NEVADA NATIONAL NNSS SECURITY SITES

Enhanced Capabilities for Subcritical Experiments

Why Subcritical Experiments?

In the absence of full-scale nuclear testing, the U.S. relies on the National Nuclear Security Administration (NNSA) to certify the effectiveness of its nuclear deterrent: the U.S. nuclear weapon stockpile. To do this, NNSA must assess issues which may affect the stockpile, including the effects of aging, the impact of evolving manufacturing processes on weapon safety and performance, approaches to stockpile life-extension programs, and the results of significant finding investigations. Subcritical experiments (SCEs) at the Nevada National Security Sites (NNSS) fulfill these responsibilities and "test" nuclear weapons without achieving criticality. Combined with advanced theory, modeling, and simulation tools, SCEs certify our nation's nuclear deterrent in the absence of nuclear testing and are essential for NNSA to maintain and modernize the stockpile.

National Nuclear Security Administration

For more information, visit:

www.nnss.gov

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Enhancing Our Capabilities

The NNSS's Enhanced Capabilities for Subcritical Experiments (ECSE) project continues to add diagnostic tools and capabilities to NNSS' existing SCE capabilities, increasing the amount of technical information gathered about the nuclear stockpile and helping to fill knowledge gaps and provide data relevant to identified stockpile concerns. Two such tools essential to both today's and tomorrow's experiments are the Scorpius and ZEUS test beds.

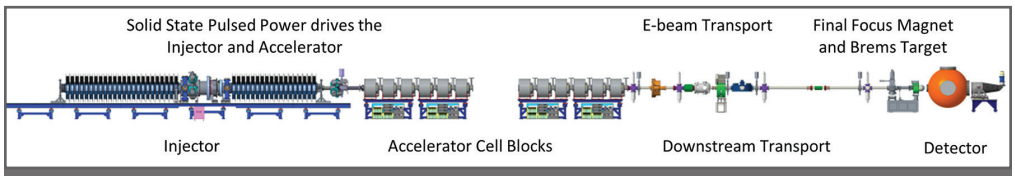
Scorpius

The Scorpius Test Bed and associated accelerator —a collaborative effort between the NNSS and Los Alamos, Lawrence Livermore and Sandia National Laboratories—will conduct radiographically diagnosed SCEs using special nuclear material. Scorpius and its subsequent experiments will be housed in the NNSS' underground PULSE facility. These experiments will produce radiographic data using plutonium-containing test objects in accordance with the specific needs of NNSA.

ZEUS Test Bed

ZEUS provides dynamic criticality data by measuring the decay of fission chains. This data is used to further develop and refine the modern predictive physics models used to certify the stockpile.

As stockpile systems age, change, and have new features added, new, effective, reliable and flexible tools like ZEUS and Scorpius are needed to help address emerging issues and ensure NNSA can continue to assure the safety and reliability of the nuclear stockpile.



A rendering of the Scorpius accelerator.

Z-pinch Experimental Underground System (ZEUS), a dense plasma focus neutron source.