LA-UR-12-22572
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Title:	Fuel Cycle Technologies FCT Research and Technology Development Campaigns Monthly Campaign Performance Review
Author(s):	Miller, Michael C.
Intended for:	Monthly Campaign Performance Review telecom, 2012-06-28 (Los Alamos, New Mexico, United States)

Fuel Cycle Technologies

FCT Research and Technology Development Campaigns
Monthly Campaign Performance Review

Mike Miller
National Technical Director – MPACT (1.02.04)
FY 2012 May Data
Held: June 28, 2012

Dial In: 301-903-9153

NE-5
Office of Nuclear Energy
U.S. Department of Energy

MPACT
Milestone Status – M2's

Milestone Number	Title	Level	Estimated Finish Date	Revised Finish Date	Actual Finish Date	$ Impact	QRL
1.02.04.02 - Accounting and Control Technologies							
M2FT-12IN0402021	Test different reference/sense electrode designs for impedance and compatibility with electrolyte	M2	7/31/2012	8/31/2012		(12,074)	QRL3
M2FT-12OR0402041	Complete proof-of-concept imaging measurements to quantify SNM in holdup configurations	M2	8/31/2012				N/A
M2FT-12LA0402011	Demonstrate simultaneous multiplexed readout of high-yield 256 pixel array with total counting rate in the kHz range	M2	8/31/2012				QRL3
M2FT-12IN0402031	Model the performance of active neutron interrogation/liquid scintillator for assaying fuel cycle materials	M2	10/31/2012				QRL3
1.02.04.03 - MPACT Analysis Tools							
M2FT-12LA0403112	Document proliferation and security evaluation criteria for use in next fuel cycle options screening	M2	6/30/2012				QRL3
M2FT-12PN0403016	Complete and Document Automatic Algorithm for MIP	M2	7/31/2012				QRL3
M2FT-12SN0403042	Complete and document baseline electrochemical model and MPACT sensitivity analysis	M2	10/31/2012				QRL3

New Altered Level 2 Milestones for this months reporting (highlighted yellow on previous 2 slides):

- **M2FT-12IN0402021:** MFC stand-down has slowed down progress.

MPACT
Milestone Status – Altered M3's

Milestone Number	Title	Level	Estimated Finish Date	Revised Finish Date	$ Impact	QRL
1.02.04.02 - Accounting and Control Technologies						
M3FT-12BN0402071	Final report on noble gas detectors (Xe) as applied to spent fuel measurement	M3	3/31/2012	5/31/2012	(2,197)	QRL3

Previously Altered Level 3 Milestones:

- **M3FT-12BN0402071:** Completed on June 11.

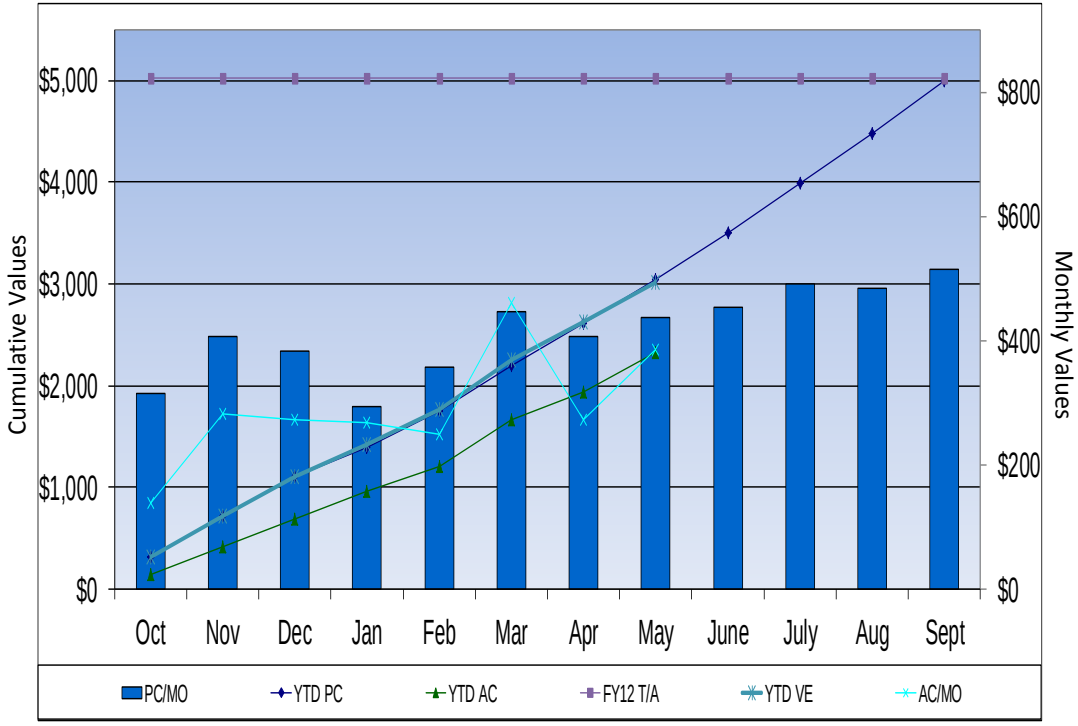
MPACT
Cost Performance ($Ks)

			MONTHLY					CUMULATIVE					CHANGE (%)	CARRYOVER
WBS	Title	Total Available	PC	VE	AC	Var (VE-AC)	Var (%)	PC	VE	AC	Var (VE-AC)	Var (%)	From Prior Month	Identified ($)
1.02.04	MPACT	$5,024	$438	$391	$386	$05	1.30%	$3,047	$3,015	$2,326	$689	22.86%	3.21%	$452

- **Cost Variation**
  The underrun is caused in part to open commitments ($177K), FY13 funding for completion of reports and the number of slow starts this year caused by lab slowdowns in programmatic work due to various safety and procedural issues.

- **Identified Carryover - $452K**
  Estimates are that less than 10% of this year's MPACT budget will carryover to the next fiscal year. Some of the carryover will accommodate for the time lag between placement of contracts and materials orders and actual billing and payment. A small amount of funding is being held back for finishing reports at the beginning of FY13.

- **Open Commitments - $177K**
  Unpaid university and collaboration contracts and long lead procurement items make up the bulk of the open commitments.



PC = Planned Cost; AC = Actual Cost; VE – Value Earned; TA = Total Available (FY12 Allotments plus FY11 Carryover)

MPACT
Major Accomplishments

Management and Integration:

- **(LANL) MPACT Management and Integration:** 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:

- **(LANL) Microcalorimetry:** 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.

- **(INL) Electrochemical Sensor:** 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.

- **(INL) Fast Neutron Multiplicity Analysis:** 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.

MPACT
Major Accomplishments

- **(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:

- **(PNNL) Multi-isotope Process Monitor:** 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.

- **(ANL) Modeling and Simulation for Analysis of Safeguards Performance (Electrochemical):** The mass balance model simulation framework for the electrochemical separations is in the process of being built following the pertinent flowsheet assumptions.

- **(SNL) Modeling and Simulation for Analysis of Safeguards Performance (Electrochemical):** We are currently examining the integration with physical security. Two students were brought on to help with visualization capability.

- **(ANL) Material Control including Process Monitoring (Pattern Recognition, Sensors):** Fabrication of the quartz chips continues at an external foundry. Design of the heat exchange manifold and chip holder was completed and handed of to an external foundry for fabrication.

MPACT
Major Accomplishments

- **(LANL) MPACT System Integration and Technical Support:** 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 :

- **(LANL) Used fuels storage security analysis, guidance and best practices:** 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) Used fuels storage security analysis, guidance and best practices:** Completed SNL best practices milestone report draft input and submitted to LANL lead, Scott Demuth, and MPACT NTD Mike Miller. Initiated FY013 planning.

MPACT
Issues and Concerns
(Include any anticipated baseline changes)

- **None.**

MPACT
Look Ahead (60-90 Days)
(General items and meetings)

- (LANL) MPACT Management and Integration Meetings, to include NA-82 and the new Proliferation and Terrorism Risk Assessment task are scheduled for June.
- The MPACT working group meeting is tentatively scheduled for September.
- The INMM 53rd annual meeting will take place July 15th – 19th in Orlando,