



Strahlenschutzkommission

Geschäftsstelle der
Strahlenschutzkommission
Postfach 12 06 29
D-53048 Bonn

<http://www.ssk.de>

**Radiological protection principles concerning the
safeguard and use of mine dumps**

Recommendation of the German Commission on Radiological Protection

Adopted at the 105th session of the Commission on Radiological Protection
on October 7/8, 1991

The German original of this English translation was published in Volume 24
of the series "Publications by the Commission on Radiological Protection"
under the title:

**Strahlenschutzgrundsätze für die
Verwahrung und Nutzung von Bergbauhalden**

Empfehlung der Strahlenschutzkommission

**In the event of any doubts about the meaning,
the German original as published shall prevail.**

Table of Contents

1	Scope	4
2	General principles	4
3	Criteria for safeguard and future use of mine dumps.....	5
4	Mine dumps already taken in use	6

1 Scope

1.1 The following recommendation refers to mine dumps in the new federal states resulting from uranium mining as well as from other mining operations.

The recommendation explicitly does not refer to:

- mine dumps containing increased amounts of pyrite
- leached low-grade ore dumps
- tailings dumps from metallurgical and chemical processes
- tailings ponds.

1.2 Topic of this recommendation is the custody of mine dumps and future use of dump sites for

- forestry
- agriculture
- sites for residential and public buildings as well as for trade and commercial use
- sites for industrial and commercial facilities as well as for public transport (especially parking lots).

The use of waste rock material is not subject of this recommendation. The recommendation is based on considerations taking into account the radiological protection of the general public and workers.

2 General principles

Mining operations in Saxony, Thuringia and Saxony-Anhalt produced a multitude of mine dumps which differ in size, shape and type of deposited material. Concerning custodial maintenance, the condition of these dumps is varied. Many were either partially or completely covered up, some overgrown or afforested. In exceptional cases, they were put to other use. The mine dumps contain different amounts of activity. In this given situation the radioactive contaminations and resulting exposures can only retrospectively be controlled, restricted and reduced subject to optimization.

For the assessment and limitation of individual radiation exposure a level for unrestricted use is recommended below which radiological protection requirements do not apply for the custody and future use of mine dumps. Further levels are recommended for an exposure range in which certain requirements generally apply for the safeguard and future use of mine dumps. Above this range, suitable measures must be taken for the safeguard and possible future use of dump sites or the restriction of access taking site-specific conditions into account.

The levels for unrestricted use are orientated on an additional potential radiation exposure of 1 mSv/a (effective dose) due to mining activities. This value is within the range of the variation of natural radiation exposures. For the individual environmental media, the recommended levels for unrestricted use are likewise within the known range of exposure to

natural radiation sources. The indoor Radon-exposure is not included in these considerations, as it is subject of the Recommendation of the Commission on Radiological Protection of June 30, 1988.

Generally, all exposure pathways significant for outdoor exposures must be assessed for the safeguard and future use of dump sites:

- external exposure to Gamma-radiation at the dump site or in the immediate vicinity
- exposure by inhalation of Rn-daughter nuclides
- exposure by ingestion of dust contaminated with long-lived alpha-emitters and
- exposure of children during playing outdoors by ingestion of dust and soil contaminated with long-lived alpha-emitters.

3 Criteria for safeguard and future use of mine dumps

Of relevance for the radiation exposure due to mine dumps is the content of activity from the U-238 decay chain in the waste rock material. Radioactive equilibrium is to be assumed. The specific activity of Ra-226 is given in Becquerel per gram waste rock material. When the activity is determined by sampling and measurement, averaging over an area of 100 m² is advisable and should be done for the following depths:

0.0 - 0.3 m

0.3 - 3 m

3 m to the foot of the dump.

Deviations from this sampling pattern are possible if representative information is available from facility records or other references on the amount and homogeneity of the activity content.

The following recommendations are therefore made for the subsequent uses of the mine dumps:

- 3.1** At a specific activity of less than 0.2 Bq/g, radiological protection measures are not required for the custody of mine dumps. There are no use restrictions.
- 3.2** For dumps with a specific activity of less than 1 Bq/g covering an area 1 ha or comprising 10⁵ m³ deposited material, radiological protection measures are not required for safeguard.

Regarding the future use, these mine dumps must be given the same consideration as areas contaminated by uranium mining. Accordingly, the recommendation of the Commission on Radiological Protection of June 28, 1991 on the industrial and commercial use of areas contaminated by uranium mining is applicable as well as the recommendation of October 8, 1991 on other uses.

- 3.3** If the above indicated values are exceeded for the given specific activity, covered area or amount of deposited material, it should be examined which radiological protection measures should be applied, considering site-specific conditions, and which future uses are possible.

- 3.4** On released mine dumps, all new construction is to be planned so that the expected Rn-concentration of 250 Bq/m^3 is not exceeded.

4 Mine dumps already taken in use

For mine dumps having already been taken in use for construction or other purposes, decisions on further procedure must be made and based on site-specific investigations of radiation exposure.