

TOPIC: ABCD

Use of ^{137}Cs Calibration Source in Evaluation of BWR Fuel Burnup**G. Ekenstam^a, M. Tarvainen^b**^aSwedish Nuclear Power Inspectorate (SKI), Stockholm, Sweden^bFinnish Centre for Radiation and Nuclear Safety (STUK), Helsinki, Finland*E-mail address of main author: G.Ekenstam@ski.se*

A method for evaluating the burnup (BU) of BWR spent fuel was investigated by using a novel type of ^{137}Cs calibration source. The source is constructed to fit in the fuel handling fixtures of all the BWR type power plants in Sweden and Finland. It can be used also in the interim storage facilities for spent fuel, CLAB in Sweden and TVO-KPA-STORE in Finland.

The source is covered by a watertight steel cylinder which is fixed inside a 0.65 m long section of ASEA-ATOM type BWR fuel channel. Inside the cylinder there is a 37 GBq ^{137}Cs pellet fixed to a wagon which can be driven up and down by means of a stepping motor. By moving the source, the repeatability of the geometrical positioning is attained.

In recent measurements, a Westphal loss free counting (LFC) system was used in connection with an ND66 multichannel analyser for scanning of fuel assemblies. By use of LFC, real time correction of counting losses is performed.

For BU verification 21 assemblies with mean BUs from 14 to 31 MW·d/kg U and cooling times from 200 to 1500 d were scanned on each of the four corners. The ^{137}Cs measurement data were corrected for radioactive decay, self-absorption and inhomogeneous Cs distribution.

The BU calculated from the measured data is shown plotted against the declared BU in Fig. 1. Error bars reflect the precision of measurements for single assemblies.

The measurement system has been developed to be used by the Swedish and Finnish national safeguards authorities for verification of spent fuel BU.