



Contribution ID: 131

Type: POSTER

Challenges and advances in characterization of irradiated graphite

Ensuring the safe handling of irradiated graphite under decommissioning of uranium-graphite reactors (UGR) is one of the factors affecting on sustainable atomic energy in the world. By now, more than 60 thousand tons of irradiated graphite have been accumulated in the world. This problem is being actively discussed in the framework of IAEA projects on irradiated graphite disposal and decommissioning of UGR. As noted by experts, the accurate characterization of irradiated graphite is great worth for solving the problem, including the measurement of dose-forming ^{60}Co and ^{137}Cs and difficult-to-measure radionuclides ^{14}C and ^{36}Cl . Obtaining reliable by activity radionuclides significantly affects upon safety of the UGR decommissioning process and its technical and economic performance. By now, the graphite problem has not been solved in any country, which requires consolidated efforts of specialists from different countries in solving this problem. The report presents progress in the Russian Federation over the last 10 years in the development of technical and methodological approaches for characterisation of recoverable graphite blocks by gamma and beta emitting radionuclides during graphite stack dismantling and packaging. By doing so, methodological and technical approaches are presented that allow solving these problems. The results of approbation of the application of the developed technique at the characterization of graphite stacks blocks of various reactor types are also presented.

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Track Classification: Track 5 - Practical experiences in integrating safety and sustainable development