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**Radiological protection principles
concerning the release of scrap from
the shutdown of uranium mining plants**

Recommendation of the German Commission on Radiological Protection

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on June 27/28, 1991

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**Strahlenschutzgrundsätze bei der Freigabe von Schrott aus der
Stilllegung von Anlagen des Uranerzbergbaus**

Empfehlung der Strahlenschutzkommission

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

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1 Problem

As a result of the shut-down of uranium mining plants of the Wismut AG great amounts of contaminated scrap occur, the utilization of which has to be controlled.

There are about 20,000 Mg of scrap occurring alone at the site Crossen. The material is very differently contaminated by

- dust layers,
- fixed coatings as a result of suspension overflow,
- adhesion of ore and intermediate products,
- settling of solid materials from suspension in pipelines and containers.

Some experience with decontamination has been gathered:

- Fatty and oily areas are prepared with grease-dissolvants and then sprayed down with water.
- Removal of fixed coatings at the inner walls of autoclaves by sand-blasting.
- In cases of adhesion of ore, decontamination is performed by a combination of scratching, brushing etc., in combination with water clean-up.

2 General principles

The release of contaminated objects requires a comparison of their contamination with the permissible values according to Annex IX, Column 4 of the Radiological Protection Act. For contaminations with natural uranium a release limit of 0.5 Bq/cm^2 is applicable. In the present case investigations were made, and this value was found to be applicable also to the release of great amounts of contaminated material as well as generally to the total alpha activity of the nuclide mixtures occurring in uranium mining.

Studies [KIST 91] have shown that the highest effective doses on the material's way from scrap release to steel products occur during scrap processing and slag utilization.

During scrap processing, the material is mechanically or thermally decomposed into chargeable sizes. This produces cutting dusts of which the specific activity usually is much higher than the mean specific activity of the scrap. The cause of this upgrading may be seen in the fact that components of the contamination layer which might have an increased specific activity are released to a greater extent than the basic material.

During the process of melting, uranium and its non-volatile decay products are mainly accumulated in the slag. Consequently, a potential inhalation of slag dust is of greater importance than exposure to the steel produced. However the specific activity of the slag during melting of the scrap considered here was found to be within the range of specific activity of the natural soil or normal slag.

3 Criteria for release

In order to limit and minimize the potential radiation exposures during non-detrimental utilization of contaminated scrap occurring in the field of uranium mining, the Commission on Radiological Protection deems the following principles necessary:

- 3.1** The material can be released if the level for unrestricted release of 0.5 Bq/cm^2 is observed, subject to the following conditions:
- a) The scrap released is delivered to the scrap trade or directly to a metal producer, so that the scrap can be assumed to be melted.
 - b) The released quantity does not contain directly re-utilizable plant components. Plant components which could be suited or made suitable for re-utilization (e.g. pump housings, mountings etc.) therefore must be destructed so as to make repair mechanically impossible.
 - c) The parts of which the released amount is compiled must have dimensions ready for melting, i.e. they must be subdivided into parts so small that a further decomposition before the melting process is not necessary. This must be done by individuals occupationally exposed to radiation, observing the measures of occupational protection usual during handling of radioactive substances.
- 3.2** The procedure of release must ensure that the measured area activity is representative for the contamination of the material to be released. This does not mean that an overall measurement has to be taken. The degree of contamination of the material and the resulting sample size for release measurements can also be assessed on the basis of informations about the operational processes or plausibility considerations.

The procedure of release has to be agreed upon with the competent authority.

4 References

- [KIST 91] Kisting, S.; Graf, R.; Görtz, R.; Goldammer, W.:
Ermittlung der radiologischen Konsequenzen der schadlosen Verwertung von α -haltigem Metallschrott.
BS 8710-4, Entwurf – Stand: April 1991