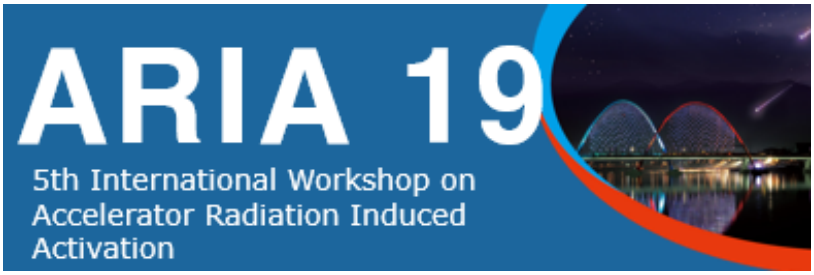

Contribution ID: **49** Type: **not specified**

An Update on CINDER2008 and AARE V1.0

Monday, 23 September 2019 10:00 (30 minutes)

The software package AARE V1.0: Activation in Accelerator Radiation Environments V1.0 was developed over several years by a collaboration between Oak Ridge National Laboratory, Paul Scherrer Institut, and Argonne National Laboratory. The core of this package is the CINDER2008 transmutation code, the latest release in the CINDER data and code series, which begun with the work of Tal England at Bettis Atomic Power Laboratory in the early 1960s. CINDER2008 is a modern implementation of the CINDER'90 software package. The most notable improvements include (1) modern programming language and methods, (2) new algorithms to more accurately solve the underlying differential equations, (3) new extended data libraries developed using fission, fusion and constant weighting functions, (4) new data library development tool, (5) automatic post-processing capabilities, (6) accident analysis tools, (7) NAMELIST input option, (8) constant power approximation and (9) high-fidelity β-delayed gamma spectra. Also included in AARE are the "Activation Script Version 2.0"and "Gamma Source Script 2.0."The Activation Script reads a compact user-prepared input file, which specifies selected MCNPX cells and the irradiation history to be used in activation calculations, parses the MCNPX output file, prepares inputs, and runs activation calculations. The results provide a wealth of information, including but not limited to nuclide inventories, activities, decay powers, and multi-group gamma-ray spectra, at the selected time steps during irradiation or at the selected decay times after the end of irradiation. The Activation Script is not limited to the CINDER2008 but supports also the SP-FISPACT and the ORIHET3 activation codes. For planning of maintenance, shipment, or disposal of irradiated structures not only their isotopic inventories but also the radiation fields surrounding them need to be known. To facilitate such calculations the Gamma Source Script was developed. The Gamma Source Script reads the gamma-ray intensities and spectra produced by the activation calculations by either the CINDER2008 or the SP-FISPAC code and prepares gamma-ray source definition cards than can be used directly in subsequent MCNPX calculation of the radiation fields. Large number of cells can be processed in a single run, resulting in a complex gamma source. AARE V1.0 was submitted to the Radiation Safety Information Computational Center in the spring of 2019 and is expected to become available soon as RSICC Code Package CCC-846. Some of the new capabilities of the CINDER2008, Activation Script, and Gamma Source Script, which we hope will be of interest to the ARIA19 participants, will be described and illustrated with examples.

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