INTRODUCTION

When power reactors are shut down, the treatment of the core components and of the reactor pressure vessel components constitutes a particular task. Due to its special radiological characteristics, this waste must basically be handled using remote-control equipment with regard to the treatment.

For its conditioning in a manner appropriate for the final storage, the waste must be dried and packed into suitable packing drums. The solution implemented by GNS and DSD in order to treat this waste from the Würgassen nuclear power plant is described in the present contribution.

Condition of the Waste

Within the framework of the dismantling of the in reactor pressure vessel components and of the core components still located in the core, these components are packed into so-called primary casks (PB 1 to PB 3) in the pool by applying various dismantling procedures. Mechanical cutting procedures are used as the dismantling procedures. Thus, for example, GNS uses a new dismantling and packing installation (ZVA) with an integrated presealing device in order to dismantle the core components such as control elements and water guide boxes in primary casks.

The vessel components in reactors are also dismantled in primary casks using the water/abrasive-jet cutting procedure. As well as the resulting primary casks with dismantled components, additional primary casks arise with the abrasive required during the water/abrasive-jet cutting procedure, supplemented by activated joint material.

KWW specified the dose rate of the primary casks as 100 Sv/h. The conditioning line described below was designed according to this dose rate.

STRUCTURE OF THE CONDITIONING LINE

The three different tasks of the conditioning line

- receiving the primary casks from the storage pools,
- drying the primary casks and
- packing the primary casks into suitable packing drums,

are each performed by a separate module. All the modules are designed and arranged so as to ensure that the entire conditioning line can be operated in an uninfluenced manner as possible. All the
modules are radiologically designed in such a way that the dose rate allows the central control station of the conditioning line to set up a permanent workplace while applying the limiting values stipulated in the Radiation Protection Ordinance.

**Input Module**

The shielding cask is used in order to receive the primary casks in the fuel-element pool from a defined transfer position and to transport them to the input module. The shielding cask and the input module are designed for the specified dose rate of 100 Sv/h. A KTA hoist is mounted on the shielding cask which is attached to the RG crane.

In the input module, the drying cask is positioned using a rail carriage, the lid is taken off the drying cask by means of remote handling and the primary cask is transfered from the shielding cask into the drying cask. All the drives of the input module are arranged outside the shielding element and are thus accessible at all times.

**Drying Module**

The loaded primary casks are dried in the drying module using the vacuum drying procedure analogously to the drying of core components with the GNS drying installation KETRA (an installation with a nationwide handling approval according to Section 3 of the Radiation Protection Ordinance). Up to eight primary casks can be dried simultaneously in the drying module. The drying casks used are equipped not only with an electrical heating system with a heating capacity of 9 KW but also with an extraction lance in order to remove free liquids. The wall thickness of the casks is 400 mm and the cask weight approx. 26 Mg.

**Packing and Removal Module**

The packing and removal module is divided into two areas which are separated from each other. In the packing module the dried primary casks are taken out of the drying casks. The weight of the primary casks and the dose rate are recorded at a measuring station. The lids are also put on the PB 1 casks in this area.

In order to carry out this work, the packing module is equipped with a travelling crane mounted below the caisson ceiling. This travelling crane is a special structure which GNS has designed especially for this application. It is characterised, in particular, by the fact that all the drives of the travelling crane are arranged in accessible positions outside the module. This drive principle guarantees the high availability of the crane. The arrangement of the drives outside the module was also retained for all the other movements (locking lid, rotary actuator for DL measuring table, seal etc.).

From the packing module, PB 1 is transferred to the removal module via a lock into a tightly docked 280-litre drum. The following components which can be operated by remote control are arranged in the removal module:
• roller conveyor in order to transport the 280-litre drums into the respective handling positions,
• lid application station for 280-litre drums and
• travelling crane in order to load the loaded 280-litre drums into transport casks.

The lid application station is a device which has proven its worth in operation, works automatically and consists four bolting devices, a barrel rotating table with a centring device and a lifting table.

When the contamination on the outer surfaces has been checked, the lid is put on the 280-litre drum and the travelling crane is used in order to transfer it into the transport cask. Within the removal module, the lid of the transport cask is mounted and the transport cask is subsequently removed.

Outside the packing and removal module, the transport cask is closed by means of remote handling and is transferred into a transport frame which can accommodate a maximum of six transport casks.

All the transport runs between the modules are carried out using the gantry cranes belonging to the conditioning line. The operation of the conditioning line is thus uncoupled from the RG crane - apart from the loading process with primary casks from the pool.

**SUMMARY**

The conditioning line described serves to create a device which permits the safe handling and conditioning of the waste occurring during the dismantling process. The technique applied is characterised by a high degree of safety. All the drives are fitted in accessible areas. The machines used have already proven their worth in other applications with similar terms of reference. By reducing the number of primary casks in the packing and removal module, quick interventions can be made in the case of disturbances which, although they are sufficiently improbable, cannot be excluded altogether.