Some Impact of Melting Scrap for the Decommissioning of Nuclear Power Plant Stade

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Introduction

The German NPP Stade (PWR, 630 MW electric) was shut down in November 2003. After a transient phase the license for dismantling was granted in 2005.

Until now, about 13,000 Mg have been dismantled in the controlled area.
A share of about one third (4,200 Mg) was dedicated to be melted.

We will describe the main criteria to chose this way of treatment and the reasons to melt or not to melt are discussed.

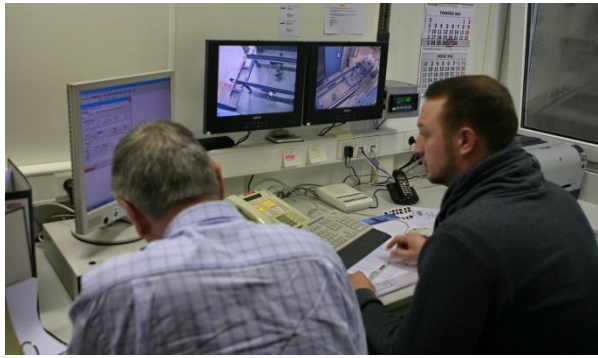
Overfiew on the dismantling of NPP Stade

Rückbaudaten:

Starting Dismantling:	Oktober 2005	Mass of dismantling scrap:	ca. 8.400 Mg
End of Dismantling:	Projected 2015	Mass of dismantling concrete :	ca. 6.300 Mg
„Green Field“:	Projected 2017	Surface subject for clearence:	ca. 78.000 m^2

Main criteria to choose a certain option for treatment of contaminated material

- Acceptance criteria of the desired service facility
- Expected decontamination result of the desired treatment
- Geometric properties of the scrap
- Availability of the desired service facility
- Process reliability and stability
- Long-term aspects
- On-site or off-site treatment
- Cost and efficiency of the process



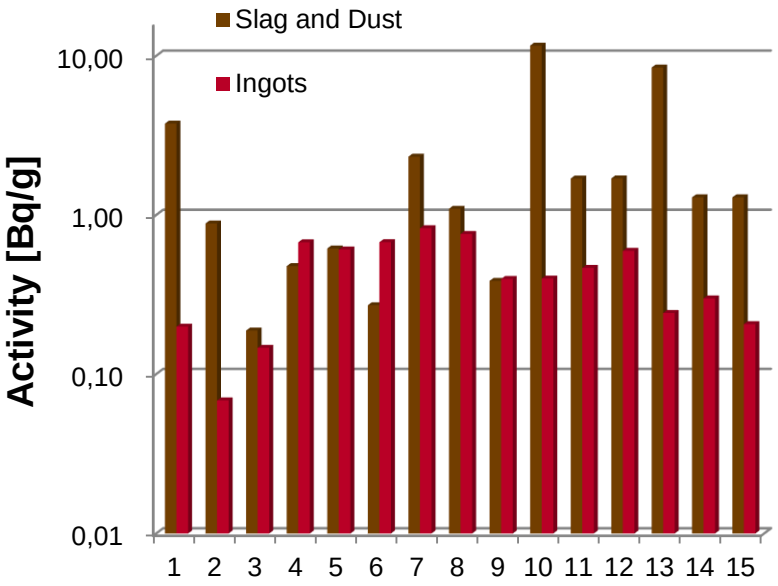
Acceptance criteria of the desired service facility

- Activity limits, for the SWT melting facility the resulting ingots must comply with the clearance levels according RP 89. Therefore radiological characteristics for the metal scrap are specified.
- Dimensions and geometries of the scrap are limited by the oven and due to safety aspects
- Only certain types of metal are accepted.

Expected decontamination result of the desired treatment

Specific activity in the ingots, the dust and slug after melting 1,000 Mg scrap

Co-60



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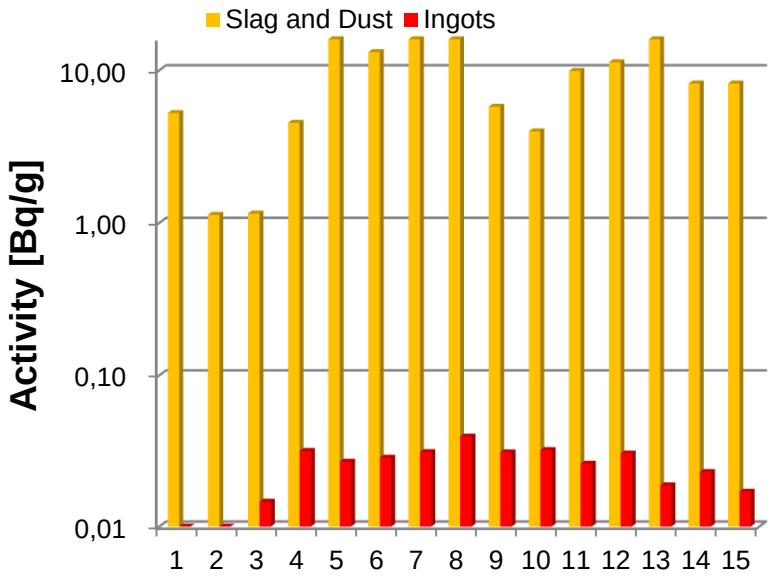

A defined part of the activity will be separated to the slug or dust during the melting process.

To estimate the resulting activity of the ingots, a simplified model is used:

All Co-60 is assumed to remain in the ingots.

All other nuclides are assumed to accumulate in the secondary waste.

Geometrical properties of the scrap

In case of NPP Stade we prefer melting for

- small tubes
- smaller parts with geometries which are not accessible for direct measurements
- Metallic parts and components with large surface and less mass

If the direct clearence on site is efficient, the material is treated at NPP stade

Availability of the desired service facility

The availability of a service facility may vary and change. Some reasons are:

- No capacity for the special types of metal at a particular time
- The facility is temporarily closed down due to an incident
- Running out of one of the licenses
- Political influence or change of laws / regulations

In case of non-availability, another service facility must be alternatively chosen or the scrap has to be treated on site.

Process reliability and stability

The complexity of the process and more often the political acceptance require stabile process without any risk of incidences.

The Risk may be reduced by the following factors:

- Election of the staff realising the process
- internal instructions
- suitable steps for quality assurance

Long-term aspects

- In Germany no final repository is available
- By melting the amount of resulting radioactive waste is reduced
- The secondary waste is chemical inert

Another way to reduce the amount of radioactive waste could be decay storage connected with later clearance of this waste.

On-site or off-site treatment

- Available space on site
- Availability of the desired treatment before melting on site
- Knowhow and experience in melting
- Availability of the needed experts and staff
- Influence on the time schedule due to the installation of the melting facility on site
- Surrounding licensing environment
- Security aspects
- Political aspects and acceptance

For large NPP components the question has to be asked vice versa.

Cost and efficiency

The overall costs are influenced by all above mentioned criteria and factors.

Not all parts of the costs can be calculated in advance and could change due to external impacts. These costs have to be estimated or are considered as a risk.

In addition the influence on the general time schedule of the dismantling project must also be taken into account.

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Summary

- If the material is assumed to meet the criteria for unrestricted clearance and this can be proved with reasonable effort and in an economic way, the clearance will be performed on-site at the NPP.

- If the clearance levels for unrestricted clearance are exceeded and the material is metallic scrap and the conditions of RP 89 will be fulfilled after melting, melting is the preferred option. Also for small tubes and scrap with complex geometries melting is often a preferred option

- about 30 % of the dismantling masses is dedicated to melting

Thank you for your attention

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