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Don't Forget What We Already Know

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A number of benchmark compilations have been developed in recent years that are utilized by nuclear data testers worldwide. These include Handbooks from the International Criticality Safety Benchmark Evaluation Project (ICSBEP), and the International Reactor Physics Evaluation Project (IRPhEP), as well as the Shielding Integral Benchmark Archive Database (SINBAD) and the Spent Fuel Isotopic Composition Database (SFCOMPO). Preceding these was the Cross Section Evaluation Working Group's (CSEWG) Benchmark Book. First issued in the 1970s with updates in the 1980s and 1990s it contains separate chapters for Fast and Thermal critical systems, the Coupled Fast Reactor Measurement Facility (CFRMF) Dosimetry Benchmark as well as a variety of Shielding Benchmarks. Beyond that there have been thousands of critical experiments performed over the decades, yielding a wealth of data suitable for cross section data testing. Some of these have been highlighted in recent "Big Papers" validating ENDF/B-VII.0, VII.1 and VIII.0 neutron and thermal scattering law nuclear data files. A number of web links are provided that lead the reader to these data. We also review a number of long-standing approximations that exist in current Monte Carlo benchmark models. These approximations date from when the typical stochastic uncertainty in a Monte Carlo's kcalc calculation was several hundred pcm, as opposed to modern calculations that often produce single digit stochastic uncertainties. With the recent release of a new Japanese Evaluated Nuclear Data Library, JENDL-5, as well as on-going nuclear data testing to support future nuclear data file releases (e.g., JEFF-4 and ENDF/B-VIII.1) now is an opportune time to review the applicability of these approximations.

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