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Joint LLNL & SNL Material Compatibility Study Commences

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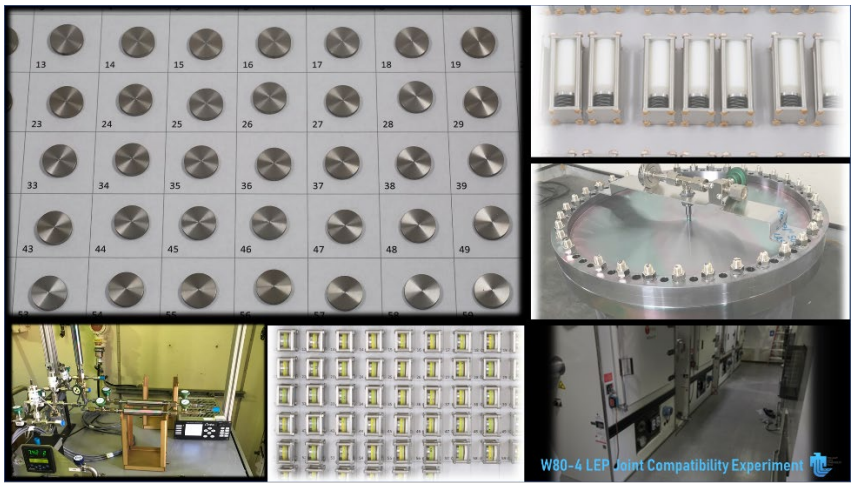
Life Extension Program launches material compatibility study

Aug 5, 2021

The fundamental goal of the W80-4 Life Extension Program (LEP) is the design and production of a safe and reliable system. Ensuring long-term viability and chemical compatibility of the materials in the warhead is paramount to its success. To that end, the material and aging compatibility team, which includes researchers from Lawrence Livermore and Sandia National Laboratories (SNL), has launched the LEP's most comprehensive compatibility test to date.

The Joint Small Core materials compatibility test uses accelerated aging methods to assess material candidates for stability and compatibility in the headspace that is shared by LLNL and SNL components. Over 180 unique SNL and LLNL materials—including high explosives, polymers, adhesives, and metals—were assembled and placed into vessels. Most of the materials were fabricated at U.S. Department of Energy production agencies. This rigorous test comprises 25 vessels, over 6,500 combined LLNL and SNL material samples, and 7 unique aging environments up to 18 months. Assessments rely on periodic gas analysis to nondestructively monitor for material degradation gases and incompatibilities, and on destructive sample testing at 3, 9, and 18 months to identify materials' chemical changes, performance changes, or both. This information will increase LLNL and SNL's confidence in the reliability of W80-4 materials.

The test commenced in April 2021 at LLNL's Site 300. "Our team overcame a number of hurdles over the past year and prepared for months," said principal investigator Gregory Nyce (MSD). In July, they completed a portion of the experiment—disassembling a subset of vessels—that will be analyzed and presented during the System-Level Baseline Design Review scheduled for March 2022. This marks a major milestone in the W80-4 LEP's ongoing efforts to ensure a safe and effective system.



Material coupons assembled into jigs in one of the 25 vessels from the Joint Small Core Experiment.

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