

# THE REBEKA FACILITY FOR RECYCLING AND TREATMENT OF RADIOACTIVE MATERIALS

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## ABSTRACT

During the next years, large quantities of contaminated material originating from the decommissioning of a research reactor (10 MW pool-type) and from the HTGR-pilot plant AVR, both located at Jülich will arise. This material has to be treated according to acceptance criteria of the German repository for radioactive waste. In addition preferably decontamination of materials for free release and reuse is applied. The treatment will be carried out in the REBEKA facility, which accommodates all necessary equipment for the following treatment work:

- cutting of large components using mechanical and thermal methods,
- decontamination with high pressure liquids or sand blasting,
- high force compaction,
- low level radiation measurement prior to free release or prior to melting of metal pieces.

The dimensions of the REBEKA facility are 60 m in length, 20 m in width and 15 m in height. The REBEKA is equipped with a bridge crane (25 tons), two cutting/decontamination boxes, a sand blasting box, ventilation systems, high force compactor and collecting tanks for liquids. REBEKA will go into operation in 1995 and will serve as a treatment facility for LLW during the decommissioning phase of several nuclear installations located at the research center. The main purpose of the REBEKA will be the treatment of contaminated steel for reuse. Material with an activity content up to 200 Bq/g can be used after melting for fabrication of shielded waste containers.

## INTRODUCTION

The Decontamination Department of the Research Centre Jülich (KFA) operates facilities for processing radioactive waste water, radioactive solvents and radioactive solid materials. In addition, there is also a facility for the decontamination of radioactively contaminated small-sized components and equipment, and a mechanical workshop. Some of the various facilities, such as the tank store for the interim storage of radioactive waste water (tank farm), evaporator for concentrating the waste waters, drum drier for drying the evaporator concentrates, incinerator for radioactive solvents (LÖMA) and incinerator for radioactive solid waste (JÜV 50) have been in operation for about 30 years and need to be modernized or replaced.

## QUANTITY OF RADIOACTIVE SOLID MATERIALS

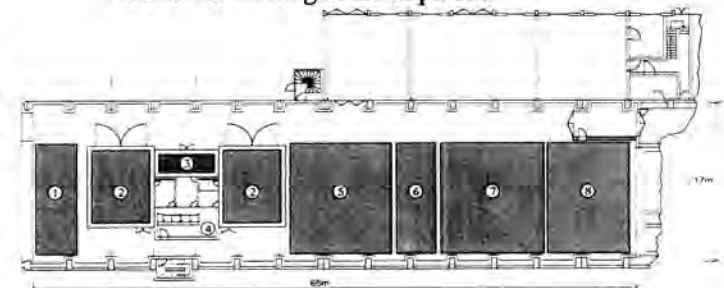
A bottleneck has arisen at the KFA with respect to the decontamination of radioactively contaminated material and 1400 m<sup>3</sup> (500 Mg) of contaminated material to be decontaminated has accumulated at present. The existing decontamination capacity is by no means sufficient to deal with this amount. In the next few years a large quantity of contaminated material will additionally arise from the decommissioning of the MERLIN research reactor (10 MW pool-type) and the HTGR pilot plant AVR. Approximately 450 Mg of additional material to be decontaminated is expected from the decommissioning of the two reactors.

This material has to be treated in accordance with the acceptance criteria of the German repository for radioactive waste. In addition, it is preferable that the materials should be decontaminated for free release and reuse.

## REBEKA FACILITY

The REBEKA facility was designed to fulfil the new statutory regulations and to eliminate the bottleneck in decontamination. This facility comprises all the necessary equipment for the following treatment steps (see Fig. 1):

- cutting of large components, e.g. pipes
- decontamination with high-pressure cleaners
- decontamination by sandblasting
- high-pressure compaction of solid materials
- vacuum drying of the pressed pieces
- measurements of low-level radiation prior to free release or melting of metal pieces.



- Key:
- |  |   |
|--|---|
| ① Measurement of the Radioactivity / Control Area<br>(w x l = 4,5m x 12m)  | ⑤ Container Area (20' - Type)<br>(11,5m x 12m)                            |
| ② Dismantling / Cutting Up / Decontamination<br>(w x l x h = 7m x 9m x 5m) | ⑥ Shielded Area (Drums + Containers (KONRAD - Type))<br>(4m x 11,5m x 3m) |
| ③ Sand Blasting<br>(7m x 3m x 3m)  | ⑦ Pressing / Drying<br>(10,5m x 2m)                                       |
| ④ Coating / Washing<br>(7m x 7m x 3m)                                      | ⑧ Container Area (KONRAD - Type)<br>(10m x 12m)                           |

Fig. 1. Equipment of the REBEKA-facility for recycling and treatment of radioactive materials.

The dimensions of the REBEKA facility are approx. 65 m long, approx. 17 m wide and approx. 12 m high. REBEKA is equipped with a 25 ton bridge crane, two cabins used for dismantling, cutting and decontamination, a sandblasting cabin, ventilation systems, high-pressure compactor, drying facility, cementation equipment and collecting tanks for liquids.

The dimensions of the cabins used for dismantling, cutting and decontamination are approx. 9 m x 7 m x 5 m (l x w x h). A double-wing gate (5 m x 5 m) is located at the front of the cabins. The cabin roof has a sliding gate of the size 4.5 m x 5 m. Each cabin is equipped with a 1 ton bridge crane and several special suction devices.

The sandblasting cabin is 3 m x 7 m x 3 m in size and is similarly equipped with a 1 ton crane. Full protective clothing is normally worn during work in all cabins.

The various operating cabins are reached via special chambers in the staff facilities.

After decontamination, the radioactive residual contamination is measured and verified. A decision is then taken as to whether the decontaminated material can be reused unrestrictedly or restrictedly, or is to be treated as radioactive waste.

The high-pressure compaction of radioactive solid materials is planned for optimum volume reduction. The high-pres-

sure compactor FAKIR (1) can, for example, be used for this purpose. In this compactor the pressing power may reach up to 1200 ton. After high-pressure compaction, the pressed pieces may be dried, e.g. by vacuum drying in the PETRA facility (2).

### OUTLOOK

Construction work on the REBEKA facility has been under way in an existing building at the Research Centre Jülich since the middle of last year. It is expected that the facility will go into operation in 1995. REBEKA will then primarily serve as a treatment facility for LLW material arising during the decommissioning phase of several nuclear installations located at the Research Centre. The main purpose of REBEKA will be the treatment of contaminated steel parts for reuse.

### REFERENCES

1. FAKIR super compactor for high-pressure compaction of solid radioactive waste GNS GmbH, Essen, Germany
2. PETRA facility for drying humid, high-pressure compacted waste and containers GNS GmbH, Essen, Germany