HUNGARIAN ATOMIC ENERGY AUTHORITY
Nuclear Safety Bulletin
H-1539 Budapest, P.O. Box 676,
Tel: +36 1 436-9881, Fax: +36 1 436-9883, e-mail: nsd@haea.gov.hu
website: http://www.haea.gov.hu/

RECENT DEVELOPMENTS IN NUCLEAR SAFETY IN HUNGARY
October 2015

General

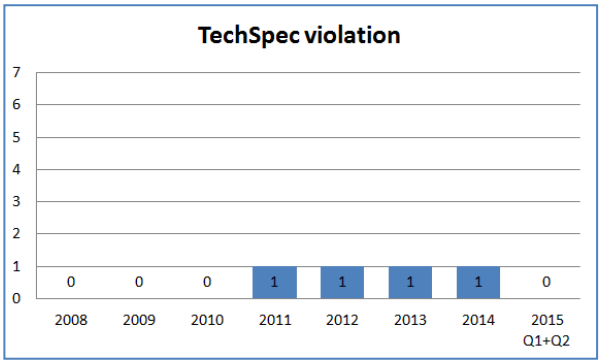
Semi-annual Safety Performance Assessment, 2015

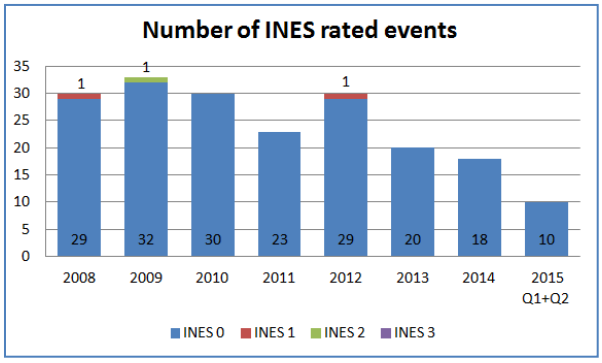
HAEA regularly evaluates the safety performance of the operators of the four nuclear facilities. The main sources for the assessment are the regular reports and the event reports of the licensees, the protocols of regulatory inspections, including the regular and the comprehensive inspections focusing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

The safety performance data are taken from the 1st and 2nd quarterly reports of Paks NPP and the 1st semi-annual reports of the other licensees.

Paks Nuclear Power Plant

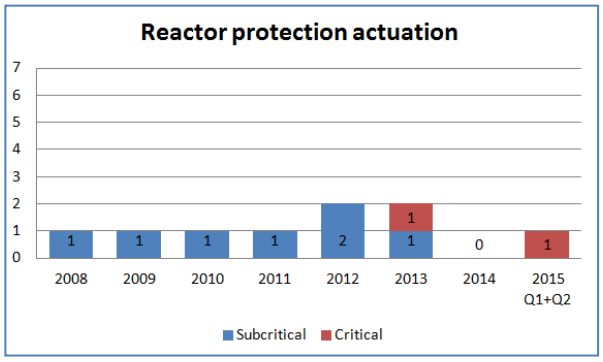
There was no event causing violation of technical specification during the examined period.

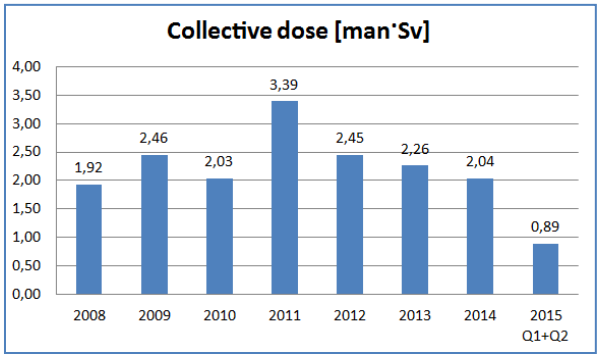




Ten events were reported by the Paks NPP to the authority. All of these have been classified as “anomaly”, corresponding to level 0 on the seven levels International Nuclear Event Scale (INES).

One automatic reactor protection actuation occurred in this period, at the NPP unit 3. See the summary of this event below, in the *Event of interest* section.

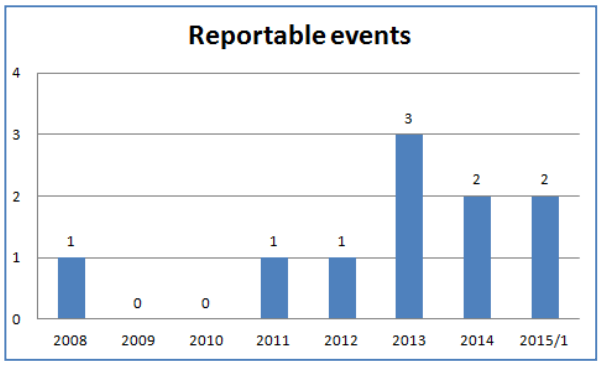




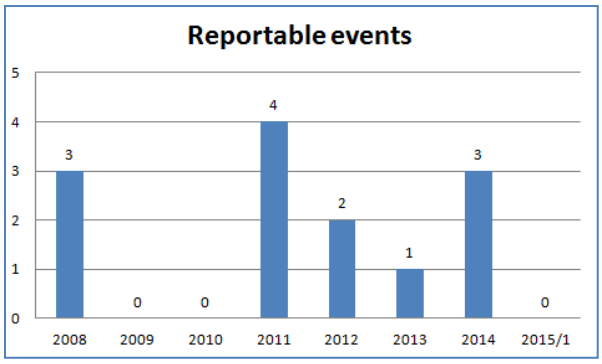
As there is a regular time lag in the reporting of collective doses, the 1st and 2nd quarterly reports refer to the doses of the November to April period. The maintenance period in the Paks NPP reactors this year began on the 4th of April, so the effect of maintenance activities appears only in a certain extent in the reported collective dose. The collective dose, however, proved to be well below the planned value.

Budapest Research Reactor

Two reportable events occurred in the first half of 2015. Both events are related to the automatic power control unit's failure.

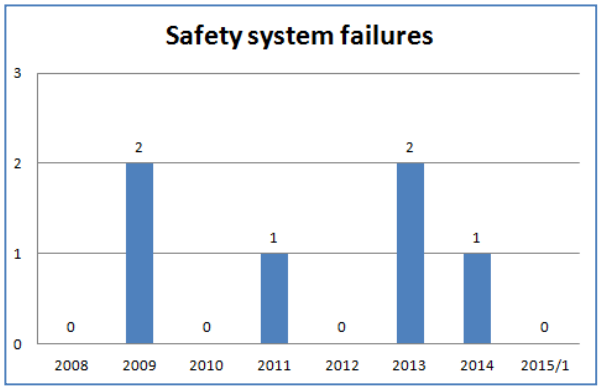


Budapest Training Reactor

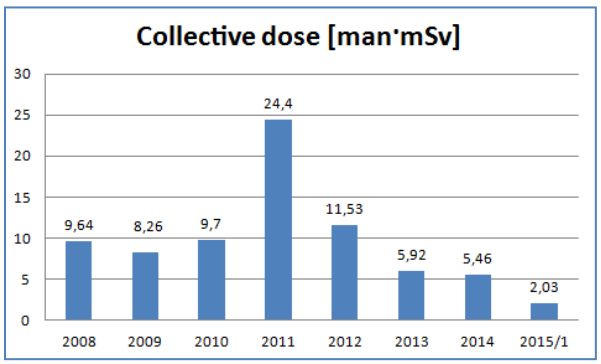


No reportable event occurred in the first half of this year.

No safety system failure occurred in this period.



Interim Spent Fuel Storage Facility



A favourably low collective dose was recorded for the first half of 2015.
Up to now, no reportable event occurred this year in the ISFS facility.

As a summary, it can be stated that during the first half of 2015 the nuclear facilities in Hungary operated in compliance with the limits and conditions specified in the operating and licensing documents.

HAEA internal

IRRS Mission in Hungary

In 2012 the Hungarian Government invited the International Regulatory Review Service mission to compare the country's regulatory system and practices with relevant IAEA Safety Standards. The full scope review was executed from 11 to 22 May 2015.

Opening speech of the IRRS mission leader, Mr. Michael R. Johnson (US NRC)

IAEA-HAEA joint press conference

IRRS missions are designed to strengthen the effectiveness of the national nuclear regulatory infrastructure, while recognizing the ultimate responsibility of each State to ensure nuclear safety. This is achieved through consideration of regulatory, technical and policy issues, in comparison with IAEA Safety Standards and, where appropriate, good practices in IAEA Member States.

The 20-member IRRS team consisted of regulatory experts from 11 IAEA Member States - Canada, Cuba, Finland, France, Greece, Pakistan, Slovenia, Sweden, the United Kingdom, the United States and the Netherlands - and four IAEA staff members.

In Budapest, they met with Government officials, and with management and staff of the four main authorities that comprise Hungary's regulatory body: HAEA, the Office of the Chief Medical Officer, the Budapest Capital Government Office Radiation Hygiene Decentre, and the Baranya County Government Office Department of Environmental Protection and Nature Conservation. The team also carried out site visits to various facilities and activities.

The mission provided 32 recommendations and 10 suggestions for improvement of the governmental infrastructure and the regulatory body, including:

- The Government should implement appropriate provisions to ensure the regulatory body's effective independence;
- The Government should ensure that regulatory authorities have sufficient staffing and other resources;
- The Government should consider measures to foster effective coordination and collaboration between regulatory authorities;

- The regulatory body should ensure that its organisation enables effective fulfilment of its statutory obligations, and
- The regulatory body should enhance its management systems and develop procedures to promote and support a strong safety culture.

Furthermore the IRRS team identified 6 good practices as well, including:

- Hungary has conducted a multi-unit NPP severe accident emergency exercise;
- HAEA has established indicators to monitor the safety performance of the two research reactors and the interim spent fuel storage installation, and
- HAEA has developed an effective database for knowledge and experience gained during the use of nuclear energy in Hungary.

Based on the previous self-assessment and the IRRS mission results an Action Plan has been elaborated which execution has been started. The follow-up mission is planned to be invited within 2-3 years.

Greg Rzentkowski, Director of the IAEA Division of Nuclear Installation Safety concluded that Hungary demonstrated a strong commitment to nuclear safety by inviting the mission. “Throughout the mission, the IRRS review team experienced full cooperation in the regulatory, technical, and policy issues by all parties in a very open and transparent manner” he said, also noting that Hungary had decided to publish the final mission report.

The final mission report was provided to the Hungarian Government in the beginning of October.

IRRS participants

Legal and Regulatory Framework

HAEA is taking over the regulatory tasks for radiation protection

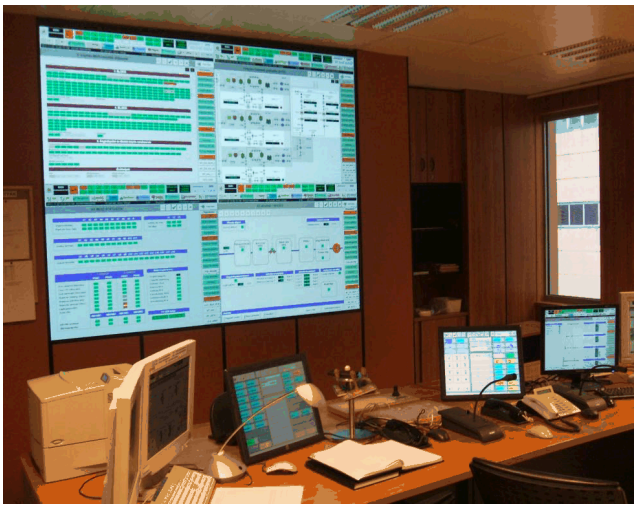
The Act VII of 2015 has given the scope of duties of radiation protection to the atomic energy oversight organization from January 1, 2016.

The Act separated the regulatory tasks among the authorities. The Office of the Chief Medical Officer will remain the competent authority for the radiation health issues, while the Hungarian Atomic Energy Authority will be responsible for supervision of other radiation safety matters.

The purpose of the amendment is to integrate the regulatory framework for nuclear safety, radiation protection, and physical protection of the peaceful use of atomic energy under the same authority. This way a single level, country wide, customer centred regulatory regime will be realized making licensing easier, reducing the number of licensing processes per licensee, and unifying data supply to be performed by the users of atomic energy.

The Hungarian Atomic Energy Authority started to prepare for the tasks by reviewing and supplementing the detailed requirements and guidelines for regulation of radiation safety, and by training the HAEA inspectors on the tasks of regulatory control over radiation protection including specialized inspections. One of the required inspector skills is to pass the extended level radiation training.

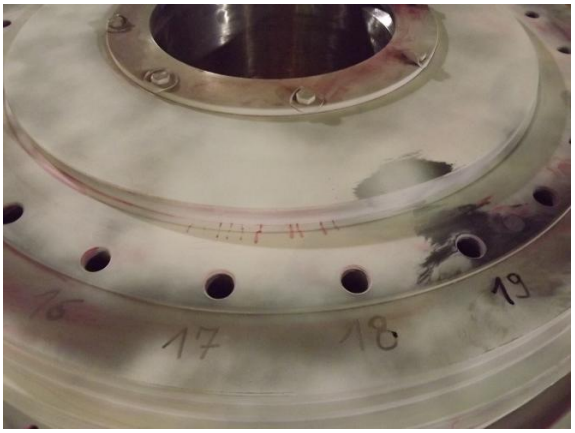
From 2016 with respect to the nuclear power plant, research reactors, radioactive waste storage and disposal facilities and the spent fuel storage facility the HAEA will be responsible for the approval of the Health Physics Code of the licensees. The new inspection tasks will also be included in the annual inspection plan of the HAEA.



However it should be noted that the HAEA already has taken into account the technical aspects of radiation protection, in its inspection practice and also the HAEA's safety performance indicator system contains radiation protection indicators. Thus the activities will not be completely new for the inspectors, who already have competences in radiation safety. Of course it is important to increase the skills and number of specialists to perform the new tasks.

Paks Nuclear Power Plant

Repair/replacement of main circulation pump components



In VVER-440 type NPP units operating in other countries damage of guide wheel and head of main circulation pumps (MCP) was repeatedly detected during the in-service inspections of the MCPs. HAEA has required the NPP Paks - as part of utilization international experience - to complete the condition survey of the mentioned components, in case of all MCPs opened during maintenance where that has not been executed yet.

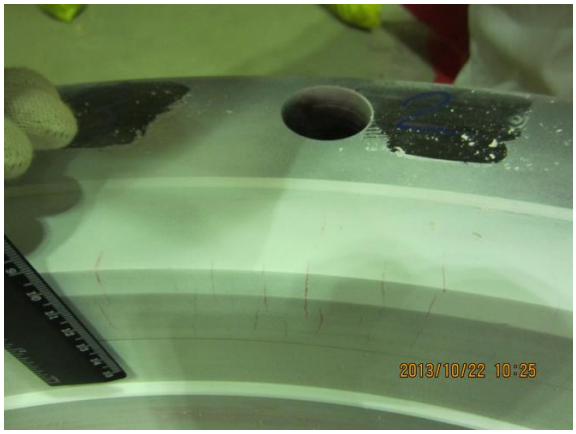
The licensee first started an inspection program in order to fulfil this requirement and as a result fatigue related indications of the guide wheels and pump heads of MCPs were detected. According to the involved experts the identified indications do not pose a risk for safety on the short term. In order to ensure long-term safe operation the operator contacted the original Russian manufacturer (CKBM). Based on the decision of the operator taken in view of the proposal of the CKMB and Russian Materials Science Expert Institute (PROMETEY) the components must be repaired or replaced. The operator assessed the situation and prepared a schedule for the repairs. The MCPs at Unit 1 and Unit 2 had priority, because at those units the licence for the extended lifetime has already been granted. On the basis of the results of the executed condition examinations the experts compiled reports which include the identification of causes of the detected indications as well as justification of safety of further operation for a specified limited period of time.

According to the schedule approved by HAEA in 2015 the licensee started implementation of repairs and replacement of MCP parts, which are expected to be completed until 2019 regarding all four units. In order to complete the program in a timely manner, the licensee purchased 8 pieces of MCPs of the same type as installed in Paks NPP from spare part store of the shut down units of Kozloduy NPP (Bulgaria). After having been inspected by Bulgarian and Hungarian NDT experts, the main components have received appropriate certification. The Russian manufacturer started to manufacture the protection rings of the pump heads and a drilling-miller machine tool, which enables the repairs of the heads within the controlled zone of the Paks units.

During this year the outage of Unit 1 occurred to be the first opportunity to eliminate the detected indications, when the replacement and modification of the pump heads and guide wheels on 5 out of 6 pumps was carried out. In the other NPP units the head indications are

minor, therefore the repair is possible. At the same time the damages of guide wheels can be corrected by replacement only, for which the original Russian manufacturer supplies the components. Accordingly, during this year outages of Unit 2 and 4, one-one MCP head and guide wheel were repaired and replaced in each.

After the guide wheel replacement and MCP head repairs, and considering the axes replacements, which have already been completed before the service life extension, the MCPs are considered to be acceptable form nuclear and operational safety points of view and capable of reliably operating for the 20 years extended service life.



Examinations and repairs on the cooling system of the spent fuel pool in 2015

In connection with the failure due to corrosion of cooling circuits of the spent fuel pool at Unit 3 MVM Paks NPP Ltd. contracted external experts to examine the cooling pipelines of the other units. The Croatian INETEC company developed a testing device and used it to test the cooling circuits of the spent fuel pool.

INETEC chose the simultaneous use of ultrasonic and eddy current methods to complete the task, whereas the circumferential movement of the examination head was driven by a built-in motor which can rotate the examination modules containing the heads in 360 degrees. With this development not only the horizontal pipe sections could be tested but the curved ones as well. On the basis of experience of the examinations carried out it is concluded that the ultrasonic and eddy current test revealed similar results as the visual and destructive tests. In the testing machine INETEC uses TOFD examination heads as well which can provide more accurate results.

INETEC examination robot

The combined ultrasonic and eddy current examination techniques recommended by INETEC provide the appropriate solution for survey of the volumetric conditions of the spent

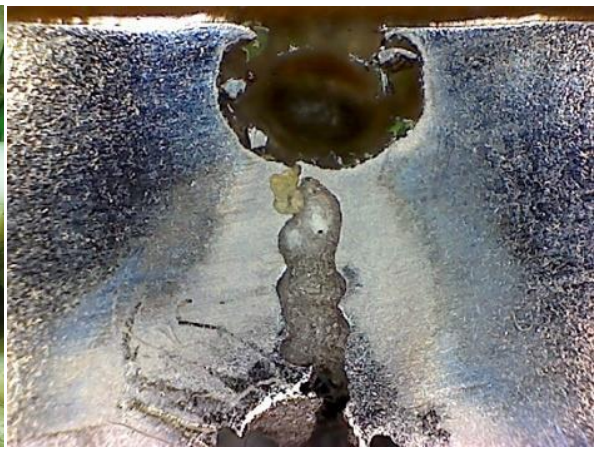
fuel pools cooling circuits, detecting the local corrosion failures and for determining the propagation of indications.

The aim of the analysis is to measure the actual failure in a qualitative and quantitative manner that also gives the exact position and size of the failure zones before starting the repair. The comprehensive investigation on Units 1-4 found that the rate of corrosion varies at the individual units. Some of the most impacted cooling circuit sections were replaced in 2015. These examinations and the planned repairs, maintenance and cyclic material structure tests justified to install the same T-joints as it had been fitted at Unit 3.

For internal non-destructive testing and replacement of the pipe section it is necessary to stop the continuous cooling of the spent fuel pools and drain their cooling circuits under the level of the outlet pipes thereby creating a non-compliant operating status compared to the technical specifications. To solve this problem and maintain the continuous cooling of the spent fuel pool temporary cooling circuits were installed which were successfully used previously.

The safety measures ensure that the increasing temperature of spent fuel in the storage pool does not exceed the limit of the normal operation.

Replacement of the spent fuel pool pipeline at Unit 2



Cross-section of a corrosion pit, cut from the pipeline at Unit 3

An Event of Interest

Reactor scram signal activation on low primary circuit pressure due to the drop of control rods caused by a short circuit in an electrical cabinet

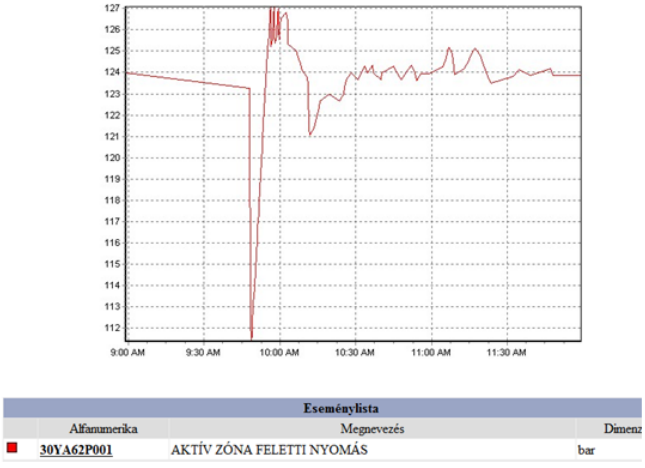
At 09:48 on 31/03/2015, during in normal operation of Unit 3, control rods dropped and the reactor power, the steam pressure and the turbine power decreased rapidly. The transient led to reduction of primary circuit pressure that lead to scram signal activation, which took place as designed.

After stabilization of unit parameters, the personnel couldn't lift control assemblies into the lower end switch, therefore measures were taken to shut down 4 reactor coolant pumps according to the Technical Specification requirement.

A short circuit had caused the trips of 2 breakers and loss of input buses and an error in a power supply of the logic system of the control rod drive mechanism in an electrical cabinet. Modules in the electrical cabinet lost power and their signals were lost. Loss of signal on power supply converters of control rod drives caused the control rods to drop and the loss of signal on the assemblies' lower limit positions, then Rector Protection System did not allowed lifting of the control rods after the scram.

The failed breaker and the failed power supply in the electrical cabinet were replaced.

Root cause of the event was the ageing of equipment and parts in the logic of the control rod system. These elements will be replaced during reconstruction of logic of control rod system and reactor power control systems from 2016.



Pressure transient in Unit 3

Emergency Preparedness and Response

EPREV Mission to Hungary in 2016

With reference to the Decree of the Disaster Management Coordination Inter-ministerial Committee and the on-going efforts for the improvement of the Hungarian Nuclear Emergency Response System, Director General of the Hungarian Atomic Energy Authority invited the International Atomic Energy Agency Emergency Preparedness Review (EPREV) Mission to Hungary for the spring of 2016.

The preparation at national level for receiving the EPREV mission is coordinated by the High Level Working Group (HLWG). The HLWG – which is composed of representatives of governmental, regional and local organizations, operators of nuclear and radiological facilities, research and technical support organizations – was established primarily for the maintenance, review and regular update of the Hungarian Nuclear Emergency Response Plan. Considering its suitability HLWG's mandate was extended for the national coordination of preparation for the EPREV mission.

The preparatory activities are going smoothly. A self-assessment of individual member organizations of the Hungarian Nuclear Emergency Response System was conducted, which is now being summarized in order to derive actions for improvement also at national level. A preparatory EPREV meeting was conducted with the participation of an IAEA representative and the future team leader of the EPREV mission. During the preparatory meeting important technical and administrative issues were discussed, such like the scope, the dates of the mission, the involved Hungarian organizations, the structure and the content of the advance reference material, etc.

Major tasks ahead are the finalization of the EPREV mission program, preparation and translation of the advance reference material, answering the IAEA EPREV questionnaire and preparing for the meetings with EPREV team members. As a new tool the IAEA EPRIMS database will be used for making accessible the outcomes of the Hungarian EPREV mission, thus Hungary may contribute to widening the EPR experiences worldwide.

The National Nuclear Emergency Response Plan

The High Level Working Group (HLWG) was established in 2006 for revision and maintenance of the National Nuclear Emergency Response Plan (NERP). The operation of HLWG is regulated by a written protocol and its activities are performed according to an annually updated work plan. As a result of HLWG's work the NERP has been reviewed several times. During the current review of the NERP changes in the government structure after the recent elections is reflected, improvements for public information activities are introduced and method of response to a new emergency scenario is included. The new version of the plan is to be approved by the Chairman of the Disaster Management Coordination Inter-ministerial Committee.


KATASZTRÓFAVÉDELMI KOORDINÁCIÓS TÁRCAKÖZI BIZOTTSÁG

Jóváhagyom

Egyetértek

ORSZÁGOS
NUKLEÁRISBALESET-ELHÁRÍTÁSI INTÉZKEDÉSI TERV

OBEIT v2.2

2013. január

Felterjesztem

Title page of the current NERP