The DOE/NNSA Nuclear Criticality Safety Program and the Purpose of the Technical Program Review

Douglas Bowen
NCSP Execution Manager
Oak Ridge National Laboratory

February 15, 2022
2022 NCSP Technical Program Review

ORNL is managed by UT-Battelle, LLC for the US Department of Energy

Background / History–Mission Vision–Organization

Early history

- Defense Nuclear Facilities Safety Board (DNFSB) Recommendations:
  - 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.
- DOE Implementation Plan for 93-2 and 97-2 recommendations resulted in establishment of the US NCSP

Defense Nuclear Facilities Safety Board

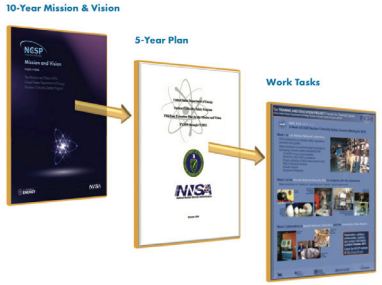
NCSP 5-year plan

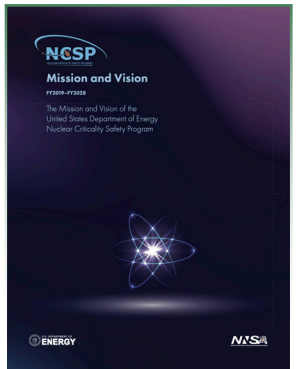
Mission

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 DOE.

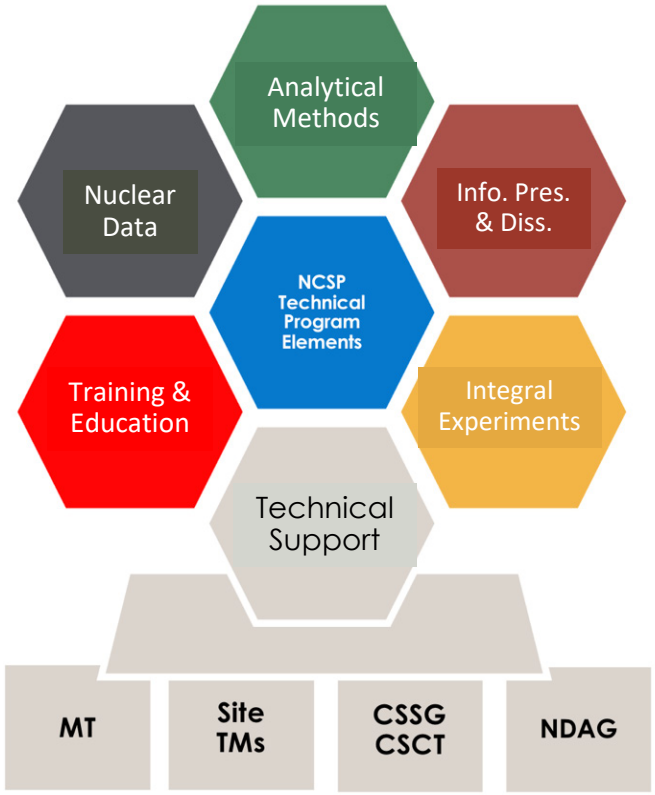
Vision

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.



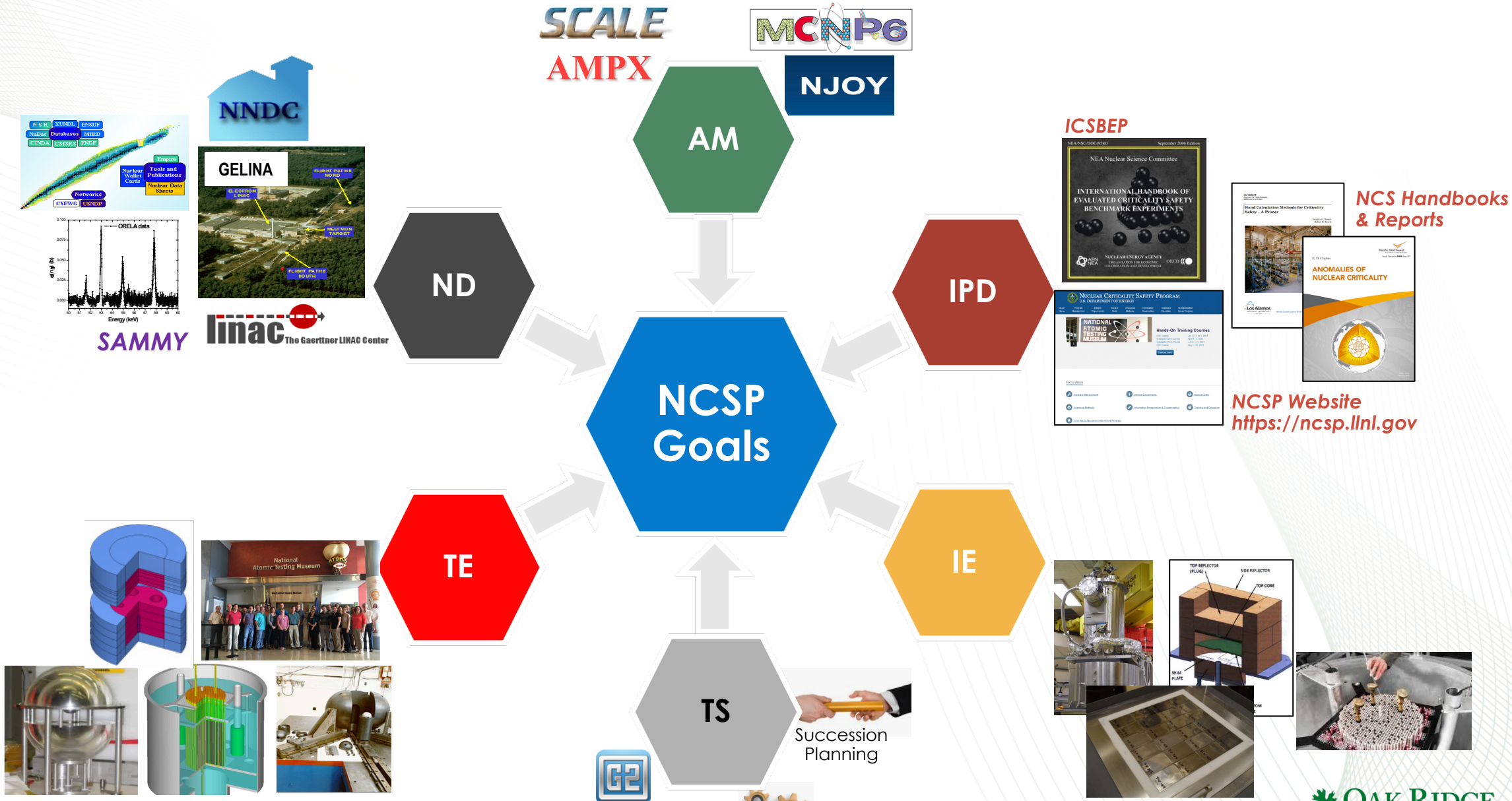


NCSP organization



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

Technical Program Element Activities



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Current NCSP Work Sites

UNM
IRSN INSTITUT DE RADIOPROTECTION ET DE SÛRETÉ NUCLÉAIRE
NNSA
NCERC
GEORGIA TECH
SRNS
Massachusetts Institute of Technology
Los Alamos NATIONAL LABORATORY EST. 1943
Y-12
BROOKHAVEN NATIONAL LABORATORY
NAVAL NUCLEAR LABORATORY
AWE
NEVADA NATIONAL NNSS SECURITY SITE
Rensselaer
THE UNIVERSITY OF ARIZONA
UF UNIVERSITY of FLORIDA
THE UNIVERSITY OF TENNESSEE
European Commission Joint Research Centre
OAK RIDGE National Laboratory
Sandia National Laboratories
Lawrence Livermore National Laboratory

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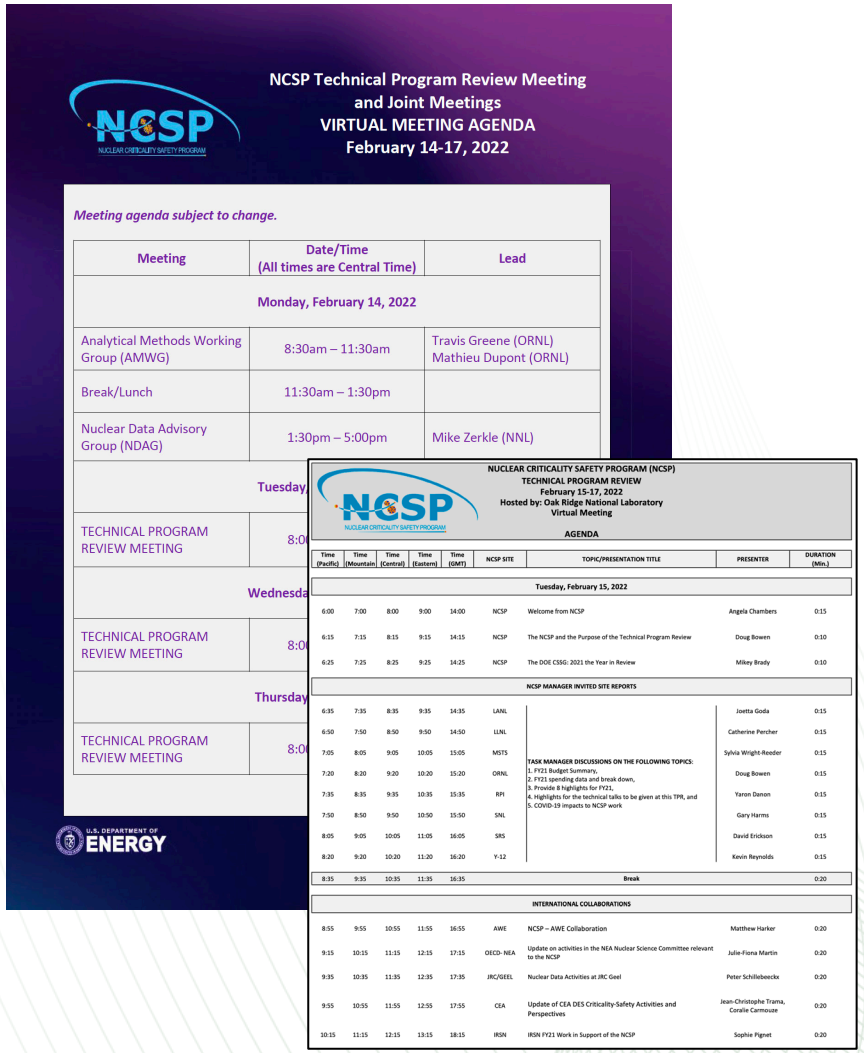
FY2021 DOE/NNSA Nuclear Criticality Safety Program (NCSP) Technical Program Review (TPR)

- TPR Agenda
  - FY 2021 CSSG year in review
  - Task managers report FY 2021 budget, status report, and highlights to NCSP Manager Dr. Angela Chambers
  - International collaboration discussions: AWE, IRSN, CEA, JRC/Geel, OECD/NEA
  - Technical presentations by NCSP sites by technical program element
- Collaborations
  - Analytical Methods Working Group – Travis Greene and Mathieu Dupont (ORNL) hosted this year
  - Nuclear Data Advisory Group – Mike Zerkle (NNL), Chair



NCSP Technical Program Review Meeting
and Joint Meetings
VIRTUAL MEETING AGENDA
February 14-17, 2022

Meeting agenda subject to change.

Meeting	Date/Time (All times are Central Time)	Lead
Monday, February 14, 2022		
Analytical Methods Working Group (AMWG)	8:30am – 11:30am	Travis Greene (ORNL) Mathieu Dupont (ORNL)
Break/Lunch	11:30am – 1:30pm	
Nuclear Data Advisory Group (NDAG)	1:30pm – 5:00pm	Mike Zerkle (NNL)
Tuesday,		
TECHNICAL PROGRAM REVIEW MEETING	8:0	
Wednesda		
TECHNICAL PROGRAM REVIEW MEETING	8:0	
Thursday		
TECHNICAL PROGRAM REVIEW MEETING	8:0	

U.S. DEPARTMENT OF ENERGY

NUCLEAR CRITICALITY SAFETY PROGRAM (NCSP)
TECHNICAL PROGRAM REVIEW
February 15-17, 2022
Hosted by: Oak Ridge National Laboratory
Virtual Meeting

AGENDA

Time (Pacific)	Time (Mountain)	Time (Central)	Time (Eastern)	Time (GMT)	NCSP SITE	TOPIC/PRESENTATION TITLE	PRESENTER	DURATION (Min.)
Tuesday, February 15, 2022								
6:00	7:00	8:00	9:00	14:00	NCSP	Welcome from NCSP	Angela Chambers	0:15
6:15	7:15	8:15	9:15	14:15	NCSP	The NCSP and the Purpose of the Technical Program Review	Doug Bowen	0:10
6:25	7:25	8:25	9:25	14:25	NCSP	The DOE CSSG: 2021 the Year in Review	Mikey Brady	0:10
NCSP MANAGER INVITED SITE REPORTS								
6:35	7:35	8:35	9:35	14:35	LANL	TASK MANAGER DISCUSSIONS ON THE FOLLOWING TOPICS: 1. FY21 Budget Summary, 2. FY21 spending data and break down, 3. Provide 8 highlights for FY21, 4. Highlights for the technical talks to be given at this TPR, and 5. COVID-19 impacts to NCSP work	Joetta Goda	0:15
6:50	7:50	8:50	9:50	14:50	LLNL		Catherine Percher	0:15
7:05	8:05	9:05	10:05	15:05	MSTS		Sylvia Wright-Reeder	0:15
7:20	8:20	9:20	10:20	15:20	ORNL		Doug Bowen	0:15
7:35	8:35	9:35	10:35	15:35	RPI		Yaron Danon	0:15
7:50	8:50	9:50	10:50	15:50	SNL		Gary Harms	0:15
8:05	9:05	10:05	11:05	16:05	SRS		David Erickson	0:15
8:20	9:20	10:20	11:20	16:20	Y-12		Kevin Reynolds	0:15
8:35	9:35	10:35	11:35	16:35	Break			0:20
INTERNATIONAL COLLABORATIONS								
8:55	9:55	10:55	11:55	16:55	AWE	NCSP – AWE Collaboration	Matthew Harker	0:20
9:15	10:15	11:15	12:15	17:15	OECD- NEA	Update on activities in the NEA Nuclear Science Committee relevant to the NCSP	Julie-Fiona Martin	0:20
9:35	10:35	11:35	12:35	17:35	JRC/GEEL	Nuclear Data Activities at JRC Geel	Peter Schillebeeckx	0:20
9:55	10:55	11:55	12:55	17:55	CEA	Update of CEA DES Criticality-Safety Activities and Perspectives	Jean-Christophe Trama, Coralie Carmouze	0:20
10:15	11:15	12:15	13:15	18:15	IRSN	IRSN FY21 Work in Support of the NCSP	Sophie Pignet	0:20

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10:15	11:15	12:15	13:15	18:15	IRSN	IRSN Work in Support of NCSP : FY2021 and Plan for Future	Sophie Pignet	0:20
10:35	11:35	12:35	13:35	18:35	**Lunch**			1:00
11:35	12:35	13:35	14:35	19:35	BNL	NCSP Activities at BNL (FY21)	David Brown	0:15
FY21 ANALYTICAL METHODS TECHNICAL PRESENTATIONS								
11:50	12:50	13:50	14:50	19:50	LLNL	TNSL improvements in FUDGE	Caleb Mattoon	0:20
12:10	13:10	14:10	15:10	20:10	LANL	Nuclear Data Activities Supporting MCNP	Jeremy Conlin	0:20
12:30	13:30	14:30	15:30	20:30	LANL/RPI	Adaptive-in-temperature Method for Fast on-the-fly Sampling of Thermal Neutron Scattering Data in Monte Carlo Neutron Transport	Wei Ji (RPI)	0:20
12:50	13:50	14:50	15:50	20:50	LANL	Update on Covariance Data Testing Strategy at LANL	Nathan Gibson	0:20
13:10	14:10	15:10	16:10	21:10	LANL	NJOY Work in FY21	Wim Haeck	0:20
13:30	14:30	15:30	16:30	21:30	LANL	FY21 MCNP Updates for NCSP	Mike Rising	0:20
13:50	14:50	15:50	16:50	21:50	**Break**			0:20
14:10	15:10	16:10	17:10	22:10	ORNL	Radiation Safety Information Computational Center (RSICC)	Tim Valentine	0:30
14:40	15:40	16:40	17:40	22:40	ORNL	AMPX Developments	Andrew Holcomb	0:20
15:00	16:00	17:00	18:00	23:00	ORNL	Expansion of the Verified, Archived, Library of Inputs and Data (VALID)	William B.J. Marshall	0:20
15:20	16:20	17:20	18:20	23:20	ORNL/MIT	Temperature-Dependent Propagation of Resonance Parameter Uncertainty	Isaac Meyer	0:20
15:40	16:40	17:40	18:40	23:40	ORNL	SCALE AM2 Accomplishments in FY21	William Wieselquist	0:20
16:00	17:00	18:00	19:00	0:00	**END OF TUESDAY TPR PRESENTATIONS**			

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Wednesday, February 16, 2022								
FY21 ANALYTICAL METHODS TECHNICAL PRESENTATIONS (Continued)								
6:00	7:00	8:00	9:00	14:00	IRSN	Status of the Slide Rule Update - Phase 4 Plutonium Configurations – Delayed Gamma	Johann Herth	0:20
FY21 INFORMATION PRESERVATION AND DISSEMINATION TECHNICAL PRESENTATIONS								
6:20	7:20	8:20	9:20	14:20	ORNL	FY21 Progress of the Oak Ridge Health Physics Reactor CAAS Benchmark Evaluation	Mathieu Dupont	0:20
6:40	7:40	8:40	9:40	14:40	SRS	CritView Database Expansion	Scott Finfrock	0:20
FY21 INTEGRAL EXPERIMENTS TECHNICAL PRESENTATIONS								
7:00	8:00	9:00	10:00	15:00	LANL	EUCLID: Experiments Underpinned by Computational Learning for Improvements in Nuclear Data	Jesson Hutchinson	0:20
7:20	8:20	9:20	10:20	15:20	LANL	IER 557: Godiva IV Reproducibility/Characterization	Joetta Goda	0:20
7:40	8:40	9:40	10:40	15:40	LANL	IER 537: CERBERUS – Copper Critical Experiment Design	Kelsey Amundson	0:20
8:00	9:00	10:00	11:00	16:00	LANL	IER 488: MUSiC Accomplishments and Goals	Rob Weldon	0:20
8:20	9:20	10:20	11:20	16:20		**Break**		**0:20**
8:40	9:40	10:40	11:40	16:40	LANL	Chlorine Worth Study in Support of PF-4 Operations	Travis Grove, Theresa Cutler	0:20
9:00	10:00	11:00	12:00	17:00	LANL	IER 517: Molybdenum Critical Experiment Design	Cole Kostelac	0:20
9:20	10:20	11:20	12:20	17:20	LLNL	Critical Configurations for IER 480: Thermal Epithermal eXperiments (TEX) Plutonium Experiments to Test New Thermal Scattering Laws	Catherine Percher	0:20
9:40	10:40	11:40	12:40	17:40	LLNL	IER 501: Pulsed Neutron Die-Away Experiments at LLNL	Daniel Siefman	0:20
10:00	11:00	12:00	13:00	18:00	LLNL	IER 297, TEX-HEU Baseline Assemblies Benchmark and Results	Jesse Norris	0:20
10:20	11:20	12:20	13:20	18:20		**Lunch**		1:00
11:20	12:20	13:20	14:20	19:20	ORNL	ORNL IE support in FY21	Justin Clarity	0:20
11:40	12:40	13:40	14:40	19:40	SNL	IER-441: Preparations for 7uPCX Experiments Targeting Epithermal Cross Sections of Tantalum.	David Ames	0:20
12:00	13:00	14:00	15:00	20:00	SNL	NCSP Integral Experiments at Sandia in FY21	Gary Harms	0:20
12:20	13:20	14:20	15:20	20:20	SNL	IER-523: Feasibility of Experiments Focused on Measuring the Effects of UO_2-BeO Material on Critical Configurations using 7uPCX	David Ames	0:20

FY21 TRAINING AND EDUCATION TECHNICAL PRESENTATIONS								
12:40	13:40	14:40	15:40	20:40	ORNL	ORNL NCSP Training and Education Support for FY 2021	Doug Bowen	0:20
13:00	14:00	15:00	16:00	21:00	LLNL	NCS Pipeline UC Berkeley Course Overview	Shauntay Coleman	0:20
13:20	14:20	15:20	16:20	21:20	LANL	University Pipeline (with UNM) for Criticality Safety Professionals	Norann Calhoun	0:20
13:40	14:40	15:40	16:40	21:40	**Break**			0:20
FY21 NUCLEAR DATA TECHNICAL PRESENTATIONS								
14:00	15:00	16:00	17:00	22:00	BNL	Automating neutron resonances classification with Machine-Learning	Gustavo Nobre	0:20
14:20	15:20	16:20	17:20	22:20	LLNL	Parallel-Plate Avalanche Counter (PPAC) Fabrication for 240Pu PFNS Measurement	Ching-Yen Wu	0:20
14:40	15:40	16:40	17:40	22:40	LANL	Modeling and evaluating 239Pu and 235U PFNS and average prompt-neutron multiplicity	Denise Neudecker, Amy Lovell	0:30
15:10	16:10	17:10	18:10	23:10	LANL	Update on the 233U capture measurement at DANCE	Esther Leal Cidoncha, Aaron Couture	0:20
15:30	16:30	17:30	18:30	23:30	**END OF WEDNESDAY TPR PRESENTATIONS**			
Thursday, February 17, 2022								
FY21 NUCLEAR DATA TECHNICAL PRESENTATIONS (Continued)								
6:00	7:00	8:00	9:00	14:00	ORNL	Resolved Resonance Region Evaluation Update of ^{140,142}Ce	Chris Chapman	0:20
6:20	7:20	8:20	9:20	14:20	ORNL	Advances in Nuclear Data Evaluation Theory for NCSP	Goran Arbanas	0:20
6:40	7:40	8:40	9:40	14:40	ORNL	SAMMY Modernization Status	Dorothea Wiarda	0:20
7:00	8:00	9:00	10:00	15:00	ORNL	Bayesian Monte Carlo Evaluation Framework	Jesse Brown	0:20
7:20	8:20	9:20	10:20	15:20	ORNL	Updates to the n+63,65Cu Angular Distributions for Critical Experiments	Jordan McDonnell	0:20
7:40	8:40	9:40	10:40	15:40	ORNL	ORNL-ND1 neutron induced cross section experiments for the NCSP	Klaus Guber	0:20
8:00	9:00	10:00	11:00	16:00	ORNL	Progress on Fissile Actinides Evaluations: 233,235U and 239Pu	Marco Pigni	0:20
8:20	9:20	10:20	11:20	16:20	ORNL	Thermal Neutron Scattering Research at ORNL	Chris Chapman	0:20
8:40	9:40	10:40	11:40	16:40	ORNL	Ta-181 Evaluation in the Unresolved Resonance Region	Jesse Brown	0:20
9:00	10:00	11:00	12:00	17:00	**Break**			0:20

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9:20	10:20	11:20	12:20	17:20	RPI	NCSP Related Nuclear Data Research at RPI	Yaron Danon	0:10
9:30	10:30	11:30	12:30	17:30	RPI	Thermal Neutron Cross Section Measurements at the RPI LINAC	Dominik Fritz	0:20
9:50	10:50	11:50	12:50	17:50	RPI	Neutron Capture and Transmission Measurements of ^{54}Fe at the RPI LINAC	Sukhjinder Singh	0:20
10:10	11:10	12:10	13:10	18:10	LANL	Update on ^{17}O evaluation and fast neutron evaluation for ^{181}Ta	Mike Herman, Mark Paris	0:20
10:30	11:30	12:30	13:30	18:30	ORNL	Horizontal Split Table Conceptual Design for Validation of Nuclear Data used in Advanced Reactors	Mathieu Dupont	0:20
10:30	11:30	12:30	13:30	18:30	NCSU	Progress of Thermal Neutron Scattering Research at NCSU	Ayman Hawari	0:15
10:45	11:45	12:45	13:45	18:45		Final Remarks	Angela Chambers	0:05
10:50	11:50	12:50	13:50	18:50	**END OF THURSDAY TPR PRESENTATIONS**			

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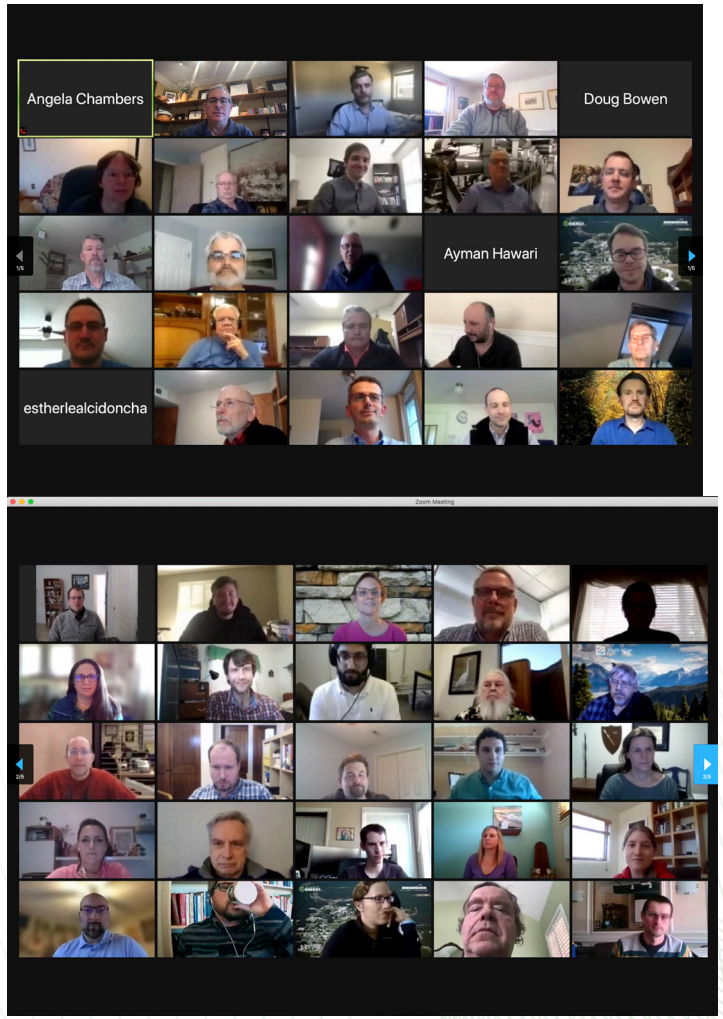
2021 Virtual NCSP TPR

- First virtual TPR for the NCSP to present status of FY2020 NCSP tasks
- First 3-day TPR
- Attendance
  - Tuesday: 152
  - Wednesday: 147
  - Thursday: 129
  - >100 people present throughout the TPR
- Presentation summary
  - 68 presentations
    - 11 non-technical presentations
    - 5 status reports from international collaborators
      - AWE, IRSN, JRC/GEEL, OECD/NEA, & CEA
    - 52 technical presentation and task status reports



2021 Virtual NCSP TPR Participants

Last, but not least…

- Thank you:
  - Marsha Henley, ORNL – Primary TPR organizer
  - Pat Williams, LLNL – NCSP website POC
  - Task managers, CSSG, & NDAG
  - Site technical staff, especially those who are presenting this week
- TPR "rules"
  - TPR scheduled to start at 9am Tues-Thurs; you can log in as early as 8:30 am to test connections, screen sharing, etc.
  - Must stay within times to ensure we stay on schedule – things worked well last year…
  - All talks are 20 minutes – includes questions; introductory talks and task manager status reports are 15 minutes
  - The goal is to inform the NCSP Manager, Dr. Angela Chambers, about the status of work performed in FY2021
  - Those presentations chosen by Dr. Chambers as "best papers" (top six or so) will get to present their work at the 2022 Winter ANS meeting in the "2021 NCSP Technical Accomplishments" Session
- Request for side meetings with the NCSP Manager: contact Marsha Henley or Doug Bowen

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Questions