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LLNL-TR-744686

# Quarterly Report 24.1.3.1

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# Safeguards Technology Development Program

## 1<sup>st</sup> Quarter FY 2018 Report

January 15, 2018

**WBS # – Project Title:** 24.1.3.1- Measurement Technology

**Lab – POC:** LLNL-Dan Decman

**Principal Investigator:** Jennifer Shusterman, shusterman1@llnl.gov

**HQ POC:** Arden Dougan

**Summary Statement of Work:** We are measuring freshly separated uranium samples using modern list mode (event-by-event) electronics with high resolution HPGe detectors to study the in-growth behaviors of uranium daughters' gamma-rays. These data will show how we can use gamma-ray spectroscopy to determine the separation date for processed uranium. With this knowledge, one can obtain proper uranium isotope ratios using standard safeguards accountability software such as U-235 or MGAU.

**Major Highlights:** We have counted, separated, and started list-mode data acquisition on a low-enriched U sample to compare with the higher enriched samples from last FY. Analysis of the list-mode data from the 90% <sup>235</sup>U enrichment measured in FY17 is in process.

### Progress (by task)

#### Task 1 – Identify and acquire gamma-ray data on third uranium sample

The third sample (3% <sup>235</sup>U enrichment) was counted on the planar and coax detectors prior to separation. This task is complete

#### Task 2 – Chemical separation of third uranium sample

Chemical processing on the third uranium sample is complete.

#### Task 3- List-mode data collection on third uranium sample is underway. Analysis of the list-mode files from the 90% <sup>235</sup>U sample is in process.

Discussions with ORNL regarding the work scope for FY18 have taken place and data files are being processed from the 90% <sup>235</sup>U data for transfer to the ORNL group. It is expected that this data transfer will occur in the next month.

#### Task 4- Transition from list-mode collection to conventional gamma spec

The first step of this transition was to switch out the computer to a more updated system and replace the gamma acquisition electronics. The new computer and new high voltage supplies have been installed and are in use. The acquisition electronics will be switched after the third uranium sample is done counting.

#### Tasks 5-9- These tasks have not yet been started.

**Publications:** N/A

**Issues:** N/A

**Project Performance:**

- **Change Management:** Discussion of Joule Metric deliverables for FY18/19 has begun.
- **Budget Performance:** The budget was on track during Q1 and matched with original estimates.
- **Schedule Performance:** We are a few weeks behind the schedule in the latest PWP because of challenges updating the computer system. We do not anticipate an impact on final deliverables.
- **Milestone and Deliverable Performance:** The two milestones due in Q1 were Tasks 1 and 2 and both were completed on time.
- **Disposition and Transfer:** Potential future transfer to IAEA though this will require further discussions regarding specific deliverable and timeline.

**Carryover:** We have spent the remaining FY17 carryover funds during Q1 on FY18 labor and procurements.