HAEA NSB

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: haea.gov.hu

RECENT DEVELOPMENTS IN NUCLEAR SAFETY IN HUNGARY

November 2013

General

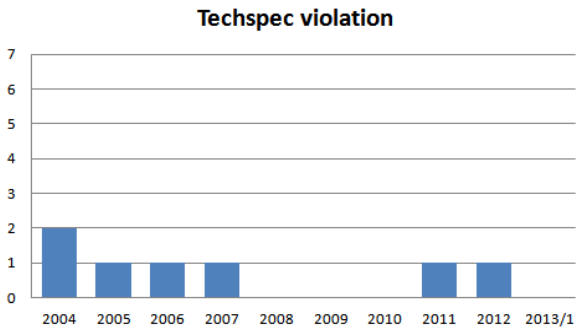
Semi-annual Safety Performance Assessment

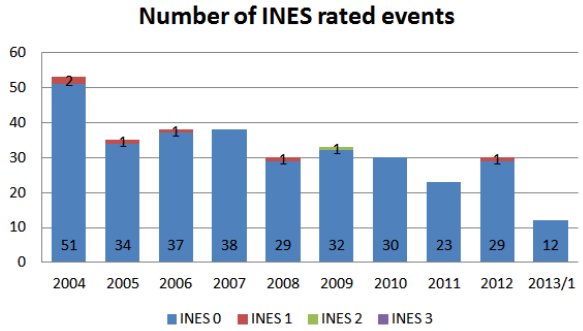
HAEA regularly evaluates the safety performance of the operators of the nuclear facilities. The main sources of data for the assessment are the regular reports and the event reports of the licensees, the protocols of regulatory inspections including the regular and the comprehensive inspections focusing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

The 2013 year's safety performance data below originate from the 1st and 2nd quarterly reports of Paks NPP and the 1st semi-annual reports of the other licensees.

Paks Nuclear Power Plant

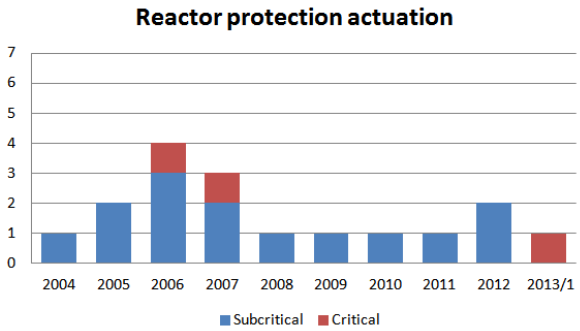
There was no technical specification violation event during the examined period.

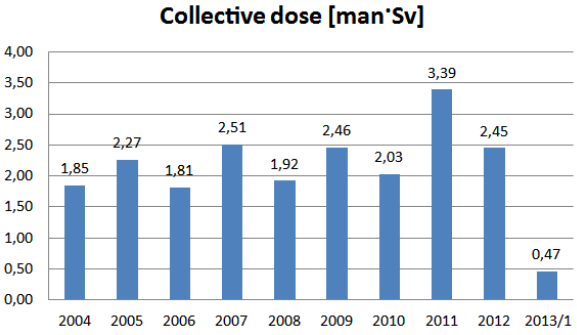




The twelve events reported by the NPP to the authority have all been classified as "anomaly", corresponding to level-0 on the seven levels International Nuclear Event Scale (INES).

There occurred one automatic reactor protection actuation during critical state of the reactor of Unit 4. This event was described in the May issue of the Bulletin as “Reactor scram due to an erroneous switchover”.

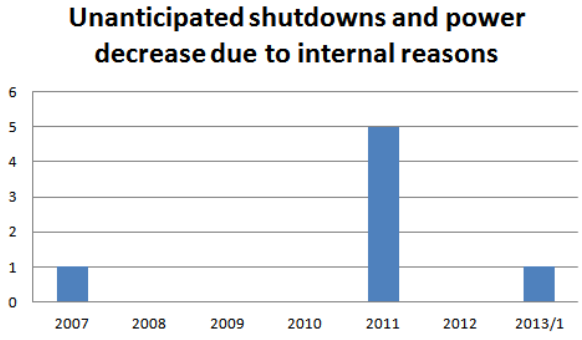


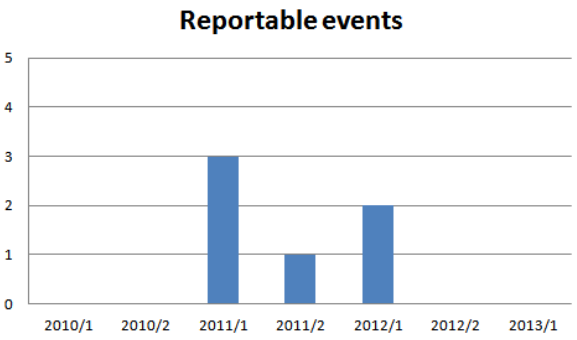


There is a regular time lag in the reporting of collective doses: the 1st and 2nd quarterly reports dealt with the doses for the period of November to April. The maintenance period of the Paks NPP reactors began this year on the 6th of April, so the effect of maintenance activities appear only to a certain extent in the reported collective dose for this year.

Budapest Research Reactor

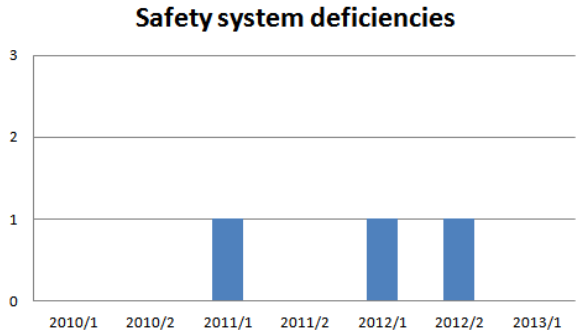
One unanticipated power decrease occurred in March 2013. This event and the five power decreases in 2011 resulted from the failure of the cold neutron source cooling system which requires the reduction of reactor power.





Training Reactor

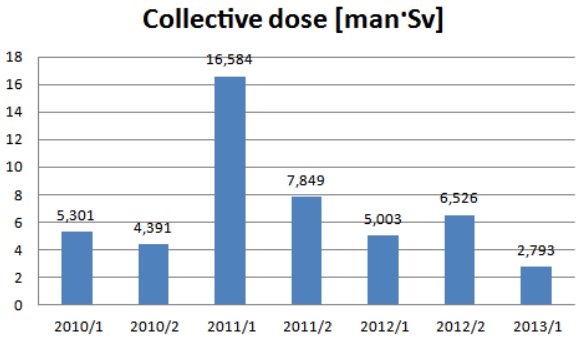
There were no reportable events in the first and second quarters of 2013.



The lack of any deficiencies associated with the safety systems is presumably due to the completed reconstruction of the control and safety rod drive mechanism, which eliminated the unanticipated rod drops that occurred earlier a couple of times.

Interim Spent Fuel Storage Facility

A favourably low collective dose was recorded for first half of 2013. The values on the graph are justly comparable since all of them represent collective doses for half year periods.



As a summary, it can be stated that during the first half of 2013 the nuclear facilities in Hungary operated in compliance with the limits and conditions specified in the operating and licensing documents.

HAEA internal affairs

Mr. Gyula Fichtinger is the Director General of the Hungarian Atomic Energy Authority

Mr. Pál Kovács, the Minister of State for Climate Change and Energy on June the 10th of 2013 announced that the Prime Minister Mr. Viktor Orbán appointed Mr. Gyula Fichtinger, as the Director General of the Hungarian Atomic Energy Authority, who has been one of the two Deputy Director Generals.

Mr. Kovács expressed his gratitude for his relentless work to Mr. József Rónaky, the resigning Director General of HAEA, after having served in this position for the last one-and-a-half-decade period and congratulated Mr. Fichtinger, the newly nominated DG, wishing him further successful work in his new role.

Legal and Regulatory Framework

1. New Radioactive Waste Working Group at HAEA

Due to recent changes in the Hungarian legal framework, HAEA shall take over the task of regulatory oversight of the radioactive waste repositories from summer 2014. In order to facilitate this process, a new working group was established this summer by the HAEA with the aim of preparing new regulatory processes and creating a new Government Decree in relation to the safety of radioactive waste repositories. The working group also comprises delegates from HAEA's licensees and partners: MVM Paks Nuclear Power Plant Ltd., MVM Paks II. Nuclear Power Plant Ltd., Public Ltd. Company for Radioactive Waste Management, National Public Health, Medical Officer Service, Ministry of National Development and Hungarian Office for Mining and Geology. The main goal of the working group is to elaborate a well-structured and detailed regulatory system, which will fit in the current regulatory system of nuclear facilities but also take account of the specific features of the different storage facilities in consideration.

2. Redefinition of the safety exclusion zones around nuclear installations in Hungary

The original safety exclusion zone around Paks NPP was established by a ministerial decree in 1983, shortly after first connection to the grid of the Unit 1. This decree did not stipulate ownership requirements within the zone; instead, it restricted some activities and determined the regulatory procedures of the nuclear and the radiation health authorities for granting exceptions in certain circumstances. The most noticeable restriction was the prohibition of building activities, including the renovation and extension of the existing dwelling-houses and other buildings.

The bases of this decree were the soviet radiation safety requirements in force at that time, more specifically it established a 3 km radius distance from the unit with the stipulation that an infant at the border of the zone should not be exposed to a thyroid dose exceeding the statutory limits even in the case of a design basis accident, taking into account that he/she consumes only milk of a cow pastured continuously at the border of the zone. The intention with the building restriction was to achieve reduction (possibly a complete elimination) of dwelling within the zone.

With the evolution of safety legislations the decree was reviewed, new principles were established for new nuclear installations, but the restrictions introduced into the property register were not lifted. This situation was not in line with the real life at least in two aspects. On one hand the persons owning properties and living in the vicinity of the plant did not give up their properties and wanted to modernize them, on the other hand substantial safety

upgrades were implemented at the plant, resulting in a substantially reduced accident probability. These modernizations were also complemented with the introduction of symptom based operational procedures, emergency preparedness organisations and severe accident management measures, changing the whole context of the issue. The mentioned changes resulted that at present no practical environmental consequences are considered with the exception of severe accidents, in which case the 3 km radius lost its justification.

As a result of the described situation appropriate amendments were introduced into the Act CXVI of 1996 on atomic energy and a new governmental decree was issued in November 2011 on the safety exclusion zones of the nuclear installations and radioactive waste repositories. The new laws not only established new and more precise criteria and requirements for definition of the zones, but established the procedures for the system of reviews of the size, if it becomes necessary. However, the functional concept of the zone is not only that it shall protect the environment from the radiation effects of the facility, but also it shall protect the facility from any human-induced effects originating from the surroundings. The size of the exclusion zone shall also ensure that the characteristics of the site taken into account in the safety analyses shall remain unchanged.

On the basis of the new law, HAEA ex officio launched the legal processes in December 2011 for revision of the safety exclusion zones of Paks NPP and the two small nuclear reactors in Budapest as well as of the first definition of such zone for the modular vault type Interim Spent Fuel Storage Facility. (This facility is situated next to the NPP site, and originally was built as part of it. Therefore it was considered then that the safety exclusion zone of the NPP envelopes this facility and its exclusion zone as well. Later it was separated from the plant, but no separate zone was defined.)

The first phase of the procedure for all facilities included a proposal on the extent of the relevant zone as submitted by the licensees, all of whom proposed the minimum extent required by the law. These proposals were accepted by the HAEA with minor modifications, because in some cases further safety related components (e.g. fuel tanks of the emergency diesels) were included from which the distance defining the boundary of the exclusion zone was to be calculated. For the NPP, the minimum required distance is 500 m, which yielded that the new zone (as well as of for the spent fuel storage) does not include the Danube and any property on the opposite bank of the river. The procedure formally was finished by regulatory decisions in 2012 August.

Taking into account the number of the clients in this legal process, it was a first of a time achievement for HAEA since more than 800 property owners were in the former safety exclusion zone, thus were to be considered as clients. Thus HAEA had to organize a public hearing. In this respect this case was somewhat similar to the case of the lifetime extension procedure of Unit 1, when the authority also accounted for a bigger interest from the public.

Finally, it is worthwhile to mention some further facts: the new safety exclusion zones were introduced into the property registers more than one year after the regulatory decision, and the removal procedure of the building restrictions in Paks town is still ongoing in October. It is also to be mentioned that the relevant heath authorities, in parallel to our procedures, carried out the same procedures for the existing radioactive waste repositories in Hungary.

Interim Spent Fuel Storage Facility

Licensee application for construction of vaults 21 to 24 of the Interim Spent Fuel Storage Facility

The spent fuel from Paks NPP is stored in the Interim Spent Fuel Storage Facility located next to the plant.

The design storage time in the facility is 50 years. The facility is designed to consist of up to 33 vaults. The storage capacity is growing according to the storing demand. At present 20 vaults are available. Currently vault 17 is being loaded.

In October 2013 HAEA granted the liecnse for constrcution of vaults 21-24. The construction works will begin in 2014, until then the preparatory earthworks are to be completed.

International co-operation

Implementation of the Targeted Safety Reassessment measures

The ENSREG (European Nuclear Safety Regulators Group) issued guidelines and recommendations to preparation of National Action Plans in response to the Fukushima accident: compilation of stress test peer review recommendations and suggestions on European nuclear power plants as directed by the ENSREG Stress test Action Plan. The structure and contents of the elaborated Hungarian National Action Plan (NAcP) closely follows these recommendations:

The introduction describes the preliminaries in general, the structure of the NAcP and the regulatory tasks relating to the execution of the corrective actions. The next chapters outline in three Parts the planned actions to be taken by the operator of the Paks NPP.

Part IV presents in tabular form all the actions , along with the deadlines, references to the National Report and to the ENSREG Report chapters.

The Hungarian Atomic Energy Authority is continously monitoring the execution of the plan.The most important measures already completed and planned are, as follows:

- **Seismic monitoring system:** In the frame of the seismic instrumentation reconstruction project which is in the preparatory phase, the question of automatic shutdown had been revised.
- **Enhancement opportunities of on-site and off-site AC power supply:** Procedures have been developed for the use of the possible, but not stationarily applied cross-links between the units for normal operation and for the cross connecting the safety buses.
- **Further independent tasks:** Periodic inspection, maintenance and operational testing of the equipment to be applied in case of extremely low water level of the Danube had been supplemented. The respective – formerly missing – inspection, testing and maintenance instructions have been developed.

Electric driven auxiliary pumps for low Danube water level

Diesel driven auxiliary pumps for low Danube water level

- **Further studies to address uncertainties:** Probabilistic assessment for operational states of closed reactor under 150º C primary circuit temperature concerning a possible time limit considering the balanced distribution of risk had been reasonably estabilished and introduced.
- **Presence of hydrogen in unexpected locations:** Distributions using less conservative, three dimensional analyses beyond the use of the lumped parameter models shall be performed.

An Event of Interest

Shutdown of Paks NPP Unit 2 due to pressure rise in the steam generator weld protection chamber

On the 6th of June 2013, a pressure rise was noticed by the operating personnel on nitrogen pressure gauge of the weld protection chamber of steam generator 4 (SG4). The pressure was released and sampling was taken from the weld protection chamber according to the procedures. The sample showed the presence of fluid. Results of chemical analysis of the

Leak location at welded joint between the nozzle and the nitrogen line

sample confirmed that the origin of the fluid was not the primary side. After multiple samplings the secondary side leak was clearly identified, and gradual shutdown of the unit was initiated as required by the Technical Specifications (TS). The appropriate inspections have been performed in cold state of the unit, which determined that the leak had been caused by a weld defect on the nitrogen charging line of the weld protection chamber, which is drained into the secondary side of the steam generator. After weld repair and successful leak test of the protection chamber, the unit was started up and power ascension to rated level was performed.

The material testing identified that the nitrogen charging line of SG4 weld protection chamber leaked at the dissimilar weld between the nozzle and the main body was, which fault was caused by galvanic corrosion. The affected line was previously not included in the material testing and ageing management programmes.

Emergency Preparedness and Response

National Nuclear Emergency Response Exercise ONER-3-2013

In its 2012 Annual Work Plan the Disaster Management Coordination Inter-ministerial Committee decided to organize a large scale national nuclear emergency response exercise in 2013. The short title of the exercise was ONER-3-2013, in which ONER refers to the Hungarian form of Hungarian Nuclear Emergency Response System (HNERS). The 3 refers to the wide and comprehensive nature of the exercise, which means that all levels of defence administration participated in it.

The General Directors of the National Directorate General for Disaster Management and the Hungarian Atomic Energy Authority (HAEA) were responsible for the preparation, conduct and evaluation of the exercise. Following their initiative, a Central Organizing Committee was set up in cooperation with the specialists of the central, sectorial, regional and local bodies concerned.

The subject of the exercise was a hypothetical nuclear emergency event evolving at Paks NPP. According to its type, the exercise was a comprehensive command post (Phase I) and partial field exercise (Phase II) at national level with a total duration of 3 days.

Major objectives of the exercise were to verify the applicability of the renewed legislative basis for the operation of the HNERS (ONER), to evaluate the effectiveness of the implemented corrective actions, which were identified after the national exercise in 2004, in order to practice the implementation of protective actions for the public, as well as the communication with the media and the public and to evaluate the readiness at all levels of public administration for disaster management.

The established exercise scenario resulted in severe accident conditions at Paks NPP, requiring urgent protective interventions. The Phase I of the exercise was designed to test the comprehensive decision making system, establishing the implementation of urgent protective actions (like sheltering, iodine prophylaxis and evacuation) in Phase II.

The HAEA Emergency Response Organisation (ERO) participated in both phases. In general, the HAEA ERO is responsible for evaluating the on-site conditions from point of view of nuclear and radiation safety with respect to the possible off-site consequences. During this exercise, the HAEA ERO analyzed the situation and predicted the possible consequences, estimated the actual and/or possible source term following the release from the damaged reactor and elaborated recommendations on protective actions. During the entire exercise the ERO operated in its Centre of Emergency Response Training and Analysis (CERTA). During the early phase of the exercise foreign observers arrived in the CERTA. During Phase II, HAEA experts presented their roles and responsibilities in HNERS to the observers, as well as the different software tools that were used during the decision-making process.

The rapid evaluation after the command post exercise determined that all major objectives were met and the national system operated well. The detailed evaluation of the exercise is in progress and is expected to be finalized by the end of November.