NUCLEAR CRITICALITY SAFTEY PROGRAM (NCSP)

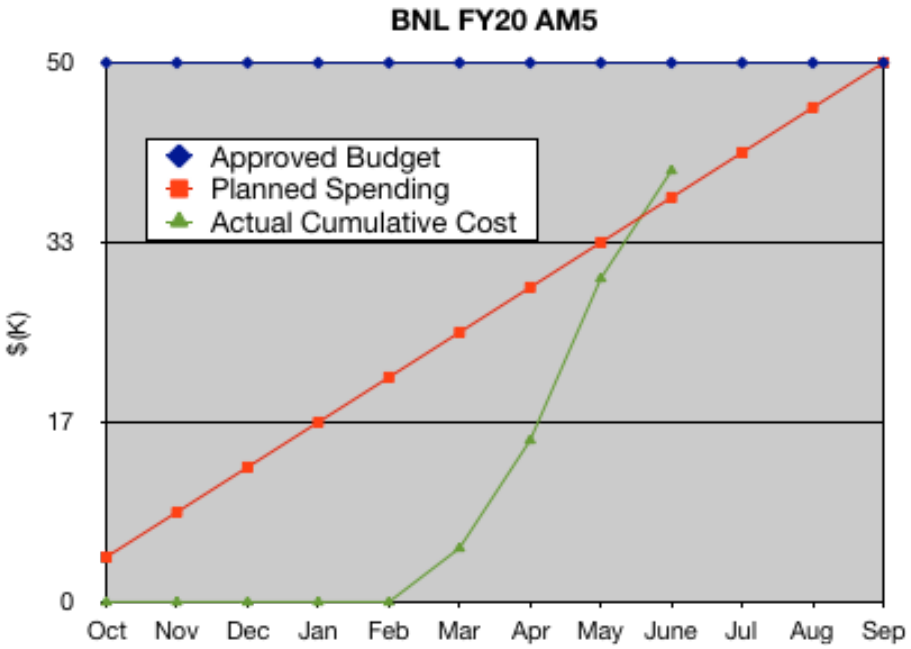
FY2020 3RD QUARTER REPORTS

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: Analytical Methods AM5
Task Title: FUDGE Generation of a Complete ENDF/B-VIII.0 Library for Testing in Production Codes
M&O Contractor Name: BNL
Point of Contact Name: David Brown
Point of Contact Phone: 631-344-2814

Reference: DP 0902000
Date of Report: July 8, 2020

BUDGET



1. **Carryover into FY 2020** = $ 0
2. **Approved FY 2020 Budget** = $ 50,000
3. **Actual spending for 1st Quarter FY 2020** = $0
4. **Actual spending for 2nd Quarter FY 2020** = $5000
5. **Actual spending for 3rd Quarter FY 2020** = $40,000
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $0

ACCOMPLISHMENTS

FUDGE has support for the full GNDS-1.9 specification, including thermal neutron scattering (TNS) data and unresolved resonance (URR) probability tables. FUDGE has demonstrated the ability to process TNS and the processed data has been used in LLNL simulations along with results from a preliminary implementation of the URR probability tables.

NCSP Quarterly Progress Report (FY-2020 Q3)

BNL ND Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	Provide a status report on completing an ENDF/B-VII.0 library with FUDGE. (AM5)		
Q2	Provide a status report on completing an ENDF/B-VII.0 library with FUDGE. (AM5)		
Q3	Provide a status report on completing an ENDF/B-VII.0 library with FUDGE. (AM5)		A BNL Post-doc (Matteo Vorabbi) has developed a way to Doppler broaden the entire 0 degK cross section probability table. He is now testing the approach on 90Zr. A writeup should be available by the end of the FY.
Q4	Provide a status report on completing an ENDF/B-VII.0 library with FUDGE. (AM5)		

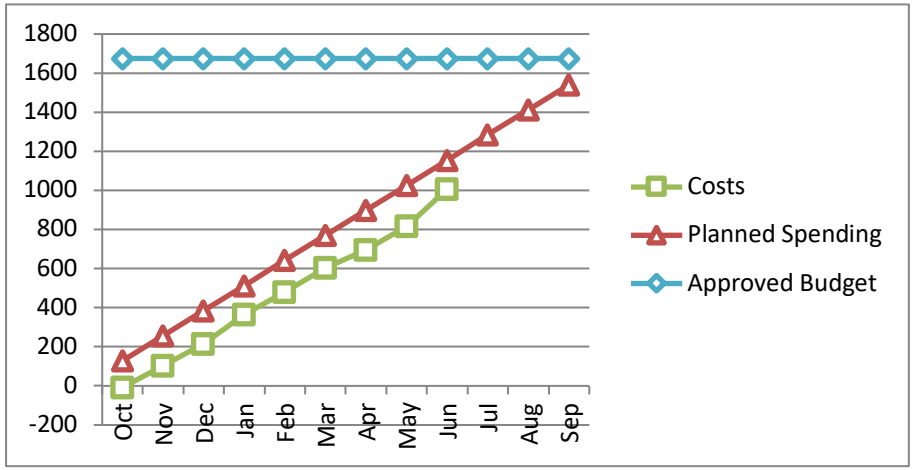
NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**	**no**	
Q2	**N/A**	**no**	
Q3	**N/A**	**no**	
Q4	**N/A**	**no**	

Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**	No	
Q2	**N/A**	**no**	
Q3	**N/A**	**no**	
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: AM1, 2, 4, 5, 7 Task Title: see last page M&O Contractor Name: LANL Point of Contact Name: Brian Bluhm / Bob Little Point of Contact Phone: 505-667-2440 / 505-665-3487	Reference: B&R DP0902000 Date of Report: July 6, 2020
BUDGET	**MAJOR ACCOMPLISHMENTS**



1. **Carryover into FY 2020 = $0**
2. **Approved FY 2020 Budget = $1,675,000 (includes carryover)**
3. **Actual spending for 1st Quarter FY 2020 = $216,459**
4. **Actual spending for 2nd Quarter FY 2020 = $386,988**
5. **Actual spending for 3rd Quarter FY 2020 = $403,321**
6. **Actual spending for 4rd Quarter FY 2020 = $**
7. **Projected carryover into FY 2021 = $135,000**

AM-1 (MCNP)

- MCNP Education and Training:
  - Our detailed MCNP class report is provided separately. We taught three on-line classes during the quarter: Introductory, Variance Reduction, Sensitivity-Uncertainty, 70 students. We used these as first tests of online classes for LANL students only. We will now extend to include non-LANL students.
  - Completed Advanced Monte Carlo class at UNM, 11 grad students
  - Thesis advisor for UNM graduate student working in area of criticality calculations
  - We completed a training module on the use of MCNP6 unstructured mesh for CAAS analysis. This module will be incorporated into future MCNP6 Criticality classes.
- MCNP Support and Maintenance
  - Supported MCNP6 users through MCNP Forum, email, direct interactions, etc.
  - MCNP V&V report. Work completed, and report is under preparation for release.
  - Code modernization effort – continuing.
  - Updating MCNP6 theory & user manual.
  - Code bug-fixes & features: kpert input fix, S(a,b) fix for fissionable nuclides.
- MCNP R&D Work, continued to investigate and develop:
  - Region-dependent sensitivity-uncertainty data for NCS validation (with UNM)
  - Subcritical multiplication methods investigation and impact of correlated fission multiplicity models in criticality calculations (with UNM)
  - New feature to properly handle S(a,b) stochastic mixing approach for temperature effects

- Further investigation and usage of partial c_k similarity metrics for experiment design and optimization

- Updated MCNP Thermal Scattering Library:
  - Updated thermal scattering library is complete with 64-page documentation: "Re-release of the ENDFB-VIII.0 S(α, β) data processed by NJOY2016," D. Kent Parsons and Cecile Toccoli, LA-UR-20-24456
  - 2 ANS summaries submitted to winter National Meeting:
    - "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
  - Library will be made available at https://nucleardata.lanl.gov in July, 2020.

AM-2 (NJOY)

- NJOY21: Work on development of modern RECONR continues (leveraged with ASC funding)
  - Modern RECONR implementation and integration is on schedule
  - Reactions and photon production reactions are linearized
  - Resolved resonances can be reconstructed and added to background
  - R-Matrix Limited (LRF=7) resonance reconstruction is being integrated into modern RECONR
  - Resulting PENDF can be created
  - Tool has been developed to compare two PENDF files by plotting the cross sections and their differences

- NJOY Support:
  - Continue to respond to issues submitted on GitHub (https://github.com/njoy/NJOY2016/issues)
  - Update to NJOY2016 to make the interface between GROUPR and ERROR the same for group structure numbers. (https://github.com/njoy/NJOY2016/pull/160)

- Improved build system being developed that will simplify compiling NJOY21 for users and developers

AM-4 (S/U Comparison Study)

- The presentation by Alwin during TPR week was subsequently invited for submission to the NCSP Best-Paper Winter ANS session:
  - J. Alwin, F. Brown, J. Clarity, I. Duhamel, F. Fernex, L. Leal, R. Little, B. J. Marshall, M. Rising, E. Saylor, K. Spencer, "S/U Comparison Study with a Focus on USLs," LA-UR-20-24758.
- We are on track to the meet the Q4 milestone.

AM-5 (Benchmark Comparison Study)

- We updated our Q2 draft report to include feedback from IRSN (Isabelle). Some revisions resulted in improved consistency with other codes, although some did not.
  - J. Alwin, K. Spencer, F. Brown, I. Duhamel, M. Rising, "LANL Critical Benchmark Comparison Study and Subsequent Revision," LA-UR-20-23376.
- We are still looking into the possibility that we are not comparing the same ICSBEP revisions or the same case, e.g. simplified vs. detailed.
- The future procedures and input file naming conventions that LANL has developed for our open-source repository will simplify future comparisons (names include revision and simplified vs. detailed, etc.). We have been getting agreement across labs on the naming convention via the OECD / NEA VaNDaL collaboration.

AM-7 (University of Michigan)

- This is a new start in FY20 "Incorporation of Benchmark Experiment Correlations into the Whisper Nuclear Criticality Safety Software." AM-7 is a University Project at the University of Michigan. The procurement is behind schedule; we will therefore slip the AM-7 milestones each by three quarters.

NCSP Quarterly Progress Report (FY-2020 Q3)

LANL AM 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	Support MCNP6 users (AM1)		
	Support NJOY users (AM2)		
	Provide status reports on LANL participation in US and International analytical methods collaborations (AM1, AM2, AM4, AM5, and AM6)		
	Provide reports on summer intern work accomplished (AM1)		
	Provide MCNP6 Criticality training course (AM1)		
	Continue to distribute MCNP6 with automated acceleration and convergence testing to NCSP early-adopters and collect feedback (AM1)		
	Obtain (University of Michigan) Whisper and explore various approaches for the effective sample size (AM7)		As indicated above, due to delays in the procurement process, we will need to slip the University of Michigan AM-7 milestones each by three quarters.
Q2	Support MCNP6 users (AM1)		
	Support NJOY users (AM2)		
	Provide status reports on LANL participation in US and International analytical methods collaborations (AM1, AM2, AM4, AM5, and AM6)		

	Report on LANL XCP-3, LANL NCS, & IRSN collaboration on detailed differences found in ICSBEP Benchmark Comparison Study (AM5)		
	Provide status of all MCNP6 and Whisper progress at the NCSP Technical Program Review (AM1)		
	Implement the selected effective sample size method into Whisper (AM7)		As indicated above, due to delays in the procurement process, we will need to slip the University of Michigan AM-7 milestones each by three quarters.
Q3	Support MCNP6 users (AM1)		
	Support NJOY users (AM2)		
	Provide status reports on LANL participation in US and International analytical methods collaborations (AM1, AM2, AM4, AM5, and AM6)		
	Provide training module on the use of MCNP6 unstructured mesh for CAAS analysis (AM1)		
	Issue an MCNP V&V report, including MCNP6 automated acceleration and convergence (AM1)		Work is complete. Report is nearly finished and will be issued early in Q4.
	Perform Whisper calculations demonstrating the impact of benchmark experiment correlations on results. (AM7)		As indicated above, due to delays in the procurement process, we will need to slip the University of Michigan AM-7 milestones each by three quarters.
Q4	Support MCNP6 users (AM1)		
	Support NJOY users (AM2)		
	Provide status reports on LANL participation in US and International analytical methods collaborations (AM1, AM2, AM4, AM5, and AM6)		
	Complete modernization of LEAPR capabilities (AM2)		

	Modernize and integrate RECONR capabilities in NJOY21 (AM2)		
	Issue report on detailed review, comparisons, and updates to the Sensitivity-Uncertainty Comparison Study (AM4)		
	Provide MCNP6 Criticality training course (AM1)		
	Document and release updated S(a,b) tables for MCNP based on ENDF/B-VIII.0 (AM1)		
	Deliver final modified version of Whisper to LANL with an ANS conference paper to disseminate the work (AM7)		As indicated above, due to delays in the procurement process, we will need to slip the University of Michigan AM-7 milestones each by three quarters.

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	OECD/NEA Paris, France May-20 AM2 Attend annual WPEC meeting and associated Sub-Group meetings (Conlin, Haeck) Contributor to multiple sub-groups-Conlin co-leads SG43; Haeck leads SG45.	No	Virtual meeting only
	Cambridge, England Apr-20 AM2 IE3 Attend PHYSOR 2020 meeting of the ANS. NCSP task that travel is performed under: LANL AM2 (Conlin, McKenzie, Hutchinson) Present NJOY updates and improvements Present research results.	No	Meeting cancelled
	Vienna, Austria TBD-date AM2 Consultancy meeting at IAEA (Conlin, Haeck) Participate in IAEA consultancy meeting on ACE processing	No	Meeting cancelled
Q4	OECD/NEA Paris, France Jul-20 AM1 OECD Expert Group Meetings for NCSP, collaboration with IRSN on NCS (Brown, Rising) Participation provides state-of-art information for improving MCNP®, Whisper, and other computational methods		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**

Q1	Foreign trip report from the ICNC 2019 Conference & OECD-NEA-WPNCS Subgroup Meetings, held in Paris, France, 15-27 September 2019.	Yes	
Q1	D.H. Timmons, M.E. Rising, C.M. Perfetti, "The Use of MCNP 6.2 KCODE for High Fidelity, Near Critical Benchmarks" (M&C 2019)	Yes	
Q1	P. Grechanuk, M.E. Rising, T.S. Palmer, "Identifying Sources of Bias from Nuclear Data in MCNP6 Calculations Using Machine Learning Algorithms" (M&C 2019)	Yes	
Q1	P.A. Grechanuk, M.E. Rising, and T.S. Palmer, "Comparing the Whisper Validation Methodology with Machine Learning Methods" (ICNC)	Yes	
Q1	B. Merryman, F. Brown, J. Alwin, and C. Perfetti, "Investigating Region-Wise Sensitivities for Nuclear Criticality Safety Validation" (ICNC)	Yes	
Q2	J. Alwin, F. Brown, J. Clarity, I. Duhamel, L. Leal, R. Little, B. J. Marshall, M. Rising, E. Saylor, K. Spencer, "Sensitivity/Uncertainty Comparison Study with a Focus on Upper Subcriticality Limits" (AMWG)	Yes	
Q2	J. Alwin, K. Spencer, F. Brown, I. Duhamel, M. Rising, "LANL Critical Benchmark Comparison Study and Subsequent Revision," LA-UR-20-23376	Yes	Submitting with Q3 reports
Q2	Forrest Brown, "Automatic Acceleration & Convergence Testing for MC NCS Calculations," (AMWG)	Yes	AMWG presentations were collected during TPR
Q2	Forrest Brown, Mike Rising, Jen Alwin, Chris Perfetti, and Todd Palmer, "Analytical Methods Work (LANL AM-1) in FY2019 to Support NCSP," (TPR)	Yes	Already posted on NCSP / TPR Web Page
Q2	Jeremy L. Conlin, "NJOY Modernization and Support," (TPR)	Yes	Already posted on NCSP / TPR Web Page
Q2	Michael E. Rising, "MCNP Modernization Status," (TPR)	Yes	Already posted on NCSP / TPR Web Page
Q2	Bob Little, "Summary of MCNP Classes in FY 2019," (TPR)	Yes	Already posted on NCSP / TPR Web Page
Q3	D. Kent Parsons and Cecile Toccoli, "Re-release of the ENDFB-VIII.0 S(α, β) data processed by NJOY2016,"LA-UR-20-24456	Yes	
Q3	D. Kent Parsons and Cecile Toccoli, "Analytic Insights into the Neutronic Characteristics of Neutron Moderators from MCNP Calculations," LA-UR-20-24442	Yes	
Q3	D. Kent Parsons, Cecile Toccoli, and Jeremy L. Conlin, "Verification of the Re-Released ENDF/B VIII.0 Based Thermal Scattering Libraries," LA-UR-20-24679	Yes	
Q3	J. Alwin, F. Brown, J. Clarity, I. Duhamel, F. Fernex, L. Leal, R. Little, B. J. Marshall, M. Rising, E. Saylor, K. Spencer, "S/U Comparison Study with a Focus on USLs," LA-UR-20-24758	Yes	
Q4			

Task Title:

AM1 MCNP Maintenance and Support, Uncertainty Analysis Development, and Modernization

AM2 NJOY Development and Maintenance, Uncertainty Analysis Development, and Modernization

AM4 Sensitivity/Uncertainty Comparison Study with a Focus on Upper Subcritical Limits

AM5 Proposed Benchmark Intercomparison Study

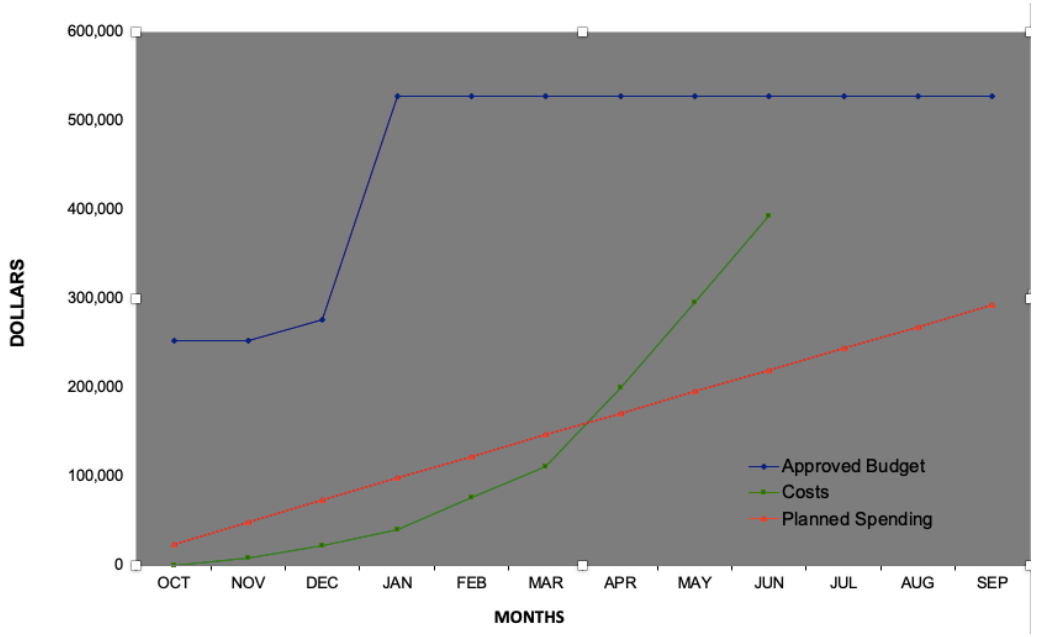
AM7 Incorporation of Benchmark Experiment Correlations into the Whisper Nuclear Criticality Safety Software

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtasks: AM2, 3, 5, 6, 7, 8
Task Titles: See last page
M&O Contractor Name: Lawrence Livermore National Laboratory
Point of Contact Name: David Heinrichs
Point of Contact Phone: (925) 424-5679

Reference: B&R DP0909010
Date of Report: July 10, 2020

BUDGET



1. **Carryover into FY 2020** = $209,244
2. **Approved FY 2020 Budget** = $528,244 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $21,786
4. **Actual spending for 2nd Quarter FY 2020** = $88,862
5. **Actual spending for 3rd Quarter FY 2020** = $282,901
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $42,260 (8%)

MAJOR ACCOMPLISHMENTS

1. Site access requested for multiphysics calculations in preparation for IER-268 resumption in Q4 (AM2).
2. A total of 2,915 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 Isabelle Duhamel (IRSN) for inclusion in the Benchmark Intercomparison Study (AM5) as follows:

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PU: 766     U233: 193     MIX: 204
HEU: 818    IEU:  188     LEU: 743
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3. The preprint "An Analytic Benchmark for Neutron Boltzman Transport with Downscattering" was provided by Vlad Sobes, Barry Ganapol, etc. LLNL completed data processing in Q2 and COG calculations in Q3 with excellent results. A summary paper is in preparation. (AM6).
4. Thermal scattering law (TSL) testing focused on discrepancies noted in the processed File 7 data due to differences in interpolation and extrapolation. To understand these discrepancies, the intercomparison was expanded to include FUDGE, FLASSH, NDEX, NJOY and COG with a special focus on hydrogen in water. (AM8)
5. LLNL to host the Nuclear Explosive Code Development Conference (NECDEC 2021) under JOWOG 42 auspices on May 10-14, 2021.

NCSP Quarterly Progress Report (FY-2020 Q3)

LLNL AM 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 status on LLNL AM activities in NCSP Quarterly Progress Reports (AM2, AM3, AM5, AM6, AM7, and AM8).		IRSN to appoint a replacement for Matthieu Duluc to lead AM3
Q2	Provide status on LLNL AM activities in NCSP Quarterly Progress Reports (AM2, AM3, AM5, AM6, AM7, and AM8).		
Q3	Provide status on LLNL AM activities in NCSP Quarterly Progress Reports (AM2, AM3, AM5, AM6, AM7, and AM8).		
Q4	Provide status on LLNL AM activities in NCSP Quarterly Progress Reports (AM2, AM3, AM5, AM6, AM7, and AM8).		

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	Paris, France October 17, 2019 AM, IE, IP&D, ND, TS5 IRSN-LLNL Meeting (Percher, Heinrichs, Kim) Coordinate joint IRSN-LLNL work as described in Appendix E of the Five-Year Execution Plan.	**Yes** (LLNL-MI-796017)	
Q2	**N/A**	**N/A**	
Q3	**N/A**	**N/A**	
Q4	Chiba, Japan May-20 AM, IE Joint International Conference on Supercomputing in Nuclear Applications and Monte Carlo (Kim, Norris) Premier conference on analytical methods and computing.	**N/A**	The conference was cancelled on April 1, 2020 due to COVID-19 and will not be rescheduled.
	Aldermaston, United Kingdom TBD-date AM, IE, I&D, ND, T&E, TS5 JOWOG29/30 Meetings (Coleman, Zywiec) Coordinate joint AWE-LLNL work as described in Appendix F of the Five Year Execution Plan.		

Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	Dave Heinrichs, Soon Kim, Ed Lent, David Griesheimer, Mike Zerkle, "β_{eff} Benchmarks," LLNL-PRES-796197, November 4, 2019	**Yes**	
	Isabelle Duhamel et al., "International Criticality Benchmark Comparison for Nuclear Data Validation," Transactions of the American Nuclear Society: **121**, 873-876, November 2019.	**Yes**	
Q2	Dave Heinrichs, Soon Kim, Ed Lent, "LLNL Analytical Methods Update," LLNL-PRES-804127, February 10, 2020.	**Yes**	
	Tony Nelson, Ed Lent, Dave Heinrichs, "Importance of LLNL's Advanced Fission Physics Modeling (FREYA) in ISSA, A Time-Dependent Benchmark," LLNL-PRES-804222, February 12, 2020.	**Yes**	
Q3	**N/A**		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

Task Titles:

AM2 Multi-Physics Methods for Simulation of Criticality Excursions

AM3 Slide Rule Application

AM5 Proposed Benchmark Intercomparison Study

AM6 Proposed 1-D Multipoint Analytical Benchmark Comparison

AM7 Technical Data for the Pitzer Formulation of Solution Compositions to Include Uranium/Plutonium Solutions with Selected Admixed Absorbers

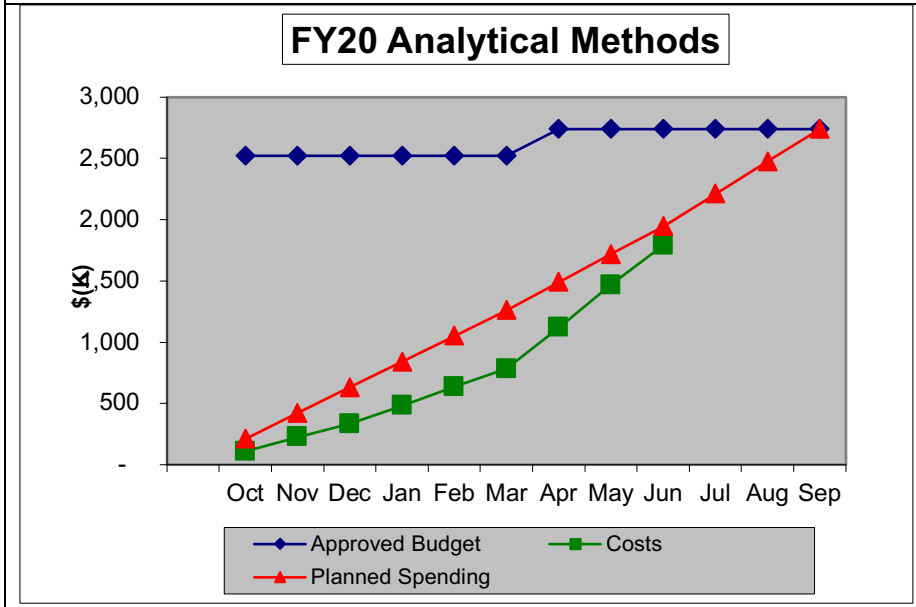
AM8 FUDGE Generation of a Complete ENDF/B-VIII.0 Library for Testing in Production Codes

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: ORNL – AM1, 2, 3, 6, 9, 10, 11, 15, 16, 20
Task Titles: See last page
M&O Contractor Name: ORNL
Point of Contact Name: Doug Bowen
Point of Contact Phone: (865) 576-0315

Reference: DP0909010/ORNL
Date of Report: July 2020

BUDGET



1. **Carryover into FY 2020** = $367K
2. **Approved FY 2020 Budget** = $2,522K (includes carryover). Budget increased by $218K to account for additional funds directed to RSICC AM1.
3. **Actual spending for 1st Quarter FY 2020** = $334K
4. **Actual spending for 2nd Quarter FY 2020** = $448K
5. **Actual spending for 3rd Quarter FY 2020** = $1009K
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $0

MAJOR ACCOMPLISHMENTS

AM1 – Radiation Safety Information Computational Center (RSICC) (Valentine)

- Distributed 160 software packages and updated 2 software packages.
- 20 SCALE, 76 MCNP®, and 2 COG packages distributed.
- RSICC quarterly report issued.

AM2 - SCALE/KENO/TSUNAMI Maintenance and Support/Cross-Section Generation/Modernization/etc. (Wieselquist)

- Major NCSP-supported activity summary
  - Completion of the following activities
    - SCALE 6.2.4 was released to RSICC
    - SCALE Newsletter 52 available on website (https://www.ornl.gov/file/spring-2020-scale-newsletter/display)
    - Modernization of USLSTATS trending code (now called VADER)
    - Speed improvements to TSUNAMI-IP used in validation/bias assessment
    - Efforts on the OECD/NEA SG-8 Criticality safety benchmark rating project
    - Improvements to CSAS-Shift allowed starting sources
  - Activities continuing into Q4 for 6.3.0 release.
    - Finalization of data directory (documentation, etc.)
    - Automating the VALID criticality safety suite so that the effect of updated code/data on the validation basis can be more easily analyzed
    - Development of a CSAS Primer
    - Finalization of the FY19 annual report
    - Additions of new benchmarks to the VALID criticality safety suite
    - Preparation for the SCALE Users' Group Workshop 2020
- SCALE 6.3 beta11, beta12 releases with the following updates (level of support from NCSP dependent on task)
  - Infrastructure/Maintenance
    - Improved TRITON-Shift (Monte Carlo transport with depletion) parallel calculation robustness
    - Updated input processing dependencies to Flex and GNU Bison versions 2.6.4 and 3.4.2, respectively
    - Improved AMPX multigroup library differencing utility
  - Code/Data Enhancements

- Modernization of VADER (previously USLSTATS) new trending code in C++ with improved performance and modularity for implementation of trending methods
- Improvements to Fulcrum graphical user interface
  - retaining axes and user presets when loading new data
  - auto-sizing dialogue boxes
  - autocomplete for cross section library names
  - reduce load times for cross section visualization
- Addition of additional neutron start types for CSAS-Shift which greatly improve convergence
- Addition of fission density 3d visualization files from CSAS-KENO and CSAS-Shift
- TRITON-Shift nodal data generation on a hexagonal mesh
- New sampling-based sensitivity indices within Sampler allow identification of key nuclear data impacting uncertainty *within* an uncertainty calculation
- Bondarenko-based multigroup self-shielding that better accounts for temperature variations across fuel elements
- Use 1-group depletion tallies by default in Continuous energy Monte Carlo--old default of multi-group which required more memory
- Modifications to AMPX covariance processing to prevent propagation of bad ENDF data, e.g. correlation coefficients much greater than the mathematical maximum of 1.0
- Speed improvements to TSUNAMI-IP used in validation/bias assessment

- Code/Data Fixes
  - Fixes to Fulcrum input checking where certain scenarios, such as an empty “read parameters” block, were flagged as an input error when they should be allowed
  - More robust handling of continuous energy (CE) vs. multigroup (MG) input differences, such as completely ignoring the “read celldata” block when performing CE calculations instead of wasting time doing unnecessary self-shielding calculations
  - Improve robustness of CSAS5 mesh tallies
  - Improve error messages for Sampler input that does not request a meaningful uncertainty analysis, e.g. asks for geometric uncertainty quantification but does not provide any uncertain variables

AM3 - AMPX Maintenance and Modernization (Wiarda)

- Attended the virtual annual WPEC meeting as well as the sub-group meetings. Gave a status report of the GNDS implementation in AMPX for SG-43.

- We almost finished converting our C++ class that converts GNDS JSON files to python. This allowed us to incorporate the latest updates to the GNDS files that offer improved namespace separation for GNDS tags with the same names.
- Work continued on adding functionality into PUFF that identifies faulty covariance matrices in ENDF and corrects them in order to preserve as much information as possible.
- Since we got permission to release AMPX as open-source, we want to release parts of AMPX and SCALE that can be open-sourced. Work continued in identifying and separating the parts that are necessary for AMPX and are not export controlled.

AM6 – Slide Rule Application (Dupont, Celik)

- ORNL is waiting for tasks to be assigned by IRSN. Discussed future plans for this task with IRSN – more activity is expected in Q4 and in FY21.

AM9 - Sensitivity / Uncertainty Comparison Study with a Focus on Upper Subcritical Limits (Saylor, Marshall)

- ORNL collaborated with LANL and IRSN on a paper for the 2020 ANS Winter Meeting, titled “S/U Comparison Study with a Focus on USLs.” No other activity in Q3.

AM10 - Proposed Benchmark Intercomparison Study (Saylor, Marshall)

- IRSN did not lead any work in Q3.

AM11 - Proposed 1D Multipoint Analytical Benchmark Intercomparison (Hart)

- ORNL has not been contacted by LLNL to initiate this task. No funds have been spent since this task was approved in FY18. Consider cancelling ORNL task and request funds be redirected.

AM15 - The Effects of Temperature on the Propagation of Nuclear Data Uncertainty in Nuclear Criticality Safety Calculations (MIT, Isaac Meyer, PhD Student)

- Identified and ran tests on section of SCALE code that imports resonance parameters and evaluates the sensitivity of the cross section to resonance parameters
- Explored data structures that will need to be used in order to doppler broaden these sensitivities using the broadening module within SCALE

AM20 - Nuclear Data and Cross Section Testing using ENDF/B-VIII.0 (Greene)

- SDFs have been generated for selected VALID cases using the SCALE 6.2 validation inputs as templates in TSUNAMI-3D-K5 and -K6.
- Uncertainty data have been examined with the 56-group covariance data from ENDF/B-VIII.0 and -VII.1 for comparisons.
- Currently analyzing the comparison data and working on a results report.

NCSP Quarterly Progress Report (FY-2020 Q3)

ORNL AM 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	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)		
	Provide status reports on ORNL participation in US and International Analytical Methods collaborations and provide brief trip summary report to NCSP Manager on items of NCSP interest. (AM2, AM3)		
	Provide status on ORNL AM activities in NCSP Quarterly Progress Reports. (AM1, AM2, AM3, AM6, AM9, AM10, AM15, AM16, AM20)		
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)		
	Provide status reports on ORNL participation in US and International Analytical Methods collaborations and provide brief trip summary report to NCSP Manager on items of NCSP interest. (AM2, AM3)		
	Provide status on ORNL AM activities in NCSP Quarterly Progress Reports. (AM1, AM2, AM3, AM6, AM9, AM10, AM11, AM15, AM16, AM20)		
	Issue an annual SCALE maintenance report to the NCSP Manager. (AM2)		This is behind schedule and will be completed in Q4. The FY19Q4 newsletter and SCALE annual report will be delayed due to the focus on completing SCALE 6.2.4 first. Both are in progress.
Q3	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)		

	Provide status reports on ORNL participation in US and International Analytical Methods collaborations and provide brief trip summary report to NCSP Manager on items of NCSP interest. (AM2, AM3)		
	Provide status on ORNL AM activities in NCSP Quarterly Progress Reports. (AM1, AM2, AM3, AM6, AM9, AM10, AM11, AM15, AM16, AM20)		
Q4	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)		
	Provide status reports on ORNL participation in US and International Analytical Methods collaborations and provide brief trip summary report to NCSP Manager on items of NCSP interest. (AM2, AM3)		
	Provide status on ORNL AM activities in NCSP Quarterly Progress Reports. (AM1, AM2, AM3, AM6, AM9, AM10, AM11, AM15, AM16, AM20)		
	Publish annual newsletter to users to communicate software updates, user notices, generic technical advice, and training course announcements. (AM2)		
	Document AMPX modernization and technical support for SCALE CE, multigroup, and covariance libraries and report status annually to the NCSP Manager. (AM3)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	OECD/NEA Paris, France Oct-19 TS1, IE, AM2 ICSBEP and IRPhE Technical Review Meetings (Bowen, Marshall) Provide oversight of NCSP IE tasks as ICSBEP tasks are the end product of the NCSP IE process.	**Yes**	
Q2	Cambridge, England Apr-20 AM2 Attend PHYSOR 2020 meeting of the ANS. (Bowen, Greene) Present papers for ANS subcritical limits and progress on GA Tech NCSP tasks.	**NO**	**TRIP CANCELLED**
Q3	Paris, France TBD – date AM, IE, IP&D, ND1, TS7 IRSN Meetings (Wiarda, Holcomb) Coordinate joint IRSN-ORNL work per 5YP such as the Pu SlideRule; Collaborate with IRSN on the resonance evaluation of the isotopes of lead for the NCSP.	**NO**	**TRIP CANCELLED**
	Geel, Belgium April 2020 ND1 ND Measurements with Zr 90 @ GELINA	**NO**	**TRIP CANCELLED**
Q4	OECD/NEA Paris, France TBD – date TS1, IE, AM2 WPNCS Meetings (Marshall, Bowen, Clarity, Wieselquist) AM collaboration; provide relationship between IAEA and ISO with respect to NCS standards.	**NO**	**Meeting was attended virtually (July 6-10, 2020).**

Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	• Dorothea Wiarda, Andrew Holcomb, Friederike Bostelmann, "Current Status of PX", November 2019	**Yes**	

	• William Wieselquist, Brad Rearden, "Recent Developments in SCALE", November 2019 • B.J. Marshall, "Energy-dependent Bias between ENDF/B-VII.1 and ENDF/B-VIII.0 for LCT Benchmarks, CSEWG, November 2019 • B.J. Marshall, "Energy-dependent Bias between ENDF/B-VII.1 and ENDF/B-VIII.0 for LCT Benchmarks, ANS, November 2019 • W.J. Marshall, "Bias between ENDF/B-VIII.0 and ENDF/B=VII.1 for LEU Pin Array System"		
Q2	None		
Q3	• M. N. Dupont and E. M. Saylor, "Evaluation of Oak Ridge National Laboratory Health Physics Research Reactor Operation Data for Criticality Accident Alarm System Benchmark Creation," June 2020. • SCALE Newletter, https://www.ornl.gov/file/spring-2020-scale-newsletter/display		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

Task Titles:

AM1 Radiation Safety Information Computational Center (RSICC)

AM2 SCALE/KENO/TSUNAMI Maintenance and Support/Cross-Section and Generation/Modernization

AM3 AMPX Maintenance and Modernization

AM6 Slide Rule Application

AM9 Sensitivity/Uncertainty Comparison Study with a Focus on Upper Subcritical Limits

AM10 Proposed Benchmark Intercomparison Study

AM11 Proposed 1-D Multipoint Analytical Benchmark Intercomparison

AM15 The Effects of Temperature on the Propagation of Nuclear Data Uncertainty in Nuclear Criticality Safety Calculations

AM16 Technical Data for the Pitzer Formulation of Solution Compositions to Include Uranium/Plutonium Solutions with Selected Admixed Absorbers

AM20 Nuclear Data and Cross Section Testing Using ENDF/B-VIII.0

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtasks: IPD1, 2, 4, 5, 6

Task Titles:

IPD1-Conduct ICSBEP for Benchmarks listed in Appendix C of the 5-Year Plan and publish annual revision to the Handbook
IPD2-Maintain the NCSP Website and Systems
IPD4-Benchmark Evaluation of Hot Box, LLNL Historical Critical Configurations at High Temperature
IPD5-IT Support at NNSS
IPD6-Benchmark Evaluation of LLNL 'Pulsed Spheres'

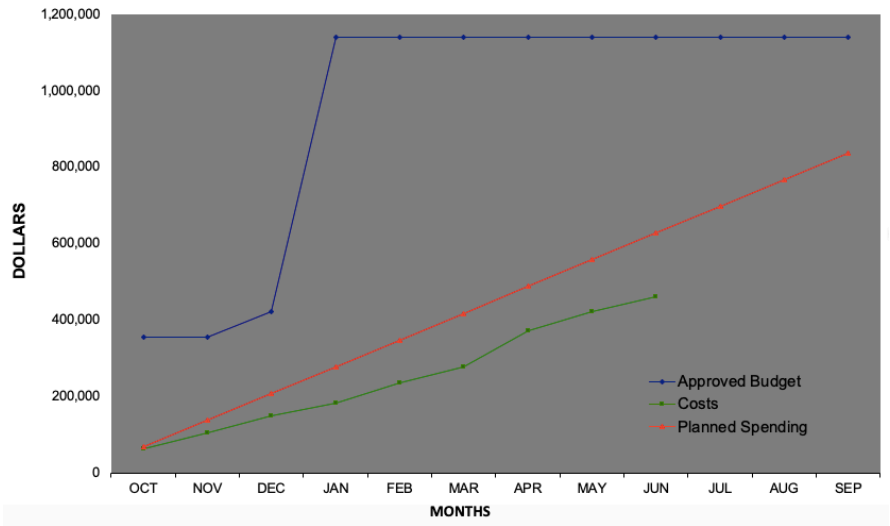
M&O Contractor Name: Lawrence Livermore National Laboratory

Point of Contact Name: David Heinrichs

Point of Contact Phone: (925) 424-5679

Reference: B&R DP0909010
Date of Report: July 10, 2020

BUDGET



1. **Carryover into FY 2020** = $230,063
2. **Approved FY 2020 Budget** = $1,141,063 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $147,416
4. **Actual spending for 2nd Quarter FY 2020** = $131,454
5. **Actual spending for 3rd Quarter FY 2020** = $184,122
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $91,285 (8%)

MAJOR ACCOMPLISHMENTS

1. ICSBEP (IPD1)

- **IER-184**, TEX baseline with PANN plates moderated by polyethylene, Percher (LLNL); and **IER-209**, LCT101, 7uPCX, 0.855 cm pitch, variable water height, Harms (SNL) have been accepted for publication in the 2020 ed. of the ICSBEP Handbook completing CED-4b.
- NCSP evaluations in preparation for the October 19-23, 2020 meeting include:
  (a) **IER-230**, 7uPCX with pitch variations, Ames (SNL)
  (b) **IER-299**, HMF101, KRUSTY cold/warm criticals, Hutchinson (LANL)
  (c) **IER-192**, Class foils with Lucite (LANL/JSI)
  (d) **IER-528**, TEX-Pu-Ta, Percher (LLNL)
- Non-NCSP evaluations in preparation include:
  (d) MIRTE-2 (IRSN)
  (e) JUPITER, HEU/Pb, LEU/Pb (JAEA, LANL)
  (f) Space nuclear thermal propulsion critical experiments, Ames (SNL)

2. Website and Systems (IPD2)

Provided NCSP website updates as requested by NCSP Management including:
- Trip report updates for 2019, 2018, 2016.
- Updated training course information
- CSSG tasking and responses
- ADA QA score increased from 59.2 to 94.6 (excellent)
- ADA Accessibility score increased from 64.7 to 69.9 (improvements in progress)

4. IT Support at NNSS (IPD5)

- NTS-SLAN was shut down and restarted on May 26 renewing all accounts. Performed essential maintenance, software updates, and continuous monitoring and authenticated scans of NCERC network devices. Attended meetings on NCERC Controls Upgrade Project.

5. Benchmark Evaluation of LLNL 'Pulsed Spheres' (IPD6)

This quarter continued to focus on simulation of the 'neutron source' created by the incident deuteron beam on the Ti-T target assembly (with no additional shell) with comparison to experimental results.

NCSP Quarterly Progress Report (FY-2020 Q3)

LLNL IP&D 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	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)		
	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)		
	Maintain, operate and modernize he NCSP website, databases, and provide user assistance as required. (IPD2).		
	Provide a status report for the evaluation of the LLNL "Hot Box" for inclusion in the ICSBEP Handbook. (IPD4)		
	Provide status report on progress on IT support at NNSS, and the benchmark evaluation of LLNL 'Pulsed Spheres.' (IPD5, IPD6).		
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)		
	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)		WPEC SG47 on SINBAD will occur on Tuesday, May 12, 2020, via WebEx only.
	Maintain, operate and modernize he NCSP website, databases, and provide user assistance as required. (IPD2)		

	Provide a status report for the evaluation of the LLNL "Hot Box" for inclusion in the ICSBEP Handbook. (IPD4)		
	Provide status report on progress on IT support at NNSS and the benchmark evaluation of LLNL 'Pulsed Spheres.' (IPD5, IPD6).		NTS-SLAN shut down on March 26, 2020, in response to cessation of programmatic work due to COVID-19 concerns.
Q3	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)		IER-184 (TEX Pu Baselines) and IER-209 (7uPCX with variable water height) completed CED-4b and will appear in the 2020 edition of ICSBEP Handbook.
	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)		Four NCSP evaluations in preparation for the October 19-23, 2020 ICSBEP meeting. The ICSBEP meeting will likely be convened on-line in October. The IRPhE and SINBAD meetings may be delayed until 2021.
	Maintain, operate and modernize he NCSP website, databases, and provide user assistance as required. (IPD2)		
	Provide a status report for the evaluation of the LLNL "Hot Box" for inclusion in the ICSBEP Handbook. (IPD4)		
	Provide status report on progress on IT support at NNSS, and the benchmark evaluation of LLNL 'Pulsed Spheres.' (IPD5, IPD6).		
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)		
	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)		
	Maintain, operate and modernize he NCSP website, databases, and provide user assistance as required. (IPD2)		
	Provide a status report for the evaluation of the LLNL "Hot Box" for inclusion in the ICSBEP Handbook. (IPD4)		

	Provide status report on progress on IT support at NNSS, and the benchmark evaluation of LLNL 'Pulsed Spheres.' (IPD5, IPD6).		

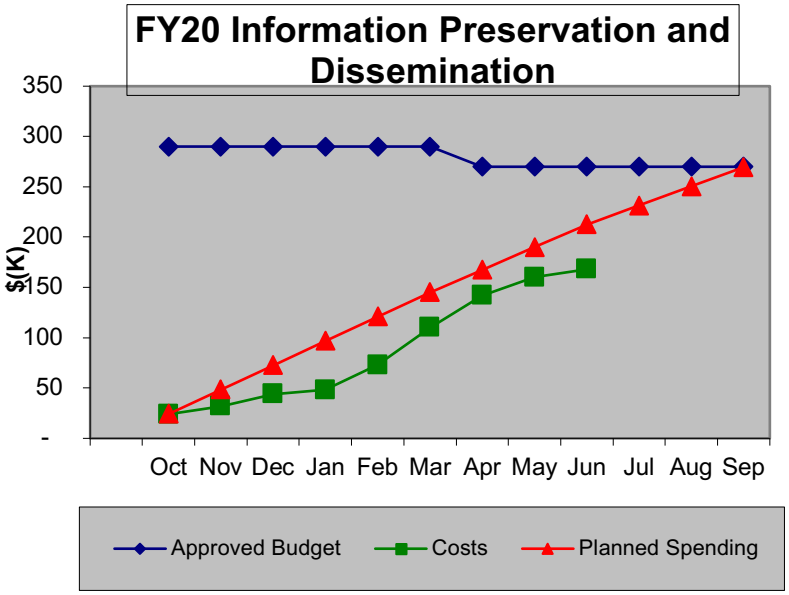
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	Paris, France October 21-25, 2019 AM, IE, IP&D, ND, TS5 ICSBEP, IRPhE, and SINBAD Technical Review Meetings (Heinrichs, Kim, Percher) Conduct ICSBEP for benchmarks listed in Appendix C of the Five-Year Execution Plan.	**Yes** (LLNL-MI-796017)	
Q2	**N/A**		
Q3	**N/A**		
Q4	OECD/NEA Paris, France Jun-20 IPD1 TS5 WPNCS Meeting (Percher, Scorby) Participate in activities of the Working Party on Nuclear Criticality Safety and expert group meetings on MC methods and excursion analyses.		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	Catherine Percher, Jesse Norris, "PU-MET-MIX-002: TEX Plutonium Baseline Assemblies: Plutonium/ Aluminum Metal Alloy Plates with Varying Thicknesses of Polyethylene Modera-tor and a Thin Polyethylene Reflector", LLNL-TR-785164-DRAFT, October 19, 2019	**No**	Final report to be uploaded into IER-184 C_EdT webpage.
Q2	**N/A**		
Q3	**N/A**		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: ORNL – IPD5, 7
Task Titles:
IPD5-Oak Ridge Health Physics Research Reactor CAAS Benchmark Evaluation
IPD7- Preserving the "Howard Dyer" Library at ORNL
M&O Contractor Name: ORNL
Point of Contact Name: Doug Bowen
Point of Contact Phone: (865) 576-0315

Reference: DP0909010/ORNL
Date of Report: July 2020

BUDGET



1. **Carryover into FY 2020** = $15K
2. **Approved FY 2020 Budget** = $290K (includes carryover) (Budget decreased by $20K in Q2 to account for funds transferred to RSICC)
3. **Actual spending for 1st Quarter FY 2020** = $44K
4. **Actual spending for 2nd Quarter FY 2020** = $66K
5. **Actual spending for 3rd Quarter FY 2020** = $58K
6. **Actual spending for 4th Quarter FY 2020** = $
7. **Projected carryover into FY 2021** = $

MAJOR ACCOMPLISHMENTS

IPD 5 – Oak Ridge Health Physics Research Reactor CAAS Benchmark Evaluation (Dupont, Saylor)

- The first version of the HPRR model has been completed in KENO VI, and preliminary calculation results have been obtained with MAVRIC and compared to experiment results. A large discrepancy exists between computational and experiment results, and the reasons of the discrepancies are currently being investigated. A paper was submitted and accepted for publication and presentation at the RPSD 2020 conference in September 2020 (RES#:138298).

IPD 7 - Preserving the "Howard Dyer" Library at ORNL (Saylor)

- Library scanning of many hundreds of files has been completed and returned to ORNL. The method for sharing the information with the NCS community is still being determined. Quality check comparing the electronic copy with the Howard Dyer library index is currently being performed.

NCSP Quarterly Progress Report (FY-2020 Q3)

ORNL IPD Milestones:

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

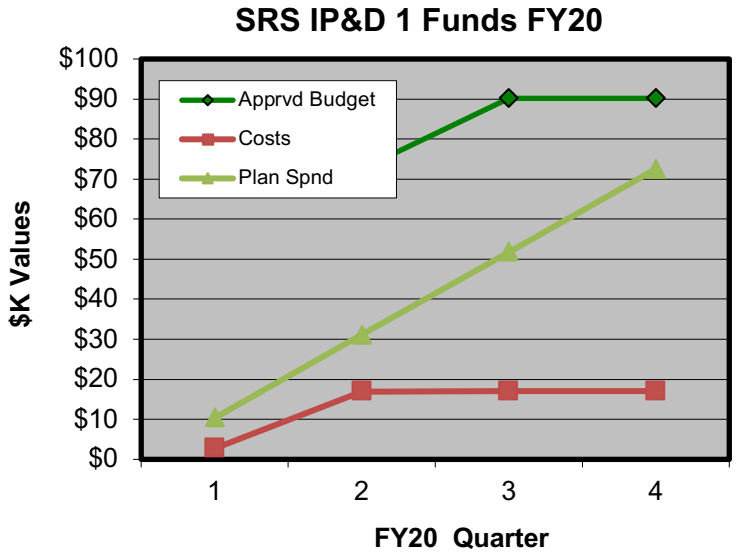
Complete	On Schedule	Behind Schedule	Missed Milestone
			

QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Provide a status report on progress made on IPD tasks. (IPD5, IPD7)		
Q2	Provide a status report on progress made on IPD tasks. (IPD5, IPD7)		
Q3	Provide a status report on progress made on IPD tasks. (IPD5, IPD7)		
Q4	Provide a status report on progress made on IPD tasks. (IPD5, IPD7)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	• M. N. Dupont and E. M. Saylor, "Evaluation of Oak Ridge National Laboratory Health Physics Research Reactor Operation Data for Criticality Accident Alarm System Benchmark Creation," June 2020.	**YES**	
Q4	**N/A**		

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: SRS IPD1 **Task Title:** ARH-600 Reissue **M&O Contractor Name(s):** SRNS **Point of Contact Name:** David Erickson **Point of Contact Phone:** 803-557-9445	**Reference: B&R DP 0909010** **Date of Report: July 9, 2020**
BUDGET	**MAJOR ACCOMPLISHMENTS**
 1. **Carryover into FY 2020** = $48.9K 2. **Approved FY 2020 Budget** = $96.9K (includes carryover) 3. **Actual spending for 1st Quarter FY 2020** = $2.7K 4. **Actual spending for 2nd Quarter FY 2020** = $14.3K 5. **Actual spending for 3rd Quarter FY 2020** = $0.0K 6. **Actual spending for 4rd Quarter FY 2020** = $TBD 7. **Projected carryover into FY 2021** = $TBD	Updated CritView package was released to NCSP for inclusion on Website. Awaiting user feedback. (Note: Financial information has changed significantly from prior quarter based on updated information from HQ)

NCSP Quarterly Progress Report (FY-2020 Q3)

SRS IP&D 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 status reports on SRS progress with CritView. (IPD1)		
Q2	Provide status reports on SRS progress with CritView. (IPD1)		
	Develop QA documents for current version to meet current SRS/DOE requirements. (IPD1)		
Q3	Provide status reports on SRS progress with CritView. (IPD1)		
Q4	Provide status reports on SRS progress with CritView. (IPD1)		
	Issue Preliminary (updated) CritView version for internal testing. (IPD1)		
	Issue Preliminary User Guide to support internal testing. (IPD1		

NCSP Quarterly Progress Report (FY-2020 Q3)

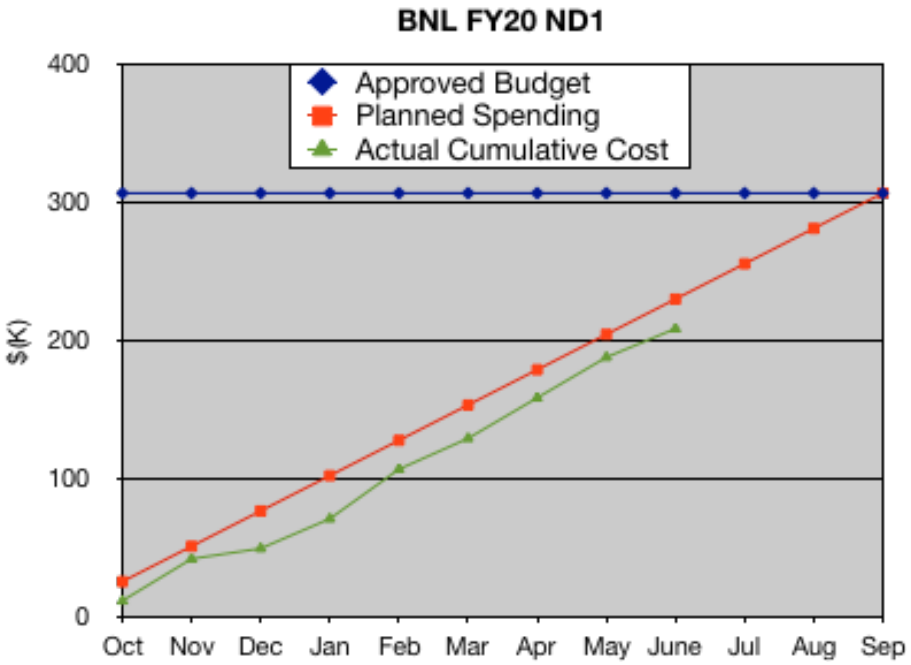
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: Nuclear Data ND1
Task Title: National Nuclear Data Center (NNDC) Support to the NCSP
M&O Contractor Name: BNL
Point of Contact Name: David Brown
Point of Contact Phone: 631-344-2814

Reference: DP 0902000
Date of Report: July 8, 2020

BUDGET



1. **Carryover into FY 2020** = $35,688
2. **Approved FY 2020 Budget** = $306,688
3. **Actual spending for 1st Quarter FY 2020** = $49,500
4. **Actual spending for 2nd Quarter FY 2020** = $79,698
5. **Actual spending for 3rd Quarter FY 2020** = $208,611
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $

MAJOR ACCOMPLISHMENTS

All ENDF projects (source code, trackers, etc.) have been moved to git.nndc.bnl.gov. ADVANCE and git.nndc.bnl.gov are communicating and GitLab is triggering builds on ADVANCE which are being posted on the NNDC website. We have begun adding CSEWG member user accounts and there are now 21 CSEWG members with activate accounts that belong to the ENDF projects.

We have are actively adding new and revised evaluations and are clearing the backlog of evaluation. NCSP Dy evaluations have been checked and formatting errors corrected. NCSU & NNL thermal scattering law data submitted since the ENDF/B-VIII.0 release has been checked. RPI thermal scattering data is still queued for addition.

NCSP Quarterly Progress Report (FY-2020 Q3)

BNL ND Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone
			

QUARTER	MILESTONE	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)		**With the new ADVANCE/GitLab system, we are revising how we will review new evaluation. More information will become available as we figure out the proper review criteria for new/revised evaluations.**
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)		
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)		**We are piloting a peer review system for checking evaluations before they are merged into the Phase 2 branch for validation by the CSEWG Validation Committee using decay data and charged particle data. Neutron data, being more complex, will follow.**
	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)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**	**no**	
Q2	**N/A**	**no**	
Q3	**N/A**	**no**	
Q4	**N/A**	**no**	

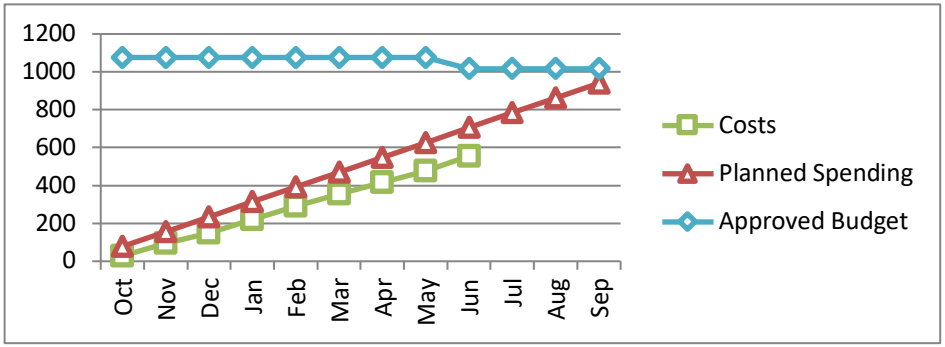
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**	No	
Q2	**N/A**	**no**	
Q3	**N/A**	**no**	
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: ND1, 2, 3
Task Title:
ND1: Nuclear Data Evaluation and Testing
ND2: Prompt Fission Neutron Spectra (PFNS) Measurement of Plutonium-240
ND3: Unresolved and Fast Measurements of Uraunium-233 (n,gamma)
M&O Contractor Name: LANL
Point of Contact Name: Brian Bluhm / Bob Little
Point of Contact Phone: 505-667-2440 / 505-665-3487

Reference: DP0902000
Date of Report: July 6, 2020

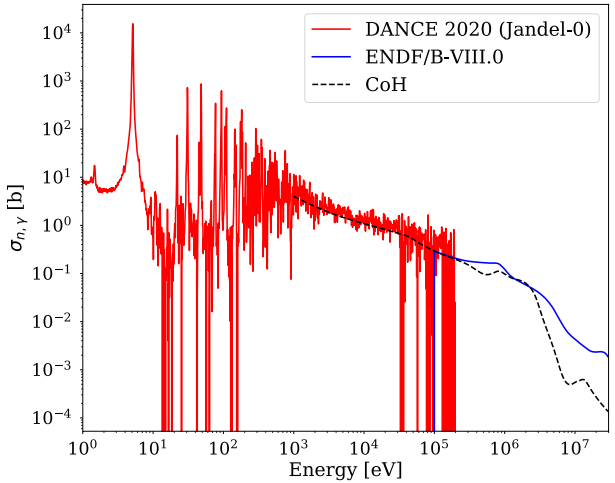
BUDGET



1. **Carryover into FY 2020 = $0**
2. **Approved FY 2020 Budget = $1,076,000 (includes carryover)**
3. **Actual spending for 1st Quarter FY 2020 = $147,361**
4. **Actual spending for 2nd Quarter FY 2020 = $206,073**
5. **Actual spending for 3rd Quarter FY 2020 = $202,295**
6. **Actual spending for 4rd Quarter FY 2020 = $**
7. **Projected carryover into FY 2021 = $76,000**

MAJOR ACCOMPLISHMENTS

- Progress on U-234 evaluation: we have received preliminary data from M. Jandel for 234U(n,g) cross section. The data was formatted and used in the evaluation procedure. As expected, the CoH model calculation is already in very good agreement with the preliminary data, as the CoH parameters have been already been calibrated using 236U(n,g) and 238U(n,g) data taken by DANCE. The plan is to also to update the resonance parameters in the evaluation file, if the experimentalist will be able to analyze all the data before the end of the fiscal year. In the figure below, we show the current ENDF/B-VIII.0 evaluation in the fast region, compared with CoH and the preliminary data. Discussions are ongoing with the experimentalists regarding the normalization of the data. We will also provide the covariance for the capture channel, based on the DANCE data, by performing a Bayesian analysis.



- Progress on Be-9 evaluation:
  - Culled 9Be(n,el) and 9Be(n,n')9Be* from EXFOR/CSIRS
  - Converted EXFOR/c5 formatted data using Perl5 LANL-EDA5 conversion code ('c5toeda')
  - Initial cull of data from EXFOR/CSISRS resulted in significant data redundancies and a large EDA5 data-set (53.2k lines)
  - Reduced elastic & inelastic data to more manageable data-set by eliminating multiple copies of Harvey integrated data; also thinned/binned [ongoing]
  - Culled reaction [(n,2n), (n,alpha), (n,t)] data; processing with 'c5toeda' [ongoing]
- In collaboration with a Machine Learning project, we are exploring similarity in criticality benchmarks as it impacts validation of nuclear data.
- ND-2 "Prompt fission neutron spectra (PFNS) measurement of Pu-240"
  - A FY20 transfer of funds to LLNL was completed.
  - We have the Pu-240 PFNS measurements on the LANSCE 2021 schedule.
  - LLNL has placed an order for the Pu-240 and for the parts they need to make the foils. We have decided to make 12, not 10, foils, since the chamber can hold 12 foils and the radioactivity is such that the amount of material per foil cannot exceed a certain amount without degrading the fission detection.
- ND-3 "Unresolved and fast measurements of U-233(n,g)"
  - "Report to NCSP on 2008 DANCE Measurements of $^{233}U(n,\gamma)$" was finalized. The report:
    - Summarized the 2008 thin-target measurement that was made for stockpile stewardship but never published.
    - Analyzed PPAC data taken to discriminate fission gammas from capture gammas, and found that the fission gamma spectra from the PPAC were usable.
    - Concluded however, that the statistics in the keV region were inadequate for reliable extraction of the capture cross section, indicating a need for a new thick-target measurement, as planned.

NCSP Quarterly Progress Report (FY-2020 Q3)

LANL ND Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	COMMENTS
Q1	Provide status reports on LANL participation in US and International Nuclear Data collaborations. (ND1)		
	Conduct CSEWG Data Evaluation Committee session. (ND1)		
	Report data testing results with ENDF/B-VIII.0 and additional beta release cross sections. (ND1)		
Q2	Provide status reports on LANL participation in US and International Nuclear Data collaborations. (ND1)		
Q3	Provide status reports on LANL participation in US and International Nuclear Data collaborations. (ND1)		
	Complete review of previous "thin" target U233 measurements and finalize specifications for new "thick" U233 target. (ND3)		
Q4	Provide status reports on LANL participation in US and International Nuclear Data collaborations. (ND1)		
	Acquire Pu240 PPAC target (ND2)		
	Deliver nuclear data evaluations as indicated in Appendix B of this document. (ND1)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	OECD/NEA Paris, France TBD-date ND1 The NEA/WPEC Subgroup 38 is developing a modern nuclear database (XML) structure. (Paris) Contributor to multiple sub-groups-Paris co-leads SG38.	No	Virtual Meeting Only
	OECD/NEA Paris, France TBD-date ND1 The NEA/WPEC Subgroup 45 is "Validation of Nuclear Data Libraries (VaNDaL) Project." (Herman) Contributor to multiple sub-groups-Herman co-leads SG45.	No	Virtual Meeting Only
	OECD/NEA Paris, France TBD-date ND1 The NEA/WPEC Subgroup 46 is "Efficient and Effective Use of Integral Experiments for Nuclear Data Validation." (Herman) Contributor to multiple sub-groups-Herman co-leads SG46.	No	Virtual Meeting Only
Q4	**N/A**		

Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	Bob Little, "LANL ND-1," (TPR)	Yes	Already posted on NCSP / TPR Web Page
Q2	Denise Neudecker et al., "Identifying Questionable ICSBEP Benchmark Data and Underestimated Uncertainties Using Machine Learning Methods," (TPR)	Yes	Already posted on NCSP / TPR Web Page
Q2	Mark Paris and Gerry Hale, "R-matrix code capabilities and modernization," (TPR)	Yes	Already posted on NCSP / TPR Web Page
Q2	Paul Koehler, "DICER (Device for Indirect Capture Experiments on Radionuclides) Instrument," (NDWG)	Yes	NDWG presentations were collected during TPR
Q2	Mark Paris, "R-matrix evaluation of ^{10}Be (n+^{9}Be) system," (NDWG)	Yes	NDWG presentations were collected during TPR
Q2	Denise Neudecker, "Nuclear Data Validation Using ICSBEP Benchmarks and Machine Learning," (NDWG)	Yes	NDWG presentations were collected during TPR

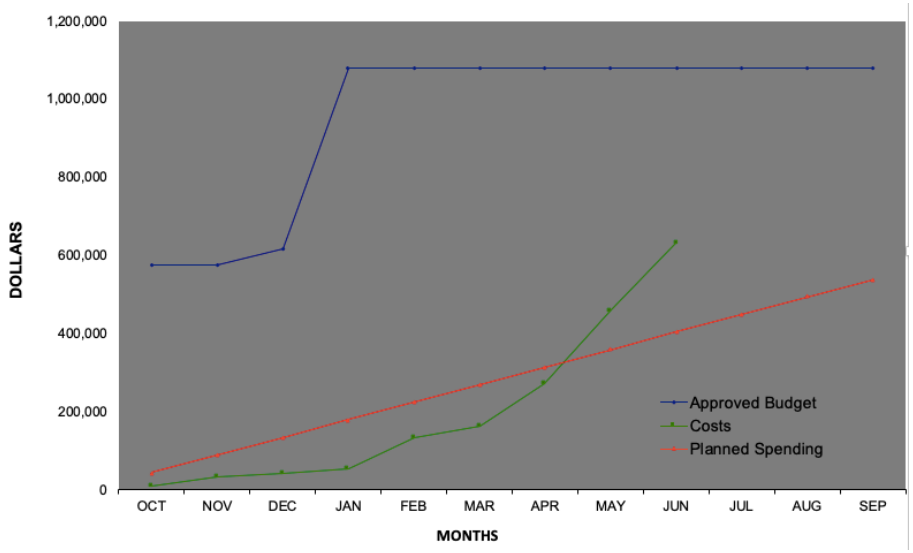
Q2	Michael Rising, "Update on subcritical benchmarks, validation, and simulations," (NDWG)	Yes	NDWG presentations were collected during TPR
Q2	Wim Haeck, "FAUST Benchmark and Validation Framework," (NDWG)	Yes	NDWG presentations were collected during TPR
Q3	E. Leal Cidoncha and A. Couture, "Report to NCSP on 2008 DANCE Measurements of ^{233}U(n,g)"	No	Waiting for LA-UR. Will submit early in Q4.
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: ND1, 2, 3, 5, 6, 7
Task Titles: See last page
M&O Contractor Name: Lawrence Livermore National Laboratory
Point of Contact Name: David Heinrichs
Point of Contact Phone: (925) 424-5679

Reference: B&R DP0909010
Date of Report: July 10, 2020

BUDGET



1. **Carryover into FY 2020** = $494,744
2. **Approved FY 2020 Budget** = $1,080,744 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $42,353
4. **Actual spending for 2nd Quarter FY 2020** = $120,734
5. **Actual spending for 3rd Quarter FY 2020** = $468,943
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $86,500 (8%)

MAJOR ACCOMPLISHMENTS

1. NCSU was able to generate the velocity autocorrelation function (VACF) for hydrogen (H) in hydrofluoric acid (HF) using previously completed and verified classical molecular dynamics (MD) models at various temperatures. The VACF was processed using Fourier analysis to obtain the temperature dependent density of excitation spectra (DOS). In addition, the spectra were decomposed into the bound and diffusive components. The diffusive component was assumed to follow a Schofield model behavior. Testing is underway of the generation of the thermal scattering law (TSL) using the temperature dependent DOS. In addition, examination of the behavior of the thermal scattering cross sections for H in HF is underway. (ND2)
2. NCSU continued the development of the *FLASSH* beta 3 code with improved capabilities. After the release of the code, feedback is currently collected from the various collaborators and code modifications have been initiated. In addition, work continues on basic code features. Progress was made on adding quality assurance and automated data extraction and plotting capabilities to facilitate the user's ability to identify issues with the generated TSL and cross sections. In addition, enhanced features are currently being developed to allow for the reporting of mixed elastic scattering data in File 7 like format. (ND3)
3. NCSU continued work on the generalized thermal scattering law (TSL) formulation for utilization in Doppler broadening analysis. Testing proceeded of the one phonon correction to the self TSL as a representation of the distinct component. This relaxes the incoherent approximation and allows for the generation of a nearly exact TSL. An updated one phonon module was developed that efficiently recognizes and utilizes lattice symmetry. This greatly enhanced accuracy and speed of the calculations. The results are promising and show good agreement with measured total cross section data. This approach is currently being upgraded to utilize the generalized Debye-Waller matrix of the distinct TSL in the self-component of the TSL. (ND5)
4. LLNL initiated procurements and has requested restart of laboratories in support of PPAC component fabrication.

NCSP Quarterly Progress Report (FY-2020 Q3)

LLNL ND 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 status on LLNL/NCSU nuclear data activities to NCSP Manager (ND1 {subtask 1 and 2}, ND2, ND3, ND5, ND6, ND7)		Costs include actual (LLNL) and estimated (NCSU) expenditures as LLNL has yet to receive invoices for Q1 from NCSU.
Q2	Provide status on LLNL/NCSU nuclear data activities to NCSP Manager (ND1 {subtask 1 and 2}, ND2, ND3, ND5, ND6, ND7)		Costs include actual (LLNL) and estimated (NCSU) expenditures as LLNL has yet to receive invoices for Q1-Q2 from NCSU.
Q3	Provide status on LLNL/NCSU nuclear data activities to NCSP Manager (ND1 {subtask 1 and 2}, ND2, ND3, ND5, ND6, ND7)		Costs include actual (LLNL) and estimated (NCSU) expenditures. NCSU invoices received at end of Q3 and will cost (as actuals) in Q4.
Q4	Provide status on LLNL/NCSU nuclear data activities to NCSP Manager (ND1 {subtask 1 and 2}, ND2, ND3, ND5, ND6, ND7)		
	Deliver thermal neutron scattering data evaluations as indicated in Appendix B of the 5-Year Plan. (ND2)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	C. A. Manring, A. I. Hawari, "Development of Neural Thermal Scattering (NeTS) Modules for Reactor Physics Applications," Transactions of the American Nuclear Society: **121**, 1351-1353, November 2019	**Yes**	
Q2	A. Hawari et al., "Thermal Scattering Law S(α,β): Measurement, Evaluation and Application," International Evaluation Co-operation Volume 42, Organization for Economic Co-operation and Development, Nuclear Energy Agency, NEA No. 7511, © OECD 2020.	**Yes**	
	D. Heinrichs et al., "Nuclear Data ND1 (LLNL)", LLNL-PRES-804223, February 11, 2020.	**Yes**	Available at ncsp.llnl.gov/TPRAgendas/2020/
Q3	**N/A**		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

Task Titles:

ND1 Subtasks 1 – Delayed Fission Gamma Multiplicity and Spectra – Data testing
ND1 Subtask 2 – Delayed Fission Gamma Multiplicity and Spectra – Document the technical basis of the method and data testing results

ND2 Generation and Benchmarking of Thermal Neutron Scattering Cross Sections in Support of Advanced Nuclear Reactor Concepts

ND3 Development and Implementation of an Advanced and Rigorous Computational Platform for Thermal Neutron Scattering Analysis

ND5 Development and Implementation of a Modern Doppler Broadening Approach Including Atomic Binding Effects

ND6 Evaluate Neutron Radiative Capture Gamma Production in Cadmium

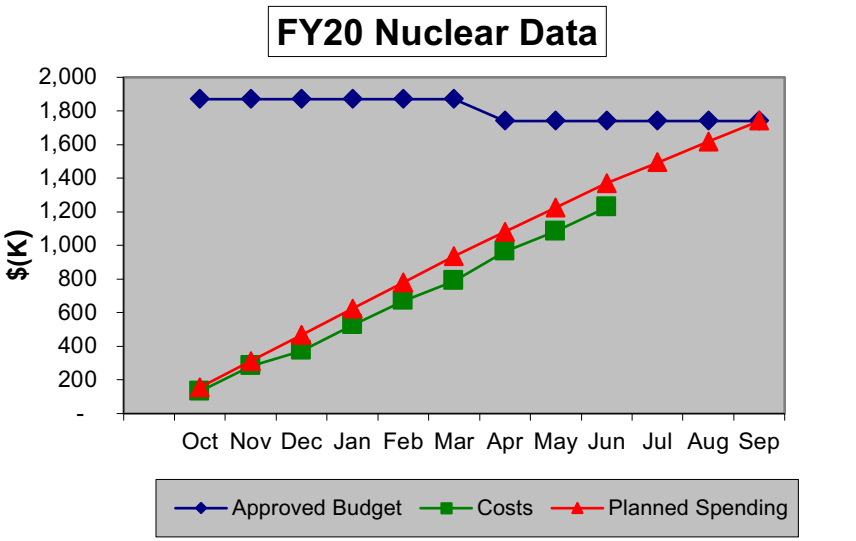
ND7 'Alpha-N' Benchmark Measurements

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: ORNL – ND1, 3, 4, 6, 7, 10
Task Title: see last page
M&O Contractor Name: ORNL
Point of Contact Name: Doug Bowen
Point of Contact Phone: (865) 576-0315

Reference: DP0909010/ORNL
Date of Report: July 2020

BUDGET



1. **Carryover into FY 2020** = $95K
2. **Approved FY 2020 Budget** = $1870K (includes carryover) (In Q2, the ND budget was decreased by $130K to account for funds moved to RSICC, AM1)
3. **Actual spending for 1st Quarter FY 2020** = $374K
4. **Actual spending for 2nd Quarter FY 2020** = $415K
5. **Actual spending for 3rd Quarter FY 2020** = $437K
6. **Actual spending for 4th Quarter FY 2020** = $
7. **Projected carryover into FY 2021 = $**

MAJOR ACCOMPLISHMENTS

ND1 –Nuclear Data Measurement and Evaluation (Guber, Pigni, Brown, McDonnell, Chapman)

- **[181Ta evaluation]** Attending meeting with D. Barry (RPI/NNL) and J. Brown (ORNL) to discuss updates and development on the tantalum evaluation. The major development plan in the resolve resonance region (RRR) is to update in the statistics of the resonance parameters up to 2.6 keV. In the unresolved resonance region, calculations to test the sensitivity of the R-infinity parameters and strengths functions for angular momentum >0 is in progress. These calculations are needed to impose consistency between URR and fast neutron region evaluation. A presentation on the preliminary results on the tantalum evaluation was given at the online session of the R-matrix workshop (RES PUB ID 141921)
- **[140,142Ce evaluations]** Attending meeting with C. Chapman to discuss the updates to the cerium evaluation. The major update is the fit of the new measured data on 142Ce with extended RRR up to 200 keV. The external functions were recalculated to account for the extended energy region. Detailed plan to finalize the evaluation work was generated
- **[233U evaluation]** Updates to the RRR evaluation were mainly to improve the fit in the low-energy region from thermal up to 20 eV for the capture and fission channels in the effort to reach an improved agreement with the benchmarks
- **[63,65Cu evaluations]** Generated by J. McDonnell, a set of ENDF files for Cu was generated and the related validation tests produced preliminary results on the performance of the evaluations. The increase of the capture cross sections above 100 keV gave benchmark calculations consistent with ENDF/B-VIII.0 evaluations. However, additional work is needed to understand the large normalization factor adopted for the measured differential data. A presentation on the progresses of the copper evaluation was given at the online session of the R-matrix workshop (RES PUB ID 141490)
- **[50,53Chromium]** The evaluation work generated considerable improvements in the benchmark performance by the fit of the natural capture yields. This was possible mainly because of the correct inclusions of the multiple scattering and self-shielding effects of the s-wave cluster of resonances in the keV region typical of structural materials such chromium

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: ORNL – ND1, 3, 4, 6, 7, 10 **Task Title:** see last page **M&O Contractor Name:** ORNL **Point of Contact Name:** Doug Bowen **Point of Contact Phone:** (865) 576-0315	**Reference:** DP0909010/ORNL **Date of Report:** July 2020
BUDGET	**MAJOR ACCOMPLISHMENTS**
	• Participated in the DOE/EURATOM online meeting on June 15th and 16th in Brussels, presented progress on action sheet 66. • Review of Five-Year Plan appendix B for NDAG. • Discussed various data sets (Cr53, Cu63) with ND staff members. • Discussed AGS covariance matrix with ND staff members, developing path forward • Mentor new staff member for the NCSP. **Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B of the 5-year plan.** • Travel to JRC-Geel was canceled and planned Zr-90 experiments are delayed due to COVID-19 (behind schedule). • JRC-Geel is opening again after COVID-19 shut down in March. • GELINA was restarted in the third week of June. • Discussion in April with JRC-Geel personnel about path forward to perform experiments at GELINA for the NCSP. • Concept of sending sample via mail was discussed and acquired data will be sent to ORNL on disk for sorting with AGL. AGL needs to be ported to ORNL computers. • 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. **Y12 ND1 – GELINA depleted Uranium target cost estimate and construction (Guber)** • Manufacturing Science Corporation (MSC) Inc. machining parts for target assembly is on schedule. Thermocouples have been purchased by JRC-Geel and shipped to MSC Inc.(green). **ND3 – Isotopic Sample Lease to Support ND1 ND Measurements (Guber, Brown)** • Return of Ce-142 sample on June 19th, 2020. (green) • Started production process for Zr-90 sample. But due to COVID-19, ORNL was shut down in March. Startup of ORNL since mid-May in phase I is ongoing and sample production was resumed (behind schedule).

NCSP Element and Subtask: ORNL – ND1, 3, 4, 6, 7, 10 **Task Title:** see last page **M&O Contractor Name:** ORNL **Point of Contact Name:** Doug Bowen **Point of Contact Phone:** (865) 576-0315	**Reference:** DP0909010/ORNL **Date of Report:** July 2020
BUDGET	**MAJOR ACCOMPLISHMENTS**
	ND4 – Thermal Neutron Total Cross Section Measurements for Improvement of Criticality Calculations and Propagation of Scattering Kernel Uncertainties (Chapman) • 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 (Wiarda, Holcomb, Arbanas, Brown)** • SAMMY uses two energy grids internally: One on which the experimental data are given and an auxiliary grid on which the calculation is done, as more energy points are needed, for example, for broadening. In preparation for using different fitting programs, we moved the energy grid to C++ and removed the energy grids from the container array. Temporary scratch files used to store the grid were eliminated. The use of the grids was made more transparent and the new C++ grid classes will make managing of the grid easier going forward. In the remainder of the year the theorical values and derivatives will also be moved onto this grid. • We started work to use a unified matrix/linear-algebra packaged across SAMMY/SCALE/AMPX, which will make it easier to develop additions to the R-Matrix algorithm and to the fitting procedure • Updates in the continuous integration pipeline allowed for faster testing times. • **[Complex radius]** a presentation on the inclusion of the complex radius in the R-matrix algorithm was given at the online session (RES PUB ID 14102) **ND7 - Nuclear Data Evaluation and Testing for Nuclear Criticality Safety Applications (Holcomb, Bowen, Shaw)** • Submitted ZEUS continuous-energy inputs and data for VALID review. • Refined cross section data path extraction for H-1 to account for data-naming convention variation across libraries. • Produced keff data with the substitution of Gd-155, Gd-156, Gd-157, Gd-158, Gd-160, H-1, and Np-237 ENDF8.0 nuclear data.

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: ORNL – ND1, 3, 4, 6, 7, 10 **Task Title:** see last page **M&O Contractor Name:** ORNL **Point of Contact Name:** Doug Bowen **Point of Contact Phone:** (865) 576-0315	**Reference:** DP0909010/ORNL **Date of Report:** July 2020
BUDGET	**MAJOR ACCOMPLISHMENTS**
	• Followed the methodology of cross section data path extraction to prepare for isotope-swapping of the following NCSP isotopes of interest, in addition to CIELO, Cu, Gd, Np: Ni-58, Ni-60, C-12, W-182, W-183, W-184, W-186. • Submitted journal article to Nuclear Science and Engineering for peer review of O-16, Fe-56, Cu-63, Cu-65 performance, with the construction of a hybrid ENDF-7.1/8.0 library for improved experimental agreement. • Alex Shaw successfully defended his MS Thesis this quarter, which is another success of NCSP university collaborations. **ND10 - Monte Carlo Evaluation of Differential and Integral Data (Arbanas, Brown, Holcomb)** • Metropolis-Hastings Monte Carlo algorithm has successfully reproduced known analytical solutions for linear model and normal probability distribution functions. (Testing for non-linear models, including cross section models, to follow in Q4.) • Coordinated activities with ND6 SAMMY Modernization for anticipated linking to the Metropolis-Hastings Monte Carlo algorithm developed for ND10 • American Nuclear Society Winter Meeting, November 15-20, 2020, Chicago, IL, extended abstract titled “Bayesian Monte-Carlo Evaluation Framework for Cross Sections Nuclear Data and Integral Benchmark Experiments”, RESolution PubID 142027.

NCSP Quarterly Progress Report (FY-2020 Q3)

ORNL ND 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 status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND1, ND3, ND4, ND6, ND7m ND10).		
	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).		
	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B (ND1).		
Q2	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND1, ND3, ND4, ND6, ND10).		Due to COVID-19, our ND measurement work will likely be behind schedule.
	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).		
	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B (ND1).		
Q3	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND1, ND3, ND4, ND6, ND10).		
	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).		

	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B (ND1).		ND measurement work at Geel, Belgium, was not possible in Q3 due to COVID-19. Facility is open for Q4 and samples are being prepared for measurements.
Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND1, ND3, ND4, ND6, ND10).		
	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).		
	Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B (ND1).		
	Document SAMMY modernization progress and report status annually to the NCSP Manager (ND6).		

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	IRMM Geel, Belgium Nov 2019 ND1, TS7 Perform resonance region nuclear data measurements using GELINA facility at IRNN in accordance with Appendix B of the Five-Year Plan Participate in WPEC and attend IAEA International Nuclear Data Evaluation Network (INDEN) meeting WPEC and INDEN Paris, France, Vienna, Austria Nov, 2019 Participate in WPEC annual meeting, coordinate international nuclear data collaborations for the NCSP, and present NCSP/ORNL nuclear data evaluation work. Attend IAEA International Nuclear Data Evaluation Network (INDEN) meeting ND1 INDEN Vienna, Austria Oct, 2019 ND1 Attend IAEA International Nuclear Data Evaluation Network (INDEN) meeting	**Yes**	

Q2	**N/A**		
Q3	OECD/NEA Paris, France Jun-20 ND1, TS Participate in WPEC annual meeting, coordinate international nuclear data collaborations for the NCSP, and present NCSP/ORNL nuclear data evaluation work (Sobes, Pigni, Wiarda) Technical meeting of international experts on nuclear data including SG38 (GND), EG-GNDS, SG42 (thermal scatter), SG44 (covariance), SG45 (validation), SG46 (IE for ND evaluation)	**No**	**CANCELLED**
	Vienna, Austria TBD – date ND1 Participate in IAEA working group meeting to improve nuclear data evaluations to support new evaluations of interest to the NCSP (Sobes, Pigni) IAEA International Nuclear Data Evaluation Network (INDEN), Vienna, 1 week. International nuclear data evaluation collaboration. Represent NCSP and ORNL interests in international nuclear data evaluation.	**No**	**CANCELLED**
Q4	Tokyo, Japan Sep-20 ND10 Participate in the 5th International Workshop on Nuclear Data Covariances 2020, (CW2020) (Pigni). Present NCSP-funded project Bayesian Monte Carlo Evaluation of Differential and Integral Data (ND10, Arbanas). Present the progress on fission modeling and generation of covariance matrices for fission product yields with physical constraints.		
	IRMM Mol, Belgium Jan-19 Apr-19 Jun-19 Sep-19 ND, TS7 Perform resonance region nuclear data measurements using GELINA facility at IRMM in accordance with Appendix B of the Five-Year Plan (Guber) Continues cross-section measurements to support the production of new cross-section evaluations per the schedule in Appendix B of the Five-Year Plan.		

NCSP Quarterly Progress Report (FY-2020 Q3)

Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	• Dorothea Wiarda, "Issues in ENDF/B-VIII.0 GNDS Covariances", November, 2019 • Dorothea Wiarda, Goran Arbanas, Andrew Holcomb, Marco Pigni, "Current Status of SAMMY", November 2019 • Marco Pigni, "Updates to R-matrix Evaluations for Fissile Actinides: 233,235U, 239Pu", November 2019 • Marco Pigni, "Status of the n+35Cl cross sections", November 2019Updates to R-matrix Evaluations of Fissile Actinides: 233,235U, 239Pu" • Klaus Guber, ORNL, C. Paradela, S. Kopecky, J. Heyse, P. Schillebeeckx, EC-JRC, "ORNL neutron cross section measurements for the US Nuclear Criticality Safety Program", November 2019 • Jesse Brown, Y. Danon RPI, D. Barry, B. Epping, M. Rapp, Naval Nuclear Laboratory, "Differential Transmission Benchmark Method to Validate Resolved and Unresolved Resonance Parameter Evaluations", November 2019 • Jesse Brown, Dorothea Wiarda, "Format proposal: R-external function", November 2019		
Q2	None		
Q3	• Arbanas et al, "Bayesian Monte-Carlo Evaluation Framework for Cross Sections Nuclear Data and Integral Benchmark Experiments" • M. Pigni, "Complex Radius in the R-Matrix algorithm for inclusion of direct capture measurement," Presentation, R-matrix Workshop, Ohio University, June 2020. • D. Barry, J. Brown, M. Pigni, "Progress on the R-matrix Analysis for the n+181Ta Evaluation, R-matrix workshop, Ohio University, June 2020. • G. Arbanas, J. Brown, A. Holcomb, D. Wiarda, "Bayesian Monte Carlo Evaluation Framework for Cross Sections Nuclear Data and Integral Benchmark Experiments," 2020 Winter ANS Meeting.		
Q4			

Task Titles:

ND1 Nuclear Data Measurement and Evaluation

ND3 Isotopic Sample Leases to Support ND1 ND Measurements

ND4 Thermal Neutron Total Cross Section Measurements for Improvement of Criticality Calculations and Propagation of Scattering Kernel Uncertainties

ND6 SAMMY Nuclear Data Evaluation Code Modernization

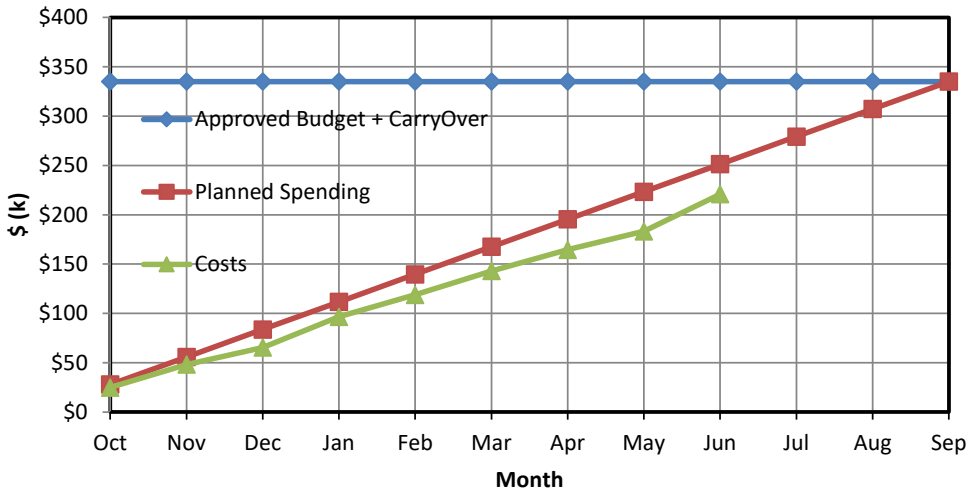
ND10 Monte Carlo Evaluation of Differential and Integral Data

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: ND1
Task Title: Resonance Region Nuclear Data Measurement Capability at RPI
M&O Contractor Name: RPI
Point of Contact Name: Yaron Danon
Point of Contact Phone: 518-276-4008

Reference: BNR Code 0909010
Date of Report: 7 2, 2020

BUDGET



1. **Carryover into FY 2020** = $ -8,913
2. **Approved FY 2020 Budget** = $ 335,087 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $ 65,388
4. **Actual spending for 2nd Quarter FY 2020** = $ 77,593
5. **Actual spending for 3rd Quarter FY 2020** = $ 77,949
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $ 18K

MAJOR ACCOMPLISHMENTS

- Cu scattering publication in internal review.
- Working with ORNL isotope center to obtain an updated quote for an Iron-54 sample needed for capture measurements.
- Preparing for Cr-53 experiment:
  - Completed work to characterize detector response to different input signals, and further investigated different digitizer settings.
  - Performed work to calculate weighting functions and their uncertainties for each detector via MCNP simulations.
  - Finalized design of detector alignment instrument

NCSP Quarterly Progress Report (FY-2020 Q3)

RPI ND1 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 status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND1)		
	Provide status reports on RPI 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)		
	Complete analysis of measurement from FY-18 (ND1)		
Q2	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND1)		
	Provide status reports on RPI 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)		No travel to report
Q3	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND1)		
	Provide status reports on RPI 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)		Participated in WPEC remotely
	Complete transmission measurement per the nuclear data schedule in Appendix B (ND1)		Due to COVID-19 stay home order, the experimental program was halted since mid-march. Expect partial reopen in July.

	Complete capture measurement per the nuclear data schedule in Appendix B (ND1)		Due to COVID-19 stay home order, the experimental program was halted since mid-march. Expect partial reopen in July.
Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND1)		
	Provide status reports on RPI 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)		
	Complete data analysis for transmission and capture measurements and provide the data to ORNL as needed to support the evaluation effort per the nuclear data schedule in Appendix B (ND1)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**	No	Did not travel
Q2	**N/A**	No	Did not travel
Q3	OECD/NEA Paris, France May-20 ND1 ND2 Participate in WPEC, and WPEC (Danon, Lui) As US Measurements Chair, participate in WPEC and SG-40 annual meeting to present NCSP/RPI nuclear data measurement work. Participate in SG (thermal scattering meeting) to present NCSP/RPI thermal scattering measurements and analysis.	No	Due to COVID meeting was hosted remotely and travel did not occur.
Q4	**N/A**		

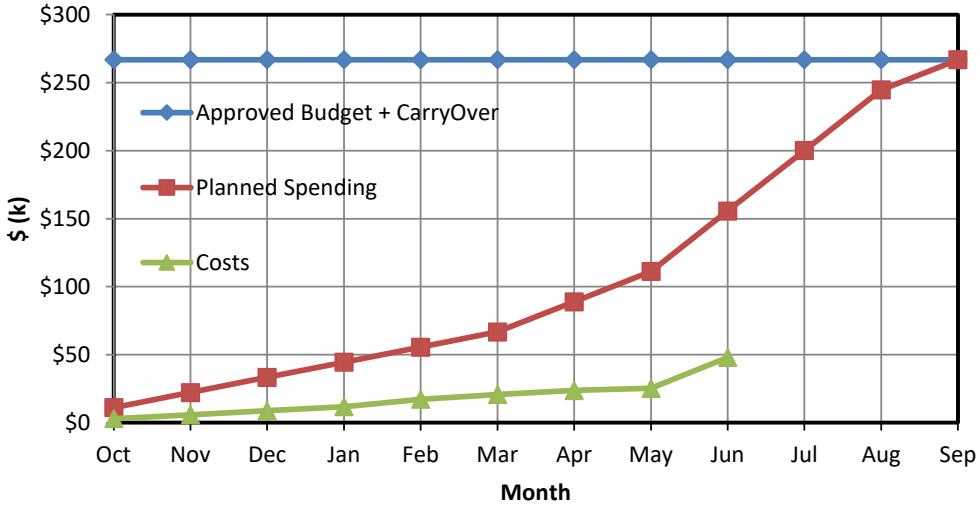
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1		No	
Q2		No	
Q3		No	
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: ND2
Task Title: Thermal Neutron Scattering Measurement for Improvement of Criticality Calculations and Propagation of Scattering Kernel Uncertainties
M&O Contractor Name: RPI
Point of Contact Name: Yaron Danon
Point of Contact Phone: 518-276-4008

Reference: BNR Code 0909010
Date of Report: 7 2, 2020

BUDGET



1. **Carryover into FY 2020** = $ 116,888
2. **Approved FY 2020 Budget** = $ 266,888 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $ 8,827
4. **Actual spending for 2nd Quarter FY 2020** = $11,998
5. **Actual spending for 3rd Quarter FY 2020** = $27,126
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $90,000

MAJOR ACCOMPLISHMENTS

- Finalized design of new neutron producing (Ta) target capable of safely handling 40 kW of electron beam power.
- Investigated disagreement between MCNP and experiment when high energy neutrons are produced from photons in Ta.
- Submitted conference paper for ANS Winter 2020.

NCSP Quarterly Progress Report (FY-2020 Q3)

RPI ND2 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 status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND2)		
	Provide status reports on RPI 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)		
	Submit cryostat order to vendor (ND2)		
Q2	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND2)		
	Provide status reports on RPI 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 to report
	Complete design and order of auxiliary support for cold moderator. (ND2)		
Q3	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND2)		
	Provide status reports on RPI 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 to report, participated in WPEC meeting remotely

	Complete cryostat test. (ND2)		Colling head malfunctioned in factory acceptance test. The vendor is working on repair.
Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND2)		
	Provide status reports on RPI 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)		
	Complete cold moderator test. (ND2)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**	No	Did not travel
Q2	**N/A**	No	Did not travel
Q3	OECD/NEA Paris, France May-20 ND1 ND2 Participate in WPEC, and WPEC (Danon, Lui) As US Measurements Chair, participate in WPEC and SG-40 annual meeting to present NCSP/RPI nuclear data measurement work. Participate in SG (thermal scattering meeting) to present NCSP/RPI thermal scattering measurements and analysis.		No travel to report, participated in WPEC meeting remotely
Q4	**N/A**		

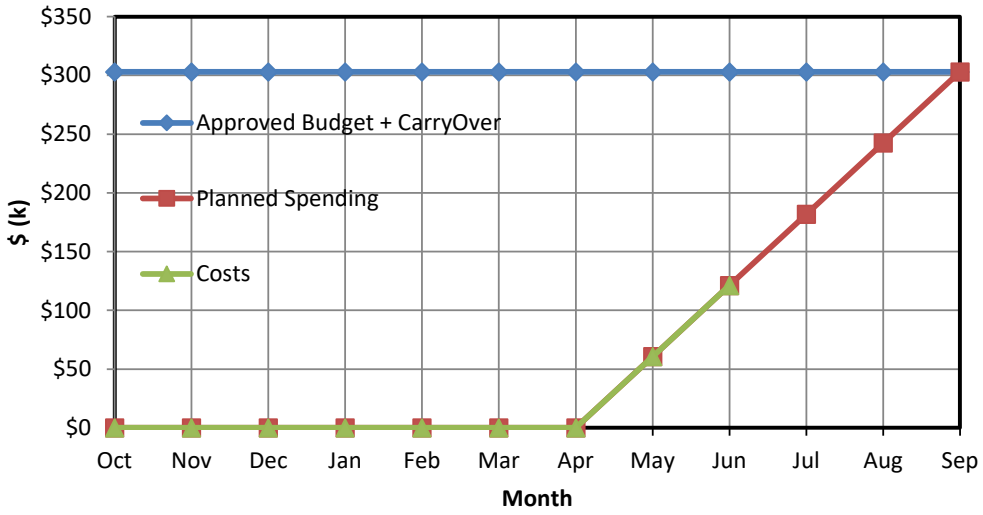
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1		No	
Q2		No	
Q3	D. Fritz, Y. Danon, A Cold Moderator For Sub-Thermal Neutron Flux Enhancement At The RPI-LINAC, submitted to ANS 2020 Winter Meeting and Nuclear Technology Expo, 2020.	YES	Submitted, pending review and approval by ANS
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: ND3
Task Title: RPI/ORNL: LINAC 2020 Nuclear Data Capabilities Maintenance Plan
M&O Contractor Name: RPI
Point of Contact Name: Yaron Danon
Point of Contact Phone: 518-276-4008

Reference: BNR Code 0909010
Date of Report: 7 2, 2020

BUDGET



1. **Carryover into FY 2020** = $ 0
2. **Approved FY 2020 Budget** = $ 303K (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $ 0
4. **Actual spending for 2nd Quarter FY 2020** = $ 0
5. **Actual spending for 3rd Quarter FY 2020** = $ 121,800
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $ 0

MAJOR ACCOMPLISHMENTS

- Management review with NNL/NCSP/RPI completed
- Completed the factory acceptance test of the first speed-of-light accelerating structure (remotely).
- Completed the factory acceptance test of the fifth modulator (remotely).
- Completed major project planning effort with NNL

NCSP Quarterly Progress Report (FY-2020 Q3)

RPI ND3 Milestones:

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

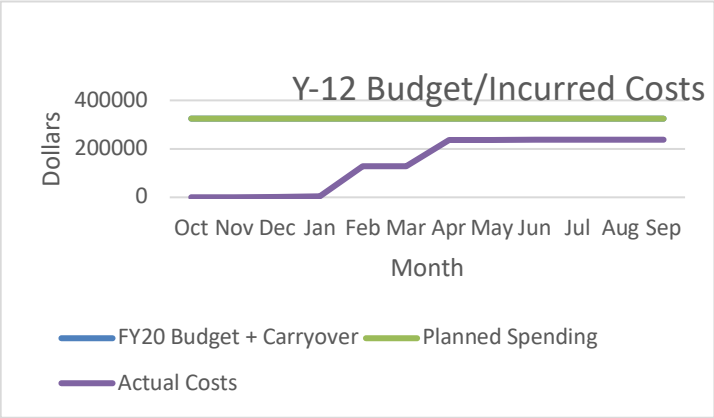
Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND3)		
	Factory acceptance test of RF Modulators 4 (ND3)		
Q2	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND3)		
	Factory acceptance test of Tapered Phase Velocity accelerating structure. (ND3)		
Q3	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND3)		
	Factory Acceptance test for Tapered Phase Velocity and Speed of Light #1 Accelerator Sections (ND3)		
	Factory Acceptance test of first Speed of Light accelerating structure and Delivery and of TPV and SOL1 Accelerator Sections. (ND3)		Delivery is behind schedule due to COVID19 (can receive large items once we return to work)
	Factory Acceptance test of Modulator 5 (remotely viewed). (ND3)		
Q4	Provide status reports on all nuclear data support activities in NCSP Quarterly Progress Reports (ND3)		
	Site acceptance testing of Modulator 1. (ND3)		
	Site acceptance testing and conditioning of first speed of light accelerating structure. (ND3)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	N/A	No	Did not travel
Q2	N/A	No	Did not travel
Q3	N/A	No	Did not travel
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1		No	
Q2		No	
Q3		No	
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtasks: ND1 **Task Title:** Fabrication of New Uranium Target for IRMM/GELINA for Cross-section Measurements **M&O Contractor Name:** Y12 **Point of Contact Name:** Kevin Reynolds **Point of Contact Phone:** (865) 241-9067	**Reference: B&R DP0909010** **Date of Report: July 8, 2020**
BUDGET	**MAJOR ACCOMPLISHMENTS**
 1. **Carryover into FY 2020** = $324,722.59 2. **Approved FY 2020 Budget** = $0.00 + $324,722.59 = $324,722.59 (includes carryover) 3. **Actual spending for 1st Quarter FY 2020** = $2,168.14 4. **Actual spending for 2nd Quarter FY 2020** = $126,087.30 5. **Actual spending for 3rd Quarter FY 2020** = $109,534.50 6. **Actual spending for 4rd Quarter FY 2020** = $ 7. **Projected carryover into FY 2021 =** $	Q1: Fabrication of new target has begun. Completion estimated in summer (Q3) with delivery in Q4 Alight overage in cost of target manufacture to be covered by carryover in accounts from previous year. Q2: No report from manufacturer as none is expected until Q3 for completion of fabrication. Q3: MSC anticipating September completion of target assembly subject to COVID impacts. Du-Mo disk completed, now waiting on stainless steel components for final assembly.

NCSP Quarterly Progress Report (FY-2020 Q3)

Y12 ND Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	COMMENTS
Q1	Provide a status report of the fabrication of a depleted uranium/molybdenum target per IRMM/GELINA specifications to the NCSP Manager. (ND1)		
Q2	Provide a status report of the fabrication of a depleted uranium/molybdenum target per IRMM/GELINA specifications to the NCSP Manager. (ND1)		
Q3	Provide a status report of the fabrication of a depleted uranium/molybdenum target per IRMM/GELINA specifications to the NCSP Manager. (ND1)		Completion this FY at risk due to COVID impacts.
Q4	Provide a status report of the fabrication of a depleted uranium/molybdenum target per IRMM/GELINA specifications to the NCSP Manager. (ND1)		

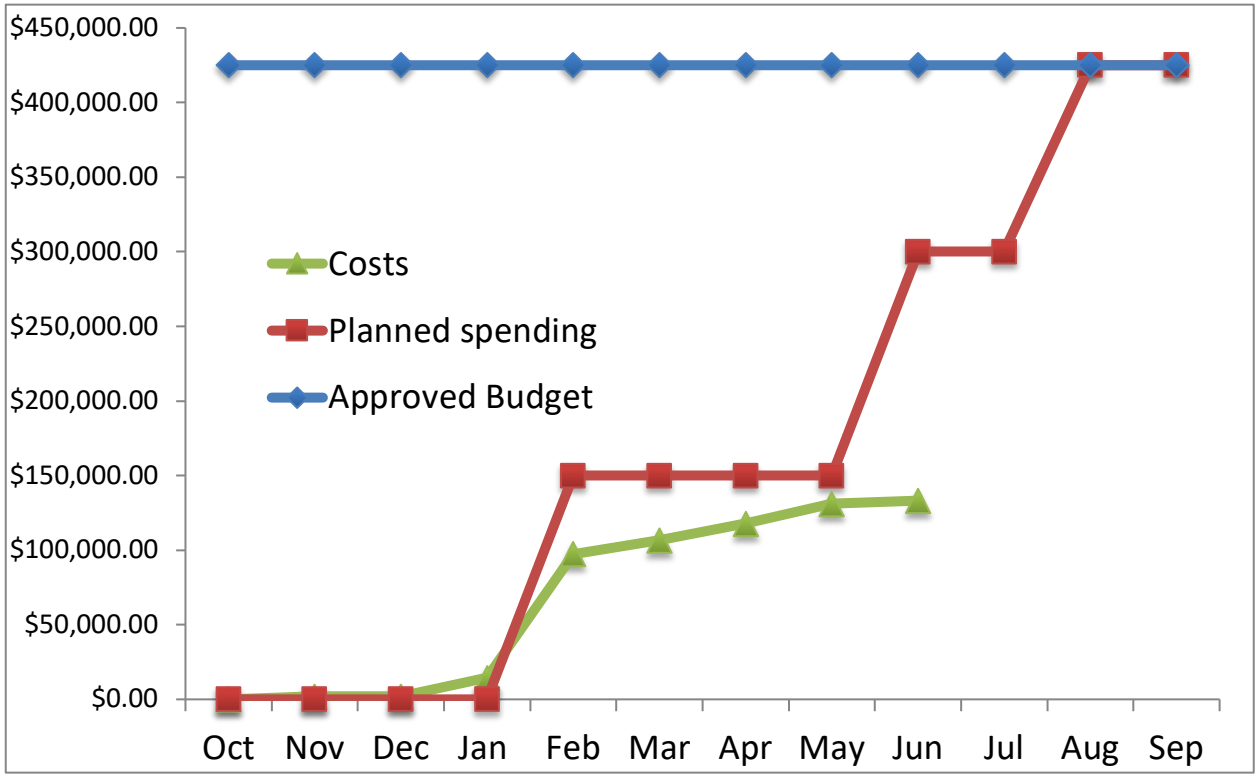
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element: LANL TE3
Task Title: Conduct Hands-On Criticality Safety Training Course at NCERC
M&O Contractor Name: Los Alamos National Laboratory (LANL)
Point of Contact Name: Joetta Goda
Point of Contact Phone: (505) 667-2812

Reference: DP0909010
Date of Report: July 4, 2020

BUDGET



1. **Carryover into FY 2020 = $0K**
2. **Approved FY 2020 Budget = $425K**
3. **Actual spending for 1st Quarter FY 2020 = $2K**
4. **Actual spending for 2nd Quarter FY 2020 = $105K**
5. **Actual spending for 3rd Quarter FY 2020 = $27K**
6. **Actual spending for 4rd Quarter FY 2020 = $0K**
7. **Projected carryover into FY 2022 = $0K**

MAJOR ACCOMPLISHMENTS

- NCSP Manager's Class in June cancelled.
- Preparations for August class are ongoing.

NCSP Quarterly Progress Report (FY-2020 Q3)

LANL TE3 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 status reports on all training activities to the NCSP Manager. (TE3)		
Q2	Provide status reports on all training activities to the NCSP Manager. (TE3)		
Q3	Provide status reports on all training activities to the NCSP Manager. (TE3)		
Q4	Provide status reports on all training activities to the NCSP Manager. (TE3)		

NCSP Quarterly Progress Report (FY-2020 Q3)

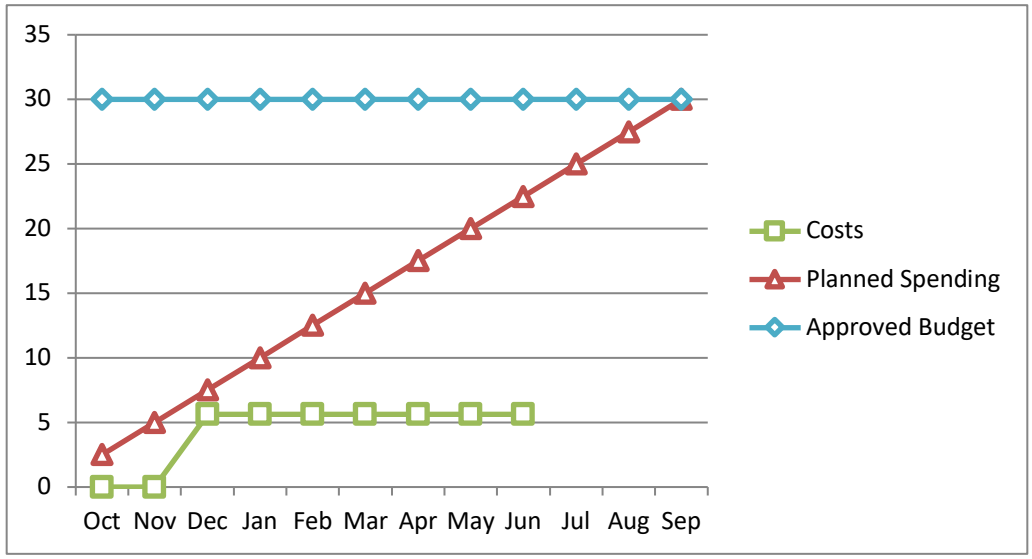
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element: LANL TE4
Task Title: On-Site Introductory Training for the NCS Practitioner on Modern Approaches to Validation using Sensitivity and Uncertainty Analysis Tools
M&O Contractor Name: Los Alamos National Laboratory (LANL)
Point of Contact Name: Brian Bluhm / Bob Little
Point of Contact Phone: (505) 667-2440 / (505) 665-3487

Reference: B&R DP090200
Date of Report: July 6, 2020

BUDGET



1. **Carryover into FY 2020 = $0**
2. **Approved FY 2020 Budget = $30,000 (includes carryover)**
3. **Actual spending for 1st Quarter FY 2020 = $5,628**
4. **Actual spending for 2nd Quarter FY 2020 = $0**
5. **Actual spending for 3rd Quarter FY 2020 = $0**
6. **Actual spending for 4rd Quarter FY 2020 = $**
7. **Projected carryover into FY 2021 = $0**

MAJOR ACCOMPLISHMENTS

- Location / dates for joint S/U training still being determined for FY20. Most recent outreach was to Idaho National Laboratory, but with travel on hold, details obviously still need to be worked out.

NCSP Quarterly Progress Report (FY-2020 Q3)

LANL TE4 Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	Provide status reports on all training activities to the NCSP Manager. (TE4)		
Q2	Provide status reports on all training activities to the NCSP Manager. (TE4)		
Q3	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 FY20. (TE4)		

NCSP Quarterly Progress Report (FY-2020 Q3)

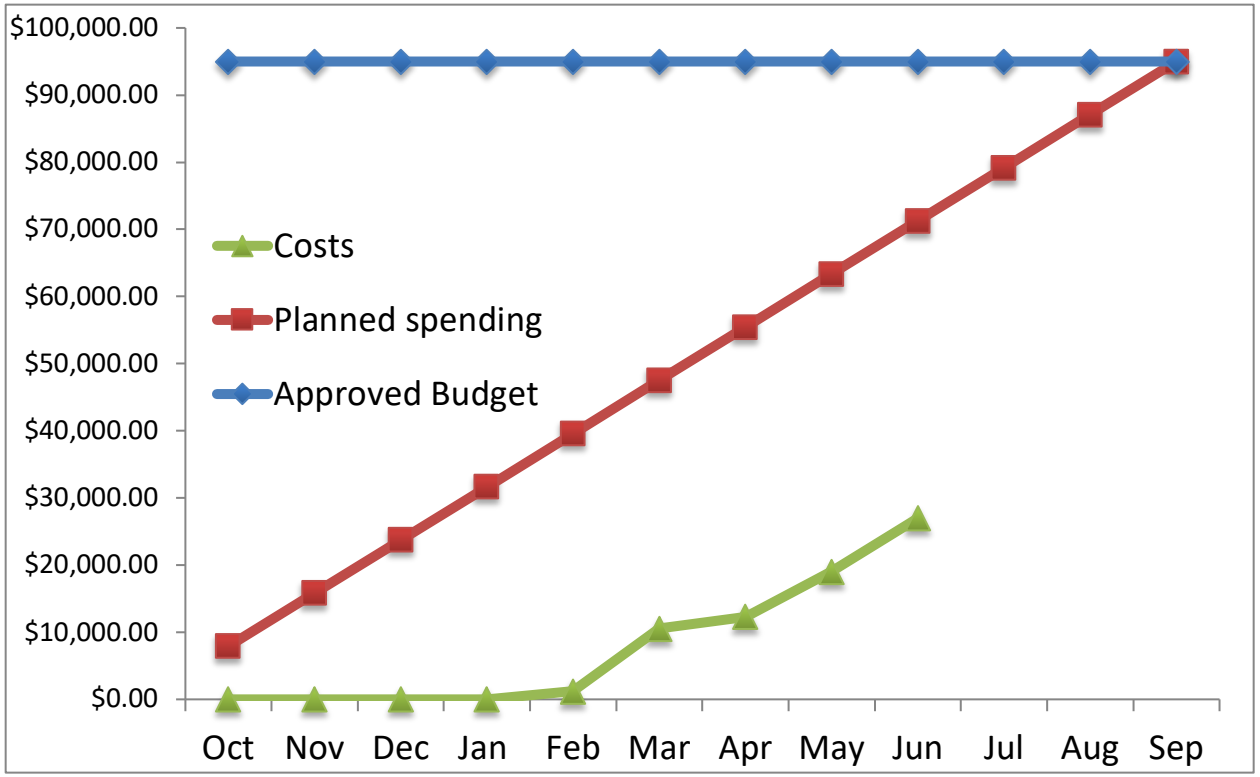
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element: LANL TE6
Task Title: Development of University Pipeline for Criticality Safety Professionals
M&O Contractor Name: Los Alamos National Laboratory (LANL)
Point of Contact Name: Joetta Goda
Point of Contact Phone: (505) 667-2812

Reference: B&R DP0909010
Date of Report: July 4, 2020

BUDGET



1. **Carryover into FY 2020 = $0K**
2. **Approved FY 2020 Budget = $50K**
3. **Actual spending for 1st Quarter FY 2020 = $0K**
4. **Actual spending for 2nd Quarter FY 2020 = $10K**
5. **Actual spending for 3rd Quarter FY 2020 = $16K**
6. **Actual spending for 4rd Quarter FY 2020 = $0K**
7. **Projected carryover into FY 2021 = $0K**

MAJOR ACCOMPLISHMENTS

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NCSP Quarterly Progress Report (FY-2020 Q3)

LANL TE6 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 status reports on all training activities to the NCSP Manager. (TE6)		
Q2	Provide status reports on all training activities to the NCSP Manager. (TE6)		
Q3	Provide status reports on all training activities to the NCSP Manager. (TE6)		
Q4	Provide status reports on all training activities to the NCSP Manager. (TE6)		

NCSP Quarterly Progress Report (FY-2020 Q3)

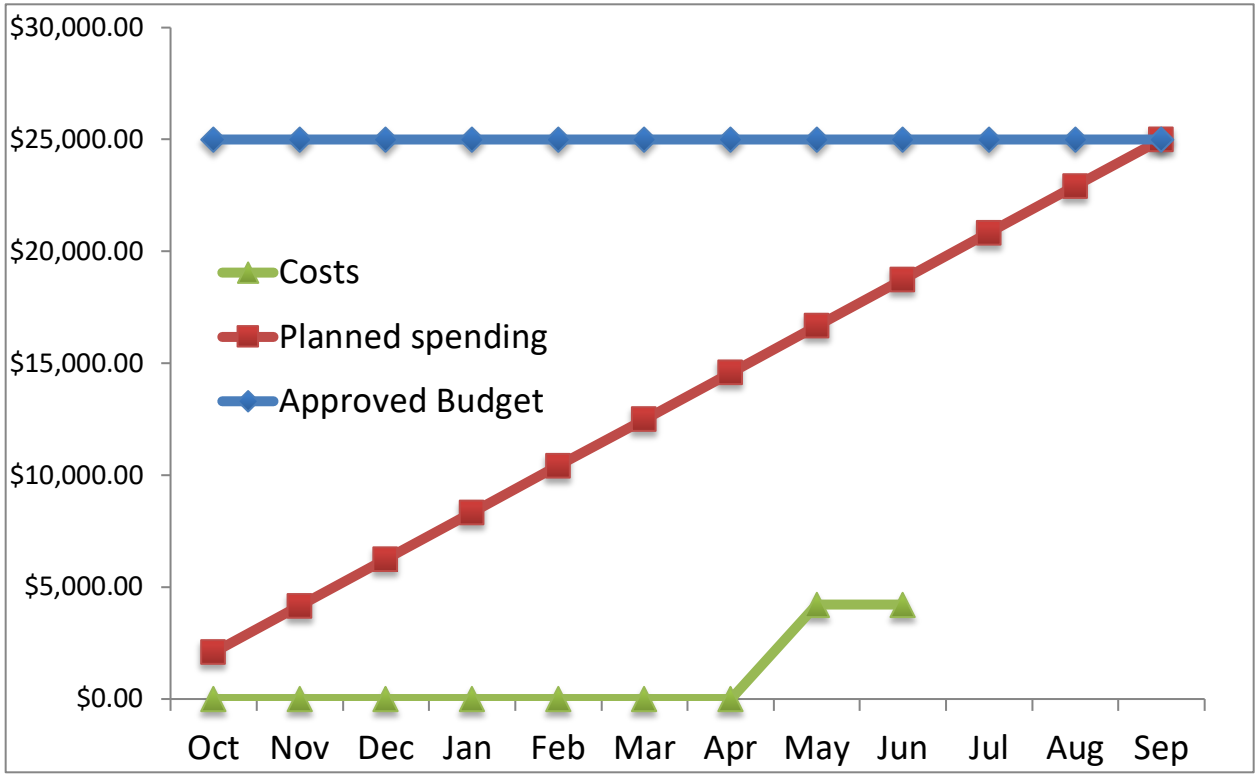
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element: LANL TE7
Task Title: Design and Develop a New NCSP T&E Course Criticality Safety Officers at DOE/NNSA Nuclear Facilities
M&O Contractor Name: Los Alamos National Laboratory (LANL)
Point of Contact Name: Joetta Goda
Point of Contact Phone: (505) 667-2812

Reference: B&R DP0909010
Date of Report: July 4, 2020

BUDGET



1. **Carryover into FY 2019 = $ 0K**
2. **Approved FY 2020 Budget = $25K**
3. **Actual spending for 1st Quarter FY 2019 = $0K**
4. **Actual spending for 2nd Quarter FY 2019 = $0K**
5. **Actual spending for 3rd Quarter FY 2019 = $4K**
6. **Actual spending for 4rd Quarter FY 2019 = $0K**
7. **Projected carryover into FY 2020 = $0K**

MAJOR ACCOMPLISHMENTS

- Charges were incorrectly put to a different code and were shifted to the correct code in May.

NCSP Quarterly Progress Report (FY-2020 Q3)

LANL TE7 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 status reports on all training activities to the NCSP Manager. (TE7)		
Q2	Provide status reports on all training activities to the NCSP Manager. (TE7)		
Q3	Provide status reports on all training activities to the NCSP Manager. (TE7)		
Q4	Provide status reports on all training activities to the NCSP Manager. (TE7)		

NCSP Quarterly Progress Report (FY-2020 Q3)

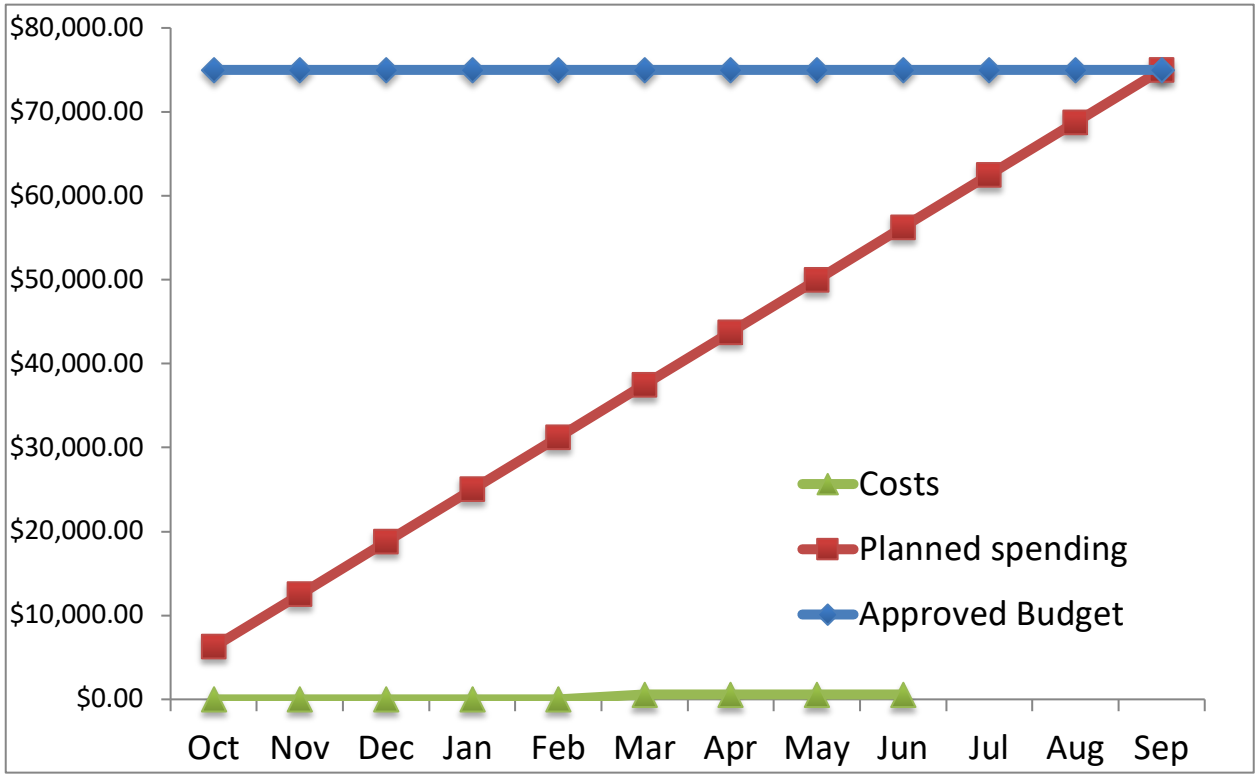
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element: LANL TE8
Task Title: Reactivity Simulation Aids
M&O Contractor Name: Los Alamos National Laboratory (LANL)
Point of Contact Name: Joetta Goda
Point of Contact Phone: (505) 667-2812

Reference: B&R DP0909010
Date of Report: July 4, 2020

BUDGET



1. **Carryover into FY 2020 = $0K**
2. **Approved FY 2020 Budget = $75K**
3. **Actual spending for 1st Quarter FY 2020 = $0K**
4. **Actual spending for 2nd Quarter FY 2020 = $1K**
5. **Actual spending for 3rd Quarter FY 2020 = $0K**
6. **Actual spending for 4rd Quarter FY 2020 = $0K**
7. **Projected carryover into FY 2021 = $0K**

MAJOR ACCOMPLISHMENTS

- No progress.

NCSP Quarterly Progress Report (FY-2020 Q3)

LANL TE8 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 status reports on all training activities to the NCSP Manager. (TE8)		
Q2	Provide status reports on all training activities to the NCSP Manager. (TE8)		
Q3	Provide status reports on all training activities to the NCSP Manager. (TE8)		
Q4	Provide status reports on all training activities to the NCSP Manager. (TE8)		

NCSP Quarterly Progress Report (FY-2020 Q3)

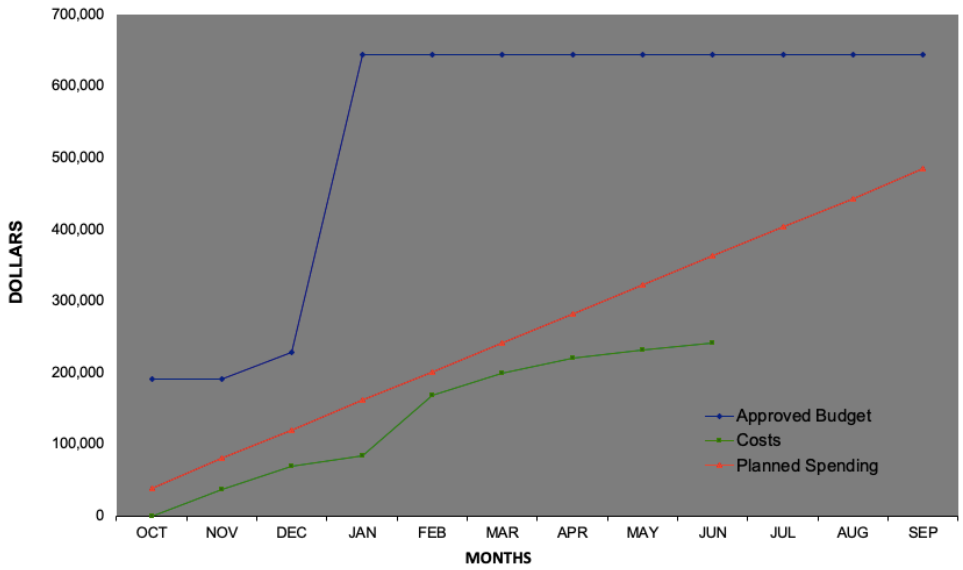
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtasks: TE1, 3, 6, 7, 9
Task Titles: See last page
M&O Contractor Name: Lawrence Livermore National Laboratory
Point of Contact Name: David Heinrichs
Point of Contact Phone: (925) 424-5679

Reference: B&R DP0909010
Date of Report: July 10, 2020

BUDGET



1. **Carryover into FY 2020** = $118,004
2. **Approved FY 2020 Budget** = $645,004 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $69,642
4. **Actual spending for 2nd Quarter FY 2020**= $130,260
5. **Actual spending for 3rd Quarter FY 2020** = $42,550
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $51,600 (8%)

MAJOR ACCOMPLISHMENTS

1. Provided registration and logistics support (TE1, TE3) for:
   - 2-week Y-12 course on April 6-17, 2020 at ORNL/NCERC*
   - 1-week Managers course on June 15-19, 2020 at NCERC*
   - 2-week CSE course on Aug 10-21, 2020 at NATM/NCERC/SNL
   - 2-week CSE course on Jan 25-Feb 5, 2021 at NATM/NCERC/SNL
   - 1-week Managers course on April 5-9, 2021 at SNL
   - 1-week Managers course on June 7-11, 20201 at NCERC
   - 2-week CSE course on Aug 9-20, 20201at NATM/NCERC/SNL

   *Course cancelled due to COVID-19 restrictions
2. For future classes, new tables and chairs were procured to provide for COVID-19 spacing requirements. Work plans have been written and controls established for the close proximity hands on portion of the class. HRP extensions have been granted for instructors and essential support personnel. Mandatory in-service inspections were completed on time. As a result of these accomplishments, LLNL is ready to support the August course. (TE1)
3. Participated in all T&E teleconferences (TE1, TE3, TE6, TE7).

NCSP Quarterly Progress Report (FY-2020 Q3)

LLNL T&E 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	Update, maintain and support the registration process and provide classroom and "hands on" TACS training in accordance with the schedule approved by the NCSP Manager. (TE1, TE3, TE6, TE7)		
	Conduct subcritical measurements using beryllium shells and finalize training materials addressing the concept of superior reflection. (TE7)		
	Provide a status report of the status of efforts to develop a new CSO/FMH course for the NCSP for piloting in FY20. (TE9)		
Q2	Update, maintain and support the registration process and provide classroom and "hands on" TACS training in accordance with the schedule approved by the NCSP Manager. (TE1, TE3, TE6, TE7)		The 1-week Managers course scheduled for March 30-April 3 was cancelled due to COVID-19 concerns.
	Conduct subcritical measurements using beryllium shells and finalize training materials addressing the concept of superior reflection. (TE7)		Instructors conducted subcritical measurements using beryllium shells in Q2.
	Provide a status report of the status of efforts to develop a new CSO/FMH course for the NCSP for piloting in FY20. (TE9)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Q3	Update, maintain and support the registration process and provide classroom and "hands on" TACS training in accordance with the schedule approved by the NCSP Manager. (TE1, TE3, TE6, TE7)		The 2-week Y12 course scheduled for April 6-17 and 1-week Manager's course scheduled for June 15-19 were cancelled due to COVID-19 concerns.
	Conduct subcritical measurements using beryllium shells and finalize training materials addressing the concept of superior reflection. (TE7)		
	Provide a status report of the status of efforts to develop a new CSO/FMH course for the NCSP for piloting in FY20. (TE9)		
Q4	Update, maintain and support the registration process and provide classroom and "hands on" TACS training in accordance with the schedule approved by the NCSP Manager. (TE1, TE3, TE6, TE7)		
	Conduct subcritical measurements using beryllium shells and finalize training materials addressing the concept of superior reflection. (TE7)		
	Provide a status report of the status of efforts to develop a new CSO/FMH course for the NCSP for piloting in FY20. (TE9)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4			
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	Catherine Percher, "LLNL 2019 Incorporation of Superior Reflectors into the Training Assembly for Criticality Safety," LLNL-PRES-804864, February 12, 2020.	**Yes**	
Q3	**N/A**		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

Task Titles:

TE1 Conduct Hands-on Training at the DAF (TACS)

TE3 Classroom Criticality Safety Training

TE6 Mobile (CAT III or IV material) Hands on Critical or Near Critical Demonstration Capability

TE7 Criticality Simulator to Demonstrate Criticality Physics Fundamentals to Process Operators

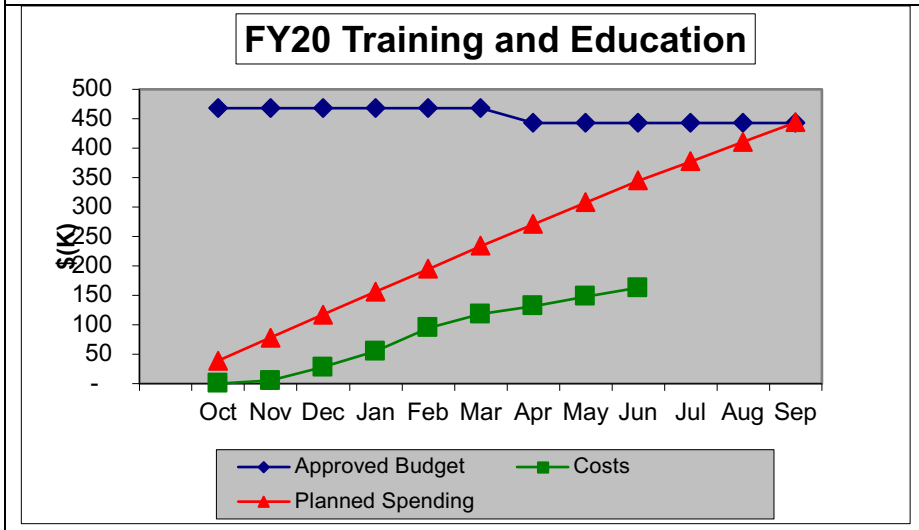
TE9 Design and Develop a New NCSP T&E Course for Criticality Safety Officers at DOE/NNSA Nuclear Facilities

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: TE1, 3, 5, 9, 10
Task Title: see last page
M&O Contractor Name: ORNL
Point of Contact Name: Doug Bowen
Point of Contact Phone: (865) 576-0315

Reference: DP0909010/ORNL
Date of Report: July 2020

BUDGET



1. **Carryover into FY 2020 = $128K**
2. **Approved FY 2020 Budget** = **$468K** (includes carryover) (In Q2, the budget was reduced by $25K to account for the movement of funds to RSICC AM1)
3. **Actual spending for 1st Quarter FY 2020 = $28K**
4. **Actual spending for 2nd Quarter FY 2020 = $90K**
5. **Actual spending for 3rd Quarter FY 2020 = $45K**
6. **Actual spending for 4th Quarter FY2020 = $**
7. **Projected carryover into FY 2021 = $**

MAJOR ACCOMPLISHMENTS

TE1 –Manage and Provide Instruction for the DOE Nuclear Criticality Safety Training & Education Program (Bowen, Marshall, Lousteau)

- COVID-19 resulted in the postponement of the April Manager Course at Sandia and the June Manager Course at NCERC. New dates have been provided in FY21.

TE3 - Hand-calculation Primer Expansion, LA-14244-M (Bowen, Busch)

- The CR and subcontractor issues delayed this task. This task is being outlined. The main body of the Hand Calc primer is being revised, a handout booklet is being generated for T&E courses, and a web-based educational tool is being developed as an NCSet tool.

TE5 - On-Site Introductory Training for the NCS Practitioner on Modern Approaches to Validation using Sensitivity and Uncertainty Analysis Tools (Marshall)

- COVID-19 restrictions were put in place and no travel or realistic scheduling can be done at this time, therefore no additional efforts have been made

TE9 - Design and Develop a New NCSP T&E Course for Criticality Safety Officers at DOE/NNSA Nuclear Facilities (Bowen + TE team)

- The CSO course materials are being finalized. This course was going to be piloted in June 2020 at the NCERC Manager Course but was postponed due to COVID-19 issues. A new pilot course date is proposed for FY21.

TE10 - Design of an Subcritical Assembly at ORNL for use with the CSO Courses (Bowen, Holcomb, Hart)

- A feasibility report has been completed and is currently going through the internal review process at ORNL. A paper for the ANS Winter meeting has been prepared to provide the results of the feasibility study.
- The concept is feasible with AGN core plates; four cores are available at Y-12
- Experiments being designed include: 1. Approach the multiplication limit via adding fissile mass, 2. Interaction experiment with

NCSP Element and Subtask: TE1, 3, 5, 9, 10 **Task Title:** see last page **M&O Contractor Name:** ORNL **Point of Contact Name:** Doug Bowen **Point of Contact Phone:** (865) 576-0315	**Reference:** DP0909010/ORNL **Date of Report:** July 2020
	the top and bottom of the assembly core, 3. Moderation addition experiment wherein materials are added to the fuel plate control rod holes to determine whether the core is under-moderated or over-moderated, and 4. Experiment to add neutron poisons to the fuel plate control rod holes to examine neutron absorption effects.

NCSP Quarterly Progress Report (FY-2020 Q3)

ORNL TE 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 a status report in NCSP Quarterly Progress Reports on implementation of the NCS training program and resolution of CSSG comments from CSSG tasking 2016-01. (TE1)		
	Provide a status report on progress made to develop an updated Hand Calculation Primer (TE3)		Lack of funding in Q1 delayed this task.
	Provide a status report in NCSP Quarterly Progress Reports on the progress of 1-day onsite introductory validation training conducted at one or more DOE sites. (TE5)		
	Provide a status report of the status of efforts to develop a new CSO/FMH course for the NCSP for piloting in FY20. (TE9)		
Q2	Provide a status report in NCSP Quarterly Progress Reports on implementation of the NCS training program and resolution of CSSG comments from CSSG tasking 2016-01. (TE1)		Yellow highlight – this was done a long time ago.
	Provide a status report on progress made to develop an updated Hand Calculation Primer (TE3)		
	Provide a status report in NCSP Quarterly Progress Reports on the progress of 1-day onsite introductory validation training conducted at one or more DOE sites. (TE5)		Not know whether we can perform a training course at INL in FY20 or not due to COVID-19 issues.
	Provide a status report of the status of efforts to develop a new CSO/FMH course for the NCSP for piloting in FY20. (TE9)		

	Complete a feasibility report to the NCSP manager for the design and installation of a subcritical assembly at ORNL using existing resources at Y-12. If the concept is feasible, submit a proposal for consideration for FY20. (TE10)		Behind schedule due to delays with Y-12. A proposal was submitted for the next step of this process.
Q3	Provide a status report on progress made to develop an updated Hand Calculation Primer (TE3)		
	Provide a status report in NCSP Quarterly Progress Reports on the progress of 1-day onsite introductory validation training conducted at one or more DOE sites. (TE5)		Delayed due to COVID-19
	Provide a status report of the status of efforts to develop a new CSO/FMH course for the NCSP for piloting in FY20. (TE9)		Delayed due to COVID-19
Q4	Provide a status report in NCSP Quarterly Progress Reports on implementation of the NCS training program and resolution of CSSG comments from CSSG tasking 2016-01. (TE1)		
	Provide a status report on progress made to develop an updated Hand Calculation Primer (TE3)		
	Provide a status report in NCSP Quarterly Progress Reports on the progress of 1-day onsite introductory validation training conducted at one or more DOE sites. (TE5)		
	Provide a status report of the status of efforts to develop a new CSO/FMH course for the NCSP for piloting in FY20. (TE9)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**none**	No	
Q2	**none**	No	
Q3	• D. Bowen, A. Holcomb, S. Hart, "Feasibility Study for a Proposed Subcritical Assembly at Oak Ridge National Laboratory," 2020 ANS Winter Meeting.	**yes**	
Q4			

Task Title:

TE1 Manage and Provide Instruction for the DOE Nuclear Criticality Safety Training & Education Program

TE3 Hand-calculation Primer Expansion, LA-14244-M

TE5 On-Site Introductory Training for the NCS Practitioner on Modern Approaches to Validation using Sensitivity and Uncertainty Analysis Tools

TE9 Design and Develop a New NCSP T&E Course for Criticality Safety Officers at DOE/NNSA Nuclear Facilities

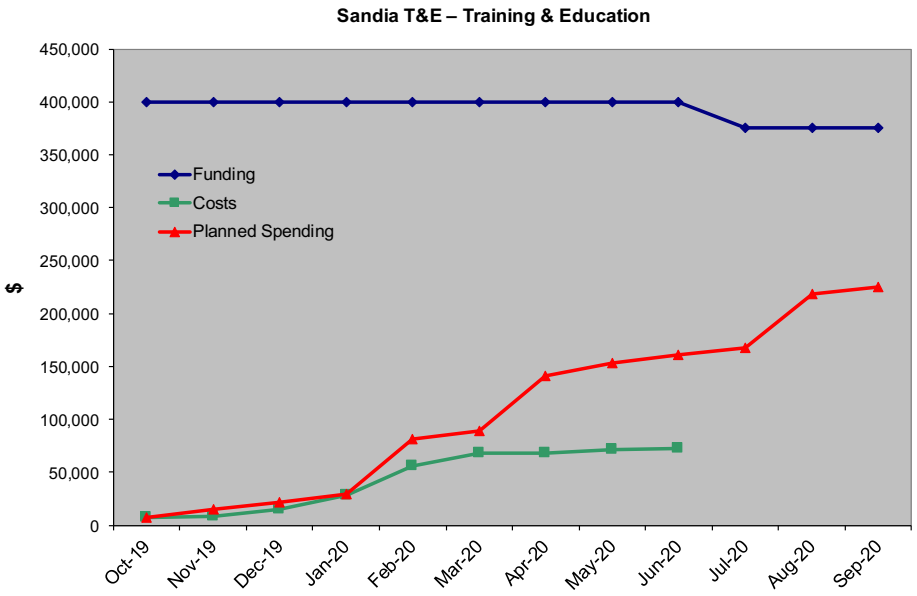
TE10 Design of a Subcritical Assembly at ORNL for use with the CSO/FMH Courses

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element: SNL TE1, 2
Task Titles:
TE1 Prepare for and Conduct Hands-on Criticality Safety Training at SNL
TE2 Design and Develop a New NCSP T&E Course Criticality Safety Officers at DOE/NNSA Nuclear Facilities
M&O Contractor Name: Sandia National Laboratories (SNL)
Point of Contact Name: Gary A. Harms
Point of Contact Phone: (505)845-3244

Reference: B&R DP 0909010
Date of Report: June 30, 2020

BUDGET



1. **Carryover into FY 2020** = $374,875
2. **Approved FY 2020 Budget** = $399,875 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $15,052
4. **Actual spending for 2nd Quarter FY 2020** = $52,775
5. **Actual spending for 3rd Quarter FY 2020** = $4,424
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $
8. **We are expecting a $25,000 pull-back in July**

MAJOR ACCOMPLISHMENTS

- The March/April Hands-On criticality safety course for Managers was postponed by the NCSP for COVID-19 concerns.
- The Sandia portion of the August Hands-On criticality safety course for NCSEs was cancelled by the NCSP for low student count.

NCSP Quarterly Progress Report (FY-2020 Q3)

SNL T&E Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone
			

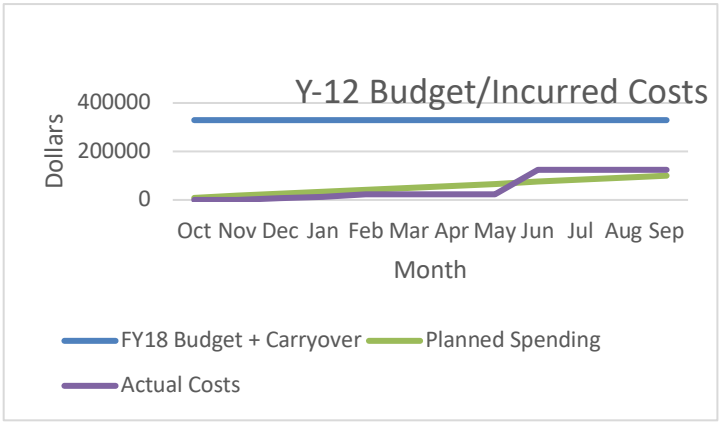
QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	Conduct hands-on training classes at Sandia and provide Human Factors and Equipment Reliability module support to the LANL training classes in accordance with the approved schedule. (TE1)		
	Work with LLNL, ORNL, LANL to develop and deploy a 1-week hands-on NCSP T&E course for fissile material handlers and criticality safety officer. (TE2)		
Q2	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)		
	Work with LLNL, ORNL, LANL to develop and deploy a 1-week hands-on NCSP T&E course for fissile material handlers and criticality safety officer. (TE2)		
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)		
	Work with LLNL, ORNL, LANL to develop and deploy a 1-week hands-on NCSP T&E course for fissile material handlers and criticality safety officer. (TE2)		
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)		
	Work with LLNL, ORNL, LANL to develop and deploy a 1-week hands-on NCSP T&E course for fissile material handlers and criticality safety officer. (TE2)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtasks: Y12 TE1, 3, 4 **Task Title:** TE1 Conduct Hands-On Criticality Safety Training Course (Lecture support week 1 of 2-week hands-on course and course material development) TE3 Design of a Subcritical Assembly at ORNL for use with the CSO Courses TE4 Design and Develop a New NCSP T&E Course for Criticality Safety Officers at DOE/NNSA Nuclear Facilities **M&O Contractor Name:** Y12 **Point of Contact Name:** Kevin Reynolds **Point of Contact Phone:** (865) 241-9067	**Reference: B&R DP0909010** **Date of Report: July 8, 2020**
BUDGET	**MAJOR ACCOMPLISHMENTS**



1. **Carryover into FY 2020** = $229,223.19
2. **Approved FY 2020 Budget** = $100,000 + $229,223.19 = $329,223.19 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $7,938.80
4. **Actual spending for 2nd Quarter FY 2020** = $16,263.71
5. **Actual spending for 3rd Quarter FY 2020** = $100,000 (transfer to LANL) no other costs
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $

Q1: No actions taken this quarter.

Q2: Travel to Las Vegas to support course, time at course and prep prior to travel.

Q3: No travel due to COVID impacts. No costs.

NCSP Quarterly Progress Report (FY-2020 Q3)

Y12 TE 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, TE3)		
	Provide a progress report on Y12 support to ORNL for a subcritical assembly feasibility study (TE4)		
Q2	Conduct hands-on training classes at NFO and NCERC to support the training classes in accordance with the approved schedule. (TE1, TE3)		
	Provide a progress report on Y12 support to ORNL for a subcritical assembly feasibility study (TE4)		
Q3	Conduct hands-on training classes at NFO and NCERC to support the training classes in accordance with the approved schedule. (TE1, TE3)		
	Provide a progress report on Y12 support to ORNL for a subcritical assembly feasibility study (TE4)		
Q4	Conduct hands-on training classes at NFO and NCERC to support the training classes in accordance with the approved schedule. (TE1, TE3)		
	Provide a progress report on Y12 support to ORNL for a subcritical assembly feasibility study (TE4)		

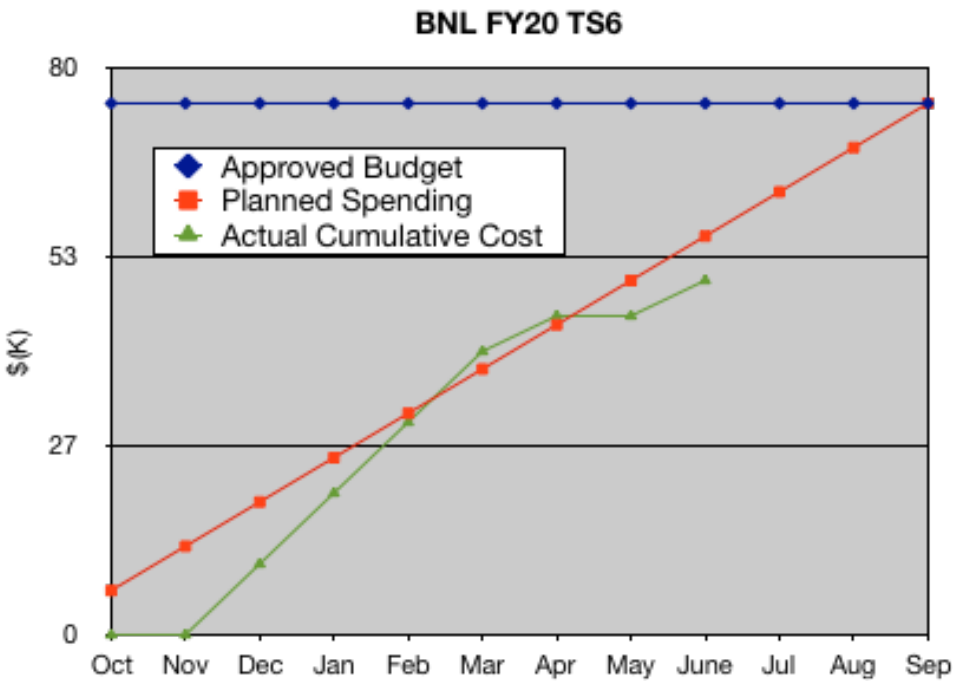
NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: NCSP Technical Support TS6 Task Title: ND Succession Planning M&O Contractor Name: BNL Point of Contact Name: David Brown Point of Contact Phone: 631-344-2814	Reference: DP0902000 Date of Report: July 8, 2020

BUDGET



1. **Carryover into FY 2020** = $0
2. **Approved FY 2020 Budget** = $75,000
3. **Actual spending for 1st Quarter FY 2020** = $10,000
4. **Actual spending for 2nd Quarter FY 2020** = $30,000
5. **Actual spending for 3rd Quarter FY 2020** = $50,000
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $

ACCOMPLISHMENTS

Sophia Hollick (a DOE SULI student collaborator, Fall 2019) completed development of new algorithm to estimate the mean resonance spacing D from resonance data. This algorithm performed far better than any existing technique for estimating D. However, it ran into trouble with missing and misclassified resonances.

Following on Sophia's work, Pedro Rodriguez (a DOE SULI student collaborator, Spring 2020) began the development of a Bayesian classifier that can both pinpoint missing resonances and suggest the appropriate spin group for misclassified resonances using some results from Random Matrix Theory (RMT).

NCSP Quarterly Progress Report (FY-2020 Q3)

BNL TS6 Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	NONE		
Q2	NONE		
Q3	NONE		This summer, Sophia and Pedro are combining efforts to extend the classifier with more RMT physics and unleash the classifier on the resonance data within the Atlas of Neutron Resonances. We aim to submit this work for publication this FY.
Q4	Provide NCSP Manager annual report of succession planning efforts.		

NCSP Quarterly Progress Report (FY-2020 Q3)

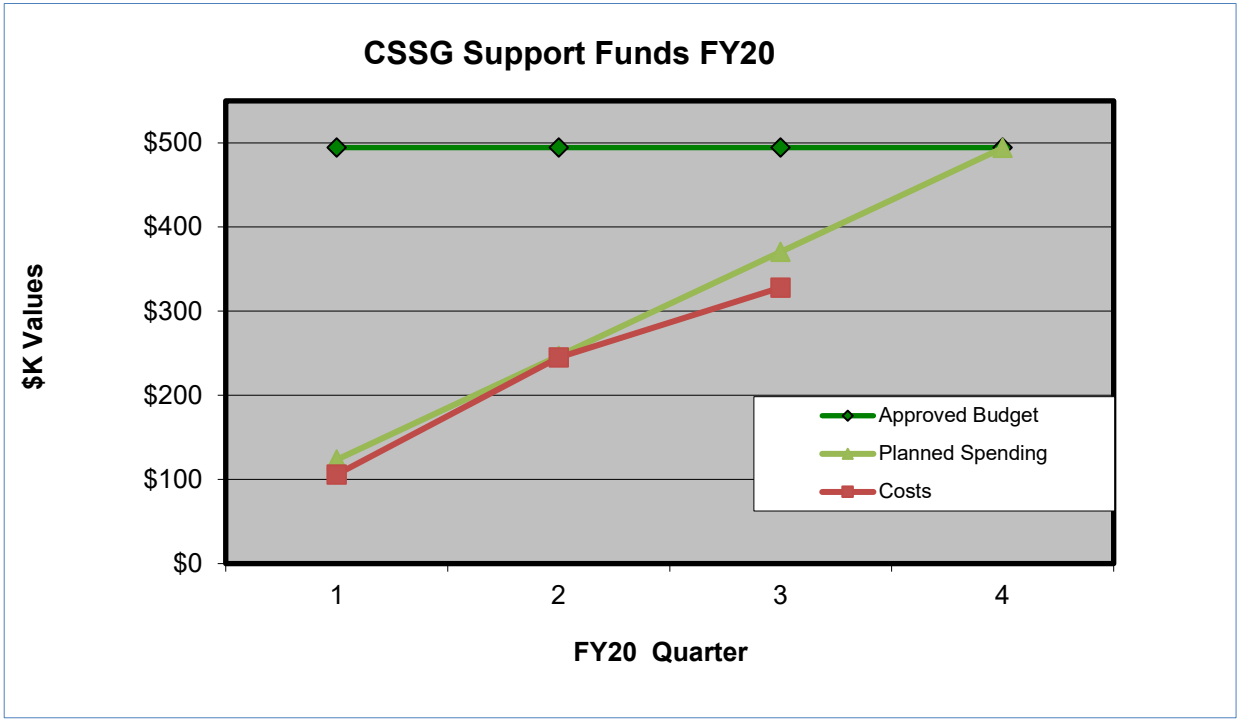
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**	**No**	
Q2	**N/A**	**No**	
Q3	**N/A**	**No**	
Q4	**N/A**	**No**	
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**	No	
Q2		**no**	
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: TS1
Task Title: CSSG Support
M&O Contractor Name(s): ANL, LANL, LLNL, ORNL, SRS
Point of Contact Name: David Hayes (CSSG Deputy Chair)
Point of Contact Phone: 505-667-4523

Reference: B&R DP 0909010
Date of Report: July 8, 2020

BUDGET



1. **Carryover into FY 2020** = $ 21,452
2. **Approved FY 2020 Budget** = $ 494,452
3. **Actual spending for 1st Quarter FY 2020** = $105,931
4. **Actual spending for 2nd Quarter FY 2020** = $138,916
5. **Actual spending for 3rd Quarter FY 2020** = $83,262
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021** = $0

MAJOR ACCOMPLISHMENTS

- Tasking 2020-01 (1158) Complete
- Tasking 2020-02 (FY21 Proposals) Complete
- Tasking 2020-03 (420.1 White Paper) Complete
- CSSG Telecons

NCSP Quarterly Progress Report (FY-2020 Q3)

CSSG TS Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	Provide the NCSP manager with a summary of CSSG activities, meetings, and tasks. (TS1)		**No Issues**
Q2	Provide the NCSP manager with a summary of CSSG activities, meetings, and tasks. (TS1)		**Taskings 2020-01, 2020-02, 2020-03 all behind schedule. Expect completion by EO APR.**
Q3	Provide the NCSP manager with a summary of CSSG activities, meetings, and tasks. (TS1)		**Taskings 2020-01, 2020-02, 2020-03 all completed. Tasking 2020-04 awaiting issuance.**
Q4	Provide the NCSP manager with a summary of CSSG activities, meetings, and tasks. (TS1)		

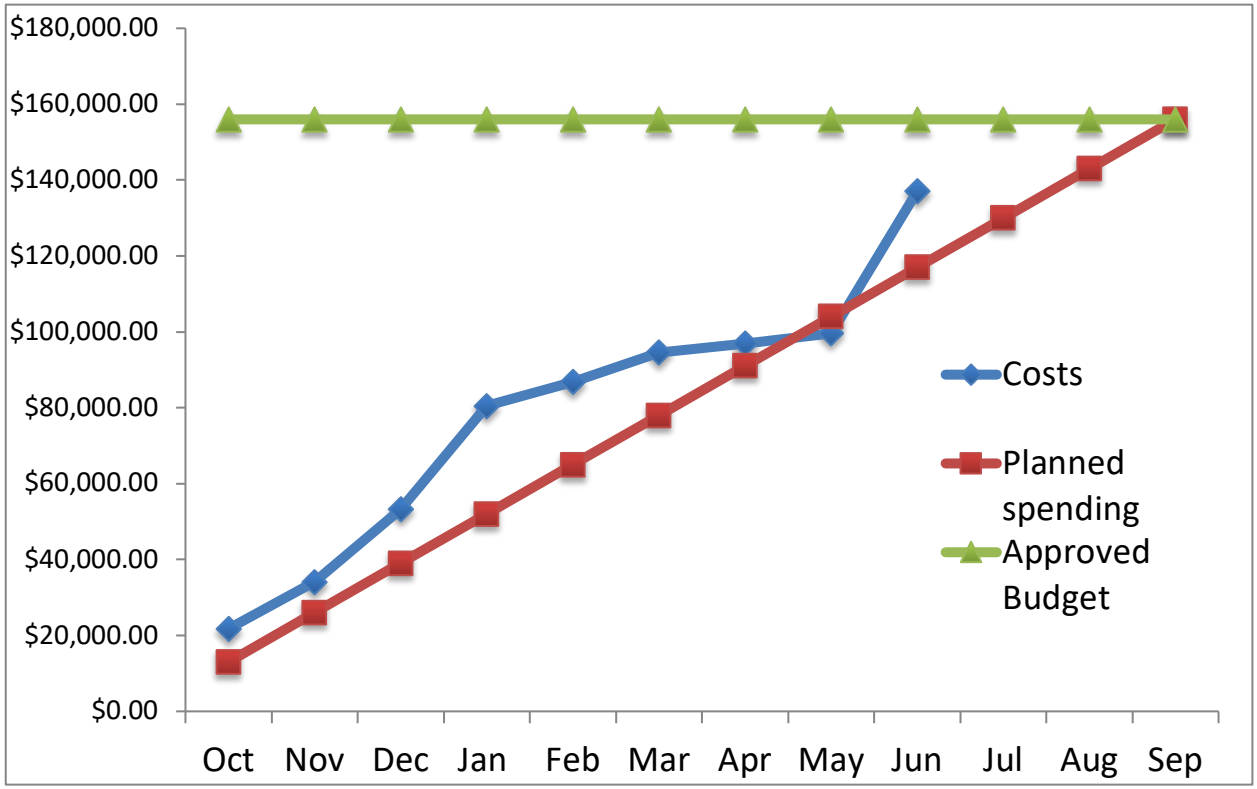
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element: LANL TS4
Task Title: AM, IE, ND Succession Planning
M&O Contractor Name: Los Alamos National Laboratory (LANL)
Point of Contact Name: Joetta Goda
Point of Contact Phone: (505) 667-2812

Reference: B&R DP0909010
Date of Report: July 4, 2020

BUDGET



1. **Carryover into FY 2020** = $0K
2. **Approved FY 2020 Budget** = $156K (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $53K
4. **Actual spending for 2nd Quarter FY 2020** = $41K
5. **Actual spending for 3rd Quarter FY 2020** = $42K
6. **Actual spending for 4rd Quarter FY 2020** = $0K
7. **Projected carryover into FY 2021** = $0K

MAJOR ACCOMPLISHMENTS

- Students working virtually for summer.

NCSP Quarterly Progress Report (FY-2020 Q3)

LANL TS4 Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	NONE		
Q2	NONE		
Q3	NONE		
Q4	Provide NCSP Manager annual report of succession planning efforts.		

NCSP Quarterly Progress Report (FY-2020 Q3)

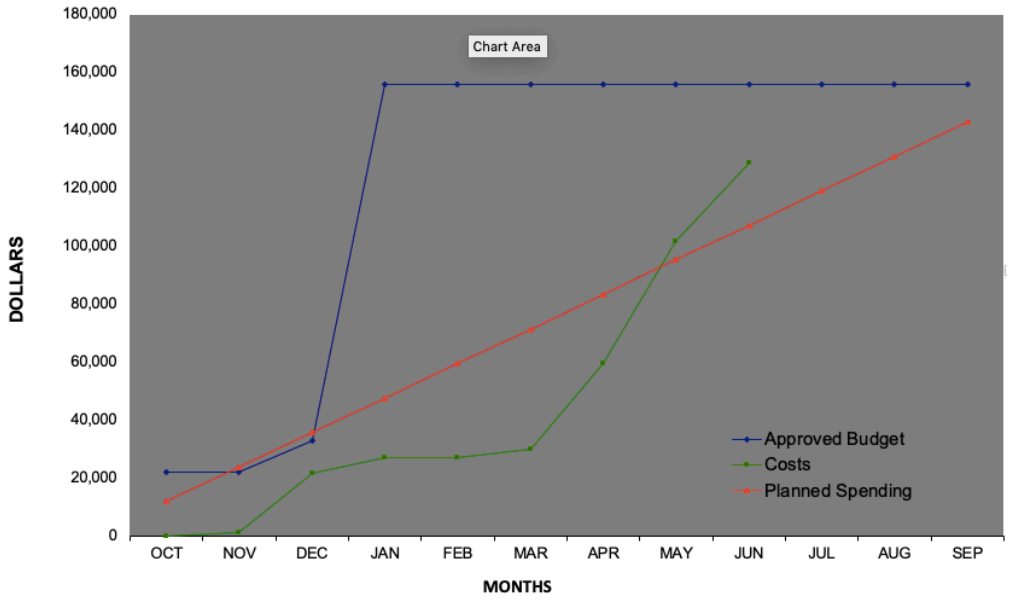
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtasks: TS5
Task Title: LLNL Succession Planning
M&O Contractor Name: Lawrence Livermore National Laboratory
Point of Contact Name: David Heinrichs
Point of Contact Phone: (925) 424-5679

Reference: B&R DP0909010
Date of Report: July 10, 2020

BUDGET



1. **Carryover into FY 2020** = $0
2. **Approved FY 2020 Budget** = $156,000 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $21,715
4. **Actual spending for 2nd Quarter FY 2020** = $ 8,256
5. **Actual spending for 3rd Quarter FY 2020** = $98,754
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021** = $0 (0%)

MAJOR ACCOMPLISHMENTS

1. Pam Williams is assisting Stacy Peterson with development and maintenance of the https://ncp.llnl.gov and https://nda.llnl.gov websites (IPD, TS).
2. Software and limited hardware purchases to facilitate telecommuting due to COVID-19 restrictions limiting onsite access to LLNL.
3. Limited office upgrades to eliminate shared offices and maximize social distancing in the workplace in LLNL B219 and B234.
4. Catherine Percher attended the 31st Working Party on International Nuclear Data Evaluation Co-operation (WPEC) online meetings on May 11-15, 2020 (AM, IE, IP&D, ND).
5. Ruby Araj, Shauntay Coleman, Liz Heckmaier, Soon Kim, Catherine Percher, John Scorby, Daniel Siefman and Will Zywiec attended the (virtual) 2020 American Nuclear Society Annual Meeting on June 8-11, 2020 (AM, IE, IP&D, ND, TS).
6. Godfree Gert registered for "Nuclear Data Fundamentals and AMPX Libraries Generation Course" offered online on October 26-30, 2020 (AM, ND, TS).

NCSP Quarterly Progress Report (FY-2020 Q3)

LLNL TS5 Milestones:

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

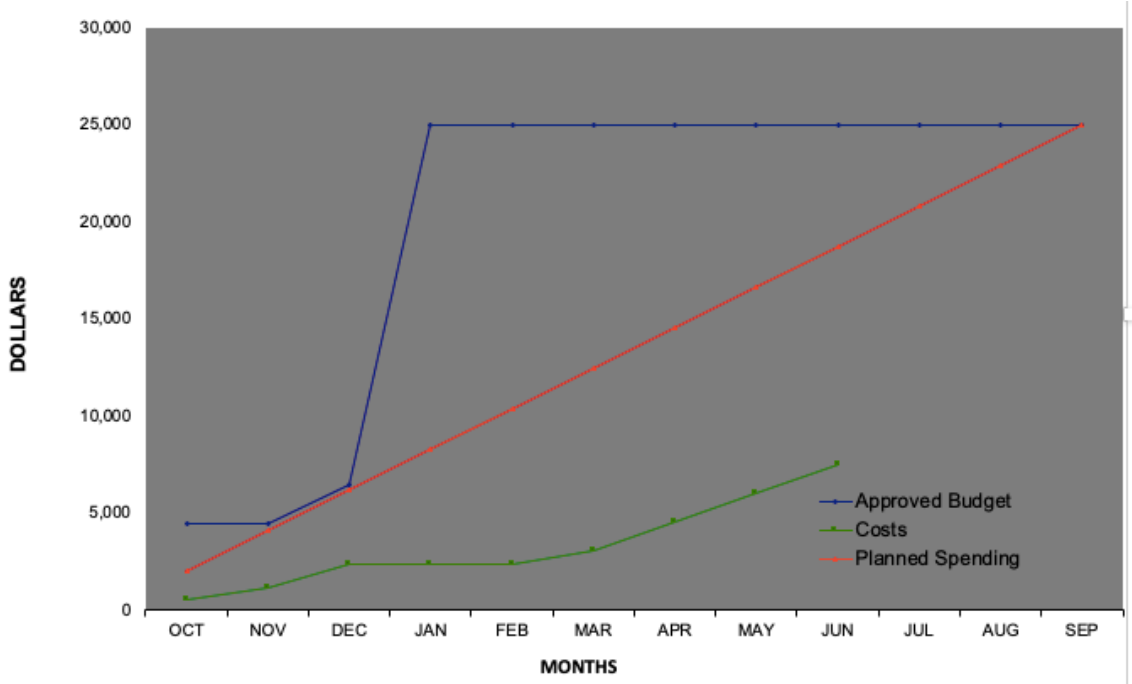
Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	NONE		
Q2	NONE		
Q3	NONE		
Q4	Provide NCSP Manager annual report of succession planning efforts.		

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtasks: TS16 **Task Title:** LLNL - NDA Website Support **M&O Contractor Name:** Lawrence Livermore National Laboratory **Point of Contact Name:** David Heinrichs **Point of Contact Phone:** (925) 424-5679	**Reference: B&R DP0909010** **Date of Report: July 10, 2020**
BUDGET	**MAJOR ACCOMPLISHMENTS**



1. **Carryover into FY 2020** = $0
2. **Approved FY 2020 Budget** = $25,000 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $2,400
4. **Actual spending for 2nd Quarter FY 2020** = $716
5. **Actual spending for 3rd Quarter FY 2020** = $4,440
6. **Actual spending for 4th Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $0 (0%)

1. Activity limited this period to basic site maintenance and ADA QA and accessibility reviews.

NCSP Quarterly Progress Report (FY-2020 Q3)

LLNL TS16 Milestones

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	Provide the NCSP manager with a summary of NDA Website support		
Q2	Provide the NCSP manager with a summary of NDA Website support		
Q3	Provide the NCSP manager with a summary of NDA Website support		
Q4	Provide the NCSP manager with a summary of NDA Website support		

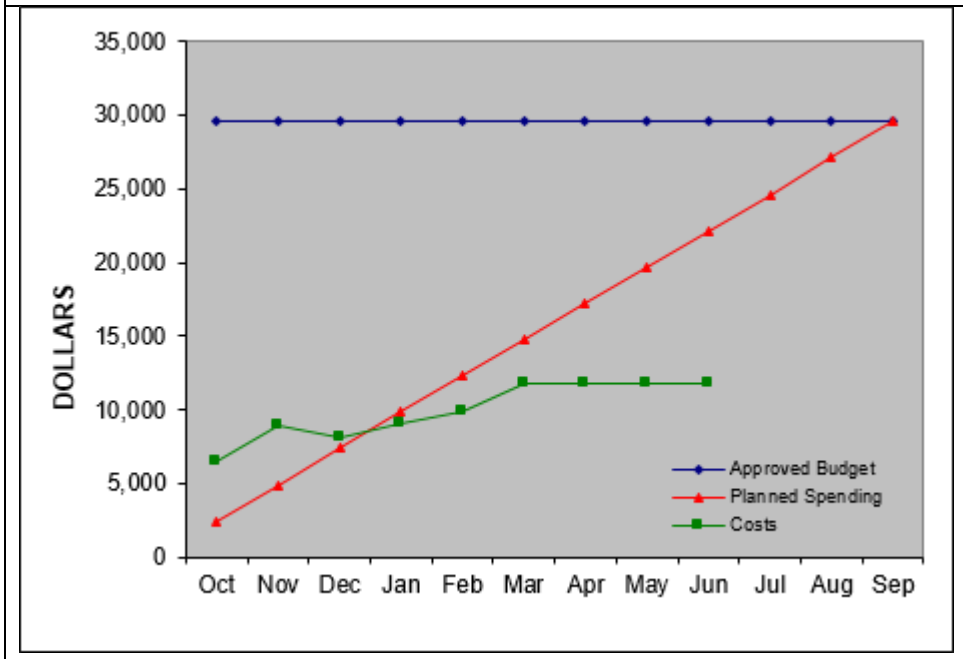
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	"DOE NNSA Nondestructive Assay Program," LLNL-WEB-765077, Approved: January 3, 2019.	**Yes**	
Q3	**N/A**		
Q4	**N/A**		

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtasks: NNL TS9
Task Title: NNL – Support for NDAG Chair activities
M&O Contractor Name: NNL
Point of Contact Name: Mike Zerkle
Point of Contact Phone: (412) 476-6188

Reference: B&R DP0909010
Date of Report: July 28, 2020

BUDGET



1. **Carryover into FY 2020** = $0.5k
2. **Approved FY 2020 Budget** = $29.5k (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $8k
4. **Actual spending for 2nd Quarter FY 2020** = $4k
5. **Actual spending for 3rd Quarter FY 2020** = $0k
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2020 =** $17k (61%)

MAJOR ACCOMPLISHMENTS

1. Completed NDAG technical review of NCSP FY2021 proposals.
2. Participated in NCSP Technical Program Review including
   a. Chaired NDAG Meeting
   b. Participated in CSSG review of NCSP FY2021 proposals in ex-officio capacity as NDAG Chair.
3. Participated in WANDA-2020 Workshop in Washington, DC including
   a. Presented NCSP Summary Presentation
   b. Co-chairing the "Transport, Scattering and Shielding" session.
   c. Completed summary of "Transport, Scattering and Shielding" session for the workshop minutes.
4. PHYSOR-2020 Conference, three authored/coauthored papers accepted for conference. Conference cancelled due to COVID-19 emergency.
   a. M. L. Zerkle, J. C. Holmes, and J. L. Wormald, "Re-evaluation of the TSL for Yttrium Hydride"
   b. J. L. Wormald, M. L. Zerkle, and J. C. Holmes, "Generation of the TSL for Zirconium Hydrides from Ab Initio Methods" (Received Best Paper Award)
   c. J. C. Holmes, M. L. Zerkle, and A. I. Hawari, "Validation of Thermal Scattering Laws for Light Water at Elevated Temperatures with Diffusion Experiments"
5. Participated in April 2020 IE Meeting remotely as NDAG Chair.
6. CEdT process support as NDAG Chair and CEdT Team Member for several IERs

NCSP Quarterly Progress Report (FY-2020 Q3)

NNL TS9 Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	Provide the NCSP manager with a summary of NDAG chair activities, meetings, and tasks. (TS9)		
Q2	Provide the NCSP manager with a summary of NDAG chair activities, meetings, and tasks. (TS9)		
Q3	Provide the NCSP manager with a summary of NDAG chair activities, meetings, and tasks. (TS9)		
Q4	Provide the NCSP manager with a summary of NDAG chair activities, meetings, and tasks. (TS9)		

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	OECD/NEA Paris, France Oct-19 TS9 ICSBEP and IRPhE Technical Review Meetings (Zerkle) Provide oversight of NCSP IE tasks as ICSBEP tasks are the end product of the NCSP IE process.	No	Report prepared, release approval delayed due to COVID-19 emergency.
Q3	Cambridge, England Apr-20 TS9 Attend PHYSOR 2020 meeting of the ANS. NCSP task that travel. (Zerkle) Present paper on thermal neutron scattering.	No	Conference cancelled due to the COVID-19 emergency.
	OECD/NEA Paris, France May-20 TS9 Participate in WPEC annual meeting (Zerkle) As NDAG Chair, participate in WPEC.	No	Meeting held online due to COVID-19 emergency.
Q4	**N/A**		

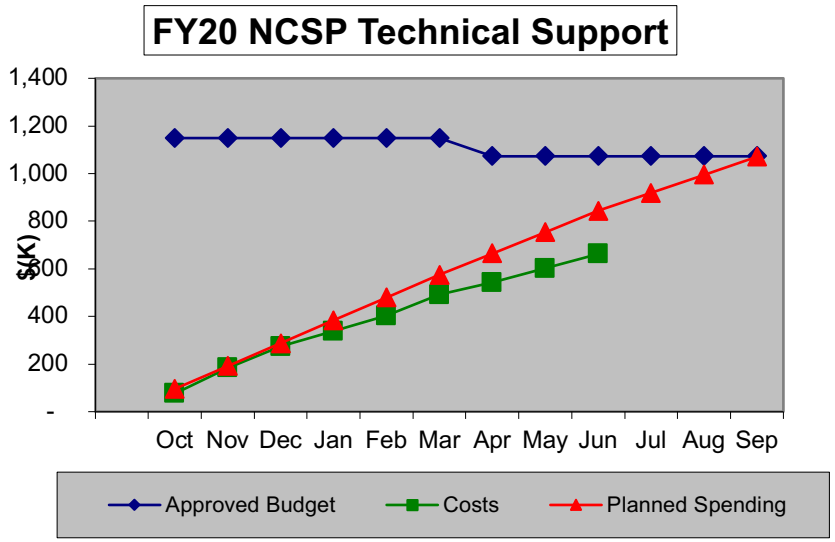
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	M. L. Zerkle, J. C. Holmes, and J. L. Wormald, "Re-evaluation of the TSL for Yttrium Hydride," *PHYSOR-2020*, Cambridge, UK, March 29-April 2, 2020 (accepted).	Yes	Submitted in Q4 once proceedings available, delayed due to COVID-19
	J. L. Wormald, M. L. Zerkle, and J. C. Holmes, "Generation of the TSL for Zirconium Hydrides from Ab Initio Methods," *PHYSOR-2020*, Cambridge, UK, March 29-April 2, 2020 (accepted)	Yes	Submitted in Q4 once proceedings available, delayed due to COVID-19
	J. C. Holmes, M. L. Zerkle, and A. I. Hawari, "Validation of Thermal Scattering Laws for Light Water at Elevated Temperatures with Diffusion Experiments," PHYSOR-2020, Cambridge, UK, March 29-April 2, 2020 (accepted)	Yes	Submitted in Q4 once proceedings available, delayed due to COVID-19
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: TS2 (Support for Lead Lab to Execute the NCSP**), TS7** (AM/ND Succession Planning), **TS8** (NCSP MGT Tool Development), **TS11** (CEdT Manager Support), **TS13** (NDA Technical Support Group and NDA Technical Infrastructure Project)
M&O Contractor Name: ORNL
Point of Contact Name: Doug Bowen
Point of Contact Phone: (865) 576-0315

Reference: DP0909010/ORNL
Date of Report: July 2020

BUDGET



1. **Carryover into FY 2020** = $183K
2. **Approved FY 2020 Budget** = $ (includes carryover) $1149K (Budget reduced in Q2 by $77K to account for the movement of funds to RSICC AM1)
3. **Actual spending for 1st Quarter FY 2020** = $273K
4. **Actual spending for 2nd Quarter FY 2020** = $ 218K
5. **Actual spending for 3rd Quarter FY 2020** = $ 171K
6. **Actual spending for 4rd Quarter FY 2020** = $ –
7. **Projected carryover into FY 2021 = $ –**

MAJOR ACCOMPLISHMENTS

TS2 – NCSP execution

- 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 Q2 QPRs into a single bookmarked PDF file for use in QPR. Conducted Q2 tele-con.
- Scott completed work on the FY20 Spring Newsletter
- Participated in CSSG telecons and assisted with CSSG tasks as necessary.
- Led and participated telecons and WebEx meetings as necessary to track NCSP MGT team actions and deliverables.
- Continue the process to populate the NDA website (http://nda.llnl.gov) with materials to support the NDA Technical Infrastructure Project.
- Working on NCSP website enhancements and fixes
- Rev. 3 of the FY20 Main 5-year plan and Rev. 2 of the Integral Experiment section was initiated in Q3.
- Continued to train Marsha Henley on NCSP MGT team work.
- Scott is working on adding legacy and FY20 foreign travel reports to the NCSP website.

TS7 – 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 train on GELINA and RPI nuclear data measurements alongside Klaus Guber and is also collaborating on ND work with RPI.

TS8 – IER Database

- The new IER database in G2 is on-line and functional. Doug Bowen and John Miller worked to get the new IER database in G2 . G2 developers assisted with providing access

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtask: TS2 (Support for Lead Lab to Execute the NCSP**), TS7** (AM/ND Succession Planning), **TS8** (NCSP MGT Tool Development), **TS11** (CEdT Manager Support), **TS13** (NDA Technical Support Group and NDA Technical Infrastructure Project) **M&O Contractor Name:** ORNL **Point of Contact Name:** Doug Bowen **Point of Contact Phone:** (865) 576-0315	**Reference:** DP0909010/ORNL **Date of Report:** July 2020
	to the IER teams. John and Doug are working with G2 developers on a list of priority improvements and bug-fixes in Q4 and for FY21. This will be synced with a new CEDT manual that is in progress. **TS11 – CEDT Manager Support** • Bowen assisted John Miller (SNL) on C_EDT tasks as needed (IER approvals, milestone tracking, and meeting execution support) • Supported monthly IE calls in Q3 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. • Bowen worked with Miller (Sandia) in Q3 to continue C_EDT transition efforts. John is now leading all IE telecons and is managing the action list/IER milestones. **TS13 – NDA Program** • Efforts continue on the TSG efforts to generate the new ANSI/ANS-8.28 standard for NDA administrative requirements in NCS programs. The first ANS-8 ballot was completed. A second ANS-8 ballot is expected very soon. • Worked with Cecil Parks on a DOE-wide NDA program with the this task being part of that effort. Plans to visit the NA-50 administrator is in progress. Bowen will publish the NCSP mission and vision in Q4 and will work with Larry Berg on a TSG re-boot and a 5-year plan.

NCSP Quarterly Progress Report (FY-2020 Q3)

ORNL TS 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	Manage CEdT process and coordinate execution of planned IERs each FY. (TS2)		
	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)		
	Provide NCSP Manager a status report of progress on the development of a program management tool. (TS8)		Implementation of IER system is due in Q2 or Q3 of FY2020. Reorg efforts with the G2 system programmers has led to some delays and mistakes.
	Provide the NCSP manager with a summary of NCSP CEdT support. (TS11)		
	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)		
Q2	Manage CEdT process and coordinate execution of planned IERs each FY. (TS2)		
	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)		
	Provide NCSP Manager a status report of progress on the development of a program management tool. (TS8)		

	Provide the NCSP manager with a summary of NCSP CEdT support. (TS11)		
	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)		
Q3	Manage CEdT process and coordinate execution of planned IERs each FY. (TS2)		
	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)		
	Provide NCSP Manager a status report of progress on the development of a program management tool. (TS8)		
	Provide the NCSP manager with a summary of NCSP CEdT support. (TS11)		
	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)		
Q4	Manage CEdT process and coordinate execution of planned IERs each FY. (TS2)		
	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)		
	Provide NCSP Manager a status report of progress on the development of a program management tool. (TS8)		
	Provide the NCSP manager with a summary of NCSP CEdT support. (TS11)		
	Participate in Q4 Budget Execution Meeting and assist NCSP Manager in finalization of approved tasks for next FY. (TS2)		

	Publish final Five-Year Plan. (TS2)		
	Provide NCSP Manager annual report of succession planning efforts. (TS7)		
	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)		

NCSP Quarterly Progress Report (FY-2020 Q3)

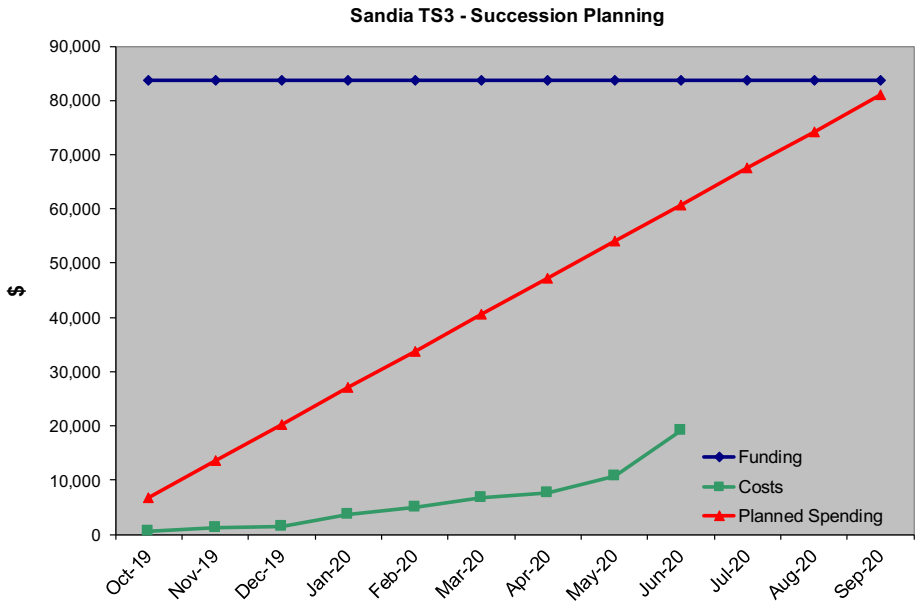
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	London, UK Jun-20 NCSP-TS2 ISO TC85/SC5 Plenary and WG8 Nuclear Criticality Safety Meetings (Bowen) Continue to provide US leadership with ISO Nuclear Criticality	**No**	**Cancelled**
Q4	Aldermaston, United Kingdom Mar 20 NCSP-TS2 Coordinate NCSP work as described in Appendix F of the Five Year Execution Plan. Bowen invited to participate.	**No**	**Cancelled**
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	5-year plans (main and IE sections)	Yes	
Q2	Rev. 1 and 2 of main 5-year plan. Rev. 1 of IE section of the 5-year plan.	Yes	
Q3	Spring NCSP newsletter	Yes	
Q4	none		

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element: SNL TS3
Task Title: Support for Experimentalist Succession Planning
M&O Contractor Name: Sandia National Laboratories (SNL)
Point of Contact Name: Gary A. Harms
Point of Contact Phone: (505)845-3244

Reference: B&R DP 0909010
Date of Report: June 30, 2020

BUDGET



1. **Carryover into FY 2019** = $2,593
2. **Approved FY 2020 Budget** = $83,593 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $1,400
4. **Actual spending for 2nd Quarter FY 2020** = $5,250
5. **Actual spending for 3rd Quarter FY 2020** = $12,527
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021** = $

MAJOR ACCOMPLISHMENTS

- We have a matrixed employee who is performing as an experimenter.
- The new experimenter is working on the IER-230 experiments.
- The new experimenter has been actively participating in the NCS community by attending conferences and publishing papers.
- Our year-round graduate student intern is making substantial progress on documenting some critical experiments done at Sandia in the late ‘80s and early ‘90s.

NCSP Quarterly Progress Report (FY-2020 Q3)

SNL TS3 Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	NONE		
Q2	NONE		
Q3	NONE		
Q4	Provide NCSP Manager annual report of succession planning efforts.		

NCSP Quarterly Progress Report (FY-2020 Q3)

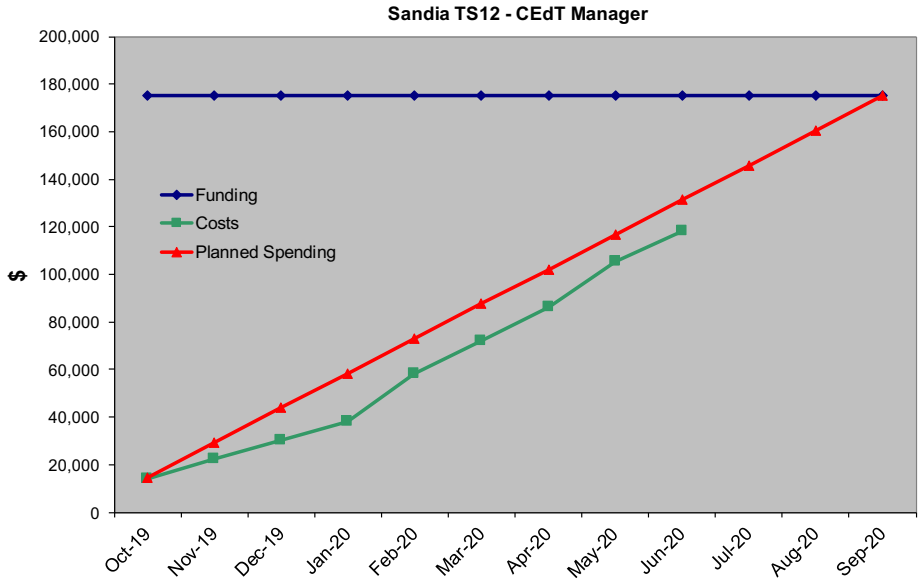
Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	D. E. Ames, TITANIUM AND ALUMINUM SLEEVE EXPERIMENTS IN FULLY-REFLECTED WATER-MODERATED U(4.31)O_2 FUEL ROD LATTICES WITH 2.8 CM PITCH, LEU-COMP-THERM-099, International Handbook of Evaluated Criticality Safety Benchmark Experiments, NEA/NSC/DOC(95)3, September, 2019.	Yes	
	D. E. Ames, "Sandia BUCCX Titanium and Aluminum Sleeve Experiments," ANS Winter Meeting and Expo, Washington DC, Nov. 2019.	Yes	
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element: SNL TS12
Task Title: Sandia – NCSP C_EdT Manager Support
M&O Contractor Name: Sandia National Laboratories (SNL)
Point of Contact Name: Gary A. Harms
Point of Contact Phone: (505)845-3244

Reference: B&R DP 0909010
Date of Report: June 30, 2020

BUDGET



1. **Carryover into FY 2019** = $0
2. **Approved FY 2020 Budget** = $175,000 (includes carryover)
3. **Actual spending for 1st Quarter FY 2020** = $30,102
4. **Actual spending for 2nd Quarter FY 2020** = $41,846
5. **Actual spending for 3rd Quarter FY 2020** = $46,145
6. **Actual spending for 4rd Quarter FY 2020** = $
7. **Projected carryover into FY 2021 =** $

MAJOR ACCOMPLISHMENTS

- Performed duties as the C_EdT Manager in support of the IE program element.
- Interacted with the various C_EdT Leads, NCSP Management Team, and other NCSP members. Facilitated IE update meetings and issued meeting agenda and minutes.
- Tracked progress and BCRs on IER action items and 2020 milestones including WFO IER action items.
- Worked in the IER database and assisted others in the transition to the new database.
- Assisted the DOE NCS Program Management Team on a broad scope of items.

NCSP Quarterly Progress Report (FY-2020 Q3)

SNL TS3 Milestones:

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

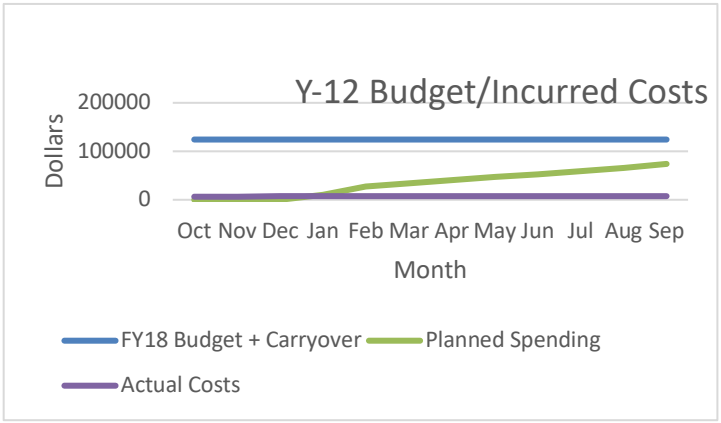
Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	Provide the NCSP manager with a summary of NCSP CEdT support. (TS12)		
Q2	Provide the NCSP manager with a summary of NCSP CEdT support. (TS12)		
Q3	Provide the NCSP manager with a summary of NCSP CEdT support. (TS12)		
Q4	Provide the NCSP manager with a summary of NCSP CEdT support. (TS12)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1			
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2020 Q3)

NCSP Element and Subtasks: Y12 TS10 **Task Title:** Y-12 – Foreign Travel and Program Support **M&O Contractor Name:** Y12 **Point of Contact Name:** Kevin Reynolds **Point of Contact Phone:** (865) 241-9067	**Reference: B&R DP0909010** **Date of Report: July 8, 2020**
BUDGET	**MAJOR ACCOMPLISHMENTS**
 1. **Carryover into FY 2020** = $ TBD 2. **Approved FY 2020 Budget** = $ TBD (includes carryover) 3. **Actual spending for 1st Quarter FY 2020** = $7,141.92 4. **Actual spending for 2nd Quarter FY 2020** = $345.87 5. **Actual spending for 3rd Quarter FY 2020** = $0.00 6. **Actual spending for 4rd Quarter FY 2020** = $ 7. **Projected carryover into FY 2021 =** $	Q1: No travel – cost this quarter is completion of cost from ICNC meeting. Q2: No travel, minor program support costs. Q3: No travel and no program support costs charged.

NCSP Quarterly Progress Report (FY-2020 Q3)

Y12 TS14 Milestones:

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	MILESTONE	STATUS	ISSUES/PATH FORWARD
Q1	Provide the NCSP manager an update of Foreign Travel and Program Support activities. (TS10)		
Q2	Provide the NCSP manager an update of Foreign Travel and Program Support activities. (TS10)		
Q3	Provide the NCSP manager an update of Foreign Travel and Program Support activities. (TS10)		Need to complete process of gathering cost data so that accurate estimate of current balance and projected carryover into FY21 (if any) can be completed.
Q4	Provide the NCSP manager an update of Foreign Travel and Program Support activities. (TS10)		

NCSP Quarterly Progress Report (FY-2020 Q3)

Foreign Trip Reports (from Appendix C – 5YP)			
Quarter	**Foreign Trip Report** (please provide details for reports not listed below)	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		
Publications (add each publication on an individual line)			
Quarter	**Publication Reference**	**Submitted yes/no**	**If no, state status of submittal**
Q1	**N/A**		
Q2	**N/A**		
Q3	**N/A**		
Q4	**N/A**		

2020-07-01

Summary of MCNP Criticality Classes in FY 2020 – Q1, Q2, Q3

F.B. Brown[1], M.E. Rising[1], J.L. Alwin[2]
[1] Monte Carlo Codes (XCP-3), [2] Radiation Transport Applications (XCP-7), LANL

FY2020 – Q3 classes are highlighted in red.

Total Students

- FY2020 – Q1: 100 students (Criticality, UNM, Intro, Intermediate, VR, UM, NJOY classes)
- FY2020 – Q2: 36 students (Criticality, UNM, Intro classes)
- FY2020 – Q3: 86 students (UNM class, LANL online: Intro, Variance Reduction, S/U)

Classes sponsored by DOE-NNSA-NCSP

- **Criticality Calculations with MCNP6 (LANL-AM1)**
  - **Oct 21-24, 2019, Y-12 22 students**
  - **March 9-13, 2020 LANL 10 students**
  - **TBD, 2020 online TBD**

  MCNP criticality class for NCS & reactor physics practitioners, with focus on best practices. Includes 1 day on NCS validation using MCNP6-Whisper. NCS participants at DOE sites do not pay registration fees.

- **Sensitivity-Uncertainty Tools & Practices for NCS Validation (LANL-TE4)**
  - **June 23, 2020 online 15 students, LANL NCS & NEN-2**
  - **TBD, 2020 TBD TBD**

  Joint LANL & ORNL effort, covering background material and specific usage of MCNP6-Whisper and SCALE-KENO-TSUNAMI-TSURFER. D. Bowen coordinates scheduling at DOE sites.

- **Monte Carlo Techniques for Nuclear Systems (LANL-AM1)**
  - **Aug 24 – Dec 6, 2019, UNM 18 students**

  This is a 1-semester class for senior undergrads & graduate students at the University of New Mexico. Includes Monte Carlo theory & practical use of MCNP6. Partially supported by NCSP, ASC, and other programs.

- **Advanced Monte Carlo Methods (LANL-AM1)**
  - **Jan 23 – May 7, 2020, UNM+online 11 graduate students**

  Advanced class covering details of transport theory, Monte Carlo, advanced computing methods, & codes. This course is also used to teach LANL staff members. Partially supported by NCSP, ASC, and other programs.

Other Classes - supported by student registration fees.

- **Introduction to MCNP6**
  - **Oct 21-25, 2019, LANL 14 students**
  - **March 2-6, 2020 LANL 15 students**
  - **April 27-30, 2020 online (LANL-only pilot) 40 students**
  - **July 20-24, 2020 online TBD**

  Introductory class, includes 1/2 day on criticality calculations (without NCS validation & Whisper).

- **Intermediate MCNP6**
  - **Oct 7-11, 2019, OECD-NEA, Paris 13 students**
  - **Oct 28 – Nov 1, 2019 LANL 13 students**
  - **Aug 24-28, 2020 online TBD**

- **Unstructured Mesh with Attila4MC**
  - **Nov 5-9, 2019 LANL 9 students**
  - **TBD, 2020 online TBD**

- **Variance Reduction**
  - **Oct 14-18, 2019 OECD-NEA, Paris 11 students**
  - **May 18, 2020 online 20 students**
  - **TBD, 2020 online TBD**

- **Using NJOY to Create MCNP ACE Files & Visualize Nuclear Data**
  - **TBD, 2020 online TBD**

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. Planned release of a modified version of this report to the NCSP has been delayed due to approvals process. However, report can now be 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.						
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 2020 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
on the
International Collaboration with the Institut de Radioprotection et de Sûreté Nucléaire (IRSN) for FY2020

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2020 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 MIRTE 1 experiments. To be discussed with ORNL.	I. DUHAMEL	B.J. MARSHAL	ORNL
This task was initiated in the frame of the OECD/NEA UACSA expert group. Experimental correlations were established for LCT007 and LCT039 – need to contact Brad Rearden to discuss about the experiments of interest for the FY2019. 2019-Q4: IRSN proposal to work on experimental correlations of MIRTE 1 experiments but a lot of discussions about the calculations of experimental correlations on the SG1 subgroup of the OCDE/AEN/WPNCS Will also be discussed at the ICSBEP meeting in October 2019 FY20-Q1: No progress FY20-Q2: MIRTE 1 final evaluation provided to ICSBEP – ORNL calculated keff results for all the experiments (received by IRSN – analysis in progress) FY20-Q3: common paper about the use of TSUNAMI for experiments design and analysis proposed for the ANS winter meeting						
IRSN-AM5	Update of the slide rule	ORNL-AM6 LLNL-AM3 AWE-AM1	Subtask 2 of IRSN proposal Update of the “slide rule” for the rapid response estimation of a criticality accident (using COG, MCNP, MAVRIC, ATTILA…)	M. DULUC	D. BOWEN D. HEINRICHS R. JONES	ORNL LLNL AWE
The next step will be in particular the number of fissions estimate (meeting about this subject during the TPR meeting, Amarillo). IRSN has to propose a new technical POC following the change of position of M. Duluc (decision in progress). FY2020-Q3: short report about the number of fission estimate in progress						
IRSN-AM7	ACE QA testing and implementation	LANL-AM2	Implementation of the defined QA tests in ACEtk and integration in GAIA	L. LEAL	J. CONLIN	LANL
Report provided by LANL to IRSN by Wim Haeck with detailed descriptions. Integration in GAIA in progress						
IRSN-AM8	Analytical Methods Working Group	NCSP-TS2	IRSN participation to NCSP analytical methods Working Group and IRSN participation to TPR meeting	S. PIGNET	F. BROWN D. BOWEN	NCSP
IRSN participation to TPR in February 2020 and presentation at AMWG meeting Participation to the NDAG meeting						
IRSN-AM9	Cross sections processing validation	ORNL-AM3	Development of an interface between GAIA and AMPX and test interface capabilities.	R. ICHOU	D. WIARDA D. BOWEN	ORNL
Tool for generating AMPX multigroup cross section library with DRAGON. Task needs completion. AMPX training course planned in May 2020 at IRSN postponed due to COVID-19						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2020 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
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. (Completion of this task before ORNL-AM9 and LANL-AM4 would be useful to identify common benchmarks.) IEU and LEU systems will be included in FY 2020.	I. DUHAMEL	D. HEINRICHS D. BOWEN F. BROWN	LLNL ORNL LANL
FY20-Q1: MCNP feedback on identified errors were received and integrated by IRSN – Analysis of LEU and IEU results is in progress – Discussions are planned during the AM meeting in February in Santa Fe and a brief synthesis will be presented during the TPR meeting FY2020-Q2: presentation on LEU and IEU comparison during the AM meeting in February – discussions with DOE labs to increase the number of common cases (IRSN, LLNL and ORNL have provided LCT 074 results) – Addition of PST41 and LCT074 results from IRSN , LLNL and ORNL in the database FY20-Q3: Discrepancies analysis for LEU and IEU systems is in progress; feedback to DOE labs is envisioned end of July Contribution to LANL report on the Pu and HEU systems comparison Study and Subsequent Revision						
IRSN-AM14	Sensitivity/Uncertainty comparison study with a focus on Upper Subcritical Limits	ORNL-AM9 LANL-AM4	Definition of three test cases Calculations and intercomparison technical report	I. DUHAMEL	F. BROWN D. BOWEN	LANL ORNL
In progress – LANL and ORNL results are available FY20-Q1: ORNL/LANL/IRSN meeting during the 2019 ANS winter meeting in November–Discussions are planned during the AM meeting in February in Santa Fe FY-2020-Q2: IRSN results sent in January 2020 – presentation of the comparison by Jen Alvin during the AM meeting in February; IRSN intend to send additional results using other covariances soon. FY20-Q3: Common paper on the comparison on the first 4 cases proposed for the ANS winter meeting MACSENS calculations have been performed using ENDF/B.VII.1 covariances data (56 groups) and are being analyzing before sending to DOE labs						
IRSN-AM15	MCNP Maintenance and Support / Uncertainty Analysis Development / Modernization / etc.	LANL-AM1	Interest for uncertainty analysis, source convergence development and modernization strategy	E. DUMONTEIL	F. BROWN	LANL
FY20-Q1: Iteration over the finalization of the EGAMCT report (issues with D. Mennerdhal's comments). Action to be closed as soon as OCDE/NEA report is published						
IRSN-AM17	Technical Data for the Pitzer Formulation of Solution Compositions to Include Uranium/Plutonium Solutions with Selected Admixed Absorbers	ORNL-AM16 LANL-AM6 LLNL-AM7	Contribution to measurements definition. Comparison of density laws (isopiestic law for instance)…	N. LECLAIRE	D. BOWEN	ORNL
Plutonium sulfate densities should be retrieved from US laboratories and a comparison could be done with plutonium nitrate densities. It is also planned to make density vs temperature measurements. Action to be revived when measurements planned. FY20-Q2: No progress						
Integral Experiments						
IRSN-IE1 **IER 184**	TEX - Ta experiment	LLNL-IE4	Sensitivity/uncertainty calculations Contribution to the evaluation of the first experiments.	M. BROVCHENKO	C. PERCHER	LLNL

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2020 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
IRSN is involved in TEX program since the beginning in 2011 and participated in the kick-off meeting. IRSN is part of the CED team and review the CED reports. In addition, in 2014 and 2015, IRSN performed sensitivities calculations on the designed configurations for TEX-Ta experiments. Regular VTC were organized to discuss the status of experiments. IRSN participated at the 2 last experiments in NNSS and will be involved in the ICSBEP evaluation in 2019 as independent reviewer. 2019-Q4: IRSN contributed to the ICSBEP evaluation as the independent reviewer FY20-Q1 and Q2: exchanges on the ICSBEP review for the baselines experiments						
IRSN-IE3 **IER 209**	New 7uPCX experiment	SNL-IE1	Contribution to ICSBEP reevaluation.	N. LECLAIRE	G. HARMS	SNL
2019 –Q4: These experiments were presented at the ICSBEP 2019 meeting. IRSN was the independent reviewer. 2020-Q2 : Review finalization : MORET 5 k_{eff} calculations were performed, as well as sensitivity calculations, and sent to SNL.						
IRSN-IE6 **IER 306**	Rh experiment	SNL-IE1	IRSN proposal: preliminary evaluation of experimental uncertainties prior to the experiment's CED-2 report.	N. LECLAIRE	G. HARMS	SNL
CED 1 report has been reviewed by the NCSP team and has been validated by IRSN. It was issued in January 2020. Preliminary effects on keff of experimental uncertainties have been calculated and will be added in the CED-2 report in 2021. (supported by a sub-contract) Some comments from Gary Harms, David Ames, Mike Zerkle, Dave Heinrichs (NCSP team) were received and will be incorporated in the CED-2 report. In particular, the NCSP review team asked for investigating a configuration involving rhodium in a resin block. Additional configurations are therefore being tested and will be added in the CED-2 report.						
IRSN-IE7 **IER 305**	Mo experiment	SNL-IE1	IRSN proposal: Leading the CED-3a report; Supplying the Mo rods for the experiment.	N. LECLAIRE	G. HARMS	SNL
FY20-Q2: A first review of the CED-2 report has been done by IRSN. F20-Q3: A draft version has been sent at the beginning of June to Gary Harms who will deliver it to the NCSP review team. Meanwhile, the report is under IRSN further steps review process. IRSN also looked at potential suppliers for the Mo sleeves and estimated the costs. However, IRSN waits for the CED-2 report to be approved before proceeding to the supplying of sleeves.						
IRSN-IE8 **IER 451**	Ti experiment	SNL-IE1	Analysis of the experiments Comparison with MIRTE program	N. LECLAIRE	G. HARMS	SNL
The independent review of experiments was done for the ICSBEP October 2018 meeting. The experiments were calculated with MORET 5. Some comparisons of sensitivity profiles were expected with the sensitivity obtained with TSUNAMI. In addition, we also planned to compare them with the sensitivities obtained for the MIRTE experiments. A feedback on titanium cross sections was also provided (prior and posterior uncertainty analysis using GLLSM). These tasks were subject to a subcontract beginning in May 2019, which is now finished. A report from the subcontractor was issued. FY20-Q2: comparison with MIRTE Ti experiments in progress – report to be published before end of the year.						
IRSN-IE11 **IER 297**	TEX - Hf experiment	LLNL-IE4	Contribution to Jemima plates characterization. Contribution to CED report.	M. BROVCHENKO	C. PERCHER	LLNL
IRSN was involved in the review of the CED2 report and provide some sensitivity calculations to LLNL. The status of the program has been discussed regularly during VTC until 2017 with LLNL. FY20-Q2: Experiments delayed. Stand-by						
IRSN-IE19	Solution reactor	Y12-IE2	Strong IRSN interest for participation in the design, specification… of a solution reactor	M. DULUC	P. ANGELO	Y-12

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2020 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
Task started in 2019. A first contact with Peter Angelo. Reports about the CRAC and SILENE review sent to NCSP in Q1FY2020 – no feedback since.						
IRSN-IE25 **IER 296**	TEX - MOX experiment	LLNL-IE4	IRSN leads this proposal for design and will author the CED-1 & 2 reports with LLNL support. Characterization of moderator and reflector plates. IRSN contribution to the moderator and reflector plates funding.	M. BROVCHENKO	C. PERCHER	LLNL
Design optimization for TEX-MOX ongoing. (Supported by sub-contracts in 2018 and 2019) CED1 report has been sent to Catherine Percher for distribution to CED-team. Waiting for feedbacks Ongoing studies about possible additional measurements for flux map and temperature.						
IRSN-IE26 **IER 295**	TEX - Iron experiment	LLNL-IE4	Contribution to the experiments design. Contribution to CED reports and review.	M. BROVCHENKO	C. PERCHER	LLNL
Not funded in FY2020.						
IRSN-IE27 **IER 498**	GODIVA CAAS benchmark	ORNL-IE4	Participation in the design. Provide IRSN materials for irradiation, analysis of results.	M. DULUC	D. BOWEN	ORNL
Some contacts with Doug BOWEN and Riley CUMBERLAND. Discussions on detectors. VTC in Q1-FY2020. A list of detectors that could be provided by IRSN has been sent in January. FY2020-Q3:Four VTC were organized since January to discuss the design						
IRSN-IE28 **IER 406**	Cf-252 CAAS benchmark	LLNL-IE1	Participation in the design. Provide IRSN materials for irradiation, analysis of results	M. DULUC F. TROMPIER	D. HEINRICHS	LLNL
Discussion in progress to perform additional measurements. Experiments postponed due to COVID-19 to later date (contingent upon LLNL communication)						
IRSN-IE29	Correction factor for dosimetry linked to the orientation of the victim	LLNL-IE1 AWE-IE7	Participation in the design. Provide IRSN materials for irradiation, analysis of results.	M. DULUC F. TROMPIER	D. HEINRICHS P. ANGUS	LLNL AWE
Task not started						
IRSN-IE30	Full dosimetry exercise around GODIVA/FLATTOP reactors or TRIGA (AFFRI)	LLNL-IE1	Participation in the design. Provide IRSN materials for irradiation, analysis of results	M. DULUC F. TROMPIER	D. HEINRICHS	LLNL
Task not started						
IRSN-IE33	Sodium activation experiment around GODIVA/FLATTOP	LLNL-IE1	Participation in the design. Provide IRSN materials for irradiation, analysis of results	M. DULUC F. TROMPIER	D. HEINRICHS	LLNL
Task not started						
IRSN-IE34 **IER 488**	MUSIC (HEU) critical and Subcritical measurements.	LANL-IE23	Participation in the definition and the design of the experiment	W. MONANGE	J. HUTCHINSON	LANL
Task in progress. IRSN's simulations in progress. IRSN staff waiting for schedule of experiments.Not sure to be allowed to go to US before October 2020						
IRSN-IE35 **IER 434**	Godiva benchmark for time dependent code validation	LANL-IE3	Participation in the preliminary design and CED-1 report.	M. DULUC	J. GODA	LANL
Task not started						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2020 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
IRSN-IE36 **IER 514**	ICSBEP/SINBAD Shielding benchmarks for shipping containers	LLNL-IE1 AWE-IE8	Participation in the preliminary design and CED-1 report	M. DULUC	D. HEINRICHS R. JONES	LLNL AWE
Task not started						
IRSN-IE37	Critical and subcritical measurements with a Zero-Power research reactor (On going task)	LANL-IE21	Analysis of the experiments, participation in the final technical report.	E. DUMONTEIL	J. HUTCHINSON	LANL
Delay (problems with HPC at IRSN still make it difficult to finish the simulation program) VTC with LANL team to discuss about the common paper to finalize the task.						
IRSN-IE40	CAAS performance testing	LLNL-IE21	Participation in testing activities. Provide IRSN materials and French CAAS probes. To be discussed with LLNL.	M. DULUC	D. HEINRICHS	LLNL
Task not started						
IRSN-IE41 **IER 499**	Thermal/Epithermal Experiments (TEX) with Chlorine and Lithium	LLNL-IE23	Participation in experiments design and CED reports. To be discussed with LLNL.	M. BROVCHENKO	D. HEINRICHS	LLNL
Task not started.						
IRSN-IE42 **IER 121**	Neptunium Subcritical Observations (NeSO) experiment	LANL-IE3	Independent review of the ICSBEP evaluation.	W. MONANGE	J. HUTCHINSON	LANL
Participation to the experiments in 2019. Independent review of the ICSBEP evaluation planned in FY2020.						
IRSN-IE43 **IER 515**	Critical experiment with americium	LANL-IE3	Participation in experiments design and CED reports.	M. BROVCHENKO	G. MCKENZIE	LANL
Not funded in FY2020. To be proposed for FY2021.						
IRSN-IE44 **IER 516**	ZTA (Zirconium Test Assembly)	LANL-IE3	Participation in experiments design and CED reports.	N. LECLAIRE	T. CUTLER	LANL
Not funded in FY2020. To be proposed for FY2021.						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2020 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
IRSN-IE45 **IER 517**	Integral Experiments for Validation of Molybdenum Neutron Cross Sections	LANL-IE3	Participation in experiments design and CED reports.	J.B. CLAVEL	D. HAYES T. CUTLER	LANL
Not funded in FY2020. To be proposed for FY2021.						
IRSN-IE46 **IER 518**	High Multiplication Subcritical (Multiplicity) Benchmark Experiments	LLNL-IE1	Participation in experiments design and CED reports.	W. MONANGE	D. HEINRICHS G. HARMS	LLNL SNL
Not funded in FY2020. To be proposed for FY2021.						
Information Preservation and Dissemination						
IRSN-IPD1	ICSBEP reviewing	LLNL-IPD1	IRSN ICSBEP reviewing tasks are reported in the IE tasks	I. DUHAMEL	D. HEINRICHS	LLNL
Review of LCT101 (SNL) and TEX-Ta (LLNL) done for October ICSBEP 2019 meeting FY-2020-Q2: review of the LCT101 (SNL) and TEX-Ta (LLNL) evaluations following the ICSBEP meeting – Collaboration with ORNL and LLNL on PST041 and LCT074 evaluation (KENO and COG results were included in the ICSBEP evaluation and included in the benchmark intercomparison)						
IRSN-IPD3	ICSBEP benchmark reviewing	LLNL-IPD1	IRSN ICSBEP reviewing tasks	I. DUHAMEL	J. FAVORITE	LANL
Task not started – IRSN interest for FLATTOP re-evaluation						
Nuclear Data						
IRSN-ND1	Contribution to new evaluations	ORNL-ND1	Contribution to new evaluation and validation for ^{54}Fe, ^{103}Rh, ^{55}Mo, Gd, Hf and ^{239}Pu isotopes.	L. LEAL	D. BOWEN	ORNL
2019: ^{103}Rh resolved evaluation completed. Progress on the ^{54}Fe and ^{56}Fe and preliminary resonance evaluation generated. IRSN benchmark assembled for testing the ^{55}Mo evaluation. New capture data from NTOF included in the Gd-155 and Gd-157 evaluation. Improved Gd resonance parameters available. Paper on Gd for ND2019 conference. Generation of covariance data for ^{155,157}Gd. Testing of the Gd evaluation has started. FY20-Q1: The Fe resonance evaluation continues FY20-Q2: work in progress for Rh URR evaluation with RPI Benchmarks testing for Iron (56 and 54) to test the new evaluations Gd 156, 158, 160 evaluations provided to IRSN by ORNL for final tests, IRSN and RPI working for improvements in URR Preliminary evaluation of Mo isotopes up to 100 eV using IRSN measurements at J-PARC on natural Molybdenum (cf. Physor conference) Hf postponed, Pb to be started very soon. Working on Pu239 evaluation in progress combining integral and differential data. FY2020-Q3: - Hafnium benchmark calculations with MORET 5 and various libraries in progress - Test of new fluorine evaluation on few ICSBEP benchmarks and generation of HF S(a,b) for HST039 analysis - Evaluation of Mo isotopes up to 100 eV using IRSN measurements at J-PARC on natural Molybdenum is underway. Transmission and capture data from LANL are needed.						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2020 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
IRSN-ND2	Nuclear data processing	LANL-ND1	Benchmark testing of ^{235}U and ^{239}Pu cross section library	L. LEAL	J. CONLIN	LANL
Test performed and new ^{235}U and ^{239}Pu resonance parameters generated. Benchmark testing on the ^{235}U and ^{239}Pu underway. Sensitivity analysis of the benchmark results will be done New Pu239 capture data measured at LANL by Shea Mosby included in the evaluation; Testing of the evaluation on the TEX experiments are under way FY20-Q1: Full paper submitted to Physor 2020 FY20-Q2 and Q3 : benchmark testing of new Pu9 evaluation on TEX experiments and PST experiments in progress						
IRSN-ND3	Nuclear data processing	LLNL-ND4	Resonance evaluation of ^{233}U (Pending prioritization of ^{233}U ND tasks for the NCSP)	L. LEAL	D. HEINRICHS	LLNL
Existing resonance evaluation extended to 2 keV. New resonance parameters derived. New ^{233}U fission and capture cross section data from n_TOF may become available shortly. The data will be incorporated in the evaluation and benchmark testing will be performed. FY2020-Q3: Generation of sensitivity profiles for various U233 benchmarks for testing						
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
2 IRSN staff authorized to attend the hands-on training in 2020. Cancelled due to COVID 19						