

Note:

This is a translation of the ESK Statement entitled “Stellungnahme zu einer möglichen Änderung des § 21 Standortauswahlgesetz”.
In case of discrepancies between the English translation and the German original, the original shall prevail.



STATEMENT by the Nuclear Waste Management Commission

Statement on a possible amendment to § 21 of the Site Selection Act

TABLE OF CONTENTS

1	Advisory request and course of events	2
2	Background	2
3	Evaluation of § 21 StandAG	3
4	Statement by BGE on site protection (7 June 2024)	5
5	Drilling and other projects	5
6	Recommendation of the ESK	6
7	Documents	8

1 Advisory request and course of events

In the site selection procedure for a repository for high-level radioactive waste, areas that are considered to be the safest possible locations for disposal must be protected from change. § 21 StandAG [1] stipulates in this regard that projects with a depth of more than 100 metres in these areas require approval in agreement with the Federal Office for the Safety of Nuclear Waste Management (BASE) [2]. There is an interest in reducing the effort associated with the regulations without compromising the protection of areas potentially suitable for a repository.

On 15 May 2024, the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) asked the Nuclear Waste Management Commission (ESK) for a statement. The statement in hand is intended to provide an opinion on whether simplifications would be advisable for drillings or all conceivable projects within the meaning of § 21 StandAG. Proposals in this regard were also submitted by BGE on 7 June 2024 [3]; these must also be evaluated with regard to the adequate protection of potential repository sites.

At its 103rd meeting on 13 June 2024, the ESK's Committee on FINAL DISPOSAL (*Endlagerung radioaktiver Abfälle* - EL) set up an ad-hoc working group (AG 21) to advise the BMUV on the above-mentioned matter. The ad-hoc working group drafted a statement in five meetings. Two meetings were used for exchanges with external experts. The EL Committee adopted the draft statement at its 105th meeting on 12 December 2024. The ESK adopted this statement at its 120th meeting on 30 January 2025.

2 Background

At the 103rd meeting of the ESK's EL Committee, BASE reported that it had processed almost 10,000 approval procedures since 2017 in connection with the protection of sites in accordance with § 21 StandAG. Due to the high number of procedures and the varying nature of the cases, this involves a great deal of time and effort. The law stipulates that approval procedures must be completed within eight weeks before an implied approval takes effect. The average processing time is approximately three weeks. Complex procedures are usually completed within six weeks. According to BASE, no application has been rejected since the start of the site protection programme in 2017, and 277 procedures were completed without approval because they had been settled otherwise.

Most of the procedures concern geothermal drilling at depths of 100 to 200 metres. According to BASE, around 96.4% of all projects are in the 0 to 200 metre depth range. Approximately 98% of these are geothermal drilling projects, while groundwater drilling accounts for around 1.6%. Projects that do not involve drilling are not highly represented, accounting for around 1% of the total.

According to the StandAG, the minimum depth of the upper boundary of the containment-providing rock zone (*einschlusswirksamer Gebirgsbereichs* - ewG) is 300 m. However, a depth of > 500 m is considered favourable (Annex 2 to § 24(3) StandAG). The containment-providing rock zone and, in the case of crystalline host rock, any technical and geotechnical barriers represent the essential barriers for the safe containment of radioactive waste (EndlSiAnfV, §4 [4]). The overburden mainly serves to protect against erosion and other external

influences on the containment-providing rock zone and the emplacement area. Where applicable, it can contribute to hindering or delaying the migration of contaminants.

Projects with final depths of less than 300 m would therefore mainly affect the overburden. Against this background, there is discussion as to whether and under what conditions it would be possible to increase the depth at which projects require approval in agreement with BASE without jeopardising the integrity and long-term safety of the containment-providing rock zone.

3 Evaluation of § 21 StandAG

§ 21 StandAG protects potential areas that are considered to be the best-possible safe locations for disposal.

For projects at a depth of 100 m or more that are located in identified areas of the site selection procedure, the competent authority decides in agreement with BASE.

Paragraph 1 defines the protection objective (*„Areas considered as best-possible safe site for disposal are to be protected against any change which may affect their suitability as a repository site.“*) [1].

Paragraph 2 standardises the conditions under which a new project may be approved in areas where rock formations suitable for disposal are available without compromising the protection objective. Here, clearly defined requirements depending on the storage and the rock must be taken into account. The specifications concern areas *„where at depths from 300 to 1,500 metres below ground level stratiform rock salt or claystone formations with a thickness of at least 100 metres, salt formations in steep stratification or crystalline rock formations with a vertical extent of at least 100 metres are present or can be expected“* [1]. Under these boundary conditions, new projects may only be approved if at least one of the following five requirements for approval (§ 21(2) sentence 1 nos. 1–5 StandAG) is met.

- **No. 1:** Projects may be approved if, based on already available data, it is apparent that the proposed site is located in an area for which at least one exclusion criterion under § 22 StandAG applies or at least one of the minimum requirements under § 23 StandAG is not met.
- **No. 2:** Projects may be approved if the project is closely related in spatial terms to measures already taken which have had a similarly strong underground impact. Whether a close spatial connection exists must be assessed on the basis of the overall geological and, where applicable, regional planning context.
- **No. 3:** Projects may be approved if the project “affects” a rock formation potentially suitable as containment-providing rock zone whose petrographic composition, tectonic situation and storage conditions are very homogeneous over a large area, both laterally and vertically. Here, the total area of the homogeneous area must be ten times the area required for the realisation of the repository.
- **No.4** allows drillings with final depths of 100 to 200 m where

- a) „...no rock strata can be significantly damaged which can provide long-term protection of underlying strata suitable for disposal or which can act as an additional barrier for the repository in the long term [1],
- b) “...in cases where at the location of the intended project at depths from 300 to 1,500 metres below ground level stratiform rock salt formations with a thickness of at least 100 metres, salt formations in steep stratification with a vertical extent of at least 100 metres are present, the salt table is 400 metres below ground level, or at a higher salt table the borehole and the measures associated with this borehole do not damage the salt formation and no significant impact on groundwater in the area of 50 meters above the highest point of the salt table can be caused” [1].

According to BASE [2] “... the legislator assumes that this depth range (100–200 metres) cannot be considered a containment-providing rock zone or emplacement area and that, at the very least, these boreholes cannot cause direct damage to such an area.”. The conditions set out in letter b) of No. 4 are intended to prevent the proposed drilling from activating or intensifying subsrosion processes at the project site.

- **No. 5** provides for the legal possibility of approval in the event of unintended hardship, in accordance with § 9g(4) AtG and taking into account the principle of proportionality, provided that there are no overriding public interests that would preclude approval.

„It is for the competent authority to decide on the approval of a project on the basis of sentence 1 nos. 1 to 5 in agreement with the Federal Office for the Safety of Nuclear Waste Management. [...] Agreement on the approval of drillings to a final depth of 200 metres on the basis of sentence 1 No. 2 or 4 is deemed to have been given if the Federal Office for the Safety of Nuclear Waste Management has not made a statement concerning the agreement within eight weeks after notification of the project by the competent authority” [1].

Paragraph 3 stipulates that, with the publication of the interim report, site protection shall be limited to identified areas, which also include all sub-areas, and to areas that have not been classified due to insufficient geological data¹. Furthermore, Paragraph 3 stipulates that the provisions of Paragraph 2 shall be replaced by decisions of BASE at the end of Phase I.

Paragraph 4 stipulates that site protection must also be observed when reporting drilling work in accordance with § 127(1) No. 1 of the Federal Mining Act.

Paragraph 5 stipulates that BASE may issue notices regulating site protection in areas being explored in Phases II or III of the site selection process.

Paragraph 6 ensures in accordance with § 9g(5) AtG that the owners concerned and other authorised users can claim compensation in the event of an impairment of use lasting longer than five years as a result of the general ruling.

¹ Such areas were not identified in the Sub-areas Interim Report.

4 Statement by BGE on site protection (7 June 2024)

In its proposal [3], BGE recommends increasing the drilling depth without requiring approval to 300 metres as part of site protection measures.

BGE's reasoning is based primarily on the “*favourable*” assessment for a depth of the upper boundary of the containment-providing rock zone of > 500 m specified in the geoscientific weighing criteria (geoWK) of the StandAG and on findings from the methodology currently being developed by BGE and the application of criteria from the representative preliminary safety analyses (*repräsentative vorläufige Sicherheitsuntersuchungen* - rvSU) for identifying investigation areas in Step 2 of Phase I of the site selection procedure.

BGE explains that an overburden that is as thick as possible or a large covering provides greater robustness and additional safety reserves for protecting the host rock area with barrier effect (WbB), e.g. against erosion and glacial channel formation.

In Steps 1 and 2 of its ongoing rvSU, BGE concludes that minimum depths for the upper boundary of the containment-providing rock zone for all host rock types are expected to be at significantly greater depths than those stipulated in the minimum requirements of the StandAG (> 300 m). For northern Germany, for example, it states that, when considering maximum channel depths and a safety distance of 100 m, clear safety disadvantages are to be expected at depths of less than 700 m [3]. In general, it states that “*safety advantages are to be expected for areas with a WbB of more than 500 m depth*” [3].

Due to the possibility of subsrosion processes, clear safety disadvantages are to be expected for rock salt formations at depths of less than 600 m [3]. For crystalline host rock units, BGE states that due to the occurrence of fissures and the resulting increased rock permeability, “*clear safety disadvantages are to be expected above a minimum distance of 500 m from the crystalline surface*” [3].

Even though BGE is currently unable to assess the consequences of individually more severe rock damage in shallow boreholes and the influence of boreholes in the overburden on dose calculations, it considers these aspects to be negligible. The effects of boreholes with depths of less than 300 m are considered acceptable. BGE bases its findings on the rvSU and assumes a minimum depth of 500 m for the upper boundary of the containment-providing rock zone for selected sites in its recommendation.

5 Drilling and other projects

Technically used boreholes represent a linear, mostly vertical and spatially very well-defined penetration of the rock with a narrowly limited diameter. Boreholes for geothermal probes (*Erdwärmesonden* - EWS) are designed as self-contained heat circulation systems within the casing (full piping). Due to the complete cementation of this casing, they are not an impermissible connection between different groundwater horizons in relation to the penetrated rock horizons. This means that, from a hydraulic point of view, any adverse impact on the groundwater can be ruled out if the drilling is carried out to the proper standards. This hydraulic separation of different horizons along the drilling depth is independent of whether such technically used and

cemented boreholes are completely closed and thus sealed off from the overlying rock (e.g. EWS) or are opened as planned in the target horizon (e.g. well).

Unlike closed, fully piped systems, more significant impacts on the rock mass cannot be ruled out for non-fully cased boreholes or non-closed systems.

In principle, all boreholes in Germany must be permanently sealed in accordance with the state of the art².

Interventions in the overburden with depths greater than 100 m, for example in the course of mining exploration (prospecting and exploration drilling, deep excavations, exploratory shafts and ramps) or mining operations, are per se part of a regulatory approval process according to mining law in which the competent approval authority involves all other authorities. In areas according to §21 StandAG, BASE is also automatically involved.

All other projects, in particular mining projects in open-cast and underground mining, have to be distinguished from drilling. Examples include ditches, workings, caverns or tunnel structures. Such projects can have varying degrees of impact on the surrounding rock in terms of area and depth, e.g. on erosion behaviour.

6 Recommendation of the ESK

In the site selection procedure, areas that are considered to be the safest possible sites for disposal must be protected from change. The procedure is currently in its first phase. The sub-areas currently under consideration also include sites where the containment-providing rock zone is located at a depth of 300 metres. However, BGE justifies its recommendation on the basis that, according to its findings, *“it can be assumed at this point in time”* [3] that the preferred depths for the containment-providing rock zone at sites to be selected in future for the disposal of high-level radioactive waste will be below 500 m.

The ESK concurs with BGE's assessment that an overburden covering the containment-providing rock zone that is thicker than the minimum depth of 300 m required by law offers clear advantages for long-term safety. Drilling in the overburden to depths of 300 m would still provide a safety distance of 200 m in relation to a potential containment-providing rock zone, even with a target minimum depth of 500 m. However, BGE's recommendation anticipates the results of the final rvSU. As explained below, the ESK therefore does not fully agree with the conclusions.

Currently, the procedures under § 21 StandAG do not explicitly distinguish between open and closed geothermal systems. From the ESK's point of view, sealed boreholes that are located at a sufficient safety distance from the containment-providing rock zone have no critical impact on it.

The following definitions for a sufficient safety distance can be found in various sources:

² For example, cf. [5].

- 25 m as a conservative safety distance to old boreholes (cf. method profile for the exclusion criterion boreholes and exclusion criterion in the Sub-areas Interim Report (lines 1216-1221 in [6])).
- A safety margin of 100 metres can be derived from the current version of § 21(2) No. 4 StandAG (projects up to 200 metres requiring approval with a minimum depth of 300 metres for the upper boundary of the containment-providing rock zone).
- An implicit safety distance of 200 m can be derived from the current version of § 21 StandAG (projects up to 100 m without the requirement for approval with a minimum depth of the upper boundary of the containment-providing rock zone of 300 m).
- 200 m as an implicit safety distance from the latest BGE statement [3] assuming a minimum depth of the containment-providing rock zone of 500 m.

Unlike the containment-providing rock zone, the overburden is not considered to have a containment function for the long-term safety of the repository. It mainly serves as a kind of protective layer, for example to mitigate the effects of glacial overprinting on the containment-providing rock zone (cf. [3]). The ESK shares the view of BGE and the other experts involved that this function of the overburden cannot be significantly impaired by drilling. Nevertheless, and in view of the other functions of the overburden (e.g. hindering or delaying the migration of contaminants), the ESK continues to recommend maintaining a safety distance from the containment-providing rock zone.

The ESK considers a safety distance of 100 m from the containment-providing rock zone for drilling to be conservative and sufficient. The safety distance addresses both the uncertainties relating to the geology and the actual implementation and subsequent maintenance of the borehole. Accordingly, the ESK recommends extending the existing depth limit for projects not requiring approval from the current 100 metres to 200 metres. This would ensure a sufficient safety distance of 100 metres even for sub-areas with an upper boundary of the containment-providing rock zone at a depth of 300 metres. The ESK recommends that this simplification only be applied to projects involving fully cased and sealed boreholes whose further use is limited to a closed system (e.g. geothermal probe). The ESK also recommends retaining the existing regulations in accordance with § 21 (2) No. 4b StandAG for the protection of sites with steeply inclined salt deposits (minimum distance of 50 m from the salt table).

7 Documents

- [1] Standortauswahlgesetz vom 5. Mai 2017 (BGBl. I S. 1074), das zuletzt durch Artikel 1 des Gesetzes vom 7. Dezember 2020 (BGBl. I S. 2760) geändert worden ist

- [2] BASE: Verfahrensabläufe zum Vollzug des § 21 Absatz 2 Standortauswahlgesetz (StandAG) und Auslegungshilfe für die unbestimmten Rechtsbegriffe in den Ausnahmetatbeständen des § 21 Absatz 2 Satz 1 Nr. 1 - 5 StandAG
Stand: Dezember 2020

- [3] Vorschlag der BGE zum Heraufsetzen der Bohrteufe im Rahmen der Standortsicherung § 21 StandAG. Stand: 07.06.2024

- [4] Endlagersicherheitsanforderungsverordnung (BGBl. I S. 2094) vom 06.10.2020

- [5] DVGW-Technische Regel - Arbeitsblatt W135 (A): Sanierung und Rückbau von Brunnen, Grundwassermessstellen und Bohrungen. Stand: Dezember 2018

- [6] BGE: Zwischenbericht Teilgebiete gemäß § 13 StandAG. Stand: 28.09.2020