LEGAL AND ORGANIZATIONAL FRAMEWORK
OF RADIOACTIVE WASTE MANAGEMENT IN HUNGARY

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ABSTRACT

The Act on Atomic Energy was promulgated in 1996. It entered into force on the 1st of June 1997 and created the appropriate legal and financial basis for the radioactive waste management and decommissioning of nuclear facilities by specifying, in accordance with international expectations, the basic principles and prescribing the establishment of the relevant executive orders and organisational framework. The Central Nuclear Financial Fund was set up and a non-profit company, the Public Agency for Radioactive Waste Management (PURAM) was established.

In 2000, with substantive assistance of the Hungarian Atomic Energy Authority, an order of the Minister of Health was issued on the execution of some provisions of the Act on Atomic Energy. The order is in accordance with the International Atomic Energy Agency's International Basic Safety Standards and the 96/92/EURATOM regulations. Linked to this order a separate ministerial order is in preparation on certain questions of storage and disposal of radioactive waste. It will deal with the relevant conditions and requirements, risk evaluation, waste acceptance criteria, waste classifications, retrievability, TENORM etc. After the promulgation of the order it is planned to support its fulfilment with guides (among others on the safety assessment) thus establishing the full verticality of the legal framework for radioactive waste management.

INTRODUCTION

On the 1st of June 1997 the Act CXVI. of 1996 on Atomic Energy entered into force in Hungary, expressing the national policy in the application of atomic energy. It regulates among others the basic aspects of the radioactive waste management and authorises the Government and the competent Ministers to issue executive orders specifying the most important requirements in this field.

The Act requires that a licence for the application of atomic energy shall be granted only if the safe storage, i.e., interim storage or final disposal, of the radioactive waste and spent fuel generated by the licensed activity can be assured in accordance with the most recent proven results of science, internationally accepted norms, as well as experience.

INSTITUTIONAL FRAMEWORK

According to the Atomic Energy Act and a Governmental Decree on the Central Nuclear Financial Fund has been set up on January 1, 1998 to finance radioactive waste disposal, interim storage and disposal of spent fuel as well as decommissioning of nuclear facilities. As required by
the Act, the Government authorised the Director General of the Hungarian Atomic Energy Authority (HAEA) to establish the Public Agency for the Radioactive Waste Management (PURAM), now in operation since June 2, 1998. The Minister supervising the HAEA has jurisdiction over the Fund, while HAEA is responsible for its administration.

PURAM performs the tasks related to the final disposal of radioactive waste, as well as to the interim storage and final disposal of spent fuel, and to the decommissioning of nuclear facilities.

REGULATORY FRAMEWORK

Key organisations with regulatory functions are the following:

The Minister of Health, through the State Public Health and Medical Officer Services (SPHMOS) performs the regulatory tasks with respect to radiation safety. SPHMOS is the responsible regulatory body for licensing and controlling the siting, construction, commissioning, operation, modification and closure of a radioactive waste disposal facility.

HAEA is the nuclear safety regulatory body. Facilities for the interim storage or final direct disposal of spent fuel are, as defined by the Act on Atomic Energy, nuclear facilities, under the regulatory competence of the HAEA. The HAEA has also regulatory tasks in connection with radioactive waste collection, handling and treatment on the site of nuclear facilities as well as in safeguards, international transportation, packaging and recording of radioactive materials.

The Act on Atomic Energy authorises also the relevant Ministers to regulate various aspects of the application of atomic energy, falling into their scope of competence. In that undertaking they are supported by their appropriate organisations.

LICENSING ORGANISATIONS

In radioactive waste management the licensing authority is the State Public Health and Medical Officer Service (on behalf of the Minister of Health). It is responsible also for the inspection and enforcement, based on a countrywide network. It is supported by the Frederic Joliot-Curie National Research Institute for Radiobiology and Radiation Hygiene.

In the licensing procedure all other public administration organisations participate as so called special authorities, in their scopes of authority and responsibility identified by separate legal regulations. In accordance with the Atomic Energy Act the responsible Ministers are enforcing, through their organisations, the following aspects in the licensing procedures:

- public security and domestic order, fire protection, physical protection and emergency preparedness;
- food, plant and animal hygiene, as well as soil protection;
- geology;
- environment protection, nature conservation and water quality protection;
- transport, water utilisation and protection of water bases;
- regional planning and building; and
mining technology and mining safety.

When the regulation of the application of atomic energy started in Hungary it was decided to rely, as far as possible, on the existing conventional authorities, instead of establishing a new regulatory body, with overall responsibility. The result is the above demonstrated divided regulatory system. The necessary co-ordination of the authorities is the task of the Hungarian Atomic Energy Commission and the Hungarian Atomic Energy Authority.

The Parliament's prior approval (decision-in-principle) is required to initiate the establishment of a radioactive waste disposal facility. The licensing authority for a radioactive waste repository is the State Public Health and Medical Officer Service (SPH莫斯), the licenses are issued by the Office of the State Medical Officer (head of SPH莫斯) procedure. The interim storage and final (direct) disposal of spent fuel is licensed by HAEA.

**LEGISLATION AND REGULATION**

The most important laws, governmental decrees and ministerial orders are the following:

- the Act CXVI. of 1996 on Atomic Energy;
- a governmental decree on duties and scope of authority of the HAEC and on the scope of duty of authority, and jurisdiction for imposing penalties, of the HAEA;
- a governmental decree on establishment of the organisation designated for implementing radioactive waste and spent fuel disposal, as well as decommissioning of nuclear installations, and on the financial source of performing these tasks;
- a governmental decree on radioactive materials as well as equipment generating ionising radiation, exempted from the scope of the Atomic Energy Act CXVI of 1996;
- an order of the Minister of Public Welfare defining the exemption levels (activity concentrations and activities) of radionuclides;
- an order of the Minister of Health on the execution of certain regulations of the Atomic Energy Act CXVI of 1996;
- an order of the Minister of Health and Social Affairs regarding the enforcement of the Act I. of 1980 on Atomic Energy (only the regulations related to radioactive waste are still in force until the entry into force of the new order now in preparation);
• an order of the Minister of Industry, Trade and Tourism on the geological and mining requirements for the siting and planning of nuclear facilities and radioactive waste disposal facilities;

• an order of the Minister of Industry, Trade and Tourism on the operation and administration of the Central Nuclear Financial Fund.

The basic rules are laid down in the Act on Atomic Energy and in accordance with internationally accepted requirements radioactive waste management

• shall be safe during the whole duration of the activity;
• shall not impose undue burden on future generations;
• shall not affect to a greater extent the human health and environment abroad, than accepted within the country.

The order of the Minister of Health on the execution of certain regulations of the Act CXVI of 1996 on Atomic Energy deals with the questions of radiation safety, dose limitation, clearance, licensing and control. The basic requirements of radiation protection as defined in the order are in line with the Basic Safety Standards (in case of workers 100 mSv effective dose limit summarised for five consecutive years, for members of the public 1 mSv/year effective dose limit). With respect to the radioactive waste management a new order is in preparation, and for the time being the old regulations from 1988 are still in force containing some requirements for a LLW/ILW surface repository.

The order of the Minister of Industry, Trade and Tourism regulates

• the investigation of geological suitability;
• the quality control;
• the general geological requirements;
• the general mining requirements;
• the procedures of the specialised mining and geological authorities.

In an attachment to the order the general aspects of research are listed to be used during the investigation of site suitability in the field of geomorphology, geomechanics, geochemistry, hydrogeology etc. Other attachments contain special geological requirements for siting to be applied for all facilities and those to be applied for HLW repositories and for ILW/LLW waste in deep geological repositories as well as in surface and near surface repositories.

According to the order the selection of sites for radioactive waste disposal facilities and the investigation of geological suitability shall be divided into phases, which shall be determined during the preparation and approval of the geological research plan. The Hungarian Geological Survey shall approve the geological research plans forming the foundation for the individual research phases and the final geological research reports concluding the research phases.

The order on the geological and mining requirements is a very detailed and prescriptive regulation. For example, it prescribes that a site may not be designated at a fault zone where
there has been a surface displacement during the last one hundred thousand years. It also requires that there should be homogenous geological properties within the host geological formation. It is difficult to prove that a site satisfies such an explicitly formulated condition. The order does not take into account that the primary goal is to achieve safety, taking into account both the engineered and natural barriers, especially for LLW/ILW repositories.

It is expected that an order of the Minister of Health now in preparation will solve this problem. It will regulate certain issues of the interim storage and final disposal of radioactive waste. The draft deals with the requirements of interim storage and final disposal of radioactive waste, the safety assessment, waste acceptance criteria, siting, design, operation and closure of a repository, the licensing procedure, inspection and reporting. There will be a separate chapter on the concentration and accumulation of natural radioactive isotopes in by-products. Attachments to the order contain among others waste acceptance requirements, classification of radioactive waste and criteria for siting and designing repositories.

The draft foresees that in the application for licence, it must be certified that the radiation load of the employees and the public, as well as the dose constraint set for the repository does not exceed the threshold determined by the competent authority. In accordance with recent international developments it will be required that the waste could be retrieved during the operating period if retrieval is justified by operational experience or required by the authority.

According to the draft the safety of the final disposal of radioactive waste must be evaluated based on the individual dose or individual risk, as well as the number of the impacted people. In the risk analysis, in selecting the initial event, the events and combination of events at a value lower than $10^{-7}$ could be ignored. With respect to the conditions presuming the expectable behaviour of the disposal system, following closure, the radiation load of the individuals in the critical group of the population must not exceed the value of 100 µSv/year owing to the effects of the waste disposed of. External events or combinations of events – of human or natural origin – affecting the disposal system during its lifecycle, which are beyond design basis, must be evaluated by applying risk criteria. As a result of these, the probability of cases involving excess human radiation dose must not exceed a value of $10^{-5}$ cases/year.

It is another important principle that an adequate level of protection of humans will grant an adequate level of protection of the other elements of the biosphere.

It is planned to support the fulfilment of the above criteria with guides (among others on the safety assessment) thus establishing the full verticality of the legal framework for radioactive waste management.

The approval of the draft order of the Minister of Health is now in the final stage. Coming into force it will provide an up to date legal basis for radioactive waste management, in line with the present internationally accepted requirements and the Joint Convention on the Safe Management of Spent Fuel and the Safe Management of Radioactive Waste that is already ratified by Hungary.
CURRENT ACTIVITIES IN RADIOACTIVE WASTE MANAGEMENT

Hungary launched a national programme in 1992 to solve the problems of radioactive waste management. There are projects under way to evaluate and increase the safety of the repository in Püspökszilágy in operation since 1976 for non-NPP wastes. As a modular type interim spent fuel storage is in operation, the disposal of HLW waste is a long term programme, much more effort is given to the disposal of the LLW/ILW waste of the Paks Nuclear Power Plant.

According to the Hungarian Standard the waste classification on the basis of activity concentration is the following:

- **Low level**: less than $5 \times 10^5$ kBq/kg
- **Medium level**: $5 \times 10^5$ - $5 \times 10^8$ kBq/kg
- **High level**: greater than $5 \times 10^8$ kBq/kg

If the determination of the radioactive concentration of solid waste is not feasible at reactor and accelerator facilities and alpha bearing waste are excluded, then the surface dose rate measurement is accepted for the basis of classification:

- **Low level**: less than 300 µGy/h
- **Medium level**: 300 µGy/h - 10 mGy/h
- **High level**: greater than 10 mGy/h

The most important radioactive waste producer is the Paks Nuclear Power Plant generating yearly:

- LLW/ILW solid waste: $210 \text{ m}^3$
- LLW/ILW liquid waste: $250 \text{ m}^3$
- Spent fuel: 372 assemblies

The total amount of LLW/ILW waste arising during the lifetime of the Paks NPP depends on the technology of the waste treatment. If the considered volume reducing technologies will be successfully applied, the originally forecasted amount of 20 000 m$^3$ can be substantially reduced.

The small amount (2.5 m$^3$/year) of high level waste generated during operation in the nuclear power plant are stored in the facility until decommissioning. In course of the decommissioning and dismantling about 20 000 m$^3$ LLW/ILW and 3700 m$^3$ HLW will be produced. The amount of waste from other applications is 10-30 m$^3$/y.

The recent developments in the HLW and ILW/LLW projects are the following.
High level and long lived wastes

In connection with the uranium mining activities a claystone formation (the Boda Claystone Formation), accessible from the mine in a depth of 1100 m, was found that appears to be a suitable host rock for a HLW repository. The uranium mine was depleted, therefore the Government took the decision that the claystone should be explored as far as possible before the closure of the mine. A research programme was carried out and it confirmed the preliminary suitability of the formation. In 1999, however, with the closure of the uranium mine the underground research work was stopped, and now a new long term policy must be elaborated.

Low and intermediate level wastes

The site selection process identified a potential site at Üveghuta, in a granitic host rock for a repository in mined cavities, 200-250 m below surface. The Geological Institute of Hungary, based on its exploration, recommended to start here the detailed investigations, necessary for the licensing. There are also other candidate sites to fall back upon if Üveghuta fails. The public at and near these sites is mostly supporting the establishment of the repository. However, some experts were questioning whether the results provide enough basis for a decision in favour of Üveghuta, and there are some local groups opposing it. The HAEC asked the IAEA to organise a WATRP mission to review the selection process and its results in 1999. The finding of the mission was that the process that led to the selection of the Üveghuta site appears reasonable, the site is potentially suitable, but further work is necessary in the field of the safety assessments. The geological investigations have also to be continued in order to provide the necessary data for the assessments.

According to the recommendations of the WATRP team, a summary of the available geological data was prepared and with this input the safety assessment was updated. Very conservative methods and assumptions were used, but even so the results are very favourable, the expected dose for the members of the public does not exceed 0.001 mSv/year. The next step is the preparation of an integrated geological evaluation and a comprehensive safety assessment. Based on their results the environmental impact study and the safety case can be prepared, and the licensing procedure can be started in 2-3 years.