
Reactor Effluent Analysis Instrumentation for Rhode Island Nuclear Science Center

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Collaborators: N/A

Program: Reactor Upgrades

ABSTRACT:

The Rhode Island Nuclear Science Center is a research nuclear reactor facility that is run by the Atomic Energy Commission of Rhode Island. The facility has been in operation since 1964. It provides nuclear science and engineering education at all levels of education, and serves education institutions not only in Rhode Island and the New England area, but also other states around the country, and in some cases from other countries around the world. The facility also collaborates with universities, research institutes, and national laboratories from around the world on a wide variety of research projects.

The objective of this project is to improve the facility research capability by investing in a new gamma spectroscopy system that has a higher efficiency than the current system that has been in use for almost 20 years. The current system is using outdated software that is no longer supported, and no longer provides the minimum detectable activities associated with the analyses performed. The new system will also have a higher efficiency than the old system. This will decrease the uncertainty in the count data, and improve the results.

At present, there are a wide variety of researchers that make use of the gamma spectroscopy system that we have. For the last twenty-five years, a small biotech company has used neutron activation analysis / gamma spectroscopy to support medical diagnostics and research from universities and hospitals from all over the world. The University of Connecticut uses the reactor to produce Ho-166, which they are using for cancer research. We use the gamma spectroscopy system to verify the activity that we are providing for them. Savannah River National Laboratory uses the gamma spectroscopy system to find Cl impurities in Pd samples. NIST has been using the system to look at the concentration of Cl and Cf in concrete to determine its structural integrity.

Additionally, reactor operation requires that the facility have a functioning gamma spectroscopy system. The system is used in order to meet a number of license specifications, such as: Monthly primary pool water analysis for Cs-137 and I-131, which could indicate that there is a fuel cladding leak, Monthly secondary cooling system water analysis for Na-24, which would indicate a primary to secondary coolant leak, Annual calibration of the confinement gaseous effluent monitor, which is done by irradiating a volume of air to produce a known quantity of Ar-41, and circulating it into the effluent monitor system, Annual confinement emergency filter efficiency test to show that the filter is at least 99.97% efficient for iodine removal. In all of the cases, a gamma spectroscopy system is used to perform the analyses.