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Technical Monthly –May 2012

MPACT Campaign

Management and Integration

- [LANL] Initial coordination meetings with NE and NA-20 were held the first week of May. Additional meetings, to include NA-82 and the new Proliferation and Terrorism Risk Assessment task are scheduled for June. Work package planning as part of the NTD transition is ongoing.

Accounting and Control Technologies

Microcalorimetry

- [LANL] Some parts to attempt repair of a malfunctioning water chiller that has been holding up work on the current detector array have arrived. We will attempt to begin running the compressor/cryostat next week to resume work on commissioning the detector array. We have also been working on a backup plan to temporarily move our system to a different lab space. Completed data analysis and prepared a paper summarizing Pu measurements for peer-review journal. Two members of our team presented work at the SORMA West 2012 conference. Completed data analysis and prepared a milestone report summarizing the development of Monte Carlo tools to study systematic errors.

Electrochemical Sensor

- [INL] The second sensor test was stopped short due to the work stand-down. Some activities related to this work have resumed, but not all. The sensor used during the second test was removed from the furnace and it showed cracks and later crumbled when being rinsed for sample preparation. The sensor material will be submitted to SEM analysis once work is resumed in the facilities where analysis is performed. A third sensor test has started. Tests with different arrangements will continue and will be oriented based on post-test analysis of the first three sensor tests. Materials with different annealing temperatures will also be prepared for analysis.

Lead Slowing Down Spectrometer

- [LANL] Continued work on perturbation method for LSDS analysis. We are running simulations to delineate issues and are checking additional data libraries to see whether there are differences in simulation results.

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Fast Neutron Multiplicity Analysis

- [INL] The University of Michigan team continues its work on the post-experiment analysis of the validation data from JRC ISPRA, as well as scoping studies using the simulation tool MCNPX-PoliMi. At INL, our new staff member working on this project is now working to model performance capabilities for the fast-neutrons scintillator design concepts. At INL our primary analysis approach is focused on the Feynman mean-to-variance approach. At the University of Michigan, the primary analysis approach is multiplicity coincidence analysis.

Fast Neutron Imaging to Quantify Nuclear Materials

- (ORNL) Fast Neutron Imaging to Quantify Nuclear Materials: Completed additional measurements of the two "trainer" configurations as well as calibration measurements with sources on an x-y stage. The imager was shipped to Pantex for an NA-22 obligation at the end of May.

(LANL) Lead Slowing Down Spectrometer

- Continued to look into He4 detector. A Swiss company was located that makes He4 detectors and associated electronics. Had a teleconference with them to assess the possible help we can get from them. We are also looking in to constructing one locally. Ongoing perturbation calculations are providing information on the fundamental systematic error limits of LSDS. In order to achieve separating the contribution of Pu and 235U to the signal, there will need to be tight controls on systematic errors.

MPACT Analysis Tools

Multi-isotope Process Monitor

- [PNNL] Attended a training call in advanced multivariate classification and analysis methods. These methods were applied to the multivariate analysis of fuel characteristics based on simulated gamma. Work continued on a computational framework to quantify the impact of gamma-ray counting statistical precision on principal component regression (PCR) analysis of a multi-component (i.e. multi-isotope) gamma-ray spectrum. Tests of the simulation framework are anticipated to begin in early June. Development of a proposal to instrument H-Canyon is being prepared in conjunction with SRNL and the NNSA's NGSI program is ongoing. Kenneth Dayman, the graduate student from University of Texas, graduated in May.

Modeling and Simulation for Analysis of Safeguards Performance (Electrochemical)

- (SNL) The mass balance model simulation framework for the electrochemical separations is in the process of being built following the pertinent flow sheet assumptions.
- **(ANL)** Fabrication of the quartz chips continues at an external foundry. Design of the heat exchange manifold and chip holder was completed and handed off to an external foundry for fabrication.

Material Control including Process Monitoring (Pattern Recognition, Sensors

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MPACT System Integration and Technical Support

- [LANL] Attended Fuel Cycle Options working group meeting in Las Vegas May 15-16. Completed a draft report on "Cost-based metrics for nuclear material security risk and proliferation risk to support fuel cycle screening". The report documents an approach to include cost-based considerations to develop metrics for security risk and proliferation risk. We examined the ROM costs associated with meeting regulations and standards related to security and safeguards. Report is in internal review.

Safeguards and Security by Design

Used fuels storage security analysis, guidance and best practices

- (LANL) The Request for Proposal (RFP) sole-sourced to WINS, for the "Security of Spent Fuel Storage" workshop, was issued by LANL at the end of May and has been received by WINS. WINS is currently preparing their response.
- [SNL] Completed SNL best practices milestone report draft input and submitted to LANL lead, Scott Demuth, and MPACT NTD Mike Miller. Initiated FY013 planning.

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