

PRACTICAL EXPERIMENTS AND SIMULATIONS FOR NUCLEAR SAFEGUARDS EDUCATION

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ABSTRACT

Recently the University of Missouri-Columbia has implemented a Nuclear Safeguards graduate certificate to help satisfy the need for increased accountability in the growing field of nuclear technology. In order to fulfill partially the requirements of this certificate, a Nuclear Safeguards Science and Technology course has been established to link the concepts of nuclear science with those of nuclear security. Courses have already been available to allow a student to become familiar with the nature and properties of radioactive isotopes as well as their nonproliferation risks and other associated hazards. However, this new course strives to provide access to the methods and principles that connect the concepts of nuclear science with their applications to the safeguarding of nuclear materials.

The three primary aspects of nuclear safeguards are material protection, control, and accountability. First, a tool is developed using a statistical model called EASI that can be used to aid in the design of physical protection systems. Secondly, an example laboratory experiment is presented that shows a calibration of a hand-held radiation detector for the use in preventing theft of a radioisotope for the purpose of material control. Finally, the development of a script in MATLAB for use in simulating gamma ray spectra, a method commonly used in material accounting, for various radioactive isotopes is presented.