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Technical Monthly – March 2012

MPACT Campaign

Management and Integration

- [LANL] Several MPACT BCPs were executed in February, reflecting the shift in MPACT priorities directed late last year. Work continued on the FY2014 IPL, also bringing it in line with the new priorities. Preparations were made for the March MPACT Working Group meeting, in conjunction with Savannah River which is hosting the meeting. Steps were taken to initiate a new project with the World Institute for Nuclear Security, including discussions with WINS staff and preliminary work on the required procurement documentation.

Accounting and Control Technologies

Microcalorimetry

- [LANL] Several hardware issues were worked through. The newest detector array is working at LANL. A thorough analysis of previously collected Pu sample data using recently developed analysis code with improved spectral energy calibrations was completed. We now have a significantly better understanding of measurement uncertainties.

Electrochemical Sensor

- [INL] Post-test analyses of the salt and sensor material for the first sensor test are almost complete. Sensor testing with different arrangements will continue and will be oriented based on post-test analysis of the first sensor test. Sensor materials for the next couple of tests are being fabricated. Materials with different annealing temperatures are being prepared for analysis.

Fast Neutron Imaging to Quantify Nuclear Materials

- [ORNL] The imager detectors repairs are complete and work with the imager is under way.

Lead Slowing Down Spectrometer

- [LANL] The milestone requiring a report on LANSCE experiments was completed and submitted. Analysis of previous experiments and comparisons to simulations is near complete. Results are being compared with previous LANSCE-LSDS and RPI results. Additional data library (TENDL) is also being checked to see whether there are differences in the simulation results.

MPACT Analysis Tools

Multi-isotope Process Monitor

- [PNNL] The mid-year MIP Monitor project accomplishments and progress was presented at the MPACT meeting held in March at SRNL. Discussions around the meeting included inquiries into the feasibility of collecting process measurement data at H-Canyon, and it was explored further after the meeting. Kenneth Dayman, the graduate student from University of Texas, completed an initial draft of his master's thesis. His research will contribute to the multivariate classifier currently under development. Sarah Bender, the graduate student from Pennsylvania State University, presented her work on a poster and in a conference paper at the MARC IX meeting.

Modeling and Simulation for Analysis of Safeguards Performance (Electrochemical)

- [ANL] A mass balance flowsheet for the fast reactor fuel was completed and a model simulation is scheduled to begin construction next month. The development of a mass balance flowsheet for light water reactor fuel will predict the behavior of the separation process using mathematical functions. The completed flowsheet will be utilized as the basis for constructing the model simulation for the electrochemical separations.
- [SNL] Comments and review of the model from the MPACT Working Group meeting have been used to evaluate updates to the EChem model. A preliminary physical security layout has been developed in ATLAS.

Material Control including Process Monitoring (Pattern Recognition, Sensors)

- [ANL] Thermal stability tests for high temperature microfluidic interconnections were completed on all compounds tested for bonding strength. An interconnection strategy was determined based on these results that we expect will allow for operation at 400C in the first generation of sampling systems. Design of the sampling system using the chosen interconnections was initiated, with handoff to an external foundry for fabrication based on ANL specified process conditions expected by the middle of the month.

Material Control including Process Monitoring (Pattern Recognition, Sensors):

- [ANL] Monte Carlo simulations of the sampling system were conducted under conditions of realistic sampling size distributions, electro-refiner inhomogeneity distributions, and detector efficiencies. These simulations were used to establish a baseline limit of detection for system operation, assuming an on-line separation step is conducted before detection.

Sensor for measuring density and depth of molten electrolyte

- [INL] The procurement effort continued. 80% of the components ordered to assemble the double bubbler have arrived at the INL.

MPACT System Integration and Technical Support

- [LANL] Pratap Sadasivan, and his team have been working on the new metrics for proliferation and security. They have defined the basic structure and method, implementation strategy, needed data, and approach to application. Initial drafting of several sections of the milestone document was started.

MPACT Technical Support

- [SRNL] The MPACT Working Group meeting was hosted at SRS on March 13-15, 2012. Approximately 65 researchers from national labs, industry and universities attended the technical meetings at the Center for Hydrogen Research on March 13-14 with a working lunch each day. 37 persons participated in a site tour, including H-Canyon and the MOX Facility, on March 15. As part of the WG meeting, a presentation by SRNL was given on H-Canyon history, capabilities and opportunities for its use as an MPACT technology test bed.

Safeguards and Security by Design

Used fuels storage security analysis, guidance and best practices

- [SNL] Coordination discussions continued for the MPACT used fuel security work packages. A telecon for UFD/MPACT transition was coordinated with Mark Mullen, MPACT NTD; Ken Sorenson, UFD S&T CAM; J.C. DeLaGarza, DOE/NE UFD Technical Program Manager; and Dan Vega, DOE/NE MPACT Technical Program Manager (Mar 22). Planned and prepared for UFD/MPACT transition meeting with LLNL and LANL (Apr 4 2012).

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