

Abstract intended for the seminar on "Decommissioning of nuclear facilities", Studsvik, Nyköping, Sweden, 14-16 September 2010.

Title: "Assessment of activity inventories in Swedish LWRs at time of decommissioning"

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Decommissioning studies for the Swedish nuclear reactors are ongoing in order to assess the waste volumes and costs. Part of this work is to assess the amount of radioactivity in the different types of decommissioning waste. ALARA Engineering has performed these assessments for most of the Swedish LWRs.

The decommissioning waste may be separated into different categories:

- Reactor internals and pressure vessel. Reactor insulation and biological shield (concrete) surrounding the vessel. These components contain neutron induced activity due to the high neutron flux close to the reactor core. The activity is determined by combining neutron flux calculations, data on materials compositions, cross sections for different nuclear reactions and operation history of the plant.
- Process systems with different degree of contamination. The contamination is mainly in the form of oxides ("crud") formed inside the components. The main activity is from activated corrosion products (Co-60, Ni-63, etc.) formed in the core region and transported with the reactor coolant to the different systems. This contamination also includes some activity in form of actinides due to the fuel failure history of the plant. The activity is assessed by combining different measurements (dose rates, gamma scanning, etc.) and calculations of nuclide vectors for different systems.
- Waste handling systems, with some small remaining traces of processed waste, mainly ion exchange resins. The activity is determined from dose rate measurements and calculated nuclide vectors.
- Contaminated concrete, e.g. behind the lining of fuel pools. The assessment is based on some measurements from plants, e.g. the Barsebäck plants, and calculated nuclide vectors.

The determined specific activities (Bq/kg or Bq/m²) for different systems (or part of systems) are combined with data on weights and contaminated surface areas in order to assess the total activity at decommissioning.

The presentation will address the methods used for this assessment, and discuss uncertainties in the assessment. The results of the assessments will be exemplified with data both from BWRs and PWRs.