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## Upgrades for MURR Reactor Control and In-Pool Maintenance Operations

**PI:** Leslie P. Foyto, University of Missouri

**Program:** Infrastructure

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**ABSTRACT:**

This proposal requests \$109,782 to support two activities essential to MURR reactor operations: fabrication of a new regulating blade drive mechanism and acquisition of an in-pool camera system capable of withstanding high radiation environments next to the reactor fuel and other irradiated components. The primary objective of the requested funds is to support MURR's educational and research mission through continued reliable operations essential to support investigations in many academic disciplines, including nuclear engineering, health physics, reactor safety, detector design and optimization, radiochemistry, nuclear analytic methods, data acquisition and analysis, and modelling and simulation of reactor systems.

The two activities are high priority requests for MURR's operations. The current regulating blade drive mechanism (which positions the regulating blade, in either the manual or automatic mode, to adjust neutron density in order to maintain the reactor at the desired power level during operation) was placed into service at the time of initial MURR criticality in 1966, and is requiring significantly more maintenance to maintain its operability (and thus facility downtime). Since calendar year 2000, there has been 10 Licensee Event Reports submitted to the U.S. Nuclear Regulatory Commission because of failure of the drive mechanism during operation – this is a Technical Specification-required component. For in-pool inspections, fuel handling, sample change-out, and other essential maintenance functions, Reactor Operations requires a camera system capable of withstanding the high radiation environment near the reactor fuel and other irradiated components in the pool. Many deep pool maintenance activities are nearly impossible without the assistance of a radiation resistant camera.

Under direction of Mr. Foyto (Project Director), senior operations and engineering staff will conduct the upgrade project according to following timeline (discussed in more detail in the Project Narrative section). We anticipate that the upgrades will be completed within the one-year period of DOE support.

Phase 1: Specification and Procurement. Upon award, Foyto will work with the MU Office of Procurement Services for issuing a bid for the acquisition of the in-pool camera system and procurement of components to fabricate a new regulating blade drive mechanism and test stand assembly. Each of these activities will be conducted following procedures that conform to University and Federal procurement policies. For fabrication of the regulating blade drive mechanism, Foyto will work with MURR's Reactor Engineering group to begin ordering components for assembly.

Phase 2: Installation. Installation of the new regulating blade drive mechanism will be scheduled to avoid facility downtime and disruption of faculty-student research. After receipt and testing, the in-pool camera will be put into service for routine operations and for any off-normal needs that might occur.

With MURR's significance in relation to the nuclear science and engineering infrastructure in the United States, the requested funding under the DOE NEUP program is an excellent investment in our country's ability to respond to current and future nuclear workforce needs and further respond to an extensive academic research portfolio in Nuclear Engineering, Health Physics, Radiochemistry, and Reactor Safety.