

General Reactor Safety Improvement at Missouri S&T Reactor

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ABSTRACT:

The primary objective of the proposed project is safety improvement of the Missouri University of Science and Technology reactor (MSTR). A part of this yields enhancement of distance learning capability of the MSTR. This objective will expand the capabilities of the MSTR in teaching, research and training. The MSTR has been operated safely since 1961. An area of safety improvement identified is in fuel handling and support for experiments designed for submersion into the reactor pool. In addition, gamma sensitive portal monitor will improve the safety standards at the MSTR. The installation of a 2-Ton overhead crane will establish improved safety in this endeavor. The MSTR is capable of distance reactor laboratory class, which has been deployed between Missouri S&T and University of Illinois. Enhancement needs identified from users' feedback include digital recording and sharing of reactor power logs in the distance learning setup.

The MSTR allows for onsite and remote research endeavors. In its current configuration, fuel handling is done manually. The overhead crane installation will minimize drop potential by eliminating the effect of fatigue experienced by fuel handlers during core reshuffling and/or unloading. It will also facilitate moving of heavy components such as core access element and in-pool delayed gamma detector rig, which weighs about 90 kg. The improvement sought will facilitate safety and expand research scope at the MSTR. The gamma portal will improve existing safety equipment for researchers within the institution. Installation of digital chart records will provide reliable and robust record keeping of reactor data. An associated benefit is the enhancement of MSTR's distance capability. It will make the performance of a reactor-based research more robust for remote users by providing access to pertinent data in real-time.

The upgrade being requested is relevant to the mission of DOE-NE in that it prioritizes safety of the reactor facility. It improves the facility to a level where advanced research involving collaborative work can be performed towards the advancement of nuclear power. Upon the completion of the project, the MSTR will be a reactor facility that is readily shared with the scientific community for nuclear education and research. It will also be a facility that can receive and safely handle wide variety of equipment for research purposes. Furthermore, it will have a modern radiation monitoring portal for enhanced safety of the facility's users. The importance of the project in terms of utility outcome is the availability of the MSTR to support more robust and wider variety of research effort onsite, while providing avenue for participation in research endeavor from remote location. The overarching impact of the requested upgrade is that it makes the MSTR into a potential national scientific user facility.