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## TA-55 building entrusted with more plutonium capability: What does it mean for the mission?

*Higher nuclear facility category will support the mission in new ways*

The first floor of the Radiological Laboratory/Utility/Office Building at TA-55, known as RLUOB (*roo-lob*) or Plutonium Facility-400 (PF-400), will soon become a bustling and dynamic space as employees and programs increase their work scope thanks to the new hazard category 3 designation.

On Feb. 7, NNSA gave the final stamp of approval designating RLUOB as a hazard category 3 (HC-3) nuclear facility. RLUOB has been designated as a radiological facility (less than HC-3) since 2013, when the first phase of RLUOB Equipment Installation was completed. HC-3 is a level up in facility hazard category, a major effort to support the national security mission.

**What does HC-3 mean?**

**Andres Borrego (NPI-7) works with the first radiological material shipment received into RLUOB in 2014.**

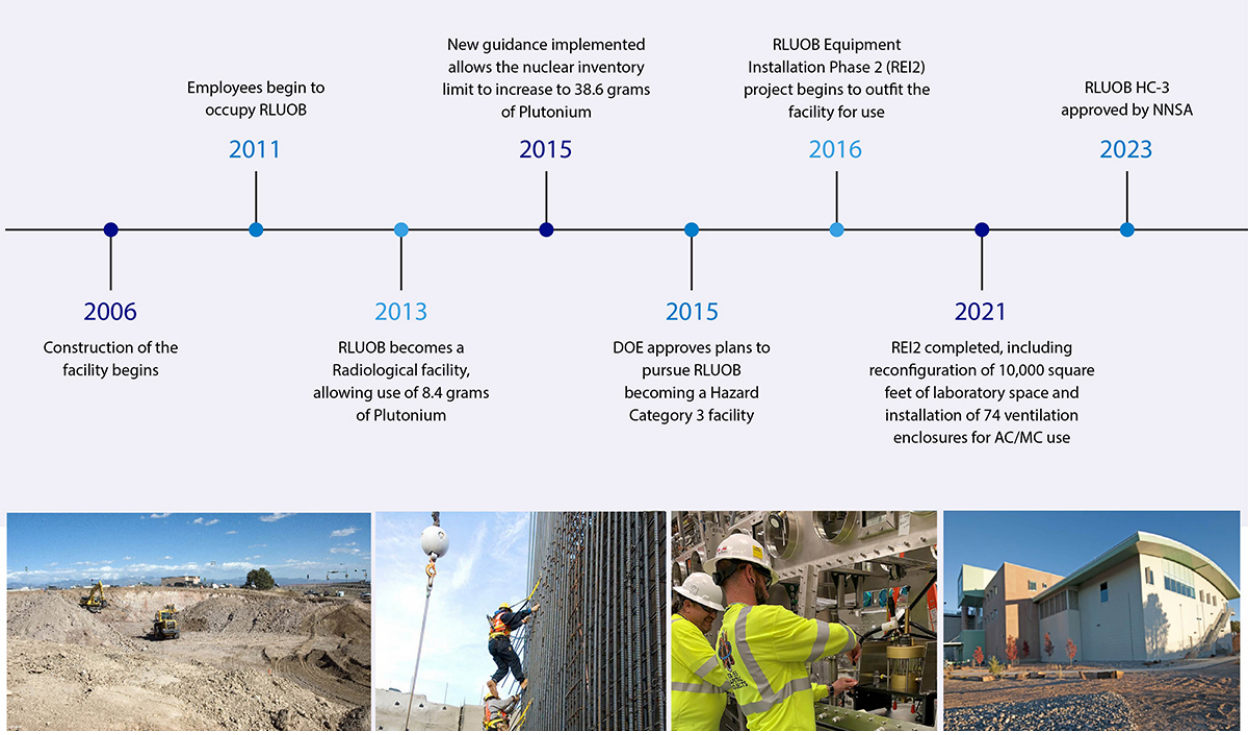
While the first floor of RLUOB has been approved for the safe use of radiological materials such as plutonium for many years, the amount of those materials allowed to be held inside was extremely limited. The jump to HC-3 means that the facility is now prepared with the proper equipment, safety measures and training to allow an increase in inventory of material in the facility, which will allow for an uptick in the small quantity sampling that the RLUOB facility specializes in.

Different from the manufacturing work that occurs in the next-door Plutonium Facility, RLUOB will support enduring analytical chemistry and materials characterization, eventually replacing the work that has long occurred in the aging Chemistry and Metallurgy Research (CMR) facility.

## A multiyear, multiorganization effort


**Hundreds of Lab staff members have been involved in the project over the years, including those who initially supported the Chemistry and Metallurgy Research Replacement (CMRR) line-item project, which established the mission need to support the new RLUOB capabilities, winning many Lab and national awards and recognitions along the way.**

The effort had a number of stages, challenges and approvals over the last decade. Going back as far as 2014 when RLUOB first received radioactive materials at an inventory limit of 8.4 grams of plutonium-239 equivalent for the entire facility, the project timeline spans almost a decade of planning and implementation.




The collaborative team effort involved DOE, NNSA and Laboratory organizations including the associate directorates of Weapons Production; Plutonium Infrastructure; Chemical, Earth and Life Sciences; Physical Sciences; Environmental, Safety, Health and Quality; Defense Protection Programs; and many other support organizations across the Lab.

**New capabilities reinforce commitment to excellence**

RLUOB's new capability will support its existing work in analytical chemistry and materials characterization (AC/MC). AC/MC provides critical information essential to determining the chemical, material, radiological and nuclear signatures of actinides (radioactive elements on the periodic table). The build-out of the first floor of RLUOB for this capability included installation of state-of-the-art instruments and ventilated enclosures, such as Halar-coated glove boxes (a coating that prevents degradation from the use of corrosive chemicals such as acids and bases).

RLUOB laboratories provide a complete set of capabilities for analyzing plutonium's bulk content (plutonium assay), trace element concentration (plasma spectroscopy, X-ray fluorescence) and materials properties (X-ray diffraction, physical property measurement system).

**David Dooley** (ALDWP-DPO) is the senior director for the Defense Programs Office in the Weapons Production directorate and has been involved in the HC-3 effort for many years. He highlights that the capability that comes with the HC-3 designation doesn't change the work being done at RLUOB, it simply increases it.

"With the implementation of HC-3, our cadence in producing small-scale samples and subsequent experiments will increase, providing more data to modelers and helping engineers and scientists address production challenges," Dooley explains. "This will help with the design and certification processes of our programs across the national security complex, both in and beyond the Plutonium Facility."

This fundamental capability will not only support the plutonium pit production mission but also actinide missions happening in PF-4 and across the complex from plutonium heat sources for NASA deep-space missions to nuclear forensics, threat reduction and more.

"Los Alamos is designated as the nation's Plutonium Center of Excellence — having this broad capability at RLUOB gets to the core of why we hold that title," Dooley said. "We've matured our systems to address a higher quantity of material, allowing us to continue our capability at a new level of excellence."

**An operational feat**

For **Stacy Howze** (TA55-RLUOB), RLUOB's facility operations manager, the journey to HC-3 involved a lot of hurdles — and a lot of paperwork. Howze is known as one of the "first residents" of the RLUOB building, journeying in his career from facility operator to shift operations supervisor to facility operations manager. He says that over that period, the challenges that came with the HC-3 project had to be overcome one step at a time. Some of those challenges included staffing issues caused by the COVID-19 pandemic, developing new operational procedures and qualification programs, and supporting the mechanical and infrastructure aspects of the effort.

"The biggest challenge of the HC-3 process was upgrading our formality, which means the qualification and procedures required to operate safely," Howze said. "We created official documents from scratch, implemented new training programs and significantly changed our safety basis. It was our job to show DOE we could do this safely, and all of that had to be documented."

That documentation was supported by the **TA-55 writer-editor team**, procedure experts deployed from the Communications and External Affairs Division's Technical Editing and Communications group. Together with the Operations Center staff, the group created or revised nearly 200 written procedures over 1.5 years.

Meanwhile, Howze and his team worked to hire more operations staff, more than doubling their numbers to support the incoming scope increase. As the AC/MC work in RLUOB increases in coming months and years, the RLUOB Operations Center, which oversees material movements, ventilation and fire systems, alarms and more, will likely evolve into a bustling hub of activities.

"The tempo of our work managing this building will certainly increase," Howze said. "Everything we're doing, we've already been doing — but HC-3 means we'll be doing more of it."


**Facility, safety management staff and chemists prepare to demonstrate the readiness to implement new requirements, ensuring RLUOB met the expectations for HC-3 operations through a series of readiness reviews.**

## What it means for the mission

The bulk of experimentation in RLUOB will support analytical sample analysis and materials characterization for plutonium missions and manufacturing programs occurring in the next-door Plutonium Facility, such as **plutonium pits** and **general-purpose heat sources** for NASA missions. Before using plutonium metal in a manufactured product, the plutonium processing operators send small samples over to their AC/MC counterparts in RLUOB. There, the scientists analyze the plutonium through a variety of processes to confirm that it has all the expected properties and makeup.

Chemists who work in RLUOB Actinide Analytical Chemistry (C-AAC) group provide the data to determine whether a plutonium pit is acceptable for the NNSA customer or whether the batteries that power the Mars rovers will provide continuous energy to the systems without damaging its hardware. They use analysis tools to provide answers to questions about specific characteristics that determine whether products will perform as expected.

The change to HC-3 is not only key for the national security mission but also means a significant increase in efficiency in characterization work. How does *more* material make things more efficient? At its foundation, it's an issue of transportation — moving materials like plutonium is no easy task. It requires special packaging, significant safety measures, personal protective equipment and a lot of paperwork.

HC-3 allows workers to move a larger amount of plutonium from facility to facility at once, and for the chemists to have many samples to work with, rather than having to wait between multiple small material transfers.

## 10,000 square feet of transformation

The scope of the CMRR RLUOB Equipment Installation-Phase 2 (REI2) project that outfitted the RLUOB lab space included the reconfiguration of 10,000 square feet of laboratory space, the installation of 74 new ventilation enclosures such as glove boxes and hoods, and other analytical instrument systems. The REI2 project was initiated as part of the overall plan to relocate the AC/MC work out of the aging Chemistry and Metallurgy Research (CMR) building and into a more modern facility.

However, without the HC-3 status, there simply wasn't enough material available to use all that space, so much of it sat quiet for the last few years. Starting soon, though, employees will begin to fill the laboratories and ramp up the work.

"Receiving HC-3 authorization is a significant milestone," said **Julie Trujillo** (TPSO), RLUOB HC-3 readiness manager. "Transferring the AC/MC capabilities from the aging CMR facility to a newer facility with modernized equipment and instruments was a big achievement. Becoming a HC-3 nuclear facility allows us to maximize utilization of RLUOB and AC/MC capabilities. It increases operational capacity and allows greater sample throughput to support pit production and other plutonium missions for LANL and the nation."

**A gleaming new workspace**

For the chemists, material scientists, radiological control technicians and other skillful employees who will work in RLUOB, the new facility will be a game-changer. While their AC/MC work that has occurred in CMR since 1952 has greatly benefited the Lab's missions, it has been increasingly hampered by aging infrastructure and equipment. The HC-3 RLUOB will allow them to get their experiments, research and sample analysis done with streamlined processes, more efficient equipment and state-of-the art technologies — all of which take up less space than the older equipment.

"Even though RLUOB has a smaller footprint than CMR, it actually has more capabilities because of the new equipment, technology and processes, and with better process flow," said **Marty Vialpando** (PPI-2), technical project manager for Program and Project Interface. Also known as "the mayor of RLUOB," he has been involved in RLUOB facility startup, operations and equipment installation since 2010.

Vialpando spent years working in the CMR facility and is one of the many resident experts on the transition of capability from CMR to RLUOB. He says that now that RLUOB has achieved HC-3, employees who have worked at CMR will start running the same experiments at both facilities to validate the results and confirm that the new equipment is working properly. The transition out of CMR will take approximately 1.5 years to ensure a safe and secure transition with qualified analysis at RLUOB.

**Milestones met**

For **Brett Kniss** (DDW), who previously worked as a deputy principle associate director for the Weapons Program, the HC-3 achievement is a huge milestone. Kniss supported the RLUOB and CMRR projects all along the way and played a

significant role in strategizing overall plutonium programs and infrastructure efforts for LANL from well before RLUOB was even constructed.

"The successful transition of the RLUOB to a hazard category 3 nuclear facility is a showcase example of adapting the infrastructure to changes in the regulatory environment and the ever-shifting needs of national nuclear programs," Kniss said. "The upgraded RLUOB will better meet the needs of the nation by allowing exciting new technologies to safely examine, diagnose and solve the material science puzzles of important national security programs."

**See more pictures and details on the transformation of RLUOB to HC-3.**

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While the first floor of RLUOB has been approved for the safe use of radiological materials such as plutonium for many years, the amount of those materials allowed to be held inside was extremely limited. So, exactly how much more plutonium will be permitted on-site?

Although 400 grams of plutonium may sound like a lot, it only takes up the space of a handful of coins!

- 38.6 grams: Density is equivalent to about two nickels (RLUOB limit before HC-3)
- 400 grams: Density is equivalent to about 19 quarters. (Current allowed limit as a HC-3 nuclear facility)

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