Note: This is a translation of the ESK document entitled "FRAGENKATALOG der Entsorgungskommission

Umsetzung der ESK-Leitlinien für die Zwischenlagerung von radioaktiven Abfällen mit vernachlässigbarer Wärmeentwicklung – Hier: Fragenkatalog zur Nachverfolgung der Empfehlungen der ESK-Stellungnahme vom 07.05.2015".

In case of discrepancies between the English translation and the German original, the original shall prevail.



## **QUESTIONNAIRE of the Nuclear Waste Management Commission**

Implementation of the ESK guidelines for the storage of radioactive waste with negligible heat generation

#### Here:

Questionnaire to follow up the recommendations of the ESK statement of 07.05.2015

#### Revised version of 16.03.2017

Compared to the original version of 02.02.2017, corrections were made in the tables of appendices 1 to 3 subsequent to the extraordinary meeting of the FA VE on 15.03.2017, which were approved at the 60th meeting of the Nuclear Waste Management Commission on 16.03.2017.

#### **Background information**

Following the publication of the ESK guidelines for the storage of radioactive waste with negligible heat generation (revised version of 10.06.2013) on 22.01.2014 in the Federal Gazette, it had been agreed – in response to anomalies in connection with the storage of radioactive waste – to follow up the implementation of these ESK guidelines. For this purpose, a questionnaire was drawn up by the ESK referring to all facilities where packages with low and intermediate level radioactive waste are stored. This explicitly included storage facilities in nuclear power plants which are operated under a licence according to § 7 of the Atomic Energy Act (AtG). In addition to storage facilities in nuclear power plants, the questions related to storage facilities in other installations according to § 7 AtG, storage facilities in (former) nuclear research centres as well as storage facilities for low and intermediate level radioactive waste (e.g. on the premises of nuclear power plants with separate licence, locally independent storage facilities and *Land* collection facilities) and other facilities in which a significant number of packages with low and intermediate level radioactive waste are stored.

By letter dated 18.12.2014, the BMUB asked the competent authorities of the *Länder* to answer these questions. The ESK was asked by the BMUB to perform a generic, facility-independent assessment of the actual condition of the waste packages on the basis of the reports submitted and to provide a description of the deficiencies that exist from the ESK point of view as regards monitoring of the waste packages and their management and to answer the question to what extent the ESK guidelines are applied and implemented, where there are deviations, and what measures must be taken to ensure safe storage of waste packages also for a longer storage period. The ESK then prepared its statement on the implementation of the ESK guidelines for the storage of radioactive waste with negligible heat generation with a total of nine recommendations and adopted them on 07.05.2015.

## Objective

The objective of this second query is to determine the current state of implementation of the ESK guidelines and the recommendations for their implementation. As in the first query (see above), the questions relate to all facilities where packages with low and intermediate level radioactive waste are stored. To answer the questions, it is irrelevant what kind of storage is concerned formally since the safety requirements in the ESK guidelines derived from the protection goals are generally to be referred to for all types of storage, regardless of the conditioning state of the waste, the waste management route intended as well as regardless of the formal classification of the storage rooms. In addition, this query is also intended to provide suggestions and recommendations for revising the ESK guidelines.

This query does not replace the review of the implementation of the ESK guidelines by the supervisory authorities of the *Länder*.

#### Performance and structure of the new query

The query is initiated by the BMUB and carried out by the *Länder* through the Technical Committee for Nuclear Fuel Cycle Matters (FA VE). Before starting the query, a workshop will be held with the *Länder* and representatives of the ESK to clarify any open questions.

The questions are addressed to the licence holder responsible for the respective site. For this purpose, it may be necessary for the responsible licence holder to obtain information from the waste owner.

This query is divided into three parts:

The first part covers the general questions about the site of the storage facility. The questions are listed in Appendix 1 as a form and are to be answered for each storage room in a separate sheet. Storage rooms with identical storage conditions and inspection conditions may possibly be grouped.

The second part of the questions is directed to concrete information on the inventory of radioactive waste and residues that should not be released from regulatory control within five years, including large components (Appendix 2).

For the classification of waste forms and packages according to the categories of raw waste (RA), pretreated waste (VA), waste products (P1), product-controlled waste products (P2), disposal containers (G1) and product-controlled disposal containers (G2), the definitions in the Inventory of Radioactive Waste of the BMUB apply. Classification into the corresponding categories must be correct at the reporting date of 31.12.2016 stated in the query.

The query differentiates between three treatment periods in order to predict potential damage to older waste forms and packages together with other information.

In the third part, a detailed report is requested for every finding that has occurred since 2002 (Appendix 3). Similar findings at the same storage location can be grouped.

For answering the questions in appendices 1 to 3, Excel spreadsheets are provided.

Appendix 4 includes explanatory notes on the terms in italics.

# Appendix 1: Questions about the storage concept

	Answers	Comments
Name and type of the facility		
Storage room designation		May also be grouped if storage conditions according to questions 1.1 to 1.3 are the same
Licence		Date of issue and of any licence modifica- tions (e.g. changes to the monitoring)
Question 1.1 Is there directed air flow in the storage area?		yes/no
Question 1.2 Is exhaust air ventilation provided with measuring and filter devices?		yes/no
Question 1.3 Are measures in place to prevent tempera- tures falling below dew point level at the packages (e.g. by air conditioning)?		yes/no
Question 2 What are the inventories of packages and large components?	Answer in Appendix 2	see Appendix 2
Question 3 Have there been <i>findings</i> since 2002 and did measures have to be implemented in the past to ensure storage suitability?		yes/no If so, specification of <i>findings</i> and measures in Appendix 3
Question 4 How are the packages stored?		Information on stacking technique (on grids in stacking frames or other spacers) and on accessibility (to individual packages or grouped packages)
Question 5.1 Are there any requirements for monitor- ing by the operator within the scope of the licence or in binding operating documents (e.g. operating manual)?		Please name documents with specifications for the <i>monitoring concept</i> (e.g. operating manual (BHB), organisation manual (OHB), instructions)

Question 5.2	Visual inspections, wipe tests, etc.
Which regular inspections of the packages	
are foreseen?	
Question 5.3	
Are these carried out on 100% of the	
stored packages or on random samples of	
the stored containers and/or reference	
packages?	
Question 5.4	
Which partial quantity/which sample	
quantity of the packages is subjected to	
inspections in each case?	
Question 5.5	
How and with which technique are the in-	
spections carried out?	
Question 5.6	
At which intervals are the inspections car-	
ried out?	
Question 5.7	
How are the results of the inspections	
documented?	
Question 6	
Which inspections are or were carried out	
or accompanied by the nuclear regulatory	
authority or an authorised expert on be-	
half of the authority?	
Question 7	
Are there any <i>qualification concepts</i> for	
all stored radioactive waste (according to	
Recommendation 2 of the ESK statement	
of 07.05.2015 <sup>1</sup> )?	
Question 8	
Do you see any need for optimisation/sup-	
plementation with regard to the ESK	
guidelines? If so, where?	

<sup>&</sup>lt;sup>1</sup> Recommendation (2) of the ESK statement dated 07.05.2015: "With regard to the management and handling of the entire spectrum of their waste by the licence holders without any delay, which is required according to the ESK guidelines [2], the ESK recommends demanding a detailed inventory with related qualification concepts as well as specification and justification of the processing schedule from the licence holders."

## Appendix 2: Information on the inventory as at 31.12.2016

Storage room	Owner	Category	Type of packag- ing	Date of handling/packaging for P1-G2 and emplacement date for RA/VA	Date of handling/packaging for P1-G2 and emplacement date for RA/VA	Date of handling/packaging for P1-G2 and emplacement date for RA/VA
				before 1989 (A)	1989-2001 (B)	as of 2002 (C)
Indication of storage room according to Appendix 1	Owner	<ul> <li>RA</li> <li>VA</li> <li>P1</li> <li>P2</li> <li>G1</li> <li>G2</li> </ul>	<ul> <li>Drum, sheet steel</li> <li>Container, sheet steel</li> <li>Cast iron con- tainer</li> <li>Concrete con- tainer</li> <li>Large compo- nent</li> <li>Others</li> </ul>	(please indicate number of packages or mass (for RA/VA))	(please indicate number of packages or mass (for RA/VA))	(please indicate number of packages or mass (for RA/VA))

## Appendix 3: Reporting on *findings* as of 2002

Please fill out separate reports for different *findings* and different storage locations.

Question		Answers	Comments
1.	Name of the facility		
2.	Storage room designation		
3.	Information on the waste packages concerned		
	3.1. Owner		
	3.2. Waste category		According to categories in Appen- dix 2
	3.3. Container		Please specify type of packaging
	3.4. Date of handling/ packaging for P1-G2 and emplacement date for RA/VA		According to categories in Appen- dix 2: A before 1989 B 1989-2001 C as of 2002
	3.5. Content		Type of waste and conditioning method (e.g. compacted mixed waste)
4.	Information on the <i>finding</i> :		
	4.1. Type of <i>finding</i>		For types of <i>findings</i> see Appendix 4
	4.2. Cause and description of the <i>finding</i>		Assessment on the origin of the <i>find-ing</i> (influence of the inventory (from inside) or the environment (from out-side))
	4.3. Number of packages of the same type with <i>find-ing</i>		
	4.4. Number of packages of the same type (total)		Total number of the packages of the same type stored in the storage room at the time of the <i>finding</i>
	4.5. Number of packages of the same type (inspected)		Proportion of packages inspected from the total quantity of packages of the same type
	4.6. Detection		When and by what measures was the <i>finding</i> detected? (e.g. during inspections, relocation of packages)
	4.7. Measures		Measures taken due to the <i>finding</i> on the package and related to placement and ambient conditions

#### **Appendix 4: Explanatory notes**

#### Monitoring concept

A monitoring concept is the description of all measures for the detection of *findings* on the inventory stored as well as the related documentation and steps of assessment.

#### Qualification concept – concepts for conditioning and waste management as well as for post-qualification

Section 9.1 et seq. of the ESK guidelines states that before carrying out the actual work within the framework of radioactive waste management, the procedure is to be planned taking into account already existing waste management concepts, starting from the raw waste produced to the duration of conditioning and storage up to the time of retrieval of the waste packages for emplacement in the Konrad repository.

Concepts describe procedures for the management of residues and raw waste as well as for the post-qualification of old packages (Section 9.5 of the ESK guidelines) and must generally be described and documented in the internal regulations typical for the facility (e.g. waste management concept in accordance with the waste framework directive, qualification concepts, organisation manual, process description, radiation protection instructions). The concepts thus ensure that waste management is fully described, i.e. in terms of waste type and details on conditioning and documentation, with a timetable for the individual steps.

#### Reference packages

If it has to be assumed that during storage the retention properties of the waste packages and manageability are subject to a relevant change over time, measures are to be taken for an early detection of adverse developments. For this purpose, a concept is to be developed. Emplacement of the waste packages in the storage facility must always be carried out in such a way that they can be made accessible as required and subjected to visual examinations and inspections. Visual examinations and inspections can also be carried out on reference packages if the condition of the other waste packages can be deduced from the condition of these reference packages.

## Findings

Findings can generally be divided into findings outwardly recognisable on the storage units and findings not recognisable from the outside. Examples are shown below.

Examples of possible findings and deviations are given below.

#### Possible types of findings (exemplary):

#### Outwardly recognisable findings

Outwardly recognisable findings are deviations visible to the naked eye without optical magnification. For further investigation, further aids (e.g. magnifying glass, microscope, camera) are appropriate. Examples:

#### Paint damage

- Scratches down to the base material.
- Flaking of the coating system which may result from corrosion processes inside the package or from inadequate repair coating and can also reach down to the base material.

## Mechanical damage

- Deformations on the side walls of containers or on the drum casing, lid, base or attachments (e.g. rolling hoops, angle rings of ISO corner castings) which impair handling and stackability.
- Lid bulging due to internal pressure, e.g. resulting from gas formation from digestion, fermentation or corrosion processes in the waste products or due to mechanical expansion of the waste products.
- Holes, cracks in the container.
- Loss of mechanical integrity. In the case of loss of mechanical integrity, the sum of damages is such that safe handling of the packages is no longer possible without further measures.

## Findings not recognisable from the outside

- Deviations from the documentation, e.g. in the case of information on content, mass, dose rate or activity inventory which have resulted, for example, in the context of deliveries to a storage facility and which may have resulted in subsequent documentation reviews.
- Deviations in product properties (e.g. residual moisture).