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## Investigation of a novel detector to detect partial defects of PWR spent fuel assemblies

The correctness and completeness of spent fuel assemblies need to be verified before they are stored inside disposal casks, according to IAEA. The correctness is verified by measuring initial enrichment, burn-up, and cooling time. The completeness is verified by detecting partial defects of a spent fuel assembly. Conventional detectors for spent fuel verification, SMOPY, DCVD, and FDET, have limitations on partial defect detection. The goal of this research is to develop a novel fast partial defect detector for PWR fuel assemblies. The proposed detector is inserted inside guide tubes of a spent fuel assembly and measures passive gamma intensity. The detector converts passive gamma into electric current using scintillator –photodiode composites. SPDD detects partial defect by the following process: 1) Estimate SPDD current distribution at each guide tube location using operator declared information and computational codes (SCALE-TRITON, MCNPX), 2) Measure SPDD generated current at each guide tube location, 3) Compare the estimated and measured current distribution to evaluate the completeness of a spent fuel assembly. This research analyzed performance of an SPDD using test case assemblies. The test case assemblies are Westinghouse 14x14 type and PLUS7 (16x16) type. The results of test case based SPDD performance analysis indicate SPDD can be used to detect partial defects of PWR spent fuel assembly especially stored inside SMR spent fuel pools in remote areas.

### Which "Key Question" does your Abstract address?

CHA1.1

### Topics

NEW1

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