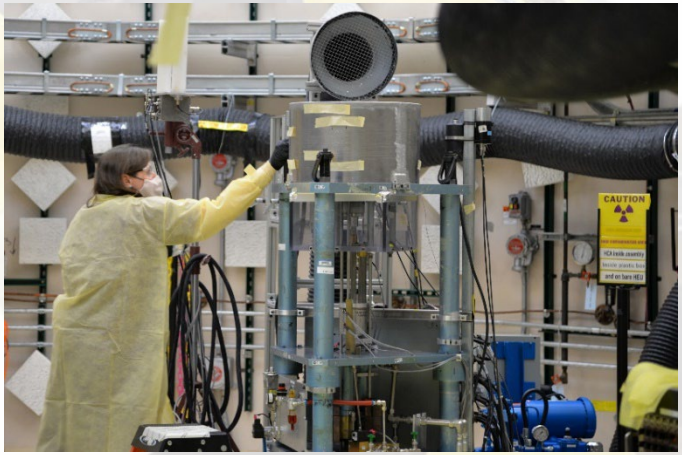
THE NEUTRON PULSE
1st Quarter 2022 Edition
NCERC

## CRITICAL ASSEMBLY OPERATIONS

NCERC experimenters performed several weeks of Godiva critical assembly operations over the quarter. These supported the Godiva Burst Reproducibility Study, a Short Lived Fission Product Yield (SLFPY) Measurement, fission chamber testing for cumulative fission product yield measurements and a burst to irradiate samples for the Prompt Fission Uranium Neutron Spectrum (PFUNS) Experiment.

## Godiva Reproducibility Study

The Godiva Burst Reproducibility study is designed to assess the reproducibility of bursts of nominally the same size, 70°C delta-T. It utilizes activation foils in the glory hole and new photodiodes positioned around the core. One week of preliminary measurements were performed which indicated less than 5% variation. Additional bursts are planned to gather more data. Confirming the variation is essential to reducing uncertainty in a shielding benchmark experiment planned in collaboration with ORNL.




◄ *Joetta Goda (NEN-2) removes dosimetry from the surface of the Godiva Top Hat following a burst.*

► *An NEN-2 experimenter loads the quartz ampules into the Godiva glory hole sample holder.*

## SLFPY Measurements

The Short Lived Fission Product Yield measurements are part of an NA-22 collaboration between LANL, PNNL and LLNL. This iteration used U-233 oxide in quartz ampules placed inside the Godiva glory hole during a 150°C delta-T burst. U-233 is the fifth isotope to be measured in the same configuration and counted in the same detector in the SLFPY series. After the burst, the samples were quickly retrieved and moved to a PNNL detector for immediate counting.

## PFUNS Experiment

This experiment measures the prompt fission neutron spectrum for U-235, using threshold activation foils. In March, a 250°C delta-T burst was performed on Godiva with activation and fission foils in the glory hole to test the processes and methods for analyzing data in advance of assembling Rocky Flats shells on Planet for the series of PFUNS steady-state irradiations, scheduled for July. The sample changer was used unattended at NCERC for the first time to count the foils. After 5 days the samples were sent back to a count lab at LANL for extended counting.

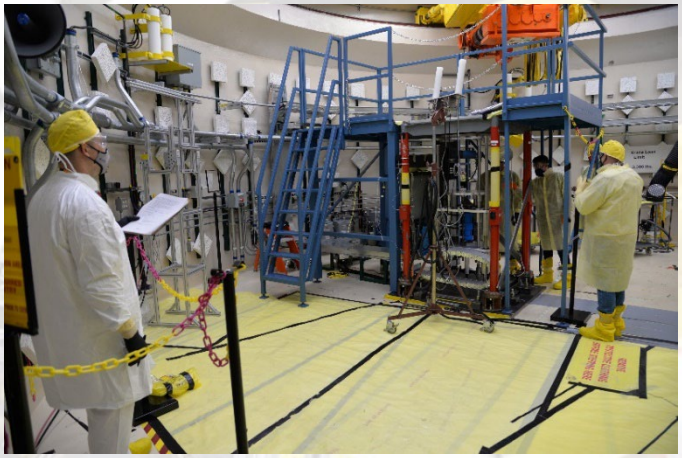
◄ *Todd Bredeweg (C-NR) and Lauren Overbay (NEN-2) set up sample changer in new location.*

## CRITICALITY SAFETY CLASSES

Two Criticality Safety Classes were held, one for the DOE NCSP and another for LANL PF-4 personnel. These classes focus on fundamentals of criticality, criticality safety, and are designed to demonstrate the effects of changing parameters important to nuclear criticality safety.

## ADDITIONAL SUPPORT OPERATIONS

Quarterly Maintenance, Surveillance, DOP Testing, and In-Service Inspection procedures were performed. The Nuclear Maintenance Manager trained three employees (two NCERC-FO and one NEN-2) on maintaining the four criticality machines. NCERC-FO supported Warehouse 6-911 housekeeping and the LANL Property inventory with NCERC at 100% accountability.



◄ *NCERC-FO personnel performing ISI on Comet critical assembly.*