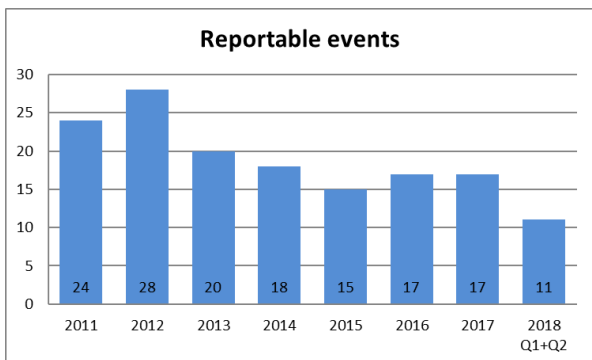
### General

#### *2018 semi-annual safety performance assessment of nuclear facilities*

The HAEA regularly evaluates the safety performance of the operators of nuclear facilities. The main sources of data for the assessment are the regular reports and the event reports of the licensees, the protocols of regulatory inspections including the regular and comprehensive inspections focusing on specific areas, and the reactive inspections.

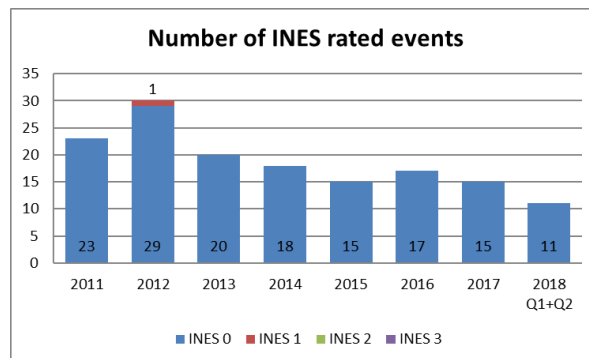
Below we provide a brief extract from the semi-annual safety performance assessment. The safety performance data are taken from the first and second quarterly reports of Paks NPP and the first semi-annual reports of the other licensees.

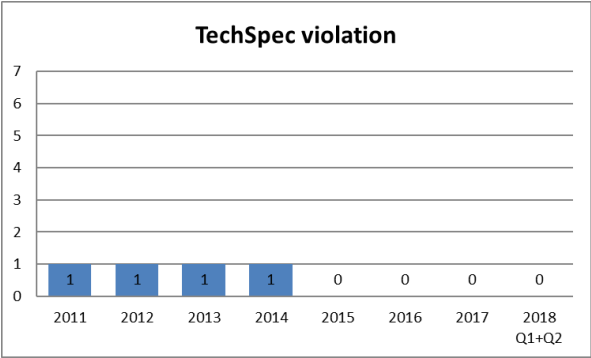
#### *Paks Nuclear Power Plant*



Eleven reportable events occurred in the first half of 2018.

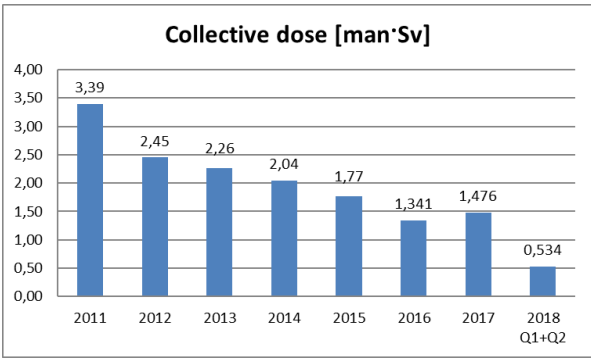
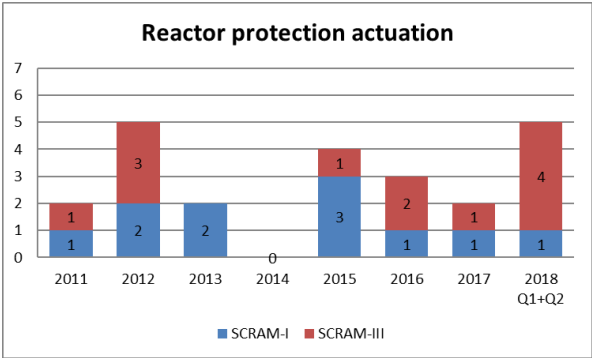
The eleven events reported by the NPP altogether were of category „below scale” corresponding to Level-0 on the seven-level International Nuclear Event Scale (INES).





There was no event causing violation of technical specification since 2014.

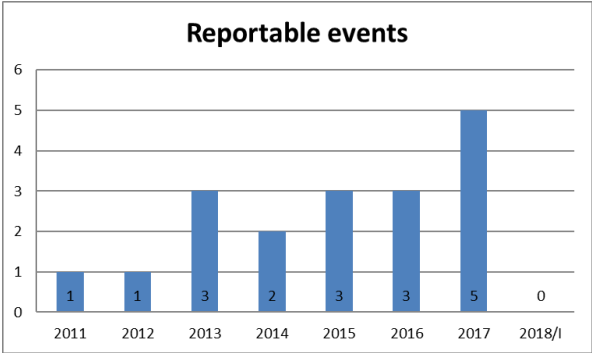
Five automatic reactor protection actuations occurred in the first half of 2018. A SCRAM-III and a SCRAM-I actuation was connected to an event, which was caused by the low level of steam generators of Unit 3. The other three SCRAM-III actuations occurred due to external electrical network failure.

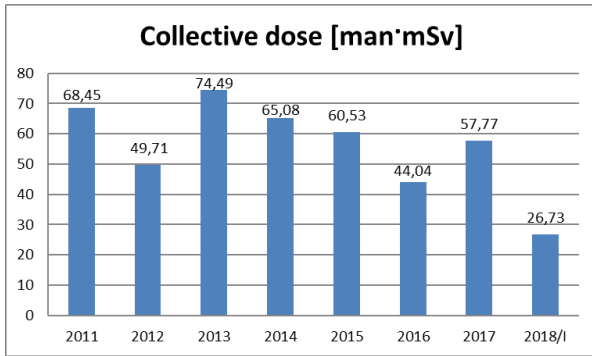


The collective radiation dose of employees has been declining since 2011. Concerning this indicator, the first and second quarterly reports of the NPP refer to the doses of the November to April period.

**Budapest Research Reactor**

No reportable events occurred in the first half of 2018 in the Budapest Research Reactor.

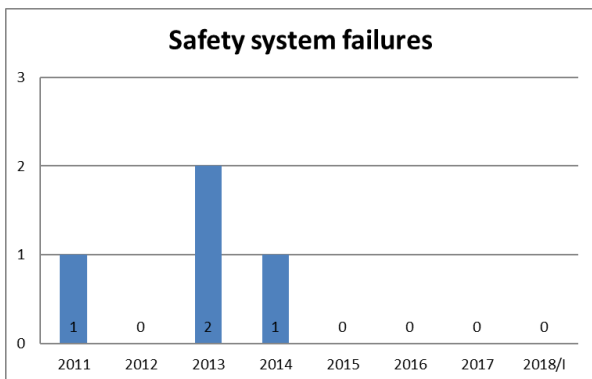
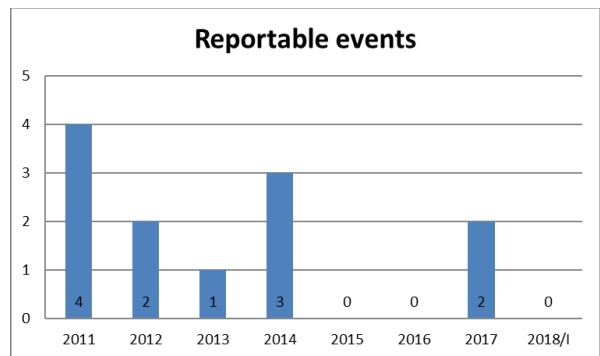




The expected collective dose of employees, based on the 2018 half year's data, is comparable to the previous year's values.

***BUTE Training Reactor***

No reportable events occurred in the Training Reactor in the first half of 2018.

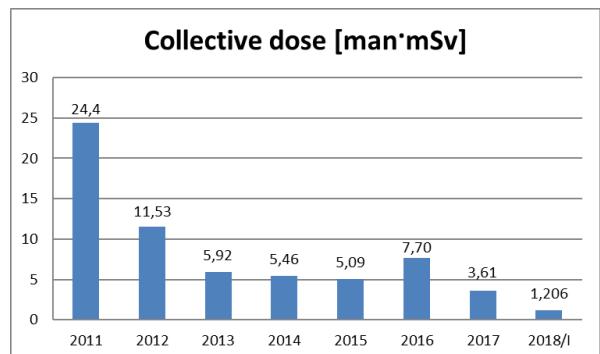


No safety system failure has occurred since 2014.

***Interim Spent Fuel Storage Facility***

The expected collective dose of employees, based on the 2018 half year's data, is slightly lower than the previous year's values.

During the year, up to now, no reportable event has occurred in the ISFS facility.



Based on the comprehensive safety performance assessment it can be stated that during the first half of 2018 the nuclear safety of facilities inspected by the HAEA were of appropriate level, as in previous years. The facilities operated safely, did not endanger the environment, the population and the employees.

## **Physical Protection**

### ***Fierce Falcon – Hungarian workshop of the Global Initiative to Combat Nuclear Terrorism***

From 10-12 April 2018, a workshop called Fierce Falcon, was held about the radiological source security and theft response under the auspices of the Global Initiative to Combat Nuclear Terrorism (GICNT) in Budapest. The programme was organised with the support of the Hungarian government and the cooperation of the HAEA, the Hungarian Academy of Sciences Center for Energy Research (HAS CER) and the United States of America Department of Energy.

GICNT was established in 2006 by the Russian Federation and the United States, which continue to serve as its co-chairs, and focuses on preventing, detecting and responding to the threat of nuclear terrorism. Through practical engagements and capacity building activities, GICNT advances information-sharing between partners, enhances national capabilities, and promotes sharing of best practices. Hungary, among 88 nations and 5 official observer institutions, is a member of this voluntary partnership. For more information about GICNT, please visit: [www.gicnt.org](http://www.gicnt.org).

The workshop, participated by 90 delegates from 26 countries, focused on best practices associated with an immediate site and local law enforcement response to a theft of radiological material.

In addition to small group facilitated discussions, technical presentations, case studies, and panel discussions, the workshop included a demonstration of the equipment and procedures that support search and recovery of radioactive material employed by the Mobile Expert Support Team (MEST) at the HAS CER. Fierce Falcon emphasized the comprehensive range of functions and capabilities aimed at securing radiological material, detecting acts of radiological material theft, the immediate response actions to theft, and the search for and recovery of a stolen radiological source.

Hungary's participation in the GICNT and in exercises such as Fierce Falcon helps enhance national capabilities and facilitates contacts and co-operation among responders and stakeholders.

## International cooperation

### *Visit of Polish Delegation in the HAEA*

On 26 June 2018, a delegation from the Polish National Atomic Energy Agency (PAA) – led by Mr Andrzej Przybycin, President of the PAA – visited the Hungarian Atomic Energy Authority. The delegation was received by Mr Gyula Fichtinger, the Director General of the HAEA.

They had a consultation about the issues of common interest, the regulatory oversight activities, the regulatory framework of Technical Support Organisation cooperation system, the regulatory activities related to new nuclear units and the radioactive waste management.

As part of the program, they visited the Paks NPP, the Interim Spent Fuel Storage Facility and the National Radioactive Waste Repository.

The delegation became familiar with Hungarian experience in safe storage and disposal of radioactive waste and spent nuclear fuel.

"Active cooperation and exchange of experience by nuclear regulatory offices in countries with similar plans and challenges related to nuclear energy and radioactive waste management – such as PAA in Poland and HAEA in Hungary – allows us to carefully prepare for tasks related to safety assessment and issuing permits for new nuclear facilities" – said Andrzej Przybycin during the meeting.



*Figure 1 The delegation of the Polish PAA visits the National Radioactive Waste Repository*

PAA actively follows technological developments regarding the latest solutions in the storage and disposal of radioactive waste and related regulatory and licensing activities. The collected experience will be used by PAA in safety assessment and issuing licenses for the construction of disposals in Poland and when issuing a license to close the current radioactive waste repository in Rózan.

During the study visit, representatives of the PAA had the opportunity to familiarize themselves with the operation of the Paks NPP. The HAEA experience in the field of safety supervision in the existing nuclear power plant and the planned licensing process for the construction of a new nuclear power plant were discussed. The PAA delegation also had the opportunity to visit the Maintenance and Training Center where the employees of the nuclear regulatory and power plant are trained. The training center at Paks is particularly interesting to the Polish side due to the fact that there is located one of two reactor vessels – available for training purposes – which were originally intended for installation in the planned Polish NPP in Żarnowiec.

### ***Training of international inspectors in the framework of the Safeguards Support Program***

This year between 23-27 April, in the framework of the Safeguards Support Program, the HAEA took part in the organization of a course, held for the safeguards inspectors of the IAEA.

Basically, Hungary provides regular and effective support for the maintenance and development of the nuclear safeguards of the IAEA in three fields: training activities, testing and developing



*Figure 1 Inspectors during training*

of new instruments and devices which are used or will be used during safeguards inspections. This Safeguards Support Program provided by Hungary is coordinated by the Department of Radiation Sources, Safeguards and Security of the HAEA. The purpose of this type of IAEA inspection is to confirm that there is no nuclear activity in the specific country in any facility which has not been notified to the IAEA, or that a notified facility does not carry out any activity which has not been declared. In the course, 12 trainer inspectors took part. Four IAEA instructors helped and supervised the activities of the trainers. Furthermore, four colleagues of the HAEA and the operators of the nuclear facilities helped in the organization of the course.

The trainees were practicing the tasks of the inspectors at the Hungarian Academy of Sciences Centre for Energy Research, at the Institute of Isotopes, at the Radanal Ltd. and at the Mecsek Environmental Base of the Mining Property Utilization Non-profit Public Ltd. On the last two days of the training the inspectors summarized their experiences and gave a presentation about the tasks in the headquarters of the HAEA.

The IAEA instructors thanked the operators and the HAEA staff for the cooperation to organize this training again in a professional and quality manner.



*Figure 2 Inspectors during training*

### ***The 6th Review Meeting of the Joint Convention has been completed***

Between 21 May and 1 June 2018, the Sixth Review Meeting of the States Parties to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management took place in Vienna.

The States Parties hold a Review Meeting every three years when they report on changes that have taken place since the previous meeting, and on national practices. Prior to the Review Meeting, the States Parties submit a national report to the Joint Convention Secretariat of the

IAEA and then exchange written questions with each other. The developments following the submission of the report are presented at a Review Meeting during a presentation.

In the first week of the meeting, the States Parties discussed each other's national reports and presentations in country groups and asked questions from the representatives of other countries in addition to the questions that had been answered earlier. Hungary was represented by a delegation led by Gyula Fichtinger, Director-General of the Hungarian Atomic Energy Authority. The Ministry for National Development, the Public Limited Company for Radioactive Waste Management, the MVM Paks Nuclear Power Plant Ltd., the Mining Property Utilization Non-profit Public Ltd. and the Department of Radiobiology and Radiohygiene of the Public Health Directorate of the National Public Health Institute were represented in the delegation.

Based on the national report, the Hungarian presentation and the answers to the questions, the Review Meeting showed that Hungarian practice complies with the requirements of the Convention. The reviewers have, among others, evaluated positively (good performance) the national policy on spent fuel and radioactive waste management adopted in 2015, the efforts made by the HAEA for resource development and training, the new system introduced for following sealed radioactive sources and the developments regarding the National Radioactive Waste Repository and the Spent Fuel interim Storage Facility.

The meeting identified the areas whose development greatly improves the safety of spent fuel management and radioactive waste management. The main elements of this are the implementation of national strategies, the existence of long-term security standards, proper human resource management, the strengthening of regulatory oversight activities, the long-term management of unused radioactive sources, a more intensive exchange of experience on remediation activities and the strengthening of international and interregional relations between States Parties.

The next, seventh review meeting will be held in Vienna from 24 May to 4 June 2021.

### ***“Topical Peer Review” at Community level on the aging management of nuclear installations in Europe***

From 14th to 18th May 2018, in Luxembourg, the Review Conference at Community level on the theme of the aging management of Member States' nuclear installations (Topical Peer Review) took place. Hungary was represented by a group of experts from the Paks NPP, the Budapest Research Reactor and the Hungarian Atomic Energy Agency.

According to the EU's Nuclear Safety Directive (2014/87/EURATOM (NSD)), a Topical Peer Review is to be performed every six years in all Member States operating nuclear facilities. The topic of the first review of this type was aging management in 2017. During the review, the Member States first made a national assessment which they published also in English, then



reviewed each other's reports and anyone could make comments or put questions on the reports. The EU invited also experts to review the reports. The results of these reviews were presented by the Member States and the invited experts at the meeting where it was still possible to answer the questions to be clarified and to identify common problems and good practices to be followed.

On the first two days, the Aging Management Programs were presented by every country. During the Hungarian presentation Eszter Rétfalvi, deputy head of department of the HAEA, introduced the national legal background, the facilities concerned and presented the general conclusions of the review. Subsequently, questions followed about the official control practices of aging management, the application of graded approach, the methods of feedback experience and the databases used.



*Figure 1 From 14th to 18th May 2018, in Luxembourg, the Review Conference at Community level on the theme of the aging management of nuclear power plants and research reactors in Europe (Topical Peer Review) took place*

During the next two days, at the parallel sessions of the four thematic fields of the review (reactor vessel, containment, concealed pipework and cables), the countries briefly presented their country-specific practice of the given field. The Hungarian presentations were held by the specialists of the Paks NPP, Sándor Rátkai and Pál Tóth. The presentations addressed the challenges identified in relation to aging management and demonstrated the Hungarian examples that are considered good practice at international level. The countries' presentations opened up vivid professional discussions.

On the last day, the experts summed up the results of the review, expressed the challenges at European level, and identified some areas to be improved and also the good practices. The review report will be adopted at the meeting of the European Nuclear Safety Regulators Group

(ENSREG) and is expected to be published on ENSREG's website. ENSREG will then develop its Implementation Plan including the improvement measures by December 2018. The implementation of recommendations and suggestions made to each Member State will be monitored.

Based on the experience of the first Topical Peer Review at European level, it can be stated that, in addition to the proven and formerly used international review conferences and review missions, it has obtained its set objectives. In a specially identified area, it has successfully motivated the Member States for further self-assessment, development and identification and sharing of the facilities' operational experience. However, organizational errors, excessive time pressure on participants and difficulties due to varying interim evaluation criteria, lowered the effectiveness of the review. The HAEA is confident that in accordance with the directive, in the future a routine and transparent review process will be developed, contributing to a high level of sustainability and continuous development of European nuclear safety.

### ***HAEA regional workshop in Budapest***

From 4th to 8th of June the HAEA hosted the „Regional Workshop on Level 2 Probabilistic Safety Assessment Application” event which was organized by the International Atomic Energy Agency.

### ***„To everybody about the atomic energy” Conference in Kecskemét: 320 participants, fantastic atmosphere,, #atom***

Kecskemét hosted the event “To everybody about the atomic energy” for the first time: the big auditorium of the Neumann János University became full. In addition to the presentations, 320 students and professors were provided credible information on the application of nuclear energy also at the interactive exhibition.

### ***VVER Regulators' Forum PSA Working Group Meeting in the HAEA***

From 17th to 19th of April 2018 the kick-off meeting of the 5th mandate of the PSA WG (Probabilistic Safety Assessment Working Group) of the VVER Regulators' Forum, which compresses the nuclear safety authorities of countries operating VVER type reactors took place at the HAEA headquarters in Budapest.

### ***Quadrilateral Meeting at the HAEA***

The annual quadrilateral meeting of the Czech, Hungarian, Slovak and Slovenian nuclear regulatory authorities was held at the HAEA, in Budapest from 3 to 4 May 2018.

## **An Event of Interest**

### ***Reactor protection activation at Paks NPP Unit 3***

On the reconstruction works of the 400 kV substation of Paks NPP, a short circuit occurred during the disconnection of a circuit breaker. This has led to protection activations, namely ultra-fast overcurrent and phase protection. In the course of it, the safety 6 kV splitters had not been switched to auxiliary power source, so the voltage dropped. The three power pumps fed by this power source were shut down. There are five of these power pumps, of which one more was lost due to a technological signal, leaving only one in operation. Thus, the volume of feedwater decreased radically. This caused the insufficient supply of feedwater to the steam generators. A reactor protection activation signal then activated (“ÜV I”).

During the reconstruction of the switching automation, there was an unattended and erroneously implemented short circuit protection function, and this led to the reactor protection activation. The refurbished protection system wasn't sufficiently capable to manage the nearby short circuits therefore the above mentioned 6 kV auxiliary power supply failed to switch on.

As a corrective action, using the experiences of this event, the licensee makes additional short circuit current calculations and assessments for different types of short circuits of all modes of operation. Based on these results, it will determine the necessary operational restrictions. The event and its lessons learnt will be elaborated in the framework of simulator exercises.

## **Paks Nuclear Power Plant**

### ***The progress of the tasks after the Stress Test***

Following the Fukushima Daiichi accident in 2011, the nuclear power plant operating Member States of the EU, at the initiation of the European Council, implemented stress test to increase the safety of nuclear power plants.

As a result of the Hungarian review, the HAEA has ordered 46 enforcement tasks to be taken and monitors its progress by supervision. These actions were implemented in order to increase the existing safety margins of the NPP, as the review had found that the modification of the design base was not necessary. Due to the complexity of the individual actions, different deadlines apply to the implementation of the specific measures, the final deadline of which is 15 December 2018.

In accordance with the status of 30 July 2018, 35 tasks have been finished and closed by the HAEA from the mentioned 46 tasks specified in the decision of the Authority. However, the implementation of some tasks is delayed, in most cases, the change of technical concept and the rules of public procurement procedures have a major role in this.

The delayed tasks are the following: building a Backup Command Center which is equivalent to the Protected Command Center, implementing the containment overpressure protecting system, establishing wireless radio connection with PCC in any cases and the reinforcement of the Fire Brigade Barracks. According to the assessments submitted by MVM Paks Nuclear Power Plant Ltd., the risk of the delay is not significant.

By the end of 2018, an extended Severe Accident Management Guide is expected to be introduced, supplemented by the treatment of accident situations in the spent fuel storage pool and the reinforcement of the earthquake resistance of the protected shelter, as well. The most important task completed in the last months was the establishment of the external cooling water tank and the establishment of a connected pipeline system, which was also put into operation in August 2018.

### ***Actions related to the ordering of the low water level of the Danube***

The lowest ever registered water level of the river Danube of the last 100 years was 84.74 mBf, which determined the impeller level of the safety cooling water and condenser cooling water pumps. After commissioning of Unit 1, in November 1983, due to the permanent drought and cold weather, even lower water levels were registered (84.72 mBf). This few days of low Danube water level was solved with the help of the country's water management directorates by closing the cold water channel and lifting the blocked part with a temporary water level. Subsequently, with the implementation of a series of actions, the safety of the cooling water system was significantly increased for low water level situations. The more important to deepen the bottom of the cold water channel from 82.00 mBf to 81.00 mBf, extend the safety cooling water pumps' pipes and replace the suction hose, also redesign and replace the condenser cooling water pumps impeller so that they can be started and operated at 83.60 mBf. The dredging of the Danube in the vicinity of the NPP has been banned.

Nuclear safety requires the absolute assurance of cooling water supply, so that it should always be provided, at the lowest level of water at all. The NPP has an Action Plan for Operation at Low Danube Levels and the related Implementation Instructions, describing the tasks corresponding to the prescribed water protection stages. Thanks to the tasks taken after the stress test, a regular inspection program for the components of this Plan has been implemented and their testing and maintenance is carried out by the operators of the power plant.

The low water protection stages are ordered by the NPP engineer on duty depending on the measured water level in the bay.

In the summer of 2018, there was a constant rain-free period and between 31 and 36°C hot in the summer, also record high temperatures were registered in Western Europe (in the Danube basin). Consequently, on 2 August, the 1st degree of water protection was ordered, and as a

result of the further decrease of water level, on the 21 August, the level 2 water protection degree was ordered.

In accordance with the Action Plan, the standby “Pajtás Pumps” have been controlled and are ready for their use. The water level is monitored in every 2 hours by the staff of the NPP External Technology Department.

## **Regulatory activity**

### ***Legal changes of the first half of 2018***

Talking about the amendments to the Hungarian nuclear law in the first half of 2018, the main issue is that as of 1 January 2018, the Act on General Public Administration Procedures took effect. From the perspective of the HAEA, this reform’s importance is utmost. The law fits in the trend that simplifies legal terminology and integrates public administration with the aim of reducing bureaucracy. In line with the new code, rule of law is on the rise. After a transitional period ending this year, if not altered until then, administrative time limits shall be settled at least in government decrees, confiscation at least in law, and prohibition from a given profession at least in law, if longer than 45 days.

In terms of the Act on Atomic Energy, from 1 January 2018, not only private persons but also expert organizations can be assigned or invited to licensing procedures related to nuclear facilities. Although the Hungarian Nuclear Safety Code (NSC) went through a quinquennial revision in 2016, further clarifications were introduced thereto in 2017 and 2018. Another significant change is that the Governmental Decree 118/2011. (VII. 11.) already more accurate about the ALARA principle. It is applicable through all stages of design service life rather than the time of operation as stipulated before. Request for site survey and site assessment licenses shall be submitted to the nuclear safety authority electronically which will archive them electronically too, instead of the hard copies and this is true for the entire service time (earlier no period of time was specified).

Also from 1 January 2018, the HAEA is entitled to approve the application of nuclear fuel elements different from those previously licensed. These fuels are such that differ from the licensed ones in one or more attributes. Such attributes are: manufacturer; isotopic or chemical composition; density; geometry of the fuel rods or assemblies; composition or pressure of the filling gas; related constructions.

Furthermore, the exclusionary reasons for employment in the application of nuclear energy were updated.

### ***Preparations for IRRS follow-up mission***

IAEA conducted an IRRS mission in Hungary in 2015, where the mission overviewed the Hungarian regulatory system compared with the IAEA standards. Security was not subject of the mission, as in 2014 IAEA conducted a successful IPPAS mission in Hungary. The result of the mission was 32 recommendations and 10 suggestions. All recommendations and suggestions were handled with an action plan by the HAEA. Hungary has invited IAEA to conduct a Follow-up IRRS mission three years after the initial mission to review the results achieved since the initial mission. As a first step of the preparation, on 2 February 2018, a preparatory meeting was held in Budapest at HAEA, where the concerned authorities presented the results achieved so far to the prospective leaders of the mission and agreed on the date of the follow-up mission and all logistic questions. As next step, Hungary prepared till the end of July 2018 the Advance Reference Material (ARM) to help the preparation of the mission members, which summarizes the results from the perspective of all three concerned authorities regarding the 42 recommendations and suggestions of the original mission of 2015. The follow-up mission will take place between 24 September and 1 October 2018. Its results will be discussed in the next issue.

## **Radioactive Waste Repositories**

### ***Public hearing in the regulatory procedure regarding the „licence application for operating the RWTDF”***

On the 5 July 2018 a public hearing took place at the community centre of Kismémedi, regarding the regulatory procedure on the operating of the Radioactive Waste Treatment and Disposal Facility (RWTDF) located at Püspökszilág.

According to the Hungarian regulations, a public hearing has to be held in all facility-level licencing procedures of the nuclear facilities, radioactive waste storage facilities and repositories. The aim of these hearings is to inform the public of the important details of the procedures, to provide an opportunity for them to share their opinions with and ask questions from the licensee and the authorities involved.

In the first part of the event the representatives of the licensee of the RWTDF, the Public Limited Company for Radioactive Waste Management (PURAM) and the HAEA gave presentations on the RWTDF and the ongoing regulatory procedure, after which they answered the question of the members of the public.

At the end of the public hearing the director of the HAEA gave a presentation on the further steps of the regulatory procedure and how the regulator will utilize the results of the hearing. He thanked the members of the public for their active participation, and he encouraged everyone to participate in similar HAEA events in future as well, highlighting the fact that the public hearing is an efficient tool for the involvement of public in regulatory procedures

The written record of the public hearing was made available for the public in the mayors' offices of Kisdémedi and Püspökszilágy, on the [HAEA's website](#) and bulletin board and on the website for public administration announcements (<http://hirdetmeny.magyarorszag.hu>).



*Figure 1 Representatives of the authorities and the licensee on the public hearing*

### ***Regulatory procedure regarding the operating licence of vaults No. 1-24 of the extended SFISF***

On 12 June 2018 the Public Limited Company for Radioactive Waste Management (PURAM), as the licensee of the Spent Fuel Interim Storage Facility (SFISF) – the facility designated for the storage of the Paks Nuclear Power Plant's spent fuel – submitted its licence application to the HAEA regarding the operating licence of the storage vaults No. 1-24 of the facility, upon which a regulatory procedure started for its evaluation. The submission of the licence application was necessary for two reasons: the operating licence for the vaults that are currently in use (No. 1-20) is valid till the 30 November 2018. According to the law, in case the validity of a nuclear facility's operating licence expires, a new operating licence is to be obtained. The other reason is that the newly constructed vaults (No. 21-24) were recently commissioned as per a HAEA licence, and these can only be operated if PURAM obtains a licence for their operation.

To support the licence application, PURAM submitted the following documents enclosed: the chapter of the Final Safety Report featuring the commissioning of vaults No. 21-24, the commissioning programme, the evaluation of the commissioning, the Operating Limits and Conditions, the operating, maintenance, ageing management, anticipated operational occurrence management and discharge monitoring procedures and programmes, the Emergency Response Plan and the Workplace Radiation Protection Rules. With this

documentation the licensee intends to verify that the SFISF can be safely operated. The submitted documents are currently being reviewed and evaluated by the HAEA.

As part of the regulatory procedure, a public hearing will be held at the Municipality of Paks on the 9 October 2018, where the public will be informed of the important details of the case, where they can express their opinions, and where the representatives of the licensee and the authorities involved will answer any questions arising.

The announcement of the public hearing, the written record documenting this event, and the HAEA's future decision in the regulatory procedure will be made available for the public in the mayor's office of Paks, on the [HAEA's website](#) and bulletin board and on the website for public administration announcements (<http://hirdetmeny.magyarorszag.hu>).



Figure 1 Loading hall of the SFISF (source: <http://www.rhk.hu/>)