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Background materials

Requirements on the Site in the Site Selection Stage

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**SELECTION OF THE GEOLOGICAL REPOSITORY SITE FOR THE SPENT
NUCLEAR FUEL AND HIGH-LEVEL WASTE**

REQUIREMENTS ON THE SITE IN THE SITE SELECTION STAGE

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1 THE DOCUMENT AIM

The aim of this document is to define the requirements on the site so that they can be used in the course of both phases of the site selection stage. In the phase of the regional mapping perspective areas are defined on the basis of the requirements. Promising sites for the SNF and HLW geological repository site are the output of the phase of the perspective site selection.

The stage of the site selection is characterized by the fact that no new information is acquired during its course. During this stage the existing information is newly interpreted and analogues considered. Obviously, the requirements must take this fact into consideration.

The results of the site selection are therefore an indispensable base on which it is possible to proceed with the site selection in the next stages of works. In the classical itemization of the site selection process the stage of the sites characterization will follow.

2 TERMS AND ABBREVIATIONS USED

2.1 TERMS

In the following text some terms are used in compliance with the definitions of TR-00-12 "What requirements does the KBS-3 repository make on the host rock?" p. 31, 32, (SKB 2000).

Function: The geological repository function means the purpose to which the repository should serve, e.g., its insulating and retarding functions. Function examples: the container should isolate the waste from the environment, the rock should retard the radionuclides release.

Performance: Performance means how well the given function serves to its purpose.

Parameter: Parameter means the physical or chemical entity (property, state, transformation, feature) important for the geological repository. Parameters could acquire various values. Examples: orientation of the aquiferous formation, porosity, pH.

Requirement: Requirement means a condition that must be fulfilled. The requirement could be posed either to the functions or to the individual parameters. The requirement defines the limits (of parameters or function) that are unacceptable in the repository. Example: the requirement that the underground water in the repository depth must not contain any dissolved oxygen can be described on the basis of the substantial safety function that requires that the container integrity (insulation) must not be damaged.

Preference: It points out conditions that must be fulfilled. Preference can refer either to the functions or to the individual parameters. Preference defines what is useful but not indispensable. Example: a preference could state that a rock should exhibit a high thermal conductivity. This preference is based on the designer's preference to store as many containers into the repository limited area as possible.

Geoscientific suitability indicators: They represent those parameters that describe the properties and state of the rock and of the underground water for which exist the site-specific values that could be used in one or more stages of works on siting for proving that

the requirement or preference is fulfilled. Example: presence of Fe²⁺ indicates the absence of oxygen.

Criteria: criteria for the site selection mean the values of the suitability indicators that could be used at the given stage for the determination whether the site meets the specified recommendations and preferences. Criteria are connected with the degree of our knowledge and there they could be changed in various phases of the works. Example: the determination of the Fe²⁺ content for the survey of the water samples quality during the survey could be used as a criterion for the verification of the requirement that the underground water in the repository depth must not contain dissolved oxygen.

2.2 ABBREVIATIONS

EDZ	Excavation disturbed zone
IAEA	International Atomic Energy Agency
GR of SNF and HLW	Geological repository of the spent nuclear fuel and high-level waste
SNF	Spent nuclear fuel
SKB	Svensk Kärnbränslehantering
SÚJB	State Office for Nuclear Safety

3 LIST OF RELATED REGULATIONS

3.1 EXTERNAL REGULATIONS

3.1.1 IAEA Recommendations

- International Atomic Energy Agency (1994): Siting of Geological Disposal Facilities, Safety Series No. 111-G-4.1. Vienna.
- International Atomic Energy Agency (1981): External Man-induced Events in Relation to Nuclear Power Plant Siting. Safety Guide No. 50-SG-S5. Vienna.

3.1.2 Czech laws and decrees

- Act of the Czech National Council (ČNR) No. 114/1992 Coll., on the nature and landscape protection
- Act No. 254/2001 Coll., on water (Water Act).
- Act No. 164/2001 Coll., on the natural healing springs, sources of natural mineral water, natural spas and spa sites and on the amendment of some related laws (Spa Act)
- Act No. 13/1997 Coll., on surface roads.
- Act No. 266/1994 Coll., on railways.
- Decree of the State Office of Nuclear Safety No. 184/1997 Coll., on the requirements of the radiation safety
- Decree of the State Office of Nuclear Safety No. 215/1997 Coll., on the criteria on siting nuclear facilities and very important sources of the ionizing radiation.

3.1.3 Domestic research reports

Woller F. et al. (1996): Critical survey of the archived geological information (Kritická rešerše archivovaných geologických informací) (59 91 0001), RAWRA archive.

Šimůnek P. (1999): Survey of criteria for the RW and SNF geological repository site (Přehled kritérií pro umístění hlubinného úložiště RAO a VP). RAWRA archive.

Procházková D., Roth Z. (1996): Comprehensive study of the earthquake formation process in Central Europe (Komplexní studium procesu vzniku zemětřesení ve střední Evropě). 74 p. Praha.

3.1.4 Foreign research reports

SKB (2000): What requirements does the KBS-3 repository make on the host rock? Technical Report TR-00-12. Stockholm.

4 BASIC FUNCTION

The geological repository basic function is to isolate the waste disposed of from the environment for sufficiently long period of time.

The basic requirement to this function is stipulated in the SÚJB Decree No. 215/1997 Coll., § 4, letter a) and in the SÚJB Decree No. 184/1997 Coll., § 5, Paragraph 1, letter b) and it is specified as follows:

The isolating and retentive properties of the surrounding rock and engineering barriers in mutual combination should be such that the deposited inventory of radionuclides will not cause, after transportation through the barriers and surrounding rock, such contamination of the affected components of the environment that in no calendar year the mean effective dose will exceed 250 mSv in the critical group of population.

The basic requirement mentioned above could be divided into requirements to the geological situation of the host rock and its indicators given in the following table (definition cf. Chapter 2.1.).

Table 1.

Requirement	Indicators
1. Favorable configuration of the rock massif	a) necessary scope and depth of the natural barrier b) favorable morphology
2. Good describability of the rock massif	a) simple geological structure b) petrographical homogeneity c) minimum of secondary transformed rocks and veins or layers of different rocks d) low degree of the tectonic damages and fractures e) absence of raw material deposits and accumulations that could become deposits
3. Good assumption of long-term stability of the massif	a) the rock massif should be stable b) the rock massif should lie in a seismically inactive region c) the rock massif should exhibit suitable rheological characteristics

Requirement	Indicators
4. Favorable geotechnical conditions	a) feasibility of the underground part of the repository b) low tendency to the EDZ formation c) favorable thermal characteristics (good conductivity, low expansivity)
5. Simple hydrogeological situation, no or low movement of the underground water	a) low permeability b) high age of the underground water
6. Favorable hydrochemical conditions (at the repository level)	a) chemical equilibrium b) favorable pH c) reducing conditions d) minimum content of dissolved substances and colloids e) minimum content of complexing substances f) compatibility of the natural surroundings with the engineering barriers materials and with the deposited waste

5 REQUIREMENTS, INDICATORS AND CRITERIA IN THE SITE SELECTION STAGE

(according to SS No. 111 - G-4.1., IAEA 1994)

The document “Siting of Geological Disposal Facilities. A Safety Guide” (Safety series No. 111-G-4.1, IAEA Vienna 1994) divides the site selection stage to:

- (a) the regional mapping phase the output of which are the suitable sites and
- (b) the potential site selection phase, the output of which are the potential sites.

The requirements given below are formulated with respect to the fact that during the stage of the site selection no new data will be accumulated and the selection will be made only on the basis of the assessment of the existing information.

Regardless of the fact that at this stage the rock massif characteristics are of primary importance for the site selection, along to the geological requirements other requirements given by the existing legislation and some relevant aspects of the surface part of the repository are also taken into consideration.

5.1 REGIONAL MAPPING PHASE

5.1.1 Legislative requirements

Quotation of all relevant laws and the full reading of the respective paragraphs are given in chapter 4 of this document.

- The selection of the perspective site should meet all the exclusion criteria of the SÚJB Decree No. 215/1994 Coll., namely the provisions of § 4 letters c, d, e, f, g, h, i, j, n, o, p, q
- The selection of the perspective site should fulfill all legislative provisions hindering the construction of the repository for reasons of the protection of the legislatively protected public interests, particularly of:

- Act No. 114/1992 Coll. of the Czech National Board on the nature and landscape protection §§ 16, 26, 29, 35, 37, etc.,
- Act No. 254/2001 Coll., on water (Water Act) § 19,
- Act No. 164/2001 Coll. on the natural healing springs, sources of natural mineral water, natural spas and spa sites and on the amendment of some related laws (Spa Act)

5.1.2 Legislative preferences

- The decisive conditions of the SÚJB Decree No. 215/1994 Coll. should be fulfilled in the site,
- The site selection should abide the requirements of the following legislative regulations:
 - Act No. 13/1997 Coll. on the roads § 30
 - Act No. 266/1994 Coll. on railways § 8,

The provisions of the legal regulations mentioned above are at this phase considered as preferences, because in absence of other possibilities railways and roads can be moved elsewhere.

5.1.3 Geological requirements, indicators, and criteria

Table 2 given below presents the requirements and indicators of Table 1 provided that they are relevant for the phase of regional mapping, and criteria provided that they can be formulated at present.

Table 2

Requirement	Indicator	Criterion
1	a	Minimum area of 10 km ² in crystalline rocks, 25 km ² in sediments, minimum depth of the crystalline rocks 1 500 m, minimum thickness of the lithologically homogenous layer of sediments chosen for the disposal is 100 m
	b	The access to the perspective site should not be complicated by its morphology
2	a	In the phase of the regional mapping the given indicators for the perspective site selection could be assessed only from the point of view of the geological knowledge of the region and existing geological maps and other sources
	b	
	c	
	d	
	e	
3	a	The site in sedimentary rocks should geodynamically stable for minimum 500 000 years
	b	Cf. SÚJB Decree No. 215/1997 Coll., § 4, letter e)
	c	In this phase of works the assessment could be made only on the basis of regional studies
4	a	In the phase of the regional mapping the assessment could be made only on the basis of the knowledge of geotechnical and physical characteristics of analogous rocks.
	b	
	c	
5	a	Assessment can be made only on the basis of the existing data and analogy
6	a, b	In the phase of regional mapping it is not possible to state criteria and due to a complete lack of information it is not possible to drawn on an analogy.
	c, d	
	e, f	

Without acquiring new information it is not possible to formulate criteria for other requirements and their indicators. In the phase of the regional mapping it will be necessary to assess these requirements with respect to the regional knowledge of the problems.

5.1.4 Other requirements

- No military storehouses, tank or artillery shooting ranges, and bombing polygons should lie in the perspective site,
- The density of population in the perspective site should be as low as possible, the absence of any large municipality is necessary.

5.2 PHASE OF THE PERSPECTIVE SITE SELECTION

5.2.1 Legislative requirements and recommendations

These requirements and recommendations are identical with the requirements and recommendations for the preceding phase of works (cf. chapter 4 for details).

5.2.2 Geological requirements, indicators, and criteria

Table 3 below presents the requirements and indicators of Table 1, provided that they are relevant for the phase of the perspective site selection, and criteria, if it is possible to formulate them at present.

Table 3

Requirement	Indicator	Criterion
1	a	For the situation of the underground part of the repository the existence of a quasi-homogeneous block with a sub-horizontal area of minimum 2 × 1.5 km for a „single-storey“ repository should be anticipated
	b	Morphology of the perspective site should secure its accessibility and exclude the possibility of any land slides, fall of rocks, etc
2	a	The archive data and analogue studies should make the statement on the simple structure of the perspective site possible
	b	The existing knowledge of petrography should allow a statement on the petrographic homogeneity. The monotype composition is not required. In sediments the thickness of the layer of the identical rock composition chosen for the repository should be > 100 m.
	c	No extensive hydrothermal or other secondary changes should be known in the area of the perspective site, the presence of lodes, layers or blocks of different rocks should be minimum
	d	In the area of the perspective site no deposits the mining of which could destroy the insulating and other properties of the natural barrier should exist. There should be no such accumulations the mining of which in future could be anticipated.
	e	In the area of the perspective site must not exist any known deposits the mining of which could damage the insulating and other properties of the natural barrier. There should be no accumulations of minerals the mining of which in future could be anticipated.
3	a	The available information should allow to assume the tectonic and geodynamical stability of the perspective site and its vicinity
	b	The available data should fulfill the exclusion criterion of the SÚJB Decree No. 215/1997 Coll., § 4, letter e)
	c	The available information should allow to conclude that favorable

		rheological characteristics could be expected in a long perspective
4	a b c	The existing data should allow to conclude that after acquiring the relevant data the indicators will be fulfilled with a high probability
5	a b	The existing data and analogues should allow to formulate a realistic assumption of a low permeability, low flow rates and high age of the underground water in the rock massif in the place of the perspective site and in its vicinity
6	a, b c, d e, f	The existing information or analogues should not exclude the assumption on favorable hydrochemical conditions in the repository depth

However, without new, suitably aimed information it is not possible to formulate any criteria for the other requirements and their indicators. It will be therefore necessary to assess these requirements in the phase of the perspective site selection with respect to the regional knowledge of the problems, experience, and analogues. This procedure is not in contradiction with the IAEA recommendation given in the documents mentioned above.

5.2.3 Other requirements

- In the perspective site it should be possible to situate the surface premises (construction site) with the center deviation of max. 5 km,
- An area of maximum 30 ha is required for the siting of the surface premises, in the version without the SNF reprocessing facility the area is substantially lower (10 ha),
- The construction site of the surface premises should have an easy connection to the roads and railways and to the media distribution networks,
- No operational airfield should lie in the distance of 10 km from the surface area fences, the distance to the military and large civil airports is subject to special regulations (IAEA recommendation 50-SG-S5, 1981)
- The minimum distance between the construction site and any residential areas should be such that the zone of emergency planning does not reach into the territory of the community
- The construction site should be at a distance from the state border minimum equal to the emergency planning zone
- Neither the surface nor the underground part of the repository should extend into the community territory regardless of its population

6 LEGISLATION REQUIREMENTS FOR THE SITE SELECTION

6.1 EXCLUSION REQUIREMENTS FOLLOWING FROM THE LEGISLATION

6.1.1 SÚJB Decree No. 184/1997 Coll., on the requirements of the radiation protection

§ 5 The content of radionuclides or of the contamination with them that allows their introduction into the environment Paragraph 1, letter b.

On the basis of SÚJB permit according to § 9, Paragraph 1, letter h) of the Decree only materials, substances and objects containing radionuclides or contaminated by them in such an extent that in no calendar year the mean effective dose of the critical group of

population exceeds 250 mSv could be used outside the working places with the ionizing radiation sources, released into water or atmosphere, deposited in dumps or otherwise introduced into the environment.

Interpretation: the insulating and retention properties of the applied engineering barriers and of the host rock formation are in mutual combination such that the deposited inventory of radionuclides will not cause, after transport through the barriers and rock formation, such contamination of the respective environment components that the absorbed effective dose of a person will exceed the value mentioned above.

§ 26 Disposal of radioactive waste

- (1) Along to the general requirements on the nuclear facilities and working places with the very important sources of the ionizing radiation, the radioactive waste repositories should meet requirements that
 - a) the storage areas of the repository are protected against the bidirectional seepage of water and are dry prior to the repository decommissioning.
 - b) the repository is protected against flood and flooding by rainfall
- (5) The fulfillment of the requirements on the radiation protection in the final disposal of radioactive waste should be demonstrated by the safety analyses of the potential consequences of the radioactive waste disposal. On the basis of the future repository site knowledge the safety analyses should provably and plausibly assess the risks that should be taken into consideration in the period after the repository decommission. The conditions of the radioactive waste disposal are derived from the safety analyses. The effective dose for an individual from the critical group of population is the decisive criterion for the safety analyses.

6.1.2 Decree of the State Office for Nuclear Safety (SÚJB) No. 215/1997 Coll. on the criteria for the siting of nuclear facilities and very important sources of the ionizing radiation

§ 4 Exclusion criteria

The exclusion criteria are as follows:

- a) the expected exceeding of the specified mean annual effective doses of the irradiation of an individual 1) from the critical group of population living at the site of the proposed nuclear facility or of the facility with a very important source of the ionizing radiation (henceforth only „equipment or facility“)
- b) impossibility to timely implement and completely execute all urgent measures to protect the population in the case of a radiation accident of the equipment or facility, particularly with respect to the population distribution and existence of inhabited municipalities in the area of the proposed site,
- c) the existence of krast phenomena in an extent endangering the rock massif stability in the bedrock and overlying layers of the ground or area chosen for siting,

- d) phenomena of post-volcanic activity as, e.g., emission of gases, thermal, mineral, and mineralized waters, detected on the ground or area proposed for siting and in the sites themselves,
- e) achievement or exceeding of the maximum 8 degrees of the calculated earthquake intensity on the MSK-64 scale (the Medveděv-Sponheuer-Kárník scale for the assessment of the macroseismic effects of an earthquake) in the area of the proposed siting,
- f) existence of zones of mobile and seismically active fractures accompanied by the surface deformations and the possible formation of associated fractures, discovered by the geological survey of the grounds proposed for siting,
- g) the occurrence of geodynamical phenomena as, e.g., land slides, block slides, plastic extrusion of the bedrock, and formation of quick soil, endangering the rock massif stability in the chosen area for siting,
- h) the occurrence of existing or expected deformations of the area chosen for siting and of the sites themselves due to the mining of gas, oil, water or deep mining of minerals, application of the minerals leaching and their pumping, that could endanger the rock massif stability in the bedrock or, as the case may be, even in the overlying layers of the construction,
- i) the occurrence of a tectonic activity in the site that could result in the change of the present inclination of the surface grounds selected for the siting in an extent exceeding the specified technological requirements,
- j) the existence of important resources of underground water or mineral waters in the sites, in which the construction or operation of the facility would result in permanent depreciation of the water quality,
- k) bearing capacity of the ground soil on the grounds selected for siting lower than 0.2 MPa, with ground soil that are sagging, highly swelling, or that have the content or organic admixtures higher than 3 per cent, if the layer thickness does not allow their removal or substitution,
- l) the occurrence of geological conditions of the selected area for siting as, e.g., loose water-bearing soil or soft compact soil, requiring the 3rd degree of the tunnel driving,
- m) in the area of the underground works the impossibility of covering the main parts of the underground construction with a rock massif of thickness higher than triple width of the underground construction, minimum 30 m,
- n) the existence of old mining activities in narrower sites in which there is a danger of undermining, water breakout and of the destroying effects of large mine or mountain quakes
- o) the occurrence of raw materials mining in narrower sites that could have an unfavorable effects on the construction and operation of the facility or equipment,
- p) intrusion of inundation areas of streams, inundated at Q100, and of areas that can be inundated due to accident of water reservoirs into grounds selected for the site,

- q) intrusion of the protection zones of highways and railways into grounds selected for the site.

6.1.3 Act No. 114/1992 Coll. of the Czech National Council on the nature and environment conservation

§ 16 Basic protection regulations of national parks

- (1) In the entire national park territory it is forbidden:
 - b) to dispose waste that originated outside the territory of the national park and to dispose other waste except in sites set aside with the consent of the nature conservation authority,
 - k) to build new highways, roads, railways, industrial facilities, residential areas, navigation canals, high-voltage transmission lines and long-distance pipelines.

§ 26 Basic protection regulations of the protected landscapes

- (1) In the entire protected landscape territory it is forbidden:
 - a) to dispose waste except in sites set aside with the consent of the nature conservation authority,
 - i) to change the preserved natural environment contrary to the specified conditions of the protected landscape protection.
- (2) Moreover, in the protected landscape territory it is forbidden:
 - a) to issue permits for and to situate the erection of new buildings,
 - b) to permit and to change the use of the territory,
 - c) to change the existing structure and areas of plantation, provided that it does not follow from the care policy of the protected landscape

§ 29 Basic protection regulations of the national nature reserves

In the entire national nature reserve it is forbidden:

- b) to issue permits and to situate the erection of buildings
- k) to change the preserved natural environment contrary to the detailed conditions of the national natural reserve protection.

§ 35 National nature monuments

- (2) Any changes or damages of the national nature monuments or their economic exploitation are forbidden if there is a danger of their damage.

§ 37 Protection zones of the especially protected areas

- (1) If it is necessary to protect the especially protected areas against interference from the neighborhood a protection zone could be declared in which activities and interferences could be specified that are permitted only with the consent of the nature conservation authority. The protection zone is declared by the same authority that declared the especially protected area using the same procedure. If a protection zone of a national nature reserve, nature reserve, or nature monument is not declared, the zone is the area at a distance of maximum 50 m from the especially protected area boundary.

- (2) In the protection zones the consent of the nature conservation authority is necessary for any construction works, terrain changes, water-management works, changes of the ground plantation, and for the specification of the economic activities in forests.

6.1.4 Act No. 138/1973 Coll., on water (Water Act)

§ 19 Protection zones

- (4) In the protection zones it is forbidden to perform any activities endangering or damaging the yield, quality or wholesomeness of the water resources. These activities are specified by the water-managing authority after negotiations with the respective state administration bodies on the decision on the declaration or changes of the protection zone according to the Paragraph 3. In the decision on the declaration or changes of the protection zones the water-managing authority could also decide, after negotiations with the respective state administration bodies, on the restriction of the use of properties and to state the conditions of protection.

6.1.5 Act No. 164/2001 Coll., on the natural healing sources, sources of natural mineral waters, natural spas and spa sites and on the amendments to the related laws (Spa Act)

§ 21 Determination of the protection zones

- (1) The ministry declares protection zones in order to protect the sources against activities that could unfavorably affect their chemical, physical, and microbiological properties, their wholesomeness, and also the water resources and yields of the sources.
- (2) The proposal of the protection zone should be based on the analysis of the source yield limitation, quality and wholesomeness risks. The protection zones are declared so the intended purpose is met and the justified interests of legal and physical persons in the respective area will be affected only in the necessary extent. The protection zones are usually declared in two degrees.
- (3) The protection zones of the individual sources are declared on the basis of expert opinion, worked out by a professionally qualified person. The protection zones could also be changed or cancelled if the reasons for their declaration according to this Act had changed or disappeared.

6.1.6 Act No. 13/1997 Coll. on roads

§ 30 Road protection zones

- (2) For the purposes of this Act the road protection zone is an area given by perpendicular planes of the height of 50 m and at a distance of:
- a) 100 m from the axis of the adjacent lane of the highway, speedway, or local speedway, or from the d axis of their crossing; if the thus delimited zone would not comprise the entire area of the rest area, the zone borders are given by the borders of the road grounds,
 - b) 50 m from the road axis or axis of the adjacent lane of other roads of the class I and of other local roads of the class I,
 - c) 15 m from the road axis or from the axis of the adjacent lane of the road of the class II or III and of the local roads of the class II.

6.1.7 Act No. 266/1994 Coll. on the railways

§ 8 Railway protection zones

- (1) The railway protection zone is an area on both sides of the railway, the borders of which are given by a perpendicular plane situated:
 - a) 60 m from the axis of the outside rails, but minimum 30 m from the borders of the railway perimeter for the national and regional railways,
 - b) 100 m from the axis of the outside rails, minimum 30 m from the borders of the railway perimeter for the national railway built for speeds exceeding 160 km/h,
 - c) 30 m from the axis of the outside rails for sidings,
 - d) 30 m from the borders of the railway perimeter, for the special railway tunnels 35 m from the axis of the outside rails for special railways,
 - e) 10 m from the carrying cable, transport cable or from the axis of the outside rails for cable cars (or railways)
 - f) 30 m from the outside tramway rails and 30 m from the outside trolley cable for the tramway or trolleybus railways.
- (2) For railways led on surface roads and for sidings in the closed premises of a plant or harbor a protection zone is not established.

§ 9

- (1) In the railway protection zone it is permitted to build and operate constructions, execute mining activities and other activities performed by mining procedures, to operate a shooting range, to store explosives, dangerous waste, and to build light sources and colored surfaces that can be confused with railway signals only with the consent of the railway administration and under conditions specified by it.

6.2 CONDITIONAL REQUIREMENTS FOLLOWING FROM THE LEGISLATION

6.2.1 Decree No. 215/1997 Coll. of the State Office of Nuclear Safety (SÚJB) on the criteria on siting nuclear facilities and very important sources of the ionizing radiation

§ 5 Conditional criteria

Conditional criteria are as follows:

- a) other karst phenomena that are not quoted in § 4 letter c) of this Decree and the active geodynamic phenomena in the sites chosen for sitting,
- b) unfavorable properties of the foundation soil, surrounding soils and rocks on the grounds chosen for sitting,
- c) achievement of the maximum intensity of the calculated earthquake intensity in the limits of the degrees 7 - 8 of MSK-64,

- d) occurrence of the hydrogeological conditions on the construction grounds that make difficult the monitoring and prediction of the underground water behavior,
- e) occurrence of aggressive underground waters with a possible contact with the building construction on the grounds chosen for siting,
- f) occurrence of well permeable soil and of the underground water level at a depth less than 2 m under the assumed level of the rough leveling of the terrain on the grounds chosen for the siting,
- g) high bulk permeation or fissure permeability of the rocks discovered by the geotechnical survey of the underground facilities,
- h) occurrence of geological conditions requiring the 2nd degree of the tunnel digging in the construction of the underground facilities,
- i) occurrence of extremely unfavorable conditions for the dispersion of exhausts into the atmosphere given first of all by the morphology of the sites,
- j) the existence of large continuously forested areas in the sites chosen for siting, where a possible fire of the forest stands would mean a danger for the facility or working place or, as the case may be, the danger for their operation and workers,
- k) occurrence of industrial production, power sources, roads, railways and water transport routes and storage of dangerous materials in the narrower sites that could under unfavorable circumstances endanger the facility or working place, their operation and their workers,
- l) interference of the routes and protection zones of gas lines, oil pipelines, pipelines for other materials, and of the underground reservoirs of the transported materials into the grounds chosen for sitting,
- m) occurrence of the broadcasting and TV transmitters and their protection zones on the grounds chosen for sitting,
- n) interference of the airfield protection zones, namely of their takeoff and landing areas and of the ground objects of the airfield facilities into the sites,
- q) the possibility of an airplane fall with the impact effects exceeding the resistance of the building with the facility or working place, with the probability higher than 10^{-7} year⁻¹.

7 CHANGES AND AMENDMENTS

Revision	With effect from	Changes
0	20 June 2002	Basic version

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