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Systems Assessment for Advanced NESs

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Abstract
Nuclear energy is expanding worldwide as many nations seek to ensure energy security and independence. Transition to advanced and closed fuel cycles that deploy Generation IV nuclear energy systems (NESs) will assure sustainability of resources. Advanced NESs require fuel that is in different material form than in contemporary nuclear reactors. These new materials will be remotely-handled and fabricated by batch processing in heavily-shielded hot cells. Optimizing safeguards with facility design, which is commonly referred to as "safeguardability," will be critical to the practical deployment of the advanced NESs. Recently, the High Reliability Safeguards (HRS) methodology has been established to study safeguardability challenges and propose practical approaches to advanced fuel cycles. HRS enhances intrinsic proliferation resistance establishing an envelope of adaptable functional components as part of a design strategy. A risk-informed approach will be utilized to assess the system as well as to inform new regulatory approaches. HRS seeks to integrate safeguards, safety, and physical security and physical protection while optimizing these important features with facility design. A hypothetical, commercial pyroprocessing facility is used as an example system. This talk will introduce the main principles that form the HRS approach and include current modeling efforts and future directions for research.

Biography
Bob received his doctorate at UC-Berkeley, Nuclear Engineering in 2006 in the field of high-level waste management. The subject specifically was mathematical modeling of radionuclides in the near-field. He continued this work subsequently during a postdoctorate research position at The University of Tokyo. In 2009, he switched fields to safeguards and safeguardability for advanced nuclear systems during his next postdoctorate position back at UC-Berkeley. That position has recently ended and he continuing research efforts in this field.