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Annex 2 to Govt. decree 155/2014. (VI. 30.) Korm.

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**Safety Code
Volume 2**

**Design, construction, operation of the storage and disposal facility, closure
and institutional control of the disposal facility**

2.1. INTRODUCTION

2.1.1. Aim and effect of the Code

2.1.1.0100. This Code aims at establishing safety requirements for the design, construction, operation of the storage and disposal facility, and closure and institutional control of the disposal facility.

2.2. DESIGN REQUIREMENTS

2.2.1. General design requirements

I. Safety goals

2.2.1.0100. In order to meet the safety goals of the storage and disposal facility the basic safety functions determined in Paragraph 2.2.1.0320 shall be performed during normal operation, anticipated operational occurrences and design basis events.

2.2.1.0110. Any discharge from the storage and disposal facility shall be as low as reasonably achievable; it shall not exceed the prescribed limit values during normal operation, incidents.

2.2.1.0120. Any discharge of the radioactive waste or radioactive material from the waste exceeding the permissible level shall be prevented during the treatment and disposal of the radioactive waste,.

2.2.1.0130. The risk meant by any anticipated operational occurrence and design basis accident shall be acceptably low; such means and procedures shall be available, which ensure the mitigation of the consequences of incidents and accidents.

2.2.1.0200. The systems, structures and components of the storage and disposal facility shall allow inspection to demonstrate the compliance with the fundamental design requirements.

2.2.1.0300. An approach graded according to the risk meant by the radioactive waste shall be applied during the establishment of requirements for the systems and measures assuring the maintenance of the normal operating state and the management of incidents and accidents. 2.2.1.0310. During the operating period, all the radiation exposure to the public and workers coming from normal operation, anticipated operational occurrences and design basis events shall be taken into account. In addition, those accidents shall also be taken into account, which may result in significant radiological consequences both from the viewpoint of occurrence probability and the magnitude of potential doses.

II. Safety functions

2.2.1.0400. In order to meet the fundamental safety functions, all those safety functions shall be determined, which shall be performed by the systems,

structures and components of the storage and disposal facility before its closure and in the post-closure phase. If relevant for the given storage or disposal facility, the safety functions shall be established for the maintenance of subcriticality and removal of heat and gases. The systems, structures and components of the storage and disposal facility shall be categorized according to importance to safety of its operation and the phase subsequent to its closure. The safety classification shall be in harmony with the consequences occurring if the given safety function is not performed or partially performed. Accordingly, the systems, structures and components shall be classified at least to two safety categories and one non-safety category. Based on the safety classification, management and other requirements shall be established for the systems, structures, components important to safety and the associated activities. 2.2.1.0420. The fundamental safety functions according to Paragraph 2.2.1.0100 are:

- a) prevention of the release of radionuclides;
- b) protection against ionising radiation;
- c) heat removal to the ultimate heat sink;
- d) assurance of sub-criticality;
- e) provision of retrievability in the appropriate extent until closure.

III. Operational limits and conditions

2.2.1.0500. During the design of the storage and disposal facility, the operational limits and conditions of the storage and disposal facility shall be established in such a way and scope, which ensure the safe operation of the facility and the compliance with the requirements established for the post-closure phase.

2.2.1.0600. The operational limits and conditions shall be determined in such a manner that provides a margin sufficient for an intervention, if the safety conditions and limits established for the prevention of incidents and accidents are met.

2.2.1.0700. The deviation of the systems, structures and components of the operating storage and disposal facility from their normal state shall be detected in due time, in order to allow the accomplishment of the necessary intervention before the parameters reach the safety conditions and limits established for the prevention of incidents and accidents.

2.2.1.0710. During the determination of the operational limits and conditions, the following shall be taken into account:

- a) environmental parameters, especially temperature, humidity and polluter materials,
- b) heat generation of the radioactive waste,
- c) prevention of the evolution of criticality,
- d) assurance of the treatment ability and retrievability of the radioactive waste.

IV. Fundamental design requirements

- 2.2.1.0800. Taking account of the characteristics of the radioactive waste (radioactivity, heat and gas generation, level of treatment and package), the technology conditions and the characteristics of the selected site, the storage and disposal facility, its systems, structures and components, as well as the engineering barriers providing the required protection shall be designed to ensure safety in the operating phase of the storage and disposal facility and its post-closure phase.
- 2.2.1.0900. The systems performing safety functions shall be designed or selected to ensure the performance of the safety functions with the reliability required in the design during their entire service life.
- 2.2.1.1000. The storage and disposal facility shall be designed taking account of the normal operational limits and conditions and the potential incidents by systematically determining the necessary information. Those features of the storage and disposal facility and its given systems, structures and components shall be identified, which are required for the compliance with the safety requirements.
- 2.2.1.1100. The appropriate blockage and isolation of the radioactive waste shall be designed with the application of technical barriers serving for treatment or composing the radioactive waste disposal system in a way that the complex system established as the combination of the single elements as a whole can ensure the required level and period of isolation and retention.
- 2.2.1.1200. The discharge of radioactive material or radiation to the environment from the storage and disposal facility shall be prevented by artificial or natural barriers, their necessary combination and multiplication, and various physical and chemical means.
- 2.2.1.1300. The safety function performance capability of the system performing safety functions of the radioactive waste storage and disposal facility shall be preserved, if a single component fails or does not perform its function whether it occurs due to a failure or degradation. The storage and disposal facility shall be designed, constructed, operated and closed according to the period determined by its hazard meant from the aspect

of the blockage and isolation of the radioactive waste, taking account of the characteristics of the hosting geological environment.

- 2.2.1.1400. The system providing the treatment and disposal shall be sufficiently robust for blockage and isolation of the radioactive waste from the environment to sustain the design conditions on the long term. The long term safety of the storage and disposal facility shall be sustained in a passive manner. As far as reasonable, passive safety solutions shall be applied during the design of systems required for the operation of the storage and disposal facility.
- 2.2.1.1500. The radioactive waste disposal system shall be constructed to be optimized for the safety of the operational and post-closure periods. The radioactive waste disposal system shall be constructed in a way that ensures the ability to retrieve the radioactive waste, if justified, during the period of uploading prior to the closure of the storage and disposal facility.
- 2.2.1.1600. Any measure aiming at returning the disposal or retrieving the radioactive waste , or preventing unintentional human intervention shall not have unacceptable harmful impact on sustaining the safe state of the storage and disposal facility during its operation and in the post-closure period.
- 2.2.1.1610. The design of the radiative waste disposal system shall ensure that the potential of unintentional human intervention and its consequences are as low as possible.
- 2.2.1.1700. The licensee shall be aware of, in the extent necessary, the behaviour of the radioactive waste disposal system and its change in time by the implementation of appropriate research and development programmes, surveys, as well as modelling, testing and monitoring activities.
- 2.2.1.1800. If the construction, operation and closure activities are performed simultaneously, then these activities shall be planned and accomplished so that they do not affect the safety during the operational and post-closure periods beyond a justified acceptable level.
- 2.2.1.1900. The measures required for the registration and verification of radioactive wastes shall be based on an integrated approach of safety, physical protection and safeguards from the design until the closure of the storage and disposal facility. Safety shall not be influenced by any measure of a purpose other than safety in an unacceptable extent.
- 2.2.1.2000. The experience gained during the design, construction, operation and closure of similar storage and disposal facilities and the relevant research results shall be taken into account during the design.

- 2.2.1.2100. Safety analysis methods shall be applied during the design (from the first phase of the design) in a way determined in this decree.
- 2.2.1.2200. In any case, the severity of the factors threatening safety of the storage and disposal facility shall be determined on the basis of site specific data, or if they are not available, then the most applicable general data or those specified in standards shall be applied.
- 2.2.1.2300. The design of systems, structures and components shall provide for fabrication, installation, construction, verification, maintenance, repair, dismantling and closure.
- 2.2.1.2400. The design shall provide for decommissioning of systems becoming unnecessary of the storage and disposal facility. This shall be realized through minimization of activation, decontamination ability, accessibility and taking account of the controllability of decommissioning.
- 2.2.1.2500. The design of the storage and disposal facility shall facilitate its closure according to the closure plans, by sustaining the compliance with the requirements for long term safety of the storage and disposal facility.

2.2.2. Technological design requirements

- 2.2.2.0100. The storage and disposal facility shall be designed with the application of the relevant standards, verified technologies and appropriate materials, taking account of the requirements for both the operational phase and the post-closure period.
- 2.2.2.0200. The appropriateness of the applied design processes and solutions shall be demonstrated.
- 2.2.2.0300. New construction having no references shall only be applied, if their design is based on appropriate research and development results and the safe operability of the systems, structures and components is justified. Such systems, structures and components shall be regularly inspected, paying special attention to their characteristics having no references.
- 2.2.2.0400. The systems, structures and components important to safety that also perform operational function shall be designed in a way that the performance of the safety function has priority over the operational function. The performance of the operational function shall not endanger and shall not hinder in any way the performance of the safety function. This condition shall be demonstrated for the concerned systems, structures and components.
- 2.2.2.0500. The design basis of systems, structures and components important to safety shall be determined and documented in a systematic manner. The technical requirements shall be established in the design specification.

- 2.2.2.0600. The design service lifetime of systems, structures and components shall be determined; the sufficiency of this service life for the safe storage and disposal shall be demonstrated.
- 2.2.2.0700. The waste form, the packaging and the barriers built for providing the appropriate level of blockage and isolation shall be qualified as systems, structures and components important to safety.
- 2.2.2.0800. The following aspects shall be taken into account during the design of systems, structures and components important to safety:
- a) use of proven design methods and applicable design concept,
 - b) application of proven structural materials, and
 - c) application of accepted standards.
- 2.2.2.0900. The radioactive waste disposal system shall be designed taking account of scenarios including the normal development history, the potential characteristics, events and processes. The design of the storage and disposal facility shall take into account those potential impacts occurring during operation, which may endanger the safety of the post-closure period.
- 2.2.2.1000. The systems, structures and components of the storage and disposal facility shall be designed to be compatible with the stored/disposed waste and the hosting environment from chemical and physical points of view. The requirements for and procedures of maintenance, testing, inspection and monitoring of systems, structures and components in the appropriate extent, taking account of their ageing, shall be determined.
- 2.2.2.1100. The structural material of pressure retaining equipment and pipeline important to safety shall have sufficient toughness.
- 2.2.2.1200. The design of the storage and disposal facility shall take into account the requirements established for the safety zone and for the management and storage of hazardous wastes, if radioactive wastes and hazardous wastes are stored together.
- 2.2.2.1300. The physical protection system of the storage and disposal facility shall be designed, licensed, implemented, operated and dismantled according to the stipulations of the relevant law.
- 2.2.2.1400. The fire protection system of the storage and disposal facility shall be designed, licensed, implemented, operated and dismantled according to the stipulations of the relevant law.
- 2.2.2.1500. Indication system shall be applied for the identification of systems, structures and components. Each element shall be marked in such a way that ensures its clear identification during the whole service life.

2.2.3. Acceptance requirements

2.2.3.0100. The acceptance requirements for radioactive wastes shall be established in the early phase of the design. The acceptance requirements shall be reviewed and updated at the end of the design phase, and regularly in the necessary extent.

2.2.3.0200. Prior to the acceptance of radioactive wastes in the storage and disposal facility and then their disposal in the radioactive waste disposal system, the acceptance requirements for the radioactive wastes shall be established in agreement with the safety report on operation and closure of the facility.

2.2.3.0300. Limits shall be established and applied for the isotope content and activity concentration in each waste package, in various parts of the storage and disposal facility and its entirety, and for each other safety important parameter.

2.2.3.0400. The establishment of acceptance criteria shall ensure the physical and chemical stability of the disposed waste, and its compatibility with the components of the disposal facility

2.2.3.0500. The acceptance requirements for radioactive wastes shall specify:

- a) limits for the waste composition,
- b) limits for the waste form,
- c) limits for the container containing the waste packages, and
- d) if necessary, limits for the waste packages.

2.2.4. Requirements for the generated radioactive wastes

2.2.4.0100. The design shall ensure the generation of the minimum amount of radioactive waste during the operation of the storage and disposal facility, and the ability to treat, process, transport, store and dispose of all radioactive waste in compliance with the ALARA principle.

2.2.4.0200. The radioactive waste treatment systems shall be designed for the collection, verification and processing of radioactive wastes generated during normal operation and incidents.

2.2.4.0300. If appropriate, the systems shall be made capable of treating radioactive gases and liquids in order to keep the quantity and concentration of the discharged radioactive materials below the established limit values.

2.2.4.0400. Systems shall be installed for the measurement and registration of radioactive materials discharged to the environment, taking account of normal and abnormal conditions.

2.2.4.0500. In order to mitigate the on-site consequences of a discharge, the environmental geographical conditions, the weather conditions, and the compatibility with buildings, release locations and activities conducted in nearby buildings shall be taken into account during the determination and installation of discharge locations.

2.2.4.0600.

2.2.4.0700. The design of the on-site management of radioactive wastes shall take into account, as far as possible, the safety aspects of all potential subsequent treatment steps. The generation of such types and forms of radioactive wastes shall be prevented, which is not compatible with the available storage and disposal technologies.

2.2.4.0800. The on-site storage technology

- a) shall make possible retrieval and any subsequent storage, transport and disposal solution,
- b) shall allow the regular instrumental verification and maintenance of the safe condition of the stored radioactive wastes,
- c) shall allow the specification and documentation of each important characteristic of the radioactive wastes in order to preserve this information for the required period until their disposal, and
- d) shall allow the estimation of the generated amounts, specification of the volume and activity of radioactive wastes.

2.2.4.0900. Appropriate and sufficient storage place shall be designed within the storage and disposal facility, where the parts of the components of the storage and disposal facility, as well as the components, parts and other support materials generated during their failure, maintenance and renewal can be stored, allowing the verification of their contamination, chemical and physical properties, their decontamination, repair and transport.

2.2.4.1000. Taking account of the acceptance criteria for the disposal of radioactive wastes, design measures shall ensure the selective collection and storage of the generated radioactive wastes.

2.2.4.1100. Design measures shall provide the potential that the majority of the radioactive waste generated in the facility can be released from regulatory control.

2.2.4.1200. The storage capacity shall be specified by taking into account that the storage and disposal facility shall have reserve capacity at any time, which allows storage in the case of unexpected events.

2.2.4.1300. Design measures shall ensure that wastes having different characteristics cannot be mixed.

2.2.4.1400. Measures shall be introduced to prevent the generation of flammable or explosive mixtures or their removal.

I. Liquid radioactive wastes

2.2.4.1500. The design of liquid radioactive waste processing systems shall take into account the composition and characteristics of the liquid.

2.2.4.1600. The wastes of different types shall be properly separated, and the most effective method of processing shall be selected, in compliance with the principle of justification.

II. Solid radioactive wastes

2.2.4.1700. Appropriate solid waste management procedures shall be designed, in harmony with the principle of waste minimisation.

2.2.4.1800. In the case of a mobile conditioning equipment, measures shall be designed to prevent the dispersion of contamination.

2.2.5. Instrumentation, control informatics

2.2.5.0100. Verification and monitoring instrumentation shall be ensured, in the scope determined in safety analyses, for the verification of safety functions, systems, structures and components during normal and abnormal conditions.

2.2.5.0200. The licensee should have the appropriate verification and measurement instruments, which allow the verification of radiation parameters during the selection, repackaging and conditioning of the radioactive waste with the necessary accuracy.

2.2.5.0300. The arrangement and application of measurement and instrumentation controls systems provide for the measurement of parameters important to safety of the storage and disposal facility, the registration and archiving of instructions given to components and measurement results in a way that allows traceability of events and their investigation in a later time.

2.2.5.0400. The verification and measurement systems shall be designed in a way that their failure or when they are out of their measurements range can be detected.

2.2.5.0500. The indicating, archiving and intervening systems and components, if appropriate, shall have continued uninterruptable electrical supply which shall be operational in the extent defined in the operational document. 2.2.5.0600. Where necessary, remotely readable indications, remotely controlled components shall be applied.

2.2.6. Design requirements for support systems

2.2.6.0100. The required availability of support systems important for the functioning of systems, structures and components important to safety shall be ensured.

2.2.6.0200. The loss of external alternate current supply of electrical supply systems shall not lead to beyond design basis conditions.

2.2.6.0300. The ventilation systems of the storage and disposal facility shall ensure:

- a) the appropriate working environment for the employees, which allows functioning of systems, structures and components important to safety,
- b) the required climatic parameters for the functioning of systems, structures and components important to safety,
- c) limitation of the dispersion of air pollution,
- d) separation of technological zones and those having breathable air,
- e) minimising the risks meant by the poisoning and other chemical characteristics of technology materials, and in explosive gas and steam mixtures, and
- f) the airborne releases of the storage and disposal facility may enter the environment only in a controlled manner.

2.2.6.0400. The design shall include appropriate alerting and intervention possibility for the inspection and operation of the ventilation systems.

2.2.6.0500. The treatment and service systems shall be designed taking account of radiation protection, simplicity of maintenance and incidents.

2.2.7. Technical requirements of radiation protection

2.2.7.0100. For the protection of people staying on the site of the storage and disposal facility, the public and the environment against the harmful effects of ionising radiation, in addition to those defined in legislation:

- a) the radiation hazardous activity shall be justified,
- b) the limit values established for a given working area or activity shall be complied with,
- c) the protection shall be optimised,
- d) the storage and disposal facility, its systems, structures and components shall be designed in order to reduce the duration of human activity performed in the radiation environment and thus the

exposure of the people staying on the site of the storage and disposal facility;

- e) systems, structures and components containing radioactive materials shall be constructed, their radiation protection shall be ensured,
- f) the radioactive materials shall be safely managed, and
- g) solutions serving for reducing the quantity and concentration of the generated radioactive materials, and keeping the dispersion of radioactive materials within the storage and disposal facility and their discharge to the environment at a level as low as reasonably achievable.

2.2.7.0200. Requirements shall be established for the regular inspection of barriers retaining discharges, including the frequency of inspection and the requirements for the compliance of the barriers.

2.2.7.0300. The exposure to people shall be limited with appropriate means in those areas of the storage and disposal facility, where dose exposure might be anticipated during their stay; the activities shall be performed on the site of the storage and disposal facility without staying or working in areas having high dose intensity.

2.2.7.0400. The bordering of areas serving for the treatment, storage and disposal of radioactive wastes and their division to zones shall be designed according to the relevant requirements.

2.2.7.0500. The working areas shall be grouped to zones based on their radiation and surface contamination. The access to, exit from and staying in every zone shall be controlled, the necessary protective means shall be provided.

2.2.7.0600. In order to prevent entering of unauthorized persons to areas where it is justified by the dose rate or its potential increment, or the radioactive contamination level or its increment, the access shall be controlled by such physical means like remotely operated locks, locked doors or intrusion detection system. These means shall not prevent escaping of any person from such areas. If such control measures cannot be reasonably achievable, an identical level of protection shall be ensured by other means.

2.2.7.0700. The persons entering to and working in contaminated areas shall be protected; the atmospheric activity, the surface contamination and the radiation shall be regularly verified by instruments within every zone and between them.

2.2.7.0710. The operation of the storage and disposal facility shall be designed by taking account of radiation protection, and the consequences of design basis events and accidents.

2.2.7.0800. Where required, the instruments shall be capable of immediate, reliable and accurate indication of the radiation and atmospheric activity of the facility, and alerting system shall be provided for the indication of the significant changes in the values. Every such instrument shall be capable of reliable indication and alerting based on the actual environmental conditions.

2.2.7.0900. As necessary, the manipulation of radioactive wastes shall be performed under closed conditions providing protection against the dispersion of contamination, if justified with remote control.

2.2.7.1000. The dose exposure of employees shall be estimated, taking account of the operation and work planning. The dose estimation shall include the maximum personal annual dose value and the average collective dose value.

2.2.7.1100. The radiation exposures of people employed in non radiation hazardous job position shall be determined by estimation. The radiation exposure to the population shall be determined based on such calculated dose values, which are relevant to a given group of the population and take into account the radiation exposure originated from various sources of the storage and disposal facility.

2.2.7.1200..

2.2.7.1300. The requirements for the necessary level of monitoring the environment, the scope and frequency of monitoring shall be determined during the design for both the operational and the subsequent institutional control phases.

2.2.7.1400. Such monitoring, control and signalling systems shall be designed and installed, which is capable of providing data on the radiological conditions of the storage and disposal facility and its environment. Measurement programmes shall be established for controlling the radiation conditions of the site and monitoring the environment. The established measurement programme shall be, at least, applicable:

- a) indicating the alterations in measured parameters,
- b) preparing trends of measured parameters,
- c) prognosing adverse processes, in due time.

2.2.7.1500. Such dosimetry control means shall be installed for the compliance with the radiation protection requirements, which are capable of

measuring the radiation level during normal operation, incidents and in the extent possible during beyond design basis events.

2.2.7.1600. Inspection levels shall be established in the radiation protection control system, taking account:

a) the prevention of the exceedance of limit values, and

b) forecasting of radiation level increase due to the degradation of the condition of a system, structure or component, or as a consequence of an unanticipated event.

1. Decontamination

2.2.7.1700. The controlled zones, the entering and exiting persons, the reusable protective clothing and the movement of objects used in controlled zones shall be controlled, and decontaminated, if required.

2.2.7.1800. The material, construction and shape of the component being in contact with radioactive fluid during operation or subject to radioactive contamination shall provide decontamination and the removal of the decontaminating solution.

2.2.7.1900. The decontamination process shall be designed to ensure that the surface quality of the affected components shall comply with the relevant requirements after decontamination.

2.2.7.2000. The decontamination of potentially contaminated transport containers and other packages shall be prepared for.

2.2.7.2100. Where necessary, the decontamination with remotely controlled means shall be designed.

2.2.7.2200. The area and resource needs of decontamination shall not reduce the level of nuclear safety.

2.2.7.2300. New decontamination technology, or a new chemical component in the case of a chemical decontamination technology shall be only introduced, if justified by safety analysis. The safety analysis shall include:

a) the management method of the generated heat;

b) the justification that the decontamination can be implemented without the failure of the safety functions of the facility;

c) the justification of the removability of the activity, considering the physical and chemical nature of the contamination;

d) if a new chemical decontamination technology, or a new chemical component is introduced

da) justification of its use, and

db) the results of corrosion analysis of structural materials and their assessment, which shall be justified by tests.

2.2.7.2400. The decontamination procedure of the rooms and equipment of the storage and disposal facility shall take into account the planned direction of contamination dispersal between rooms and equipment, and the limitations that are relevant to the chemicals and technologies to be used in the given rooms.

2.2.7.2500. Surfaces providing decontamination ability shall be provided in rooms, where contaminated waters may spill, and the dispersion of contamination shall be prevented. Where contaminated water may spill, appropriate boundary surfaces and solutions for directing the dispersion shall be applied for the limitation of the contaminated surfaces, rapid removal, collection of spilled liquids, its storage preventing soil contamination and transport.

2.2.7.2600. Locally installed decontamination means shall be provided for works entailing significant radiation exposure, or it shall be justified that the central decontamination equipment can be properly applied under the given circumstances.

2.2.8. Demonstration of safety

1. Evaluation of safety

2.2.8.0100. The compliance with the safety criteria for the storage and disposal facility, the behaviour of the technical barriers of the storage and disposal facility and their appropriateness shall be continuously evaluated in the design phase of the storage and disposal facility, during its service life until the transition to passive institutional control.

2.2.8.0200. The appropriateness of the applicability and reliability of systems serving for the treatment and disposal of radioactive wastes, the radiological impacts of the treatment and storage shall be demonstrated by safety analyses.

2.2.8.0300. As part of the safety evaluation, the compliance with the requirements established for the protection of the workers and the public shall be demonstrated during the normal operation of the storage and disposal facility and during incidents.

2.2.8.0400. As part of the safety evaluation such scenario based analysis shall be presented for the systems treating the radioactive wastes, preparing the radioactive wastes for disposal and serving for disposal, which takes into account all those potential characteristics, events and processes that influence the safety of the storage and disposal facility, including unintentional human interventions and other human actions. The

potential for unintentional human interventions shall be considered in the safety analyses separately from the normal evolution history, but in the same timescale, in a form of actualised type scenarios.

2.2.8.0500. During the evaluation of safety all such events shall be identified, which may have radiological consequences. All potential external and internal hazard factors shall be determined.

2.2.8.0600. The experience regarding the construction and operation of the storage and disposal facility shall be regularly and continuously collected, analysed, evaluated for sustaining and enhancing the safety level of the storage and disposal facility and for substantiating the decommissioning the closure plans.

2.2.8.0700. The harmony of design requirements for the storage and disposal facility, the actual state of systems, structures and components, and of the documentation reflecting the implementation shall be continuously ensured.

2.2.8.0800. The design should take account of each credible combination of events having potential impact on the storage and disposal facility, including events of either external or internal origin. The event combinations to be taken into account during the design shall be selected based on engineering judgement or probabilistic analyses. The events that can be excluded from the scope of scenarios and events to be considered during the design of the storage and disposal facility are as follows:

a) internal initiating events occurring as a result of the failure of systems or components, human failures or of both, if their frequency is lower than 10^{-6} /year, and

b) such events induced by external human activity or events of natural origin characterizing the site, the frequency of which is lower than 10^{-7} /year, or if the risk factor is at such distance that allows demonstrating that its impact is negligible for the storage and disposal facility.

2.2.8.0900. From the scope of the risk analysis the initiating events or event-combinations of a frequency lower than 10^{-7} /year may be excluded.

2.2.8.1000. The external events and event-combinations having human or natural origin affecting the radioactive waste disposal system during its service life, which are out of the optimized design basis, shall be judged based on the application of risk criteria. The risk of cases occurring as a result of these events entailing additional radiation exposure to any member of the population shall not exceed 10^{-5} case/year.

2.2.8.1100. Subsequent to the closure of the disposal facility, the disposed radioactive waste induced radiation exposure of the members of the

critical group of the population shall not exceed the value of the dose constraint established for the disposal facility.

2.2.8.1200. Safety evaluations shall justify if the appropriate defence in depth is ensured through those protection levels (i.e. physical barriers, systems serving for the protection of the barriers, administrative procedures), the failure or lack of which may cause significant safety consequences for the population and the environment.

2.2.8.1300. The validity periods of the safety evaluations shall be clearly determined. During the safety evaluation, based on the data available on the systems of the storage and disposal facility (requirements, specifications, instrumental verification) the following shall be assessed and documented:

a) the interactions between systems and those potential processes, which lead to the increase of the probability of the discharge of radioactive isotopes,

b) the potential dispersion methods and pathways of radioactive isotopes discharged from the storage and disposal facility.

2.2.8.1400. The compliance with safety requirements shall be assessed for events taken into account during the design which describe the timely behaviour of the storage and disposal facility based on conservative analyses.

2.2.8.1500. As part of the safety evaluation the maximum radioactive waste quantity and activity value to be disposed shall be determined for the given site and facility type. In addition, taking account of the half lives, the mobility of radioisotopes and other factors these values shall be determined for each isotope group individually.

2.2.8.1600. It shall be demonstrated that the potential accumulation of fissile materials leading to nuclear chain reaction can be excluded.

2.2.8.1700. If the evolution of the nuclear chain reaction cannot be excluded due to long term uncertainty factors, then the safety evaluation shall justify that such an event does not result in unacceptable reduction of post-closure safety.

2.2.8.1800. Such models and computer programs shall be used in the safety evaluation, which have been tested and as far as possible validated in advance.

2.2.8.1900. The data used during the safety evaluation and the uncertainties of the applied assumptions as well as their impact on the compliance with the safety requirements and goals shall be individually evaluated.

- 2.2.8.2000. The safety of the storage and disposal facility shall be evaluated based on individual dose or individual risk. The analyses used to justify safety shall be documented in such a manner and in a depth, which allow their repetition, independent review and their alteration in the scope required for the evaluation of modification. In addition, the review and re-evaluation of the extent of applied conservatism and the margins available based on analyses shall be allowed.
- 2.2.8.2100. The appropriateness of any intervention, modification affecting a safety important system, structure or component that causes a state deviating from the licensed state shall be justified with safety analysis.

II. Content requirements of the safety report

- 2.2.8.2200. The safety report shall describe every safety relevant circumstance, which is related to the storage and disposal facility, particularly to the waste to be disposed, the design, construction, operation, closure, decommissioning and post-closure activities.
- 2.2.8.2300. The safety report shall clearly, understandably and comprehensively substantiate safety. The information taken into account during the design of the storage and disposal facility and its systems shall be systematically identified and presented. The content and details of the report shall be in line with the level determined by the given life cycle phase of the storage and disposal facility.
- 2.2.8.2400. The safety report shall clearly, justifiably and traceably present the applied assumptions and factors influencing safety. All safety significant uncertainty factors shall be identified. It shall be demonstrated that these factors are considered in the analyses to an appropriate extent; the method how the uncertainty factors are dealt with shall be described.
- 2.2.8.2500. The safety report shall demonstrate that the system providing for the disposal, including its arrangement, filling up and closure was developed as a result of a process including the optimization of radiation protection.
- 2.2.8.2600. The safety report, already in the construction phase, shall describe the programme, plans and requirements for the closure of the disposal facility and post-closure activities. This information shall be updated, as appropriate, in the subsequent life cycle stages of the storage and disposal facility.
- 2.2.8.2700. The safety report shall describe the management system of the licensee, including its fundamental principles and the alteration of the management system according to the various life cycle stages.

2.2.8.2800. The safety report, in line with the principle of graded approach, shall describe the synthesis of considerations relating to post-closure safety; the resulted reliability shall be evaluated.

2.2.9. Emergency response planning

2.2.9.0100. The emergency preparedness and response plan shall be graded to the consequences caused by potential accidents.

2.2.9.0200. The sources of threats identified during the design shall be categorized to threat categories based on their potential severity. During preparation, the capability of responding to the most severe emergency situation as identified by safety analyses shall be reached. It shall be demonstrated that the preparation can ensure, in the case of every postulated initiating event and potential emergency situation, the timely performance of the relevant measures (i.e. classification, notification, activation and emergency response measures).

2.2.9.0210. The emergency response plan shall include all those actions, which ensure the recovery of the storage and disposal facility from the emergency situation to normal operation.

2.2.9.0300. An emergency command centre shall be established for the personnel performing the response activity; they should be provided with sufficient information and the tools required for the interventions needed during the emergency situation and communication with the organizational units and venues responsible for responding to the emergency.

2.2.9.0400. The personnel staying in the emergency command centre shall be protected against hazards induced by the emergency situation. The regular inspection of the functionality of the emergency command centre shall be made possible.

2.2.9.0500. Simply, clearly, reliably indicated and illuminated, safe escape routes and other conditions required for their safe use shall be ensured in the storage and disposal facility, in order to facilitate the implementation of emergency measures. The escape routes shall comply with labour safety, radiation protection, fire protection, and facility safety requirements.

2.2.10. Specific design requirements

2.2.10.0100. The type of the planned storage and disposal facility, and in correspondence the type and quantity of the waste to be stored and disposed shall be identified as early as possible in the design phase. The storage and disposal concept shall be in harmony with the national programme on the management of spent fuel and radioactive waste.

2.2.10.0200. The design of the storage of liquid radioactive wastes shall include the provision of detection, collection and recovery system for leaking

liquids for the case of leakage of the waste packages or tanks containing liquids.

2.2.10.0300. The radioactive waste packages stored in the disposal facility until their final disposal shall be arranged in a way that their arrangements allow the timely detection of the damaging (especially the loss of integrity and the corrosion processes) of the packaging.

1. Design requirements for the deep geological disposal facility providing the final disposal of high activity radioactive wastes

2.2.10.0400. The radioactive waste disposal system for the final disposal of high activity radioactive wastes shall be designed to ensure adequate heat removal.

2.2.10.0500. The final disposal of high activity radioactive wastes shall take into account the responses of the technical barriers, host rock and the surrounding hydrogeology environment to the heat impact.

2.2.10.0600. The application of filling material, in the case of high activity radioactive wastes, shall take into account the heat impact and the radiolysis.

2.2.10.0700. The host rock providing final disposal of high activity radioactive wastes shall be resistant to heat impact, shall maintain its positive features, and shall ensure equal dispersion of the unequal heat impact in the geology barrier or in the technical barrier being in contact therewith, in order to prevent stress occurrences.

2.2.10.0800. The long term safety of deep geological disposal facilities shall be realised with the optimum use of the characteristics of the host geological environment. Consequently, it shall be strived for not causing changes unacceptable for long term safety in the host rock by the disposal facility, protecting the technical barriers by the host environment, completing the safety functions performed by the technical barriers with the safety functions performed by the geological barriers.

2.2.10.0900. The adequacy of the technical barriers under conditions provided by the host environment shall be demonstrated by examinations performed in an underground research laboratory.

2.2.10.1000. If the preoperational geological and hydrogeological monitoring examinations or those performed in parallel to operation reveal that the host rock has characteristics less positive than expected at the planned location of the underground volumes, or the planned arrangement may adversely affect the characteristics of the host rock, then the arrangement of the underground volumes shall be redesigned.

2.2.10.1100. The design of the deep geological high activity radioactive waste disposal facility shall maintain the positive characteristics of the host rock during its construction, operation and closure.

Consequently:

- a) the activities shall affect the rock surrounding the volume for disposal as low as possible,
- b) the host rock shall be reinforced and injected in a way that significant quantity of materials having adverse impact on the performance of the barriers shall not be provided in the disposal volume,
- c) the quantity of organic, oxidising and other potentially harmful material shall be at minimum in the disposal volume.

2.2.10.1200. The layout of the facility shall ensure the separation of the waste disposal activities from the transportation of the potentially removed rocks and filling materials, and from the movement of heavy work machines potentially used for construction activities performed in parallel.

2.2.10.1300. The falls or other rock movements caused by potential construction works performed in parallel shall be prevented in those volumes, where the disposal of radioactive wastes is in progress or has been completed.

2.2.10.1400. The activities shall be performed in a way to prevent the generation of such flow paths, which may allow water being contact with waste packages.

2.2.10.1500. The design of the underground facility shall ensure that the incidents and accidents postulated for the operational period, especially flooding, water penetration, fire or explosion can have adverse impact in as small as possible area of the facility, and that these events can be detected and the response actions to these events can be implemented.

2.2.10.1600. The arrangement of pedestrian and transport pathways, holes and tunnels shall ensure the safe performance of operational activities during both the waste disposal and potential retrieval processes.

2.2.10.1700. Radiation protection controlled zone shall be designated for waste management (packing and inspection) activities performed in the underground part of the disposal facility in the pre-closure and operating period.

2.3. CONSTRUCTION AND OPERATIONAL REQUIREMENTS

2.3.1. Operational limits and conditions

- 2.3.1.0100. Such operational documents shall be elaborated and maintained by the licensee, the compliance with which ensures the meeting of the operational limits and conditions.
- 2.3.1.0200. The necessary number and tasks of the personnel in service shall be determined, which allow the implementation of actions during potential incidents.
- 2.3.1.0300. The documentation containing the operational limits and conditions shall be kept up-to-date. The documentation shall be reviewed in the mirror of the obtained experience, the advances of science and technology, and in any case, if the implemented modifications or safety analysis justifies the review. If appropriate, the review shall result in amendments to the document.
- 2.3.1.0400. The rules of the modification process shall apply to the modification of operational limits and conditions.
- 2.3.1.0500. The operating personnel shall have access to the documentation containing the operational limits and conditions.
- 2.3.1.0600. The concerned personnel shall demonstrate their knowledge of the operational limits and conditions and their technical substantiation. The operating personnel providing management function shall be aware of their importance regarding the safety of the storage and disposal facility.
- 2.3.1.0700. The licensee shall establish and implement an oversight programme in order to comply with the operational limits and conditions. The results of the programme shall be evaluated and saved.
- 2.3.1.0800. Any violation of the operational limits and conditions shall be followed by an immediate corrective action in order to comply again with the requirements of the operational limits and conditions.
- 2.3.1.0900. Any violation of the operational limits and conditions shall be investigated and corrective action shall be developed and implemented for preventing the recurrence of the non-compliance.

2.3.2. Commissioning

- 2.3.2.0100. The subsequent step to the construction of the storage and disposal facility and to the technical modification of its systems is the commissioning; it shall be verified that the design objectives are met and thus the storage and disposal facility, its systems, structures and components are capable of safe operation and the maintenance of the conditions for safety storage or disposal.
- 2.3.2.0200. Prior to the commissioning of the storage and disposal facility or its systems, a commissioning work programme shall be elaborated, which

specifies the actions and inspection tasks required for the verification of safety, and the actions, responsibilities and relations of the participating organizations.

2.3.2.0300. The operating and maintenance personnel shall participate in the commissioning of systems categorized to a safety class, in order to ensure that the commissioning becomes an important practical step of the preparation for the operation.

2.3.2.0400. The work programme shall include, at least, the following:

a) the description of the task to be implemented and the conditions of its commencement, the examinations to be performed during the programme, the expected values of their results and acceptance criteria,

b) the arrest points,

c) the process, methods and order of examinations,

d) organizational issues and responsibilities,

e) the minimum number of personnel involved in the programme, their professional qualifications,

f) the fire and labour safety requirements to be complied with during the work, and if the work entails radiation hazards then the radiation protection requirements,

g) the management of non-compliances between parameters prescribed in the work programme and those experienced during the practical implementation.

2.3.2.0500. The commissioning shall be executed according to the work programme. The execution of the work programme and the authenticity of the collected information shall be justified by the responsible personnel participating in the activities.

2.3.2.0600. During commissioning, the examinations assessing and demonstrating the "0" state of safety important systems shall be performed and documented, in order to allow the identification of any subsequent change.

2.3.2.0700. Based on the experience gained during commissioning of the storage and disposal facility the safety report of the facility shall be updated as necessary, including the finalization of the operational limits and conditions.

2.3.2.0800.

2.3.3. Organizational structure of the licensee

2.3.3.0100. The licensee is responsible for the safe operation of the storage and disposal facility, in compliance with all legal and regulatory requirements.

2.3.3.0200. The licensee organization shall be transparent, it shall have clearly defined and described task and resource distribution, cooperation relations and scopes of responsibilities.

2.3.3.0300. The most important aspects for the establishment of the licensee organization is the continuous demonstration of the compliance with the requirements for the safe conditions of the storage and disposal facility, the existence and appropriate performance of safety functions, and the capability of properly preventing of and responding to incidents and accidents. The appropriateness of the organizational structure shall be justified and documented in accordance with these aspects prior to commissioning of the storage and disposal facility and commencement of any organizational change. The establishment, development and operation of the organizational structure shall ensure the operation of the following functions:

- a) management and planning functions,
- b) execution functions,
- c) independent review functions,
- d) support functions.

2.3.3.0400. The licensee may involve contractors to the performance of tasks being in connection with the operation of the storage and disposal facility with the following conditions:

- a) sufficient number of personnel having sufficient expertise and sufficient resources shall always be at the disposal of the licensee in order to know and understand the design basis of the facility, the actual construction and operation of the storage and disposal facility and its systems,
- b) sufficient number of personnel having sufficient expertise and sufficient resources shall be sustained by the licensee for the establishment of the regulations for the contractors, direction, evaluation and supervision of the contractors' work,
- c) the licensee shall take care of the availability of the necessary engineering and technical support in every safety related area,
- d) the services provided by contractors shall not extend the entirety of the design, direction and verification functions of the storage and disposal facility,

e) the operation of the storage and disposal facility shall be supervised by an organizational unit being independent of the operation; the planning of inspections, the approval of results shall be performed by the supervisory organizational unit of the licensee.

2.3.3.0500. The inspection of safety important systems, structures and components, the verification of the safety supervision shall be performed by an organization unit being independent of the operation, which has sufficient authority, expertise, resources, information and decision making rights.

2.3.3.0600. The work of the employees of contractors on safety important system, structures and components shall be approved and verified by an employee of the licensee having expertise relevant to the given work.

2.3.3.0700. The licensee is responsible for providing the personnel with equipment and labour conditions required for the safety work performance.

2.3.3.0800. In order to sustain safety and determine potential safety enhancements that can be reasonably and economically implemented the licensee shall continuously monitor the state of the storage and disposal facility.

2.3.3.0900. The appropriate regulation for the operational processes of the storage and disposal facility shall ensure that the safety related decisions are made based on sufficient and reliable information. The safety related decisions shall be preceded by appropriate analysis and independent safety review.

2.3.3.1000. The scope of responsibilities, rights, lines of command, communication lines shall be clearly determined and documented for the employees.

2.3.3.1100. The organizational and operational rules of the licensee shall contain the requirements for job descriptions. Those rights, obligations, scope of responsibilities, necessary competences and dependency relations shall be established within the organization of the licensee from individuals to the organizations having various sizes. The job descriptions shall include the qualifications and conditions for a given job position.

2.3.3.1200. The possibility of implementing any changes during the operation of the storage and disposal facility by any other person than those employees designated for the given task and having the necessary qualification shall be excluded.

2.3.4. Requirements for employees

2.3.4.0100. The number and expertise of personnel required for sustaining the safe condition of the storage and disposal facility shall be analysed in a systematic manner as described in documents. The necessary and

sufficient number, expertise and capability of safe working of the personnel shall be documented in the safety report of the storage and disposal facility.

- 2.3.4.0200. The licensee shall have long term human power economy plan for the safety important job positions.
- 2.3.4.0300. The human relations, particularly the dependency relations, the effect of cooperation and communication shall be taken into account during the composition of the operating personnel.
- 2.3.4.0400. The personnel designated to operate the storage and disposal facility shall always comply with the requirements for number, educational qualification, professional qualification, expertise, commitment to safety, health condition, physical and psychological aptitude as established for the given task in writing. In addition, the above shall ensure the aptitude of the personnel to perform their tasks in the case of an incident or accident. The compliance with the requirements shall be documented.
- 2.3.4.0500. The requirements for work performance and employees shall be identical, independently of whether the work is performed by the employee of the licensee or a contractor.
- 2.3.4.0600. Appropriate verification system and means shall be provided for the verification of the working aptitude, health, physical and psychological condition, professional qualification and experience of the employees working at the storage and disposal facility.
- 2.3.4.0700. The licensee shall compile an alcohol and drug policy, which includes the drug prevention strategy of the licensee, the purpose, principles, method and regularity of the performance of the safe work performance aptitude examination, and the scope of the employees performing activities entailing particular risk, against whom the random labour safety aptitude examination is justified to be ordered.
- 2.3.4.0800. In order to sustain the high level of safety and physical protection, the licensee shall inform every employee of the established alcohol and drug policy and it shall be made accessible for every employee.
- 2.3.4.0900. The safe work performance aptitude of employees working at the storage and disposal facility shall be regularly verified, in order to sustain the high level of safety and security. Such person is not capable of working, who is under the effect of alcohol, drug (as a result of a positive alcohol or drug test).
- 2.3.4.1000. The safe work performance aptitude examination shall only be performed by a doctor. The doctor shall comprehensively inform the person being subject to safe work performance aptitude examination, a

copy of the document containing the results of the aptitude examination shall be given to the person being subject to the examination.

- 2.3.4.1100. The licensee, in harmony with its comprehensive training policy, shall establish in writing and regularly review the programme of the professional preparation of the personnel, the verification of the preparation, the regular refreshing trainings and the regular verification of the preparation.
- 2.3.4.1200. The training and refreshing training programme, the leadership behaviour and leading by example, support and expectation shall ensure that the personnel on every level of the organization understand the primary importance of safety and properly fulfil their obligations during the normal operation of the storage and disposal facility, prevention of and response to potential incidents and accidents.
- 2.3.4.1300. The training and refreshing training programme shall cover theoretical and practical trainings. The refreshing training shall cover the operational experience and the modifications.
- 2.3.4.1400. The training programme shall pay particular attention to the measures to be implemented during incidents and accidents. The licensee shall ensure for the safety important job positions that the personnel have the appropriate qualification before commencing any activity; such training programmes shall be established, which develops and sustain the expertise of the personnel. The training needs shall be assessed.
- 2.3.4.1500. Appropriate training programme shall be ensured for safety important job positions, based on the continuous assessment of training needs. The trainings shall be provided by lecturers having appropriate qualification. The effectiveness of the training shall be regularly measured; the aptitude of the personnel shall be verified and the experience gained during the verification shall be taken into account during the compilation of refreshing trainings.
- 2.3.4.1600. The training documentation shall include the criteria for the training programme. The management shall be regularly informed of the effectiveness of trainings.
- 2.3.4.1700. The training programme shall cover the management, the personnel responsible for the operation of the storage and disposal facility, technical support and maintenance staff, who shall also know and understand the authority requirements.
- 2.3.4.1800. Personal register shall be established and updated of the training of employees working in safety important job positions, the results of the verification of knowledge, and the exams required for these job positions.

2.3.4.1900. The licensee shall elaborate the procedure of obtaining and renewing of licenses required for safety important job positions. Documented criteria shall be applied for judging whether the professional knowledge and aptitude of the given employee is sufficient for letting him/her going to the regulatory licensing exam.

2.3.4.2000. The personnel responsible for the operation of the storage and disposal facility shall have sufficient safety, radiation protection, fire protection, on-site and off-site emergency response and industrial safety knowledge for the professional, effective and safe performance of their tasks designated to their job positions.

2.3.5. Safety culture

2.3.5.0100. The commitment to safety shall be taken into account as an inevitable aspect during the selection of the management in order to appropriately practice authorizations and perform tasks in agreement with the safety regulations.

2.3.5.0200. The level of the safety culture of people participating in the operation of the storage and disposal facility shall be continuously enhanced in accordance with the international requirements.

2.3.6. General requirements for operation

2.3.6.0100. The appropriate work conditions of the personnel shall be continuously provided; measures shall be taken to allow access to those parts of the storage and disposal facility under incident conditions, where the personnel perform their work. The radiation exposure of the personnel shall not exceed the unacceptable limit values.

2.3.6.0200. The visual and sound indication of signals providing information shall be continuously operable in accordance with the operational documentation.

2.3.6.0300. The functionality of indication, archiving and intervention means shall be continuously maintained and regularly verified in accordance with the safety report of the storage and disposal facility.

2.3.6.0400. The personnel shall be familiar with the content of technical documents supporting operation, covering all the details, including their modifications.

2.3.6.0500. The actual version of the technical documents supporting operation, including the documentations for the incidents and accidents shall be at the disposal of the personnel at the place of work.

2.3.7. Management of incidents and accidents

- 2.3.7.0100. Internal regulations shall be elaborated and applied for the safe management of potential degradation resulting in exceedance of storage and disposal limits for waste forms and waste packages.
- 2.3.7.0200. The implementation instructions and procedures shall regulate the documentation of parameters in the case when the operational and environmental parameters deviate from the permitted limitations. The procedures shall determine the organizational and administrative frames of impact analyses to be made, evaluations to be performed and necessary corrective actions to be determined in the case of deviations.
- 2.3.7.0300. The elaboration of changes of operative documents of operation, temporary modifications, modifications, actions, examinations and experiments beyond the scope of normal operation, temporary operational instructions ordered because of technical needs shall be regulated. The organization responsible for safety being independent of operation shall be involved into the approval process of these documents.
- 2.3.7.0400. The activities implementing actions, examinations and experiments beyond the scope of normal operation, temporary modifications ordered because of technical needs shall only commence if the documents elaborated and approved according to the regulation are available.
- 2.3.7.0500. Every temporary modification shall be clearly identified. The operational personnel shall be appropriately informed of temporary modifications and their impact on the storage and disposal facility.
- 2.3.7.0600. The systems, structures and components of the storage and disposal facility shall not be brought to a state deviating from the effective operational documentation, process and implementation instructions, including the instructions for temporary modifications.
- 2.3.7.0700. The number of simultaneously existing temporary modifications shall be minimized, the duration of their existence shall be limited. The deviating state dealt with as temporary modification shall be terminated and the design state preceding the temporary modification shall be restored in the first technically possible time by eliminating the cause needing the realization of the deviating state.
- 2.3.7.0800. Incident response instructions shall be available for the management of potential incidents analysed in the safety report of the storage and disposal facility and those recognized later in order to restore or replace the lost safety functions. The handling, testing, incident response instructions shall describe the actions required for the restoration of the safe state of the storage facility.

2.3.7.0900. The incident response instructions shall be in agreement with other operating instructions and the accident management guidelines.

2.3.7.1000. The incident response instructions shall ensure that the personnel can quickly recognize those situations, when a given instruction shall apply. Consequently, the entering and leaving conditions of the instructions shall be determined, based on which the personnel can identify the relevant instruction, and if appropriate, can step into accident management guidelines.

2.3.7.1100. Accident management guidelines shall be elaborated for dealing with accident conditions determined in the safety report of the storage and disposal facility in order to mitigate accident consequences, if the actions aimed to restore or replace the lost safety functions were ineffective. The accident management guideline shall be elaborated in a systematic manner, applying a facility specific approach.

2.3.7.1200. The incident response instructions and accident management guidelines shall be verified and validated, as far as possible, in such a form, in which they will be applied, in order to ensure the administrative and technical correctness of the documents.

2.3.7.1300. The method applied for the facility specific validation and verification shall be documented. The effectiveness of the consideration of human factors and technical principles in the instructions and guidelines shall be assessed during validation.

2.3.7.1400. The incident response instructions and accident management guidelines shall be kept up-to-date.

2.3.7.1500. The operating personnel and the technical support personnel shall be regularly trained for the application of incident response instructions, and if possible, for the application of accident management guidelines.

2.3.8. Sustaining the technical state of the storage and disposal facility

2.3.8.0100. The capability of fulfilling safety functions performed by the applied active and passive systems shall be justified in the operational life cycle phase preceding the closure of the disposal facility. The justification shall be made with safety analyses, implementation of system maintenance and inspection programme including ageing management, or with the combination of safety analyses and implementation of programmes.

2.3.9. Maintenance and oversight programme

1. Subject and scope of the maintenance and oversight programme

2.3.9.0100. A maintenance and oversight programme shall be elaborated and implemented on safety important systems for the demonstration of the reliable operability of the storage and disposal facility.

2.3.9.0200. The maintenance and oversight programme shall include:

- a) activities related to repair and replacement of parts, revision and general maintenance, replacement, planning, implementation and assessment of post-maintenance adjustment and requalification, and authentications and calibration of measurements having legal effect,
- b) regular inspection and testing of systems for demonstrating their reliability, in order to determine whether they are capable of operating or a corrective action becomes necessary, and
- c) inspection, assessment and evaluation of ageing of systems due to impacts appearing during operation.

II. Elaboration and review of the programme

2.3.9.0300. The maintenance and oversight programme of safety important systems, structures and components shall be elaborated on the basis of:

- a) safety classification,
- b) inherent reliability,
- c) susceptibility to degradation, and
- d) operational and other experience, results of ageing management programmes.

2.3.9.0400. The acceptance criteria of the maintenance and oversight programme shall be established taking account of design requirements and authoritative technical standards.

2.3.9.0500. The maintenance and oversight programme shall take into account the operational limits and conditions.

2.3.9.0600. The review shall cover:

- a) the ageing processes identified on components,
- b) inspection results,
- c) actual state of components, and
- d) existence of safety margins specified in design requirements and authoritative technical standards.

2.3.9.0700. The data generated during the implementation of maintenance and oversight programmes shall be collected, stored and analysed. The data shall be assessed to identify commencing and recurring failures, in order

to allow initiating corrective maintenance and modifying the preventive maintenance and oversight programme accordingly.

- 2.3.9.0800. The potential impact of the applied maintenance and oversight programme on the safety of the storage and disposal facility shall be evaluated.
- 2.3.9.0900. The documentation of the maintenance and oversight programme of safety important systems, structures and components shall be stored until the transition of the storage and disposal facility to institutional control phase.
- 2.3.9.1000. The maintenance and oversight programme shall be regularly reviewed, taking account of the operational experience; all suggested modification of the programme shall be evaluated considering the availability of systems, safety of the storage and disposal facility, and the compliance with the relevant regulations.
- 2.3.9.1100. The potential impact of the applied maintenance and oversight programme on the safety of the storage and disposal facility shall be evaluated.
- 2.3.9.1200. Optimal balance shall be found during the establishment of the maintenance and oversight programme between the increase in reliability that can be reached by the implementation of the programme and the increase of risk of inoperability due to maintenance. If programmes having maintenance scheduling differing from that of the valid maintenance programmes are introduced, then their impact shall be analysed.
- 2.3.9.1300. The licensee may execute the maintenance and oversight programme or its parts with the involvement of contractors, but it has full responsibility also for such transferred tasks. The licensee shall perform the responsible coordination of administrative, technical and verification activities, paying particular attention to the following objectives:
- a) sustaining the operability of systems to be kept in operation,
 - b) such organization of maintenance activities, which results in as low as reasonably achievable radiation exposure, and
 - c) protection of the people working on the site of the storage and disposal facility and the public in the environment from any unacceptable radiation exposure.

III. Execution of the maintenance and oversight programme

- 2.3.9.1400. The maintenance and oversight programme shall be organized in a way that it does not mean unjustified risk to the employees.

- 2.3.9.1500. Procedures shall be elaborated for the execution of the maintenance and oversight programme, which shall be reviewed and validated with a frequency defined in the safety report of the storage and disposal facility.
- 2.3.9.1600. A work planning and management system shall be established to execute the maintenance and oversight programme according to the licensing conditions and in harmony with the procedures.
- 2.3.9.1700. The licensee shall be prepared for the execution of the maintenance and oversight programme, at least in the scope of complying with safety requirements, even if the contractors designated for contribution cannot perform the designated tasks.
- 2.3.9.1800. Every maintenance, inservice test and inspection shall be performed based on an approved, written procedure, in order to ensure and strengthen the operation of the systems, structures and components in compliance with the established safety requirements .
- 2.3.9.1900. The programmes for maintenance, inservice tests and inspections of the storage and disposal facility shall be reviewed based on the gained experience and shall be modified if necessary.
- 2.3.9.2000. The appropriateness, effectiveness of the maintenance and oversight programme, and the meeting of its objectives shall be monitored with the frequency substantiated in the safety report of the storage and disposal facility; the results shall be analysed.
- 2.3.9.2100. Subsequent to any abnormal event, the licensee shall re-justify the safety functions and functional integrity of the systems concerned by the event; the necessary corrective actions, including oversight and maintenance, shall be accomplished.
- 2.3.9.2200. The measurements and examination instruments used for examinations and tests, together with all of their elements and accessories shall be authenticated and calibrated, what shall be verified before their application. Every instrument shall be clearly identified in the authentication or calibration record. The licensee shall regularly verify its activities in relation to authentication and calibration, in agreement with its management system.

2.3.10. Ageing management

- 2.3.10.0100. If the required technical state is demonstrated by the execution of an oversight programme, then the licensee shall establish such an ageing management programme for the safety classified systems, in the frame of which:
- a) all potential ageing mechanisms of safety important components are identified,

b) the potential consequences of potential ageing processes are determined,

c) the activities aiming at preventing the occurrence of ageing mechanisms, mitigation of consequences and tracing of the evolution of the degradation are determined and executed in order to sustain the availability and reliability of safety important components and to ensure the ability to fulfil the safety functions under the conditions specified in the design basis.

2.3.10.0200. Such monitoring, testing, sampling and inspection activity shall be performed for the evaluation of ageing effects, which ensure the timely identification of processes unanticipated during operation and degradation, and the implementation of the necessary preventive corrective actions.

2.3.10.0300. Such database shall be operated for the effective execution of the ageing management programme, which is capable of collecting, storing and analysing the information in connection with the components falling under the scope of the programme, and supports the determination, optimization of the necessary actions and the coordination of their execution.

2.3.10.0400. The ageing management programme shall be regularly reviewed and updated by inclusion of new information become known in the meantime into the programme and by taking action to deal with new problems raised. The tools and methods developed recently shall be taken into account; the effectiveness of the applied maintenance practice shall be evaluated. During the review, the postulated effects of degradation processes shall be compared with monitoring results; if required, corrective actions shall be implemented.

2.3.10.0500. During the periodic safety review of the storage and disposal facility, it shall be assessed and justified whether the ageing and wearing mechanisms were taken into account and whether the unanticipated ageing induced problems were identified.

2.3.11. Execution of inservice inspections

1. Subject and scope of the inservice inspection programme

2.3.11.0100. If the required technical state of the safety classified systems of the storage and disposal facility is justified by the implementation of an inspection programme, then a documented inservice inspection programme shall be established and implemented for the safety important system, structures, components, and for the pressure retaining equipment and pipelines being under authority supervision in

order to justify the integrity of the systems, structures and components, and to execute the measures required for sustaining their safety state.

2.3.11.0200. The inservice inspection programme shall cover, in accordance with the safety importance of pressure retaining equipment and pipelines, the inspections performed with non-destructive examination, their requirements, the execution of the repeated examination after replacements and repair, and the evaluation of the results.

2.3.11.0300. The inservice inspection programme shall include the inservice inspection, examination of safety important systems, structures and components, and pressure retaining equipment and pipelines falling under authority supervision, in order to determine whether they are capable of operating safely or any corrective action is necessary.

II. Elaboration and review of the programme

2.3.11.0400. The inservice inspection programme shall be elaborated and reviewed in the same way as the maintenance and oversight programme is elaborated and reviewed.

2.3.11.0500. The scope, time schedule, criteria and execution methods of inservice non-destructive tests shall be determined by the licensee and then shall be approved by the atomic energy oversight organization. The cycle time of inservice non-destructive tests shall be determined in a conservative manner, which allows the observation of any degradation of even the most loaded components before their failure.

2.3.11.0600. The tests prescribed in the inservice inspection programme shall be accomplished in the given scope at least once within a cycle time. The licensee shall prepare and submit to the authority the programme of examinations to be performed in the next year by December 31 of the previous year.

2.3.11.0700. The material testing records and data generated during the implementation of the inservice inspection programme shall be collected, stored and evaluated until the closure of the disposal facility.

2.3.11.0800. The licensee may implement the inservice inspection programme or certain parts of it with the involvement of contractors; however it has full responsibility for the transferred tasks. The licensee shall perform the responsible coordination of administrative, technical and verification activities.

III. Implementation of the programme

2.3.11.0900. Procedures shall be elaborated and then regularly reviewed for the implementation of the inservice inspection programme.

- 2.3.11.1000. During the implementation of the inservice inspection programme the systems, structures and components shall be examined, inspected and tested by authorized employees.
- 2.3.11.1100. Subsequent to any abnormal event the licensee shall re-demonstrate the functionality and integrity of the concerned systems and execute the required corrective actions, including examinations and tests.
- 2.3.11.1200. The effective performance of inservice non-destructive examinations the pre-commissioning state of systems, structures and components shall be recorded and the possibility to compare to inservice examination results shall be ensured.
- 2.3.11.1300. If a defect greater than the acceptance criterion is identified, then the potential appearance of defects on components having identical function and construction shall be examined. The scope of additional examinations shall be determined taking account of the nature of the defect and its safety consequences.
- 2.3.11.1400. The inservice inspection of pressure retaining equipment and pipelines of the storage and disposal facility falling under the scope of authority supervision shall be performed by programmes approved by the authorized organization of the licensee. A condition for putting into operation of pressure retaining equipment and pipelines is that they shall possess valid and successful inservice examination. The pressure retaining equipment and pipeline cannot be put into operation and cannot be operated, if its repair, modification and extraordinary examination were not performed according to the plan.
- 2.3.11.1500. The inservice inspections required for keeping pressure retaining equipment and pipelines in operation shall be executed by the end of the year when the effect of the previous examination loses its validity.
- 2.3.11.1600. A pressure retaining equipment or pipeline can be put into operation after an unsuccessful inservice inspection, if the cause of the unsuccessful inspection is eliminated and the inspection is repeated with a successful result.
- 2.3.11.1700. The authority shall be informed on an unsuccessful inspection of any pressure retaining equipment and pipeline falling in the scope of authority supervision, the cause of the unsuccessful inspection and the executed actions required for the assurance of operability.
- 2.3.11.1800. The pressure retaining equipment and pipelines falling in the scope of authority supervision shall have at least two copies of passport, which shall be stored in separate places. In the case of other pressure retaining equipment and pipelines falling under the scope of authority supervision,

the existence of and accessibility to the documentation including technical and administrative data and information characterizing the given equipment or pipeline and justifying its operability shall be ensured.

2.3.11.1900. The first, regular and extraordinary inspections of pressure retaining equipment and pipelines falling in the scope of authority supervision, and any modification and repair shall be documented in their passport. Any note on the method or cycle time of the inservice inspection of a pressure retaining equipment and pipeline falling in the scope of authority supervision shall be taken based on and taking account of authority license or approval.

2.3.11.2000. The inspection, repair and modification of a pressure retaining equipment and pipeline falling in the scope of authority licensing procedure shall be recorded in its passport within 30 days.

2.3.11.2100. The licensee shall provide all human, material, labour safety and technical condition for the undisturbed, safe and professional performance of the inservice inspection of pressure retaining equipment and pipelines. Additionally, a representative of the licensee shall participate in the inspection.

2.3.12. Repairs and replacements

2.3.12.0100. The repair of components shall not reduce the safety of the storage and disposal facility.

2.3.12.0200. The repair can be made

a) without building any part or structural element, especially with cleaning, elimination of contact defect, or machining (removing material) according to approved technological instruction or by additive material (welding), or

b) replacement by part, structural element being identical with or similar to the original one, or

c) the combination of those described above.

2.3.12.0300. Subsequent to repairing a safety important component, as a condition for putting it into operation, the compliance with the technical and quality management requirements for the given component and installation position shall be justified.

2.3.12.0400. The safety important components shall be repaired by applying such programmes that are approved according to an internal procedure. The compliance of experience gained during repairs with the below aspects shall be evaluated by the independent organization of the licensee performing its internal supervision:

- a) the applied repair technology,
- b) the technical state of repaired components, and
- c) safety functionality and reliability of repaired components.

2.3.12.0500. The repair of safety important components and the evaluation of the experience of the repair activity shall be documented.

2.3.12.0600. The repair technologies developed based on designer and manufacturer requirements shall be reviewed regularly and if justified, in order to apply more advanced repair technologies.

2.3.12.0700. As a part of the preparation process for the replacement of safety important components, the quantity of the necessary spare parts shall be determined and made available taking account of designer and manufacturer requirements and inspection and maintenance experience.

2.3.12.0800. The activities relating to the provision of a stock of spare parts shall be performed based on the management system and internal regulation of the licensee.

2.3.12.0900. The licensee shall continuously monitor the availability of spare parts and shall operate a procedure which ensures the prevention and monitoring of potential ageing processes of spare components.

2.3.12.1000. Only properly stored, checked and documented spare parts can be installed, which shall comply with the requirements established for the original ones.

2.3.13. Internal regulation of modification, general requirements

2.3.13.0100. The licensee shall have a change management policy, which ensures the priority of safety and is in agreement with the long term strategy and goals of the licensee.

2.3.13.0200. The licensee shall have a systematic, transparent and accurate change management procedure that is applicable to any type of change. The change management procedure shall include the identification of the external or internal cause of change and the steps of the evaluation, planning, execution and continuous monitoring.

2.3.13.0300. The change management procedure shall apply to every modification.

2.3.13.0400. The modification shall not decrease the level of safety.

2.3.13.0500. The modification related activities shall be performed and supervised by the licensee based on a regulation fitting into its management system. The system of procedures ensuring the technical and safety compliance

of the modifications and the meeting of the safety requirements shall be established taking account of the relevant phases of modifications.

2.3.13.0600. The licensee shall ensure the technical and safety compliance of the modifications and the meeting of the safety requirements with the application of a procedure containing graded processes according to modification categories.

2.3.13.0700. The supervision of modifications and the enforcement of individual authority requirements for modification shall be performed by a designated, independent organizational unit of the licensee. Such employees shall not be designated for supervision or internal independent verification, who have initiated the modification or participated in its planning, preparation and execution.

2.3.13.0800. In order to apply a graded approach, each modification shall be categorized according to its safety importance as follows, with the application of a procedure adjusted into the management system of the licensee:

a) those modifications shall be classified to Category 1, which can be characterized by at least one of the following characters:

aa) the potential dose exposure during the execution of the modification or during normal operation or under abnormal conditions after the execution of the modification reaches 10% of the dose constraint,

ab) the modification changes those principles and conclusions, which provides basis for the design and licensing of the storage and disposal facility,

ac) the modification changes the scope of incidents and accidents taken into account in the safety report,

ad) the modification changes such technical solutions, which are required for meeting the safety objectives established in the safety code, or

ae) the modification leads to the change of requirements basically determining the operation of the storage and disposal facility,

b) those modifications shall be classified to Category 2, which cannot be classified either to Category 1 or Category 3,

c) those modifications shall be classified to Category 3, which can be characterized at least one of the following three characters:

ca) the modification cannot have any adverse safety consequence,

cb) the components belonging to the scope of the modification are not among the safety important components and individual authority licenses do not contain any requirement against them, or

cc) the modification does not entail any damage to defence in depth or physical barriers, or significant increase of dose exposure of the personnel and the public even in the case of any design or execution failure.

2.3.13.0900. The resources required for the preparation for, execution and post-execution operation of each modification and the entirety of the decided modifications shall be at the disposal of the licensee.

2.3.13.1000. A unified register shall be established and maintained for planning and providing the necessary resources, regulated preparation, execution and supervision of modification, which allows the identification of the actual state of modification and the actual schedule of further preparation and execution.

2.3.13.1100. The licensee shall regularly evaluate the effects induced by each executed modification and their entirety, the reached enhancement; and if no enhancement was reached, then the causes of the unsuccessful result shall be identified and further actions shall be determined.

2.3.14. Preparation, execution, review and documentation of modifications

2.3.14.0100. The licensee shall execute the modifications by assessing the safety consequences and reviewing the compliance with the requirements for the given modification in a documented manner.

2.3.14.0200. The licensee shall strive for making modifications only if justified.

2.3.14.0300. A preliminary safety evaluation shall be made, being aware of the objective, scope of and requirements for the given modification, assessing its safety consequences; the modification shall be categorized based thereon. The safety analysis and categorization shall be subject to internal, independent review.

2.3.14.0400. The further preparation for and execution of the modification shall be performed taking account of the categorization agreed by the atomic energy oversight organization.

2.3.14.0500. Documentation substantiating the modification shall be prepared as follows:

a) detailed execution plans or plans providing basis for design in the case of technical modification of systems, structures and components,

b) modified versions and formulation of the conditions for their application in the case of change of technical and regulating documents independently of technical modifications, and

c) new and changed internal regulations, and the formulation of conditions and processes for their introduction in the case of the modification of the management system.

2.3.14.0600. In the case of modification belonging to Category 1 or 2, the safety evaluation relating to the nature of the modification shall be prepared in order to substantiate the background documentation of the modification. In all case, the background document of the modification shall take into account all such safety effect of the modification, which appears during the execution of the modification or subsequent to it in any lifecycle stage of the storage and disposal facility. The background documentation of the modification shall justify that the concept of the modification is in compliance with the legal requirements and that the execution of the modification and the modified system, structure, component, organization, document or management system can be safely applied, if the internal regulations of the storage and disposal facility are fully met. If the modification influences the content of the safety report of the storage and disposal facility, then it shall be updated accordingly as an annex to the background documentation of the modification.

2.3.14.0700. The background documentation of the modification and the documents of the independent review shall be approved by that organizational unit of the licensee, which performs the supervision of the modifications.

2.3.14.0800. Subsequent to the end of execution planning of any technical modification, if the preliminary safety analysis and the categorization of the modification are performed in advance, then the preliminary categorization of the modification shall be reviewed. If, as a result of the review, the modification is classified to a lower category, then the procedural rules valid for the new category shall apply.

2.3.14.0900. If information appearing in any preliminary documentation or substantiating information is changed during the preparation for execution of the modification, then every concerned document prepared for the modification shall be re-issued.

2.3.14.1000. In the case of a technical modification, the modified system, structure and component can be put in operation, if the modification related training programme is completed and the operational documents are updated.

2.3.14.1100. A condition of the modification of the organizational structure, management system, technical and regulating documents is that the documents regulating in general and in detail the operation of the storage and disposal facility shall be available, and the employees shall be aware

of the changes in the regulation to be implemented due to the modification of the organization.

2.3.14.1200. Based on the decision of the licensee, the background documentation of the modification can be made in a merged manner, including the categorization of the modification, the preliminary safety analysis and the categorization based thereon, and the subsequent preparatory activity. A condition for this approach is the demonstration of the compliance of all requirements established for the modification. Even in this case, the execution of the modification can be commenced only after the authority procedure of the modification is completed.

2.3.14.1300. In the case of modification of the organizational structure, the management system, technical and regulating documents, the licensing is made in one step based on the comprehensive background documentation of the modification.

2.3.14.1400. The technical modifications can be put in operation only after the approval of the organizational unit providing the internal supervision and meeting the license conditions and prescriptions.

2.3.14.1500. Subsequent to the modification, a report shall be made on the execution in accordance with the requirements for the modification. The report shall be approved by the organizational unit of the licensee performing the supervision of modifications.

2.3.15. Technical requirements for radiation protection

2.3.15.0100. -

2.3.15.0500.

2.3.15/A. Radiation protection programme

2.3.15.0510. In addition to those provisions established in the government decree on radiation protection, the provisions of these regulations for the radiation protection programme of the licensee shall also be taken into account.

2.3.15.0520. The operating organisation shall ensure the appropriate implementation of the radiation protection programme and fulfilment of this objectives by the supervision, inspection and auditing of the radiation protection methods and procedures.

2.3.15.0530. The dose rates shall be monitored, based on the radiation protection programme, at the location of those activities, where the systems and components may cause radiation exposure, especially during inspection and maintenance.

2.3.15.0600. In order to meet the radiation protection related technical requirements, written and approved regulations shall apply to:

- a) radiation protection monitoring of persons,
- b) the radiation protection monitoring of the storage and disposal facility, the site of the storage and disposal facility and a specified environment of the site,
- c) the continuing and reliable monitoring of radioactive discharges through known discharge routes, and
- d) documentation of the above.

2.3.15.0700. Alerting limits shall be defined in the radiation protection monitoring system, which:

- a) assists preventing the exceedance of authority limits, and
- b) signals the occurrence of adverse processes, degradation of technical barriers or the increase of radiation hazard due to unplanned events in due time.

2.3.15.0800. The documentation regulating radiation protection shall include elaborated and approved procedures and technologies, applying which the corrective actions becoming necessary based on monitoring results can be performed.

2.3.15.0900. The supervision of radiation protection activities shall be performed by an organizational unit consisting of qualified professionals knowing the storage and disposal facility, which organizational unit is independent of the organizations performing operation, maintenance and commissioning and the head of which is capable of and obliged to representing radiation protection aspects in front of the top management of the licensee.

2.3.15/B. Radiation protection organisation

2.3.15.1000. The tasks of the radiation protection officer shall be performed by the radiation protection organisation established within the organisation of the licensee. This organisation shall consist of the licensee's qualified employees, who are well aware of the storage and disposal facility, the actual licensing documentation, the radiation protection aspects of hazards meant by the operation and facility related activities.

2.3.15.1100. It shall be ensured that the leadership of the radiation protection organisation can directly report to the higher management of the licensee.

2.3.15.1200. The radiation protection officer and its deputy shall have license for radiation protection expert activities.

2.3.15/C. Planning of radiation protection training

2.3.15.1300. In addition to the training related requirements of the government decree on radiation protection, the scope of the radiation protection training shall include the specific features of the radioactive waste storage and disposal facility

2.3.15/D. Designation of work areas

2.3.15.1400. The area of the facility shall be divided to controlled, supervised and free zones, taking into account the expected and measured dose rates and radioactive contamination, and the expected doses.

2.3.15.1500. Within the controlled zone, the designation of workplaces and rooms, as well as the working conditions shall be reviewed regularly and in the case of radiation protection relevant modifications.

2.3.15.1600. The potentially contaminated and radiation hazardous areas shall be identified and indicated in order to ensure that the persons entering these areas or staying there are aware of the radiation conditions and their effects.

2.3.15.1700. Technical solutions and administrative measures shall be applied to monitor those areas of the facility, where radiation exposure may be expected in a significant portion of any limit values specified in law, authority resolution and internal regulating documents; entering those areas and staying therein shall be controlled and limited. The monitoring, control and limitation shall be graded to the risk of radiation exposure.

2.3.15.1800. The potentially radioactive contaminated fluids and surfaces shall be considered as radioactive, unless measurement justifies the opposite.

2.3.15/E. Optimisation of radiation hazardous works

2.3.15.1900. The optimisation of radiation protection shall take into account the type of the facility, design aspects and those operational changes, events and modifications occurring during the lifecycle of the facility, which may have affect on radiation protection arrangements.

2.3.15/F. Dose constraint

2.3.15.2000. In addition to the requirements established in the government decree on radiation protection, inspection levels shall be applied to workers, in order to optimise radiation protection.

2.3.15.2100. The occupational dose constraint shall be determined as a value for designing the personal dose of a person subject to occupational radiation resulted by a given facility or practice, as a well determined effective dose or dose equivalent for a person during a given period of time.

2.3.15.2200. The proposal for the dose constraint shall take into account:

- a) the type and nature of radiation, and the means of its prevention,
- b) regional factors, and
- c) anticipated benefit.

2.3.15.2300. In order to keep the dose limits and dose constraints, the licensee shall specify dosimetry and technology warning levels below the permitted limit values. These warning levels shall be specified in the WRPR. The potential exceedance of the reference levels shall be investigated by the licensee.

2.3.15.2400. The technology warning levels shall be specified to timely indicate the degradation of the conditions of processes and components, or the increment of radiation hazard due to unexpected events.

2.3.15/G. Shielding

2.3.15.2500. The doses shall be reduced by the application of radiation protection shielding as high as reasonably achievable.

2.3.15.2600. The licensee shall provide shielding tools of different type and material, which are required for temporary shielding of various works.

2.3.15/H. Personal protecting tools

2.3.15.2700. The licensee shall inspect and control the use of protecting tools, shall maintain their adequate condition, and shall ensure that the users are aware of their purposeful application.

2.3.15/I. Dose planning

2.3.15.2800. Dose planning shall be performed for occupational radiation exposure resulted by work processes being significant from radiation protection point of view.

2.3.15/J. Minimisation of radioactive materials and sources

2.3.15.2900. The unused radioactive materials shall be removed from workplaces.

2.3.15/K. Workplace control and monitoring system

Personal dosimetry control

2.3.15.3000. The licensee shall ensure the radiation protection control of persons staying at the controlled zone with the application of electronic dosimeters having passing operating principle and being continuously readable. If necessary, beta and neutron dosimeters shall also be provided, and the internal radiation exposure shall be determined by accredited procedures.

2.3.15.3100. The licensee shall provide identical level of protection to contractors and the authority during their work performed at radiation hazardous workplaces as to their own employees.

2.3.15.3200. An employee being aware of the local radiation protection rules shall escort the visitors on the site of the facilities. The visitors shall be informed on the rules to be followed; they shall be provided with appropriate protective tools.

2.3.15/L. Control of discharges

2.3.15.3300. The environmental monitoring programme shall be able, with adequate level of reliability, to determine the radiation exposure of the critical group.

2.3.15.3400. The discharge control system shall be designed to detect a significant increase in discharges in almost real time. The system shall provide warning of the detection in almost real time.

2.3.15.3500. The failure of a component shall not have effect the operability of other components of the radiation protection and environmental monitoring system.

2.3.15.3600. The radiation protection and environmental monitoring system shall be verified by an as real as possible test programme prior to the commissioning of the facility. During the verification process, the consequences of accident situations on the system shall be simulated, together with failures and environmental impacts (temperature, overpressure, humidity, vibration and radiation).

2.3.15.3700. The effectiveness and efficiency of the filters used during the operation of systems and components shall be regularly verified and maintained.

2.3.15/M. Decontamination

2.3.15.3800. The potential of decontamination shall be provided at all locations, where the radiation exposure of the operating personnel can be reasonably reduced.

2.3.15.3900. The control, and if necessary the decontamination of persons entering and exiting the controlled zones, the reusable protective clothing and objects used shall be ensured.

2.3.15.4000. The area and resource needs of decontamination shall not reduce the level of nuclear safety.

2.3.15.4100. During decontamination, the initial and the target states shall be determined, the reached state shall be recorded.

2.3.15.4200. The decontamination shall be performed by appropriately trained personnel; they shall be directed by a professional having experience in decontamination.

2.3.16. Management of radioactive waste generated during operation

2.3.16.0010. The activities in relation to the management of radioactive wastes shall be performed in harmony with the national programme on the management of spent fuel and radioactive waste, taking into account the future, off-site radioactive waste management plans.

2.3.16.0100. The licensee shall elaborate a site specific documentation for the management of radioactive waste. The documentation shall include the activities serving for the compliance with the following major requirements:

a) the quantity and activity of radioactive wastes generated during operation shall be optimized,

b) the radioactive wastes generated during operation shall be collected and stored selectively, based on activity concentration and physical state,

c) the dispersion of contamination shall be prevented,

d) all wastes generated during operation shall be treated as radioactive waste, unless the opposite is not justified by documented verification measurements,

e) the release of radioactive wastes out of requirements shall be performed according to effective legal and authority requirements,

f) the activities in the storage and disposal facility in relation to radioactive wastes shall be kept in agreement with the national programme of radioactive waste management, and

g) the quantity of generated radioactive wastes shall be decreased by release in the highest justified extent.

2.3.16.0110. An internal regulation shall be developed and introduced to ensure the realisation of release measures.

2.3.16.0200. The licensee shall elaborate and operate a programme to demonstrate until disposal that the radioactive waste packages, in the whole period of storage, comply with the limiting conditions determined in the safety report.

2.3.16.0300. In order to meet the requirements, the following shall be dealt with in accordance with written and appropriately approved regulation:

a) oversight of the generation of radioactive wastes,

b) collection, classification, storage and oversight of radioactive wastes,

- c) transport of radioactive wastes,
- d) documentation of those listed above, and the necessary instrumentation and resources, and
- e) existence of the necessary procedures, technologies and requirements.

2.3.16.0400. The licensee shall develop and apply a registration system, which includes the place and characteristics, including the owner of each radioactive waste package stored temporarily on the site of the storage facility. The tagging system shall ensure the individual identification of each radioactive waste package during the whole period of storage until disposal.

2.3.16.0500. The accumulation of high quantity of radioactive wastes waiting for treatment or conditioning shall be prevented as justified.

2.3.17. Emergency response

On-site emergency preparedness

2.3.17.0100. The emergency preparedness of the storage and disposal facility shall provide the conditions required for the harmonized and effective emergency response in due time, at appropriate location, under appropriate management and control. The licensee shall be able to use the available resources in a well trained and exercised manner.

2.3.17.0200. The licensee shall establish an emergency response organization having due responsibility and authority, prepared for activation in emergency situations and able to perform its tasks on the site from decision making to operative actions in any phase of the emergency. The head of the emergency response organization is the top manager of the licensee or a person designated by him/her having full authorization for taking actions. Every position of the organization shall be occupied by a person designated in advance. The number of staff of the organization shall be determined in order to ensure the continuous availability of sufficient number of persons having appropriate qualification. The operation of the organization and each of its actions shall be regulated in written documents.

2.3.17.0300. The licensee shall establish and then continuously keep up-to-date the on-site emergency preparedness and response plan of the storage and disposal facility, taking account of the experience gained during operation, exercises and of effective regulations. The emergency response plan shall be in agreement with laws, national, regional and local emergency response plans, international recommendations, and the fire protection plan and the response plan to other disasters of the storage and disposal facility. The emergency response plan shall provide

actions to every emergency situation identified in safety analyses that entails discharge of radioactive materials or radiation exposure. The emergency response plan and the subordinated documents shall regulate the actions planned in every operating state of the emergency response organizations of the storage and disposal facility.

2.3.17.0400. From the commissioning life cycle stage of the storage and disposal facility to its transition to the stage of institutional control the licensee shall be prepared for the identification of emergency situations and the immediate commencement of the emergency response activity. An emergency classification system shall be elaborated for this purpose.

2.3.17.0500. As of the operation life cycle stage of the storage and disposal facility until the transition to the stage of institutional control a person shall always be present on the site, who is authorized to classify the emergency situation, declare the emergency situation and its end, initiate emergency response actions, notification of off-site organizations, who shall be responsible for the performance of these tasks and shall have the information required for effective actions and right to dispose over the equipment required for the execution of the tasks. If the potential accidents of the storage and disposal facility allow that, then the requirement can be complied with by a duty system out of working hours.

2.3.17.0600. An effective alerting and communication system shall continuously be at the disposal of the licensee in order to allow alerting and directing people staying on the site of the storage and disposal facility and external contacts in the case of an emergency.

2.3.17.0700. The licensee shall be prepared for accounting for the persons staying on the site of the storage and disposal facility and protecting their safety. The protective tools required by the protective actions to be introduced, the protection of persons participating in emergency response and the treatment of injured persons subject to radiation exposure or contamination under emergency conditions shall be provided.

2.3.17.0800. The licensee shall prepare for the technological and radiation protection analysis of the emergency situation, estimation of the occurred or anticipated discharges, and forecasting the radiological consequences.

2.3.17.0900. The licensee shall prepare for the documentation of the events occurred during the emergency, the actions implemented and of the content of emergency communication, and for the information of the population and the public.

2.3.17.1000. Basic training, refreshing training with a frequency defined in regulation and practical training shall be provided for the persons

performing tasks in the emergency response organization to properly know and practice their tasks assigned to them in the emergency response plan.

2.3.17.1010. It shall be ensured that the workers identified in the Nuclear Emergency Response Plan are provided with adequate and regularly updated information on the health risks of their interventions, and the protective actions to be implemented. This information shall cover the full spectrum of potential emergency situations and the type of interventions. At the occurrence of an emergency, the information shall be immediately completed in an adequate manner, taking into account the specific circumstances of the given situation.

2.3.17.1020. The licensee shall ensure the training of emergency workers, as appropriate, the training shall include practical tasks.

2.3.17.1100. The ability of the emergency response organization to perform their emergency response tasks shall be verified by regular exercises. The licensee shall prepare long term and annual plans for emergency response trainings and exercises. At least once every two year a full scope exercise concerning the entire organization shall be conducted, which shall involve the organizations responsible for off-site emergency response.

2.3.17.1200. In order to know the tasks to be performed in the case of an emergency the licensee shall provide general emergency response training to every person, who can stay on the site of the storage and disposal facility without escort.

2.3.18. Emergency response

2.3.18.0100. The emergency response activity shall aim at mitigating the consequences of the occurred emergency situation.

2.3.18.0200. The licensee shall perform its emergency response activity pursuant to its emergency response plan.

2.3.18.0300. The emergency response organization of the licensee shall commence its activity immediately after the declaration of the emergency situation. The licensee shall organize and direct its emergency response activity that the consequences of the declaration of the emergency and the emergency response activity do not hinder or endanger the performance of operable safety functions and as far as possible do not degrade the condition of the technical barriers.

2.3.18.0400. The classification of the event to an emergency class shall immediately entail the implementation of the substantiated and justified protective actions of the storage and disposal facility.

2.3.18.0500. During emergency response the licensee shall continuously provide the public with useful, unified, consistent and easily understandable information.

2.3.18.0600. The emergency response organization of the licensee shall continuously assess the evolution of the emergency situation from technology and radiation protection points of view. The licensee shall provide, in its situation and technology reports, regular information on the result of the assessment to the competent authorities.

2.3.19. Fire protection

2.3.19.0100. During the operation of the storage and disposal facility, in addition to the laws on specific fire protection requirements in relation to the use of atomic energy and the method their enforcement in the activities of authorities, and the general fire protection laws, the stipulations of this section shall also be complied with.

2.3.19.0200. Defence in depth shall be provided by the licensee for the fire protection of the operating storage and disposal facility, on the basis of:

a) prevention of fire generation,

b) as soon as possible detection of fires and commencement of fire fighting to reduce damages, and

c) prevention of the propagation of fires, which are not yet extinguished by fire fighting actions, in order to minimize their adverse impact on safety functions and intactness of technical barriers.

2.3.19.0300. In order to prevent fires the quantity of flammable materials and the amount of potential fire sources influencing safety important systems, structures and components shall be regulated in internal documents and shall be minimized. Internal regulations shall be established and introduced to ensure the accomplishment of fire protection measures. The regulation documents shall establish requirements for the regular inspection, maintenance and testing of fire barriers, fire detection and fire exhauster systems.

2.3.19.0400. The measures determined based on fire hazard analysis shall be implemented.

2.3.19.0500. The licensee, in cooperation with the competent national, regional and local organizations shall prepare for the protection against fire, fire fighting activity in case of fire, technical rescue activity; accordingly, fire protection rules shall be established and maintained.

2.3.19.0600.

2.3.19.1000.

2.3.20. Operational experience

- 2.3.20.0100. A programme shall be established and implemented for the regular and continuous collection, screening, analysis and documentation of data, experience and events in relation to the safety of the storage and disposal facility. The facility relevant experience and events reported by similar storage and disposal facility shall also be taken into account.
- 2.3.20.0200. The experience gained at the storage and disposal facility and those from other storage and disposal facilities shall be evaluated in order to identify problems or pre-cursors in connection with safety, and to reveal tendencies showing the degradation of safety or decrease of safety margins.
- 2.3.20.0300. Special attention shall be paid, when the experience is analysed and evaluated, to investigate deviations experienced and reportable events occurred during operation (including maintenance, repair, inspection and review), to evaluate the severity of their actual and potential consequences, and to determined actions to be accomplished for preventing the recurrence of similar deviations.
- 2.3.20.0400. The changing of external impacts and on-site characters shall be monitored within the scope defined in the safety report of the storage and disposal facility. The data shall be analysed with the frequency defined in the safety report to prevent the increase of risk.
- 2.3.20.0500. The implementation of the programme of collection and evaluation of experience shall ensure that experience based results are generated, conclusions are drawn, actions are accomplished, good practice is taken into account, and timely and appropriate corrective actions are accomplished to prevent the recurrence of problems and evolution of adverse effects on safety.
- 2.3.20.0600. The licensee, as far as required and possible, shall keep contact with the organizations participated in design and construction in order to feed back the operational experience, and if needed to ask advice.
- 2.3.20.0700. The licensee shall be responsible for the evaluation of events, the preparation of the investigation report and the accomplishment of investigation and analysis tasks required for the preparation of the report.
- 2.3.20.0800. In the case of safety significant events the preliminary investigation shall be conducted at most within 5 days in order to determine whether urgent measures are required to be implemented.
- 2.3.20.0900. The investigation report shall include:

- a) the sequence of sub-events, the time and circumstances of observation, the name of the person providing the report,
- b) the comparison of the event with previous, similar events,
- c) evaluation of the safety impact, real and potential consequences,
- d) evaluation of the activity of the employees and the management, the appropriateness of regulated processes and prescriptions,
- e) the deviations, their description and safety evaluation,
- f) the identification of the direct, contributing and root causes,
- g) the description of those measures accomplished before the implementation of the corrective measures, which were introduced to prevent the use of an inappropriate product, service, process, location, tagging mode,
- h) the corrective actions aiming at recovering safety, preventing the recurrence of the event, and where appropriate, at enhancing safety,
- i) the immediate measures for the mitigation of the impact of the deviation implemented by the initiator or others,
- j) the potential alternative corrections of the deviation,
- k) the demonstration of the existence of safety margins established in the design (in construction phase),
- l) the specification of design modifications required by the deviation (in construction phase).

2.3.20.1000. The rules of determining, implementation and monitoring of corrective actions aiming at preventing the recurrence of the events shall be regulated.

2.3.20.1100. The new data, scientific results and reports on experience gained at other, similar storage and disposal facilities shall be continuously assessed and utilized.

2.3.20.1200. The safety indicators defined in connection with the operation of the storage and disposal facility shall be regularly evaluated, and if justified corrective actions shall be established.

2.3.20.1300. The experience shall be taken into account during the reviews of operational documents.

2.3.21. Management of the operational documentation

2.3.21.0100. The management of the operational documentation of the whole lifetime of safety important systems shall be regulated in a written and approved procedure, which shall cover at least the following:

- a) technical scope: list of relevant systems, structures and components,
- b) documentation scope: list and specification of relevant documents,
- c) rules of elaboration, verification, approval and issuance,
- d) rules of modification and revoking,
- e) rules of use and archiving, and
- f) rules of regular review of the documentation.

2.3.21.0200. If the elaboration, use and archiving of the operational documentation is performed by more than one organizational unit, then the harmony between the documentation of the units shall be ensured, and the transfer of the documentation between organizational units shall be regulated.

2.3.21.0300. The documented information of the storage and disposal facility shall always be in agreement with the physical configuration of the systems of the storage and disposal facility, and both of them shall be in agreement with the design requirements.

2.3.21.0400. The licensee shall ensure the continuously and up-to-date availability of the information, which is in agreement with the actual physical state and operational characteristics of the storage and disposal facility, in order to support substantiated and safe decision making.

2.3.22. Labour safety

2.3.22.0100. During the performance of labour safety and labour health tasks of the storage and disposal facility, in order to prevent labour accidents and occupational sicknesses, the licensee shall ensure that

1. the simultaneous activities of workers under the employment of different employers in the controlled zone shall be harmonised with the involvement of the local radiation protection officer, and
2. serious labour accidents and occupational sicknesses occurred in the operating storage and disposal facility shall be reported to the atomic energy oversight organisation.

2.4. CLOSURE REQUIREMENTS

2.4.1. Closure of the disposal system

2.4.1.0100. The disposal facility shall be closed in a way, which ensures the performance of the safety functions required in the post-closure stage.

2.4.1.0200. The closure plan of the disposal facility shall ensure the minimum needs for maintenance and supervision during active institutional control. Prior to commencement of decommissioning and closure the

programmes for the execution of the activities shall be updated taking account of the following, as appropriate:

- a)* the actual post-decommissioning or post-closure state of the disposal facility, the determining characters of disposed wastes,
- b)* loading and closure of the environment hosting the disposal,
- c)* dismantling of unnecessary systems, structures and components, removal of unnecessary buildings,
- d)* recovery of the environment,
- e)* procedures of the storage of information on disposed radioactive wastes and the environment hosting the disposed wastes.

2.4.1.0300. Any modification of the approved decommissioning and closure plans shall be planned, authorized and accomplished in compliance with the requirements for modifications.

2.4.2. Institutional control of the disposal facility

2.4.2.0100. The environmental parameters, processes and the measurable concentration of radioactive isotopes in environmental elements shall be monitored in the active institutional control phase.

2.4.2.0200. In the case of surface disposal facilities, the maintenance of the accessible components of the radioactive waste disposal system and the limitation of the use of the site or other purpose can be taken into account.

2.4.2.0300. It shall be justified for the transition to passive institutional control phase that:

- a)* the results of the monitoring programme are in harmony with those described in the safety report, and
- b)* limitation of the use of the area and any other measure that might be justified in the post-closure period are specified.