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MPACT Campaign

Management and Integration

- [LANL] Attended joint UFD/MPACT meeting with the NRC to discuss used fuel security for extended storage. NRC expressed interest in what FCT is doing in this area and we agreed to continue the information exchange. The MPACT working group meeting was held Aug 28-20 at Idaho Falls, Center for Advanced Engineering Studies. The meeting was well attended and updates were given for each of the Campaign's work packages as well as from DOE-NE, NA-22, NA-24, and three NEUP projects. Representative from four industry vendors attended as well and a new reactor concept was presented by General Atomics. INL arranged the logistics and site tours the final day.

Accounting and Control Technologies

Microcalorimetry

- [LANL] A NIST collaborator traveled to LANL to help diagnose observed multiplexing limitations with the detector array. It was determined that an electronic settling time after switching row addresses is longer at LANL that observed at NIST and this is the cause of the multiplexing difficulties. We have implemented several hardware modifications intended to mitigate this problem. Following that we have now successfully recorded data at 1 kHz total array counting rate from Gadolinium with all detector pixels simultaneously multiplexed and about 89% of pixels producing data. Measurements on plutonium are more challenging due to the larger pulse heights, and we are now working to determine how many pixels can be simultaneously multiplexed for Pu measurement.

Electrochemical Sensor

- [INL] A SEM and DSC analyses were performed on different samples to contribute to the end of year technical report.

Fast Neutron Multiplicity Analysis

[INL] We are preparing the final report for the current phase of the project, which is focusing on assessing design options for a fast-neutron multiplicity counter. This effort will result in a conceptual design for a fast neutron multiplicity counter. We have placed an order for a VME crate and are in the process of placing orders for a 16-channel data acquisition board (from Struck) and a computer interface control card (also from Struck). These are long lead-time items and we do not expect to receive them until December.

Fast Neutron Imaging to Quantify Nuclear Materials

[ORNL] Completed analysis of mock holdup scenarios. Compiled analysis in a report emailed to the campaign technical director on 9/11/2012.

Lead Slowing Down Spectrometer

- [LANL] Continuing to study the He4 detector issue. We have continued work on perturbation methods to analyze spent fuel LSDS data, and using a limited time window, have achieved some success. We are looking into the possibility of predicting the isotopic response of fission chambers, from the response of other isotopes. (e.g., determining the response of a 239Pu chamber from that of a 235U chamber).
- [PNNL] Studied the use of Th fission chambers for the analysis as well as the impact of the lead size. ISU is preparing a small Th fission chamber report. We organized contributions for Oct. 31 deliverable from collaboration members.

MPACT Analysis Tools

Multi-isotope Process Monitor

[PNNL] The dynamic fuel mixing experiment performed last FY was reworked to provide better experimental control and data quality; this experiment was performed utilizing event mode data logging techniques. A program to extract the event mode data into a useable format is being developed. We investigated the impact of gamma-ray counting statistical precision on the effectiveness of Principal Component Regression (PCR) as applied to a three-component mixture (Am-241, Co-57, and Eu-152) of radioisotopes. The results indicate an approximate 1/sqrt (counts) dependence of the RMS reconstructed component-activity precision on the total spectrum intensity, when the three spectral components are of comparable intensity. Counting experiments were begun to provide data to test and verify the uncertainty analysis and to explore the effect of detector resolution on data analysis results.

Modeling and Simulation for Analysis of Safeguards Performance (Electrochemical)

- [ANL] We completed initial fast reactor fuel electro-refining process model. A poster entitled Modeling of Pyro-processing Flowsheets for Recycle of Used Nuclear Fuel was presented at the 2012 International Pyro-processing Research Conference.

[SNL] All modeling results have been written up into the final report. The report is currently being finalized for review.

Material Control including Process Monitoring (Pattern Recognition, Sensors)

- (ANL) Fabrication of quartz chips continued at an external foundry. Awaiting delivery of the heat exchange manifold and chip holder.

Material Control including Process Monitoring (Pattern Recognition, Sensors)

- [ANL] We received the quartz chips and heat exchange manifold from external foundry.

Experimental set-up will be tested and installed in an inert atmosphere glovebox.

Sensor for measuring density and depth of molten electrolyte

[INL] We are trying to catch up after the MFC stand down and ROK CRADA priority over this work reduced the availability for the last few months of the technician tasked with assembling the system. Flow meters and pressure transducers have been assembled to be tested. Data acquisition hardware has been ordered and some components have arrived.

MPACT System Integration and Technical Support

- [LANL] Exchanged reports with Fuel Cycle Options team on Proliferation and Security metrics.

For more information on MPACT contact Mike Miller (505) 667-3335