

Topical Report Submittal Least Squares Methodology

ENCLOSURE 2

Topics to be Addressed

- Required Input Parameters and Associated Uncertainties for Least Squares Application
- Application of the FERRET Code for Least Squares Evaluation of Dosimetry Sets
- Use of Least Squares Results at Measurement Locations to Evaluate Pressure Vessel Exposure

Required Input Parameters

- Plant Specific Neutron Transport Calculation.
- Measured Sensor Reaction Rates
- Dosimetry Reaction Cross-Sections

Neutron Transport Calculations

- Description of the Methodology.
 - Codes and Cross-Section Libraries
 - Geometric Modeling
 - Treatment of Operational Variables Such as System Temperature and Pressure
 - Spatial and Energy Description of the Source

Neutron Transport Calculations

- Benchmark Testing
 - PCA Configuration 12/13 Comparisons
 - H. B. Robinson Cycle 9 In-Vessel and Ex-Vessel Dosimetry Comparisons
 - Calculation of Draft NUREG/CR-6115 Analytical Benchmarks for PWR's
 - Comparisons with Westinghouse Operating Reactor Dosimetry Data Bases

Neutron Transport Calculations

- Analytical Sensitivity Studies for Key Input Parameters
 - Geometry and Material Densities
 - Core Neutron Source
 - Nuclear Data
 - Transport Code Input Options

Neutron Transport Calculations

- Determination of Uncertainty in the Plant Specific Calculation by Combination of the Results of Benchmark Testing and the Analytical Sensitivity Studies.

Sensor Reaction Rates

- Counting Procedures
- Irradiation History Corrections
- Fission Sensor Corrections
 - Impurities
 - Plutonium Build-In in U-238
 - Photo-Fission
- Evaluation of Westinghouse Operating Reactor Dosimetry Data Bases

Reaction Cross-Sections

- Description of the SNLRML Evaluated Dosimetry Cross-Section Data Base and Uncertainty File

FERRET Code Application

- Description of the Least Squares Methodology.
- Discussion of Prior Use
 - R. L. Simons Re-Evaluation of Surveillance Capsule Fluence for Use in the Reg. Guide 1.99 Trend Curve Development
 - HEDL Evaluation of the PCA/PSF Benchmark Experiments

FERRET Code Application

- Code Testing
 - Standard U-235 Fission Field
 - PCA 12/13 Configuration Evaluation and Comparison to published LSL and SENSAK results
 - H. B. Robinson In-Vessel and Ex-Vessel Benchmark
 - Evaluation of Westinghouse Operating Reactor Dosimetry Data Bases

FERRET Code Application

- Sensitivity Studies
 - Choice of Sensor Set
 - Uncertainty Assignments
 - Calculated Spectrum
 - Reaction Rates