



NUCLEAR CRITICALITY SAFETY PROGRAM (NCSP)

FY2021 1st QUARTER REPORTS

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: AM4, 5 M&O Contractor Name: BNL Point of Contact Name: David Brown Point of Contact Phone: 631-344-2814			Reference: DP0909010 Date of Report: Jan., 2021																																																				
BUDGET																																																							
<p style="text-align: center;">BNL FY21 AM4,5</p> <table border="1"> <caption>Budget Data for BNL FY21 AM4,5</caption> <thead> <tr> <th>Month</th> <th>Approved Budget (\$K)</th> <th>Planned Spending (\$K)</th> <th>Actual Cumulative Cost (\$K)</th> </tr> </thead> <tbody> <tr><td>Oct</td><td>98,000</td><td>0</td><td>0</td></tr> <tr><td>Nov</td><td>98,000</td><td>19,600</td><td>0</td></tr> <tr><td>Dec</td><td>98,000</td><td>39,200</td><td>0</td></tr> <tr><td>Jan</td><td>98,000</td><td>58,800</td><td>0</td></tr> <tr><td>Feb</td><td>98,000</td><td>78,400</td><td>0</td></tr> <tr><td>Mar</td><td>98,000</td><td>98,000</td><td>0</td></tr> <tr><td>Apr</td><td>98,000</td><td>98,000</td><td>0</td></tr> <tr><td>May</td><td>98,000</td><td>98,000</td><td>0</td></tr> <tr><td>June</td><td>98,000</td><td>98,000</td><td>0</td></tr> <tr><td>Jul</td><td>98,000</td><td>98,000</td><td>0</td></tr> <tr><td>Aug</td><td>98,000</td><td>98,000</td><td>0</td></tr> <tr><td>Sep</td><td>98,000</td><td>98,000</td><td>0</td></tr> </tbody> </table>			Month	Approved Budget (\$K)	Planned Spending (\$K)	Actual Cumulative Cost (\$K)	Oct	98,000	0	0	Nov	98,000	19,600	0	Dec	98,000	39,200	0	Jan	98,000	58,800	0	Feb	98,000	78,400	0	Mar	98,000	98,000	0	Apr	98,000	98,000	0	May	98,000	98,000	0	June	98,000	98,000	0	Jul	98,000	98,000	0	Aug	98,000	98,000	0	Sep	98,000	98,000	0	<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$ 0 2. Approved FY 2021 Budget = \$ 98,000 3. Actual spending for 1st Quarter FY 2021 = \$0 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$
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Q1	Provide status on generating a draft document defining the TNSL code or software interface. (AM4)	 	Drafting the GNDS-2.0 specifications is taking longer than expected; a TNSL covariance format is among the pending changes. Otherwise, the TNSL format has been created and is being tested at LLNL in FUDGE. Elements of this new format have been back-ported to the																																																				

NCSP Quarterly Progress Report (FY-2021 Q1)

			ENDF-6 format by NNL and several new evaluations using this new format have been proposed.
Q1	Provide status on completing an ENDF/B-VIII.0 library with FUDGE. (AM5)		Until FUDGE has “officially” implement GNDS-2.0, we cannot use it to generate ENDF/B-VIII.0 in the new format.
Q2	Provide status on generating a draft document defining the TNSL code or software interface. (AM4)		
Q2	Provide status on completing an ENDF/B-VIII.0 library with FUDGE. (AM5)		
Q3	Provide status on generating a draft document defining the TNSL code or software interface. (AM4)		
Q3	Provide status on completing an ENDF/B-VIII.0 library with FUDGE. (AM5)		
Q4	Provide status on generating a draft document defining the TNSL code or software interface. (AM4)		
Q4	Provide status on completing an ENDF/B-VIII.0 library with FUDGE. (AM5)		

ACCOMPLISHMENTS

- AM4 - Thermal Scattering and Self-Shielding in GNDS/FUDGE
 - n/a
- AM5 - FUDGE Generation of a Complete ENDF/B-VIII.0 Library for Testing in Production Codes
 - M. Vorabbi presented work from FY20 in two separate venues:
 - US Nuclear Data Week 2020, NDAG session, “Alternate approach for calculating the URR PDFs”, Brookhaven National Laboratory (USA), 2020 November 30 - December 4.
 - Fall Meeting of the Division of Nuclear Physics of the American Physical Society, “Improving the probability tables of the cross section of near closed-shell nuclei”, New Orleans (USA), 2020 October 29 - November 1.

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.








NCSP Quarterly Progress Report (FY-2021 Q1)

Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1	n/a		
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: AM1, 2, 3, 4, 5, 7 M&O Contractor Name: LANL Point of Contact Name: Joetta Goda/Bob Little Point of Contact Phone: 505-667-2812/505-665-3487			Reference: DP0909010 Date of Report: January, 2021																																																						
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Q1	Provide reports on summer intern work accomplished (AM1)																																																								

NCSP Quarterly Progress Report (FY-2021 Q1)

Q1	Continue to distribute MCNP6 with automated acceleration and convergence testing to NCSP early-adopters and collect feedback (AM1)		
Q1	Provide a status report on NJOY user support (AM2)		
Q1	Provide status reports on LANL participation in US and International analytical methods collaborations (AM2)		
Q1	Provide status in NCSP Quarterly Progress Reports (AM3)		RPI subcontract delayed.
Q1	Provide status reports on LANL participation in US and International analytical methods collaborations (AM4)		
Q1	Provide status reports on LANL participation in US and International analytical methods collaborations (AM5)		
Q1	Provide status in NCSP Quarterly Progress Reports (AM7)		
Q2	Provide a status report on MCNP6 user support (AM1)		
Q2	Provide status reports on LANL participation in US and International analytical methods collaborations (AM1)		
Q2	Provide status of all MCNP6 and Whisper progress at the NCSP Technical Program Review (AM1)		
Q2	Provide MCNP6 Criticality training course (AM1)		
Q2	Provide a status report on NJOY user support (AM2)		
Q2	Release modernized and integrated versions of THERMR and LEAPR with documentation (AM2)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q2	Provide status reports on LANL participation in US and International analytical methods collaborations (AM2)		
Q2	Provide status in NCSP Quarterly Progress Reports (AM3)		
Q2	Provide status reports on LANL participation in US and International analytical methods collaborations (AM4)		
Q2	Provide status reports on LANL participation in US and International analytical methods collaborations (AM5)		
Q2	Provide status in NCSP Quarterly Progress Reports (AM7)		
Q3	Provide a status report on MCNP6 user support (AM1)		
Q3	Provide status reports on LANL participation in US and International analytical methods collaborations (AM1)		
Q3	Issue an MCNP V&V report, including MCNP6 automated acceleration and convergence (AM1)		
Q3	Provide a status report on NJOY user support (AM2)		
Q3	Provide status reports on LANL participation in US and International analytical methods collaborations (AM2)		
Q3	Provide status in NCSP Quarterly Progress Reports (AM3)		
Q3	Provide status reports on LANL participation in US and International analytical methods collaborations (AM4)		
Q3	Provide status reports on LANL participation in US and International analytical methods collaborations (AM5)		
Q3	Provide status in NCSP Quarterly Progress Reports (AM7)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q4	Provide a status report on MCNP6 user support (AM1)		
Q4	Provide status reports on LANL participation in US and International analytical methods collaborations (AM1)		
Q4	Release MCNP 6.3 to RSICC (AM1)		
Q4	Provide MCNP6 Criticality training course (AM1)		
Q4	Develop and demonstrate long-term strategy for distributing all Los Alamos supported ACE files (AM1)		
Q4	Provide a status report on NJOY user support (AM2)		
Q4	Provide status reports on LANL participation in US and International analytical methods collaborations (AM2)		
Q4	Demonstrate modernized ACER capabilities for processing fast neutron files with NJOY21 (AM2)		
Q4	Provide status in NCSP Quarterly Progress Reports (AM3)		
Q4	Provide data files and report for h-h2o and graphite on-the-fly S(alpha,beta) temperature effects. (AM3)		
Q4	Provide status reports on LANL participation in US and International analytical methods collaborations (AM4)		
Q4	Issue report on detailed review, comparisons, and updates to the Sensitivity-Uncertainty Comparison Study (pending carryover funding). (AM4)		
Q4	Provide status reports on LANL participation in US and International analytical methods collaborations (AM5)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q4	Issue final report on all LANL results related to the ICSBEP Benchmark Comparison Study (AM5)		
Q4	Provide status in NCSP Quarterly Progress Reports (AM7)		
Q4	Deliver final modified version of Whisper to LANL with an ANS conference paper to disseminate the work (AM7)		

ACCOMPLISHMENTS

- AM1 - MCNP® Maintenance and Support, Uncertainty Analysis Development, and Modernization
 - Education
 - Online MCNP6 classes: See separate summary of MCNP classes
 - Monte Carlo course at UNM, 11 undergrad + 2 grad students
 - Thesis advisor for UNM graduate student working in area of criticality calculations
 - R&D Work, continued to investigate & develop:
 - Region-dependent sensitivity-uncertainty data for NCS validation (UNM)
 - Subcritical multiplication methods investigation and impact of correlated fission multiplicity models in criticality calculations (UNM)
 - Prepared article for journal publication on using Whisper benchmarks and sensitivities to identify problematic nuclear data (OSU)
 - OECD-NEA-WPNCs-Subgroup-6 on statistical testing for automated criticality source convergence (F.B. Brown lead). Completed final report. Transmitted to OECD-NEA for publication.
 - Further investigation and usage of partial c_k similarity metrics for experiment design and optimization.
 - MCNP Support & Maintenance
 - Support MCNP6 users. MCNP Forum, email, direct interactions, etc.
 - MCNP V&V report. Work completed, & report is under preparation for release.
 - Code modernization effort – continuing.
 - Updating MCNP6 theory & user manual.
 - Enable stochastic mixing for S(a,b) thermal scattering law temperature effects.
 - Provided guidance reports for obtaining, installing, and using ENDF/B-VIII.0 nuclear data.
 - Pre-release version of MCNP6.3 provided to SNL & UNM for testing & feedback. **Milestone complete.**
 - Reports on summer intern work – see report list below. **Milestone complete.**
 - Reports & Publications
 - F.B. Brown & M.E. Rising, “Guide for Using ENDF/B-VIII.0 Nuclear Data with MCNP”, LA-UR-20-30460 (2020).

NCSP Quarterly Progress Report (FY-2021 Q1)

- F.B. Brown (Ed.), “Statistical Tests for Diagnosing Fission Source Convergence and Undersampling in Monte Carlo Criticality Calculations”, final report for OECD-NEA-WPNCs Subgroup-6, to be published by OECD-NEA in 2021.
- J.L. Alwin, F.B. Brown, M.J. Lazaric, B.R. Murphy, K.D. Spencer, “Comparison Study of Upper Subcritical Limits Derived Using Sensitivity/Uncertainty Tools Case Studies of Benchmarks & Applications”, LA-UR-20-28129.
- J.L. Alwin, F.B. Brown, J. Clarity, I. Duhamel, F. Fernex, et al, “S/U Comparison Study with a Focus on USLs”, ANS Winter meeting, LA-UR-20-24758, LA-UR-20-28222.
- R.H. Mendleski, K.Y. Spencer, E. Moll, R.F. Sartor, J.L. Alwin, W. Haeck, “Validation of MCNP Critical Benchmark Models of PU-MET-FAST-016”, ANS Winter Meeting, LA-UR-20-29300, LA-UR-20-25118.
- J.D. Hutchinson, T.A. Smith, N.A. Kleedtke, N.W. Thompson, R.C. Little, M.R. Rising, J.L. Alwin, T.J. Grove, I.J. Michaud, “Sensitivity Studies, Gap Analysis, and Benchmark Experiment Optimization”, ANS Winter Meeting, LA-UR-20-29405, LA-UR-20-24750.
- C.M. Kostelac, N. Thompson, R.G. Sanchez, J.D. Hutchinson, K.Y. Spencer, W. Haeck, J.L. Alwin, “Validation and Independent Uncertainty Analysis of the MIX-SOL-THERM-003 ICSBEP Benchmark”, ANS Winter Meeting, LA-UR-20-29459, LA-UR-20-24749.
- D.T. Wise, B. Madahar, K.Y. Spencer, J.L. Alwin, W. Haeck, “Validation of MCNP Critical Benchmark Models of Moderated Highly Enriched Uranium Slabs, ANS Winter Meeting, LA-UR-20-29255, LA-UR-20-24771.
- MCNP Data Libraries
 - Presented two papers at the 2020 ANS Winter Meeting. These were reported in Q3 of FY2020, but were presented in October of 2020.
 - “Analytic Insights into the Neutronic Characteristics of Neutron Moderators from MCNP Calculations,” D. Kent Parsons and Cecile Toccoli, LA-UR-20-24442.
 - “Verification of the Re-Released ENDF/B VIII.0 Based Thermal Scattering Libraries,” D. Kent Parsons, Cecile Toccoli, and Jeremy L. Conlin, LA-UR-20-24679.
- AM2 - NJOY Development and Maintenance, Uncertainty Analysis Development, and Modernization
 - Presented NJOY Status report at CSEWG
 - Updating build system of NJOY21. This greatly simplifies our build system and makes further development possible.
 - Release of NJOY21 version 1.2.0 which uses new build system
 - Preparation for the release of version 1.3.0, including:
 - C++ version of LEAPR and THERMR through our MIT contract
 - Modern RECONR
 - Released NJOY2016 version 1.60, which uses physical constants from CODATA2018. These new constants were approved as an ENDF format proposal at the latest CSEWG.
- AM3 - Development of an Adaptive-in-temperature Method for fast on-the-fly Sampling of Thermal Neutron Scattering Data in MCNP6
 - No progress to report. Subcontract with RPI is not in place yet.
- AM4 - Sensitivity/Uncertainty Comparison Study with a Focus on Upper Subcritical Limits
 - Presented paper at ANS Winter Meeting summarizing results of comparison
- AM5 - Proposed Benchmark Intercomparison Study
 - Working with IRSN to identify cause of discrepancies for cases in LCT, MIX and U233 series of benchmarks.
- AM7 - Incorporation of Benchmark Experiment Correlations into the Whisper Nuclear Criticality Safety Software

NCSP Quarterly Progress Report (FY-2021 Q1)

- The method called the Uniformly Ordered Binary Decision Algorithm has been developed and implemented into a research version of Whisper1.1. The results show that the inclusion of correlations can significantly lower the predicted baseline upper subcritical limit for some cases.
- A conference publication to be presented at the ANS Annual Meeting in June 2021 has been prepared to disseminate the work.

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference	Sent to NCSP? Yes/no	If no, status of submittal
Q1	F.B. Brown & M.E. Rising, "Guide for Using ENDF/B-VIII.0 Nuclear Data with MCNP", LA-UR-20-30460 (2020).	Yes, will send.	
Q1	F.B. Brown (Ed.), "Statistical Tests for Diagnosing Fission Source Convergence and Undersampling in Monte Carlo Criticality Calculations", final report for OECD-NEA-WPNC Subgroup-6, to be published by OECD-NEA in 2021.	No, will send next quarter.	
Q1	J.L. Alwin, F.B. Brown, M.J. Lazaric, B.R. Murphy, K.D. Spencer, "Comparison Study of Upper Subcritical Limits Derived Using Sensitivity/Uncertainty Tools Case Studies of Benchmarks & Applications", LA-UR-20-28129.	Yes, submitted in Q4FY20	
Q1	J.L. Alwin, F.B. Brown, J. Clarity, I. Duhamel, F. Fernex, et al, "S/U Comparison Study with a Focus on USLs", ANS Winter meeting, LA-UR-20-24758, LA-UR-20-28222.	Yes, submitted in Q3FY20	
Q1	R.H. Mendleski, K.Y. Spencer, E. Moll, R.F. Sartor, J.L. Alwin, W. Haeck, "Validation of MCNP Critical Benchmark Models of PU-MET-FAST-016", ANS Winter Meeting, LA-UR-20-29300, LA-UR-20-25118.	Yes, will send.	
Q1	J.D. Hutchinson, T.A. Smith, N.A. Kleedtke, N.W. Thompson, R.C. Little, M.R. Rising, J.L. Alwin, T.J. Grove, I.J. Michaud, "Sensitivity Studies, Gap Analysis, and Benchmark Experiment Optimization", ANS Winter Meeting, LA-UR-20-29405, LA-UR-20-24750.	Yes, will send.	
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Q1	D.T. Wise, B. Madahar, K.Y. Spencer, J.L. Alwin, W. Haeck, "Validation of MCNP Critical Benchmark Models of Moderated Highly Enriched Uranium Slabs, ANS Winter Meeting, LA-UR-20-29255, LA-UR-20-24771.	Yes, will send.	
Q1	"Analytic Insights into the Neutronic Characteristics of Neutron Moderators from MCNP Calculations," D. Kent Parsons and Cecile Toccoli, LA-UR-20-24442.	Yes, submitted in Q3FY20	



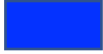
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Q1	"Verification of the Re-Released ENDF/B VIII.0 Based Thermal Scattering Libraries," D. Kent Parsons, Cecile Toccoli, and Jeremy L. Conlin, LA-UR-20-24679.	Yes, submitted in Q3FY20	
Q2			
Q3			
Q4			

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NCSP Element and Subtask: AM2, 3, 4, 5, 6, 8 M&O Contractor Name: LLNL Point of Contact Name: David Heinrichs Point of Contact Phone: (925) 424-5679			Reference: DP0909010 Date of Report: January, 2021																																																				
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QUARTER	TASK	STATUS	ISSUES/PATH FORWARD																																																				
Q1	Provide status in NCSP Quarterly Progress Report (AM2)		Focus is on analysis of IER268 (PDV) experimental results.																																																				
Q1	Provide status in NCSP Quarterly Progress Report (AM3)		See accomplishments.																																																				
Q1	Provide a status report on generating a draft document defining the TNSL code or software interface. (AM4)		See accomplishments.																																																				

NCSP Quarterly Progress Report (FY-2021 Q1)

Q1	Provide status in NCSP Quarterly Progress Report (AM5)		See accomplishments.
Q1	Provide status in NCSP Quarterly Progress Report (AM6)		See accomplishments.
Q1	Provide status in NCSP Quarterly Progress Report (AM8)		See accomplishments.
Q2	Provide status in NCSP Quarterly Progress Report (AM2)		
Q2	Provide status in NCSP Quarterly Progress Report (AM3)		
Q2	Provide a status report on generating a draft document defining the TNSL code or software interface. (AM4)		
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Q2	Provide status in NCSP Quarterly Progress Report (AM8)		
Q3	Provide status in NCSP Quarterly Progress Report (AM2)		
Q3	Provide status in NCSP Quarterly Progress Report (AM3)		
Q3	Provide a status report on generating a draft document defining the TNSL code or software interface. (AM4)		
Q3	Provide status in NCSP Quarterly Progress Report (AM5)		
Q3	Provide status in NCSP Quarterly Progress Report (AM6)		
Q3	Provide status in NCSP Quarterly Progress Report (AM8)		
Q4	Provide status in NCSP Quarterly Progress Report (AM2)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q4	Provide status in NCSP Quarterly Progress Report (AM3)		
Q4	Provide a status report on generating a draft document defining the TNSL code or software interface. (AM4)		
Q4	Provide status in NCSP Quarterly Progress Report (AM5)		
Q4	Provide status in NCSP Quarterly Progress Report (AM6)		
Q4	Provide status in NCSP Quarterly Progress Report (AM8)		

ACCOMPLISHMENTS

- AM3 – Slide Rule Application
 - The task specification for Phase 4, “Update of the Nuclear Criticality Slide Rule Calculations: Plutonium Configurations – Delayed Gamma” was completed on Nov. 27, 2020 and added to https://ncsp.llnl.gov/am_criticality_sliderule.php. Reviewed “Estimation of the Total Number of Fissions” by M. Duluc (IRSN).
- AM4 - Thermal Scattering and Self-Shielding in GNDS/FUDGE
 - HF thermal scattering law data now available in COG using data from ENDF/B-VIII.0 File 7. FUDGE processing into ACE format in progress.
- AM5 - Proposed Benchmark Intercomparison Study
 - A total of 3,162 high-precision COG (k-eff) ICSBEP benchmark results using ENDF/B-VII.1, ENDF/B-VIII.0 and JEFF-3.3 have been provided to Nicolas Leclaire (IRSN) for inclusion in the study as follows:

PU: 766	U233: 193	MIX: 245
HEU: 991	IEU: 188	LEU: 779
 - COG input files were also provided to Scott McKinley (LLNL) for translation to MERCURY input for additional LLNL participation in the study.
- AM6 - Proposed 1D Multipoint Analytical Benchmark Intercomparison
 - COG/FUDGE results for the analytic benchmark by Sobes et al. were completed and will be presented at the AMWG Meeting on Feb. 22, 2021.
- AM8 - FUDGE Generation of a Complete ENDF/B-VIII.0 Library for Testing in Production Codes
 - Library generation in progress for an elevated temperature ICSBEP benchmark including thermal neutron scattering laws for HF and H2O. Status of Fudge presented at CSEWG – see publications.

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference	Sent to NCSP? Yes/no	If no, status of submittal
Q1	C. M. Mattoon, “Status of Fudge, November 30, 2020: CSEWG,” LLNL-PRES-816458.	Yes	










NCSP Quarterly Progress Report (FY-2021 Q1)

Q1	B. Ganapol, "Solution of the Monoenergetic Neutron Transport Equation in a Half Space via Singular Eigenfunction Expansion," Transactions of the American Nuclear Society, Vol. 123, pp. 685-689, 2020 ANS Virtual Winter Meeting, November 16-19, 2020	No	Copyrighted material
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: AM1, 2, 3, 6, 9, 10, 11, 15, 17 M&O Contractor Name: ORNL Point of Contact Name: Doug Bowen Point of Contact Phone: (865) 576-0315		Reference: DP0909010 Date of Report: January, 2021																																																					
BUDGET																																																							
<div style="text-align: center; border: 1px solid black; padding: 5px; margin-bottom: 10px;">FY21 Analytical Methods</div> <table border="1" style="margin-top: 10px; font-size: small;"> <caption>Approximate Data from FY21 Analytical Methods Graph</caption> <thead> <tr> <th>Month</th> <th>Approved Budget (\$K)</th> <th>Costs (\$K)</th> <th>Planned Spending (\$K)</th> </tr> </thead> <tbody> <tr><td>Oct</td><td>2,900</td><td>100</td><td>200</td></tr> <tr><td>Nov</td><td>2,900</td><td>400</td><td>500</td></tr> <tr><td>Dec</td><td>2,900</td><td>400</td><td>700</td></tr> <tr><td>Jan</td><td>2,900</td><td>400</td><td>900</td></tr> <tr><td>Feb</td><td>2,900</td><td>400</td><td>1,200</td></tr> <tr><td>Mar</td><td>2,900</td><td>400</td><td>1,450</td></tr> <tr><td>Apr</td><td>2,900</td><td>400</td><td>1,450</td></tr> <tr><td>May</td><td>2,900</td><td>400</td><td>1,450</td></tr> <tr><td>Jun</td><td>2,900</td><td>400</td><td>1,450</td></tr> <tr><td>Jul</td><td>2,900</td><td>400</td><td>1,450</td></tr> <tr><td>Aug</td><td>2,900</td><td>400</td><td>1,450</td></tr> <tr><td>Sep</td><td>2,900</td><td>400</td><td>1,450</td></tr> </tbody> </table>		Month	Approved Budget (\$K)	Costs (\$K)	Planned Spending (\$K)	Oct	2,900	100	200	Nov	2,900	400	500	Dec	2,900	400	700	Jan	2,900	400	900	Feb	2,900	400	1,200	Mar	2,900	400	1,450	Apr	2,900	400	1,450	May	2,900	400	1,450	Jun	2,900	400	1,450	Jul	2,900	400	1,450	Aug	2,900	400	1,450	Sep	2,900	400	1,450	<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$ 418K 2. Approved FY 2021 Budget = \$ 2,895K (includes carryover) 3. Actual spending for 1st Quarter FY 2021 = \$378 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$ 	
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NCSP Quarterly Progress Report (FY-2021 Q1)

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Q1	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM11)		
Q1	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM15)		
Q1	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM17)		
Q2	Continue distribution of available and newly packaged software to the NCS community requesters (at no direct cost to them) and provide distribution totals quarterly. (AM1)		
Q2	Provide status on RSICC activities in NCSP Quarterly Progress Reports. (AM1)		
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Q2	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM2)		
Q2	Issue an annual SCALE maintenance report to the NCSP Manager. (AM2)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q2	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM3)		
Q2	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM6)		
Q2	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM9)		
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Q2	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM17)		
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NCSP Quarterly Progress Report (FY-2021 Q1)

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Q4	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM2)		
Q4	Publish annual newsletter to users to communicate software updates, user notices, generic technical advice, and training course announcements. (AM2)		
Q4	Document AMPX modernization and technical support for SCALE CE, multigroup, and covariance libraries and report status annually to the NCSP Manager. (AM3)		
Q4	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM3)		
Q4	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM6)		
Q4	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM9)		
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NCSP Quarterly Progress Report (FY-2021 Q1)

Q4	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM11)		
Q4	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM15)		
Q4	Provide status on ORNL activities in NCSP Quarterly Progress Report (AM17)		

ACCOMPLISHMENTS

- AM1 - Radiation Safety Information Computational Center (RSICC)
 - Distributed 687 software packages and updated 1 software package.
 - 127 SCALE, 291 MCNP®, and 0 COG packages distributed.
 - RSICC quarterly report issued.
 - Quarter 1 – University Requests – 384; NCSP Direct Requests – 17

FY2021 University Distributions

Month	MCNP®	SCALE
October	100	39
November	26	14
December	36	20

- You may note that slightly more than half of the distributions of MCNP® and SCALE are to U.S. university students in nuclear engineering department or programs.
- AM2 - SCALE/KENO/TSUNAMI Maintenance and Support/Cross-Section Generation/Modernization/etc.
 - A significant investment has been made in using AM-2 funds to expand the contents of the VALID Library. Some of this work will be completed using AM-17 funds when they become available.
 - Over 80 deuterium-moderated benchmarks that were generated as part of Travis Greene's master's thesis have been submitted for review. These benchmarks are in different phases of the review process.
 - LCT-079 has been entered for review. This experiment was performed at SNL and features Rh foils in some rods in certain configurations.
 - KENO models of the TEX Pu baselines, PMM-002, have been generated from the evaluation about to be published in the 2020 ICSBEP Handbook. These models will be reviewed in Q2.
 - Work has begun on a number of fast Pu metal benchmarks including PMF-003, PMF-016, PMF-024, and PMF-037. Many of these benchmarks will be completed in Q2.

NCSP Quarterly Progress Report (FY-2021 Q1)

- ZEUS models (HMI-006, HMF-072, and JMF-073) generated as part of Alex Shaw's master's thesis have been submitted for review. Review of these models has begun.
 - Models of the TEX Ta evaluation (PMM-003) and the class foils evaluation (HMT-004) were generated as part of the review of the proposed evaluations. Comments were provided to the ICSBEP Technical Review Group.
 - Results generated from this validation work will provide the basis for two ANS summaries planned for submission for the summer ANS meeting. The drafting, review, and submission of those summaries will occur in Q2, with presentations (if accepted) at the ANS meeting in Q3.
 - The KENO V.a and KENO-VI primers have been completed, incorporating all reviewer comments. The final organization review is being performed at ORNL, and the final documents should be released in Q2.
- AM3 - AMPX Maintenance & Modernization
 - A number of members of the nuclear data team (Doro Wiarda, Andrew Holcomb, Jesse Brown, Chris Chapman) attended the annual CSEWG virtual meeting. Doro Wiarda gave the SAMMY/AMPX status report and co-chaired the format session. Andrew Holcomb presented the new covariance fixups implemented into AMPX to ensure that all processed nuclear data covariance matrices are mathematically legal.
 - Since there were suggested updates to the R-external format by members of the CSEWG membership, the format proposal and the AMPX code was updated accordingly
 - Work continued on improving the thermal scattering processing code Y12. Improved angular gridding based on values of α was implemented and fixed short collision time errors that led to large number x small number issues with cold moderator materials. Testing is ongoing to ensure these changes do not adversely affect other moderators. In addition, a difference in the calculated values for the incoherent elastic cross section calculated by AMPX and NJOY was discovered and is being investigated.
- AM6 – Slide Rule Application
 - ORNL is still on standby, waiting for instructions from IRSN Slide Rule Updates. A teleconference is scheduled on January 8th 2021 with the different collaborators of the project to define the next tasks.
- AM9 - Sensitivity / Uncertainty Comparison Study with a Focus on Upper Subcritical Limits
 - Supported review and presentation of an ANS summary written by Jen Alwin providing results of S/U intercomparison work to date as part of the Recent Technical Achievements of the NCSP session.
- AM10 – Proposed Benchmark Intercomparison Study
 - No work was performed on this task in Q1. Work has been slowed by transition of the intercomparison coordinator at IRSN.
- AM11 – Proposed 1D Multipoint Analytical Benchmark Intercomparison
 - This task has been cancelled.
- AM15 – The Effects of Temperature on the Propagation of Nuclear Data Uncertainty in Nuclear Criticality Safety Calculations
 - Added capability to evaluate doppler broadened derivatives of the cross section with respect to resonance parameters

NCSP Quarterly Progress Report (FY-2021 Q1)

- Finished initial implementation of method for evaluation of temperature dependent groupwise cross section covariance matrices. The method is currently working for test cases with few resonances (~3) and coarse group structure (~44) and needs further validation
- Developed templated input file for managing covariance library production given a list of desired nuclides, group structures, temperatures, etc.
- AM17 – Expansion of the Verified, Archived, Library of Inputs and Data (VALID)
 - There has been no work performed on this task as no funding has been provided.

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1	Pulled from RES	Yes	
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: IPD1, 2, 4, 5, 6, 7 M&O Contractor Name: LLNL Point of Contact Name: David Heinrichs Point of Contact Phone: (925) 424-5679			Reference: DP0909010 Date of Report: January, 2020																																																				
BUDGET																																																							
<table border="1"> <caption>Budget Data (Estimated from Graph)</caption> <thead> <tr> <th>Month</th> <th>Approved Budget</th> <th>Costs</th> <th>Planned Spending</th> </tr> </thead> <tbody> <tr><td>OCT</td><td>220,000</td><td>150,000</td><td>50,000</td></tr> <tr><td>NOV</td><td>220,000</td><td>250,000</td><td>150,000</td></tr> <tr><td>DEC</td><td>220,000</td><td>400,000</td><td>250,000</td></tr> <tr><td>JAN</td><td>950,000</td><td>250,000</td><td>350,000</td></tr> <tr><td>FEB</td><td>950,000</td><td>250,000</td><td>450,000</td></tr> <tr><td>MAR</td><td>950,000</td><td>250,000</td><td>550,000</td></tr> <tr><td>APR</td><td>950,000</td><td>250,000</td><td>650,000</td></tr> <tr><td>MAY</td><td>950,000</td><td>250,000</td><td>750,000</td></tr> <tr><td>JUN</td><td>950,000</td><td>250,000</td><td>850,000</td></tr> <tr><td>JUL</td><td>950,000</td><td>250,000</td><td>950,000</td></tr> <tr><td>AUG</td><td>950,000</td><td>250,000</td><td>1,050,000</td></tr> <tr><td>SEP</td><td>950,000</td><td>250,000</td><td>1,150,000</td></tr> </tbody> </table>			Month	Approved Budget	Costs	Planned Spending	OCT	220,000	150,000	50,000	NOV	220,000	250,000	150,000	DEC	220,000	400,000	250,000	JAN	950,000	250,000	350,000	FEB	950,000	250,000	450,000	MAR	950,000	250,000	550,000	APR	950,000	250,000	650,000	MAY	950,000	250,000	750,000	JUN	950,000	250,000	850,000	JUL	950,000	250,000	950,000	AUG	950,000	250,000	1,050,000	SEP	950,000	250,000	1,150,000	1. Carryover into FY 2021 = \$ 54,942 2. Approved FY 2021 Budget = \$ 956,942 3. Actual spending for 1 st Quarter FY 2021 = \$ 400,994 4. Actual spending for 2 nd Quarter FY 2021 = \$ 5. Actual spending for 3 rd Quarter FY 2021 = \$ 6. Actual spending for 4 th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$ 76,555 (8%)
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QUARTER	TASK	STATUS	ISSUES/PATH FORWARD																																																				
Q1	Manage all aspects of the DOE NCSP participation in the ICSBEP as required to ensure the finalizing and publishing ICSBEP evaluations per IE schedule. (IPD1)		OECD NEA has approved the 2019 edition of the ICSBEP Handbook and plans to ship ISO files to the DVD manufacturer the week of January 11, 2021. DVDs should be available for distribution to NCSP users in late January or early February 2021.																																																				
Q1	Provide status reports on LLNL participation in US and International IPD collaborations																																																						

NCSP Quarterly Progress Report (FY-2021 Q1)

	(including ICSBEP) and provide a brief summary report to NCSP Manager on items of NCSP interest. (IPD1)		
Q1	Maintain, operate, and modernize the NCSP website, databases, and provide user assistance as required. (IPD2)		
Q1	Provide a status report for the evaluation of the LLNL "Hot Box" for inclusion in the ICSBEP Handbook. (IPD4)		
Q1	Provide status report on progress (IPD5)		
Q1	Provide status report on progress (IPD6)		
Q1	Provide the NCSP manager an update of NDA website support. (IPD7)		
Q2	Manage all aspects of the DOE NCSP participation in the ICSBEP as required to ensure the finalizing and publishing ICSBEP evaluations per IE schedule. (IPD1)		
Q2	Provide status reports on LLNL participation in US and International IPD collaborations (including ICSBEP) and provide brief summary report to NCSP Manager on items of NCSP interest. (IPD1)		
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Q2	Provide status report on progress (IPD6)		
Q2	Provide the NCSP manager an update of NDA website support. (IPD7)		
Q3	Manage all aspects of the DOE NCSP participation in the ICSBEP as required to		

NCSP Quarterly Progress Report (FY-2021 Q1)

	ensure the finalizing and publishing ICSBEP evaluations per IE schedule. (IPD1)		
Q3	Provide status reports on LLNL participation in US and International IPD collaborations (including ICSBEP) and provide brief summary report to NCSP Manager on items of NCSP interest. (IPD1)		
Q3	Maintain, operate, and modernize the NCSP website, databases, and provide user assistance as required. (IPD2)		
Q3	Provide a status report for the evaluation of the LLNL "Hot Box" for inclusion in the ICSBEP Handbook. (IPD4)		
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Q3	Provide status report on progress (IPD6)		
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Q4	Manage all aspects of the DOE NCSP participation in the ICSBEP as required to ensure the finalizing and publishing ICSBEP evaluations per IE schedule. (IPD1)		
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Q4	Provide the NCSP manager an update of NDA website support. (IPD7)		

NCSP Quarterly Progress Report (FY-2021 Q1)

ACCOMPLISHMENTS

- IPD1 - Conduct ICSBEP for Benchmarks of the 5-Year Plan and publish annual revision to the Handbook
 - LLNL published a summary of the 2020 ICSBEP TRG Meeting – see publications. All NCSP evaluations were accepted pending resolution of review comments including: (a) IER230, LCT102, 7uPCX with pitch variations, Ames (SNL); (b) IER299, HMF101, KRUSTY cold/warm criticals, Hutchinson (LANL); (c) IER192, HMT004, Class Foils with Lucite, Snoj (JSI); and IER528, PMM003, TEX-Pu-Ta, Percher (LLNL) completing CED-4a.
 - LLNL reviewed and provided updated sample COG results for LCT016, MIRTE-2, Nicolas Leclaire (IRSN).
 - NCSP evaluations in progress for the 2021 ICSBEP TRG Meeting are: (a) IER489, U235 URR IE (LANL); (b) IER297, TEX-HEU Baselines (LLNL); and (c) IER230, Characterize the Thermal Capabilities of 7uPCX (SNL).
- IPD2 - Maintain the NCSP Website and Systems
 - Developed and deployed the TPR registration webpages using LLNL's contract with CVENT. Performed routine maintenance and updates as directed by NCSP Management (e.g., Sliderule, training events, IRSN POC).
- IPD4 - Benchmark Evaluation of Hot Box, LLNL Historical Critical Configurations at High Temperature
 - No progress this period.
- IPD5 - IT Support at NNSS
 - LLNL continues to support the NCERC control room upgrades as IT and Networking SME. Provided monthly "authenticated" scans for NCERC network devices and system upgrades as required. Supporting LANL OCIO and ISSO on "Weapons" security plan consolidation.
 - Supported IER466 (NCERC ops support) and IER540 (PF4 training) in October, and IER462 (NCSP training) and IER535 (non-NCSP) in November.
- IPD6 - Benchmark Evaluation of LLNL 'Pulsed Spheres'
 - Results for deuterons impinging on the Ti-T target assembly surrounded by polyethylene were presented at the ANS Winter Meeting – see publications.
- IPD7 - LLNL - NDA Website Support
 - Website maintenance.

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference	Sent to NCSP? Yes/no	If no, status of submittal
Q1	Soon S. Kim et al., "Application of COG to Deuteron Transport Problems," Transactions of the American Nuclear Society, Vol. 123, pp. 1189-1191, ANS Virtual Winter Meeting, November 16-19, 2020.	No	Copyrighted material.
Q1	David P. Heinrichs, "Report on the (on-line) 2020 ICSBEP Technical Review Group (WebEx) Meeting," LLNL-MI-816976, October 31, 2020.	Yes	
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: IPD5, 7 M&O Contractor Name: ORNL Point of Contact Name: Doug Bowen Point of Contact Phone: (865) 576-0315			Reference: DP0909010 Date of Report: January, 2021																																																						
BUDGET																																																									
<div><div>FY21 Information Preservation and Dissemination</div><div><table><caption>FY21 Information Preservation and Dissemination Data</caption><thead><tr><th>Month</th><th>Approved Budget (\$K)</th><th>Costs (\$K)</th><th>Planned Spending (\$K)</th></tr></thead><tbody><tr><td>Oct</td><td>0</td><td>30</td><td>0</td></tr><tr><td>Nov</td><td>0</td><td>60</td><td>0</td></tr><tr><td>Dec</td><td>0</td><td>80</td><td>0</td></tr><tr><td>Jan</td><td>0</td><td>80</td><td>0</td></tr><tr><td>Feb</td><td>0</td><td>80</td><td>0</td></tr><tr><td>Mar</td><td>0</td><td>80</td><td>0</td></tr><tr><td>Apr</td><td>0</td><td>80</td><td>0</td></tr><tr><td>May</td><td>0</td><td>80</td><td>0</td></tr><tr><td>Jun</td><td>0</td><td>80</td><td>0</td></tr><tr><td>Jul</td><td>0</td><td>80</td><td>0</td></tr><tr><td>Aug</td><td>0</td><td>80</td><td>0</td></tr><tr><td>Sep</td><td>0</td><td>80</td><td>0</td></tr></tbody></table></div><div><div>Approved Budget</div><div>Costs</div><div>Planned Spending</div></div></div>			Month	Approved Budget (\$K)	Costs (\$K)	Planned Spending (\$K)	Oct	0	30	0	Nov	0	60	0	Dec	0	80	0	Jan	0	80	0	Feb	0	80	0	Mar	0	80	0	Apr	0	80	0	May	0	80	0	Jun	0	80	0	Jul	0	80	0	Aug	0	80	0	Sep	0	80	0	<div>1. Carryover into FY 2021 = \$ -8K</div> <div>2. Approved FY 2021 Budget = \$-8K (includes carryover)</div> <div>3. Actual spending for 1st Quarter FY 2021 = \$81K</div> <div>4. Actual spending for 2nd Quarter FY 2021 = \$</div> <div>5. Actual spending for 3rd Quarter FY 2021 = \$</div> <div>6. Actual spending for 4th Quarter FY 2021 = \$</div> <div>7. Projected carryover into FY 2022 = \$</div>		
Month	Approved Budget (\$K)	Costs (\$K)	Planned Spending (\$K)																																																						
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Complete <div></div>		On Schedule <div></div>		Behind Schedule <div></div>	Missed Milestone <div></div>																																																				
QUARTER	TASK	STATUS	ISSUES/PATH FORWARD																																																						
Q1	Provide a status report on progress made. (IPD5)	<div></div>																																																							
Q1	Provide a status report on progress made. (IPD7)	<div></div>																																																							

NCSP Quarterly Progress Report (FY-2021 Q1)

Q2	Provide a status report on progress made. (IPD5)		
Q2	Provide a status report on progress made. (IPD7)		
Q3	Provide a status report on progress made. (IPD5)		
Q3	Provide a status report on progress made. (IPD7)		
Q4	Provide a status report on progress made. (IPD5)		
Q4	Provide a status report on progress made. (IPD7)		

ACCOMPLISHMENTS

- IPD5 – Oak Ridge Health Physics Research Reactor CAAS Benchmark Evaluation
 - The HPRR sulfur pellet measurements benchmark report has been completed and has been sent to the NCSP in November 2020. The report will be sent to the ICSBEP Technical Review Group in the correct format, for presentation at the 2021 ICSBEP Technical Review Group meeting.
- IPD7 - Preserving the “Howard Dyer” Library at ORNL
 - Library has been scanned (previously reported)
 - Gap analysis is being performed (scanned documents versus Dyer index) to determine missing documents

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference example) J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: IPD1 M&O Contractor Name: SRNS Point of Contact Name: David Erickson Point of Contact Phone: 803-557-9445			Reference: DP0909010 Date of Report: January, 2021																						
BUDGET																									
<div><p>SRS IP&D 1 Funds FY21</p><table><caption>SRS IP&D 1 Funds FY21 Data</caption><thead><tr><th>FY21 Quarter</th><th>Apprvd Budget (\$K)</th><th>Costs (\$K)</th><th>Plan Spnd (\$K)</th></tr></thead><tbody><tr><td>1</td><td>50</td><td>2</td><td>7</td></tr><tr><td>2</td><td>50</td><td>2</td><td>15</td></tr><tr><td>3</td><td>50</td><td>2</td><td>28</td></tr><tr><td>4</td><td>50</td><td>2</td><td>42</td></tr></tbody></table></div>			FY21 Quarter	Apprvd Budget (\$K)	Costs (\$K)	Plan Spnd (\$K)	1	50	2	7	2	50	2	15	3	50	2	28	4	50	2	42	<div><p>1. Carryover into FY 2021 = \$79.8K 2. Approved FY 2021 Budget = \$ 0K 3. Actual spending for 1st Quarter FY 2021 = \$1.7K 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$</p></div>		
FY21 Quarter	Apprvd Budget (\$K)	Costs (\$K)	Plan Spnd (\$K)																						
1	50	2	7																						
2	50	2	15																						
3	50	2	28																						
4	50	2	42																						
MILESTONES																									
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Complete		On Schedule		Behind Schedule																					
				Missed Milestone																					
QUARTER	TASK	STATUS	ISSUES/PATH FORWARD																						
Q1	Provide status reports on SRS progress with CritView. (IPD1)																								
Q1	NCSP Approved Scope for FY21. (IPD1)		Late start, in progress																						
Q2	Provide status reports on SRS progress with CritView. (IPD1)																								
Q2	TBD based on Approved Scope. (IPD1)																								

NCSP Quarterly Progress Report (FY-2021 Q1)

Q3	Provide status reports on SRS progress with CritView. (IPD1)		
Q3	TBD based on Approved Scope. (IPD1)		
Q4	Provide status reports on SRS progress with CritView. (IPD1)		
Q4	Provide updated CritView database for user testing. (IPD1)		

ACCOMPLISHMENTS

- IPD1 – ARH-600 Reissue (CritView)

PUBLICATIONS

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Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

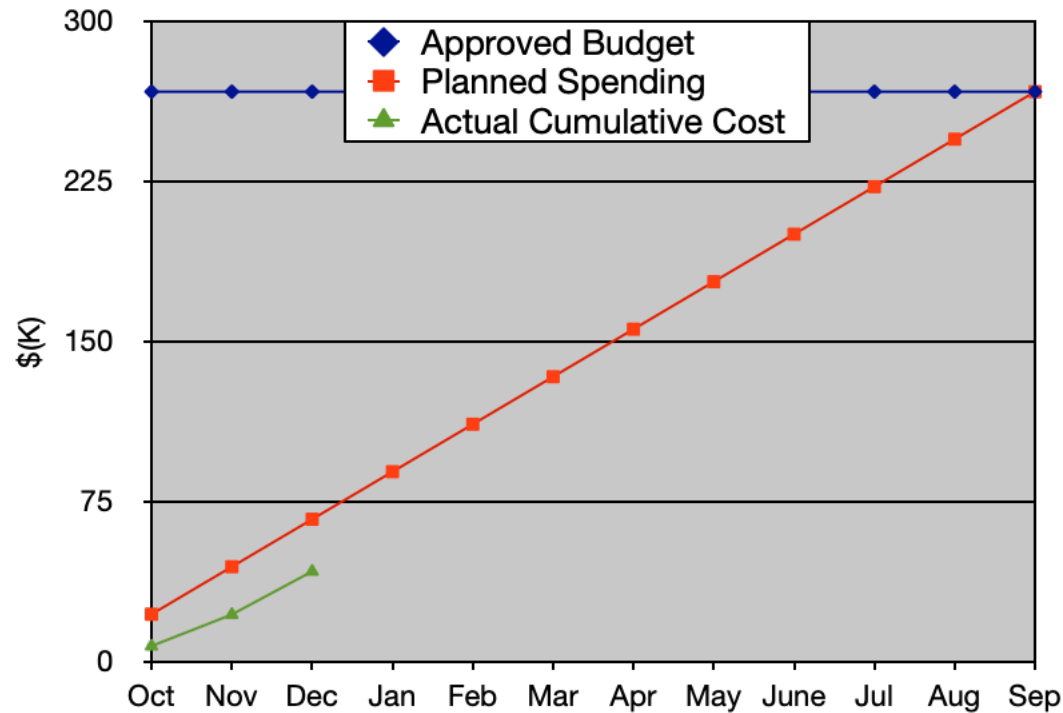
NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: ND1
M&O Contractor Name: BNL
Point of Contact Name: David Brown
Point of Contact Phone: 631-344-2814

Reference: DP0909010
Date of Report: Jan., 2021

BUDGET

BNL FY21 ND1



1. Carryover into FY 2021 = \$ 0
2. Approved FY 2021 Budget = \$ 267,000
3. Actual spending for 1st Quarter FY 2021 = \$42,331
4. Actual spending for 2nd Quarter FY 2021 = \$
5. Actual spending for 3rd Quarter FY 2021 = \$
6. Actual spending for 4th Quarter FY 2021 = \$
7. Projected carryover into FY 2022 = \$


MILESTONES

STATUS (copy color code and paste below in 'STATUS' field)

Complete 	On Schedule 	Behind Schedule 	Missed Milestone
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QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Maintain and upgrade ADVANCE code system by performing data verification of new NCSP evaluations and performing quality assurance on the data as required and provide status reports on all nuclear data support activities to the NCSP Manager. (ND1)	 	CSEWG is deciding on a review process for all ENDF evaluations. Currently, all submitted evaluations are stored in the 'phase1' branch and this branch is checked by ADVANCE. To move to the 'phase2' branch for integral validation, evaluations must pass through an as-yet-undefined peer review process. We had planned to work this

NCSP Quarterly Progress Report (FY-2021 Q1)

			process out at the 2020 mini-CSEWG which was postponed due to COVID-19.
Q1	If mandated by CSEWG, release new ENDF library. (ND1)		Release of a beta version of the next ENDF library (ENDF/B-VIII.1) was discussed and approved by the CSEWG Executive Committee. A timeline for this beta release has not been decided. CSEWG has set a target date of February 2023 for the final release of ENDF/B-VIII.1.
Q2	Maintain and upgrade ADVANCE code system by performing data verification of new NCSP evaluations and performing quality assurance on the data as required and provide status reports on all nuclear data support activities to the NCSP Manager. (ND1)		
Q2	If mandated by CSEWG, release new ENDF library. (ND1)		
Q3	Maintain and upgrade ADVANCE code system by performing data verification of new NCSP evaluations and performing quality assurance on the data as required and provide status reports on all nuclear data support activities to the NCSP Manager. (ND1)		
Q3	If mandated by CSEWG, release new ENDF library. (ND1)		
Q4	Maintain and upgrade ADVANCE code system by performing data verification of new NCSP evaluations and performing quality assurance on the data as required and provide status reports on all nuclear data support activities to the NCSP Manager. (ND1)		
Q4	If mandated by CSEWG, release new ENDF library. (ND1)		
ACCOMPLISHMENTS			

NCSP Quarterly Progress Report (FY-2021 Q1)

- ND1 - National Nuclear Data Center (NNDC) Support to the NCSP
 - D. Brown worked with the rest of the NNDC to host the 2020 Virtual US Nuclear Data Week (30 Nov. – 2 Dec. 2020) via zoom.gov. This included 2.5 days of CSWEG business and 0.5 days of NCSP NDAG business.
 - D. Brown presented several NCSP related talks at Nuclear Data Week:
 - Updates to the ENDF-6 format proposal process using git.nndc.bnl.gov
 - Overview of the progress towards the GNDS-2.0 format
 - Status of covariance testing performed by ADVANCE
 - Summary of new evaluations added to the ENDF library
 - Update of evaluations performed in collaboration with RQ Wright
 - D. Brown also hosted a “gitlab clinic” at Nuclear Data Week to introduce users to the new Gitlab instance at git.nndc.bnl.gov
 - In FY21, Q1, there were several NCSP changes/additions committed to Gitlab: 10 evaluations to the neutron sublibrary and 6 evaluations to the TSL sublibrary. These 6 TSL evaluations are divided into several files each to account for each scatterer. These evaluations and many others are staged for peer review.

PUBLICATIONS





Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: ND1, 2, 3, 4 M&O Contractor Name: LANL Point of Contact Name: Joetta Goda/Bob Little Point of Contact Phone: 505-667-2812/505-665-3487			Reference: DP0909010 Date of Report: January, 2021																																																						
BUDGET																																																									
<table><caption>Budget Data (Estimated from Graph)</caption><thead><tr><th>Month</th><th>Costs</th><th>Planned Spending</th><th>Approved Budget</th></tr></thead><tbody><tr><td>Oct</td><td>100</td><td>100</td><td>1400</td></tr><tr><td>Nov</td><td>200</td><td>200</td><td>1400</td></tr><tr><td>Dec</td><td>300</td><td>300</td><td>1400</td></tr><tr><td>Jan</td><td></td><td>400</td><td>1400</td></tr><tr><td>Feb</td><td></td><td>550</td><td>1400</td></tr><tr><td>Mar</td><td></td><td>650</td><td>1400</td></tr><tr><td>Apr</td><td></td><td>750</td><td>1400</td></tr><tr><td>May</td><td></td><td>850</td><td>1400</td></tr><tr><td>Jun</td><td></td><td>950</td><td>1400</td></tr><tr><td>Jul</td><td></td><td>1050</td><td>1400</td></tr><tr><td>Aug</td><td></td><td>1150</td><td>1400</td></tr><tr><td>Sep</td><td></td><td>1300</td><td>1400</td></tr></tbody></table>				Month	Costs	Planned Spending	Approved Budget	Oct	100	100	1400	Nov	200	200	1400	Dec	300	300	1400	Jan		400	1400	Feb		550	1400	Mar		650	1400	Apr		750	1400	May		850	1400	Jun		950	1400	Jul		1050	1400	Aug		1150	1400	Sep		1300	1400	<div>1. Carryover into FY 2021 = \$ 30,000.00</div> <div>2. Approved FY 2021 Budget = \$ 1,386,000.00</div> <div>3. Actual spending for 1st Quarter FY 2021 = \$265,679.90</div> <div>4. Actual spending for 2nd Quarter FY 2021 = \$</div> <div>5. Actual spending for 3rd Quarter FY 2021 = \$</div> <div>6. Actual spending for 4th Quarter FY 2021 = \$</div> <div>7. Projected carryover into FY 2022 = \$101,000.00</div>	
Month	Costs	Planned Spending	Approved Budget																																																						
Oct	100	100	1400																																																						
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QUARTER	TASK	STATUS	ISSUES/PATH FORWARD																																																						
Q1	Provide status reports on LANL participation in US and International Nuclear Data collaborations. (ND1)																																																								
Q1	Conduct CSEWG Evaluation and Covariance sessions. (ND1)																																																								
Q1	Report data testing results with ENDF/B-VIII.0 and additional beta release cross sections at CSEWG. (ND1)																																																								

NCSP Quarterly Progress Report (FY-2021 Q1)

Q1	Provide status report on progress (ND2)		
Q1	Provide status report on progress (ND3)		
Q1	Complete review of previous “thin” target U233 measurements and finalize specifications for new “thick” U233 target (ND3)		Completed early during FY20 – see Q3 ND report.
Q1	Provide status report on progress (ND4)		
Q2	Provide status reports on LANL participation in US and International Nuclear Data collaborations. (ND1)		
Q2	Provide status report on progress (ND2)		
Q2	Provide status report on progress (ND3)		
Q2	Provide status report on progress (ND4)		
Q3	Provide status reports on LANL participation in US and International Nuclear Data collaborations. (ND1)		
Q3	Provide status report on progress (ND2)		
Q3	Provide status report on progress (ND3)		
Q3	Complete fabrication of new “thick” U233 target (ND3)		
Q3	Provide status report on progress (ND4)		
Q4	Provide status reports on LANL participation in US and International Nuclear Data collaborations. (ND1)		
Q4	Deliver nuclear data evaluations as indicated in Appendix B of the Five Year plan. (ND1)		
Q4	Provide status report on progress (ND2)		
Q4	Start taking Pu240 PFNS data (ND2)		
Q4	Provide status report on progress (ND3)		
Q4	Acquire initial U233 thick-target data (ND3)		
Q4	Provide status report on progress (ND4)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q4	Finalize the analysis, submit the results for publication, and make the data available to IRSN and EXFOR. (ND4)		
ACCOMPLISHMENTS			
<ul style="list-style-type: none"> • ND1 – Nuclear Data Evaluation and Testing <ul style="list-style-type: none"> ○ Light nuclei: <ul style="list-style-type: none"> ▪ n+9Be - We continue to try to understand the benchmarking of the new evaluation completed last fiscal year by comparing with thick-target outgoing neutron spectra measured at the RPI Linac. We have written a simple Mathematica program to identify the structure in the measured spectra with resonances in the evaluated cross sections, in order to better assess the features of an MCNP calculation that models the measured thick-target angular yields. ▪ n+6Li - work continues on a new R-matrix analysis of reactions in the 7Li system that includes much new experimental information, and gives evaluated n+6Li cross sections to higher energies than before. ▪ Work currently done under other funding that relates to NCSP interests: <ul style="list-style-type: none"> • n+12,13C - new measurements of n+C elastic and inelastic scattering are being incorporated in our R-matrix analyses of reactions in the 13C and 14C systems. • n+16O - new measurements of 13C(alpha,n) cross sections are being added to the data base of our analysis of the reactions in the 17O system, which now includes excited-state channels of 16O and 13C in the basis set since it goes to higher energies. ○ Progress on nubar and PFNS and consistent nubar/PFNS evaluations: <ul style="list-style-type: none"> ▪ Over the past quarter, we have been investigating the PFNS for U-235 with CGMF to see how much change we can get in the PFNS from the input parametrization (Y(A), TKE, spin, energy sharing) for the consistent <nu>/PFNS evaluation. Out of these models, only the excitation energy sharing changes the shape of the PFNS significantly - but regardless of the value, the "inflection point" (when the PFNS is plotted as a ratio to Maxwellian) is still at the wrong outgoing neutron energy. We have also looked at adjusting the mass-dependencies of the excitation energy sharing, TKE(A), and sigma_TKE(A), which do not have a noticeable effect on changing the shape. ▪ We have started running CGMF calculations for Pu-239 nubar. Even though we are already very close to ENDF with CGMF for Pu-239, this can provide a test case for a CGMF nubar evaluation and starting to look at consistent parameters across the isotopic chains (which was one of our backup goals, if the PFNS isn't solved). ▪ Made progress on 239Pu nu-bar evaluation: Some of it is documented in LA-UR-20-29720. Did an uncertainty estimate of the same experimental data as used by Phil Young and first evaluation using these data. Still missing: including new experimental data, covariance between experiments, and including CGMF model. ▪ Made progress on 239Pu PFNS evaluation: Some of it is documented in LA-UR-20-29720. Did an uncertainty estimate of newest Chi-Nu and CEA experimental data and included in an evaluation with the Los Alamos model. Also did testing of evaluated data. Still missing: including CGMF model. ○ Ta181 evaluation <ul style="list-style-type: none"> ▪ The new evaluation of Ta181, a material utilized in the PF-4 casting, has been undertaken to improve on the current ENDF/B-VIII.0 evaluation. The latter was obtained with default calculations using TALYS code about a decade ago, without thorough comparison 			

NCSP Quarterly Progress Report (FY-2021 Q1)

with experimental data. This evaluation does not reproduce total cross sections and has unphysical double-differential neutron spectra. Most likely coupled-channel calculations with spherical optical model parameters were used (documentation is very scarce), while the classical exciton model was employed for the pre-equilibrium emission.

- The new evaluation in the fast neutron range relies on the curated set of abundant experimental data. Special attention has been dedicated to elastic angular distributions below 2 MeV because of their potential importance to the criticality safety at PF-4. EMPIRE code has been used for the theoretical modeling. These calculations are a significant upgrade compared to the TALYS calculations - (i) dispersive coupled-channel potential has been used instead of the spherical one, (ii) preequilibrium emission has been treated within quantum-mechanical Multistep Direct (MSD) and Multistep Compound (MSC) mechanisms instead of the classical exciton model. Engelbrecht-Weidenmueler transformation will be used to account for the interference between direct and compound nucleus mechanisms.
- In the 1st quarter dispersive CC potential for Ta181, available from the RIPL library (#610), has been adjusted to improve prediction of the total cross sections and elastic angular distributions below 20 MeV, with particular attention to the region below 2 MeV. Combination of manual adjustments with the Kalman filter have been used. Gilbert-Cameron and EMPIRE-specific level densities were considered. The former ones have been selected, for the time being, but this choice might still be revised in the course of the evaluation. Adjusting number of discrete levels to the level densities resulted in the elimination of the bump in the capture cross sections around 1 MeV that is not present in the experimental data. Similar bump exists in the ENDF/B-VIII.0 evaluation pointing to mismatch between discrete levels and level densities. MSD + MSC calculations produced double-differential neutron spectra which are in very good agreement with the experiments between 5 and 20 MeV. Only one parameter in the MSD calculations was adjusted to obtain this result.
- In the current FY level densities will be adjusted using Kalman filter to fine-tune individual reaction cross sections. CoH3 code will be used to predict direct-semidirect component to the radiative capture and CoH3 scissors mode for the M1 gamma transitions will be tested. Covariances will be produced and validation will be performed with a few available integral experiments (notably TEX-3).
- It should be noted, that ORNL is evaluating resonance region within the NCSP. We are in contact with the ORNL evaluation team and the two complimentary pieces will be eventually combined in a single evaluation.
- Data Testing
 - A number of documents were published relating to data testing results and improved infrastructure providing additional capabilities and efficiency for data testing:
 - “Which nuclear data can be validated with LLNL pulsed-sphere experiments?”, Denise Neudecker, Oscar Cabellos, Alexander R. Clark, Wim Haeck, Robert Capote, Andrej Trkov, Morgan C. White, and Michael E. Rising, *Annals of Nuclear Energy*, 2021.
 - J.L. Alwin, F.B. Brown, W. Haeck, M.E. Rising, K.D. Spencer, “Procedure for Creating, Reviewing, & Submitting Input Files into Benchmark Library”, LA-UR-20-29183
 - W. Haeck, K.Y. Spencer, J.L. Alwin, “Benched: Upgrading and Updating the Los Alamos Benchmark Suite for the 21st Century”, ANS Winter Meeting, LA-UR-20-29471, LA-UR-20-24777.
- Machine Learning for Nuclear Data
 - A paper was submitted describing machine learning and problematic nuclear data:
 - P.A. Grechanuk, M.E. Rising, T.S. Palmer, “Application of Machine Learning to Identify Problematic Nuclear Data”, to be submitted to *Nucl. Sci. Eng.* (2021).

NCSP Quarterly Progress Report (FY-2021 Q1)

- Nuclear Data Week
 - During CSEWG, Mark Chadwick and Patrick Talou co-chaired the Evaluation session, Toshihiko Kawano chaired the Fission Product Yield Evaluation session, and Denise Neudecker chaired the Covariance session (all from Los Alamos)
 - Over a dozen presentations were made during CSEWG by Los Alamos scientists associated with the NCSP.
 - Two presentations were made during the NDAG:
 - One was an overview of Los Alamos nuclear data accomplishments in FY20 and plans for FY21.
 - The other was a technical presentation by Amy Lovell, titled “Towards a Consistent Evaluation of Fission Observables: Status, Challenges, and Plans for Consistent Modeling and Evaluation of Fission Data: Nubar, PFNS, and FPY.”
- ND2 – Prompt Fission and Neutron Spectra (PFNS) Measurement of Plutonium-240
 - Progress in certifying a new rad glove box (or rad lab) at LLNL, needed to proceed with the 240Pu foil deposition.
- ND3 – Unresolved and Fast Measurements of U233 (n, gamma)
 - Background
 - For U-233, fission is around one order of magnitude more likely than capture, hence, the accuracy in the capture cross section measurement relies on discrimination between the gammas produced in capture and fission reactions, requiring an experimental setup combining capture and fission detectors. Therefore the new measurement at LANL will combine the Detector for Advanced Neutron Capture Experiments (DANCE), to measure gammas, with the NEUtron detector array at dANCE (NEUANCE) to detect neutrons coming from fission and determine by coincidence the gammas produced by fission reactions, in order to distinguish them from the ones produced by capture reactions. A thick U-233 sample was proposed in order to obtain enough statistics to have a good resolution in the Unresolved Resonance Region (URR).
 - Target samples
 - We obtained 30 mg of U-233 material from Oak Ridge National Laboratory, supplied as a solid oxide. Two samples were produced at LANL, one of 20 mg and another one of 10 mg.
 - Experiment
 - The experiment was planned for the end of the CY 2020 campaign at LANSCE. The 20 mg sample was placed on FP14 on 11th December. The 20 mg sample was measured during 10 days and the 10 mg sample was placed in the beam during 1 day. The rest of the beam time was used to measure radioactive sources for calibration, background measurements and tests to determine the U-233 windows required during the data taking, also some measurements were done with a U-235 sample to cross-check the performance and the systematics.
 - Data Analysis
 - The first step in the data analysis consists of calibrating the DANCE and the NEUANCE crystals. The intrinsic radioactivity of the BaF2 crystals has been used to calibrate the DANCE crystals by using the α -decay chain of the Ra-226 present inside the BaF2. The NEUANCE crystals have been calibrated using Na-22, Y-88 and Cs-137 gamma sources.
 - Once that all the crystals from both detectors have been calibrated, the next step of the analysis method consists in tagging the signals in coincidence between DANCE and NEUANCE to identify the gammas that come from the Fission Fragments, then the signals that fulfill this coincidence condition are tagged, to be later subtracted when calculating the capture yield. Good separation between neutrons and gammas was achieved with NEUANCE.

NCSP Quarterly Progress Report (FY-2021 Q1)

- Next Steps
 - DANCE has been used to measure the gammas from capture reactions, and the ones produced by fission reactions will be identified and subtracted using NEUANCE. We also plan to request additional LANSCE beam time in the next run cycle.
- ND4 – 95-Mo Neutron Capture and Transmission Measurements
 - The data files; ORELA 95Mo transmission, (n,gamma), and (n,alpha) data and the corresponding SAMMY files were located and verified. SAMMY was executed and the results compared to the data, and the agreement is very good. The next step is locating and verifying the files used to assign resonance spins and parities, and cross sections for the URR.

PUBLICATIONS




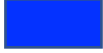




Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference	Sent to NCSP? Yes/no	If no, status of submittal
Q1	“Which nuclear data can be validated with LLNL pulsed-sphere experiments?”, Denise Neudecker, Oscar Cabellos, Alexander R. Clark, Wim Haeck, Robert Capote, Andrej Trkov, Morgan C. White, and Michael E. Rising, submitted to Annals of Nuclear Energy, 2021.	Yes – will send.	
Q1	J.L. Alwin, F.B. Brown, W. Haeck, M.E. Rising, K.D. Spencer, “Procedure for Creating, Reviewing, & Submitting Input Files into Benchmark Library”, LA-UR-20-29183	Yes - will send.	
Q1	W. Haeck, K.Y. Spencer, J.L. Alwin, “Benched: Upgrading and Updating the Los Alamos Benchmark Suite for the 21 st Century”, ANS Winter Meeting, LA-UR-20-29471, LA-UR-20-24777.	Yes – will send.	
Q1	P.A. Grechanuk, M.E. Rising, T.S. Palmer, “Application of Machine Learning to Identify Problematic Nuclear Data”, to be submitted to <i>Nucl. Sci. Eng.</i> (2021).	No – will send in Q2.	
Q1	Amy Lovell, “Towards a Consistent Evaluation of Fission Observables: Status, Challenges, and Plans for Consistent Modeling and Evaluation of Fission Data: Nubar, PFNS, and FPY,” presented at NDAG.	Yes - will send.	
Q1	Denise Neudecker, “Additional information to CSEWG talk on Average Prompt-fission Neutron Multiplicity and PFNS Evaluations for 239Pu, ”LA-UR-20-29720	Yes - will send	
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: ND1a, 1b, 2, 3, 5, 6, 7, 8, 9, 10, 11 M&O Contractor Name: LLNL Point of Contact Name: David Heinrichs Point of Contact Phone: (925) 424-5679			Reference: DP0909010 Date of Report: January, 2021																																																				
BUDGET																																																							
<table border="1"> <caption>Budget Data (Estimated from Graph)</caption> <thead> <tr> <th>Month</th> <th>Approved Budget</th> <th>Costs</th> <th>Planned Spending</th> </tr> </thead> <tbody> <tr><td>OCT</td><td>\$400,000</td><td>\$50,000</td><td>\$50,000</td></tr> <tr><td>NOV</td><td>\$400,000</td><td>\$100,000</td><td>\$150,000</td></tr> <tr><td>DEC</td><td>\$400,000</td><td>\$153,005</td><td>\$250,000</td></tr> <tr><td>JAN</td><td>\$956,257</td><td></td><td>\$350,000</td></tr> <tr><td>FEB</td><td>\$956,257</td><td></td><td>\$450,000</td></tr> <tr><td>MAR</td><td>\$956,257</td><td></td><td>\$550,000</td></tr> <tr><td>APR</td><td>\$956,257</td><td></td><td>\$650,000</td></tr> <tr><td>MAY</td><td>\$956,257</td><td></td><td>\$750,000</td></tr> <tr><td>JUN</td><td>\$956,257</td><td></td><td>\$850,000</td></tr> <tr><td>JUL</td><td>\$956,257</td><td></td><td>\$950,000</td></tr> <tr><td>AUG</td><td>\$956,257</td><td></td><td>\$1,050,000</td></tr> <tr><td>SEP</td><td>\$956,257</td><td></td><td>\$1,150,000</td></tr> </tbody> </table>		Month	Approved Budget	Costs	Planned Spending	OCT	\$400,000	\$50,000	\$50,000	NOV	\$400,000	\$100,000	\$150,000	DEC	\$400,000	\$153,005	\$250,000	JAN	\$956,257		\$350,000	FEB	\$956,257		\$450,000	MAR	\$956,257		\$550,000	APR	\$956,257		\$650,000	MAY	\$956,257		\$750,000	JUN	\$956,257		\$850,000	JUL	\$956,257		\$950,000	AUG	\$956,257		\$1,050,000	SEP	\$956,257		\$1,150,000	<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$ 268,257 2. Approved FY 2021 Budget = \$ 956,257 3. Actual spending for 1st Quarter FY 2021 = \$ 153,005* 4. Actual spending for 2nd Quarter FY 2021= \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$ 76,501 (8%) <p>*NCSU costs are estimated. LLNL costs are actuals.</p>	
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Q1	Provide status on nuclear data activities to NCSP Manager (ND1a, 1b)		On hold pending restart of Criticality Slide Rule project for plutonium systems																																																				
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NCSP Quarterly Progress Report (FY-2021 Q1)

Q1	Provide status on nuclear data activities to NCSP Manager (ND5)		
Q1	Provide status on nuclear data activities to NCSP Manager (ND6)		
Q1	Provide status on nuclear data activities to NCSP Manager (ND7)		
Q1	Provide status on nuclear data activities to NCSP manager (ND8)		
Q1	Provide status on nuclear data activities to NCSP manager (ND9)		
Q1	Provide status on nuclear activities to NCSP manager (ND10)		
Q1	Provide status report PPAC target fabrication progress (ND11)		
Q1	Fabricate the Pu240 PPAC targets and fission detector components (ND11)		
Q2	Provide status on nuclear data activities to NCSP Manager (ND1a, 1b)		
Q2	Provide status on nuclear data activities to NCSP Manager (ND2)		
Q2	Provide status on nuclear data activities to NCSP Manager (ND3)		
Q2	Provide status on nuclear data activities to NCSP Manager (ND5)		
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Q2	Provide status on nuclear data activities to NCSP manager (ND9)		
Q2	Provide status on nuclear data activities to NCSP manager (ND10)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q2	Provide status report PPAC target fabrication progress (ND11)		
Q2	Assemble and test the Pu240 fission detector (ND11)		
Q3	Provide status on nuclear data activities to NCSP Manager (ND1a, 1b)		
Q3	Provide status on nuclear data activities to NCSP Manager (ND2)		
Q3	Provide status on nuclear data activities to NCSP Manager (ND3)		
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Q3	Provide status on nuclear data activities to NCSP manager (ND10)		
Q3	Provide status report PPAC target fabrication progress (ND11)		
Q4	Provide status on nuclear data activities to NCSP Manager (ND1a, 1b)		
Q4	Provide status on nuclear data activities to NCSP Manager (ND2)		
Q4	Deliver thermal neutron scattering data evaluations as indicated in Appendix B of the 5-Year Plan. (ND2)		
Q4	Provide status on nuclear data activities to NCSP Manager (ND3)		
Q4	Provide status on nuclear data activities to NCSP Manager (ND5)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q4	Provide status on nuclear data activities to NCSP Manager (ND6)		
Q4	Provide status on nuclear data activities to NCSP Manager (ND7)		
Q4	Provide status on nuclear data activities to NCSP manager (ND8)		
Q4	Provide status on nuclear data activities to NCSP manager (ND9)		
Q4	Provide status on nuclear data activities to NCSP manager (ND10)		
Q4	Provide status report PPAC target fabrication progress (ND11)		
Q4	Provide an update on the development and testing of NeTS modules for selected materials such as light water, graphite, etc. (ND10)		

ACCOMPLISHMENTS

- ND2 - Generation and Benchmarking of Thermal Neutron Scattering Cross Sections in Support of Advanced Nuclear Reactor Concepts
 - NCSU completed the evaluation of several TSL libraries. This includes TSL File 7 libraries for hydrogen in liquid hydrogen fluoride (H in HF), hydrogen in heavy oil (H in oil), an updated library for H in polyethylene (H in CH₂), Sapphire (Al in Al₂O₃ and O in Al₂O₃), and molten salt FLiBe. These libraries have been submitted to NNDC. An evaluation of H in H₂O was also produced and supplied to NNL for testing. Work is underway to evaluate the TSL for uranium metal and uranium carbide.
- ND3 - Development and Implementation of an Advanced and Rigorous Computational Platform for Thermal Neutron Scattering Analysis
 - NCSU continued the development of the FLASSH advanced platform for TSL evaluation. During this period, enhancements were introduced to the calculation of the coherent elastic component of scattering, an optional SCT capability was developed, and an ACE format module was incorporated into the code. In addition, various numerical enhancements were implemented to speed up the execution and parallelization of calculations.
- ND5 - Development and Implementation of a Modern Doppler Broadening Approach Including Atomic Binding Effects
 - NCSU completed the development of the ability to use calculate the distinct component (S_d) of the scattering law, which allows its inclusion in TSL evaluations, where both S_d and S_s are calculated. This also resulted in producing the first File 7 evaluations that include the S_d data and it allows its utilization in Doppler broadening analysis, which was not previously available.
- ND6 - Evaluate Neutron Radiative Capture Gamma Production in Cadmium
 - COG results for the ICSBEP SILENE CAAS Benchmark with cadmium-lined polyethylene shield provided on pages 7-10 of the LLNL Report to NDAG – see publications. LLNL proposes accepting Belgia EXFOR data for Cd-113 into ENDF/B-VIII.1 together with JEFF-3.3 data for the other cadmium isotopes.
- ND7 - ‘Alpha-N’ Benchmark Measurements
 - Required work control documents completed for alpha-n measurements in two LLNL non-nuclear facilities. Measurements to commence next quarter.
- ND8 - Study: Fission TPC Measurement of the U-233/U-235 (n,f) Cross Section Ratio
 - Results of similar fission TPC measurements of the Pu-239/U-235 (n,f) cross section ratio were summarized on page 3 of the LLNL Report to NDAG – see publications. LLNL is preparing a cost estimate for U-233/U-235 target fabrication, the (n,f) ratio measurement and analysis.

NCSP Quarterly Progress Report (FY-2021 Q1)

- ND9 – Scoping Study: Li-6 Doped Liquid Scintillator Array for Fission Correlations
 - On hold pending CR constraints
- ND10 – Development and Implementation of Machine Learning Methods for Thermal Scattering Law Evaluations
 - NCSU initiated work on the development of neural network analysis for TSL representation. The TSL of H in H₂O was chosen as the material for testing such developments. TSL data sets were generated for use in network training.
- ND11 - Fabricate the Pu240 PPAC targets and fission detector components
 - Status report on PPAC fabrication provided on pages 4-5 in the LLNL Report to NDAG – see publications.

PUBLICATIONS








Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference	Sent to NCSP? Yes/no	If no, status of submittal
Q1	Bret Beck et al., “LLNL Report: Presented (on-line) to the Nuclear Data Advisory Group on December 3, 2020,” LLNL-PRES-817232.	Yes	
Q1	A. I. Hawari et al., “Thermal Neutron Scattering Law Benchmark and Validation at NCSU.”	Yes	
Q1	A. I. Hawari et al., “Thermal Scattering Law Evaluations and Progress at NCSU.”	Yes	
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: ND1, 3, 4, 6, 10 M&O Contractor Name: ORNL Point of Contact Name: Doug Bowen Point of Contact Phone: (865) 576-0315			Reference: DP0909010 Date of Report: January, 2021																																																				
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<div> <div>FY21 Nuclear Data</div> <table border="1"> <caption>FY21 Nuclear Data (Estimated Values)</caption> <thead> <tr> <th>Month</th> <th>Approved Budget (\$K)</th> <th>Costs (\$K)</th> <th>Planned Spending (\$K)</th> </tr> </thead> <tbody> <tr><td>Oct</td><td>2,000</td><td>100</td><td>200</td></tr> <tr><td>Nov</td><td>2,000</td><td>300</td><td>400</td></tr> <tr><td>Dec</td><td>2,000</td><td>300</td><td>600</td></tr> <tr><td>Jan</td><td>2,000</td><td>300</td><td>800</td></tr> <tr><td>Feb</td><td>2,000</td><td>300</td><td>1,000</td></tr> <tr><td>Mar</td><td>2,000</td><td>300</td><td>1,000</td></tr> <tr><td>Apr</td><td>2,000</td><td>300</td><td>1,000</td></tr> <tr><td>May</td><td>2,000</td><td>300</td><td>1,000</td></tr> <tr><td>Jun</td><td>2,000</td><td>300</td><td>1,000</td></tr> <tr><td>Jul</td><td>2,000</td><td>300</td><td>1,000</td></tr> <tr><td>Aug</td><td>2,000</td><td>300</td><td>1,000</td></tr> <tr><td>Sep</td><td>2,000</td><td>300</td><td>1,000</td></tr> </tbody> </table> </div>		Month	Approved Budget (\$K)	Costs (\$K)	Planned Spending (\$K)	Oct	2,000	100	200	Nov	2,000	300	400	Dec	2,000	300	600	Jan	2,000	300	800	Feb	2,000	300	1,000	Mar	2,000	300	1,000	Apr	2,000	300	1,000	May	2,000	300	1,000	Jun	2,000	300	1,000	Jul	2,000	300	1,000	Aug	2,000	300	1,000	Sep	2,000	300	1,000	<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$91K 2. Approved FY 2021 Budget = \$ 1,969K (includes carryover) 3. Actual spending for 1st Quarter FY 2021 = \$258K 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$ 	
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NCSP Quarterly Progress Report (FY-2021 Q1)

Q1	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND1)		Travel to JRC-Geel was canceled and planned Zr-90 experiments are delayed due to COVID-19. Due to increased COVID-19 cases in Belgium, Belgium did go into lockdown in October 2020. GELINA was intermittently operational. Thus, no experiments were performed.
Q1	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND3)		
Q1	Provide status reports on ORNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest (ND3)		
Q1	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND3)		
Q1	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND4)		
Q1	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND6)		
Q1	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND10)		
Q2	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND1)		
Q2	Provide status reports on ORNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest (ND1)		
Q2	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND1)		
Q2	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND3)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q2	Provide status reports on ORNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest (ND3)		
Q2	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND3)		
Q2	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND4)		
Q2	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND6)		
Q2	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND10)		
Q3	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND1)		
Q3	Provide status reports on ORNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest (ND1)		
Q3	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND1)		
Q3	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND3)		
Q3	Provide status reports on ORNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest (ND3)		
Q3	Complete cross-section measurement and evaluation deliverables per the nuclear data		

NCSP Quarterly Progress Report (FY-2021 Q1)

	schedule in Appendix B of the 5 Year Plan (ND3)		
Q3	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND4)		
Q3	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND6)		
Q3	Provide status reports on all activities in NCSP Quarterly Progress Reports (ND10)		
Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND1)		
Q4	Provide status reports on ORNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest (ND1)		
Q4	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND1)		
Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND3)		
Q4	Provide status reports on ORNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest (ND3)		
Q4	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND3)		
Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND4)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND6)		
Q4	Document SAMMY modernization progress and report status annually to the NCSP Manager (ND6)		
Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND10)		

ACCOMPLISHMENTS

- ND1 - Nuclear Data Measurement and Evaluation
 - The work on n+233U evaluation in the RRR+URR is in progress. Analysis on the correlations of the external function and related sensitivity to the thermal region was performed together with the analysis of the experimental correction for measured data in the URR. Work on the extension of the evaluation up 2.5 keV was initiated and a preliminary fit was performed and a manuscript on the progress of the n+233U evaluation to be submitted in RES (Annals of Nuclear Energy) was performed. In the INDEN, CSEWG, NDAG meetings in November/December several presentations were given.
 - Continue to work and mentor data analysis for nat-Ce and Ce-142. Direct capture calculations have been performed and will be included in the Ce evaluation.
 - Discussion with BNL personnel about Cr data analysis and experiments. A publication for the Cr evaluation was finalized and submitted to Nucl. Data Sheets for publication.
 - Mentor new staff member for the NCSP. Discussions about implementing new ND beamline at SNS.
 - Participated in CSWEG and NDAG meeting during the nuclear data week in November/December. Several presentations about the NCSP ND work were given.
 - Cerium
 - Statistical checks were performed on existing resonance parameters. Integral values (Maxwellian average cross section & resonance integral) were included into the fitting procedure. Inclusion of a direct capture component to the 140Ce was considered. An update of 140,142Ce evaluation status was presented at the 2020 CSEWG meeting.
 - Polystyrene
 - Inelastic thermal neutron scattering measurements were performed at the SEQUOIA beamline at the ORNL Spallation Neutron Source. A talk was given at the 2020 CSEWG meeting detailing the measurements and preliminary analysis of the experimental data. No significant differences were found in polystyrene tacticity or molecular weight. Future beamtime has been tentatively allocated for further measurements at the VISION beamline to determine effect of crystallinity.
- Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B of the 5-year plan.

NCSP Quarterly Progress Report (FY-2021 Q1)

- Travel to JRC-Geel was canceled and planned Zr-90 experiments are delayed due to COVID-19 (**behind schedule**). Due to increased COVID-19 cases in Belgium, Belgium did go into lockdown in October 2020. GELINA was intermittently operational. Thus, no experiments were performed.
 - Natural Zr data obtained during previous experimental campaigns were prepared for data reduction. The data cover various sample thickness transmission and capture data with different background filters in progress. Started data reduction on natural Zr.
- Y12 ND1 – GELINA depleted Uranium target cost estimate and construction
 - MSC Inc. received several machined parts for the target assembly.
- ND3 - Isotopic Sample Leases to Support ND1 ND Measurements
 - No new action
- ND4 - Thermal Neutron Total Cross Section Measurements for Improvement of Criticality Calculations and Propagation of Scattering Kernel Uncertainties
 - Joint task with RPI (RPI-ND2)
 - RPI has not yet provided ORNL with data to analyze due to their beamline upgrades
 - RPI task has not progressed to the point where ORNL ND4 funding can be used
- ND6 – SAMMY Nuclear Data Evaluation Code Modernization
 - Started to make the fitting routines in SAMMY more modular. This will allow us to use the fitting routines independent from SAMMY. This included putting all data covariance information in C++ in-memory structures, including the pup'ed parameter covariance. A temporary file to store pup'ed parameter covariance parameters is no longer needed. In addition, the in-memory access to the implicit data covariance information was consolidated and temporary files with that information eliminated.
 - Corrected the inversion of the pup'ed parameter covariance data in the case of non-zero off-diagonal elements.
 - Started work on breaking up SAMMY into an API so that it can be used with fit routines other than the internal fit routines. Very preliminary work was started to connect SAMMY to MINUIT and the Metropolis Hastings algorithm currently developed for ND-10.
 - Attended the CSEWG meeting and gave the AMPX/SAMMY status report.
- ND10 - Monte Carlo Evaluation of Differential and Integral Data
 - The Metropolis Hastings Monte Carlo algorithm (implemented and used for the ND-10 Bayesian Monte Carlo task) is being adapted as one implementation of the fitting API designed for transparent/modular use with SAMMY or any other SCALE modules, in synergy with the NCSP ORNL ND-6 Task.
 - Interface to SAMMY will be used in the first application of the Bayesian Monte Carlo method to a realistic evaluation of U-233 to commence in Q2.
 - Progress report on NCSP ORNL ND-10 Task titled “Bayesian Monte Carlo Evaluation Framework for Cross Sections Nuclear Data and Integral Benchmark Experiments” has been presented at the Recent Nuclear Criticality Safety Program Technical Accomplishments Session of the 2020

NCSP Quarterly Progress Report (FY-2021 Q1)

American Nuclear Society Virtual Winter Meeting, November 16-19, 2020, available online at

<https://www.ans.org/meetings/wm2020/session/view-210/>. This presentation demonstrated that the conventional use of linear approximation and the assumption of normal probability density functions may lead to inaccurate uncertainties in evaluated nuclear data and integral benchmark experiments.

- Attended and presented at the annual Cross Section Evaluation Working Group Meeting of the Nuclear Data Week at the Brookhaven National Laboratory, November 30 – December 4, 2020.

PUBLICATIONS




Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1	Received and sent separately	yes	
Q2			
Q3			
Q4			





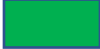






NCSP Quarterly Progress Report (FY-2021 Q1)

<p>NCSP Element and Subtask: ND1, 2, 3 M&O Contractor Name: RPI Point of Contact Name: Yaron Danon Point of Contact Phone: 518-276-4008</p>	<p>Reference: DP0909010 Date of Report: January, 2021</p>																																																				
BUDGET																																																					
<table border="1" style="display: none;"> <caption>Budget Data (Estimated from Graph)</caption> <thead> <tr> <th>Month</th> <th>Approved + CarryOver (\$k)</th> <th>Planned (\$k)</th> <th>Costs (\$k)</th> </tr> </thead> <tbody> <tr><td>Oct</td><td>630</td><td>50</td><td>30</td></tr> <tr><td>Nov</td><td>630</td><td>90</td><td>60</td></tr> <tr><td>Dec</td><td>630</td><td>130</td><td>85</td></tr> <tr><td>Jan</td><td>630</td><td>180</td><td>-</td></tr> <tr><td>Feb</td><td>630</td><td>220</td><td>-</td></tr> <tr><td>Mar</td><td>630</td><td>260</td><td>-</td></tr> <tr><td>Apr</td><td>630</td><td>310</td><td>-</td></tr> <tr><td>May</td><td>630</td><td>360</td><td>-</td></tr> <tr><td>Jun</td><td>630</td><td>420</td><td>-</td></tr> <tr><td>Jul</td><td>630</td><td>520</td><td>-</td></tr> <tr><td>Aug</td><td>630</td><td>580</td><td>-</td></tr> <tr><td>Sep</td><td>630</td><td>630</td><td>-</td></tr> </tbody> </table>	Month	Approved + CarryOver (\$k)	Planned (\$k)	Costs (\$k)	Oct	630	50	30	Nov	630	90	60	Dec	630	130	85	Jan	630	180	-	Feb	630	220	-	Mar	630	260	-	Apr	630	310	-	May	630	360	-	Jun	630	420	-	Jul	630	520	-	Aug	630	580	-	Sep	630	630	-	<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$ 183,029 2. Approved FY 2021 Budget = \$ 446,000 3. Actual spending for 1st Quarter FY 2021 = \$85,716 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$
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Apr	630	310	-																																																		
May	630	360	-																																																		
Jun	630	420	-																																																		
Jul	630	520	-																																																		
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NCSP Quarterly Progress Report (FY-2021 Q1)

Q1	Complete analysis of measurement from FY-20 (ND1)		Completed analysis of preliminary Cr-nat capture experiment
Q1	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports. (ND2)		
Q1	Provide status reports on NNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest. (ND2)		No travel using NCSP funds
Q1	Complete neutron output testing (ND2)		Demonstrated a working cold moderator
Q1	Provide status report LINAC refurbishment activities in NCSP Quarterly Progress Reports (ND3)		
Q1	Complete RF window qualification (ND3)		Delayed (COVID + staff loss) to Q2
Q1	Complete of SOL 1 Accelerator Section RF Conditioning. (ND3)		Delayed (COVID + staff loss) to Q2
Q2	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports. (ND1)		
Q2	Provide status reports on NNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest. (ND1)		
Q2	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports. (ND2)		
Q2	Provide status reports on NNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest. (ND2)		
Q2	Perform thermal cross section measurements for moderators (ND2)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q2	Provide status report LINAC refurbishment activities in NCSP Quarterly Progress Reports (ND3)		
Q2	Complete TPV Accelerator Section RF Conditioning. (ND3)		Likely to be delayed to Q3 or 4
Q3	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports. (ND1)		
Q3	Provide status reports on NNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest. (ND1)		
Q3	Complete nuclear data measurements (transmission/capture or scattering) per the nuclear data schedule in Appendix B of the 5 year plan. (ND1)		
Q3	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports. (ND2)		
Q3	Provide status reports on NNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest. (ND2)		
Q3	Complete thermal cross section measurements (ND2)		
Q3	Provide status report LINAC refurbishment activities in NCSP Quarterly Progress Reports (ND3)		
Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports. (ND1)		
Q4	Provide status reports on NNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide		

NCSP Quarterly Progress Report (FY-2021 Q1)

	a brief trip summary report to NCSP Manager on items of NCSP interest. (ND1)		
Q4	Complete measurements data analysis and provide the data to ORNL as needed to support the evaluation effort per the nuclear data schedule in Appendix B of the 5 year plan (ND1)		
Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports. (ND2)		
Q4	Provide status reports on NNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest. (ND2)		
Q4	Complete documentation (PhD thesis) and publication (ND2)		
Q4	Provide status report LINAC refurbishment activities in NCSP Quarterly Progress Reports (ND3)		
Q4	Complete Medium Voltage Electrical Distribution Upgrade (ND3)		

ACCOMPLISHMENTS

- ND1 – Resonance Region Nuclear Data Measurement Capability at RPI
 - Three faulty C₆D₆ detector (from array of 7) were fixed by the vendor, QA testing confirmed they now work correctly.
 - Developed new data processing and analysis codes, and improved DAQ software for Mid Energy Capture System.
 - Analysis of preliminary capture data from a natural Cr-53 sample is in progress.
- ND2 – Thermal Neutron Scattering Measurement for Improvement of Criticality Calculations and Propagation of Scattering Kernel Uncertainties
 - Successfully reached cold moderator temperature of 20 K during a cool-down test
 - Successfully operated the cold moderator and achieved a neutron production gain (below 0.01 eV) of a factor of 3 at 50 K.
- ND3 - LINAC 2020 Nuclear Data Capabilities Maintenance Plan
 - Lost one technical staff (out of 3), received approval to hire a replacement (during institute hiring freeze).
 - Setup for RF windows test nearing completion.

PUBLICATIONS

NCSP Quarterly Progress Report (FY-2021 Q1)

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov .			
Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1	D. Fritz, Y. Danon, "A Cold Moderator For Sub-Thermal Neutron Flux Enhancement At The RPI-LINAC", Transactions of the American Nuclear Society, Vol. 123, 2020 ANS Virtual Winter Meeting, November 16-19, 2020.	Yes (in Q1)	
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: ND1 M&O Contractor Name: Y12 Point of Contact Name: Kevin Reynolds Point of Contact Phone: (865) 241-9067		Reference: DP0909010 Date of Report: January, 2021	
BUDGET			
<p style="text-align: center;">Y-12 Budget/Incurred Costs</p> <p style="text-align: center;">Month</p> <p style="text-align: center;"> — FY20 Budget + Carryover — Planned Spending — Actual Costs </p>		<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$ 105,193.05 2. Approved FY 2021 Budget = \$ 30,000 3. Actual spending for 1st Quarter FY 2021 = \$256.45 (\$95,500 commit from GELINA work still outstanding) 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$ 	
MILESTONES			
STATUS (copy color code and paste below in 'STATUS' field)			
Complete 	On Schedule 	Behind Schedule 	Missed Milestone
QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	As necessary, provide a status report of the fabrication of a depleted uranium/molybdenum target per IRMM/GELINA specifications to the NCSP Manager. (ND1)		Part manufacturing proceeding. Partial delivery of parts received and they fit up well. Still awaiting final shipment but no issues expected. Photos sent in separate e-mail update.
Q2	As necessary, provide a status report of the fabrication of a depleted uranium/molybdenum target per		

NCSP Quarterly Progress Report (FY-2021 Q1)

	IRMM/GELINA specifications to the NCSP Manager. (ND1)		
Q3	As necessary, provide a status report of the fabrication of a depleted uranium/molybdenum target per IRMM/GELINA specifications to the NCSP Manager. (ND1)		
Q4	As necessary, provide a status report of the fabrication of a depleted uranium/molybdenum target per IRMM/GELINA specifications to the NCSP Manager. (ND1)		

ACCOMPLISHMENTS








- ND1 - Y-12 Fabrication of New Uranium Target for IRMM/GELINA for Cross-section Measurements

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference Example:	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TE3, 4, 6 M&O Contractor Name: LANL Point of Contact Name: Joetta Goda Point of Contact Phone: 505-667-2812			Reference: DP0909010 Date of Report: January 4, 2021																																																						
BUDGET																																																									
<table><caption>Budget Data (Estimated from Graph)</caption><thead><tr><th>Month</th><th>Approved Budget</th><th>Planned spending</th><th>Costs</th></tr></thead><tbody><tr><td>Oct</td><td>\$950,000</td><td>\$0</td><td>\$0</td></tr><tr><td>Nov</td><td>\$950,000</td><td>\$150,000</td><td>\$150,000</td></tr><tr><td>Dec</td><td>\$950,000</td><td>\$160,000</td><td>\$150,000</td></tr><tr><td>Jan</td><td>\$950,000</td><td>\$170,000</td><td>\$150,000</td></tr><tr><td>Feb</td><td>\$950,000</td><td>\$320,000</td><td>\$150,000</td></tr><tr><td>Mar</td><td>\$950,000</td><td>\$330,000</td><td>\$150,000</td></tr><tr><td>Apr</td><td>\$950,000</td><td>\$480,000</td><td>\$150,000</td></tr><tr><td>May</td><td>\$950,000</td><td>\$480,000</td><td>\$150,000</td></tr><tr><td>Jun</td><td>\$950,000</td><td>\$650,000</td><td>\$150,000</td></tr><tr><td>Jul</td><td>\$950,000</td><td>\$650,000</td><td>\$150,000</td></tr><tr><td>Aug</td><td>\$950,000</td><td>\$800,000</td><td>\$150,000</td></tr><tr><td>Sep</td><td>\$950,000</td><td>\$800,000</td><td>\$150,000</td></tr></tbody></table>			Month	Approved Budget	Planned spending	Costs	Oct	\$950,000	\$0	\$0	Nov	\$950,000	\$150,000	\$150,000	Dec	\$950,000	\$160,000	\$150,000	Jan	\$950,000	\$170,000	\$150,000	Feb	\$950,000	\$320,000	\$150,000	Mar	\$950,000	\$330,000	\$150,000	Apr	\$950,000	\$480,000	\$150,000	May	\$950,000	\$480,000	\$150,000	Jun	\$950,000	\$650,000	\$150,000	Jul	\$950,000	\$650,000	\$150,000	Aug	\$950,000	\$800,000	\$150,000	Sep	\$950,000	\$800,000	\$150,000	<div>1. Carryover into FY 2021 = \$ 400,000</div> <div>2. Approved FY 2021 Budget = \$ 540,000</div> <div>3. Actual spending for 1st Quarter FY 2021 = \$148,617</div> <div>4. Actual spending for 2nd Quarter FY 2021 = \$</div> <div>5. Actual spending for 3rd Quarter FY 2021 = \$</div> <div>6. Actual spending for 4th Quarter FY 2021 = \$</div> <div>7. Projected carryover into FY 2022 = \$140,000</div>		
Month	Approved Budget	Planned spending	Costs																																																						
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Q1	Provide status reports on all training activities to the NCSP Manager (TE4)																																																								
Q1	Provide status reports on all training activities to the NCSP Manager, to include photos and content for the quarterly newsletter (TE6)																																																								

NCSP Quarterly Progress Report (FY-2021 Q1)

Q2	Provide status reports on all training activities to the NCSP Manager (TE3)		
Q2	Provide status reports on all training activities to the NCSP Manager (TE4)		
Q2	Provide status reports on all training activities to the NCSP Manager, to include photos and content for the quarterly newsletter (TE6)		
Q3	Provide status reports on all training activities to the NCSP Manager (TE3)		
Q3	Provide status reports on all training activities to the NCSP Manager (TE4)		
Q3	Provide status reports on all training activities to the NCSP Manager, to include photos and content for the quarterly newsletter (TE6)		
Q4	Provide status reports on all training activities to the NCSP Manager (TE3)		
Q4	Provide status reports on all training activities to the NCSP Manager (TE4)		
Q4	In collaboration with ORNL, provide introductory 1-day S/U workshop training to one or more DOE sites in FY21. (TE4)		
Q4	Provide status reports on all training activities to the NCSP Manager, to include photos and content for the quarterly newsletter (TE6)		

ACCOMPLISHMENTS

- TE3 – Conduct Hands-On Criticality Safety Training Course at NCERC
 - NCSP Class for Y-12 Employees taught week of October 26 at NCERC.
- TE4 – On-Site Introductory Training for the NCS Practitioner on Modern Approaches to Validation using Sensitivity and Uncertainty Analysis Tools
 - Began early in second quarter—will provide update in next quarterly report.
- TE6 – Development of University Pipeline for Criticality Safety Professionals
 - Beginning in 2nd quarter.

PUBLICATIONS

NCSP Quarterly Progress Report (FY-2021 Q1)


Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TE1, 3, 6, 8 M&O Contractor Name: LLNL Point of Contact Name: David Heinrichs Point of Contact Phone: (925) 424-5679	Reference: DP0909010 Date of Report: January, 2021																																																				
BUDGET																																																					
<table border="1" style="margin-top: 10px; font-size: small;"> <caption>Budget Data (Approximate)</caption> <thead> <tr> <th>Month</th> <th>Approved Budget</th> <th>Costs</th> <th>Planned Spending</th> </tr> </thead> <tbody> <tr><td>OCT</td><td>115,000</td><td>30,000</td><td>40,000</td></tr> <tr><td>NOV</td><td>115,000</td><td>80,000</td><td>80,000</td></tr> <tr><td>DEC</td><td>115,000</td><td>125,000</td><td>115,000</td></tr> <tr><td>JAN</td><td>225,000</td><td>125,000</td><td>160,000</td></tr> <tr><td>FEB</td><td>225,000</td><td>-</td><td>200,000</td></tr> <tr><td>MAR</td><td>225,000</td><td>-</td><td>225,000</td></tr> <tr><td>APR</td><td>225,000</td><td>-</td><td>225,000</td></tr> <tr><td>MAY</td><td>225,000</td><td>-</td><td>225,000</td></tr> <tr><td>JUN</td><td>225,000</td><td>-</td><td>225,000</td></tr> <tr><td>JUL</td><td>225,000</td><td>-</td><td>225,000</td></tr> <tr><td>AUG</td><td>225,000</td><td>-</td><td>225,000</td></tr> <tr><td>SEP</td><td>225,000</td><td>-</td><td>225,000</td></tr> </tbody> </table>	Month	Approved Budget	Costs	Planned Spending	OCT	115,000	30,000	40,000	NOV	115,000	80,000	80,000	DEC	115,000	125,000	115,000	JAN	225,000	125,000	160,000	FEB	225,000	-	200,000	MAR	225,000	-	225,000	APR	225,000	-	225,000	MAY	225,000	-	225,000	JUN	225,000	-	225,000	JUL	225,000	-	225,000	AUG	225,000	-	225,000	SEP	225,000	-	225,000	<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$ 89,634 2. Approved FY 2021 Budget = \$ 223,634* 3. Actual spending for 1st Quarter FY 2021 = \$ 123,883 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$ 0 <p style="margin-top: 20px;">*At current spending, this budget will be exhausted In FY 2021 Q2. LLNL TE subtasks will continue with carryover from other elements.</p>
Month	Approved Budget	Costs	Planned Spending																																																		
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Q1	Provide status report on the activities to the NCSP manager (TE6)																																																				

NCSP Quarterly Progress Report (FY-2021 Q1)

Q1	Provide status report on all training activities to the NCSP manager, to include photos and content for the quarterly newsletter. (TE8)		
Q2	Provide status report on the activities to the NCSP manager (TE1)		
Q2	Provide status report on the activities to the NCSP manager (TE3)		
Q2	Provide status report on the activities to the NCSP manager (TE6)		
Q2	Provide status report on all training activities to the NCSP manager, to include photos and content for the quarterly newsletter. (TE8)		
Q3	Provide status report on the activities to the NCSP manager (TE1)		
Q3	Provide status report on the activities to the NCSP manager (TE3)		
Q3	Provide status report on the activities to the NCSP manager (TE6)		
Q3	Provide status report on all training activities to the NCSP manager, to include photos and content for the quarterly newsletter. (TE8)		
Q4	Provide status report on the activities to the NCSP manager (TE1)		
Q4	Provide status report on the activities to the NCSP manager (TE3)		
Q4	Provide status report on the activities to the NCSP manager (TE6)		
Q4	Provide status report on all training activities to the NCSP manager, to include photos and content for the quarterly newsletter. (TE8)		

ACCOMPLISHMENTS

- TE1 – Conduct Hands-on Training at the DAF (TACS)
 - Provided one hands on training course with TACS to Y-12 NCS Engineers the week of November 2-6, 2020
 - Coordinated registration for all NCSP classes
 - Completed mandatory in-service inspections and annual updates of work control and work authorization documents.

NCSP Quarterly Progress Report (FY-2021 Q1)

- TE3 – Classroom Criticality Safety Training
 - Participated in telcons to shift to a virtual 1st week of the criticality course
- TE6 - Mobile (CAT III or IV material) Hands on Critical or Near Critical Demonstration Capability
 - No activity this period
- TE8 - Development of University Pipeline for Criticality Safety Professionals
 - Assisted in virtually teaching the Fall 2020 UC Berkeley NUC ENG 156 Criticality Safety course as part of the NCS university pipeline, including teaching lectures and developing, mentoring, and grading NCS evaluation term projects.

PUBLICATIONS


Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference	Sent to NCSP? Yes/no	If no, status of submittal
Q1	N/A		
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

<p>NCSP Element and Subtask: TE1, 3, 5, 11, 12</p> <p>M&O Contractor Name: ORNL</p> <p>Point of Contact Name: Doug Bowen</p> <p>Point of Contact Phone: (865) 576-0315</p>	<p>Reference: DP0909010</p> <p>Date of Report: January, 2021</p>																																																				
BUDGET																																																					
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;"> FY21 Training and Education </div> <table border="1" style="margin-top: 10px; font-size: small;"> <caption>Estimated Data for FY21 Training and Education</caption> <thead> <tr> <th>Month</th> <th>Approved Budget (\$K)</th> <th>Costs (\$K)</th> <th>Planned Spending (\$K)</th> </tr> </thead> <tbody> <tr><td>Oct</td><td>700</td><td>0</td><td>50</td></tr> <tr><td>Nov</td><td>700</td><td>20</td><td>120</td></tr> <tr><td>Dec</td><td>700</td><td>40</td><td>180</td></tr> <tr><td>Jan</td><td>700</td><td>50</td><td>230</td></tr> <tr><td>Feb</td><td>700</td><td>50</td><td>280</td></tr> <tr><td>Mar</td><td>700</td><td>50</td><td>350</td></tr> <tr><td>Apr</td><td>700</td><td>50</td><td>350</td></tr> <tr><td>May</td><td>700</td><td>50</td><td>350</td></tr> <tr><td>Jun</td><td>700</td><td>50</td><td>350</td></tr> <tr><td>Jul</td><td>700</td><td>50</td><td>350</td></tr> <tr><td>Aug</td><td>700</td><td>50</td><td>350</td></tr> <tr><td>Sep</td><td>700</td><td>50</td><td>350</td></tr> </tbody> </table>	Month	Approved Budget (\$K)	Costs (\$K)	Planned Spending (\$K)	Oct	700	0	50	Nov	700	20	120	Dec	700	40	180	Jan	700	50	230	Feb	700	50	280	Mar	700	50	350	Apr	700	50	350	May	700	50	350	Jun	700	50	350	Jul	700	50	350	Aug	700	50	350	Sep	700	50	350	<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$236K 2. Approved FY 2021 Budget = \$706K (includes carryover) 3. Actual spending for 1st Quarter FY 2021 = \$49K 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$
Month	Approved Budget (\$K)	Costs (\$K)	Planned Spending (\$K)																																																		
Oct	700	0	50																																																		
Nov	700	20	120																																																		
Dec	700	40	180																																																		
Jan	700	50	230																																																		
Feb	700	50	280																																																		
Mar	700	50	350																																																		
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Jun	700	50	350																																																		
Jul	700	50	350																																																		
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MILESTONES																																																					
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Complete 	On Schedule 	Behind Schedule 	Missed Milestone 																																																		
QUARTER	TASK	STATUS	ISSUES/PATH FORWARD																																																		
Q1	Provide a status report in NCSP Quarterly Progress Reports on implementation of the NCS training program (TE1)																																																				
Q1	Provide a status report to the NCSP manager. (TE3)																																																				

NCSP Quarterly Progress Report (FY-2021 Q1)

Q1	Provide a status report to the NCSP manager. (TE5)		
Q1	Provide a status report to the NCSP manager. (TE11)		
Q1	Provide a status report to the NCSP manager. (TE12)		
Q2	Provide a status report in NCSP Quarterly Progress Reports on implementation of the NCS training program (TE1)		
Q2	Provide a status report to the NCSP manager. (TE3)		
Q2	Provide a status report to the NCSP manager. (TE5)		
Q2	Provide a status report to the NCSP manager. (TE11)		
Q2	Provide a status report to the NCSP manager. (TE12)		
Q3	Provide a status report in NCSP Quarterly Progress Reports on implementation of the NCS training program (TE1)		
Q3	Provide a status report to the NCSP manager. (TE3)		
Q3	Provide a status report to the NCSP manager. (TE5)		
Q3	Provide a status report to the NCSP manager. (TE11)		
Q3	Provide a status report to the NCSP manager. (TE12)		
Q4	Provide a status report in NCSP Quarterly Progress Reports on implementation of the NCS training program (TE1)		
Q4	Provide a status report to the NCSP manager. (TE3)		
Q4	Provide a status report to the NCSP manager. (TE5)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q4	Provide a status report to the NCSP manager. (TE11)		
Q4	Provide a status report to the NCSP manager. (TE12)		
ACCOMPLISHMENTS			
<ul style="list-style-type: none"> TE1 - Manage and Provide Instruction for the DOE Nuclear Criticality Safety Training & Education Program <ul style="list-style-type: none"> Late in FY20Q4, telecons were initiated to begin plans for a Y-12 special course at Y-12 (2-day condensed) in FY20Q4 and 1-week hands-on course at NCERC in FY21Q1. The Y-12 special course was successfully completed with 16 students trained during the lecture week and 10 total students trained at NCERC. Six students still require the second week of the course. In Q1, an FY21 training and education planning session was completed with the core instructors of the lecture portion of the 2-week hands-on course. Knowing that virtual training would need to be performed, the team assembled a updated agenda to ensure the course could be performed with WebEx. Performed two planning telecons for the Jan/Feb 2021 2-wk hands-on course. Sandia had to back out due to NM state COVID-19 restrictions. First week will be held virtually (WebEx) and second week will be held at NCERC for up to 10 students. TE3 - Hand-calculation Primer Expansion, LA-14244-M <ul style="list-style-type: none"> Work began on developing an outline for a primer revision (ORNL document) working with Dr. Robert Busch. Dr. Busch and Doug Bowen met face-to-face in Q4 in Albuquerque, NM, to discuss LA-14244-M errata and resolutions. A web-based hand-calc exercises will be generated for this task that is envisioned to be added to the NCSET module hand-calc offerings for new NCS practitioners. Efforts in progress to hire a summer student to help with HTML hand-calc modules for the NCSP NCSET Modules. TE5 - On-Site Introductory Training for the NCS Practitioner on Modern Approaches to Validation using Sensitivity and Uncertainty Analysis Tools <ul style="list-style-type: none"> FY21 offerings in progress with ORNL & LANL. This course may be expanded to 2 offerings due to the lack of travel needed to complete the task. INL and BWXT (Lynchburg and Erwin-NFS) facilities are being considered as target audiences. TE11 - Revision of the LA-12808 Nuclear Criticality Safety Guide <ul style="list-style-type: none"> No work has been done for this task. Awaiting FY21 funding. TE12 - Design of a Subcritical/Critical Assembly at ORNL for Use with the CSO/FMH Courses <ul style="list-style-type: none"> A final feasibility report for a subcritical assembly has been published as an ORNL report (ORNL TM-2020/1598) was published in August. The results of the study indicate that sufficient quantities of fuel exist at Y-12 to construct a subcritical assembly. ORNL management have been supportive of the proposed assembly and are supporting the effort. Computations indicate an assembly can easily be constructed and operated at ORNL economically. NCSP funds in FY21 will be used to finalize the design for assembly fabrication and fuel shipments from Y-12. FY21 efforts are awaiting funding in February to complete a final design for the assembly. 			

NCSP Quarterly Progress Report (FY-2021 Q1)

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference example) J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TE1 M&O Contractor Name: Sandia National Laboratories (SNL) Point of Contact Name: Gary A. Harms Point of Contact Phone: (505)845-3244			Reference: DP0909010 Date of Report: December, 2020																																																				
<div>BUDGET</div> <div> <div> <div>Sandia T&E – Training & Education</div> <table border="1"> <caption>Sandia T&E – Training & Education Budget Data</caption> <thead> <tr> <th>Month</th> <th>Funding</th> <th>Costs</th> <th>Planned Spending</th> </tr> </thead> <tbody> <tr><td>Oct-20</td><td>\$301,011</td><td>\$0</td><td>\$0</td></tr> <tr><td>Nov-20</td><td>\$301,011</td><td>\$0</td><td>\$0</td></tr> <tr><td>Dec-20</td><td>\$301,011</td><td>\$0</td><td>\$0</td></tr> <tr><td>Jan-21</td><td>\$301,011</td><td>\$0</td><td>\$0</td></tr> <tr><td>Feb-21</td><td>\$301,011</td><td>\$0</td><td>\$0</td></tr> <tr><td>Mar-21</td><td>\$301,011</td><td>\$0</td><td>\$0</td></tr> <tr><td>Apr-21</td><td>\$301,011</td><td>\$0</td><td>\$80,000</td></tr> <tr><td>May-21</td><td>\$301,011</td><td>\$0</td><td>\$130,000</td></tr> <tr><td>Jun-21</td><td>\$301,011</td><td>\$0</td><td>\$140,000</td></tr> <tr><td>Jul-21</td><td>\$301,011</td><td>\$0</td><td>\$145,000</td></tr> <tr><td>Aug-21</td><td>\$301,011</td><td>\$0</td><td>\$195,000</td></tr> <tr><td>Sep-21</td><td>\$301,011</td><td>\$0</td><td>\$200,000</td></tr> </tbody> </table> </div> <div> <ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$301,011 2. Approved FY 2021 Budget = \$301,011 3. Actual spending for 1st Quarter FY 2021 = \$10,437 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$ <p>All spending is from FY20 carryover</p> </div> </div>				Month	Funding	Costs	Planned Spending	Oct-20	\$301,011	\$0	\$0	Nov-20	\$301,011	\$0	\$0	Dec-20	\$301,011	\$0	\$0	Jan-21	\$301,011	\$0	\$0	Feb-21	\$301,011	\$0	\$0	Mar-21	\$301,011	\$0	\$0	Apr-21	\$301,011	\$0	\$80,000	May-21	\$301,011	\$0	\$130,000	Jun-21	\$301,011	\$0	\$140,000	Jul-21	\$301,011	\$0	\$145,000	Aug-21	\$301,011	\$0	\$195,000	Sep-21	\$301,011	\$0	\$200,000
Month	Funding	Costs	Planned Spending																																																				
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Sep-21	\$301,011	\$0	\$200,000																																																				
<div>MILESTONES</div> <div> <div>STATUS (copy color code and paste below in 'STATUS' field)</div> <div> <div>Complete </div> <div>On Schedule </div> <div>Behind Schedule </div> <div>Missed Milestone </div> </div> </div>																																																							
QUARTER	TASK	STATUS	ISSUES/PATH FORWARD																																																				
Q1	Conduct hands-on training classes at Sandia and provide Human Factors and Equipment Reliability module support to the LANL training classes in accordance with the approved schedule. (TE1)	 																																																					
Q2	Conduct hands-on training classes at Sandia and provide Human Factors and Equipment Reliability module support to the LANL training																																																						

NCSP Quarterly Progress Report (FY-2021 Q1)

	classes in accordance with the approved schedule. (TE1)		
Q3	Conduct hands-on training classes at Sandia and provide Human Factors and Equipment Reliability module support to the LANL training classes in accordance with the approved schedule. (TE1)		
Q4	Conduct hands-on training classes at Sandia and provide Human Factors and Equipment Reliability module support to the LANL training classes in accordance with the approved schedule. (TE1)		

ACCOMPLISHMENTS

- TE1 - Prepare for and Conduct Hands-on Criticality Safety Training at SNL
 - Preparations were made for the January-February class for NCS professionals
 - The Sandia portion of the class was postponed by Sandia due to COVID-19 concerns
 - The Sandia portion of the class will be rescheduled
 - Preparations were made to present the Human Factors and Equipment Reliability module of the January-February class

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henley@m@ornl.gov.

Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TE1 M&O Contractor Name: Y12 Point of Contact Name: Kevin Reynolds Point of Contact Phone: (865) 241-9067	Reference: DP0909010 Date of Report: January, 2021		
BUDGET			
<p style="text-align: center;">Y-12 Budget/Incurred Costs</p> <p style="text-align: center;">Dollars</p> <p style="text-align: center;">Month</p> <p style="text-align: center;"> — FY18 Budget + Carryover — Planned Spending — Actual Costs </p>	1. Carryover into FY 2021 = \$200,759.84 2. Approved FY 2021 Budget = \$ 0.00 3. Actual spending for 1 st Quarter FY 2021 = \$0.00 4. Actual spending for 2 nd Quarter FY 2021 = \$ 5. Actual spending for 3 rd Quarter FY 2021 = \$ 6. Actual spending for 4 th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$		
MILESTONES			
STATUS (copy color code and paste below in 'STATUS' field)			
Complete 	On Schedule 		
Behind Schedule 	Missed Milestone 		
QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Conduct hands-on training classes at NFO and NCERC to support the training classes in accordance with the approved schedule. (TE1)		No travel.
Q2	Conduct hands-on training classes at NFO and NCERC to support the training classes in accordance with the approved schedule. (TE1)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q3	Conduct hands-on training classes at NFO and NCERC to support the training classes in accordance with the approved schedule. (TE1)		
Q4	Conduct hands-on training classes at NFO and NCERC to support the training classes in accordance with the approved schedule. (TE1)		

ACCOMPLISHMENTS






- TE1 - Conduct Hands-On Criticality Safety Training Course (Lecture support week 1 of 2-week hands-on course and course material development)

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference Example:	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TS6 M&O Contractor Name: BNL Point of Contact Name: David Brown Point of Contact Phone: 631-344-2814			Reference: DP0909010 Date of Report: Jan., 2021																																																						
BUDGET																																																									
<div>BNL FY21 TS6</div> <table border="1"><caption>BNL FY21 TS6 Budget Data</caption><thead><tr><th>Month</th><th>Approved Budget (\$K)</th><th>Planned Spending (\$K)</th><th>Actual Cumulative Cost (\$K)</th></tr></thead><tbody><tr><td>Oct</td><td>100</td><td>10</td><td>8</td></tr><tr><td>Nov</td><td>100</td><td>18</td><td>15</td></tr><tr><td>Dec</td><td>100</td><td>26</td><td>23</td></tr><tr><td>Jan</td><td>100</td><td>34</td><td>31</td></tr><tr><td>Feb</td><td>100</td><td>42</td><td>39</td></tr><tr><td>Mar</td><td>100</td><td>50</td><td>47</td></tr><tr><td>Apr</td><td>100</td><td>58</td><td>55</td></tr><tr><td>May</td><td>100</td><td>66</td><td>63</td></tr><tr><td>June</td><td>100</td><td>74</td><td>71</td></tr><tr><td>Jul</td><td>100</td><td>82</td><td>79</td></tr><tr><td>Aug</td><td>100</td><td>90</td><td>87</td></tr><tr><td>Sep</td><td>100</td><td>100</td><td>95</td></tr></tbody></table>				Month	Approved Budget (\$K)	Planned Spending (\$K)	Actual Cumulative Cost (\$K)	Oct	100	10	8	Nov	100	18	15	Dec	100	26	23	Jan	100	34	31	Feb	100	42	39	Mar	100	50	47	Apr	100	58	55	May	100	66	63	June	100	74	71	Jul	100	82	79	Aug	100	90	87	Sep	100	100	95	<div>1. Carryover into FY 2021 = \$ 0</div> <div>2. Approved FY 2021 Budget = \$ 99,000</div> <div>3. Actual spending for 1st Quarter FY 2021 = \$23,513</div> <div>4. Actual spending for 2nd Quarter FY 2021 = \$</div> <div>5. Actual spending for 3rd Quarter FY 2021 = \$</div> <div>6. Actual spending for 4th Quarter FY 2021 = \$</div> <div>7. Projected carryover into FY 2022 = \$</div>	
Month	Approved Budget (\$K)	Planned Spending (\$K)	Actual Cumulative Cost (\$K)																																																						
Oct	100	10	8																																																						
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				Missed Milestone 																																																					
QUARTER	TASK	STATUS	ISSUES/PATH FORWARD																																																						
Q1	Provide NCSP Manager report of succession planning efforts. (TS6)		We are writing up the project now and are aiming for submission this quarter.																																																						
Q2	Provide NCSP Manager report of succession planning efforts. (TS6)																																																								

NCSP Quarterly Progress Report (FY-2021 Q1)

Q3	Provide NCSP Manager report of succession planning efforts. (TS6)		
Q4	Provide NCSP Manager report of succession planning efforts. (TS6)		

ACCOMPLISHMENTS

- TS6 – ND Succession Planning
In FY20, this project developed into an effort to create a machine learning code that can classify resonances by spin group using only the statistical properties of neutron resonances. The code could be used to set up the Bayesian prior for SAMMY or REFIT, at much less cost (in manpower and time) than current practice. This project has advance rapidly to the point where we are drafting a paper for submission to a journal (either Physical Review Letters, Physical Review C or both). All told, 4 students have worked on this project and two of them presented work this quarter:
 - D. Brown presented work from FY20 in 3 separate venues:
 - The 2020 American Physical Society Division of Nuclear Physics meeting
 - The 2020 US Nuclear Data Week (during the Nuclear Data Advisory Group meeting)
 - The 2020 IAEA Consultants Meeting on machine learning for nuclear data
 - S. Scoville (SULI student) presented this work at the SULI virtual poster session
 - P. Rodriguez (former SULI student) presented this work the 2020 APS meeting

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

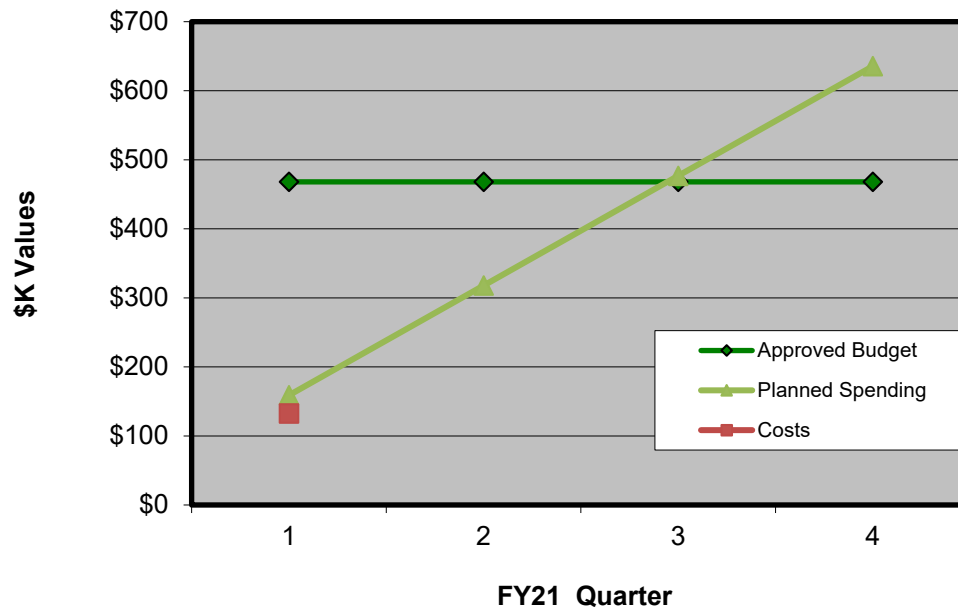
NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TS1
Task Title: CSSG Support
Point of Contact Name: David Hayes
Point of Contact Phone: 505-667-4523

Reference: DP0909010
Date of Report: January 2021

BUDGET

CSSG Support Funds FY21



1. Carryover into FY 2021 = \$ 167,524
2. Approved FY 2021 Budget = \$ 468,000
3. Actual spending for 1st Quarter FY 2021 = \$132,521
4. Actual spending for 2nd Quarter FY 2021 = \$
5. Actual spending for 3rd Quarter FY 2021 = \$
6. Actual spending for 4th Quarter FY 2021 = \$
7. Projected carryover into FY 2022 = \$0

MILESTONES

STATUS (copy color code and paste below in 'STATUS' field)

Complete On Schedule Behind Schedule Missed Milestone

QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Provide NCSP Manager report of activities. (TS1)	 	None
Q2	Provide NCSP Manager report of activities. (TS1)		
Q3	Provide NCSP Manager report of activities. (TS1)		
Q4	Provide NCSP Manager report of activities. (TS1)		

NCSP Quarterly Progress Report (FY-2021 Q1)

ACCOMPLISHMENTS

- TS1 – Activities
 - CSSG Telecons
 - ANS Winter Meeting Panel Session
 - Completion of Tasking 2020-04, *CSSG Review of SRPPF Design Documents*
 - Draft Tasking 2021-01, *CSSG Review of Draft Revision to DOE-STD-1134*
 - Draft Tasking 2021-02, *CSSG Review of FY22 NCSP Proposals*

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference example) J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1	N/A		
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TS4 M&O Contractor Name: LANL Point of Contact Name: Joetta Goda Point of Contact Phone: 505-667-2812			Reference: DP0909010 Date of Report: January 4, 2021																																																						
BUDGET																																																									
<table><caption>Budget Data</caption><thead><tr><th>Month</th><th>Costs</th><th>Planned spending</th><th>Approved Budget</th></tr></thead><tbody><tr><td>Oct</td><td>\$5,000</td><td>\$10,000</td><td>\$148,000</td></tr><tr><td>Nov</td><td>\$10,000</td><td>\$25,000</td><td>\$148,000</td></tr><tr><td>Dec</td><td>\$15,000</td><td>\$40,000</td><td>\$148,000</td></tr><tr><td>Jan</td><td>\$15,000</td><td>\$50,000</td><td>\$148,000</td></tr><tr><td>Feb</td><td>\$15,000</td><td>\$60,000</td><td>\$148,000</td></tr><tr><td>Mar</td><td>\$15,000</td><td>\$75,000</td><td>\$148,000</td></tr><tr><td>Apr</td><td>\$15,000</td><td>\$85,000</td><td>\$148,000</td></tr><tr><td>May</td><td>\$15,000</td><td>\$100,000</td><td>\$148,000</td></tr><tr><td>Jun</td><td>\$15,000</td><td>\$115,000</td><td>\$148,000</td></tr><tr><td>Jul</td><td>\$15,000</td><td>\$125,000</td><td>\$148,000</td></tr><tr><td>Aug</td><td>\$15,000</td><td>\$135,000</td><td>\$148,000</td></tr><tr><td>Sep</td><td>\$15,000</td><td>\$150,000</td><td>\$148,000</td></tr></tbody></table>				Month	Costs	Planned spending	Approved Budget	Oct	\$5,000	\$10,000	\$148,000	Nov	\$10,000	\$25,000	\$148,000	Dec	\$15,000	\$40,000	\$148,000	Jan	\$15,000	\$50,000	\$148,000	Feb	\$15,000	\$60,000	\$148,000	Mar	\$15,000	\$75,000	\$148,000	Apr	\$15,000	\$85,000	\$148,000	May	\$15,000	\$100,000	\$148,000	Jun	\$15,000	\$115,000	\$148,000	Jul	\$15,000	\$125,000	\$148,000	Aug	\$15,000	\$135,000	\$148,000	Sep	\$15,000	\$150,000	\$148,000	<div>1. Carryover into FY 2021 = \$ 0</div> <div>2. Approved FY 2021 Budget = \$ 148,000</div> <div>3. Actual spending for 1st Quarter FY 2021 = \$16,875</div> <div>4. Actual spending for 2nd Quarter FY 2021 = \$</div> <div>5. Actual spending for 3rd Quarter FY 2021 = \$</div> <div>6. Actual spending for 4th Quarter FY 2021 = \$</div> <div>7. Projected carryover into FY 2022 = \$0</div>	
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QUARTER	TASK	STATUS	ISSUES/PATH FORWARD																																																						
Q1	Provide NCSP Manager report on succession planning efforts. (TS4)	<div></div>																																																							
Q2	Provide NCSP Manager report on succession planning efforts. (TS4)																																																								
Q3	Provide NCSP Manager report on succession planning efforts. (TS4)																																																								

NCSP Quarterly Progress Report (FY-2021 Q1)

Q4	Provide NCSP Manager report on succession planning efforts. (TS4)		
ACCOMPLISHMENTS			
<ul style="list-style-type: none">TS4 – AM, IE, ND Succession Planning			
PUBLICATIONS			
Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov .			
Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TS5 M&O Contractor Name: LLNL Point of Contact Name: David Heinrichs Point of Contact Phone: (925) 424-5679			Reference: DP0909010 Date of Report: January, 2021
<h3>BUDGET</h3>			
			<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$ \$11,255 2. Approved FY 2021 Budget = \$ 11,255* 3. Actual spending for 1st Quarter FY 2021 = \$ 11,255 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$0 <p>*Activities funded solely by carryover exhausted in Q1.</p>
<h3>MILESTONES</h3>			
STATUS (copy color code and paste below in 'STATUS' field)			
Complete		On Schedule	
		Behind Schedule	
		Missed Milestone	
QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Provide NCSP manager report on succession planning efforts. (TS5)		TS5 carryover exhausted in Q1. Succession planning activities to be funded in subsequent quarters by carryover in other elements.
Q2	Provide NCSP manager report on succession planning efforts. (TS5)		
Q3	Provide NCSP manager report on succession planning efforts. (TS5)		
Q4	Provide NCSP manager report on succession planning efforts. (TS5)		

NCSP Quarterly Progress Report (FY-2021 Q1)

ACCOMPLISHMENTS

- TS5 - AM, IE, ND Succession Planning
 - Araj, Coleman, Norris, Siefman & Yamanaka attended the (online) 2020 ANS Winter Meeting, Nov. 16-19, 2020.
 - Siefman attended the (online) IAEA Consultancy Meeting on Machine Learning for Nuclear Data, Dec. 8-11, 2020.
 - Norris and Siefman attended (online) CSEWG & NDAG meetings during Nuclear Data Week, Nov. 30-Dec. 4, 2020.
 - Siefman attended (online) WPEC meetings, Nov. 9-16, 2020.

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference	Sent to NCSP? Yes/no	If no, status of submittal
Q1	Daniel Siefman, "Constrained Bayesian Optimization of Criticality Experiments: Presented to WPEC Subgroup 46," LLNL-PRES-816559, November 12, 2020.	Yes	
Q1	Daniel Siefman, "Constrained Bayesian Optimization of Criticality Experiments at LLNL" Presented to IEAE Consultancy Meeting on Machine Learning for Nuclear Data, LLNL-PRES-817545, December 10, 2020	Yes	
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TS9 M&O Contractor Name: NNL Point of Contact Name: Mike Zerkle Point of Contact Phone: (412) 476-6188	Reference: DP0909020 Date of Report: January, 2021																																																				
BUDGET																																																					
<table border="1" style="margin-top: 10px; font-size: small;"> <caption>Budget Data (Estimated from Graph)</caption> <thead> <tr> <th>Month</th> <th>Approved Budget</th> <th>Planned Spending</th> <th>Costs</th> </tr> </thead> <tbody> <tr><td>Oct</td><td>\$29,000</td><td>\$0</td><td>\$0</td></tr> <tr><td>Nov</td><td>\$29,000</td><td>\$0</td><td>\$0</td></tr> <tr><td>Dec</td><td>\$29,000</td><td>\$0</td><td>\$0</td></tr> <tr><td>Jan</td><td>\$29,000</td><td>\$0</td><td>\$0</td></tr> <tr><td>Feb</td><td>\$29,000</td><td>\$3,500</td><td>\$0</td></tr> <tr><td>Mar</td><td>\$29,000</td><td>\$7,000</td><td>\$0</td></tr> <tr><td>Apr</td><td>\$29,000</td><td>\$10,500</td><td>\$0</td></tr> <tr><td>May</td><td>\$29,000</td><td>\$14,000</td><td>\$0</td></tr> <tr><td>Jun</td><td>\$29,000</td><td>\$17,500</td><td>\$0</td></tr> <tr><td>Jul</td><td>\$29,000</td><td>\$21,000</td><td>\$0</td></tr> <tr><td>Aug</td><td>\$29,000</td><td>\$24,500</td><td>\$0</td></tr> <tr><td>Sep</td><td>\$29,000</td><td>\$29,000</td><td>\$0</td></tr> </tbody> </table>	Month	Approved Budget	Planned Spending	Costs	Oct	\$29,000	\$0	\$0	Nov	\$29,000	\$0	\$0	Dec	\$29,000	\$0	\$0	Jan	\$29,000	\$0	\$0	Feb	\$29,000	\$3,500	\$0	Mar	\$29,000	\$7,000	\$0	Apr	\$29,000	\$10,500	\$0	May	\$29,000	\$14,000	\$0	Jun	\$29,000	\$17,500	\$0	Jul	\$29,000	\$21,000	\$0	Aug	\$29,000	\$24,500	\$0	Sep	\$29,000	\$29,000	\$0	<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$ 0* 2. Approved FY 2021 Budget = \$ 29,000 3. Actual spending for 1st Quarter FY 2021 = \$249 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$ <p style="margin-top: 20px;">*FY2020 carryover (\$18k) transferred to the RPI LINAC Upgrade Project.</p>
Month	Approved Budget	Planned Spending	Costs																																																		
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QUARTER	TASK	STATUS	ISSUES/PATH FORWARD																																																		
Q1	Provide status report on all NDAG chair activities in NCSP Quarterly Progress Reports (TS9)		None.																																																		
Q2	Provide status report on all NDAG chair activities in NCSP Quarterly Progress Reports (TS9)																																																				

NCSP Quarterly Progress Report (FY-2021 Q1)

Q3	Provide status report on all NDAG chair activities in NCSP Quarterly Progress Reports (TS9)		
Q4	Provide status report on all NDAG chair activities in NCSP Quarterly Progress Reports (TS9)		

ACCOMPLISHMENTS

- TS9 – Support for NDAG Chair activities
 - Participated in Oct 2020 (virtual) NR/NCSP/RPI LINAC Program Review Meeting
 - Participated in 2020 (virtual) ICSBEP/IRPhEP/SINBAD Technical Review Group Meeting
 - Independent Reviewer for PMF001 Revision
 - Participated in 2020 (virtual) CSEWG Meeting as Validation Committee Co-Chair, appointed Validation Committee Chair following meeting
 - Submitted Mixed Elastic Scattering format proposal to improve the treatment of thermal elastic scattering in ENDF-102
 - Submitted TSL evaluations for H(⁷LiH), ⁷Li(⁷LiH), D(⁷LiD), ⁷Li(⁷LiD), Be(Be₂C), C(Be₂C) to NNDC for inclusion in ENDF/B-VIII.1
 - CSEWG presentations on Mixed Elastic Scattering format proposal and NNL TSL evaluations
 - Completed Nov/Dec 2020 NDAG Meeting, virtual due to COVID-19
 - Participated in several DOE Nuclear Data Working Group (NDWG) meetings
 - Planning for WANDA-2021 Workshop
 - Planned or organized Expanded Benchmarking Session with co-chairs
 - Prepared Introduction presentation for Expanded Benchmarking Session with co-chairs
 - CeDT support for several IERs

PUBLICATIONS






Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference example) J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TS2, 7, 8, 11, 13 M&O Contractor Name: ORNL Point of Contact Name: Doug Bowen Point of Contact Phone: (865) 576-0315			Reference: DP0909010 Date of Report: January, 2021																																																						
BUDGET																																																									
<div><div>FY21 NCSP Technical Support</div><table><caption>Estimated Data for FY21 NCSP Technical Support</caption><thead><tr><th>Month</th><th>Approved Budget (\$K)</th><th>Costs (\$K)</th><th>Planned Spending (\$K)</th></tr></thead><tbody><tr><td>Oct</td><td>1477</td><td>50</td><td>100</td></tr><tr><td>Nov</td><td>1477</td><td>100</td><td>250</td></tr><tr><td>Dec</td><td>1477</td><td>120</td><td>350</td></tr><tr><td>Jan</td><td>1477</td><td>130</td><td>450</td></tr><tr><td>Feb</td><td>1477</td><td>140</td><td>550</td></tr><tr><td>Mar</td><td>1477</td><td>145</td><td>650</td></tr><tr><td>Apr</td><td>1477</td><td>145</td><td>700</td></tr><tr><td>May</td><td>1477</td><td>145</td><td>700</td></tr><tr><td>Jun</td><td>1477</td><td>145</td><td>700</td></tr><tr><td>Jul</td><td>1477</td><td>145</td><td>700</td></tr><tr><td>Aug</td><td>1477</td><td>145</td><td>700</td></tr><tr><td>Sep</td><td>1477</td><td>145</td><td>700</td></tr></tbody></table></div>			Month	Approved Budget (\$K)	Costs (\$K)	Planned Spending (\$K)	Oct	1477	50	100	Nov	1477	100	250	Dec	1477	120	350	Jan	1477	130	450	Feb	1477	140	550	Mar	1477	145	650	Apr	1477	145	700	May	1477	145	700	Jun	1477	145	700	Jul	1477	145	700	Aug	1477	145	700	Sep	1477	145	700	<div>1. Carryover into FY 2021 = \$155K 2. Approved FY 2021 Budget = \$1,477K 3. Actual spending for 1st Quarter FY 2021 = \$128K 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$</div>		
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Q1	Maintain up-to-date spreadsheet of proposed tasks for NCSP Manager after the NCSP proposal review meeting and through the final task prioritization effort by the NCSP Management Team. (TS2)	<div></div>																																																							

NCSP Quarterly Progress Report (FY-2021 Q1)

Q1	Manage 5-year plan development and maintenance and oversee the CEDT process and manage main 5-year plan and Integral Experiment Request Milestones. (TS2)		
Q1	Provide NCSP Manager annual report of succession planning efforts (TS7)		
Q1	Provide NCSP Manager a status report of progress on the new IER system in G2 (TS8)		
Q1	Provide the NCSP Manager a status report support provided to manage the CEDT process and assist CEDT manager as necessary to support IE 5-year plan objectives. (TS11)		
Q1	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)		
Q2	Maintain up-to-date spreadsheet of proposed tasks for NCSP Manager after the NCSP proposal review meeting and through the final task prioritization effort by the NCSP Management Team. (TS2)		
Q2	Manage 5-year plan development and maintenance and oversee the CEDT process and manage main 5-year plan and Integral Experiment Request Milestones. (TS2)		
Q2	Provide NCSP Manager annual report of succession planning efforts (TS7)		
Q2	Provide NCSP Manager a status report of progress on the new IER system in G2 (TS8)		
Q2	Provide the NCSP Manager a status report support provided to manage the CEDT process and assist CEDT manager as necessary to support IE 5-year plan objectives. (TS11)		
Q2	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q3	Maintain up-to-date spreadsheet of proposed tasks for NCSP Manager after the NCSP proposal review meeting and through the final task prioritization effort by the NCSP Management Team. (TS2)		
Q3	Manage 5-year plan development and maintenance and oversee the CEDT process and manage main 5-year plan and Integral Experiment Request Milestones. (TS2)		
Q3	Provide NCSP Manager annual report of succession planning efforts (TS7)		
Q3	Provide NCSP Manager a status report of progress on the new IER system in G2 (TS8)		
Q3	Provide the NCSP Manager a status report support provided to manage the CEDT process and assist CEDT manager as necessary to support IE 5-year plan objectives. (TS11)		
Q3	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)		
Q4	Maintain up-to-date spreadsheet of proposed tasks for NCSP Manager after the NCSP proposal review meeting and through the final task prioritization effort by the NCSP Management Team. (TS2)		
Q4	Manage 5-year plan development and maintenance and oversee the CEDT process and manage main 5-year plan and Integral Experiment Request Milestones. (TS2)		
Q4	Organize and lead the Budget Execution Meeting and assist NCSP Manager in finalization of approved tasks for next FY (TS2)		
Q4	Publish final Five-Year Plan. (TS2)		
Q4	Provide NCSP Manager annual report of succession planning efforts (TS7)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q4	Provide NCSP Manager a status report of progress on the new IER system in G2 (TS8)		
Q4	Provide the NCSP Manager a status report support provided to manage the CEdT process and assist CEDT manager as necessary to support IE 5-year plan objectives. (TS11)		
Q4	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)		

ACCOMPLISHMENTS

- TS2 - Support for Lead Lab to Execute the NCSP
 - Prepare and maintain elements of NCSP Plan and associated activities:
 - Monitor Five-Year Plan progress,
 - Review/revise task list, and
 - Schedule/participate in meetings and teleconferences.
 - Manage and provide oversight/coordinate efforts for the NCSP Information, Preservation, and Dissemination task element.
 - Manage and provide oversight/coordinate efforts for the NCSP Training and Education Program task element.
 - Participated in NCSP management team and other NCSP-related meetings, as required by the NCSP Manager.
 - Prepared Q4 QPRs into a single bookmarked PDF file for use in QPR. Conducted Q4 telecon.
 - Henley completed work on the FY20 Winter Newsletter
 - Participated in CSSG telecons and assisted with CSSG tasks as necessary. Bowen supported the CSSG tasking 2020-04 (SRS Pit Production Facility work).
 - Led and participated telecons and WebEx meetings as necessary to track NCSP MGT team actions and deliverables.
 - Working on NCSP website enhancements and fixes and updates for accomplishments, foreign travel reports, and planning calendars.
 - Continued to train Marsha Henley on NCSP MGT teamwork.
 - Henley/Scott is working on adding legacy and FY20 foreign travel reports to the NCSP website. Work is complete.
 - Proposal call was initiated and completed in Q1. Vetting packages were prepared for the CSSG and NDAG regarding the proposals and constraints provided by the NCSP manager for the ranking effort.
 - Began FY21 Technical Program Review (TPR) planning efforts and started working with LLNL on a registration site on the NCSP website. TPR will be virtual in FY21 and will be hosted by ORNL via Zoom with IT oversight.
- TS7 - AM, ND Succession Planning
 - Chris Chapman and Jordan McDonnell continued to work on nuclear data evaluations with Marco Pigni on Ce and V nuclear data evaluations. Chris is continuing work on thermal neutron scattering measurements at the ORNL SNS. Jesse Brown has been utilizing these funds to assist with SAMMY and AMPX modernization and to assist with the Monte Carlo Framework evaluation being performed at ORNL for the NCSP.

NCSP Quarterly Progress Report (FY-2021 Q1)

- TS8 - NCSP Program Management Tools Development
 - Miller/Bowen continue to work to ensuring all IER team members and leads have access to the IER system. Issues are vetted and fixed working with ORNL and DOE HQ staff – no work completed here in Q1 due to lack of funds. A list of IER enhancements and fixes have been prioritized and funded and will be fixed in the various G2 update campaigns. This effort will be coordinated with the CEDT manual revision that is in progress.
- TS11 - NCSP C_EdT Manager Support
 - Miller lead and Bowen supported C_EdT tasks as needed (IER approvals, milestone tracking, and meeting execution support)
 - Supported monthly IE calls in Q1 and associated BCR approvals and IER milestone tracking
 - The C_EdT manager tracked IER products and Baseline Change Reviews and worked with the NCSP manager to approve tasks, as required.
 - Miller/Bowen working to find a new milestone tracking and progress scheme.
- TS13 - NDA Technical Support Group and NDA Technical Infrastructure Project
 - Efforts continue on the TSG efforts to generate the new ANSI/ANS-8.28 standard for NDA administrative requirements in NCS programs. A second ANS-8 ballot is in progress and nearly complete. Bowen had a telecon with Chambers, Berg, and Dolin regarding the “reboot” of the NDA program in Q1. The NCSP Mission and Vision is being finalized at ORNL that will describe the various aspects of the NDA program. Further telecons will help Berg in his planning efforts with his new program with assistance of the TSG chair, Dolin, and ORNL, Bowen. NDA Mission and Vision is expected to be completed in Q2.

PUBLICATIONS

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Q1	None	N/A	
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TS3, 12 M&O Contractor Name: Sandia National Laboratories (SNL) Point of Contact Name: Gary A. Harms Point of Contact Phone: (505)845-3244			Reference: DP0909010 Date of Report: December, 2020																																																				
BUDGET																																																							
<p style="text-align: center;">Sandia Technical Support</p> <table border="1"> <caption>Estimated Budget Data for Sandia Technical Support</caption> <thead> <tr> <th>Month</th> <th>Funding (\$)</th> <th>Costs (\$)</th> <th>Planned Spending (\$)</th> </tr> </thead> <tbody> <tr><td>Oct-20</td><td>280,000</td><td>30,000</td><td>25,000</td></tr> <tr><td>Nov-20</td><td>280,000</td><td>45,000</td><td>45,000</td></tr> <tr><td>Dec-20</td><td>280,000</td><td>60,000</td><td>65,000</td></tr> <tr><td>Jan-21</td><td>280,000</td><td></td><td>85,000</td></tr> <tr><td>Feb-21</td><td>280,000</td><td></td><td>105,000</td></tr> <tr><td>Mar-21</td><td>280,000</td><td></td><td>125,000</td></tr> <tr><td>Apr-21</td><td>280,000</td><td></td><td>145,000</td></tr> <tr><td>May-21</td><td>280,000</td><td></td><td>165,000</td></tr> <tr><td>Jun-21</td><td>280,000</td><td></td><td>185,000</td></tr> <tr><td>Jul-21</td><td>280,000</td><td></td><td>205,000</td></tr> <tr><td>Aug-21</td><td>280,000</td><td></td><td>225,000</td></tr> <tr><td>Sep-21</td><td>280,000</td><td></td><td>280,000</td></tr> </tbody> </table>			Month	Funding (\$)	Costs (\$)	Planned Spending (\$)	Oct-20	280,000	30,000	25,000	Nov-20	280,000	45,000	45,000	Dec-20	280,000	60,000	65,000	Jan-21	280,000		85,000	Feb-21	280,000		105,000	Mar-21	280,000		125,000	Apr-21	280,000		145,000	May-21	280,000		165,000	Jun-21	280,000		185,000	Jul-21	280,000		205,000	Aug-21	280,000		225,000	Sep-21	280,000		280,000	1. Carryover into FY 2021 = \$32,488 2. Approved FY 2021 Budget = \$280,488 3. Actual spending for 1 st Quarter FY 2021 = \$61,119 4. Actual spending for 2 nd Quarter FY 2021 = \$ 5. Actual spending for 3 rd Quarter FY 2021 = \$ 6. Actual spending for 4 th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$
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Q1	Provide NCSP Manager with report of succession planning efforts. (TS3)	 																																																					
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NCSP Quarterly Progress Report (FY-2021 Q1)

Q2	Provide the NCSP manager with a summary of NCSP CE _d T support (TS12)		
Q3	Provide NCSP Manager with report of succession planning efforts. (TS3)		
Q3	Provide the NCSP manager with a summary of NCSP CE _d T support (TS12)		
Q4	Provide NCSP Manager with report of succession planning efforts. (TS3)		
Q4	Provide the NCSP manager with a summary of NCSP CE _d T support (TS12)		

ACCOMPLISHMENTS

- TS3 – Support for Experimentalist Succession Planning
 - We have a matrixed employee who is performing as an experimenter.
 - The new experimenter is nearing completion of the IER-230 experiments and transitioning towards work on IER-441.
 - The new experimenter has been actively participating in the NCS community by attending conferences and publishing papers.
 - The student intern is in the final stages of the MS Thesis Degree, which is based on analysis techniques for evaluating critical experiments.
 - The student intern decided to continue education towards a PhD Degree and will also continue working with us as a year-round intern as a PhD student.
- TS12 - NCSP CE_dT Manager Support
 - Performed duties as the CE_dT Manager in support of the IE program element.
 - Interacted with the various CE_dT Leads, NCSP Management Team, and other NCSP members.
 - Facilitated IE update meetings and issued meeting agenda and minutes.
 - Assisted the DOE NCS Program Management Team on a broad scope of items.
 - Tracked progress and BCRs on IER milestones/action items.
 - Worked in the IER database and assisted others in gaining access to the database.

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			

NCSP Quarterly Progress Report (FY-2021 Q1)

Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TS15 M&O Contractor Name: SRNS Point of Contact Name: David Erickson Point of Contact Phone: 803-557-9445	Reference: DP0909010 Date of Report: January 2021																				
BUDGET																					
<p style="text-align: center; font-weight: bold;">SRS NDA TSG Funds FY21</p> <table border="1" style="margin-top: 10px; font-size: small;"> <caption>Graph Data: SRS NDA TSG Funds FY21</caption> <thead> <tr> <th>FY21 Quarter</th> <th>Apprvd Budget (\$K)</th> <th>Costs (\$K)</th> <th>Plan Spnd (\$K)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>70</td> <td>0</td> <td>10</td> </tr> <tr> <td>2</td> <td>70</td> <td>0</td> <td>25</td> </tr> <tr> <td>3</td> <td>70</td> <td>0</td> <td>35</td> </tr> <tr> <td>4</td> <td>70</td> <td>0</td> <td>48</td> </tr> </tbody> </table>	FY21 Quarter	Apprvd Budget (\$K)	Costs (\$K)	Plan Spnd (\$K)	1	70	0	10	2	70	0	25	3	70	0	35	4	70	0	48	<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$ 41,223 2. Approved FY 2021 Budget = \$ 30,000 3. Actual spending for 1st Quarter FY 2021 = \$362 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$
FY21 Quarter	Apprvd Budget (\$K)	Costs (\$K)	Plan Spnd (\$K)																		
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NCSP Quarterly Progress Report (FY-2021 Q1)

Q3	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS15)		
Q4	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS15)		

ACCOMPLISHMENTS

- TS15 - NDA Technical Support Group and NDA Technical Infrastructure Project

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference Example: J., "Excluding Benchmark Statistical Outliers in Nuclear Criticality Safety Validation: A Comparison Study of Upper Subcritical Limits for Plutonium Systems using Whisper-1.1", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2021 Q1)

NCSP Element and Subtask: TS14 M&O Contractor Name: Y12 Point of Contact Name: Kevin Reynolds Point of Contact Phone: (865) 241-9067	Reference: DP0909010 Date of Report: January, 2021		
BUDGET			
<p style="text-align: center; margin-top: 10px;"> — FY18 Budget + Carryover — Planned Spending — Actual Costs </p>	<ol style="list-style-type: none"> 1. Carryover into FY 2021 = \$ 9,371.48 2. Approved FY 2021 Budget = \$ 30,000 3. Actual spending for 1st Quarter FY 2021 = \$0 (there is a \$14,886.80 commit for CSSG support carried over that has not yet posted) 4. Actual spending for 2nd Quarter FY 2021 = \$ 5. Actual spending for 3rd Quarter FY 2021 = \$ 6. Actual spending for 4th Quarter FY 2021 = \$ 7. Projected carryover into FY 2022 = \$ 		
MILESTONES			
STATUS (copy color code and paste below in 'STATUS' field)			
Complete 	On Schedule 		
Behind Schedule 	Missed Milestone 		
QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS14)		No activity this quarter.
Q2	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS14)		

NCSP Quarterly Progress Report (FY-2021 Q1)

Q3	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS14)		
Q4	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS14)		

ACCOMPLISHMENTS

- TS14 - NDA Technical Support Group and NDA Technical Infrastructure Project

PUBLICATIONS

Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference Example:	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2			
Q3			
Q4			

2021 Q1 – SCALE Training Courses Report for the Nuclear Criticality Safety Program

<u>Class Name</u>	SCALE Criticality Safety Calculations
<u>Class Dates</u>	Oct 5 – 9, 2020
<u>Location</u>	Oak Ridge National Lab, Virtual
<u>Number of Attendees</u>	21
<u>Short Description</u>	This course provides instruction on the use of the KENO Monte Carlo codes for criticality safety calculations and is appropriate for beginning through advanced users. KENO V.a is a fast and easy-to-use code that allows users to build complex geometry models using basic geometrical bodies such as cuboids, spheres, cylinders, hemispheres, and hemicylinders. KENO-VI is a 3-D generalized geometry Monte Carlo code that allows for versatile modeling of complex geometries. Both versions of KENO provide convenient, efficient methods for modeling repeated and nested geometry configurations such as lattices. Both versions of KENO use ENDF/B-VII.0 or ENDF/B-VII.1 cross-section data distributed with SCALE to perform either continuous energy (CE) or multigroup (MG) calculations. KENO includes a 2D color plotting capability and produces easy-to-navigate HTML output. This class uses the Fulcrum user interface for interactive model setup, visualization, computation, and output review. The KENO3D tool is still used in SCALE 6.2 for 3-D visualization. Instruction is also provided on the SCALE material input and resonance self-shielding capabilities and Fulcrum capabilities for visualizing fluxes, reaction rates, and cross-section data.

<u>Class Name</u>	SCALE TRITON Lattice Physics and Depletion
<u>Class Dates</u>	Oct 12 – 15, 2020
<u>Location</u>	Oak Ridge National Lab, Virtual
<u>Number of Attendees</u>	19
<u>Short Description</u>	SCALE supports a wide range of reactor physics analysis capabilities. SCALE reactor physics calculations couple neutron transport calculations with ORIGEN to simulate the time-dependent transmutation of various materials of interest. TRITON is SCALE's modular reactor physics sequence for a wide variety of system types. Attendees of this course will learn how to use TRITON for depletion analysis. The TRITON training material is centered around using the NEWT 2-D transport module for 2-D depletion analysis and briefly touches on 3-D depletion analysis. The course will instruct users on the use of KENO in place of NEWT for 3-D Monte Carlo-based depletion; however, KENO is not covered in depth within this course. Additional applications of TRITON are incorporated into the training, including the creation of ORIGEN libraries for rapid spent fuel characterization calculations, and defining appropriate unit cell calculations of various reactor types for cross section processing.

<u>Class Name</u>	SCALE ORIGEN Standalone Fuel Depletion, Activation, and Source Term Analysis Course
<u>Class Dates</u>	Oct 19 – 22, 2020
<u>Location</u>	Oak Ridge National Lab, Virtual
<u>Number of Attendees</u>	20
<u>Short Description</u>	This is a hands-on class that covers the use of ORIGEN for isotopic depletion, decay, decay heat, and radiation source-terms calculations. The course features the use of the Fulcrum consolidated SCALE graphical interface and its' plotting capabilities for

	displaying nuclear data and results. Participants will learn about ORIGEN's capabilities and nuclear data, how to generate ORIGEN libraries, and how to use ORIGEN for activation, spent fuel, and nuclear safeguards applications. This class introduces the ORIGAMI tool for convenient characterization of spent nuclear fuel with radially and axially varying burnup. Advanced applications including simulation of chemical processing, continuous feed and removal are also covered.
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<u>Class Name</u>	Nuclear Data Fundamentals and AMPX Libraries Generation
<u>Class Dates</u>	Oct 26 - 28, 2020
<u>Location</u>	Oak Ridge National Lab, Virtual
<u>Number of Attendees</u>	14
<u>Short Description</u>	<p>This course takes the participants through the fundamentals of the nuclear data pipeline, from the creation of Evaluated Nuclear Data File (ENDF) libraries, through processing with the AMPX code suite, to end use in SCALE. In addition to their use in SCALE, AMPX libraries are used in the CASL VERA high-fidelity multi-physics code suite; provide depletion, activation, and decay data for ORIGEN, which is integrated in a wide range of tools; and generate covariance data used in sensitivity uncertainty (S/U) calculations. This course is relevant for all users interested in understanding the sources, approximations and important differences in nuclear data libraries as well as for the advanced practitioners wishing to learn to process nuclear data libraries on their own. Those interested in generating custom libraries, whether from international sources such as the Joint European Fission Fusion (JEFF), the Japanese Evaluated Nuclear Data Library (JENDL), among others, or generating special purpose libraries with customized group structures and weighting spectra will find this course particularly useful. The course is focused on the practical use of the AMPX nuclear data processing code distributed with SCALE and includes demonstrations and in-class exercises, in addition to theoretical lectures. Participants will learn how nuclear data, along with associated uncertainty information, is generated before it enters the ENDF library. They will then be guided through the building of processed libraries for neutron transport in continuous-energy and multi-group formats. Nuclear data uncertainty information and its propagation to quantities of interest through S/U methods will be discussed and the associated AMPX processing capabilities will be demonstrated. Detailed discussion of nuclear data validation will be presented. The course will conclude with lectures on fission product yield and decay data and associated uncertainties, along with demonstrations of their use in SCALE.</p>

<u>Class Name</u>	Sensitivity/Uncertainty Methods in Nuclear Criticality Safety Validation
<u>Class Dates</u>	October 28 - 29, 2020
<u>Location</u>	Nuclear Regulatory Commission, Rockville, Maryland (Virtual)
<u>Number of Attendees</u>	14
<u>Short Description</u>	<p>Topics covered included:</p> <ul style="list-style-type: none"> • Sensitivity coefficient meaning, purpose, generation and use • Performing validation for Nuclear Criticality Safety (NCS) applications • Nuclear covariance data and data-induced uncertainties • Sensitivity/uncertainty (S/U)-based experiment selection for NCS validation • S/U-based techniques for addressing weaknesses in NCS validation • Statistical analysis of validation results, including available ORNL tools

<u>Class Name</u>	Source Terms and Radiation Shielding for Spent Fuel Transportation and Storage Applications SCALE 6.3beta Training Course
<u>Class Dates</u>	Nov 30 – Dec 4, 2020
<u>Location</u>	Nuclear Regulatory Commission, Rockville, Maryland (Virtual)
<u>Number of Attendees</u>	20
<u>Short Description</u>	This course will focus on the use of ORIGEN/ORIGAMI for source terms calculation in spent nuclear fuel and the use of MAVRIC for shielding analysis of complex spent fuel storage and transportation configurations. The course will rely on the Fulcrum user interface for interactive model setup, visualization, computation, and output review.

STATUS REPORT

on the

International Collaboration with the Atomic Weapons Establishment (AWE)

Reference			AWE Contributions and POCs			
AWE Reference	Task Description	NCSP Reference	FY2018 AWE Contribution	AWE Technical POC	Collaborator POC	DOE Lab
Analytical Methods						
AWE-AM1	Slide rule update	ORNL-AM6 LLNL-AM3 IRSN-AM5	Perform calculations; attend meetings; review analysis and reports	R. JONES	M. DULUC	ORNL
AWE effort currently on hold due to lack of resource.						
INTEGRAL EXPERIMENTS						
AWE-IE1	Inaugural international inter-comparison of nuclear accident dosimetry using Flattop	LLNL-IE1 IRSN-IE15	Co-author final report (CED-4b)	P. ANGUS	D. STONE	LLNL
Report completed and issued by C. Wilson before his departure in 2019. Next inter-comparison exercise anticipated to be 2021.						
AWE-IE2	Development of Passive Neutron Spectrometer (PNS)		Fully commission TLD version of the PNS; Perform validation irradiations at NPL; develop unfolding tools for directionality	P. ANGUS	D. STONE	LLNL
3x PNS developed and built. Irradiations at NPL, planned for March 2020 (with potential involvement from US community), impacted by COVID-19 pandemic.						
AWE-IE3 IER 406	Cf-252 CAAS benchmark	LLNL-IE1 IRSN-IE28	Perform/support PNS(TLD) measurements with a shadow cone	P. ANGUS	D. HEINRICHS	LLNL
Dependent on completion of IE2.						
AWE-IE4 IER 175	Godiva-IV CAAS benchmark	ORNL-IE4 IRSN-IE27	Review of experiment design. Provide measurement capability as required	T. BIRKETT	J. SCORBY	ORNL
AWE involvement complete. Any further work dependent on future ORNL programme.						
AWE-IE5	Correction factor for dosimetry linked to orientation of the victim	LLNL-IE1 IRSN-IE29	Participate in experiment design; use PNS data to determine directional components of neutron fields (Godiva, Flattop, LLNL RCL)	P. ANGUS	D. HEINRICHS	LLNL
Dependent on completion of IE2 (unfolding tools for directionality). Linked with IE11 (2021 International inter-comparison)						
AWE-IE6	ICSBEP shielding benchmark for shipping containers	LLNL-IE13 IRSN-IE36	Participate in experiment design; PNS(TLD) could be deployed as primary measurement device AWE to do some preliminary design	P. ANGUS	S. KIM	LLNL

Reference			AWE Contributions and POCs			
AWE Reference	Task Description	NCSP Reference	FY2018 AWE Contribution	AWE Technical POC	Collaborator POC	DOE Lab
Not started due to long lead time (2023) and dependence on PNS availability (see IE2). Scope definition required.						
AWE-IE7 IER 153	Measure fission neutron spectrum shape using threshold activation detectors	LANL-IE3	Provide input into foil selection; use AWE unfolding codes to provide independent analysis. TBC AWE to provide foil suggestions per MYERS	P. ANGUS	T. CUTLER B. MYERS	LANL
Awaiting LANL to advise on the extent of AWE involvement.						
AWE-IE8	Diagnostic development for measurement of correlated leakage radiations	LLNL-IE1	A feasibility study is being developed at AWE to ascertain suitable counting scenarios and methods. An experimental design will then be produced in the following years based upon the outcomes of this study	N. KELSALL	D. HEINRICHS	LLNL
An internal AWE report has been issued summarizing the outcome of the fast neutron liquid scintillation trials conducted at the DAF in 2019. This will inform future measurement aspirations but the schedule for measurement campaigns is on hold during the COVID-19 pandemic.						
AWE-IE9	(Neutron multiplicity experiments) AWE/LLNL NCT 5 year measurement campaign	LLNL-PROPOSAL 18	Participate in experiment design, measurements and reporting	N. KELSALL	D. HEINRICHS	LLNL
AWE has issued an internal report summarizing the results from analysis of bulk material measurements. Modified version of this report has been shared with the NCSP.						
AWE-IE10	Enhanced methods of criticality accident dosimetry.	LLNL-IE1 IRSN-30 IRSN-33 Naval Dosimetry Center	Develop prototypes, participate in design, execution and reporting of dosimetry experiments	P. ANGUS	F. TROMPIER	LLNL
No progress to date. Potentially use IE11 as an opportunity to compare & test any new instrumentation.						
AWE-IE11	International inter-comparison of nuclear accident dosimetry AWE to assist in preliminary design FY19 and FY20	LLNL-IE18 SNL-IE4	Produce experiment design; participate in exercise; produce final report. Repeat 2 - 3 years	P. ANGUS	D. STONE	LLNL
Next international inter-comparison is scheduled for 2021.						
AWE-IE12	CIDAAS testing	Proposal 20	Deploy AWE CIDAAS for test irradiation. Repeat 2 - 3 years	T. BIRKETT	J. SCORBY	LLNL
AWE successfully tested CIDAAS in May 2018 and provided support to CED-4. Technical report detailing the results has been issued. New design of visual alarm procured, which will be evaluated during the next available Testing Visit.						
AWE-IE13	Characterization of AFRRI TRIGA reactor radiation field	LLNL-IE18 SNL-IE4	Provide support to experiment design	P. ANGUS	A. ROMANYUKHA	LLNL

Reference			AWE Contributions and POCs			
AWE Reference	Task Description	NCSP Reference	FY2018 AWE Contribution	AWE Technical POC	Collaborator POC	DOE Lab
	AWE will provide onsite measurement					
AWE was fully prepared for July 2019 trial, prior to the regulatory shut-down of TRIGA. If trial is re-scheduled for 2021 AWE will be able to support it, provided sufficient notice is given.						
INFORMATION PRESERVATION AND DISSEMINATION						
AWE-IPD1	Conduct benchmark evaluations of legacy IEU integral experiments Requires no NCSP funding	LLNL-IPD1	Assess feasibility of sponsoring PhD; determine availability of data	R. JONES	D. HEINRICHS	LLNL
Considered unlikely to make any material progress.						
TRAINING AND EDUCATION						
AWE-TE1	Hands-on criticality safety training	ORNL-TE1 LANL-TE1 LLNL-TE1 LLNL-TE3 SNL-TE1 IRSN-TE1	AWE personnel to attend training course	R. JONES	D. BOWEN B. MYERS D. HEINRICHS G. HARMS S. EVO (IRSN)	ORNL
No AWE personnel attended courses during the reporting period. Currently no AWE personnel are expected to attend courses in the next quarter.						

STATUS REPORT of international collaboration with the Institut de Radioprotection et de Sûreté Nucléaire (IRSN) for FY2021

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	Task Title	DOE Reference	FY 2021 IRSN Contribution	IRSN Technical POC	DOE Technical POC	DOE LAB
Analytical Methods						
IRSN-AM1	Validation and qualification methods	ORNL-AM2 ORNL-IPD4	Determination of the experimental correlations of Valduc experiments. To be discussed with ORNL.	N. LECLAIRE	B.J. MARSHAL	ORNL
Q1 status No progress						
IRSN-AM5	Update of the slide rule	ORNL-AM6 LLNL-AM3 AWE-AM1	Contribution to doses computation benchmarks, comparison with COG and SCALE results	M. DULUC	D. BOWEN D. HEINRICHS R. JONES	ORNL LLNL AWE
Q1 status The document about the specifications for delayed gamma calculations for plutonium systems was sent on 27 th November to all collaborators (ORNL, LLNL, NNL, AWE). It was discussed during a meeting on 8 th January and partners decided to make first calculations for April 2021. The next meeting is planned on 13 th April.						
IRSN-AM8	Analytical Methods Working Group	NCSP-TS2	IRSN participation to NCSP analytical methods Working Group, NDAG meeting, and TPR meeting	S. PIGNET	F. BROWN D. BOWEN D. HEINRICHS	NCSP
Q1 status IRSN will participate in the NDAG meeting. Luiz LEAL will make a presentation on ND needs. Presentations are scheduled to be delivered in next TPR meeting.						
IRSN-AM9	Cross sections processing validation	ORNL-AM3	AMPX training - Development of an interface between GAIA and AMPX and test interface capabilities.	R. ICHOU	D. WIARDA D. BOWEN	ORNL
Q1 status Nicolas LECLAIRE and Frederic FERNEX participated in AMPX training on October 2020. Due to the COVID-19 situation other planned activities were delayed.						
IRSN-AM13	Benchmark intercomparison study	LLNL-AM5 ORNL-AM10 LANL-AM5	Definition of common set of developed benchmark models Calculations for Pu and HEU systems. LEU, MIX, U233 and SPEC systems will be included in FY 2021.	N. LECLAIRE	D. HEINRICHS D. BOWEN F. BROWN	LLNL ORNL LANL
Q1 status Analysis of inconsistencies on LEU systems, MIX and U233 calculations. Conclusions transmitted to LANL (Jennifer ALWYN). Next action: Proposal of additional cases to be modelled with the MORET code in 2021 for U233 systems. A status of results will be presented at the next TPR meeting.						
IRSN-AM14	Sensitivity/Uncertainty comparison study with a focus on Upper Subcritical Limits	ORNL-AM9 LANL-AM4	Definition of test cases Calculations and intercomparison Technical report	A. BARDELAY	F. BROWN D. BOWEN	LANL ORNL
Q1 status No progress						

[illegible]

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	Task Title	DOE Reference	FY 2021 IRSN Contribution	IRSN Technical POC	DOE Technical POC	DOE LAB
IRSN-IE49	Iron/Steel/Chromium Critical Experiment Series	LANL-IE3	Participation in experiments design and CED reports. High interest for IRSN.	J-B. CLAVEL	J. HUTCHINSON	LANL
Q1 status No progress						
Information Preservation and Dissemination						
IRSN-IPD1	ICSBEP reviewing	LLNL-IPD1	IRSN ICSBEP reviewing tasks are reported in the IE tasks	S. PIGNET	D. HEINRICHS	LLNL
Q1 status MIRTE 2 experiments evaluation approved. Few modifications in progress. To be published in 2021 handbook.						
Nuclear Data						
IRSN-ND1	Contribution to new evaluations	ORNL-ND1 NNL-ND1 RPI	Contribution to new evaluations and validation in accordance with the milestone schedule in Appendix B	L. LEAL	D. BOWEN T. TRUMBULL	ORNL NNL RPI
Q1 status Work on the evaluation of Mo and Pb isotopes are in progress; Evaluation of F19, Fe54, Fe56, Pu239 in progress; Rh103 evaluation completed and available for testing;						
IRSN-ND2	Nuclear data Evaluation and Testing	LANL-ND1 LANL-ND2	Contribution to new evaluations and validation in accordance with the milestone schedule in Appendix B Contribution to Prompt Fission Neutron Spectra (PFNS) Measurement of Plutonium-240	L. LEAL	B. BLUHM	LANL
Q1 status No progress						
IRSN-ND3	Nuclear data Evaluation and Testing	LLNL-ND8 ORNL-ND1	Resonance evaluation of ²³³ U	L. LEAL	D. HEINRICHS D. BOWEN	LLNL ORNL
Q1 status Work underway. Resolved resonance evaluation nearly completion; focus on the unresolved resonance evaluation:						
IRSN-ND4	Delayed fission gamma multiplicity and spectra	LLNL-ND1 (a and b)	Data testing as new experimental data becomes available from foil activation measurements and dosimetry testing using GODIVA, FLATTOP, and other assemblies	M. BROVCHENKO	D. HEINRICHS	LLNL
Q1 status Activity is on hold waiting for LLNL input						
Training and Education						
IRSN-TE1	Hands-on criticality safety training	ORNL-TE1 LANL-TE3 LLNL-TE1 SNL-TE1	IRSN attendance to NCSP classes. Possible lectures by IRSN working with NCSP training and education coordinator.	S. PIGNET	D. BOWEN	NCSP

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	Task Title	DOE Reference	FY 2021 IRSN Contribution	IRSN Technical POC	DOE Technical POC	DOE LAB
Q1 status Activity delayed due to COVID. IRSN would like to send 2 participants to August 2021 session (if possible to travel)						

Additional information:

- **IER 513** Blind NAD Intercomparison with Godiva: exchanges (F. TROMPIER) with LLNL in November 2020 about the next dose blind intercomparison exercise plan at NCERC using the Godiva reactor. IRSN plans to participate to the exercise in 2021.
- **IER 520** TEX-Pu240 on the Planet machine: exchanges between LLNL and IRSN on the possible designs
- **IER 479** TEX low temperature: exchanges between LLNL and IRSN on the possible designs.
- **IER 519** TEX with absorbers Fe and Mn : technical exchanges between LLNL and IRSN on the nuclear data validation needs.