NBL Program Office

NNSA National Nuclear Security Administration

NBL PO NEWS

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DEFENSE PROGRAMS

OFFICE OF STOCKPILE PRODUCTION INTEGRATION

NA-121

INNOVATE. COLLABORATE. DELIVER.

A Message from the Director, Richard Essex

Program Update: Greetings from the New Brunswick Laboratory (NBL) Program Office. Peter Mason officially retired as Director of the NBL Program Office at the end of October 2024. After many years and various roles at NBL, Pete was instrumental in guiding NBL's transition from a laboratory to a Program Office within the DOE Office of Science. He coordinated the transition from the Office of Science to NNSA while simultaneously managing NBL's mission activities. His years of hard work and dedication to the NBL mission are very much appreciated.

The learning curve has been a steep one since I started as Director of the NBL Program Office. Despite my 14 years at New Brunswick Laboratory and 2 years of collaboration with the Program Office, while at the National Institute of Standards and Technology (NIST), taking over from Pete has been a challenge. While learning the ropes of the Program Office and as a part of the Office of Stockpile Production Integration (NA-121), I have been working hard to shepherd several important projects that were in process when I took over. The contractors supporting the NBL Program Office, my colleagues in NA-121, the DOE national laboratories, and at NIST have been instrumental in maintaining the momentum. Their continued support has been invaluable.

Our previous newsletter mentioned a plan to change the name of the NBL Program Office. The goal of this change is to avoid any confusion when referring to "New Brunswick Laboratory" as NBL is no longer a lab and it has been half a century since its relocation from New Brunswick, New Jersey. This change is still in the planning stage, and we will provide more information on the proposed transition in the next program update. In the interim, I am pleased to provide an update on a variety of accomplishments and ongoing projects.

As always, I welcome all feedback. Please send any comments, concerns, or complaints to me at: richard.essex@nnsa.doe.gov

NBL Program Office Mission Activities:

Nuclear Forensic Reference Materials (NFRMS): In 2008, the DHS National Technical Nuclear Forensic Center (NTNFC) initiated a program to produce reference materials specifically for nuclear forensic analysis. Originally, the still-operating New Brunswick Laboratory (NBL) was coordinating these activities and managing the stock of NFRMs. Since then, both NBL and the NFRM Program have undergone a series of transitions. One result of these transitions is that it became unclear what organization would manage and certify the reference materials produced by the program. Details are still being worked out, but the current plan is to formalize NBL Program Office responsibility for managing the existing stocks of NFRMs. Toward that end, the Program Office has recently issued certificates for three previously completed reference materials after independent assessments by the Program Office and NIST. These new Certified Reference Materials (CRMs) include a ^{229}Th isotope spike material (NFRM Th-1), a ^{231}Pa calibration material (NFRM Pa-1) and a high purity ^{233}U isotope spike (NFRM U-233).

Uranium Radiochronometry Project: The NBL Program Office helped coordinate a NA-24 funded project at Lawrence Livermore National Laboratory (LLNL) to produce two 'young' uranium radiochronometry CRMs (i.e., CRMs certified for the age of purification). As part of this project, four DOE laboratories participated in an Interlaboratory Comparison (ILC) exercise to measure model purification ages of these materials. Participants included LLNL, the Pacific Northwest National Laboratory (PNNL), the Oak Ridge National Laboratory (ORNL), and the Los Alamos National Laboratory (LANL). The ILC exercise results have been reviewed, and a final report was issued in April 2025. A certification package for the new reference materials has also been drafted and will be forwarded to NIST for an independent assessment

HALEU Isotopic Reference Material: ORNL has prepared a new 19.6 % ^{235}U enriched uranium isotope-amount ratio reference material for NBL Program Office. This new CRM was created as a gravimetric mixture of two high purity uranium metal reference materials (CRM 112A and CRM 116A). Each CRM unit consists of 5 mg of uranium as dried nitrate in a 30 mL Teflon bottle. The draft certification package for the reference material is complete and will be submitted to NIST for an independent review. This new CRM will be named U196 and will be available to users early in FY 2026.

Plutonium Isotopic Standards (CRM 136A, CRM 137A, CRM 138A) Update: Characterization analyses are currently underway for the last of three updated Pu isotopic standards (CRM 138A). Measurement results have been collated for the CRM 136A and CRM 137A materials and statistical analysis of the results has been performed by staff in the Statistical Engineering Division at NIST. Certification packages are being prepared for the materials, and the NBL Program Office plans to have certificates issued for two of the materials, CRM 136A and CRM 137A, before the end of CY 2025 with CRM 138A to follow in CY 2026. In parallel with the new CRMs, the Program Office will issue revised certificates with updated isotopic compositions for the original plutonium isotopic standards (CRMs 136, 137, and 138).

Pu Metal CRM 126B Update: LANL has prepared over 300 units of the nominally 1 gram Pu metal standard, CRM 126B. Initial testing indicates that the cast metal will be an excellent high purity reference material. LANL, LLNL, ORNL, and Savannah River National Laboratory (SRNL) have developed analysis plans based on the NBL Program Office requirements. It is anticipated that characterization analyses for certification will begin in late FY 2025 or early FY 2026.

Neptunium CRM: ORNL is currently scheduling a task to repurify and calcine 10 grams of neptunium reserved for the NBL Program Office for use in a new Np CRM. ORNL expects to repurify the material in the coming months. Following purification, samples will be transferred to the Analytical Chemistry Group for trace impurities by ICP-MS, TGA, and alpha/gamma measurements.

New DU Metal CRM: The NBL Program Office, in cooperation with the Y-12 National Security Complex and Manufacturing Sciences Corporation (MSC), has begun processing a large casting of depleted uranium (DU) to serve as the base material for a new DU metal CRM. Acceptance testing analyses of selected samples from the casting are underway at ORNL. If these analyses indicate that the DU metal meets homogeneity specifications, MSC will prepare CRM units in two sizes, just under 4 grams and 25 grams. This new CRM, to be named C115A, and will be certified for uranium content, isotopic composition, and selected trace elements.

Nuclear Fuels Working Group: The NBL Program Office is continuing efforts to establish a working group to assess and evaluate reference materials needs of current and in-development commercial fuel-cycle companies. A survey inquiring about certified reference material needs was circulated to commercial fuel cycle facilities at the end of CY 2024. The results are being used to guide future activities and discussion. Staff from the Program Office and ORNL will attend American Society for Testing and Materials meetings this month for further outreach. If you are interested in sharing needs, please contact NBLSales@nnsa.doe.gov. Note that the NBL Program Office, as a US government program, is bound by criminal and civil law to protect proprietary information and does not share such information with its laboratory collaborator.