



HUNGARIAN ATOMIC ENERGY AUTHORITY Nuclear Safety Bulletin

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RECENT DEVELOPMENTS IN NUCLEAR SAFETY IN HUNGARY April 2014

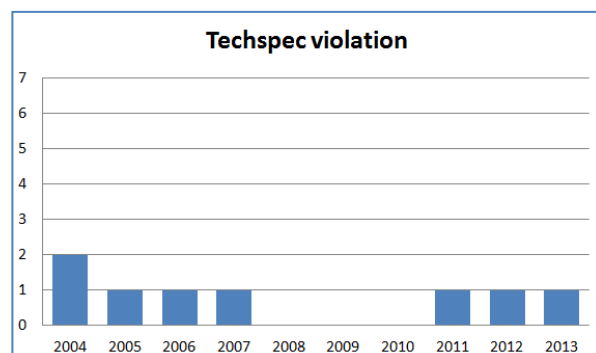


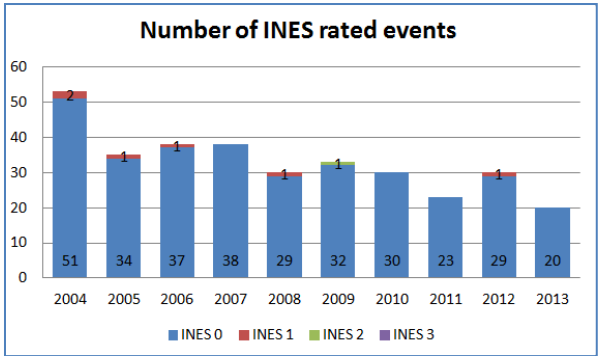
General

Paks NPP Safety Performance Assessment 2013

HAEA regularly evaluates the safety performance of the operators of the 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 the comprehensive inspections focusing on specific areas, and the reactive inspections. Hungarian nuclear facilities have been operating safely and there was no danger to the environment public or employees.

There was one event when the Technical Specification was violated in 2013. During an interlock test, the level of a hydro-accumulator decreased below the limit of TechSpec due to human error: the operating personnel failed to implement the measures required in such circumstances.

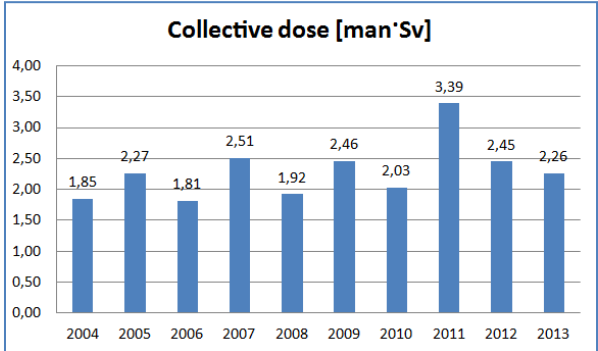
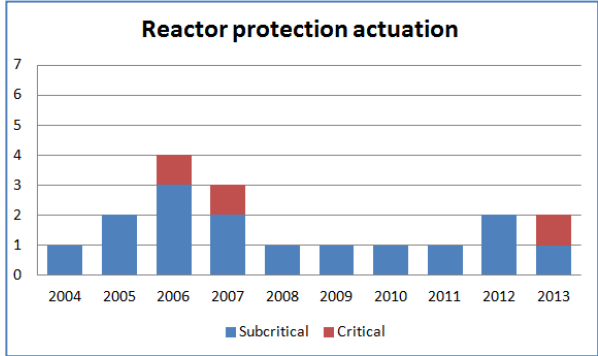




Twenty events have been reported by the NPP during 2013. All events are "anomaly", corresponding to level-0 on the seven-level International Nuclear Event Scale (INES).

One automatic reactor protection actuation occurred during the critical state of the reactor of Unit 4. This event was described in the 2013/1 issue of the Bulletin as "Reactor scram due to an erroneous switchover".

One reactor protection actuation also occurred in subcritical state of the Unit 2 reactor during testing of the reactor protection system due to a hardware failure of the tester equipment.



The collective radiation doses of employees were low, after the higher value in 2011 the collective dose fell back to the average level of the previous years. The radioactive releases into the environment were also very small.

As a summary, the general evaluation of nuclear safety condition of nuclear facilities showed acceptable and stable safety performance results in 2013.

Plans to maintain the current capacity of the Paks power plant

On the 14th of January, an intergovernmental cooperation agreement was signed between Hungary and Russia on the peaceful use of nuclear power. In the framework of that agreement, Russia will be involved in maintaining the current capacity of the Paks Nuclear Power Plant by providing a financial loan and also to deliver and construct two new units at Paks to replace the plant's outdated ones. The agreement also covers cooperation in spent fuel management, nuclear R&D, human resource development, nuclear space applications.

HAEA internal affairs

Mr. Szabolcs Hullán is the Deputy Director General of the Hungarian Atomic Energy Authority

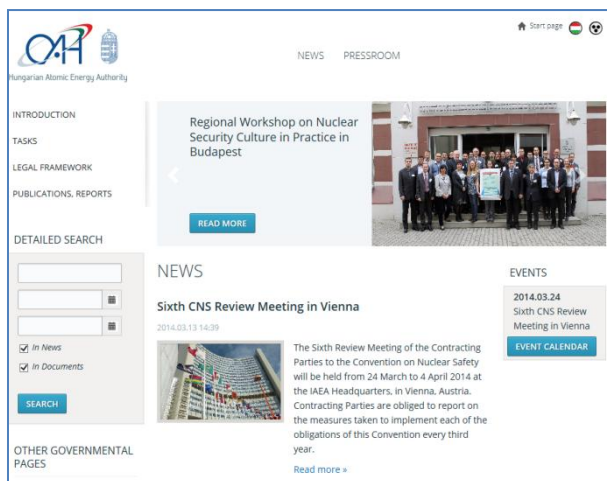


Ms. Zsuzsa Németh, Minister for National Development, appointed Mr. Szabolcs Hullán, as Deputy Director General for Nuclear Safety Issues of the Hungarian Atomic Energy Authority.

The primary task of the newly appointed Deputy Director is to maintain the recognized

professional standards of official work in the face of the new challenges, and to educating a new generation of well-prepared human-power for the long-term tasks, mainly the regulatory supervision of construction and operation of new nuclear power units.

HAEA renewed its homepage



The Hungarian Atomic Energy Authority renewed its homepage (www.haea.gov.hu). New content and structure, fresh design, easy-to-use surfaces, customer friendly functioning and modern solutions characterize the new webpage.

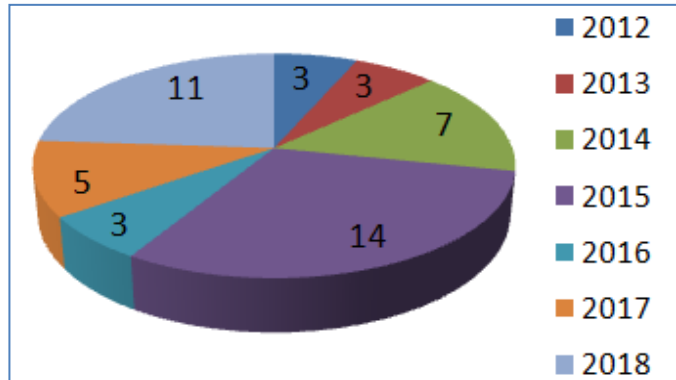
Calendar, pressroom and detailed search function are also available among the new services offered. The website is optimized for different kind of communication devices,

platforms and browsers so users can surf on laptops, tablets and mobiles without difficulties.

Paks Nuclear Power Plant

Safety enhancement measures prescribed by the Targeted Safety Reassessment

After the Fukushima nuclear power plant accident occurred in 2011, the EU Council has concluded that nuclear power plants in the European Union should be subject to a comprehensive safety review, assessing risks and making public the entire process.



Annual distribution of tasks

In Hungary, the "stress test" review was called as "Targeted Safety

Reassessment". The national reports with the results of the review were submitted to the EU Commission in December 2011.

The EU Council arranged an international review of the National reports by international experts in the first quarter of 2012. The review concluded that Hungarian national report on the Targeted Safety Reassessment was comprehensive and the assessments carried out by the Paks Nuclear Power Plant revealed no major shortcoming. Note, that the report also provided a list of issues, where the safety of the plant could be further improved. In addition to the review of the Hungarian Report, the international review team also carried out a visit at the Hungarian Atomic Energy Agency (HAEA) and at the operator in order to substantiate conclusions of the report with corresponding explanations and proofs. During this visit the experts could look into the required documentation, inspect whatever they wished, and during walk down the site they got admittance to all locations they required.

HAEA ordered by its resolution HA5589 the implementation of the safety enhancement measures on the basis of the National Report and imposed reporting obligations upon Paks NPP on the progress of the implementation of the corrective measures. The list of ordered measures includes 46 tasks. The measures typically relate to the increase of protection against external hazards (such as earthquakes, flooding), to the existing and alternative supply of electric power, to alternative cooling options, to the reduction of consequences of major accidents, as well as amendment of existing operating instructions and preparation of new ones. Implementation of individual measures have different deadlines, the latest completion deadline is the 15th of December, 2018.

The HAEA inspected the progress of the measures in 2013 March. One significant finding of the inspection was that if the required procurement is unsuccessful or in case of an appeal against a decision, the deadlines will be impossible to maintain, causing delayed implementation of the safety enhancing measures. Both the HAEA and Paks NPP indicated the problem to the supervising Ministry for National Development.

Finally, on the basis of the evidences in the Progress Report submitted early August 2013, HAEA concluded that the implementation of the measures imposed by the decision progresses according to schedule and the deadlines are expected to be met.

The three tasks scheduled for 2013 and two other tasks were also completed in the past year, so there is a total of eight tasks completed. The HAEA staff supervises the tasks to be carried out in compliance with the legal requirements via licensing and inspection of safety related modifications..

Operation of Paks Nuclear Power Plant units beyond the design service lifetime

The government decree on safety requirements of the nuclear facilities and the related official activities govern the nuclear safety regulatory process for licensing the operation of NPPs beyond the design service life (service life extension - SLE). Wide range of technical activities for the SLE preparation includes determination of aging effects and aging processes that require treatment, assessing the condition of the involved systems, structures and components, evaluation of existing aging management programmes and their amendment, if necessary, and development of new programmes to verify the safe operation of the non-replaceable equipment and structures.

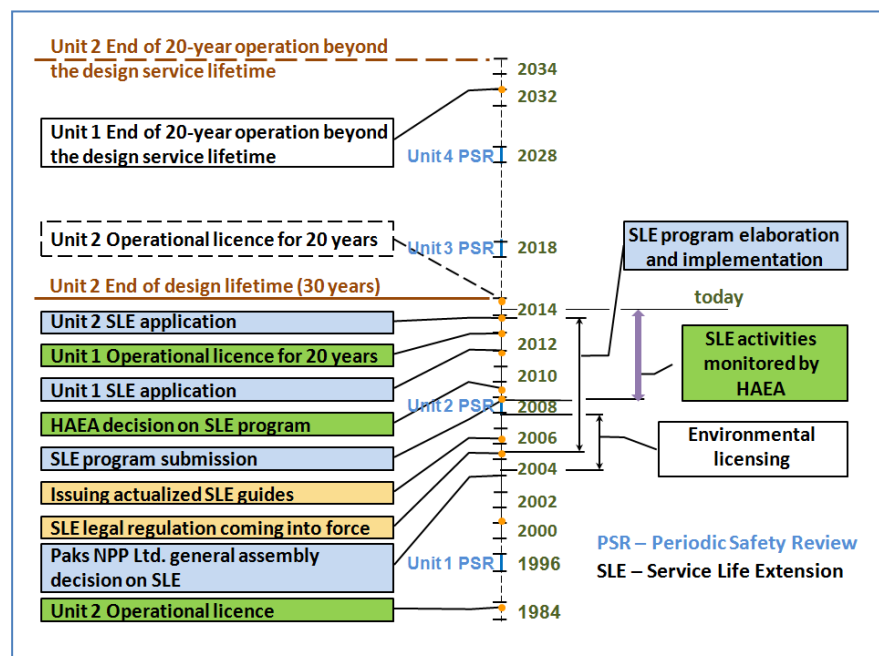
The nuclear safety authority has issued the license for Paks NPP Unit 1 to operate beyond the design service life in December 2012. The HAEA bound this license remaining in force to the execution of seven tasks. Completion of five of these tasks was due in 2013:

In accordance with the prescriptions Paks NPP completed the turbine building steel structure reinforcement, prepared earthquake resistance calculations for steel bridge structures connecting certain buildings and on the basis of calculations carried out all the necessary reinforcements, completed a new system for measuring the on-site wind characteristics, carried out the review of the time limited ageing analyses taking into account the criteria set out in the authorization and also started to carry out the required extended surveillance of the reactor vessel. The HAEA monitored the performance of the tasks below and carried out the licensing and inspection duties relating to these activities.

- The design of the current meteorological tower is not demonstrated against extreme wind (10^{-4} /year frequency) loads, so as a condition of the operating license the HAEA prescribed the construction of a new measurement system, which Paks NPP is trying to achieve by establishment of a Doppler sonar. HAEA conducted in 2013 the construction authorization process needed to install the measuring system, assessed the test run report of the installed system and accepted the proposal of Paks NPP for further measures including a schedule.
- To ensure the earthquake-resistance of the steel structure bridges connecting the NPP buildings important to safety, HAEA required in the new operating license of Unit 1 to provide new calculations and, depending on the results, perform reinforcements to ensure the required strength. An authority permit was needed to carry out the reinforcements. All of the reinforcement works were completed by the 15th of December, 2013.

In accordance with legal regulations, one year before the expiry of the design service life, in November 2013 the Paks NPP submitted the SLE application of Unit 2. The application summarizes the results of previous activities to demonstrate the further operability. The application is to describe that Paks NPP has implemented the planned service life extension programme tasks, and the results of the tests and their analysis should demonstrate that Unit2 can be operated till the 31st of December, 2034.

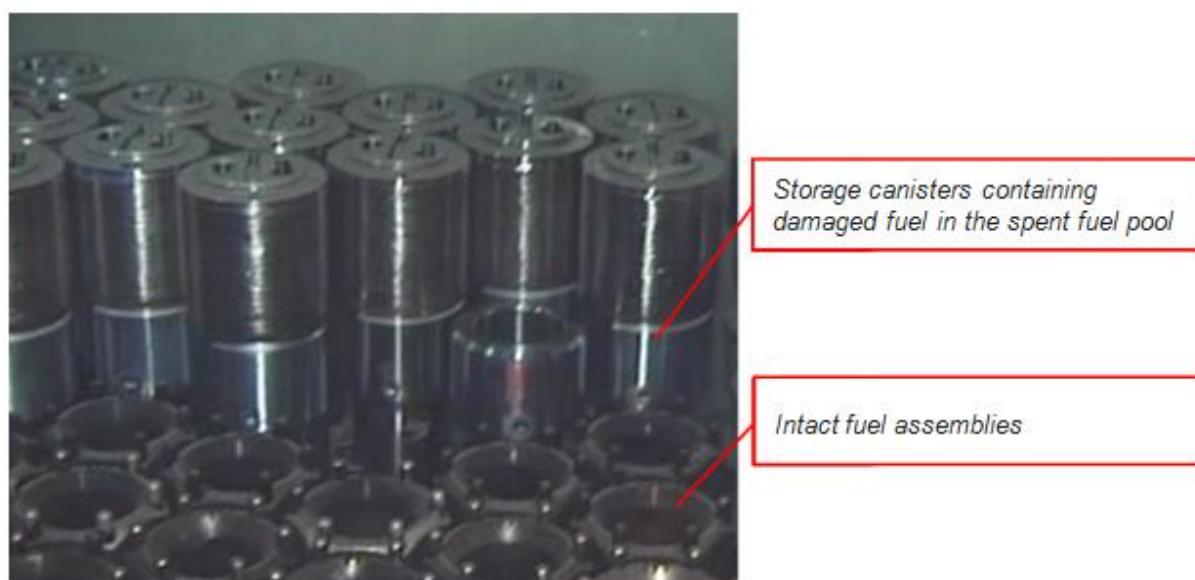
The HAEA has launched the licensing process, began the review and assessment of the documentation and took the preliminary procedural steps (such as notifying customers, preparation for public hearings, involvement of special authorities, etc.), in compliance with the legislation in force.



Preparation of damaged fuel for repatriation

The severe incident of Unit 2 in 2003 resulting in fuel damage has posed serious challenges also to the HAEA both from professional and resource provision aspects. The inspectors of HAEA continuously monitored the activities of the elimination of the consequences of the incident including the authorization of elimination actions, supervision of implementation and the on-site monitoring and evaluation of the results.

The restoration works were carried out in 2006-2007. The storage of the encapsulated damaged fuel has been taking place in the spent fuel pool together with normal spent fuel in a previously authorized and controlled way (see Figure). The activity concentration of radioactive substances in the SF pool was by an order of magnitude lower than permitted.



The HAEA's final conclusions on the periodic safety review completed in 2008 covering all units of the Paks NPP stipulated for Unit 2 that the damaged fuel stored in the spent fuel pool must be removed by the end of the year 2015. Paks NPP planned and prepared for the autumn of 2013 to complete the works necessary to transport the damaged fuel from the spent fuel pool (drying and the hermetic closure of the canisters).

The developed technical solution also allows for the encapsulated fuel to be processed in a spent fuel reprocessing facility. The technical solution was designed and developed in a multi-annual work. Tests in inactive conditions were carried out. The documents underlying the nuclear and radiological safety were prepared for the drying and pressurizing operations and for the storage period. In 2011 and 2012 HAEA issued the permits required for performance of the activities.

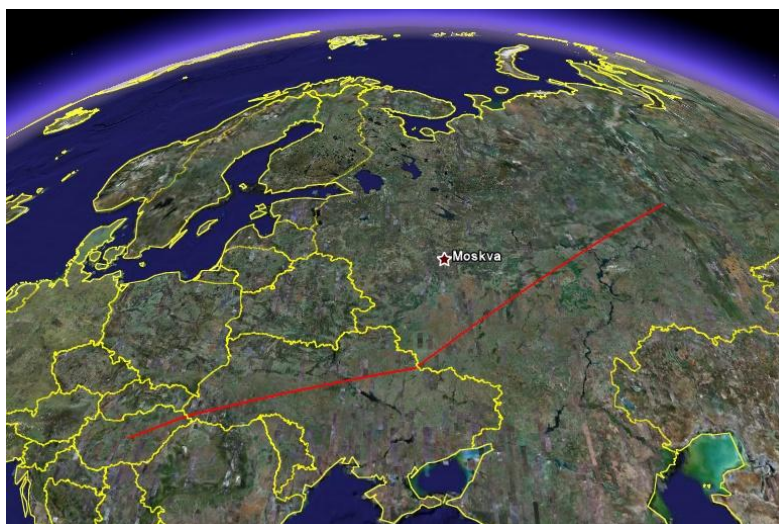
The special equipment necessary for the dedicated technology, developed by the Russian principal contractor and approved by the HAEA, had been manufactured by Paks NPP in co-operation with several Hungarian enterprises and research institutions. The instruments previously employed during the incident restoration also were used with minor conversions. After the tests conducted in the manufacturing plants the equipment were assembled at Paks NPP Unit 2 and put into operation in inactive environment then the functional tests have been successfully implemented. These activities were inspected by the HAEA several times on the site. The necessary equipment modifications were approved by HAEA. The executive staff have been trained and debriefed under the HAEA supervision. The implementation of the inactive tests also showed that the drying and hermetic sealing of the canisters do not impede the safe operations of the twin units.

After the completion of annual maintenance of Units 1 and 2 in 2013 the functional tests were fully repeated. By the successful completion of the functional tests all technical and technological conditions were fulfilled for the start in September.

In 2013 September the actual drying operations of the canisters containing the damaged fuel and their hermetic closure began. The capsules after thermal drying were filled with inert gas. At the end the gas-tightness was verified.

The work was completed by the end of December, during the activity no important problem arose, and there were no reportable events.

The HAEA inspectors continuously monitored the drying and hermetic sealing works, and the gas-proofness tests were particularly supervised. The results demonstrated the success of the implementation, and the suitability of the dried and hermetically sealed canisters for delivery.



Interim Spent Fuel Storage Facility

Regulatory activities associated with the Interim Spent Fuel Storage Facility (ISFSF) expansion

Installation and commissioning of new vaults of Interim Spent Fuel Storage Facility is going on in a modular way, as spent fuel is generated in Paks NPP. The HAEA issued construction permit for building a total of 33 vaults. The 16 vaults already in operation provided storage for 450 fuel assemblies. Construction and installation work for another four-vault expansion of the facility (vaults 17-20) were completed in 2013. The new modules were built with square grid spacing of the storage tube positions instead of the former triangular grid. Thus, while maintaining the nuclear safety the number of fuel assemblies stored has been increased to 527 per vault compared to the previous 450 per vault storage capacity.

On the basis of the commissioning authorization granted by the HAEA specific functional tests were carried out on each equipment and then completed the plant's commissioning activities, which demonstrated the safe operation of the interacting systems according to plans. The HAEA supervised the commissioning process on the site. Based on the experience gained during the test run, HAEA concluded that the new vault modules can be operated as described in the plans in accordance with the requirements of nuclear safety.

The operation of the 1-16 vaults and the new 17-20 vaults are supplied by common systems therefore they are in inseparable operational connection. Thus, HAEA conducted the operation authorization procedure for the extended facility covering the vaults 1-20 vaults in 2013. In the administrative process the HAEA involved the South Transdanubian Environmental Protection and Water Management Inspectorate, the National Police and the National Directorate General for Disaster Management.

The HAEA reviewed the authorization documentation of operation and held on-site inspections and based on that, the ISFSF met the requirements and the conditions of safe operation. The special authorities in the procedure gave their consent to issuing the authorization, thus in June 2013 HAEA granted the license to operate the facility. The new vaults expand the storage capacity by 2108 fuel assemblies, which is enough for five years spent fuel generation of Paks NPP.

For long-term operation of the nuclear power plant it is necessary to further expand the ISFS Facility. The licensee has therefore requested the construction permit for vaults 21-24 in 2013. Technical features of the new modules to be built are the same as of the vaults 17-20. Considering the consent of the special authorities the HAEA issued the construction permit in October 2013 for four new vaults.



Budapest Research Reactor

The Periodic Safety Review of the Budapest Research Reactor

According to the Act CXVI of 1996 on atomic energy, the Licensee and the nuclear safety regulator shall carry out in regular intervals a full scope review and assessment of the nuclear safety of the nuclear installations, covering the status of fulfilment of nuclear safety requirements, the level of risks, taking into account the operational experience and the new knowledge related to nuclear safety

The Periodic Safety Review of the Budapest Research Reactor shall be carried out in ten years intervals and so it took place in 2013. In addition to the nuclear safety aspects the review extended over environmental protection, radiohygiene, fire protection and disaster management areas, hence besides the HAEA the South Transdanubian Inspectorate for Environment, Nature and Water Management, the National Public Health and Medical Officer Service Office of the Chief Medical Office, the territorially competent professional municipal fire departments and the National Directorate General for Disaster Management took part in the process as well.

The review began on 7 February 2013 and finished on 6 November 2013. 17 HAEA inspectors took part in the proceedings. As a result of the review the HAEA ordered a total of 27 safety improvement measures, which must be carried out during the period from 2013 to 2016. The measures cover review of safety analysis, revision of earthquake- resistance analysis, the environmental qualification of safety related components, the review of aging management, the refurbishment of process systems, the clarification of documentation, the review of management system, the review of processes, related events and operation, and many other safety-related activities.

In order to monitor the implementation of safety improvement measures the HAEA obliged the Licensee of the Budapest Research Reactor to prepare a progress report to show the implementation of safety improvements with a semi-annual frequency.

Considerable part of the required corrective actions requires specific intervention to the process systems and equipment of the facility, and so requires an authority license. The regulatory supervision of such activities contains several on-site inspections.

Based on the assessment of the the periodic safety review results the HAEA granted the operation license on 21 November 2013 to the Budapest Research Reactor for an additional 10-year cycle.

An Event of Interest

Leakage of boric acid solutions from the spent fuel pool



At the spent fuel pool of Paks NPP Unit 3 and connected systems (refuelling pool, inspection shaft 1 and their pipelines), several leaks of borated water have been experienced. In order to fix these leakages the plant performed several unsuccessful actions.

In May 2013 the NPP personnel experienced leakages in primary circuit rooms of Unit 3. An inspection programme and an action plan was launched to identify defects that caused the leaks. Some through-wall leaks at several pipe sections were observed due to pitting corrosion. During the inspections local perforation of the leak tight hermetic wall in the area of leakage location, caused by the leak was also identified. The pipeline sections have been replaced and the hermetic wall has been repaired. The spent fuel pool and connecting systems were inspected again and after negative results were given back to operation. An expert panel was established to identify the root cause of the event. Continuous monitoring of leaks at Unit 3 and inspection of units 1, 2 and 4 are in progress.

Emergency Preparedness and Response

ConvEx-3 (2013) Emergency Exercise

The ConvEx-3 (2013) was a full scale exercise prepared by the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE). The ConvEx-3 (2013), code-named 'Bab Al Maghrib', was hosted by Morocco and designed to allow Member States and international organizations to evaluate their response in a severe radiological emergency triggered by a nuclear security event and to identify emergency preparedness and response areas requiring improvements. The exercise was conducted on 20 and 21 November 2013 and lasted approximately 26 hours. The simulated "explosions" took place in the port of Tangier Med and Marrakech medina in Morocco. Issues addressed during the exercise were connected to a radioactive release into the atmosphere, medical response and public health, security, transparent public communications, industry and tourism and commerce, in particular import and export of goods.

The exercise provided an excellent opportunity for the Emergency Response Organization (ERO) of the Hungarian Atomic Energy Authority (HAEA) to practice its operation in case of a foreign nuclear emergency, performing independent assessments on the local implications of the incident, as well as providing accurate and up-to-date information to Hungarian citizens and formulate recommendations on behaviour for Hungarian citizens staying in the affected areas. The organization adequately complied with its obligations stated in RESPEC Contract and effectively supported the work of the Emergency Centre of EC ENER D.3. Through the exercise the HAEA ERO was proved to meet its responsibilities described in laws and international treaties.

Chief evaluators from Member States and international organizations, including the International Atomic Energy Agency (IAEA) have prepared their own evaluation reports. Based on these reports, the Lead Exercise Evaluator prepared a final Exercise Report, which was discussed at the ConvEx-3 (2013) evaluation meeting taking place in Vienna on 11-12 February 2014.



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, Mr. Gyula Fichtinger, 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.

Since 1999, the IAEA provides the EPREV service to appraise independently the preparedness for a radiation incident or emergency in Member States. An EPREV provides an appraisal by the IAEA and international experts, focusing on preparedness for response to a radiation emergency and assessing the capability to respond to such situations. Although an EPREV is based on international guidelines and best practices, it is not prescriptive: it takes into account the practical context in the host country and emphasizes the positive features of practices and customs within that country.

Based on the plans, the IAEA and the international experts are going to make a full appraisal of the Hungarian Nuclear Emergency Response System, including the review of the arrangements, organizational structures and technological background related to the field of nuclear emergency preparedness and response.