Preparing Oregon State University to Meet the Research Challenges of the Global Nuclear Energy Partnership

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Final Scientific/Technical Report for
DOE AWARD DE-FG07-07ID14858

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Executive Summary

The OSU Radiation Center requested \$100,000 under the Global Nuclear Energy Partnership University Readiness program to provide for graduate student support, reactor equipment upgrades, and irradiation support. A portion of the funds requested were used to support the graduate education of a graduate student for a period of one year. The remaining funds were utilized to enhance the irradiation facilities of the Oregon State TRIGA[®] Reactor as well as to offset the costs of irradiations for initial investigations where grant funding is not available.

The focus of this effort was to create an environment that would enhance facilities and equipment at Oregon State University which emphasize GNEP related themes, specifically material science analytical capabilities for the next generation of nuclear reactors. These enhancements included development of a prompt gamma neutron activation analysis analytical capability, digital reactor data logging, electronic dosimetry for researchers, replacement of sample grapples, and irradiation/analytical services.

Comparison of Accomplishments with Project Goals

Goal or Objective	Accomplishment
Graduate Educational Support	One student was supported for one year. The subject of the thesis involved the development of a prompt gamma neutron activation analysis beam for material science applications.
Electronic and Radiation Monitoring System enhancement	A number of instruments or pieces of equipment were purchase to provide researchers with enhanced capability to access and record data. These purchases include electronic dosimetry, a digital data logger, and a set of replacement sample grapples.
Preliminary Investigation Irradiation Funds	Funds were provided to offset the cost of irradiations for 15 different researchers over 16 distinct projects and involved 630 different samples.

Project Activity Summary

The Global Nuclear Engineering Partnership (GNEP) is critically dependent upon the education of students with the theoretical and research skill necessary to address the multitude of research question associated with the advanced reactor designs and fuel management programs that are central to GNEP. This effort asked for and funded a graduate student for their entire second year. The subject of the research involved development of a neutron-beam line to performing prompt-gamma neutron activation analysis. This effort also included developing the analytical capability including beam-line commissioning, detector calibration, shielding, beam-stop creation, and shutter control. This student will likely be pursuing a Ph.D. related to the continued development of the beam-line to include a neutron depth profiling capability. Combined, these techniques provide a unique set of analytical tools available to researchers interested in material composition for both fuels and advanced reactor design materials.

Several equipment upgrades were requested under this program. The intent of the upgrades was to increase the ease of utilizing the reactor and related facilities for researchers interested in material science issues, specifically both prompt and delayed activation analysis. These upgrades include:

- A set of electronic dosimeters to provide real-time dosimetry information to researchers on the beam floor
- A digital data logger to provide readily accessible reactor power and performance information, enabling the researcher to correlate reactor performance with analytical results
- A set of replacement sample positioning grapples to insert and remove samples from the reactor core

Just as requested in the original proposal, the remainder of funds requested was used to offset the costs of irradiations for preliminary research studies. Often times, researchers have research ideas that require initial irradiations to determine the feasibility or sensitivity of the proposed idea, but funding from research grants is unavailable to pay the costs of irradiation and handling of their samples. In total, this program provided funding for:

- 15 researchers
- 630 samples irradiated or analyzed
- 16 distinct projects