HAEA NSD

HUNGARIAN ATOMIC ENERGY AUTHORITY

Nuclear Safety Directorate

H-1539 Budapest, P.O. Box 676,

Tel: +36 1 436-4881, Fax: +36 1 436-4883, e-mail: nsd@haea.gov.hu

RECENT DEVELOPMENTS IN NUCLEAR SAFETY IN HUNGARY

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General

1. Hungarian energy policy 2008-2020

In order to foster the long term safety, competitiveness and sustainability of energy supply, the Hungarian Parliament has taken decision on the Hungarian energy policy for the period of 2008-2020. Among others, in this policy the Hungarian Parliament invites the Government to initiate the preparatory works for a possible decision on new nuclear energy capacities. Following the technical, environmental and societal foundations propositions shall be submitted to the Parliament in due time on the necessity and conditions of the investment and on the type and siting of a nuclear power plant. Furthermore, the Government shall take care of proper execution of the programs aimed at final disposal of nuclear wastes.

2. Change in supervision of HAEA

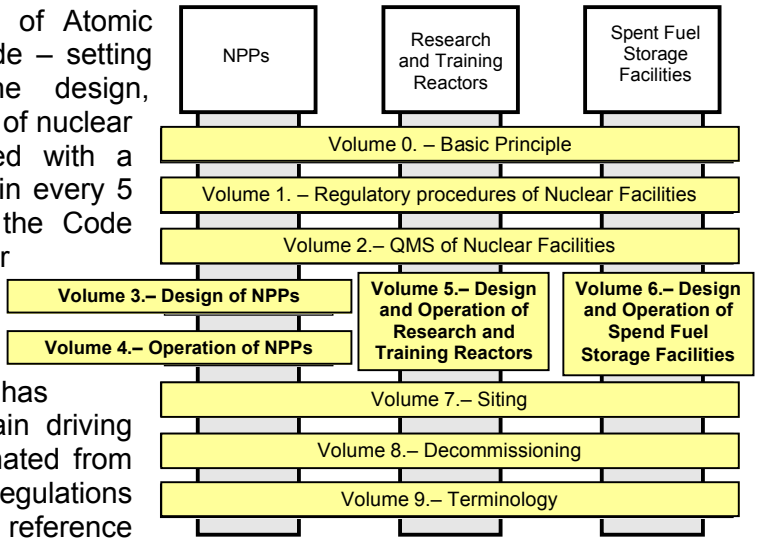
HAEA is a governmental office and as such it is under the supervision of the Government. This supervision is performed via a designated minister independently from his/her ministerial responsibilities. In May 2008, Mr. Pál Szabó, the Minister of Transport, Energy and Communication has taken over the supervision of HAEA from the Minister of Justice. Following a severe train accident in October Mr. Szabó has offered his resignation to the Prime Minister. The resignation was accepted. Nomination of a new minister is expected soon.

3. Common Assessment Framework evaluation of the HAEA activity

Common Assessment Framework (CAF) is a formalized tool for the evaluation of the functioning, strengths and weaknesses of an organization. It is based on anonym answers by the employees to a set of targeted questions. The CAF methodology has been adapted to governmental organizations and has been applied to evaluate the functioning and management of HAEA. 63 out of the 78 employees of HAEA have volunteered to answer the questionnaire including more than fifty questions in nine topics areas. The answers have been evaluated according to the CAF methodology. It became apparent that the average ratings by the employees were higher than those of the nationwide averages in 8 out of the 9 areas. A detailed analysis of the results is expected to reveal further important issues. The assessment is planned to be repeated after a one or two year period of time to obtain indication on the changes.

Legal and Regulatory Framework

1. Revision of Nuclear Safety Code completed



According to the Act on Use of Atomic Energy the Nuclear Safety Code – setting the legal framework of the design, operation and decommissioning of nuclear installations – shall be revised with a frequency not lower than once in every 5 years. The actual version of the Code entered in force in 2005 - after some delay due to the consequences of the serious fuel cleaning incident in 2003. The revision of this version has been started in 2006. The main driving force behind the revision originated from three sources, inclusion of regulations stemming from the WENRA reference levels on one hand, the change of the regulatory attitude intending to put more emphasis on inspection and less on approval and prescriptions on the other hand, and also formulation of the IAEA basic principles in a legally binding way. The new Code consists of nine volumes (c.f. Nuclear Events of Interest 2007/2), as depicted in the figure above.

Revision has been completed and the Code, along with the draft of a Governmental Decree to promulgate it, has been submitted for intergovernmental harmonization. The Governmental Decree includes the Basic Safety Principles formulated in the Safety Fundamentals by IAEA.

2. Preparations to amend Atomic Law

In parallel to the revision of the Nuclear Safety Codes the Act on Atomic Energy has also been revised and its modification was proposed. The proposed amendments are aimed to reflect the change in the regulatory philosophy. Furthermore, they reflect the changes in how the communities neighboring a nuclear facility can be financially supported from the Central Nuclear Fund in their communication and development activities. The amended version has been submitted for intergovernmental harmonization.

Nuclear Power Plant Paks

1. Power Uprate

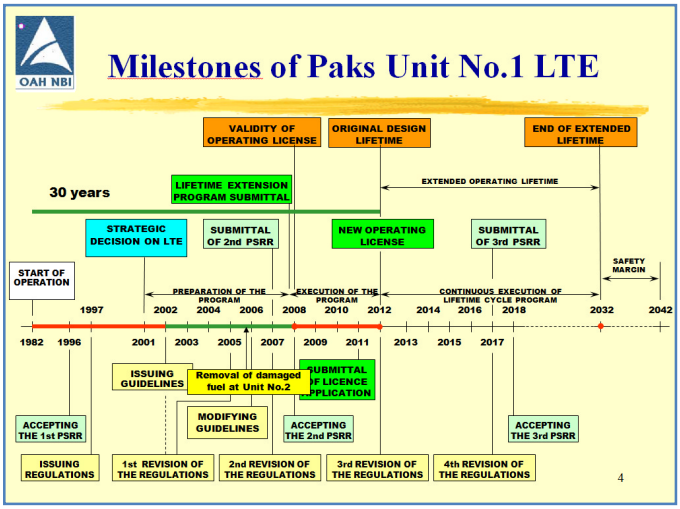
The Paks NPP operates four VVER-440/213 type reactor units, originally designed to produce 1375 MWth and 440 MWe each. Earlier upgrades of the secondary circuit and turbine resulted in cca. 470 MWe with an unchanged thermal capacity at all four units. Recently an upgrade of the primary side has been decided to increase the nominal power by 8% to 1875 MWth, resulting in cca. 500 MWe generated power. The power increase is due to an increase of 5 ^{o}C of the outlet coolant temperature. This is primarily reached by refined primary

pressure regulation, core control system upgrade and a new type of fuel assemblies. Additional modifications have been performed in certain technological components, e.g. replacement of some of the MCP impellers and decrease of initiating pressure value of the hydro-accumulators. The upgrading process has been completed on units no. 4 and 1, is ongoing and the power is being stepwise increased on unit no. 2. Unit no. 3 is now operating at a power level of 104%. The power increase at the latter two units is to be completed in 2009.

2. Periodic Safety Review

Periodic Safety review of the power plant units is performed once in every ten years of operation. Previous reviews were held for two units at a time. The actual review has been performed for all four units of the Paks NPP. The scope of the review is defined in the Nuclear Safety Code and it is conform to the IAEA recommendations. Besides the nuclear safety authority, a number of co-authorities take part in the process, including the environmental, health, disaster management and mining authorities.
The PSR was submitted in March 2008 and HAEA has nine month for the evaluation. 90% of the HAEA NSD staff participated in the assessment in 14 groups organized according to the main chapters of the Report. Preliminary results suggest that the Report shall be approved with the requirement of more than 100 safety enhancing measures in three importance categories. Temporary limitation of the operational licenses of the units is an option to consider.

3. Preparations to Lifetime Extension



The units of the Paks NPP have been put into operation between 1982 and 1987 with a designed lifetime of 30 years. The management of the power plant has decided on the extension of the units' lifetime by 20 more years in 2001. The lifetime extension was almost unanimously supported by the Hungarian Parliament in December 2005. Environmental impact analysis was prepared and submitted for public debate in 2006. Public hearings both in Hungary and in the neighboring countries (Austria, Rumania, and Croatia) were organized. Environmental approval was issued, and then challenged by environmentalist organizations. Final court decision reinforced the approval in November 2005. The nuclear safety regulatory approval process requires a Program to be submitted by the NPP four years before the expiry of the operational license, latest. The Program needs to demonstrate either the suitability of the systems and system components for extended operation or, the process of safely ensuring it. The Program has just been submitted to HAEA. For the evaluation of the Program, HAEA NSD has established a project involving about 75% of the inspectors in five topical review groups. A detailed overview plan has been prepared. The reviewing process is planned to take about six months and ends up with a regulatory resolution including the conditions and requirements imposed by the regulator on the Program.

4. Events of Interest

Event: *Fire at turbine bearing due to lube oil pipe leakage.*
Following an outage Paks NPP Unit No.1 reached 100 % power level. Field operators observed smoke at bearing 2 of turbine № 1. They quenched the fire with a fire extinguisher and alarmed the fire brigade. The turbine was shutdown. The flanged joint of the lube oil pipe to the bearing was leaky. The oil wept to some isolation material and ignition of isolation material caused the fire.

Assessment: The self-ignition temperature of oil is 390 °C. This temperature level was surely not reached on the spot. The „Rockwool" isolation material, which was present at the oil spot, reduced the flashpoint of oil. The isolation material is supposed to have absorbed oil which had filtrated through the minor leakiness and after turbine heat up a self-ignition occurred.
The isolation material found in the bearing area was not used for equipment isolation. This amount of waste may have been collected in the vicinity of the bearing area over several years.
The flange became leaky due to operational vibration. Maintenance procedures of turbines don't cover the inspection of flanged joints therefore personnel do not perform periodic inspection of these joints. The flange had not been disassembled for years.

Causes: Maintenance procedures of turbines do not cover the inspection and maintenance of flanged joints connecting turbine oil system pipes and turbine bearings.
During previous installations and removals of isolation no duly careful cleanup was performed after working activity.

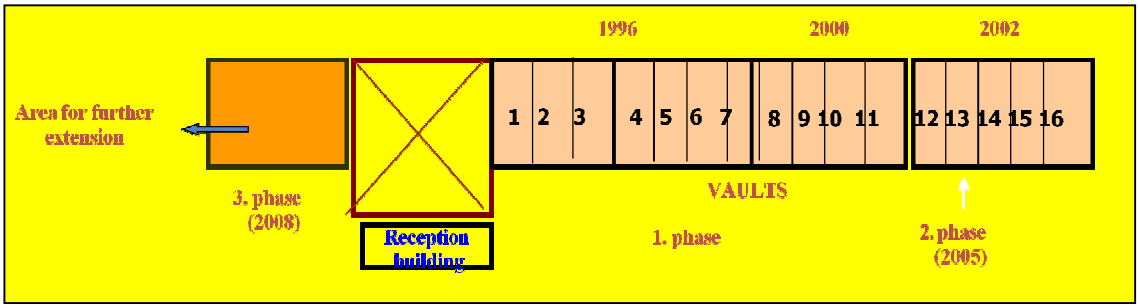
Consequences: The event had no direct impact on nuclear safety. However, the development of any fire involves significant risk since potential propagation of the fire may jeopardize the operability of equipment with basic safety functions. The fire created during this event covered a small area and after detection of the first suspicious indication (smell of smoke) operating personnel paid special attention to the turbine area and extinguished the fire when it broke out.

Corrective actions: In the future during outages of units the flanged joints connecting turbine oil system pipes and turbine bearings have to be inspected and repaired as needed.
Maintenance procedures of turbines have to determine the inspection and repair methods and the test frequency of flanged joints connecting turbine oil pipes and turbine bearings.
Turbine areas difficult to access have to be cleaned during outages.

Other Nuclear Installations

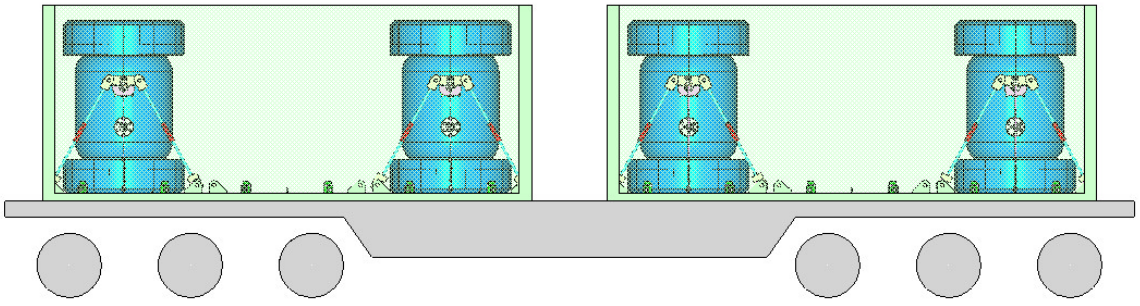
1. Operational License of the Extended ISFSF issued

In the first phase of establishing the modular vault type Interim Spent Fuel Storage Facility (ISFSF) at Paks 11 vaults have been installed with a capacity of 450 fuel assemblies each. As interim storage is intended for 50 years the facility can be extended to include as much as 32 vaults. In the second phase another 5 vaults have been installed. The FSAR for the entire facility with 16 vaults has been submitted to the HAEA NSD in March 2008, parallel to the PSR of the 11 vaults of the first phase. Following the evaluation of these submittals the regulatory body decided on issuing an operational license valid up to the end 2009. During this period of time non-conformances revealed in the evaluation shall be rectified and the results shall be reported in an amended version of the FSAR by March 2009. Following the evaluation of this version the license is expected to be issued for ten years.



2. Repatriation of the BRR HEU fuel

Based on Hungary's commitment to nonproliferation and global threat reduction, in the framework of the Global Threat Reduction Initiative by the National Nuclear security Administration of the USA, about 154,4 kg of HEU spent fuel of Russian origin of the Budapest Research Reactor (BRR) has been repatriated to the Russian federation in September-October 2008. Preceding the actual repatriation, the External Spent Fuel Storage facility of the BRR was refurbished to become suitable for the opening of the canisters containing the spent fuel, to accept and serve the transport casks and the transport vehicles, respectively. A new building has been erected and provided with a high capacity bridge crane as well as with a cask carrier platform. The refurbishment was supervised by the nuclear safety authority, the transport safety, safeguards and security by the respective authority branch of HAEA with the participation of the Euratom and IAEA safeguards inspectors. For difficulties in obtaining transit permit along the possible overland pathways, the shipment was carried inside Budapest by trailer, from Budapest to Koper (SLO) by train, from Koper to Murmansk (RUS) by ship and from Murmansk to Chelyabinsk again by train. The transport arrived to its destination with no difficulty whatsoever.



International co-operation

1. Meetings organized

Regional Workshop on Application of Best Estimate plus Uncertainty (BEPU) Analyses, 10-14. March, 2008, Budapest, in the framework of the TC RER/9/088 IAEA Project. – The purpose of the workshop was to address the application of Best Estimate plus Uncertainty Analyses by designers, operators, regulators and technical support organizations for the assurance of safety and reliability of nuclear installations. Deterministic safety analyses for Anticipated Operational Occurrences (AOOs), Design Basis Accidents (DBAs) and Beyond Design Basis Accidents (BDBAs) are essential instruments for confirming the adequacy of safety provisions. For BDBAs, best estimate calculations are used in several countries together with an evaluation of the uncertainties associated with the relevant phenomena. The workshop consisted of presentations and discussions in working groups. The 40 participants from 13 different countries presented their national experience/approach related to deterministic safety analyses.

Use of Safety Margins and Advanced Safety Assessment Methods in Plant Modifications, 15-19. September, 2008, Budapest – A joint IAEA-OECD NEA-EU workshop with participation of 55 experts from 23 countries was held in the premises of HAEA. Recent developments in international standards and requirements as well as the best practices of some of the countries have been discussed. Due to the highly professional participation the meeting significantly contributed to building up a common international platform in the topic of nuclear safety assessment. Presentations and summary documents of the meeting are collected on a CD ROM.

2. Bilateral and multilateral co-operations

Visit by D.E. Klein, Chairman of USNRC. Dr. Dale E. Klein, Chairman of the US Nuclear Regulatory Commission arrived in Hungary on 22 September for the invitation of dr. József Rónaky, Director General of the Hungarian Atomic Energy Authority (HAEA). On 23 September he had a meeting with dr. József Pálinkás, President of the Hungarian Academy of Sciences (HAS), then dr. Klein delivered a speech entitled „Nuclear renaissance" at the library hall of the HAS. In the afternoon he discussed current issues of common interest with the leading officials of the HAEA. On 24 September Dr. Klein visited the surface and undeground facilities of the National Radioactive Waste Repository in Bátaapáti opened officially on 6 October. The visit concluded by an international press conference.

The General Conference of IAEA offered occasions for meetings with Hungary's bilateral and multilateral partners in nuclear safety. *Bilateral* discussions were held with the delegations of USA, Rumania and Croatia. The *traditional quadrilateral meeting* of the top nuclear regulators from Czech Republic, Hungary, Slovakia and Slovenia was also held during the GC.

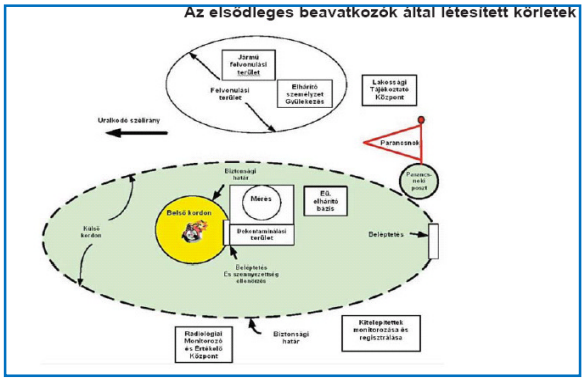
3. Hungarian fellows with leading European nuclear regulators

After the severe fuel cleaning incident at the Paks NPP in 2003 HAEA has decided to attempt to learn and implement the best applicable working practices of other nuclear regulatory authorities. Within the framework of an IAEA's international co-operation project the regulatory authorities of Finland, Spain and UK have each hosted two Hungarian nuclear inspectors for a two months long fellowship. The fellow inspectors were involved in the current activities of the host regulatory bodies. HAEA is working continuously to build into its processes the knowledge obtained, and both the HAEA

management and the participants are extremely thankful to the IAEA and to the host regulatory organizations for devoting moral and material resources to this project, as well as to the managers and experts mentoring the visiting inspectors for their kind efforts.

Emergency Preparedness

1. National Nuclear Emergency Plan revised



The latest version of the National Nuclear Emergency Plan is effective since 2002. Since that time experiences have been gathered with the application of the Plan. It has become evident that certain formal and conceptual changes of the existing version are necessary to be made. Furthermore, the related IAEA recommendations as well as the structure of the participating governmental organizations have undergone substantial modifications. For these reasons the High Level Working Group that has elaborated the existing version has been revitalized for the revision of the present version and compilation of a new one. Important conceptual changes were: inclusion of the Public Communication Plan, detailed description of the National Emergency Preparedness System, and exact definition of the various operating states of the NEPS and elevated emphasis on radiological emergencies. The revised plan has been accepted by the Governmental Co-ordination Committee and is forming a basis for the revision of the sectoral and local emergency plans.

2. Preparations to a National Nuclear Emergency Preparedness Exercise

Following the decision by the Governmental Co-ordination Committee Hungary is planning to conduct the national level ONER-3-2009 Nuclear Emergency Response Exercise in autumn 2009. The major objectives of the exercise are:

- Applicability test of new nuclear emergency plans
- Evaluation of the effectiveness of implemented lessons learned from earlier exercises
- Implementation of protective actions
- Media and public communication
- Evaluation of overall readiness of civil protection organizations.

The exercise scenario is planned for severe accident conditions of the Paks Nuclear Power Plant, requiring urgent protective interventions. A two phase exercise is being prepared exercising the comprehensive decision making system in the first phase and implementing urgent protective actions, like sheltering, iodine prophylaxis and evacuation, in the second phase. The Emergency Response Organization of the Paks NPP as well as all major off-site organs of the Hungarian Nuclear Emergency Response System are expected to play in the exercise. Considering the IAEA classification rules (see EPR-ENATOM 2007) the Hungarian ONER-3-2009 exercise is planned to reach the level of CONVEX-3 exercises, therefore it is open for all countries in the Central and Eastern European region, their participation is most welcome. Further detailed information will be communicated later as the preparations for the exercise are advancing.