

On behalf of the Nuclear Criticality Safety Program Manager, Dr. Jerry McKamy, NNSA NA-511, LLNL hosted an International Intercomparison Exercise of Nuclear Accident Dosimetry Systems at the Nevada Nuclear Security Site (NNSS). LANL provided irradiation services in the Device Assembly Facility (DAF) using the GODIVA-IV fast-burst reactor. After irradiation in DAF, the dosimeters were transported to the LLNL Nuclear Accident Dosimetry (NAD) Laboratory in Building 23-703, Mercury Nevada. Limited radiochemical processing and dissolution was performed in the LLNL RADCHEM Laboratory in Building 23-600.

10 CFR 835.1304 requires installations possessing sufficient quantities of fissile material to potentially constitute a critical mass, such that the excessive exposure of individuals to radiation from a nuclear accident is possible, shall provide nuclear accident dosimetry for these individuals. The American National Standard ANSI/HPS-N13.3-2013 provides criteria for the design, implementation, operation and performance testing of nuclear accident dosimeter systems.

LLNL received and installed each laboratory's equipment in the NAD Laboratory the week of May 16, 2016 and prepared dosimetry systems on phantoms and stands for transport to DAF. The two photographs below show some of the Nuclear Accident Dosimeters used in the calibration activations and the blind (unknown to experimenters) dosimetry measurement. The photograph on the left shows LLNL's BOTTle Man-akin ABSorber phantom (BOMAB) with various dosimeters attached. The photograph on the right shows dosimeters mounted on aluminum plates on rolling stands. All materials were bagged in plastic for contamination control.



LANL received and positioned the dosimeters in DAF for each of three GODIVA-IV irradiations the week of May 23, 2016. Within hours following an irradiation, the dosimeters were transported to the LLNL NAD Lab for measurement and evaluation. Preliminary dose estimates were collected from each participating laboratory within 24 hours of receipt. Final dose estimates will be completed and published later this year in laboratory reports followed by a summary publication.

Ten laboratories participated in the exercise:

- Atomic Weapons Establishment (United Kingdom)
- Consolidated Nuclear Security, Y-12
- Institute for Radiation Protection and Nuclear Safety (France)
- Lawrence Livermore National Laboratory
- Los Alamos National Laboratory
- National Security Technologies
- Naval Dosimetry Center
- Pacific Northwest National Laboratory
- Sandia National Laboratory
- Savannah River Site



2016 Nuclear Accident Dosimetry International Intercomparison Exercise Participants

The participants shown in the photograph above are (from left to right): Alexander Romanyukha (NDC-USN), Bruno Asselineau (IRSN), Douglas McAvoy (LLNL), David R. Farrar (SNL), Andrew Waterfall (AWE), Francois Trompier (IRSN), Chris Wilson (AWE), David Hickman (LLNL), Marion Baumann (IRSN), David Heinrichs (LLNL), Elliott Leonard (SNL), Eric Letang (IRSN), Becka Hudson (LLNL), Karen Jeffers (LLNL), Matthieu Duluc (IRSN), Don Felske (LLNL), Liam Buchanan (AWE), Lydia Tai (LLNL), John Scorby (LLNL), Dann Ward (SNL), Shannon Morley (PNNL), Randy Sullivan (SRS), Andy Warren (SRS), David Roberts (SRS), Elizabeth Hillmer (LANL), Milan Gadd (LANL), Francisco Garcia (LANL), Bruce Rathbone (PNNL) and John Stephens (PNNL).

Not shown are Todd Matz and Paul Yap-Chiongco (LLNL); Douglas McBride, Jeff Gill, Ben McGee, Pam McGinely and Bob Stueckrath (NSTec); and the GODIVA-IV fast-burst reactor operations crew including Joetta Goda, David Hayes, John Bounds and Jesson Hutchinson (LANL).

LLNL led previous delegations on behalf of NNSA to perform similar experiments at the Commissariat à l'énergie atomique (CEA) Valduc facility near Dijon, France, in 2009, 2010 and 2014, following closure of reactor facilities at Los Alamos. With the facilities at Valduc now closed, the present experiments demonstrate that LLNL, in coordination with LANL and AWE, under the auspices of the DOE Nuclear Criticality Safety Program, have successfully re-established a US national capability for nuclear accident dosimetry research, development and performance testing.

For further information, contact Dave Heinrichs, Nuclear Criticality Safety Division Leader, Nuclear Operations, at [heinrichs1@llnl.gov](mailto:heinrichs1@llnl.gov).

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