

MITR Modular Hot Cells for Post-Irradiation Examination

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Program: Infrastructure

ABSTRACT:

Objective: The proposed project seeks to expand the capability of the MIT research reactor (MITR) at the MIT Nuclear Reactor Laboratory to perform post-irradiation examinations (PIE) on highly radioactive samples. Samples will originate in MITR in-core materials and fuels irradiations, or in irradiations at other facilities. A broad range of PIE measurements is envisioned, with flexibility to install and remove instruments and experiments in response to the needs of particular programs. The facility will be complementary to existing capabilities for lower activity samples.

Description: The goals of the project will be accomplished by installing a suite of two modular, turnkey hot cells, designed, manufactured and installed by an established hot cell supplier. The design of the hot cells will be customized to meet the goals of the project with respect to activity limits, access ports, manipulator and glove port capability and instrumentation access and feedthroughs. These hot cells will be located within the reactor containment building adjacent to an existing hot cell used for disassembly of in-core experiment sample trains and will accommodate existing transfer casks.

Impact: Expanding the hot cell infrastructure with dedicated PIE hot cells will increase the number of samples and the types of PIE that can be carried out on samples too activated to be examined in existing facilities outside the reactor containment building. This will increase the utility of existing irradiation programs devoted to, for example, accident tolerant fuel development, in-core sensor testing, advanced fuel concept testing and fluoride salt cooled reactor technology development. More information will be extracted from irradiated samples in these programs without the necessity for expensive shipments to other facilities. Equally important, the availability of modern, reliable hot cells dedicated to PIE will enable the expansion of the user base to include MIT and visiting faculty and students. This will both increase the volume of PIE that can be performed and contribute to the education and training of a new generation of nuclear scientists and engineers. The MIT Nuclear Reactor Lab and the MITR are already part of the Nuclear Science User Facilities and the new PIE facility also be available for NSUF projects, providing a valuable resource to a large pool of researchers.