

Brief Overview of the NCSP

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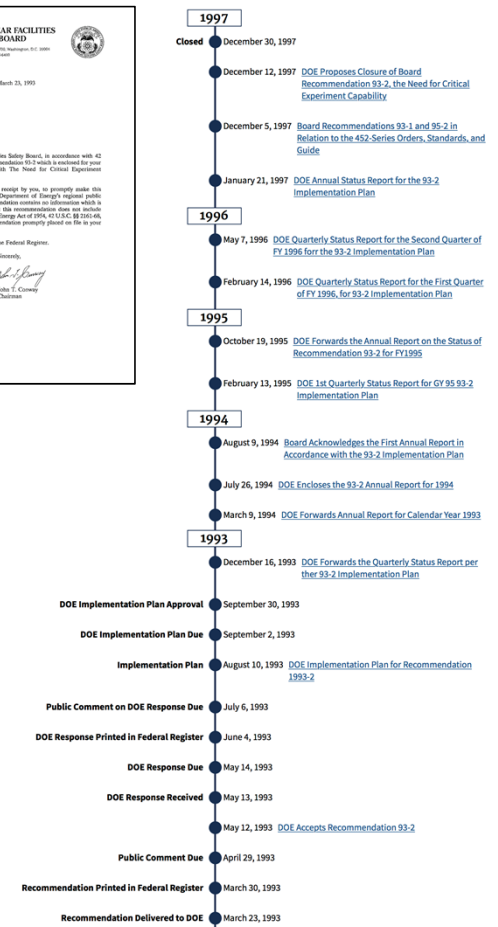
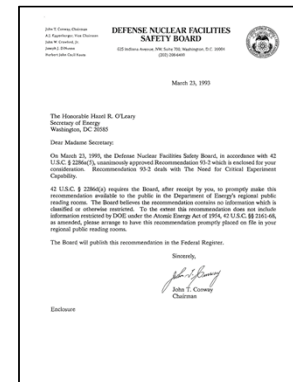
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ENERGY

Background / History

- Defense Nuclear Facilities Safety Board (DNFSB) Recommendations 93-2 and 97-2:
 - 93-2 (3/23/1993): Need for a general-purpose critical experiment capability that will ensure safety in handling and storage of fissionable material.
 - 97-2 (5/19/1997): Need for improved criticality safety practices and programs to alleviate potential adverse impacts on safety and productivity of DOE operations.
- 97-2 encompassed ongoing DOE activities of 93-2 while broadening scope to address important cross-cutting safety activities needed to ensure NCS throughout the Complex.
- DOE Implementation Plan for Board Recommendation 93-2 and 97-2 resulted in establishment of the US Nuclear Criticality Safety Program (NCSP)



NCSP Organization and Overview

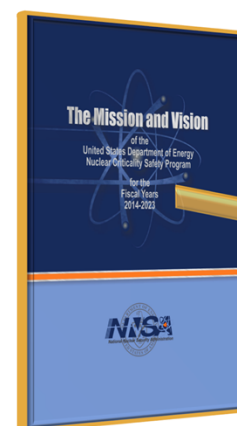
- Mission

- Provide sustainable expert leadership, direction and the technical infrastructure necessary to develop, maintain and disseminate the essential technical tools, training and data required to support safe, efficient fissionable material operations within the Department of Energy.

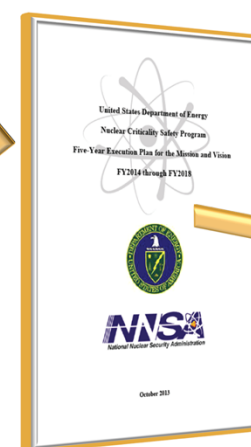
- Vision

- Continually improving, adaptable and transparent program that communicates and collaborates globally to incorporate technology, practices and programs to be responsive to the essential technical needs of those responsible for developing, implementing and maintaining nuclear criticality safety.

10 Year Mission & Vision



5 Year Plan

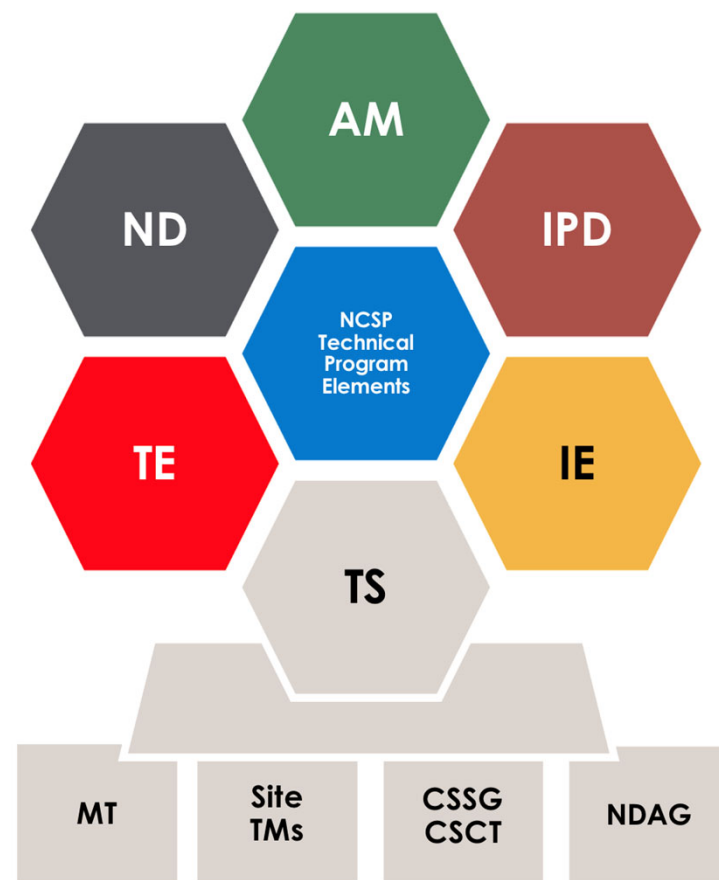


Work Tasks



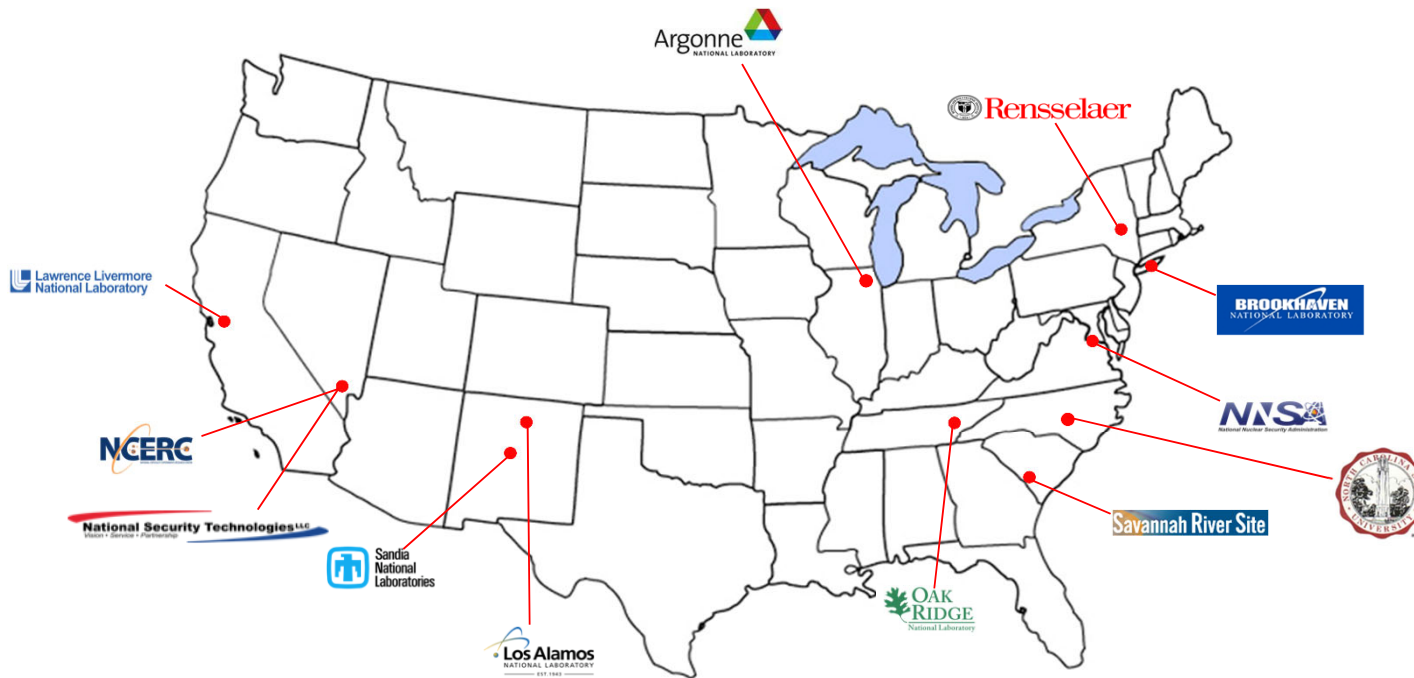
NCSP Technical Program Elements

- **Analytical Methods (AM) – 15% of budget**
 - Maintain and improve the Production Codes and Methods for Criticality Safety Engineers (MCNP/SCALE, NJOY/AMPX)
- **Nuclear Data (ND) – 13% of budget**
 - Perform Measurements of Basic Nuclear (Neutron) Physics Cross-Sections and Generate New Evaluated Cross-Section Libraries and Covariance Data for Use in Production Criticality Safety Codes
- **Information Preservation and Dissemination (IPD) – 4% of budget**
 - Protects Valuable Analyses and Information Related to Criticality Safety (includes ICSBEP)
- **Integral Experiments (IE) – 52% of budget**
 - Critical and Subcritical Experiments at the Critical Experiments Facility (CEF) at the Device Assembly Facility (DAF) in Nevada and Sandia National Laboratory Pulse Reactor Facility– provides integral tests of codes and data
- **Training and Education (TE) – 6% of budget**
 - Web-based training modules and 1- & 2-week Hands-On Criticality Safety courses for Criticality Safety Engineers, Line Management, and Oversight Personnel
- **Technical Support (TS) – 10% of budget**
 - Managerial and technical support



TS – Technical Support
MT – Management team
TMs – Task managers
CSSG – Criticality Safety Support Group
CSCT – Criticality Safety Coordinating Team
NDAG – Nuclear Data Advisory Group

Current NCSP Work Sites



FY2019 NCSP Budget: \$26.8 million



US DOE NCSP Contributors

US Contributors

- National Laboratories

- Argonne (ANL)
- Brookhaven (BNL)
- Lawrence Livermore (LLNL)
- Los Alamos (LANL)
- Oak Ridge (ORNL)
- Pacific Northwest (PNNL)
- Sandia (SNL)

- Sites

- Nevada National Security Site (NNSS)
- Savannah River (SRNL)

- Universities

- Rensselaer Polytechnic Institute (RPI)
- Georgia Institute of Technology (Ga Tech)
- North Carolina State University (NCSU)
- Massachusetts Institute of Technology (MIT)
- University of Florida (Gainesville) (UF)
- University of Tennessee (Knoxville) (UTK)



International Partners

- U.K.: AWE (JOWOG-30)

- France:

- IRSN (Formal MOU with NCSP)
- CEA (Nuclear Data)

- Belgium: Institute for Reference Materials and Measurements (IRMM) differential nuclear data measurements

- OECD/NEA

- ICSBEP
- WPEC
- WPNCs



2018 Technical Program Review @ ORNL



2018 NCSP TPR Best Paper Award Winners

Recent Nuclear Criticality Safety Program Technical Accomplishments

Sponsored by NCSD

Session Organizer: Lori Scott (*NCSP*) **Cochairs:** Angela Chambers (*NNSA*), Douglas G. Bowen (*ORNL*)

Location: Floridian L **Time:** 3:50-6:50 pm

- 3:55 pm:** Kilopower Reactor Using Stirling TechnologY (KRUSTY) Update: Cold Critical Experiments, Rene Sanchez, Travis Grove, David Hayes, Joetta Goda, George McKenzie, Jesson Hutchinson, Theresa Cutler, John Bounds, Jessie Walker (*LANL*)
- 4:20 pm:** Thermal Epithermal eXperiments (TEX) with Plutonium Zero Power Physics Reactor (ZPPR) Plates First Critical Preliminary Results, C. M. Percher, S. S. Kim, D. P. Heinrichs (*LLNL*), R. G. Sanchez, T. J. Grove, Jesson Hutchison, Theresa Cutler, George McKenzie (*LANL*)
- 4:45 pm:** Qualification of Y-12 Legacy Criticality Accident Alarm System Detectors, Chris Haught, Chris Woodrow, Troy McMillen (*Consolidated Nuclear Security*)
- 5:10 pm:** Impact of the Dynamic Structure Factor on Doppler Broadening for ^{238}U in UO_2 , N. C. Sorrell, A. I. Hawari (*NCSU*)
- 5:35 pm:** A Testing Trifecta: Data, Codes, and Evaluations, W. J. Marshall, A. M. Holcomb (*ORNL*)
- 6:00 pm:** CURIE Preliminary Design, T. Cutler, R. Bahrn, J. Hutchinson, M. Rathbun, D. Fritz (*LANL*)
- 6:25 pm:** Computational Optimization of TEX Critical Experiment Design, Jesse Norris, William Zywiec, Anthony Nelson, Catherine Percher, David Heinrichs (*LLNL*)

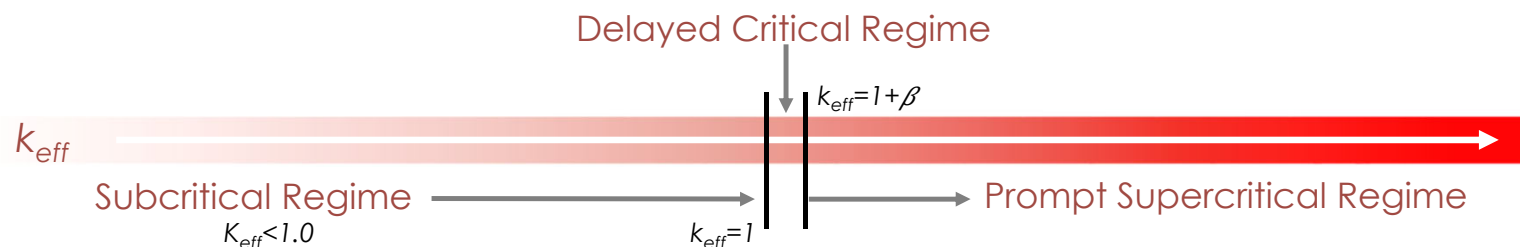
NCSP Integral Experiments

- NCSP integral measurements are performed at
 - Sandia National Laboratories (SNL) and
 - National Criticality Experiments Research Center (NCERC), currently operated by Los Alamos National Laboratory
 - NCERC is located at the Nevada National Security Site (NNSS) inside the Device Assembly Facility (DAF)
- Types of experiments that can be performed
 - Subcritical
 - Rocky Flats shells, BeRP ball, Np-237 sphere, TACS shells, etc.
 - Critical/Delayed Supercritical
 - NCERC: Planet, Comet, Godiva IV, Flattop
 - Sandia: Sandia Pulse Reactor critical assembly (2 fuel types, currently)
 - Prompt Supercritical
 - NCERC: Godiva IV (< 300 deg. C pulse)

DAF/NCERC



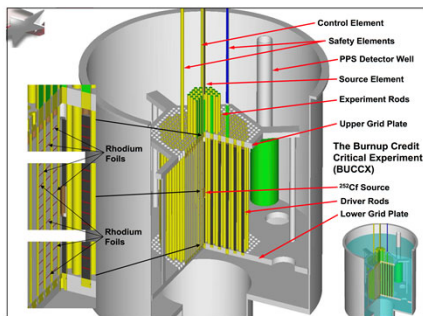
SNL/TA-V/SPR Facility



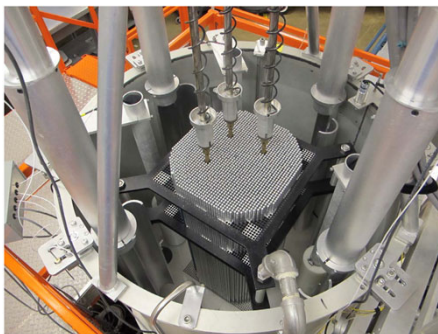
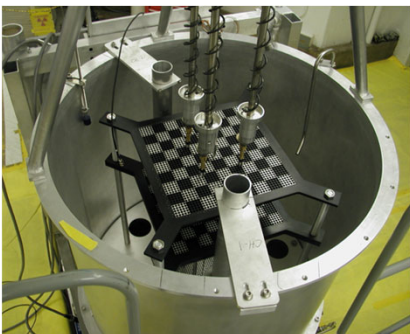
NCSP Critical Assemblies

Sandia National Laboratory

SNL – BUCCX – U(4.31)/Fission Product Experiments



SNL – 7uPCX – U(6.9) UO₂ rods



NCERC/DAF



Questions

