



3 Simulating Burnup Effects in ZED-2 Measurements

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Presented to US Nuclear Regulatory Commission
Chalk River Laboratories

2004 July 27-29





Objectives

- **Design a fuel composition that allows the effect of burnup on CVR and other reactivity coefficients to be measured in ZED-2**
- **Expected major effects that have to be considered are**
 - the build up of Pu isotopes
 - depletion of U235
 - depletion of Dy, &
 - build up of fission products
- **Considerations of schedule, cost and manufacturability of the fuel encourage the use of readily available sources of Pu, U and Dy, provided the effects of burnup are well represented**
- **ZED-2 measurements are supplemented by measurements in other critical facilities, and through inter-code comparisons with MCNP**



WIMS v 2-5d Modelling



Evolution of Fuel Composition (U-235)



Evolution of Fuel Composition (Pu-239)



Evolution of Fuel Composition (Dy)



Contribution from Main Isotopes to CVR



Pu Contributions to CVR



U-235 Contributions to CVR



Fission Product Contributions to CVR



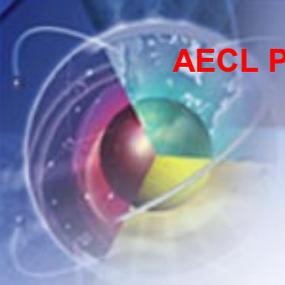
Composition of an ACR Fuel Bundle at a Burnup of 12582 MWd/t



Available Isotopic Compositions of Pu



Various Compositions of Simulation Fuels





Final Choice

AECL Protected-Proprietary



Other ZED-2 Measurements for Validating Effect of Burnup



Summary

- **Purpose of ZED-2 experiments is to provide validation data for physics phenomena, in this case the effect of isotopic composition on important physics parameters**
 - intent is not to explicitly simulate a point in burnup
- **ZED-2 data will provide sufficient validation data for range of fuel compositions, to validate the physics toolset for the effects of important isotopes in ACR fuel**
 - U-235, U-239, Pu, Dy
- **This will be supplemented by measurements in other critical facilities, and most importantly, through inter-code comparisons with MCNP**



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