

**Annex 3 to Govt. decree 155/2014. (VI. 30.) Korm.
Safety Code**

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Volume 3: Site survey and assessment of the storage and disposal facility, siting of the storage and disposal facility

3.1. INTRODUCTION

3.1.1. Goal of the Code

3.1.1.0100. The goal of the code is to determine the requirements for the survey and assessment of the site of the planned storage and disposal facility, and for the siting of the facility, in the period from the selection of the formation potentially applicable to host the storage and disposal facility until the submission of the construction license application of the storage and disposal facility.

3.1.2. Scope of the Code

3.1.2.0100. The scope of the code covers the entirety of the assessments made for the selection of the site for storage and disposal facility that is appropriate from safety point of view and for the determination of the design basis data (hereinafter referred to as site survey), and the siting requirements.

3.1.2.0200. The code shall not apply to the environmental impact assessment of the site survey and the planned storage and disposal facility.

3.1.2.0300. The provisions of Section 3.2 shall apply to the site survey of each storage and disposal facility falling under the scope of these regulations. The general provisions of Section 3.3 shall apply with the differences determined in Section 3.4. The specific requirements for certain types of storage and disposal facilities are determined in Section 3.4.

3.2. GENERAL SITE SURVEY REQUIREMENTS

3.2.1. Basic requirements for site survey and assessment

3.2.1.0100. The site survey and assessment shall aim at selecting the site of the storage and disposal facility within the designated survey area, determining the characteristics of the site and justifying its suitability.

3.2.1.0200. During the site survey, all those past, present and future potential natural and human induced characteristics, events and processes shall be assessed and evaluated, which affects or may affect the safety of the planned facility, the radiological impact of the facility in the environment during the operating and post-closure period. The impacts and consequences of intentional human actions and processes against the planned storage and disposal facility shall not be assessed and evaluated in the frame of the site survey.

3.2.1.0300. During the site survey, special attention shall be paid to the identification of site characteristics potentially preventing siting, the assessment

and evaluation of factors entailing potential hazards to the surface and underground facilities of the storage and disposal facility, and the specification of those data relating to the site and the storage and disposal facility, which are required for:

- a) its technical design;
- b) its safe operation and the analysis of the impacts of discharges; and
- c) evaluation of long term safety after its closure.

3.2.1.0400. The date of the planned final closure of the storage and disposal facility shall apply to the period of assessments and evaluations from the viewpoint of safe operation. The period for the evaluation of long term safety after closure shall be specified based on the lifetime of the waste disposal system. The specification of the evaluation period shall take into account the timeline of the dispersion of radioisotopes potentially discharged from the storage and disposal facility in the geological formation until reaching the biosphere.

3.2.1.0500. During site survey, the entirety of characteristics, potential events and processes assessed and evaluated based on deterministic considerations and probabilistic aspects shall be demonstrated. Those potential risk factors can be excluded, with appropriate justification, from further assessment and evaluation, the occurrence probability of which does not exceed 10^{-4} /year value during the lifetime of the storage and disposal facility and the occurrence probability of which does not exceed 10^{-2} /year value in the evaluation period of long term safety, and the safety impact of which on the planned waste disposal system can be neglected. The justification of the exclusion shall consider potential accumulating and propagating effects.

3.2.1.0600. The survey and assessment of the site shall be divided to subsequent survey phases, according to the graded approach.

3.2.2. Planning the site survey

3.2.2.0100. A site survey frame programme shall be developed for the planning of the site survey. As a part of it, an individual geological research programme, and research plan for each research phase shall be developed, according to the topics listed in Paragraph 3.2.2.0400.

1. Site survey frame programme

3.2.2.0200. A site survey frame programme shall be developed for the as-planned implementation of the site survey, in compliance with the requirements. The site survey frame programme shall be developed, at first, after the selection of the geological structure potentially suitable to host the storage and disposal facility, at the commencement of the on-scene activities aiming at the selection of

the potential site, and it shall be regularly reviewed based on the results of each research phase.

3.2.2.0300. The site survey frame programme shall determine the following boundary conditions of site survey:

- a)* the nomination of the geological structure potentially suitable to host the storage and disposal facility, the geological location of the survey area;
- b)* the characteristics and quantity of the waste to be stored and disposed;
- c)* purpose of the facility (interim storage or final disposal of radioactive waste) and its type (surface, near surface or deep geological storage and disposal facility);
- d)* the planned life cycle of the storage and disposal facility; and
- e)* division of the site survey to research phases, the purpose of each research phase, its main tasks and planned duration, with the indication of the decision points and licensing procedures.

3.2.2.0400. The site survey frame programme shall determine all those research, development and demonstration activities, which shall be performed in each research phase in order to substantiate the construction license application of the storage and disposal facility. The planned activities shall be presented in detail, according to the progress of the site survey, including the following topics:

- a)* composition and radioisotope content of the radioactive waste to be stored and disposed in the storage and disposal facility, management of the wastes and their conditioning, the physical and chemical properties of the waste form;
- b)* the structure, properties and characteristics, long term behaviour of the waste package (waste form and packaging) and interaction with other elements of the waste disposal system;
- c)* the arrangement of the technical barriers (fitting, built barriers, blockages), their properties and characteristics, long term behaviour and interaction with other elements of the waste disposal system;
- d)* the natural, social and geological formation of the storage and disposal facility, natural processes relevant for the safety of the storage and disposal facility according to Paragraph 3.2.1.0500, the properties and characteristics of the geological barrier, its long term evolution history and interaction with other elements of the waste disposal system;
- e)* the structure and arrangement of the surface and subsurface elements of the storage and disposal facility, the technical-technological solutions of the construction and closure;
- f)* operation of the storage and disposal facility, the transportation, movement, placement, retrieval of waste packages, prevention of incidents, response to and management of accident;

g) measurement, assessment, modeling and evaluation methods; and

h) data management and protection of information.

3.2.2.0500. The site survey frame programme shall present the scheduling of research, development and demonstration activities to be performed in each topic, according to the research phases. The site survey frame programme shall ensure the harmony and links between the topics, the management of content overlaps between tasks, and the entirety of the provision of knowledge and information that is necessary for the justification of the construction license application. The research, development and demonstration activities determined in the site survey frame programme shall be coordinated by the licensee.

3.2.2.0600. The research, development and demonstration activities determined in the site survey frame programme shall be prioritized and scheduled according to the research phases, taking into account the results of the preliminary safety evaluation performed according to Paragraph 3.2.3.0600 and the safety evaluation substantiating the siting performed according to Paragraph 3.2.3.1600. The prioritization and scheduling shall be performed based on the following aspects:

a) the level of knowledge and information, its appropriateness and uncertainty;

b) the significance of the information to be obtained from research, development and demonstration activities to the safety of the storage and disposal facility; and

c) the time need of the research, development and demonstration activities, the urgency and importance of the knowledge and information to be obtained by the given activity to further research, safety evaluation, technical design and licensing procedures.

II. Geological research programme

3.2.2.0700. The geological research programme to be developed as part of the site survey frame programme shall determine all those research tasks, which make possible to know and characterize the natural environment of the planned storage and disposal facility, and to predict its future evolution.

3.2.2.0800. The geological research programme shall specify the most important aspects of geological research, including:

a) the denomination of the rock formation potentially hosting the storage and disposal facility, the reasons of the designation of the formation, the surface and sub-surface extension of the hosting rock;

b) the location of the geological research activity, the selection criteria of the site to be surveyed;

c) the planned depth of the storage and disposal facility; and

d) the division of the geological research to phases, the purpose and main tasks of each geological research phase, the planned duration of the phases, the decision points with the indication of licensing procedures.

3.2.2.0900. The geological research programme shall determine all those geological research tasks, which shall be performed in each geological research phase for the selection of the site, specification of its characteristics, and justification of its suitability. The planned activities and the major tools and research methods to be applied shall be presented in detail according to the progress of the geological research, in the following professional areas:

- a)* nature-geography and socio-economical characteristics of the research area;
- b)* the safety of the storage and disposal facility, nature and human induced processes having affect on the environmental radiological impacts of the facility;
- c)* building geological characteristics of the surface facilities of the storage and disposal facility;
- d)* geological structure of the research area, spatial location of the geological formations and structures, known and potential natural resources;
- e)* water geological aspects of the research area;
- f)* past and current geodynamic processes of the research area and its environment, and the potential future alteration of the geological history of the area;
- g)* mineralogy, mechanical (strength), rock physics and transport properties of the hosting rock.

3.2.2.1000. During the selection of geological research methods and during the planning of the number, type and location of research facilities, and during the selection of procedures and technologies to be applied for the formation of the subsurface area by mining methods, it shall be strived for keeping the damage to the host rock and the geological barrier as low as necessary, not to cause any adverse effect on the safety of the storage and disposal facility. Among the research methods, the non-destructive methods entailing the smallest intervention shall get priority.

3.2.2.1100. The geological research shall be planned to allow monitoring of the geological formation and hydrogeological conditions of the site and the storage and disposal facility

- a)* prior to the siting of the storage and disposal facility (primary state),
- b)* during the siting, construction and operation of the storage and disposal facility (construction transient and secondary state), and
- c)* during the closure and institutional control of the storage and disposal facility (closure transient and tertial state).

3.2.2.1200. The tasks, tools and methods of the geological research, the number and type of the research facilities, and the geological-hydrogeological monitoring system shall be designed in compliance with the requirements of Section 3.3, taking into account the deviations determined in Section 3.4.

III. Site survey plan

3.2.2.1300. The site survey plan shall present the particular research, development and demonstration activities planned to be performed during the given research phase, according to the topics listed in Paragraph 3.2.2.0400.

3.2.2.1400. During the determination of the particular activities and tasks of the site survey plan and the selection of the research methods and tools, the newest proven results of science, the international good practice and expectations, as well as the national research experience shall be taken into account. The adequacy of the planned assessment and evaluation methods shall be ensured by validation and verification.

3.2.2.1500. The geological research tasks to be performed in the given research phase shall be detailed in the site survey plan. The geological research plan of the given research phase shall be developed in harmony with the geological survey frame programme. The planned geological research activities, the major tools and research methods shall be presented according to the topics listed in Paragraph 3.2.2.0900.

3.2.2.1600. The site survey plan shall identify the public administration number of the area of geological research, the EOVS system coordinates of its surface corner points, and the boundary of the research depth. The research area shall be indicated in a way that allows obtaining information on the geological formation of the site and the planned facility, and the placement of the planned geological research facility.

3.2.2.1700. The type, number, planned location, depth and other major characteristics of the geological research facilities planned in the given research phase shall be determined and justified in the site survey plan. The construction of the research facility (research shaft, research pit, underground research laboratory) being part of the storage and disposal facility and to be established by subsurface mining methods shall be initiated if the siting license for the storage and disposal facility is obtained.

3.2.3. Evaluation of site survey results

3.2.3.0100. The results of the site survey shall be presented for each research phase in a closing report and preliminary safety report. The implementation of the site survey frame programme shall be presented in a complex closing report and a safety report substantiating the siting.

IV. Closing report of the research phase

3.2.3.0200. The closing report of the research phase shall be compiled based on the research plan and research license of the given phase. The closing report shall briefly summarize the research preliminaries, and provide detailed information on research, development and demonstration activities performed during the given research phase, and the results shall be evaluated according to the topics listed in Paragraph 3.2.2.0400. The appropriateness of the applied research tools and methods for the purpose shall be evaluated in the closing report.

3.2.3.0300. The closing report of the research phase shall include the data and parameters characterizing the storage and disposal facility and the site, which were determined during the given research phase; their uncertainty shall be evaluated. The data and information obtained during the site survey shall be organized into a unified database, their long term protection shall be provided.

3.2.3.0400. The closing report of the research phase shall present, according to the topics listed in Paragraph 3.2.2.0900, the geological research activities, the major tools and research methods used during the geological research, and the results. In addition, the data observed by the geological-hydrogeological monitoring system established according to Paragraph 3.2.2.1100 during the site survey shall be assessed.

V. Preliminary safety report

3.2.3.0500. Safety assessment shall be made based on the closing report of the research phase, which aims at determining the priorities of the next research phase and narrowing the research area. The results of the safety assessment shall be summarized in the preliminary safety report.

3.2.3.0600. The preliminary safety report shall be compiled according to the international good practice. The preliminary safety report shall provide information on the methodology of the safety assessment, the assessment environment and the time frame of the assessment. It shall provide information on the protection strategy of the storage and disposal facility, the systems and components serving for the performance of the basic safety functions (structure of waste packages, technical barriers, the concept of the layout of the storage and disposal facility, and the geological formation).

3.2.3.0700. Based on the results of the preceding research phase, all those natural and human induced characteristics, events and processes shall be assessed and evaluated in the preliminary safety report, which have or may have influence on the safety of the facility and the environmental radiological impact of the storage and disposal facility based on the evaluation performed according to Paragraph 3.2.1.0500. Evolution history scenarios shall be derived based on this review and the analysis of the anticipated long term evolution history of the facility. The evaluations shall be documented in such a detail that allow the

determination of the justification of the review and the completeness of the derivation of scenarios.

3.2.3.0800. During the safety evaluation, numeric models shall be used for the calculations of the anticipated behaviour of the site and the systems of the storage and disposal facility, the spatial and timely evolution of safety characteristics (criteria). The calculations shall primarily use the particular data and information available about the site and the systems of the storage and disposal facility. Lacking of those, relevant data from the professional literature, and technically-scientifically justified, reasonably conservative assumptions and considerations shall be used. The uncertainty of the used data, applied models and applied assumptions shall be provided in each case, its impact on the evolution of safety characteristics shall be evaluated. The evaluation shall take into account the uncertainty resulted by potential future changes.

3.2.3.0900. Based on the normal evolution history scenario describing the most probable evolution history of the site and the systems of the storage and disposal facility, the dispersion of radionuclides in the waste disposal system shall be assessed. The impact of uncertainties shall be analyzed and evaluated. The contribution of each system component to the fulfillment of safety requirements shall be evaluated by sensitivity analysis, which shall consider the uncertainty of the long term behaviour of the input parameters and the storage and disposal facility. Alternative evolution history scenarios having lower probability but more significant radiological consequences than the normal scenario shall also be assessed. The results of various calculations, analyses and evaluations shall be presented in a clear manner, in both graphical and table formats, to indicate the timely and spatial evolution of safety characteristics (criteria), and the results shall be summarized.

3.2.3.1000. The site survey frame programme, the purpose of subsequent research phases, their relation and scheduling shall be reviewed based on the preliminary safety report. The future research, development and demonstration activities shall be prioritized and scheduled according to Paragraph 3.2.2.0600. Based on the available nature-geography and geological information, taking account of socio-economical circumstances, the area proposed for further geological research shall be designated, while the area not suitable to site the storage and disposal facility shall be excluded from future research. The planned structure of the waste packages, technical barriers and the storage and disposal facility shall be reviewed, the planned waste disposal system shall be technically optimized taking into account the geological properties.

VI. Complex research closing report

3.2.3.1100. A complex research closing report shall be prepared after the completion of the surface geological research phases. The complex research closing report shall be compiled based on the site survey frame programme and the site survey license granting authorization for its implementation. In the complex research closing report, concise information shall be provided on the research, development and demonstration activities performed during the site survey, and their results shall be evaluated according to the topics listed in Paragraph 3.2.2.0400.

3.2.3.1200. All data and parameters characterizing the site and the systems of the storage and disposal facility shall be provided in the complex research closing report, their uncertainty shall be evaluated. The complex research closing report should provide information on the storage place of available data and information, the way of their long term protection, and proposal shall be made on the qualification of unnecessary information.

3.2.3.1300. The complex research closing report shall include the summary geological report on the implementation of the geological research phases and their results. The report shall provide information on the performed geological research activities, the applied major tools and research methods and their results, according to the topics of professions as listed in Paragraph 3.2.2.0900. The summary geological report shall evaluate the applicability of the used geological research tools and methods to their purpose. Based on the lessons learned, proposal shall be made for the geological research tools and methods to be applied during siting (subsurface research and volume allocation).

3.2.3.1400. The summary geological research report shall evaluate the observation data of the geological-hydrogeological monitoring system established during the surface research phases of the site survey. It shall be justified that the observation system is applicable for the monitoring of the siting transient state of the geological formation during siting (subsurface research and volume allocation).

VII. Safety report substantiating the siting

3.2.3.1500. Based on the complex research closing report, the lack of site characteristics excluding the siting and the suitability of the designated site for siting shall be justified in the safety report substantiating the siting. Accordingly, based on the available information, the adequacy of the site and the systems of the storage and disposal facility, and the fulfillment of the safety goals during the operation of the storage and disposal facility and after its closure shall be evaluated. The results of the safety evaluation shall be compiled in the safety report substantiating the siting.

3.2.3.1600. During the compilation of the safety report substantiating the siting, the requirements established in Paragraphs 3.2.3.0700-3.2.3.1000 shall be

complied with. The safety analyses shall be performed primarily based on data and information relevant to the waste disposal system determined during site survey and then optimized according to Paragraph 3.2.3.1100 and the selected site. Data from professional literature, and technically-scientifically substantiated, reasonably conservative assumptions and considerations can exceptionally be used, if justified.

3.2.3.1700. Based on the performed analyses and evaluations, the safety report substantiating the siting shall determine that value range of the input data, which, if complied with, ensures that the storage and disposal facility can be safely operated both in normal operating condition and in the case of an incident, and that the long term safety can be justified for the post-closure period.

3.2.3.1800. The safety of the storage and disposal facility shall be evaluated in the safety report substantiating the siting based on the personal dose or personal risk, and the number of influenced persons. During the determination of the personal dose, every possible radioactive release route and dispersion pathway, and every possible direct and indirect exposure pathway from waste disposal shall be taken into account.

3.2.3.1900. Under design basis conditions assuming the anticipated behaviour of the waste disposal system, the radiation exposure to individuals of the public reference group from the stored and disposed radioactive waste shall not exceed the value of dose constraint either during normal operation of the storage and disposal facility or in the post-closure period.

3.2.3.2000. The external, natural or human induced events and event combinations affecting the waste disposal system during its lifetime, which are out of the design basis, shall be evaluated with the application of risk criteria. Accordingly, the resulted risk of events entailing exceeding radiation exposure to any individual of the public shall not be greater than 10^{-5} event per year.

3.2.3.2100. The site survey programme shall be reviewed based on the results of the safety evaluation substantiating the siting, the purpose, relation and scheduling of future research phases (entailing sub-surface volume allocation) shall be determined. The future research, development and demonstration activities shall be prioritised and scheduled according to Paragraph 3.2.2.0600. The programme of siting activities of the storage and disposal facility shall be compiled.

3.3. SITING REQUIREMENTS OF THE STORAGE AND DISPOSAL FACILITY

3.3.1. *General geological requirements*

3.3.1.0100. A storage and disposal facility can be sited, where

a) the geological formation of the site, the hosting rock and the geological barrier can be well known and modeled based on the current level of science and technology;

b) the characteristics, events and processes of the geological formation are known in detail, their future evolution can be reliably predicted for the lifetime of the waste disposal system;

c) the characteristics, events and processes of the geological formation do not jeopardize the structure and operation of the planned storage and disposal facility, and the required performance of the technical barriers; and

d) the geological barrier is characterized by such properties, which prevent the dispersion of potentially release radioactive isotopes and their accumulation in a critical extent in the geological formation.

3.3.1.0200. In addition to the requirements established in Paragraph 3.3.1.0100, subsurface or deep geological radioactive waste storage or disposal facility can be sited, where

a) the geological formation provides protection against the effects jeopardizing and being harmful to the facility of surface originated weather, erosion, water arrangement changes and human actions;

b) the spatial extension of the hosting rock provides sufficient volume for the construction of underground waste storage and disposal volumes;

c) the hydrogeological conditions ensures that the radioactive isotopes potentially released for the storage and disposal facility can reach the surface after a sufficiently long period of time, and their concentration, due to dilution, decreases to a level acceptable from radiation exposure point of view; and

d) the geological barrier has properties preventing or inhibiting (retaining, delaying, absorbing) the release and dispersion of radioactive isotopes, and these properties will not change during the lifetime of the waste disposal system.

3.3.1.0300. A deep geological disposal facility serving for the disposal of high activity and long half-life radioactive waste can only be sited, where the geological formation itself can ensure meeting the long term radiation protection requirements for the post-closure period.

3.3.2. Nature-geography and socio-economical requirements

3.3.2.0100. The siting of the surface facilities of the storage and disposal facility shall take into account the location of settlement, the public density and distribution, the demographic trends, the current and future expected use of areas, the traffic and communication aspects, and the other nature geography and

socio-economical aspects of the environment of the site, which have influence on the consequences of radiological releases and the implementation of nuclear emergency countermeasures.

3.3.2.0200. The surface facility of the storage and disposal facility shall not be sited nearby such hazardous industrial, agricultural, trade, military, traffic and transportation facility, which may mean hazard to the operation of the planned storage and disposal facility as a result of a fire, explosion, generation of toxic clouds, smoke or heat, if this risk cannot be reduced, by technical solutions, to the acceptable level. In the surroundings of the planned surface facility(ies), the facilities and activities entailing potential hazard shall be assessed in the area having a radius of 10 km, the airports in the area having a radius of 20 km.

3.3.2.0300. The evaluation of the suitability of the site shall take into account the accessibility of the storage and disposal facility, and the safety of its material flow, its energy supply and the transportation route of the radioactive wastes.

3.3.2.0400. The analysis of the dispersion of radioactive discharges shall cover the assessment of the current and future evolution of every such aspect, which may influence the potential consequences of radioactive discharges. In the frame of this analysis, especially the land and water use, as well as the role of the biosphere in the accumulation and transport of radionuclides shall be assessed and evaluated.

3.3.2.0500. In order to make the basic conditions of the site of the storage and disposal facility and its environment comparable with the conditions occurring in its various life cycle stages, basic condition assessment shall be performed prior to the submission of the siting license application of the storage and disposal facility, which shall serve as a reference level for the evaluation of the results obtained during the operation of the storage and disposal facility and during its institutional control. The assessment shall cover the determination of the "0" state of the environmental background radiation and the epidemiology base level of the public.

3.3.3. Requirements for natural and human induced surface processes

3.3.3.0100. The siting of the storage and disposal facility shall take into account the topography, hydrometeorology and flow conditions, and their possible alteration as a function of the planned lifetime of surface facilities and the lifetime of the waste disposal system.

3.3.3.0200. The surface facility of the storage and disposal facility shall not be constructed on a slope steeper than 15 degrees in the case of solid formation and 5 degrees in the case of loose formation, on an area that has strongly divided surface, or on an area that has erosion, slipping or sliding hazard. The stability of

the slopes shall be assessed for the design basis earthquake according to Paragraph 3.3.7.0400.

3.3.3.0300. The surface facilities of the storage and disposal facility, and the shafts and cuts providing access to subsurface facilities shall not be constructed on an area that has flood, internal flood and deposit accumulation hazard. Based on the topography, hydrometeorology and flow conditions of the assessed area, meteorological and hydrological model shall be developed prior to the submission of the construction license application of the storage and disposal facility. The risk of flooding, internal flooding and deposit accumulation shall be evaluated based on the model. The evaluation shall cover impacts induced by extreme hydro meteorological events or by potential failure of water construction facilities.

3.3.3.0400. The surface facility of the storage and disposal facility shall not be constructed on an area that has hazard of a sudden sinking, groaning, collapsing or elevating surface, above karst or formations disposed to karsting, and on the surface impact area of a subsurface natural or artificial hole, mine, unrecultivated deep drilling or other artificial object.

3.3.3.0500. The evaluation of the risk of natural and human induced processes shall take into account the possibility and impact of the combination, simultaneous or subsequent occurrence of various environmental conditions.

3.3.4. Building geology requirements

3.3.4.0100. The surface facilities of the storage and disposal facility shall not be constructed on an area, where low load bearing deposits disposed to soil liquefaction or having special soil mechanic behaviours (material changing its volume, turf, coal and anhydrite) jeopardizing the safety of the storage and disposal facility occur, with the exception if tested technical solutions exist to justify the safety of the facility.

3.3.4.0200. The stability of the load bearing layers shall be evaluated for both static and dynamic loads. The possibility of soil liquefaction shall be assessed in the case of a design basis earthquake according to Paragraph 3.3.7.0400.

3.3.4.0300. In the environ of the foundation of the surface facilities of the storage and disposal facility, the groundwater itself, or as a result of water-rock interactions, shall not form aggressive, corrosive weathering product and solution, and shall not jeopardize the elements of the engineered barrier system.

3.3.5. Requirements of the geological formation

3.3.5.0100. The subsurface facilities of the storage and disposal facility shall not be constructed in such a geological formation, which, due to its complexity and variability, can be assessed with a large number of research facilities for the safety

evaluation and design of the storage and disposal facility that entail significant damage to the geological barrier.

3.3.5.0200. The subsurface facilities of the storage and disposal facility, with special attention to the volumes serving for the storage and disposal of radioactive waste, shall not be constructed in such a geological formation, where the hazards of collapse, water break through, explosion, gassy or gas outbreak, or endogen or exogenous fire according to the mine safety regulation may jeopardize the construction of the facility, the safe operation and closure of the storage and disposal facility.

3.3.5.0300. During the selection of the site, those known or potential nature resources shall be taken into account, the current or future utilization of which may influence the safety of the storage and disposal facility and its environment during the operational and post-closure period, especially

a) the recorded or potential mineral raw material sources, raw material research areas, mine lands;

b) reserve areas and protection structures of operating, future or potential underground drinking water bases;

c) existing and potential sources and protection structures of mineral, healing and thermal waters, and

d) geological structures used for or potentially applicable for the geological storage of carbon dioxide, carbon hydrogen or other gases.

3.3.6. Requirements for hydrogeological conditions

3.3.6.0100. The siting of the storage and disposal facility the hydrogeological conditions and their potential alteration shall be taken into account as a function of the planned operating lifetime of the storage and disposal facility and the lifetime of the waste disposal system. Numeric hydrogeological models shall be used for the assessment and evaluation of the impacts of the climate change, surface erosion, and the alteration of leaking-surgling conditions on the flow system of underground waters, and of the dispersion of radioisotopes potentially released from the storage and disposal facility in the geological formation.

3.3.6.0200. Storage and disposal facility can be sited where natural formations or artificially constructed technical barriers having large extension and low water leading characteristics are above underground volumes used for the storage and disposal of radioactive wastes, which can reduce leaking in or can divert water flow from the storage and disposal facility.

3.3.6.0300. The hosting rock of the storage and disposal facility shall be characterised by low horizontal and vertical water leading capability and downward hydraulic gradient, in order to prevent the potentially discharged

radioisotopes reaching the surface by the down warding water flow. A favourable aspect for the siting of the storage and disposal facility is, if the potentially released radioisotopes when reaching the surface in the bleeding areas, after a potential dilution, can contact the biosphere below the limit value.

3.3.6.0400. Storage and disposal facility can only be sited, where the physical properties and chemical composition of underground waters are favourable, so the water itself or through water-rock interactions cannot form aggressive, corrosive weathering product or solution, cannot jeopardise the elements of the technical barrier system, and can prevent the dissolution of radioactive material during the interaction between the water and the waste.

3.3.7. Requirements for geodynamical processes

3.3.7.0100. The siting of the storage and disposal facility shall take into account the current and future geodynamical processes of the geological formation (elevation and sinking, seismic, tectonic and volcanic events), their potential impact on the planned storage and disposal facility, the characteristics of the geological barrier and the hydrogeological conditions. The impact and consequences of geodynamical processes shall be assessed as a function of the operational lifetime of the storage and disposal facility and the lifetime of the waste disposal system, with the development of alternative evolution history scenarios. The scenarios to be evaluated shall be selected in line with the requirements of Paragraph 3.2.1.0500.

3.3.7.0200. Storage and disposal facility shall not be sited on an area, where, due to intensive lifting and sinking of the Earth's crust, the required safety functions of the technical barrier system and the geological barrier are not sustained in the period taken into account in the safety evaluation, or their sustainment cannot be justified.

3.3.7.0300. Prior to the submission of the siting license application of the storage and disposal facility a micro seismic measurement network shall be installed and operated, which is required for the reliable characterization of the seismic hazards of the site, with the use of the data of the micro seismic measurement network and the available archive and professional literature data.

3.3.7.0310. The hazard curve of seismic hazards and earthquake related phenomena shall be determined by 10⁻⁴/year occurrence probability for the lifetime of the storage and disposal facility, and by 10⁻²/year occurrence probability for the entire period of the long term safety evaluations. The uncertainty of the determination of the hazard shall be evaluated.

3.3.7.0400. The design basis earthquake of the site for the period of the evaluation shall be determined in the summary geological report elaborated according to Paragraph 3.2.3.1400 based on the seismic hazard curve. The free

surface reply spectrum and the appropriate acceleration-time function shall be determined taking account of the non-linear transfer of the surface lawyers, which shall serve as input data for the evaluation of the suitability of the site according to Paragraphs 3.3.3.0200 and 3.3.4.0200, and for the technical design of the storage and disposal facility.

3.3.7.0500. During the site survey, the possibility, the potential consequences and the impacts of dislocations reaching the surface or crossing the subsurface facilities shall be analyzed and evaluated. Radioactive waste storage and disposal facility shall not be sited in the environ of such tectonic structure, break segment, where such surface movement occurred in the last one hundred-thousand years, which exclude the siting of the facility from safety point of view.

3.3.8. Requirements for the properties of the hosting rock

3.3.8.0100. The hosting rock of the storage and disposal facility shall be characterized by such physical, physical-chemical, thermodynamic, mineralogy and geochemical properties, which facilitate decreasing the concentration of radioactive isotopes potentially released from the storage and disposal facility through precipitation, sorption and matrix diffusion, preventing the formation of such particles, colloids, organic and inorganic complexes, which increase the mobility of the radioactive isotopes.

3.3.8.0200. The siting of the storage and disposal facility shall take into account the impact of the self-healing ability of the hosting rock, so the closing ability of boundary surfaces and cracks on the safety of the storage and disposal facility.

3.3.8.0300. In addition to laboratory analyses, the favourable properties of the hosting rock shall be justified at the depth and under the conditions of the planned waste storage and disposal by local measurements and examinations made in drill holes or in the underground research laboratory.

3.4. SPECIAL REQUIREMENTS FOR CERTAIN TYPE OF STORAGE AND DISPOSAL FACILITIES

3.4.0.0100. In the case of a multi-purpose storage and disposal facility, during the assessment and evaluation of the site, all facility-relevant special requirements shall be taken into account, and the more stringent requirement shall be complied with.

3.4.1. Special requirements for the siting of a radioactive waste interim storage facility

3.4.1.0100. In the case of an interim storage facility, the siting requirements in Paragraphs 3.3.2, 3.3.3 and 3.3.4 shall be carefully assessed in detail. The impact of natural and human induced surface processes shall be assessed and evaluated

as a function of the planned lifetime of the facility, at least for the period of one hundred years.

3.4.1.0200. In the case of an interim storage facility, the retention of ionizing radiation, radioactive and other hazardous materials during the operation of the facility, in normal operating state and transient situations shall be ensured by the technical barrier system itself. The properties of the geological formation shall prevent the dispersion even in an accident situation. In the case of an interim storage facility, the requirements in Paragraphs 3.3.5, 3.3.6 and 3.3.8 shall be met only for assessing the limitation of the dispersion of releases, and planning and implementation of emergency measures.

3.4.1.0300. In the case of an interim storage facility, only the impacts of seismic and tectonic events shall be assessed among the geodynamical processes, taking into account the lifetime of the interim storage facility.

3.4.2. Special requirements for the siting of a low and intermediate level, short lifetime radioactive waste surface final disposal facility

3.4.2.0100. Surface final disposal facility can only be sited on positive topography form element, where the maximum level of groundwater is at least five meter below the lowest level of the technical protection.

3.4.2.0200. In the case of a surface final disposal facility, the siting requirements in Paragraphs 3.3.2, 3.3.3 and 3.3.4 shall be carefully assessed in detail. The impact of natural and human induced surface processes shall be assessed and evaluated as a function of the lifetime of the waste disposal system, at least for the period of one thousand years.

3.4.2.0300. In the case of a surface final disposal facility, the retention of ionizing radiation, radioactive and other hazardous materials during the operation of the facility, in normal operating state and transient situations shall be ensured primarily by the technical barrier system. The properties of the geological formation shall prevent and delay the dispersion in an accident situation and after the closure of the facility. In the case of a surface final disposal facility, the requirements in Paragraphs 3.3.5, 3.3.6 and 3.3.8 shall be comprehensively and carefully assessed in detail.

3.4.2.0400. In the case of a surface final disposal facility, only the impacts of seismic and tectonic events shall be assessed among the geodynamical processes.

3.4.2.0500. During the determination of the time period of the assessments and evaluations described in Paragraphs 3.4.3.0300 and 3.4.3.0400, the lifetime of the waste disposal system, and the anticipated time period needed for the radioactive isotopes potentially released from the facility to disperse in the geological formation and to reach the biosphere shall be taken into account.

3.4.3. Special requirements for the siting of a low and intermediate level, short lifetime radioactive waste underground final disposal facility

3.4.3.0100. In the case of an underground final disposal facility, the requirements in Paragraphs 3.3.2, 3.3.3 and 3.3.4 shall be assessed and evaluated in relation of the surface facilities of the disposal facility, as the function of their planned lifetime, at least for the period of one hundred years.

3.4.3.0200. In the case of an underground final disposal facility, the retention of ionising radiation, radioactive and other hazardous materials after closure shall be ensured at the beginning by the technical barrier system, and after its proportional degradation the properties of the geological formation shall prevent and delay the dispersion. Thus, the requirements in Paragraphs 3.3.5-3.3.8 shall be comprehensively and carefully assessed in detail.

3.4.3.0300. The compliance with the requirements in Paragraphs 3.3.5-3.3.8 shall be assessed and evaluated in a quantitative manner, for the period of at least one hundred thousand years, taking into account the anticipated time period needed for the radioactive isotopes potentially released from the facility to disperse in the geological formation and to reach the biosphere.

3.4.4. Specific requirements for the siting of a high activity or long lifetime radioactive waste deep geological disposal facility

3.4.4.0100. In the case of a deep geological disposal facility, the requirements in Paragraphs 3.3.2-3.3.4 shall be assessed and evaluated in relation of the surface facilities of the disposal facility, as the function of their planned lifetime, at least for the period of one hundred years.

3.4.4.0200. In the case of a deep geological disposal facility, the compliance with the long term radiation protection requirements shall be ensured by the geological formation itself. The properties of the geological formation shall prevent and delay the dispersion of radioactive and other hazardous materials released from the disposal facility. Thus, the requirements in Paragraphs 3.3.5-3.3.8 shall be comprehensively and carefully assessed in detail.

3.4.4.0300. The compliance with the requirements in Paragraphs 3.3.5-3.3.8 shall be assessed and evaluated in a quantitative manner, for the period of at least one hundred thousand years, taking into account the lifetime of the waste disposal system. The long term evolution of characteristics, events and processes, and the derivation, assessment and qualitative evaluation of evolution history scenarios shall be performed for the period of at least one million years, taken into account the anticipated time period needed for the radioactive isotopes released from the facility to disperse in the geological formation and to reach the biosphere.

3.4.4.0400. The assessment of the hosting rock according to Paragraph 3.3.8 shall be completed with the careful and in-detail assessment and evaluation of thermal properties. The temperature, melting point, heat transfer ability, thermal expansion coefficient of the hosting rock shall ensure that the heat generation of the radioactive waste to be disposed cannot modify, in dangerous extent, the geo-mechanical properties. It shall be justified that the favourable physical, physical-chemical, thermodynamic, mineralogy, geochemical and hydrogeological properties of the geological barrier taken into account in the safety evaluation will sustain under the effect of heat.

3.4.4.0500. In the case of a deep geological disposal facility, underground research laboratory shall be established based on the siting license, where the suitability of the hosting rock shall be justified with local measurements and examinations performed at the depth and under the conditions of the planned waste disposal. The compliance with requirements for and the future realisation of the planned mining volume allocation, shaft assurance, waste disposal and closure method and tools shall be presented and justified, under inactive conditions, in the underground research laboratory.

3.4.4.0600. Calculations shall demonstrate in the safety report justifying the siting of a high activity or long lifetime radioactive waste deep geological disposal facility that such event or condition cannot occur during the operation of the facility and after its closure, which may lead to enrichment of nuclear material in a dangerous extent in the disposal facility or in its geological formation.