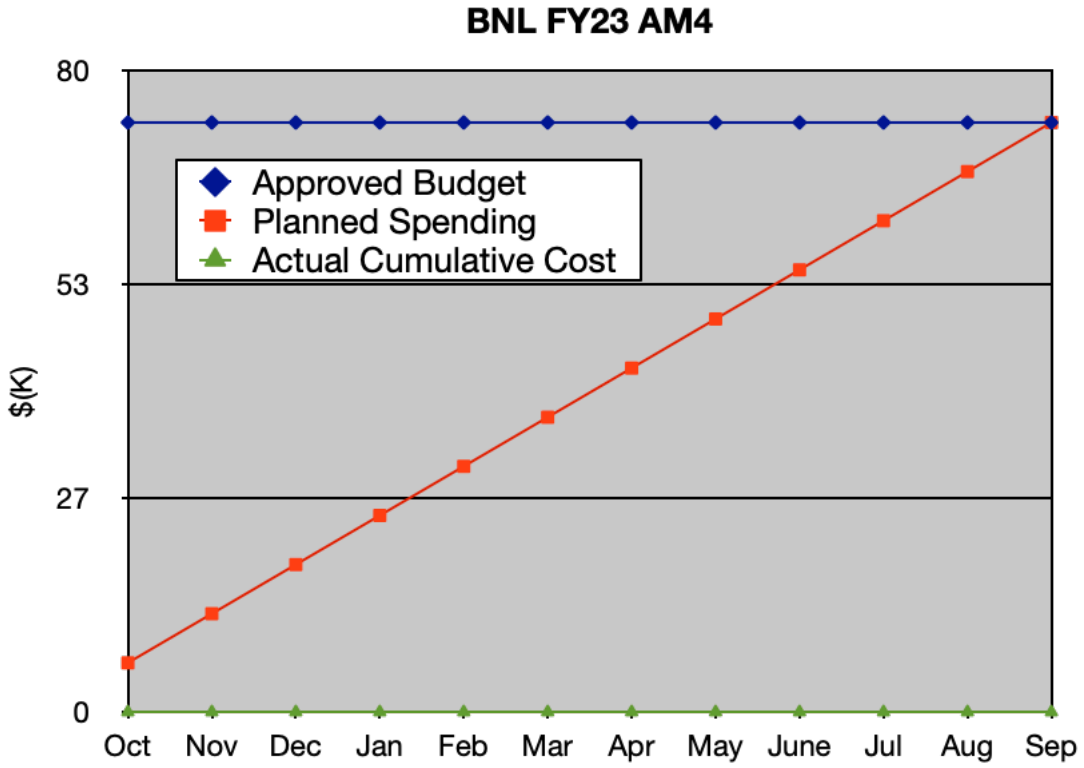
NUCLEAR CRITICALITY SAFETY PROGRAM (NCSP)

FY2023 3rd QUARTER REPORTS

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: AM4 **M&O Contractor Name**: BNL **Point of Contact Name:** Gustavo Nobre **Point of Contact Phone:** 631-344-5205	**Reference:** DP0909010 **Date of Report:** 26 July, 2023

BUDGET



1. Carryover into FY 2023 = $ 3,524
2. Approved FY 2023 Budget = $ 70,000
3. Total FY 2023 Budget w/Carryover: $73,524
4. Actual spending for 1st Quarter FY 2023 = $0
5. Actual spending for 2nd Quarter FY 2023 = $0
6. Actual spending for 3rd Quarter FY 2023 = $0
7. Actual spending for 4th Quarter FY 2023 = $0
8. Projected carryover into FY 2024 = $73,676

NOTE: Include commitments as part of spending

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 generating a draft document defining the TNSL code or software interface in NCSP Quarterly Progress Report. (AM4)		The work has not started yet.
Q2	Provide a status report on generating a draft document defining the TNSL code or software interface in NCSP Quarterly Progress Report. (AM4)		The work has not started yet.
Q3	Provide a status report on generating a draft document defining the TNSL code or software interface in NCSP Quarterly Progress Report. (AM4)		The work has not started yet and likely will be performed on FY24.
Q4	Provide a status report on generating a draft document defining the TNSL code or software interface in NCSP Quarterly Progress Report. (AM4)		Per discussion at the NCSP Budget Execution Meeting, work on this task will be postponed until FY24.

ACCOMPLISHMENTS

Progress has been made in the efforts to define a probability distribution function (PDF) and to develop a numerical technique to smooth the theoretical PDF generated with the code FUDGE. Focus is now to process and analyze the previous developments. This work was forced to a halt since the postdoc responsible for it took a permanent position in the UK. During the 2023 Budget Execution Meeting it was requested and accepted that the current funds of this task will be carried over to FY24 and combined with FY24's budget to allow for Dave Brown to work on it and conclude the task.

PUBLICATIONS

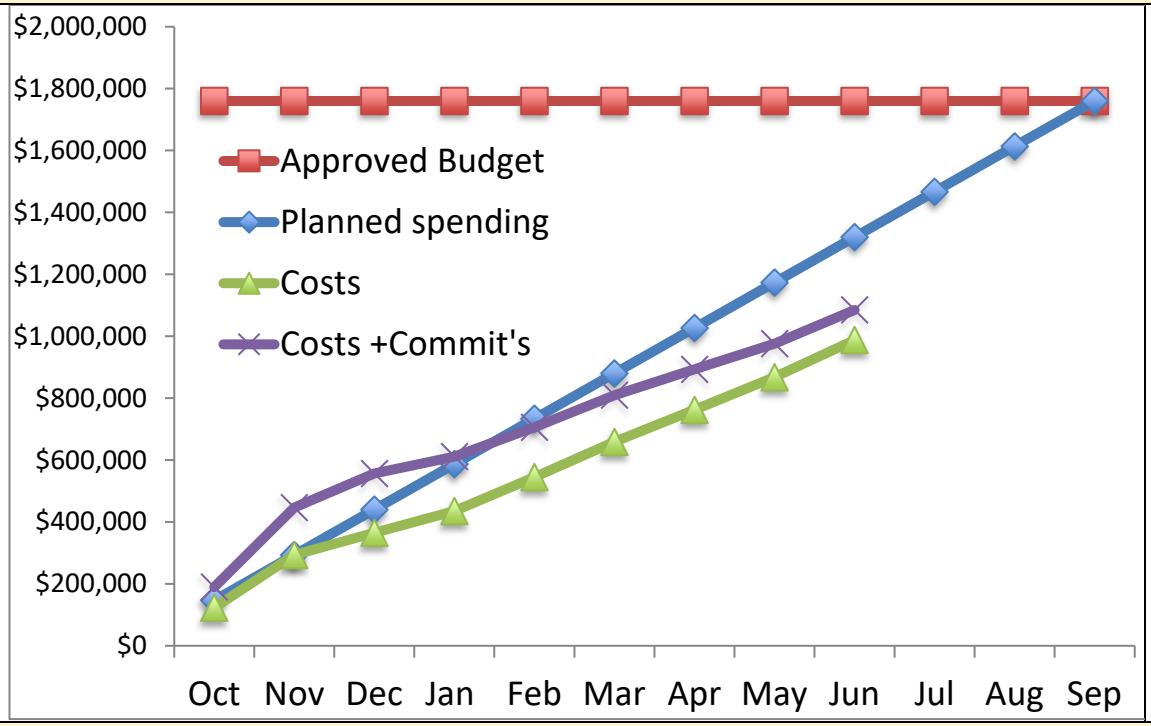
Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	**Publication Reference** **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019	**Sent to NCSP? Yes/no**	**If no, status of submittal**
Q1	N/A		
Q2			
Q3			
Q4			

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: AM1, 2, 3, 5, 7 **M&O Contractor Name**: LANL **Point of Contact Name:** Joetta Goda/Bob Little/Jen Alwin **Point of Contact Phone:** 505-667-2812/505-665-3487/505-667-7252	**Reference:** DP0909010 **Date of Report:** July 24, 2023

BUDGET



1. Carryover into FY 2023 = $ 260,000
2. Approved FY 2023 Budget = $ 1,500,000
3. Total FY 2023 Budget w/Carryover = $ 1,760.000
4. Actual spending for 1st Quarter FY 2023 = $ 364,894 (plus $191,414 commits= $556,308)
5. Actual spending for 2nd Quarter FY 2023 = $ 293,789 Sum =$658,683 (plus $150,754 commits =$809,437)
6. Actual spending for 3rd Quarter FY 2023 = $ 328,923 Sum=$987,606 (plus $97,451 commits = $1,085,057
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $

NOTE: Include commitments as part of spending

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 MCNP6 user support activities (AM1)		
Q1	Provide a status report on LANL participation in US and International analytical methods collaborations (AM1)		

Q1	Provide a status report on ENDF/B-VIII.1 processing and testing activities (AM1)		
Q1	Provide a status report on summer intern work activities (AM1)		
Q1	Provide a status report on MCNP6 Criticality training course activities (AM1)		
Q1	Provide a status report on NJOY maintenance and user support activities (AM2)		
Q1	Provide a status report on LANL participation in US and International analytical methods collaborations (AM2)		
Q1	Provide a status report on ACEtk photonuclear and photoatomic ACE support table (AM2)		
Q1	Provide a status report on Adaptive-in-temperature Method for fast on-the-fly Sampling of Thermal Neutron Scattering Data in MCNP6 activities (AM3)		
Q1	Provide a status report on LANL participation in US and International analytical methods collaborations (AM5)		
Q2	Provide a status report on MCNP6 user support activities (AM1)		
Q2	Provide a status report on LANL participation in US and International analytical methods collaborations (AM1)		
Q2	Provide a status report on ENDF/B-VIII.1 processing and testing activities (AM1)		
Q2	Provide a status report on MCNP6 and Whisper progress activities (AM1)		
Q2	Provide a status report on NJOY maintenance and user support activities (AM2)		
Q2	Provide a status report on LANL participation in US and International analytical methods collaborations (AM2)		

Q2	Provide a status report on ACEtk photonuclear and photoatomic ACE support table (AM2)		
Q2	Complete the ACEtk photonuclear and photoatomic ACE support tables, both specifications and interface (AM2)		
Q2	Provide a status report on Adaptive-in-temperature Method for fast on-the-fly Sampling of Thermal Neutron Scattering Data in MCNP6 activities (AM3)		
Q2	Provide a status report on LANL participation in US and International analytical methods collaborations (AM5)		
Q3	Provide a status report on MCNP6 user support activities (AM1)		
Q3	Provide a status report on LANL participation in US and International analytical methods collaborations (AM1)		
Q3	Provide a status report on ENDF/B-VIII.1 processing and testing activities (AM1)		
Q3	Provide MCNP6 Criticality training course (AM1)		
Q3	Merge additional benchmark input files into the Los Alamos Benchmark Suite (LABS) targeting new additions to ICSBEP and remaining input files from Whisper-1.1 library (AM1)		
Q3	Develop and test MCNP_PSTUDY revision (AM1)		
Q3	Provide a status report on NJOY maintenance and user support activities (AM2)		
Q3	Provide a status report on LANL participation in US and International analytical methods collaborations (AM2)		
Q3	Provide a status report on ACEtk photonuclear and phototoxic ACE support table (AM2)		
Q3	Provide a status report on Adaptive-in-temperature Method for fast on-the-fly Sampling of Thermal Neutron Scattering Data in MCNP6 activities (AM3)		

Q3	Provide a status report on LANL participation in US and International analytical methods collaborations (AM5)		
Q4	Provide a status report on MCNP6 user support activities (AM1)		
Q4	Provide a status report on LANL participation in US and International analytical methods collaborations (AM1)		
Q4	Provide a status report on ENDF/B-VIII.1 processing and testing activities (AM1)		
Q4	Process and test ENDF/B-VIII.1 candidate evaluations and provide a documented assessment (AM1)		
Q4	Contingent upon successful processing, integrate and test ENDF/B-VIII.0-based covariance data library for Whisper-1.2 (AM1)		
Q4	Obtain approval to open-source the Los Alamos Benchmark Suite (LABS) (AM1)		
Q4	Issue an MCNP V&V report, expanded to include LABS releases (AM1)		
Q4	Provide a status report on NJOY maintenance and user support activities (AM2)		
Q4	Provide a status report on LANL participation in US and International analytical methods collaborations (AM2)		
Q4	Provide a status report on ACEtk photonuclear and photoatomic ACE support table (AM2)		
Q4	Demonstrate initial capabilities of “scion” processing component, which will perform tasks including integration, linearization, and interpretation of distribution data. (AM2)		
Q4	Provide a status report on Adaptive-in-temperature Method for fast on-the-fly Sampling of Thermal Neutron Scattering Data in MCNP6 activities (AM3)		
Q4	Provide data files and report for h-h2o and graphite on-the-fly S(alpha,beta) temperature effects. (AM3)		
Q4	Provide a status report on LANL participation in US and International analytical methods collaborations (AM5)		
Q4	Issue final report on all LANL results related to the ICSBEP Benchmark Comparison Study (AM5)		

ACCOMPLISHMENTS

- AM1 - MCNP® Maintenance and Support, Uncertainty Analysis Development, and Modernization
  - **Education**
    - Two in-person and one online MCNP6 classes taught at LANL with 73 students, including one in-person Criticality Calculations with MCNP6 class: See separate summary of MCNP classes.
    - Mentoring an RPI graduate student working on on-the-fly temperature treatment of thermal neutron scattering. The summer student efforts have included (also see AM3 below):
      - Working with W. Haeck on defining an alternate ACE thermal neutron scattering formalism to hold the temperature-dependent data.
      - Working with M. Rising and C. Josey on the MCNP team to work on writing and integrating new reading, interpreting, and sampling functions for this newly structured data.
    - Research mentorship of two UNM graduate students working on plutonium solution density predictive capabilities.
  - **R&D Work**
    - A presentation on MCNP was provided to a recent Los Alamos Capability Review:
      - Michael E. Rising, "Recent MCNP® Code Developments and Improvements for Nuclear Energy Applications," Los Alamos Report (LA-UR-23-23473) presented at a LANL Nuclear and Particle Futures Capability Review.
    - Two papers were submitted to and accepted at the 2023 ICNC conference. The overall NCSP V&V report detailing all of the MCNP6.3 calculations is under construction, which is based on the contents of these two papers. A couple of general observations on the MCNP6.3 criticality V&V results:
      - Using the new MCNP6.3 fission matrix convergence testing and acceleration techniques provides equally valid results in comparison to the default MCNP6.3 algorithms.
      - Using the new MCNP6.3 HDF5-formatted PTRAC capability reduces the computational cost of the subcritical multiplication benchmark simulations by ~20% in comparison to the legacy PTRAC capability.
    - The Whisper open-source release is pending LANL Feynman Center for Innovation (FCI) approval. FCI has raised some concerns on licensing Whisper as open-source after having been released alongside MCNP6 through RSICC. We are iterating with FCI to find the best path forward; once approved the code will be made available on GitHub.
    - Adding recent subcritical multiplication benchmarks to V&V testing framework. A study on the verification and computational cost of MCNP6.3 features for subcritical multiplication benchmarks is underway and is documented in the draft full paper submitted to and accepted at the 2023 ICNC meeting.
    - The NCSP-specific V&V report with new MCNP6.3 features (e.g., Doppler Broadening Rejection Correction, Automated Acceleration and Convergence Testing) is being drafted. A portion of the report is documented in the draft full paper submitted to and accepted at the 2023 ICNC meeting.
    - The updates to the MCNP_PSTUDY tool are currently being evaluated. Development of a revised tool will take place after the initial scoping work is completed.
    - The Whisper code is being prepared for the new ENDF/B-VIII.0 covariance data inclusion.
      - Options to allow the user to select the covariance data are being added (see covariance data comment below in the MCNP Data section).
      - A new CMake-based build system will be integrated for more general configuring and building options.

- Attended the OECD/NEA WPNCS meetings, June 26-30, 2023. The trip report is provided as a supplemental document to the NCSP.

- **MCNP Support and Maintenance**
  - Support MCNP6 users. MCNP Forum, website, email, direct interactions, etc.
  - Continuous MCNP public website updates posted online.
  - Planning and preparation for the 2023 MCNP User Symposium is underway. This event will be hybrid, to be held September 18-21, 2023. More details can be found on the event website: https://web.cvent.com/event/8f3e1b73-a626-40cd-aa46-788bc58413ec/summary.
  - Upgraded the mcnp_help@lanl.gov email help service to an issue tracking system.
  - Consolidating and archiving past V&V results in repository
- **MCNP Data (AM1)**
  - The processed ENDF/B-VIII.1 beta 1 was released and tested during this quarter.
  - ENDF/B-VIII.0 Covariance Library for Whisper
    - During Q3, the XCP-5 Nuclear Data Team onboarded a new staff member (Bobbi Riedel) who is intended to take cognizance of covariance library creation, curation, and maintenance. Automated processing tools were cleaned up and can be used to format covariances to the ACE-like format currently used by Whisper. Light discussions are continuing toward a new and more robust format, but this isn't yet the top priority. Collaboration with Whisper team in XCP-3 has helped to understand processing capabilities and limitations and prepare for the data to be delivered.
    - Using the automated processing tools discussed in the previous bullet, all available ENDF/B-VIII.0 covariance data have been processed through NJOY and formatted for Whisper to use. Whisper is being updated to allow for a new choice in covariance data. Full end-to-end verification testing (from application model to USL calculation) of the ENDF/B-VIII.0 data is underway internally before these data are released publicly.

- AM2 - NJOY Development and Maintenance, Uncertainty Analysis Development, and Modernization
  - **NJOY 2016**
  - Two updates to NJOY2016 were released: NJOY2016.70 and NJOY2016.71. The improvements in NJOY2016.70 were described in detail in the previous quarterly report. For NJOY2016.71:
    - This update adds the new MF7 MT451 (thermal scattering general information) ENDF format to MODER so that this module will be able to interpret the new MF7 section. No other capability in NJOY2016 currently uses the information in this section.
    - This update also resolves an issue encountered when processing some JENDL5 evaluation that use LAW=7 (which ACER converts into LAW=1) due to errors in the temporary files.

    Current ENDF/B-VIII.1b1 processing has not shown any issues in NJOY2016.
  - User support:
    - Various questions on the GitHub issues trackers
    - Support on ENDF formats: fission yield data and covariance data
    - Support on ACE formats and possible extensions of the photonuclear format (following the release of the IAEA photonuclear data library)
    - Support on how to use ENDFtk and ACEtk at LANL (both internal at LANL and external)
  - **ACEtk (NJOY21)**
    - Continued internal testing of ACEtk, users are providing feedback that help us correct and/or improve ACEtk (mainly interface improvements)

- Both the photoatomic (non eprdata) and photonuclear developments are done. Photoatomic data is in the develop branch and all PRs for photonuclear data have been completed. After that, most ACEtk related PRs are small corrections so we'll be done with all code reviews in a couple of weeks.

- **Scion (NJOY21)**
  - Scion is a major component that is a FY23 (and beyond) emphasis for NJOY21. Scion development has advanced very well. This is a short overview of features:
    - Representation of series expansions: normal polynomial, Legendre and Chebyshev series. This provides linearization, integration, differentiation, and root finding (which is used in linearization)
    - Tabulated data with different interpolation zones (i.e. a TAB1). This provides linearization. These have built-in support for "jumps", i.e. the sometimes annoying duplicate energy points that NJOY2016 struggles with (NJOY2016 shifts both values at the last significant digit to deal with these – scion does not)
    - Operator overloading for basic math operations:
      - +=, -=, *= and /= for scalars on series and tables
      - +=, -= on series and tables
      - +, -, * and / for scalars on series and tables
      - + and - on series and tables

      This means we can calculate a total from its components in a few lines of code (it also has unionization of the x grid if two tables have different grids)
    - Some math stuff: legendre and Chebyshev polynomial evaluation (this should be in the standard C++ library but Apple does not add it to their compiler suite), clenshaw and horner evaluation functions, etc.
    - Basic integration is next (trapezium rule basically for calculating multigroup xs without a weighing spectrum)

- AM3 - Development of an Adaptive-in-temperature Method for fast on-the-fly Sampling of Thermal Neutron Scattering Data in MCNP6 (RPI)
  - Creation of a file format to store the coefficient data to be used in MCNP.
  - Alteration of the MCNP 6.3 source code to allow OTF data to be sampled (In progress).
  - Creation of benchmark cases in MCNP 6.3 to allow the comparison of OTF data to the standard ACE data contained within MCNP 6.3 (In progress).
  - RPI student Camden Blake is at LANL for the summer, working with the MCNP team for coding and other efforts.
- AM5 - Benchmark Intercomparison Study
  - This project is transitioning away from ICSBEP k-eff comparisons. For FY23 and FY24 the focus will be on beta-eff and shielding benchmark intercomparisons. We have been reviewing previous Los Alamos work for these categories and plan to submit initial results to IRSN before the end of the FY.

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

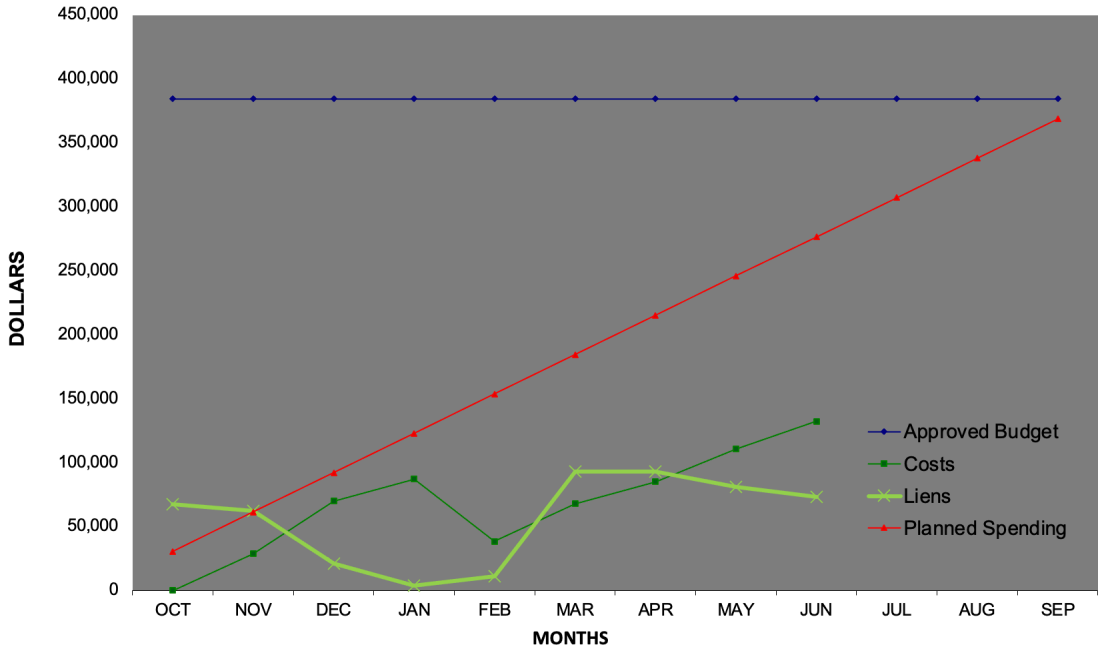
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Jennifer L. Alwin, Jerawan Armstrong, Simon R. Bolding, Alexander R. Clark, Chelsea D'Angleo, Micky R. Dzur, Robert A. (Art) Forster III, Avery S. Grieve, Esteban Gonzalez, Wim Haeck, Colin Josey, Karen C. Kelley, Joel A. Kulesza, M. Robert MacQuigg, Vedant Mehta, Michael E. Rising, Div Sharma, Joshua B. Spencer, Holly Trellue, and James R. Tutt, "A list of 2022 MCNP User Symposium Abstracts from XCP-3," Los Alamos Report (**LA-UR-22-30534**).
Q1	Colin Josey, Avery S. Grieve, and Michael E. Rising, "Results and Responses for the 2022 User Forum Survey," presented at the 2022 MCNP User Symposium (**LA-UR-22-30614**).
Q1	Alexander R. Clark, Michael E. Rising, Colin Josey, and Joel A. Kulesza, "Verification and validation testing and tools: comparison between MCNP code versions and nuclear data libraries," presented at the 2022 MCNP User Symposium (**LA-UR-22-30692**).
Q1	Alexander R. Clark, "Easy PERT: a Python tool for writing PERT cards and parsing PERT card results," presented at the 2022 MCNP User Symposium (**LA-UR-22-30831**).
Q1	Jennifer L. Alwin, M. Robert MacQuigg, Joshua B. Spencer, Wim Haeck, Joel A. Kulesza, and Michael E. Rising, "Critical Benchmarks Modeled with MCNP Unstructured Mesh," presented at the 2022 MCNP User Symposium (**LA-UR-22-30840**, Draft).
Q1	Michael E. Rising, "Multigroup Cross-section Generation in MCNP6.3," presented at the 2022 MCNP User Symposium (**LA-UR-22-30839**).
Q1	Michael E. Rising, "MCNP6.3: A Year in Review," presented at the 2022 MCNP User Symposium (**LA-UR-22-30768**).
Q1	Michael E. Rising and Simon R. Bolding, "Coincident Capture through Post-processing PTRAC," presented at the 2022 MCNP User Symposium (**LA-UR-22-30927**).
Q1	Colin Josey, Avery S. Grieve, and Michael E. Rising, "MCNP6.3 Code and Nuclear Data Installation Guide," presented at the 2022 MCNP User Symposium (**LA-UR-22-30884**, Draft).
Q1	Robert C. Little, Michael E. Rising, Jennifer L. Alwin, Rian M. Bahran, Travis J. Grove, Alexander R. Clark, Jesson D. Hutchinson, M. Robert MacQuigg, Alexander T. McSpaden, Isaac J. Michaud, Bobbi Riedel, Travis A. Smith, and Nicholas W. Thompson, "Nuclear data covariances are critical input to determine upper sub-critical limits and to design experiments to increase it," presented at the Nuclear Data Uncertainty Quantification Working Meeting (NDUQWM) (**LA-UR-22-31233**).
Q1	Nicholas W. Thompson, Jesson D. Hutchinson, Jennifer L. Alwin, Alexander R. Clark, Theresa E. Cutler, Michael J. Grosskopf, Wim Haeck, Michal W. Herman, Noah A. Kleedtke, Juliann R. Lamproe, Robert C. Little, Issac J. Michaud, Denise Neudecker, Michael E. Rising, Travis A. Smith, and Scott A. Vander Wiel, "Neutron Leakage Spectra Sensitivities for ICSBEP Benchmarks," presented at the American Nuclear Society (ANS) Winter Meeting and Nuclear Technology Expo (**LA-UR-22-32047**).

Q1	Jeffrey S. Bull, Colin Josey, Joel A. Kulesza, and Michael E. Rising, "MCNP® Code Version 6.3.0 Build Guide," Los Alamos Report (**LA-UR-22-32851**, Rev. 1).
Q1	Colin Josey, Alexander R. Clark, Joel A. Kulesza, Eric J. Pearson, and Michael E. Rising, "MCNP® Code Version 6.3.0 Verification & Validation Testing," Los Alamos Report (**LA-UR-22-32951**, Rev. 1).
Q1	Michael E. Rising, Jerawan C. Armstrong, Simon R. Bolding, Forrest B. Brown, Jeffrey S. Bull, Timothy P. Burke, Alexander R. Clark, David A. Dixon, Robert A. (Art) Forster III, Jesse F. Giron, Avery S. Grieve, H. Grady Hughes, Colin J. Josey, Joel A. Kulesza, Roger L. Martz, Austin P. McCartney, Gregg W. McKinney, Scott W. Mosher, Eric J. Pearson, Michael E. Rising, Clell J. (CJ) Solomon Jr., Sriram Swaminarayan, Jeremy E. Sweezy, Stephen C. Wilson, and Anthony J. Zukaitis, "MCNP® Code Version 6.3.0 Release Notes," Los Alamos Report (**LA-UR-22-33103**, Draft).
Q1	Jennifer Alwin, "Nuclear Criticality Safety Needs for Validation of Chlorine", Los Alamos Report (**LA-UR-22-30437**, Draft).
Q1	Tara Robertson, Jennifer Alwin, Christopher Perfetti, Rachael Bulso, "Application of an Empirical Density Law via Python for Aqueous Plutonium Nitrate Systems in MCNP6", Los Alamos Report (**LA-UR-22-32993**).
Q1	Riley Bulso, Jennifer Alwin, Christopher Perfetti, Tara Robertson, Kelly Aldrich, Theresa Cutler, David Kimball, James Bunsen, Laura Worl, "Application of an Empirical Density Law via Python for Aqueous Plutonium Chloride Systems in MCNP6", Los Alamos Report (**LA-UR-22-20040**).
Q2	Robert C. Little, Michael E. Rising, Joel A. Kulesza, Patrick Talou, Conny Egozi, Timothy Burke, Jill Gibson, and Angelique Johnson, "MCNP® Site Support Newsletter First Quarter 2023," Los Alamos Report (**LA-UR-23-23122**).
Q2	Michael E. Rising, Jerawan C. Armstrong, Simon R. Bolding, Forrest B. Brown, Jeffrey S. Bull, Timothy P. Burke, Alexander R. Clark, David A. Dixon, Robert A. (Art) Forster III, Jesse F. Giron, Avery S. Grieve, H. Grady Hughes, Colin J. Josey, Joel A. Kulesza, Roger L. Martz, Austin P. McCartney, Gregg W. McKinney, Scott W. Mosher, Eric J. Pearson, Michael E. Rising, Clell J. (CJ) Solomon Jr., Sriram Swaminarayan, Jeremy E. Sweezy, Stephen C. Wilson, and Anthony J. Zukaitis, "MCNP® Code Version 6.3.0 Release Notes," Los Alamos Report (**LA-UR-22-33103, Rev. 1**).
Q2	Michael E. Rising, Alexander R. Clark, and Jennifer L. Alwin, "Verification and Validation of the New MCNP6.3 Criticality Features," Los Alamos Report (**LA-UR-23-21142**) submitted to ICNC 2023 conference.
Q2	Michael E. Rising, Nicholas H. Whitman, and Jesson D. Hutchinson, "Verification and Performance Impact of the New Parallel MCNP6.3 Particle Track Output Capability for Subcritical Multiplication Simulations," Los Alamos Report (**LA-UR-23-21143**) submitted to ICNC 2023 conference
Q3	Michael E. Rising, "Recent MCNP® Code Developments and Improvements for Nuclear Energy Applications," Los Alamos Report (**LA-UR-23-23473**) presented at a LANL Nuclear and Particle Futures Capability Review.
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: AM2, 3, 4, 5 **M&O Contractor Name**: LLNL **Point of Contact Name:** Catherine Percher **Point of Contact Phone:** (925) 579-4226	**Reference:** DP0909010 **Date of Report:** July 26, 2023

BUDGET



1. Carryover into FY 2023 = $190,317
2. Approved FY 2023 Budget = $194,000
3. Total FY23 budget w/Carryover = $384,317
4. Actual spending for 1st Quarter FY 2023 = $70,063
5. Actual spending for 2nd Quarter FY 2023 = -$2,144
6. Actual spending for 3rd Quarter FY 2023 = $64,356
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $ 15,520

   NOTE: Include commitments as part of spending

   Note for Q2: Strange behavior of cost line was due to a lien being inappropriately costed in November of 2022, and the funds were redeposited in February of 2023.

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 Multi-Physics methods for simulation of criticality excursions activities (AM2)		
Q1	Provide a status report on slide rule application activities (AM3)		

Q1	Provide a status report on thermal scattering and self-shielding in GNDS/FUDGE activities. (AM4)		
Q1	Provide a status report on proposed intercomparison study activities. (AM5)		
Q2	Provide a status report on Multi-Physics methods for simulation of criticality excursions activities (AM2)		
Q2	Provide a status report on slide rule application activities (AM3)		
Q2	Provide a status report on thermal scattering and self-shielding in GNDS/FUDGE activities. (AM4)		
Q2	Provide a status report on proposed intercomparison study activities. (AM5)		
Q3	Provide a status report on Multi-Physics methods for simulation of criticality excursions activities (AM2)		
Q3	Provide a status report on slide rule application activities (AM3)		
Q3	Provide a status report on thermal scattering and self-shielding in GNDS/FUDGE activities. (AM4)		
Q3	Provide a status report on proposed intercomparison study activities. (AM5)		
Q4	Provide a status report on Multi-Physics methods for simulation of criticality excursions activities (AM2)		
Q4	Provide a status report on slide rule application activities (AM3)		
Q4	Provide a status report on thermal scattering and self-shielding in GNDS/FUDGE activities. (AM4)		
Q4	Provide a status report on proposed intercomparison study activities. (AM5)		

ACCOMPLISHMENTS

- AM2 – Multi-Physics Methods for Simulation of Criticality Excursion
  - Project continues under different funding stream trying to match PDV results to Multiphysics Godiva model
- AM3 – Slide Rule Application

- Slide Rule meeting in July where it was decided IRSN would provide a draft final report at the end of the FY, to be completed in FY24. All LLNL calculations have been completed and the final report is in preparation by IRSN. A decision on the final application has yet to be made.

- AM4 - Thermal Scattering and Self-Shielding in GNDS/FUDGE
  - LLNL generated several versions of unresolved region probability tables for a COG / Mercury shielding benchmark intercomparison. Some issues with FUDGE URR processing were identified and fixed, with more results expected soon.
  - We ran extensive tests on ENDF-VIII.1 candidate evaluations and provided feedback and review to the library maintainers at the NNDC when any issues were encountered using FUDGE.
  - LLNL team members attended several sessions at the 2023 Working Party for Evaluation Co-operation (WPEC) at the NEA in Paris. C. Mattoon chaired the EG-GNDS committee on the continued development of the GNDS standard, and Mattoon and Gert both took part in discussions on improved unresolved resonance handling, proper use of integral benchmarks, and others.
- AM5 - Proposed Benchmark Intercomparison Study
  - Jeremy Bez is the new lead for IRSN, replacing Nicolas Leclaire, and he has solicited β-eff benchmarks from all labs for comparison this FY-LLNL provided 32 benchmark results
  - Shielding will be the focus of FY24 intercomparison and LLNL has provided preliminary results with more underway

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

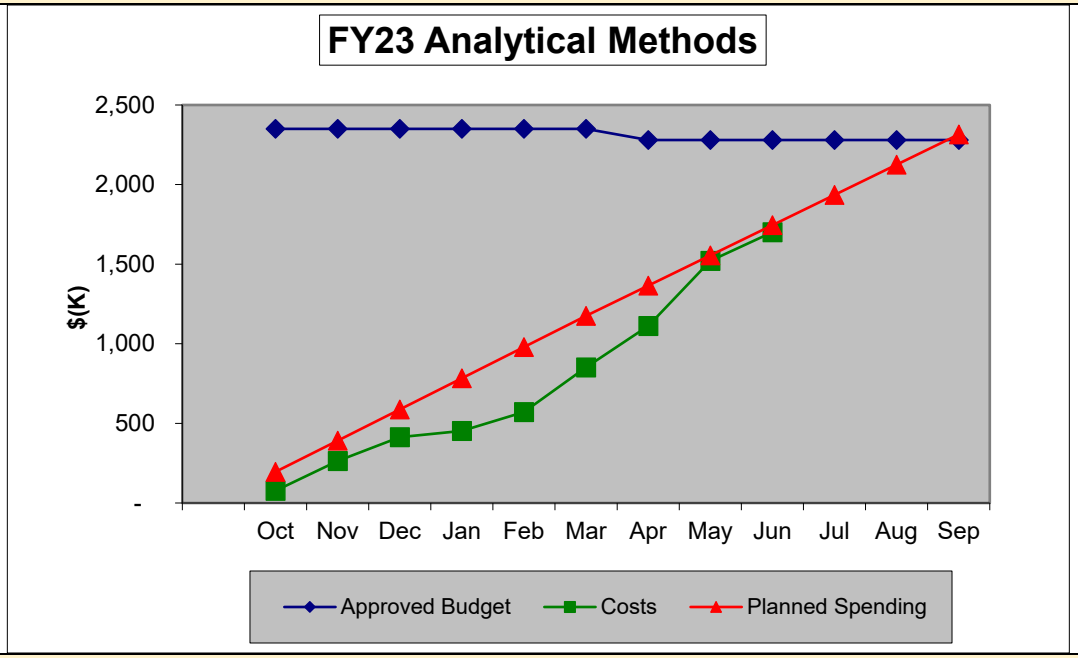
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Heinrichs, D. et al, "COG Beta-Effective Benchmarks," LLNL-TR-843852, December 20, 2022
	Mattoon, C. "TNSL Support in GNDS 2.0 and Beyond," LLNL-PRES-842271, November 4, 2022
	Mattoon, C. "GNDS v2.0 Release and Future Developments," LLNL-PRES-842271, November 4, 2022
Q2	none
Q3	Heinrichs, D. and E. Lent, "Bramblett and Czirr Self-Shielded Fission Rates for ^{235}U Physical and Analytic Benchmark," LLNL-TR-851689, June 30, 2023.
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: AM1, 2, 3, 6, 10, 17, 18, 19 **M&O Contractor Name**: ORNL **Point of Contact Name:** Doug Bowen **Point of Contact Phone:** (865) 576-0315	**Reference:** DP0909010 **Date of Report:** July 26, 2023

BUDGET



1. Carryover into FY 2023 = $50K
2. Approved FY 2023 Budget = $ 2300K
3. Total FY 2023 Budget w/Carryover = $2280K
4. Actual spending for 1st Quarter FY 2023 = $414K
5. Actual spending for 2nd Quarter FY 2023 = $438K
6. Actual spending for 3rd Quarter FY 2023 = $849K
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $0

NOTE: Include commitments as part of spending

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)		
Q1	Provide status on RSICC activities (AM1)		
Q1	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)		
Q1	Provide status on TSUNAMI upgrades. (AM2)		
Q1	Provide status on VADER. (AM2)		
Q1	Provide status on Sampler improvements. (AM2)		
Q1	Provide status on CSAS improvements. (AM2)		
Q1	Provide status on SCALEHELP. (AM2)		
Q1	Provide status on SCALE 7.0 support. (AM2)		
Q1	Provide status on SCALE training (other than stats). (AM2)		
Q1	Publish a quarterly newsletter. (AM2)		Newsletter delayed coinciding with SCALE 6.3 release.
Q1	Provide status on AMPX maintenance and modernization activities (AM3)		
Q1	Provide status on Slide Rule application activities (AM6)		
Q1	Provide status on proposed benchmark intercomparison study activities (AM10)		
Q1	Provide status on VALID activities (AM17)		
Q1	Provide status on determination of appropriate integral parameters for critical experiment activities. (AM18)		
Q1	Provide status on analysis of Sum-of-Fractions for Nuclide Mixtures activities. (AM19)		
Q2	Continue distribution of available and newly packaged software to the NCS community requesters (at no direct cost to them) and provide distribution totals quarterly. (AM1)		

Q2	Provide status on RSICC activities (AM1)		
Q2	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)		
Q2	Provide status on TSUNAMI upgrades. (AM2)		
Q2	Provide status on VADER. (AM2)		
Q2	Provide status on Sampler improvements. (AM2)		
Q2	Provide status on CSAS improvements. (AM2)		
Q2	Provide status on SCALEHELP. (AM2)		
Q2	Provide status on SCALE 7.0 support. (AM2)		
Q2	Provide status on SCALE training (other than stats). (AM2)		
Q2	Publish a quarterly newsletter. (AM2)		Newsletters will resume in Q3
Q2	Provide status on AMPX maintenance and modernization activities (AM3)		
Q2	Provide status on Slide Rule application activities (AM6)		
Q2	Provide status on proposed benchmark intercomparison study activities (AM10)		
Q2	Provide status on VALID activities (AM17)		
Q2	Provide status on determination of appropriate integral parameters for critical experiment (AM18)		
Q2	Provide status on analysis of Sum-of-Fractions for Nuclide Mixtures (AM19)		
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)		

Q3	Provide status on RSICC activities (AM1)		
Q3	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)		
Q3	Provide status on TSUNAMI upgrades. (AM2)		
Q3	Provide status on VADER. (AM2)		
Q3	Provide status on Sampler improvements. (AM2)		
Q3	Provide status on CSAS improvements. (AM2)		
Q3	Provide status on SCALEHELP. (AM2)		
Q3	Provide status on SCALE 7.0 support. (AM2)		
Q3	Provide status on SCALE training (other than stats). (AM2)		
Q3	Publish a quarterly newsletter. (AM2)		
Q3	Provide status on AMPX maintenance and modernization activities (AM3)		
Q3	Provide status on Slide Rule application activities (AM6)		
Q3	Provide status on proposed benchmark intercomparison study activities (AM10)		
Q3	Provide status on VALID activities (AM17)		
Q3	Provide status on determination of appropriate integral parameters for critical experiment (AM18)		
Q3	Provide status on analysis of Sum-of-Fractions for Nuclide		

	Mixtures (AM19)		
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)		
Q4	Provide status on RSICC activities (AM1)		
Q4	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)		
Q4	Provide status on TSUNAMI upgrades. (AM2)		
Q4	Provide status on VADER. (AM2)		
Q4	Provide status on Sampler improvements. (AM2)		
Q4	Provide status on CSAS improvements. (AM2)		
Q4	Provide status on SCALEHELP. (AM2)		
Q4	Provide status on SCALE 7.0 support. (AM2)		
Q4	Provide status on SCALE training (other than stats). (AM2)		
Q4	Publish a quarterly newsletter. (AM2)		
Q4	Document AMPX modernization and technical support for SCALE CE, multigroup, and covariance libraries and report status annually to the NCSP Manager. (AM3)		
Q4	Provide status on Slide Rule application activities (AM6)		
Q4	Provide status on proposed benchmark intercomparison study activities (AM10)		
Q4	Provide status on VALID activities (AM17)		
Q4	Provide status on determination of appropriate integral parameters for critical experiment (AM18)		
Q4	Provide status on analysis of Sum-of-Fractions for Nuclide Mixtures (AM19)		

ACCOMPLISHMENTS

- AM1 - Radiation Safety Information Computational Center (RSICC)

- Distributed 930 software packages
- 327 SCALE, 307 MCNP®, and 0 COG packages distributed
- RSICC quarterly report issued.

FY2023 University Distributions		
Month	MCNP®	SCALE
October	105	26
November	56	28
December	58	33
January	26	26
February	85	34
March	54	25
April	24	19
May	22	29
June	18	20
July		
August		
September		
Total	448	240

- AM2 - SCALE/KENO/TSUNAMI Maintenance and Support/Cross-Section Generation/Modernization
  - Provide status on TSUNAMI upgrades:
    - **Multigroup (MG) CLUTCH development:**
      CLUTCH sensitivity method, originally developed for only continuous energy (CE) Monte Carlo transport, was expanded to the multi group Monte Carlo transport. Its first prototypic implementation was obtained with MG KENO transport, and its preliminary results and development details were summarized in a paper submitted to the ICNC 23.
    - **External F*(r) map capability:**
      A capability was added to the CLUTCH method in TSUNAMI sequences that enables reading mesh-based F*(r) map importance function from a 3dmap file.
    - **CLUTCH with deterministically computed F*(r) map:**
      A method was developed by Greene to provide F*(r) map importance function for the TSUNAMI/CLUTCH calculations by processing Denovo computed adjoint fluxes with KENO computed birth spectrum on the same mesh grid. A paper was submitted to ICNC 23 to discuss this new approach for F*(r) map importance function determination and its preliminary results.
    - **TSUNAMI Primer updates:**
      The existing primer was converted into a Word document to allow updates, and with was started in expanding the Quickstart section to include TSUNAMI-1D and all three TSUNAMI-3d options (MG, CLUTCH, IFP).
    - **TSUNAMI-IP new capabilities:**
      Capability for TSUNAMI-IP to calculate and report c(k) and uncertainty contributions per nuclide has been implemented and is

now under testing and review.

- Provide status on VADER:
  - **Code development and maintenance:**
    Development and maintenance activities were planned, and separate issues were created to facilitate extensive testing, bug fixes and enhancements that will be performed in Q4.
- Provide status on Sampler improvements
  - No major efforts.
- Provide status on CSAS improvements
  - **New k-eff estimators to CSAS-Shift sequence:**
    An effort is in progress which enables k-eff results from different estimators Shift calculates. With this update, CSAS-Shift will print k-eff per generation from three k-eff estimators (track-length, collision and absorption) and their combination in CE mode, and two k-eff estimators (track-length and collision) and their combination in MG mode. In SCALE 7.0, CSAS-Shift will print the best k-eff estimate using the combined results from all these estimators.
  - **Nubar tally result:**
    CSAS-Shift problem characterization edit was updated with nubar tally result.
    No major efforts on source convergence metrics.
- Provide status on SCALEHELP
  - Minor efforts.
- Provide status on SCALE7.0 support.
  - No major efforts.
- Provide status on SCALE training (other than stats).
  - No major efforts.
- Publish a quarterly newsletter.
  - Newsletter is in final stages, updated with information as SCALE 6.3 early user feedback is collected.

- AM3 - AMPX Maintenance & Modernization
  - In collaboration with Brookhaven National Laboratory, a build of the public version of AMPX is in progress for use in the ADVANCE system for testing the ENDF library in the course of NNDC work.
  - The ENDF/B-VIII.1 Beta 1.1 release was processed by members of the AMPX team. The status of the processing and performance in the VALID suite was presented at the mini-CSEWG meeting at Lawrence Livermore National Laboratory in April 2023. That effort will continue as the next ENDF/B-VIII.1 Beta releases (Beta 2 expected at the end of June) are available through the next business quarter.
  - In the course of processing the ENDF/B-VIII.1 Beta 1.1 covariance library, the PUFF sequence within AMPX was updated to handle lumped sums in the covariance files. This is under testing and subsequent code review.
  - The 10eV multigroup libraries (ENDF-7.1 and ENDF-8) were updated with new homogenous f-factors to incorporate the effects of a fix to the CENTRM interpolation routines.

- The status of AMPX support for the GNDS-2.0 evaluated nuclear data format was reviewed and presented at the WPEC meeting in Paris, France, in May 2023.

- AM6 – Slide Rule Application
  - A virtual meeting was held to review the progress of the Slide Rule Application project. Missing simulations will be identified to compile the final report as the deliverable for the project. The IRSN staff is working on descriptions for the required simulations and desired output format for the participants (IRSN, ORNL, and LLNL). ORNL will perform the simulations once they are identified by the IRSN. (Celik)
- AM10 – Proposed Benchmark Intercomparison Study
  - AM10 funding was used to support participation of Metwally, Dupont, and Lang at the TEX 2.0 meeting and NCSP M&V planning at LVOC in May 2023.
- AM17 – Expansion of the Verified, Archived, Library of Inputs and Data (VALID)
  - Near completion (1 week) of LCT-096 and LCT-097 models after iterating on review.
  - Began the review process of the detailed PMF-001 (Jezebel) model.
  - Provided review of the following benchmarks:
  - HMF-028-001
  - PMF-001-001 Simplified
  - LMT-003-001-3 Detailed and Simplified
  - IMF-022-006 Detailed and Simplified
  - LMT-007-001-6
  - PMF-016-001-6
  - LCT-079-001-10
  - HCF-003-002,21,22,23
  - HCI-006-006
  - HCM-002-003,7,10-17,20
  - Continued development and sensitivity analysis for three LEU-SOL-THERM benchmarks for the Verified, Archived Library of Inputs and Data (VALID) – (Reed)
- AM18 – Determination of Appropriate Integral Parameters for Critical Experiment
  - Expanded python-based bias error estimation tool to include additional integral parameters and criteria regarding the impact they have on VALID.
  - Analyzed additional system types in VALID for their bias estimation error as a function of input integral parameters.
  - Restructured python tool for improved robustness, readability, and usability.
  - Submitted an ANS summary to demonstrate the python tool and present preliminary results for the effect of the correlation coefficient on computational bias error. This summary is under review for the 2023 ANS winter meeting.
- AM19 – Analysis of Sum-of-Fractions for Nuclide Mixtures
  - Teams meetings were held during this time to discuss the presentation of the results at the ICNC meeting in October in Japan.
  - Travis Greene is continuing working on the validation portion of the final report along with Travis Zipperer. This is currently a working draft available through Teams from PNNL.

- Two conference papers detailing the validation efforts of ORNL were written and have been accepted for oral presentation at the ICNC conference in Sendai, Japan.
- An additional paper discussing the results of specific light-water and polyethylene validation differences discovered in the Sum-of-Fractions work were presented at the summer ANS meeting (June) in Indianapolis.

PUBLICATIONS

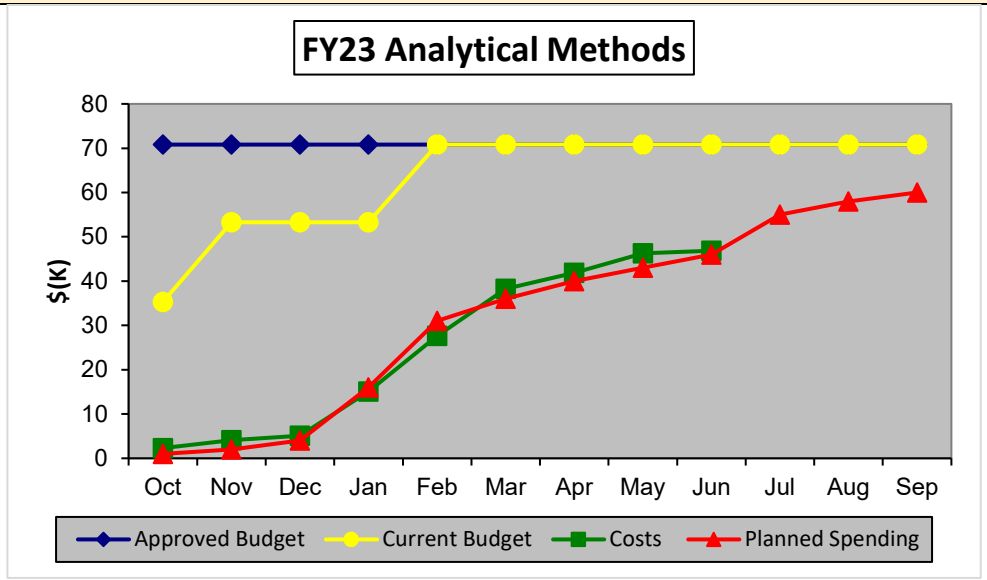
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Jordan McDonnell, BK Jeon, Kang Seog Kim, Dorothea Wiarda, Jesse Brown, Chris Chapman, Andrew Holcomb, "AMPX," CSWEG, Upton, NY, Nov 2022.
	William B.J. Marshall, Travis Greene, Alex Shaw, "Updated Gadolinium Validation in SCALE 6.3.0 using ENDF/B-VIII.0 Data," CSWEG, Upton, NY, Nov 2022.
	Alex Shaw, William B.J. Marshall, "Analysis of SCALE Criticality and Sensitivity Calculations for Reflected HEU Cylinders," Nuclear Criticality Safety Division Topical Meeting (NCSD 2022), 666-674 (June 2022).
	Mathieu Dupont, "Evaluation of Oak Ridge National Laboratory Health Physics Research Reactor Operation Data for Critical Benchmark Creation," Nuclear Criticality Safety Division Topical Meeting (NCSD 2022), 725-734 (June 2022)
	William B.J. Marshall, Alex Lang, "Multigroup Examination of Nickel-Reflected HEU System," Nuclear Criticality Safety Division Topical Meeting (NCSD 2022), 784-791 (June 2022)
	William B.J. Marshall, Travis Greene, "Performance of the Initial Implementation of the Shift Monte Carlo Code in SCALE 6.3," Nuclear Criticality Safety Division Topical Meeting (NCSD 2022), 754-763 (June 2022)
	Travis Greene, William B.J. Marshall, Justin Clarity, "Impact of Increased Latent Generations on Sensitivity Calculations with SCALE," Nuclear Criticality Safety Division Topical Meeting (NCSD 2022), 744-753 (June 2022)
	Travis Greene, William B.J. Marshall, Justin Clarity, "Impact of Increased Latent Generations on Sensitivity Calculations with SCALE," submitted to 2022 American Nuclear Society Annual Meeting, June 2022.
	Alex Lang, William B.J. Marshall, "Multigroup Examination of Nickel-Reflected HEU System," submitted to 2022 American Nuclear Society Annual Meeting, June 2022.
Q2	Shane Hart, Justin Clarity, "Creation of the VADER Code in SCALE," Nuclear Criticality Safety Division Topical Meeting (NCSD 2022), 385-391 (June 2022)
	Shane Hart, Justin Clarity, "Creation of the VADER Code in SCALE," Nuclear Criticality Safety Division Topical Meeting (NCSD 2022), Anaheim, CA, June 2022
	Douglas Bowen, "ISO TC85/SC5/WG8 “Nuclear Criticality Safety” Meeting, NRC public Workshop, Oak Ridge, TN, February 2023.
	Matthieu Duluc, Johann Herth, Tristan Adatte, D. Heinrichs, Soon Kim, Douglas Bowen, Cihangir Celik, Mathieu Dupont, "Update of the Nuclear Criticality Slide Rule: Review of the Estimation of the Number of Fissions," Nuclear Criticality Safety Division Topical Meeting (NCSD 2022), 446-455

	(June 2022)
	Johann Herth, Matthieu Duluc, Tristan Adatte, D. Heinrichs, Soon Kim, Douglas Bowen, Cihangir Celik, Mathieu Dupont, "Update of the Nuclear Criticality Slide Rule Calculations: Plutonium systems – Delayed Fission Gamma," Nuclear Criticality Safety Division Topical Meeting (NCSD 2022), 456-463 (June 2022)
	William B.J. Marshall, "Expansion of the Verified, Archived, Library of Inputs and Data (VALID)," Technical Program Review Meeting, Albuquerque, NM, February 2023.
	Jordan McDonnell, Jesse Brown, Chris Chapman, Bk Jeon, Kang Seog Kim, Dorothea Wiarda, "AMPX Developments in FY2022," Technical Program Review Meeting, Albuquerque, NM, February 2023.
	Douglas Bowen, "Nuclear Criticality Safety Repository, Radiation Safety Information Computational Center (RSICC), & NDA Program," Technical Program Review Meeting, Albuquerque, NM, February 2023.
	Lisa Reed, Veronica Karriem, William B.J. Marshall, "Assessing the Impact of Sensitivity/Uncertainty-Based Selection Criteria on Computational Bias Prediction," Technical Program Review Meeting, Albuquerque, NM, February 2023.
	William Wieselquist, "SCALE Activities in FY22," Technical Program Review Meeting, Albuquerque, NM, February 2023.
Q3	Douglas Bowen, "American Nuclear Society ANS-8 Standards Forum," 2023 ANS Winter Meeting and Technology Expo, Indianapolis, IN, June 2023.
	Shane Hart, Seth Johnson, Robert Lefebvre, William Wieselquist, "Improvements of SCALE Infrastructure on Microsoft Windows,"2023 ANS Winter Meeting and Technology Expo, Indianapolis, IN, June 2023.
	Travis Greene, William B.J. Marshall, Alex Lang, Travis Zipperer, "Impact of Thermal Scattering Law on Similarity Assessment in Light-Water or Polyethylene-Moderated Systems," 2023 ANS Winter Meeting and Technology Expo, Indianapolis, IN, June 2023.
	Walid Metwally, Douglas Bowen, "Nuclear Criticality Safety Training: Needs and Efforts," 2023 ANS Winter Meeting and Technology Expo, Indianapolis, IN, June 2023.
	Alex Lang, Lisa Reed, "EM NCS Needs for TEX 2.0," TEX 2.0 Meeting, Livermore, CA, May 2023.
	William B.J. Marshall, Walid Metwally, "ORNL S/U Capabilities for Critical Experiment Design," TEX 2.0 Meeting, Livermore, CA, May 2023.
	William B.J. Marshall, Travis Greene, "Validation Progress and Plans for ENDF/B-VIII.1β1 at ORNL," mini-CSEWG, Lawrence Livermore National Laboratory, Livermore, CA, April 2023.
	William B.J. Marshall, "Covariance Testing Progress for ENDF/B-VIII.1β1 at ORNL," mini-CSEWG, Lawrence Livermore National Laboratory, Livermore, CA, April 2023.
	William B.J. Marshall, Shane Hart, "Vader in a Nutshell," 2023 SCALE Users' Group Workshop, Oak Ridge, TN, April 2023.
	Walid Metwally, Alex Lang, "ANS 2023 Nuclear Safety Workshop Presentation," 2023 ANS Student Conference, Knoxville, TN, May 2023.
	Travis Greene, Lisa Reed, "NCS Applications Using SCALE 6.3.0," 2023 SCALE Users' Group Workshop, Oak Ridge, TN, April 2023.
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: AM1 **M&O Contractor Name**: PNNL **Point of Contact Name:** Travis Zipperer **Point of Contact Phone:** (206) 428-3474	**Reference:** DP0909010 **Date of Report:** August, 2023

BUDGET



1. Carryover into FY 2023 = $35,313
2. Approved FY 2023 Budget = $35,500
3. Total FY2023 Budget w/Carryover = $70,813
4. Actual spending for 1st Quarter FY 2023 = $5,118
5. Actual spending for 2nd Quarter FY 2023 = $33,131
6. Actual spending for 3rd Quarter FY 2023 = $8,609
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $2,542

NOTE: Include commitments as part of spending

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 of Sum-of-Fractions analysis for nuclide mixtures (AM1)		
Q2	Provide a status of Sum-of-Fractions analysis for nuclide mixtures (AM1)		
Q3	Provide a status of Sum-of-Fractions analysis for nuclide mixtures (AM1)		
Q4	Provide a status of Sum-of-Fractions analysis for nuclide mixtures (AM1)		

NCSP Quarterly Progress Report (FY-2023 Q3)

ACCOMPLISHMENTS

- AM1 – Analysis of Sum-of-Fractions for Nuclide Mixtures
  - Q1: Constructed case matrix for water and polyethylene reflected systems (around 1900 cases each); calculations to commence in Q2
  - Q1: Met with ORNL staff in December to discuss collaboration on the NCSP Technical Program Review Presentation and ICNC 2023 publications.
  - Q2: Submitted Abstract to ICNC 2023 on evaluation of Sum of Fractions for water and polyethylene moderated systems.
  - Q2: Presented at the NCSP TPR meeting in Albuquerque in February on Sum of Fractions methodology.
  - Q2: Completed case matrix for water and polyethylene reflected systems.
  - Q2: Developing draft report of SoF methodology.
  - Q3: Submitted Paper to ICNC 2023 on evaluation of Sum of Fractions for water and polyethylene moderated systems.
  - Q3: Continuing development of SoF report.

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

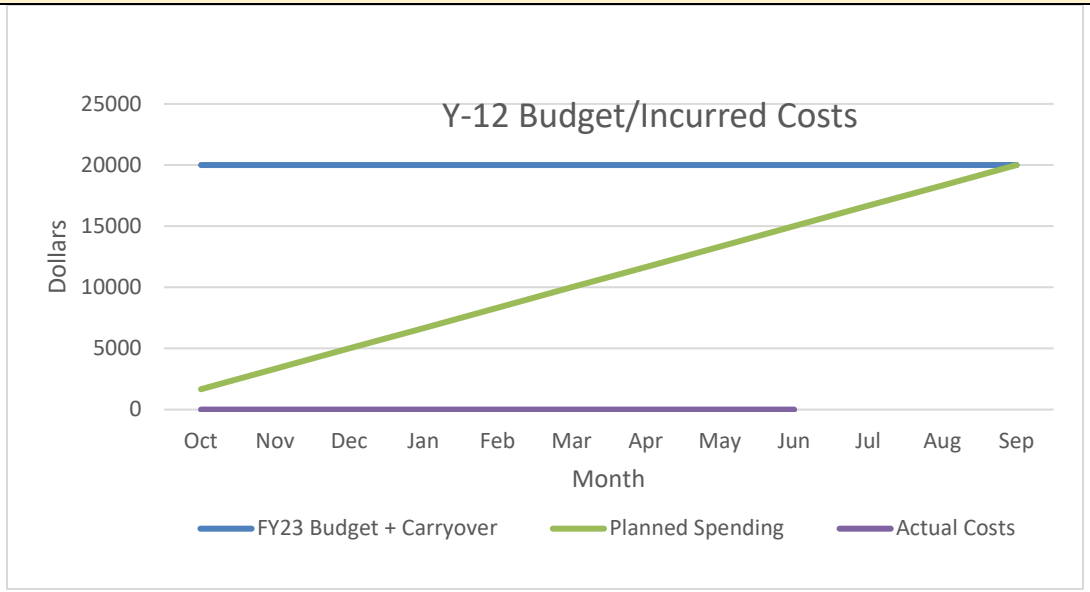
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	1) Travis Zipperer and Travis Greene, "Applicability of the Sum-of-Fractions for Moderated Systems", PNNL-SA-182011, February 21, 2023. 2) Travis Zipperer, Andrew Prichard, Travis Greene, BJ Marshall, and Alex Lang, **Abstract:** "Evaluation of the Sum-of-Fractions Methodology for Water and Polyethylene Moderated Systems", PNNL-SA-181534, January 31, 2023.
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: AM1 **M&O Contractor Name**: Y12 **Point of Contact Name:** Kevin Reynolds **Point of Contact Phone:** (865) 241-9067	**Reference:** DP0909010 **Date of Report:** July 17, 2023

BUDGET



1. Carryover into FY 2023 = $0.00
2. Approved FY 2023 Budget = $20,000.00
3. Total FY 2023 Budget w/Carryover = $20,000.00
4. Actual spending for 1st Quarter FY 2023 = $0.00
5. Actual spending for 2nd Quarter FY 2023 = $0.00
6. Actual spending for 3rd Quarter FY 2023 = $0.00
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $

NOTE: Include commitments as part of spending

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 Y12-AM1 activities in NCSP Quarterly Progress Reports. (AM1)		No activity this quarter to report.
Q2	Provide status on Y12-AM1 activities in NCSP Quarterly Progress Reports. (AM1)		No activity this quarter to report.
Q3	Provide status on Y12-AM1 activities in NCSP Quarterly Progress Reports. (AM1)		No activity this quarter to report.

Q4	Provide status on Y12-AM1 activities in NCSP Quarterly Progress Reports. (AM1)		

ACCOMPLISHMENTS

- AM1 – Proposed Benchmark Intercomparison Study
  -

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

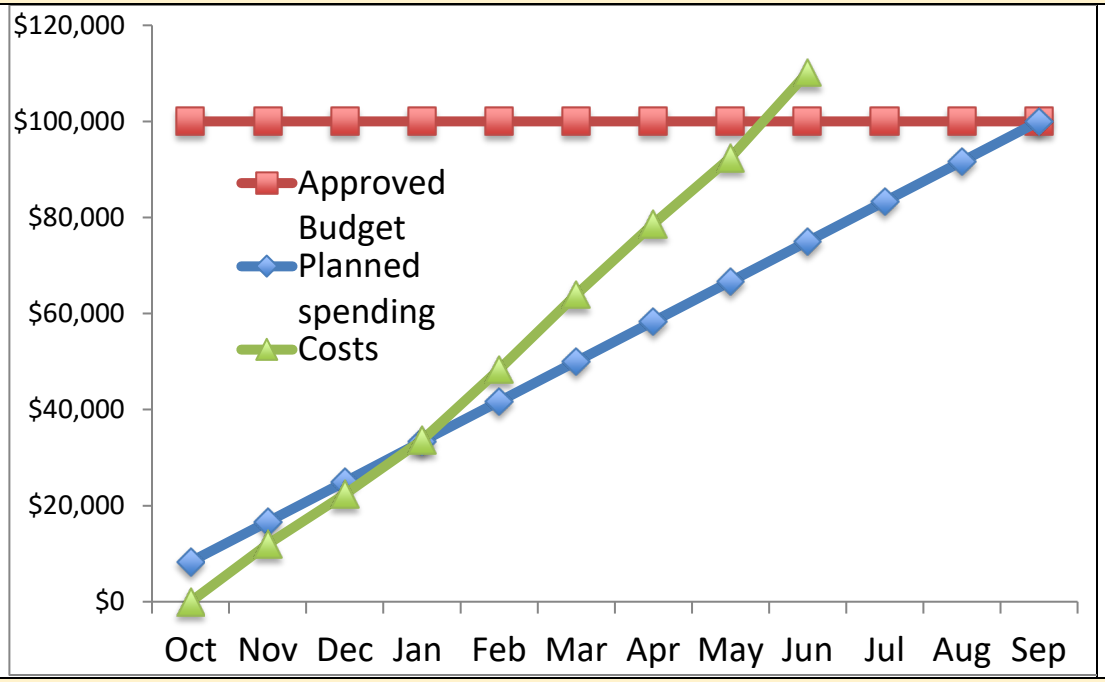
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	**Publication Reference** **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: NIPD3 **M&O Contractor Name**: LANL **Point of Contact Name:** Joetta Goda/Bob Little **Point of Contact Phone:** 505-667-2812/505-665-3487	**Reference:** DP0909010 **Date of Report:** July 9, 2023

BUDGET



1. Carryover into FY 2023 = $ 0
2. Approved FY 2023 Budget = $ 100,000
3. Total FY23 Budget w/Carryover = $100,000

Q1	$22,392	$0	$22,392
Q2	$41,566	$0	$41,566
Q3	$46,237	$0	$46,237
Q4			$0

4.
5. Projected carryover into FY 2024 = $

NOTE: Include commitments as part of spending

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 IT support activities at NNSS (IPD3)		
Q2	Provide a status report on IT support activities at NNSS (IPD3)		

Q3	Provide a status report on IT support activities at NNSS (IPD3)		
Q4	Provide a status report on IT support activities at NNSS (IPD3)		

ACCOMPLISHMENTS

- IPD3 – IT support at NNSS
  - *Began weekly visits to NCERC to troubleshoot issues*
  - *Upgrading malfunctioning switches in Count Room*
  - Maintaining networks, security upgrades
  - Installing printer drivers, troubleshooting printer issues.
  - Inspection of equipment for Control Room Upgrades
  - Laptop inspection
  - Attending meetings on secure computing and Wi-Fi disablement

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

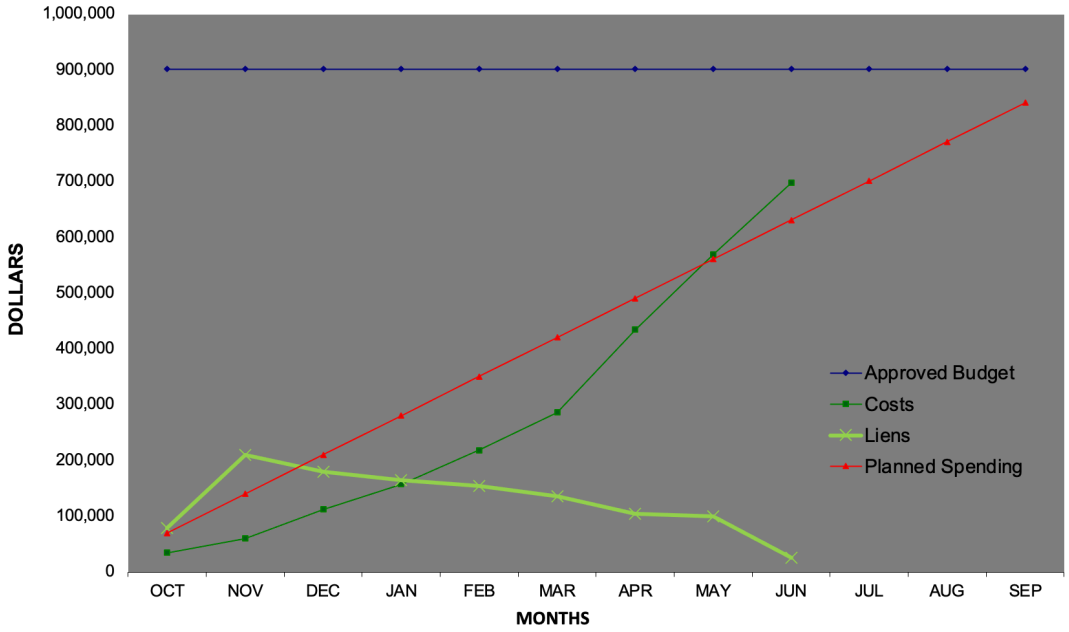
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	**Publication Reference** **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: IPD1, 2, 5, 6 **M&O Contractor Name**: LLNL **Point of Contact Name:** Catherine Percher **Point of Contact Phone:** (925) 579-4226	**Reference:** DP0909010 **Date of Report:** July 26, 2023

BUDGET



1. Carryover into FY 2023 = $151,559
2. Approved FY 2023 Budget = $750,000
3. Total FY23 Budget w/Carryover = $901,559
4. Actual spending for 1st Quarter FY 2023 = $112,918
5. Actual spending for 2nd Quarter FY 2023= $112,665
6. Actual spending for 3rd Quarter FY 2023 = $411,339
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $60,000

NOTE: Include commitments as part of spending

NOTE: Q3 had some spurious charges (approximately $120K of contract accruals that were not actually costed and should be returned to the IPD budget) and so LLNL expects some revision to the Q3 spending.

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)		

Q1	Provide status reports on LLNL participation in US and International IPD collaborations (including ICSBEP). (IPD1)		
Q1	Maintain, operate, and modernize the NCSP website, databases, and provide user assistance as required. (IPD2)		
Q1	Provide a status report on IT support at NNSS (IPD5)		
Q1	Provide a status report on benchmark evaluation of LLNL 'Pulsed Spheres' (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)		
Q2	Provide status reports on LLNL participation in US and International IPD collaborations (including ICSBEP). (IPD1)		
Q2	Maintain, operate, and modernize the NCSP website, databases, and provide user assistance as required. (IPD2)		
Q2	Provide a status report on IT support at NNSS (IPD5)		
Q2	Provide a status report on benchmark evaluation of LLNL 'Pulsed Spheres' (IPD6)		
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)		
Q3	Provide status reports on LLNL participation in US and International IPD collaborations (including ICSBEP). (IPD1)		
Q3	Maintain, operate, and modernize the NCSP website, databases, and provide user assistance as required. (IPD2)		
Q3	Provide a status report on IT support at NNSS (IPD5)		
Q3	Provide a status report on benchmark evaluation of LLNL 'Pulsed Spheres' (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)		
Q4	Provide status reports on LLNL participation in US and International IPD collaborations (including ICSBEP). (IPD1)		

Q4	Maintain, operate, and modernize the NCSP website, databases, and provide user assistance as required. (IPD2)		
Q4	Provide a status report on IT support at NNSS (IPD5)		
Q4	Provide a status report on benchmark evaluation of LLNL 'Pulsed Spheres' (IPD6)		

ACCOMPLISHMENTS

- **IPD1 - Conduct ICSBEP for Benchmarks of the 5-Year Plan and publish annual revision to the Handbook**
  - Out of ten evaluations sent to the ICSBEP Technical Review Group, there were 6 American evaluations
  - Four new and one legacy NCSP evaluations were presented at ICSBEP Meeting in April 2023:
    (1) ALARM-REAC-SST-SHIELD-001, Neutron Fluence and Element 57 Dose Responses to a Bare and Steel-Reflected Pulse of the ORNL HPRR (ORNL)
    (2) LEU-COMP-THERM-111 (IER305): 7uPCX fuel with Mo sleeves (SNL)
    (3) PU-MET-THERM-004 (IER480): TEX-Pu benchmark optimized for Polyethylene and Lucite thermal scattering, (LLNL)
    (4) HEU-MET-FAST-104 (IER488): MUSiC, HEU Critical and Subcritical Measurements (LANL)
    (5) Chlorine Worth Study (LANL)
  - Additional LANL/JAEA collaboration experiment (HEU-MET-FAST-102) of Fast-Spectrum Critical Assemblies with a Pb-HEU Core Surrounded by a Copper Reflector
- **IPD2 - Maintain the NCSP Website and Systems**
  - Updated documents, links, calendars, taskings, newsletters, photos/portraits, created art for updated banners.
  - Maintained lists of email subscribers for various "group" emails used by NCSP management.
  - Rebuild NCSET modules: HS3104
  - Attended Mission and Vision meeting at LLNL
  - LFE: meetings and page build, still in development
  - Working on user survey questionnaire for NCSP site
  - Continue to update site to meet accessibility requirements
  - NCSP Primer to NCSP site (this is live)- *developer still has a few more things to address*
- **IPD5 - IT Support at NNSS**
  - Brian Musick retired halfway through quarter- his replacement is currently uncleared, so classified IT support has been supplemented by LLNL main site personnel
  - Provided ISSM/ISSO and System Administrator support for Nevada IT including required weekly NTS-SLAN/NCERC system updates, monthly "authenticated" scans for NCERC network devices, and system upgrades as required. Created and renewed NTS-SLAN accounts throughout the quarter.
  - NTS-SLAN SharePoint site creation for user account creation/tracking (On-going)
  - Transitioning System Administrator role for NTS-LAN to LANL support team
  - Equipment inspection for NCERC transitioned to LANL support team
- **IPD6 - Benchmark Evaluation of LLNL 'Pulsed Spheres'**
  - S. Kim (retired, under Delphi contract) mentored A. Tamashiro to take over the pulsed sphere benchmark evaluation

- A. Tamashiro presented first benchmark of LLNL pulsed spheres to SINBAD task force review at April 2023 meeting.

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

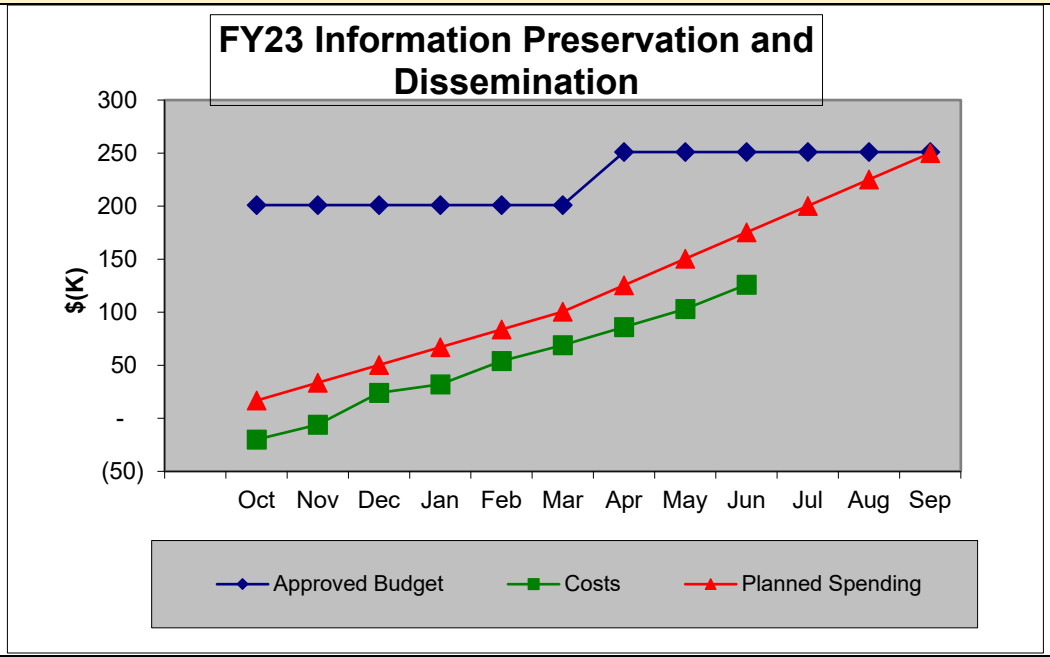
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	C. Percher, J. Bess, W. Marshall, et al, Abstract for "Status of the International Criticality Safety Benchmark Evaluation Project," LLNL-ABS-844502, International Conference on Nuclear Criticality Safety, Sendai, Japan (2023).
	J. Bess, C. Percher, W. Marshall, et al, "Engagement Opportunities in OECD NEA Benchmark Development," Frontiers in Energy Research: Nuclear Energy, February 2023. https://doi.org/10.3389/fenrg.2023.1085764
	J. Bess, C. Percher, W. Marshall, et al, " Intrinsic value of the international benchmark projects, ICSBEP and IRPhEP, for Advanced Reactor Development," Frontiers in Energy Research: Nuclear Energy, March 2023. **https://doi.org/10.3389/fenrg.2023.1085788**
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: IPD3, 4, 5 **M&O Contractor Name**: ORNL **Point of Contact Name:** Doug Bowen **Point of Contact Phone:** (865) 576-0315	**Reference:** DP0909010 **Date of Report:** July 26, 2023

BUDGET



1. Carryover into FY 2023 = $161K
2. Total Approved FY 2023 Budget w/Carryover = $251K
3. Actual spending for 1st Quarter FY 2023 = $24K
4. Actual spending for 2nd Quarter FY 2023 = $45K
5. Actual spending for 3rd Quarter FY 2023 = $57K
6. Actual spending for 4th Quarter FY 2023 = $
7. Projected carryover into FY 2024 = $

NOTE: Include commitments as part of spending

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 the development of the NCSP repository at OSTI.gov. (IPD3)		
Q1	Provide a status report on the development of the NCSP LFE database (IPD4)		

Q1	Provide a status report about the progress on the HPRR benchmark. (IPD5)		
Q2	Provide a status report on the development of the NCSP repository at OSTI.gov. (IPD3)		
Q2	Provide a status report on the development of the NCSP LFE database (IPD4)		
Q2	Provide a status report about the progress on the HPRR benchmark (IPD5)		
Q3	Provide a status report on the development of the NCSP repository at OSTI.gov. (IPD3)		
Q3	Provide a status report on the development of the NCSP LFE database (IPD4)		
Q3	Provide a status report about the progress on the HPRR benchmark (IPD5)		
Q4	Provide a status report on the development of the NCSP repository at OSTI.gov. (IPD3)		
Q4	Provide a status report on the development of the NCSP LFE database (IPD4)		
Q4	Provide a status report about the progress on the HPRR benchmark (IPD5)		

ACCOMPLISHMENTS

- IPD3 – Nuclear Criticality Safety Repository
  - Curation for FY23 Q2 records has been completed. The NCSP has also curated records from the first 10,000 searches of the "Seventy-Five Years of Nuclear Criticality Safety Documents – A Bibliography" (LLNL-TR-760080) document. The records that have been curated are primarily from the 4,938 records that were determined to be usable from the analysis that was completed during FY23 Q2. Usable records include those with certain access limitations (i.e., UNL), source input types (i.e., DOE2411API), and statuses (i.e., Completed). Additionally, the NCSP Team completed searching for the second half of the Bibliography document. Our total search count for the second half is 13,040 records, including

9,944 records with matches and 3,096 records without matches in E-Link. Our total search count for the entire Bibliography document is 23,011 records, including 17,307 with matches and 5,703 without matches.

Product Type	Existing Curated	New Curated	FY23Q3 Totals	Cumulative
Tech Reports	371	1	372	578
Conference Products	687	84	771	1,284
Accepted Manuscripts	4	2	6	69
Books	0	0	0	1
Patents	0	0	0	1
Totals	**1,062**	**87**	**1,149**	**1,933**

  - Per customer direction, team members are prioritizing curation of new records as they are delivered. No new records are available as of right now, but FY23 Q3 records are expected soon. The team is currently continuing the curation of the usable records from the first 10,000 searches.
  - With the completion of the searches for the second half of the Bibliography document, a spreadsheet containing the metadata of the 9,943 records with matches will be analyzed. Once the analysis is complete, the NCSP Team will begin the curation process for those records that are determined to be usable. Additionally, the FY23 Q3 records for the NCSP project will be prioritized for curation when they are released to the team.
- IPD4 – Learning from Experience (LFE) database
  - The LFE database is currently being tested on the NCSP website. A panel session was conducted by the US and UK to get feedback on the LFE proposal and what the details for this database would be useful to the NCS community. This feedback is being incorporated into the website
- IPD5 – Oak Ridge Health Physics Research Reactor CAAS Benchmark Evaluation
  - The ORNL HPRR CAAS benchmark evaluation was judged “not acceptable” by the ICSBEP technical review group in April 2023. It was decided to retract the evaluation from the ICSBEP submission system, and to adapt the evaluation to submit it to SINBAD (shielding database focused). The document adaptation work was started during Q3 and will be completed during Q4 2023 or Q1 2024.

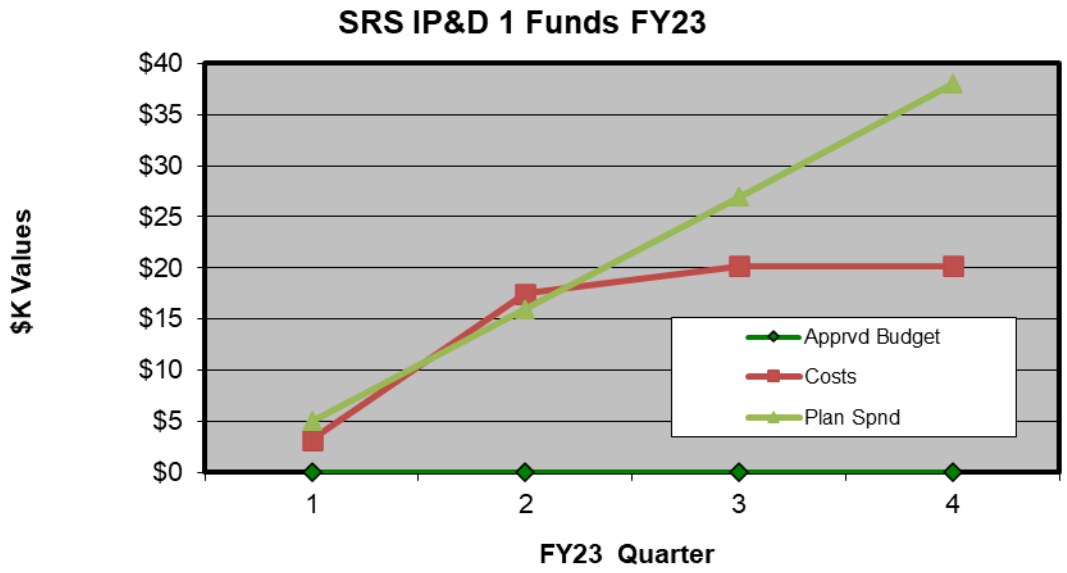
PUBLICATIONS

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	None
Q2	John Mihalczo, Delayed Critical and Subcritical Experiments with Polyethylene Moderated Unreflected Thin 15 in. Diameter HEU Metal Plates, ORNL/TM-2022/2724, UT-Battelle, LLC, Oak Ridge National Laboratory (February 2023)
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: IPD1 **M&O Contractor Name**: SRNS **Point of Contact Name:** Scott Finfrock **Point of Contact Phone:** 803-557-1317	**Reference:** DP0909010 **Date of Report:** July, 2023

BUDGET



1. Carryover into FY 2023 = $ 40.5K
2. Approved FY 2023 Budget = $0K
3. Total FY 2023 Budget w/Carryover = $40.5K
4. Actual spending for 1st Quarter FY 2023 = $3.2K
5. Actual spending for 2nd Quarter FY 2023 = $14.3K
6. Actual spending for 3rd Quarter FY 2023 = $2.7K
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $TBD

NOTE: Include commitments as part of spending

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 progress with CritView. (IPD1)		More time has become available, so progress is being made.
Q1	NCSP Approved Scope for FY23. (IPD1)		Scope for FY22/FY23 has been approved
Q2	Provide status reports on progress with CritView. (IPD1)		No issues. Code work in progress.
Q2	TBD based on Approved Scope. (IPD1)		N/A

Q3	Provide status reports on progress with CritView. (IPD1)		Code work in progress. Limited staff availability this quarter reduced spending. Still expect to meet goal in 4th quarter.
Q3	TBD based on Approved Scope. (IPD1)		N/A
Q4	Provide status reports on progress with CritView. (IPD1)		
Q4	Provide updated CritView database for user testing. (IPD1)		

ACCOMPLISHMENTS

- IPD1 – ARH-600 Reissue (CritView)
  -

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

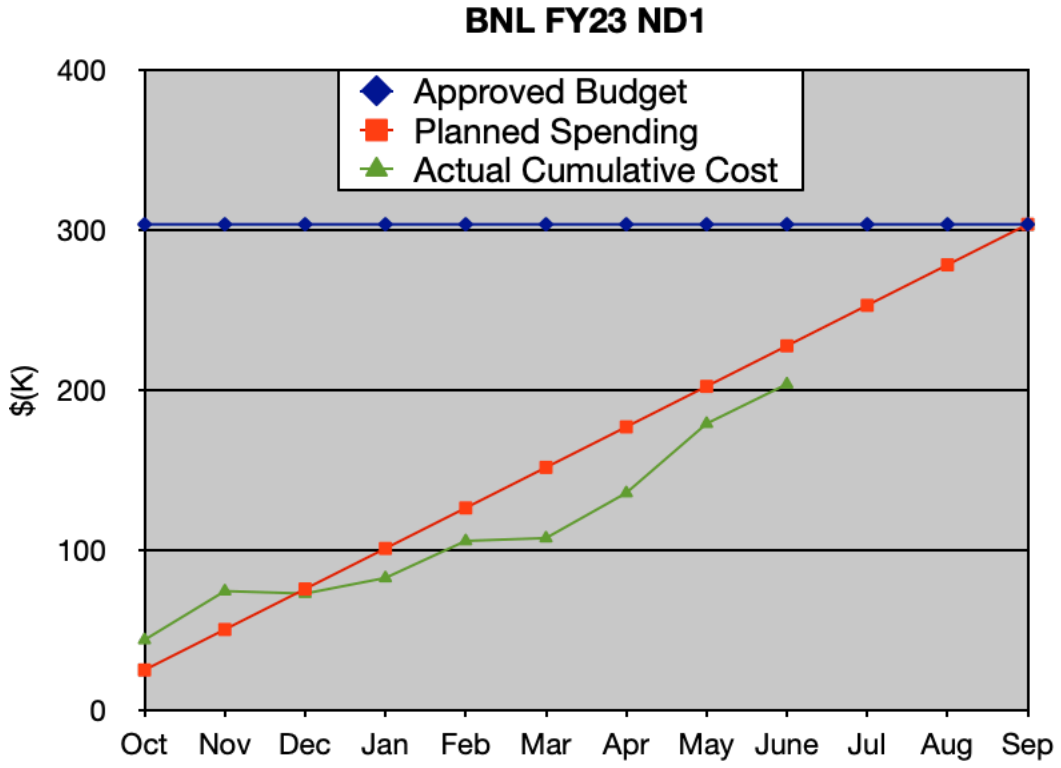
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	**Publication Reference** **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: ND1 **M&O Contractor Name**: BNL **Point of Contact Name:** Gustavo Nobre **Point of Contact Phone:** 631-344-5205	**Reference:** DP0909010 **Date of Report:** 26 July, 2023

BUDGET



1. Carryover into FY 2023 = $ 13,754
2. Approved FY 2023 Budget = $ 290,000
3. Total FY 2023 Budget w/Carryover = $303,754
4. Actual spending for 1st Quarter FY 2023 = $73,063
5. Actual spending for 2nd Quarter FY 2023 = $34,667
6. Actual spending for 3rd Quarter FY 2023 = $96,160
7. Actual spending for 4th Quarter FY 2023 = $0

   Projected carryover into FY 2024 = $15,188 **NOTE:** Include commitments as part of spending

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	Maintain and upgrade ADVANCE code system by performing data verification of new NCSP evaluations and performing quality assurance on the data as required. Provide status reports		ADVANCE build reports simplified and condensed using Markdown format. Build reports are now generated on a per-commit basis to any ENDF development branch. The

	on all nuclear data activities in the NCSP Quarterly Progress Reports. (ND1)		build reports contain information only on the changeset of a given commit. We are in final testing and should deploy in Q2.
Q1	If mandated by CSEWG, release new ENDF library. (ND1)		Released many versions of a preliminary ENDF/B-VIII.1-Beta0 for testing within the community. In parallel, refined and continued the review process aiming for a more comprehensive Beta1 release in the next quarter.
Q2	Maintain and upgrade ADVANCE code system by performing data verification of new NCSP evaluations and performing quality assurance on the data as required. Provide status reports on all nuclear data activities in the NCSP Quarterly Progress Reports. (ND1)		The ADVANCE system has been successfully implemented in mirror repositories and should be fully deployed in Q3.
Q2	If mandated by CSEWG, release new ENDF library. (ND1)		Released Beta1 containing many updates for the neutron, FPY, alphas sublibraries. This was in the Make-It-Happen list. TSL could not get reviewed in time for Beta1, but should be released in Beta1.1 in the next quarter.
Q3	Maintain and upgrade ADVANCE code system by performing data verification of new NCSP evaluations and performing quality assurance on the data as required. Provide status reports on all nuclear data activities in the NCSP Quarterly Progress Reports. (ND1)		Fully deployed ADVANCE and worked to significantly expand its capabilities.
Q3	If mandated by CSEWG, release new ENDF library. (ND1)		Released ENDF/B-VIII.1-Beta1.1 on April 18, including many TSL contributions and small fixes in the neutrons sublibrary. Continued the coordination, organization and review effort in preparation for a Beta 2 release.
Q4	Maintain and upgrade ADVANCE code system by performing data verification of new NCSP evaluations and performing quality assurance on the data as required. Provide status reports on all nuclear data activities in the NCSP Quarterly Progress Reports. (ND1)		
Q4	If mandated by CSEWG, release new ENDF library. (ND1)		.

ACCOMPLISHMENTS

- Released ENDF/B-VIII.1-Beta1.1 containing more than 60 updated or new TSL evaluations and minor fixes for a few neutron evaluations, compared to Beta1.
- Co-organized mini-CSEWG at LLNL (April 25-27, 2023)
- Attended and presented at TEX-2.0 meeting.
- Published the 2022 CSEWG Meeting minutes (BNL-224203-2023-INRE).
- Presented about ENDF developments at the WPEC and WONDER international meetings
- Coordinated developments to ENDF library in preparation of the Beta2 release
    - Proper merge of exit distributions from LLNL/LANL/KAERI
    - Implemented CSEWG decision on photonuclear library
    - Coordinated 239,240,241Pu updates to address issues pointed out during mini-CSEWG
    - Coordinated review process
    - Merged batch of format fixes done by LLNL to the electrons sublibrary
    - Fixes and updates in the neutron sublibrary
    - Documented issue trackers in preparation for Beta2 release and for the upcoming Hackathon
- Organized contributions for the ENDF/B-VIII.1 accompanying paper.
- Made significant enhancements to ADVANCE system:
    - optimized most of the code runners and ensured their compliance with PEP 8 standards.
    - Expanded ADVANCE's reporting capabilities significantly, including incorporating advanced features for the integration of AMPX. AMPX, a powerful nuclear data processing code suite developed and hosted at Oak Ridge National Laboratory, generates continuous-energy and multigroup neutron and gamma libraries, further enhancing the versatility of ADVANCE.

PUBLICATIONS

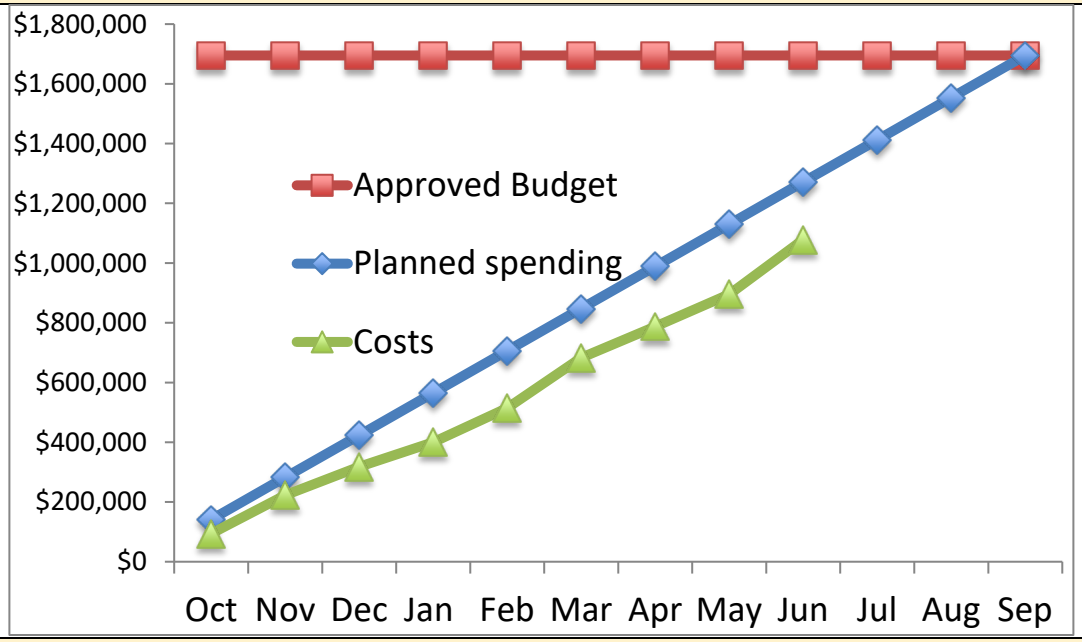
Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1	Minutes for the 2021 CSEWG Meeting - BNL-223530-2022-INRE	Yes	
Q2			
Q3	D. Brown, “CSEWG Meeting Minutes”, BNL-224203-2023-INRE	Yes	
Q4			

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: ND1, 2, 2a, 2b **M&O Contractor Name**: LANL **Point of Contact Name:** Joetta Goda/ Jen Alwin **Point of Contact Phone:** 505-667-2812/505-667-7252	**Reference:** DP0909010 **Date of Report:** July 24, 2023

BUDGET



1. Carryover into FY 2023 = $ 145,000
2. Approved FY 2023 Budget = $ 1,550,000
3. Total FY23 Budget w/Carryover = $ 1,695,000
4. Actual spending for 1st Quarter FY 2023 = $ 318,227 ($0 commits)
5. Actual spending for 2nd Quarter FY 2023 = $ 364,505 Sum = $ 682,732 ($0 commits)
6. Actual spending for 3rd Quarter FY 2023 = $395,729 Sum = $ 1,078,461 ($0 commits)
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $

NOTE: Include commitments as part of spending

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 LANL participation in US and International Nuclear Data collaborations. (ND1)		
Q1	Conduct CSEWG Evaluation and Covariance sessions. (ND1)		
Q1	Report data testing results with ENDF/B-VIII.0 and additional beta release cross sections at CSEWG. (ND1)		

Q1	Provide a status report on Nuclear Data activities at LANSCE (ND2)		
Q1	Provide status report on Prompt Fission Neutron Spectra (PFNS) Measurement of Plutonium-240 (ND2a)		
Q1	Provide status report on Unresolved and Fast Measurements of Uraunium-233 (n,gamma) (ND2b)		
Q2	Provide a status report on LANL participation in US and International Nuclear Data collaborations. (ND1)		
Q2	Provide a status report on Nuclear Data activities at LANSCE (ND2)		
Q2	Provide status report on Prompt Fission Neutron Spectra (PFNS) Measurement of Plutonium-240 (ND2a)		
Q2	Provide status report on Unresolved and Fast Measurements of Uraunium-233 (n,gamma) (ND2b)		
Q3	Provide a status report on LANL participation in US and International Nuclear Data collaborations. (ND1)		
Q3	Provide status report on Prompt Fission Neutron Spectra (PFNS) Measurement of Plutonium-240 (ND2a)		
Q3	Provide a status report on Nuclear Data activities at LANSCE (ND2)		
Q3	Provide status report on Unresolved and Fast Measurements of Uraunium-233 (n,gamma) (ND2b)		
Q4	Provide a status report on LANL participation in US and International Nuclear Data collaborations. (ND1)		
Q4	Deliver nuclear data evaluations as indicated in Appendix B of the Five-Year plan. (ND1)		
Q4	Provide a status report on Nuclear Data activities at LANSCE (ND2)		
Q4	Provide status report on Prompt Fission Neutron Spectra (PFNS) Measurement of Plutonium-240 (ND2a)		

Q4	Obtain final experimental results for Pu-240 PFNS at LANSCE, finalize data analysis, and deliver data to evaluators (ND2a)		
Q4	Provide status report on Unresolved and Fast Measurements of Uraunium-233 (n,gamma) (ND2b)		
Q4	Finalize acquisition of U-233 thick target capture data, finalize data analysis, and deliver data to evaluators (ND2b)		

ACCOMPLISHMENTS

- ND1 – Nuclear Data Evaluation and Testing
  - Light Nuclei
    - We submitted the final n+6Li evaluation for ENDF/B-VIII.1-beta1.3.
    - We are testing another version of n+9Be for ENDF/B-VIII.1-beta1.3. Initial testing indicates improved PMF-38 keff = 0.99993(10) coming down from 1.00173(10). This version includes an (n,2n) mt24 that interpolates between the 8.0 and new R-matrix evaluation (from 8.1beta1.1).
    - No further change for n+16O having been fixed for ENDF/B-VIII.1 as reported during the previous quarter.
  - 35Cl (leveraging funding from GAIN)
    - We produced a preliminary new evaluation of 35Cl, and we confirmed that the file works well in MCNP simulations in collaboration with TerraPower. The new evaluation includes the most recent (n,p) and (n,alpha) data measured by the LENZ spectrometer, as well as updated neutron optical potential that was fitted to the experimental total cross sections. We have extended this evaluation to 20 MeV by comparing other available experimental data of (n,p), (n,alpha), and (n,2n) cross sections, and the final evaluation will be completed soon.
  - La-139
    - We continued the fast evaluation with testing of the angular distributions for the elastic channel. The first test gives relatively good agreement (see figure 1), but we are working on adjusting the parameters a bit more to see whether we can improve the agreement.

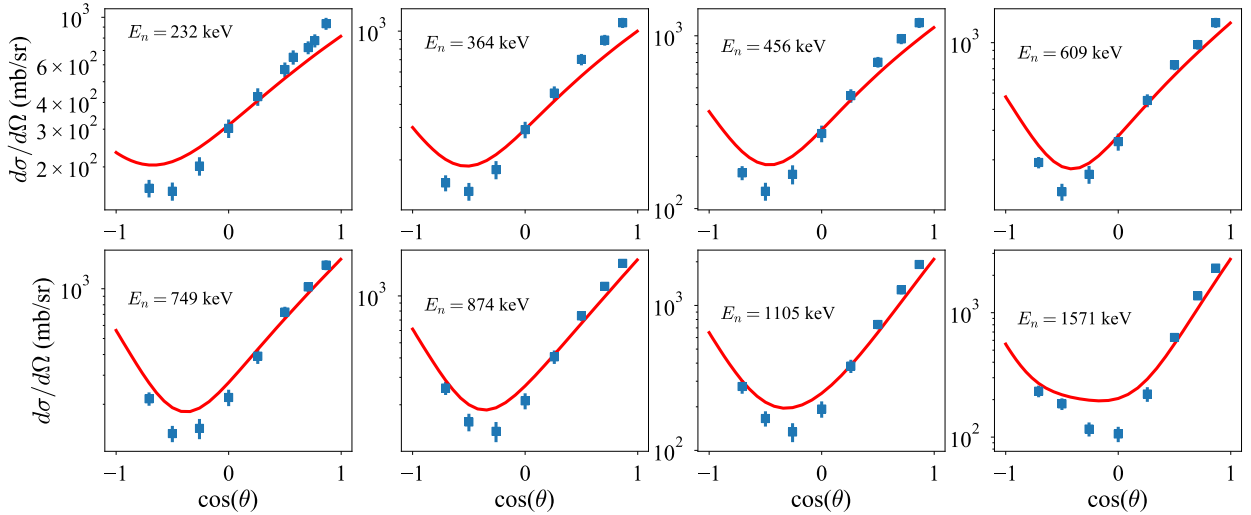


Figure 1: The angular distribution for the elastic scattering of neutrons on ^{139}La.

- Pb-208
  - We worked with RPI to produce new evaluations of 208Pb, which include the updated resonance parameters and elastic scattering angular distributions. We confirmed that the new evaluation performs well in the fast critical benchmarks, and full testing by including other updated actinide data is underway.
- Actinides
  - Pu-238, Pu-240, Pu-241, Pu-242 "Attempt a consistent nu-bar evaluation supported by a model code to provide better evaluated nu-bar for minor Pu-isotopes"
    - We calculated sensitivities for nubar from thermal to 20 MeV for 238Pu, 239Pu, 240Pu, 241Pu, and 242Pu with CGMF, using consistent parametrizations for mass, total kinetic energy, and spin distributions. Sensitivities, baseline nubar values, and baseline parameter values with uncertainties are now available for us to perform the consistent evaluation.
    - We also finished the experimental uncertainty quantification for 240Pu (4/8 accepted) and 241Pu (7/14 accepted) nu-bar, and made the necessary database for the evaluation.
  - 238U "Finalize prompt fission neutron spectra based on LANSCE Chi-Nu Data"
    - We continue to work on experimental data uncertainty quantification.

- ND2 – Nuclear Data Measurements at LANSCE
  - Work Towards Fabricating a ^{239}Pu Sample for Measurements with DICER
    - Two batches of highly enriched 239Pu ("Clinton Pu") have been chemically purified. These two batches contain several times more material than needed for the two thinnest (3e-4 and 6e-4 atoms of 239Pu per barn) DICER samples we anticipate. To ensure that these very thin samples are uniform, we will dissolve the 239Pu in deuterated hydrochloric acid (DCl), very similar to what was done for our recent successful measurements on 88Zr. We have verified that enough 239Pu can be dissolved in the available volume (about 10 microliters) using HCl and will perform tests with DCl soon. We plan to use DCl rather than HCl because deuterium has a much lower absorption cross section than hydrogen. We have designed and fabricated containers for mounting the samples in DICER and expect to test them soon.
  - Analysis of ^{143}Nd(n,γ) and ^{149}Sm(n,γ) Cross sections from DANCE and ^{147,149}Sm(n,tot) Cross Sections from DICER
    - During the third quarter of FY 2023, the simultaneous SAMMY analysis of DICER and DANCE on 149Sm was finished. Discrepancies in angular momenta between the data and ENDF were observed. In addition, preliminary results were presented in the 6th International Workshop On Nuclear Data Evaluation for Reactor application. A foreign trip report has already been submitted and we include in this report the presentation that was given (LA-UR-23-25695). The R-Matrix analysis on 143Nd using SAMMY is ongoing. Wrong spin assignments were found in ENDF/B-VIII.0 for some resonances when comparing with the DANCE experimental data. This seems to be due to the fact that the spin was randomly assigned in the evaluation. Preliminary results have been presented in the 2023 R-Matrix Workshop on Methods and Applications held in Athens (OH) from 20-23 of June, 2023 (LA-UR-23-26588).
  - Perform PFNS Measurements of U-233 at Chi-Nu
    - We have caused a small amount of funding to be sent to LLNL this FY to begin procurement of parts for the PPAC, which will be completed during FY24.

- We have obtained a quote to purchase the U-233 material and a procurement is in process at Los Alamos. The material we were quoted is 99.98% U-233.

- ND2a – Prompt Fission Neutron Spectra (PFNS) Measurement of Plutonium 240
  - Data processing is complete with final data analysis being calculated right now. A PRC paper on these data is ~half completed, and data will be submitted for evaluation this FY.
- ND2b - Unresolved and Fast Measurements of U233 (n, gamma)
  - The paper "Measurement of the neutron-induced capture-to-fission cross section ratio in 233U at LANSCE" was published online in Physical Review C (LA-UR-23-20578).
  - The postdoc working on this project was converted to staff during Q3.
- Additional Presentations and International Collaborations
  - A paper for ICNC on "Consistent nuclear data evaluations for criticality safety" was accepted.
  - Our Pu-239, U-235 PFNS and nu-bar mean values and covariances and U-238 nu-bar values are part of ENDF/B-VIII.1beta1.
  - Among our presentations at the recent mini-CSEWG were two by Denise Neudecker:
    - "Covariance testing and update on 239Pu and 235U PFNS covariances", LA-UR-23-24329 (2023),
    - "Validating ENDF/B-VIII.1beta1 with LLNL pulsed-sphere neutron-leakage spectra", LA-UR-23-24085 (2023).

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

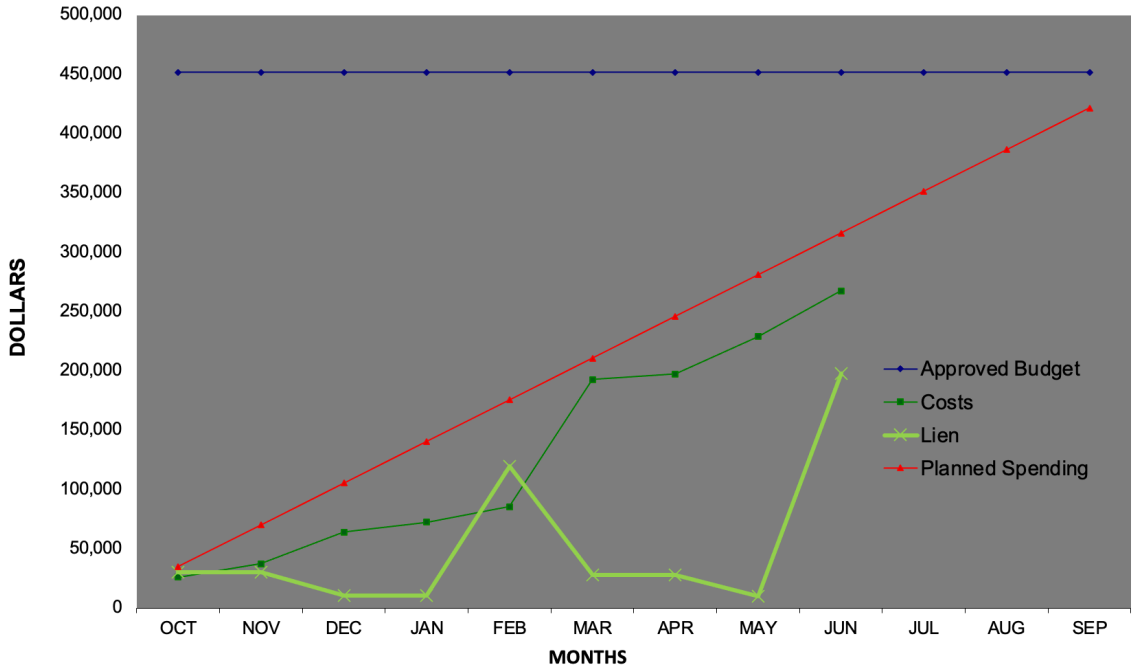
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	D. Neudecker, "^{239}Pu and ^{235}U PFNS and nu-bar covariances", **LA-UR-22-31319**, Presented at CSEWG meeting November 2022.
Q1	D. Neudecker, "New nuclear data proposed for the ^{238}U nu-bar, ^{235}U nu-bar and PFNS", **LA-UR-22-31314**, Presented at CSEWG meeting November 2022.
Q1	D. Neudecker, "ENDFB/VIII.1beta0 testing with LLNL Pulsed Spheres", **LA-UR-22-31317**, Presented at CSEWG meeting October 31, 2022.
Q1	N. Kleedtke, S. Kahler, W. Haeck, D. Neudecker, "Validation of ENDF/B-VIII.1-β0-based Continuous Energy Data Tables", **LA-UR-22-31596**, Presented at CSEWG meeting November 2022.
Q2	D. Neudecker, A. Lovell, K. Parsons, N. Gibson, P. Talou, "Release of 239Pu and 235U PFNS and nu-bar Covariances" **LA-UR-23-20728.**

Q3	Denise Neudecker, "Covariance testing and update on 239Pu and 235U PFNS covariances,"**LA-UR-23-24329**, Presented at April 2023 Mini-CSEWG meeting.
Q3	Denise Neudecker, "Validating ENDF/B-VIII.1beta1 with LLNL pulsed-sphere neutron-leakage spectra," **LA-UR-23-24085,** Presented at April 2023 Mini-CSEWG meeting.
Q3	Athanasios Stamatopoulos, Paul E. Koehler, Esther Leal Cidoncha, Aaron Joseph Couture, Gencho Y. Rusev, and John Leonard Ullmann, " Study of 149Sm capture and total cross sections for burnup credit applications," **LA-UR-23-25695**, Presented at International Workshop On Nuclear Data Evaluation for Reactor Applications (WONDER) (Aix-En-Provence, France).
Q3	Esther Leal Cidoncha, Athanasios Stamatopoulos and Paul Koehler, " R-Matrix analysis of the neutron-induced cross sections on143Nd and 147,149Sm measured at LANSCE," **LA-UR-23-26588**, Presented at 2023 R-matrix Workshop on Methods and Applications.
Q3	E. Leal-Cidoncha , A. Couture, E. M. Bond, T. A. Bredeweg , C. Fry , T. Kawano , A. E. Lovell , G. Rusev, I. Stetcu , J. L. Ullmann, L. Leal, and M. T. Pigni, " Measurement of the neutron-induced capture-to-fission cross section ratio in 233U at LANSCE," **LA-UR-23-20578** (also Phys. Rev. C 108, 014608 (2023)).
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: ND9, 12 **M&O Contractor Name**: LLNL **Point of Contact Name:** Catherine Percher **Point of Contact Phone:** (925) 579-4226	**Reference:** DP0909010 **Date of Report:** July 26, 2023

BUDGET



1. Carryover into FY 2023 = $76,734
2. Approved FY 2023 Budget = $375,000
3. Total FY23 Budget w/Carryover = $421,734
4. Actual spending for 1st Quarter FY 2023 = $64,059
5. Actual spending for 2nd Quarter FY 2023 = $128,739
6. Actual spending for 3rd Quarter FY 2023 = $74,844
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $30,000

NOTE: Include commitments as part of spending

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 Li-Doped Liquid Scintillator Array for Fission Correlations (ND9)		
Q1	Provide a status report on thermal scattering law evaluations and methods development (ND12)		NCSU had to delay work in December because we could not fund the contract due to funding timing.

Q2	Provide a status report on Li-Doped Liquid Scintillator Array for Fission Correlations (ND9)		
Q2	Provide a status report on thermal scattering law evaluations and methods development (ND12)		
Q3	Provide a status report on Li-Doped Liquid Scintillator Array for Fission Correlations (ND9)		
Q3	Provide a status report on thermal scattering law evaluations and methods development (ND12)		
Q4	Provide a status report on Li-Doped Liquid Scintillator Array for Fission Correlations (ND9)		
Q4	Provide a status report on thermal scattering law evaluations and methods development (ND12)		

ACCOMPLISHMENTS

- **ND9 – Scoping Study: Li-6 Doped Liquid Scintillator Array for Fission Correlations**
  - Completed the initial analysis of whether the Li6 loaded scintillator provides additional information to allow for better fission/scattering discrimination and fission neutron multiplicity accuracy. While the initial results showed that the Li6 capture did not improve the results over non-Li6 loaded scintillator. This is due to the Li6 capture only being ~75% efficient (the other 25% of neutrons capture on hydrogen), as well as the detector to detect fast neutrons was not as efficient at containing thermal neutrons. We are now performing studies with a detector design that is better tuned to the thermal neutrons, and trying scintillators with a higher lithium loading to determine conclusively if Li6 loaded scintillator is appropriate for this application.
- **ND12 – Thermal Scattering Law Evaluations and Methods Development**

  Generation and Benchmarking of Thermal Neutron Scattering Cross Sections in Support of Advanced Nuclear Reactor Concepts
  - NCSU completed work on the DOS for the TSL evaluation of paraffin (NCSP's Appendix B material for FY 2022 and 2023) for both amorphous and crystalline microstructures. At this stage, generation of the TSL and related cross sections is underway.
  - NCSU continued work on the TSL evaluations that will be part of ENDF/B-VIII.1 release (see past QPRs for a listing of the specific evaluations). In addition, recently completed evaluations are being prepared for contribution to ENDF/B. This includes the PuO_2 TSL evaluation.

  Development and Implementation of a Modern Doppler Broadening Approach Including Atomic Binding Effects
  - NCSU continued work on testing *FLASSH* 1.0 for TSL evaluation and execution of the Doppler broadening operation. All evaluated TSL libraries to appear in the ENDF/B-VIII.1 release were successfully performed using *FLASSH*. Code related review comments are currently being addressed.

  Development and Implementation of Machine Learning Methods for Thermal Scattering Law Evaluations
  - NCSU continued work on training the CDFs that are needed to link the NeTS modules of specific materials into a Monte Carlo simulation tool. The Serpent code was chosen as the platform for such testing. Techniques for accelerating the execution of the coupled Serpent-NeTS construct are being tested for steady state and transient simulations.

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

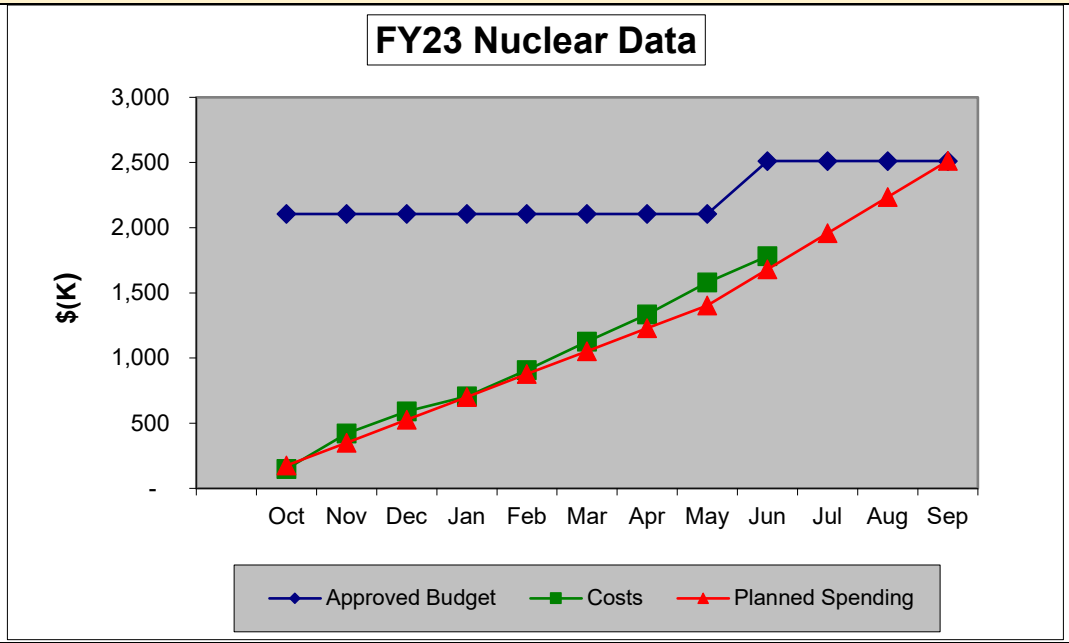
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Laramee, B.K., N.C. Fleming, and A.I. Hawari, "Implementation of TSL Evaluations Beyond the Incoherent Approximation," Presentation to CSEWG, November 1, 2022
	Fleming, N.C., J. P. W. Crozier, B. K. Laramee, and A. I. Hawari, "TSL Nuclear Fuel Evaluations and Capabilities at NC State University," Presentation to CSEWG, November 1, 2022
	Crozier, J.P.W. and A.I. Hawari, "Neural Thermal Scattering (NeTS) Modules for Graphite & Beryllium," Presentation to CSEWG, November 1, 2022
Q2	E. Lee, N. C. Fleming, Ayman I Hawari, "Benchmark of Neutron Thermalization in Graphite Using a Pulsed Slowing-Down-Time Experiment," *Nuclear Science and Engineering*, https://doi.org/10.1080/00295639.2022.2162789 , 2023
	N. C. Fleming, …, Ayman I. Hawari, "FLASSH 1.0: Thermal Scattering Law Evaluation and Cross Section Generation for Reactor Physics Applications," *Nuclear Science and Engineering*, 2023. **(Accepted)**.
Q3	J. P. W. Crozier, A. I. Hawari, "Ab Initio Evaluation of Plutonium Dioxide $\boldsymbol{S(\alpha,\beta)}$ and Thermal Neutron Cross Sections," *Transactions of the American Nuclear Society*, 2023.
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: ND1, 2, 3, 4, 6, 9, 11 **M&O Contractor Name**: ORNL **Point of Contact Name:** Doug Bowen **Point of Contact Phone:** (865) 576-0315	**Reference:** DP0909010 **Date of Report:** July 26, 2023

BUDGET



1. Carryover into FY 2023 = $89K
2. Approved FY 2023 Budget = $ 2,016K
3. Total FY 2023 Budget w/Carryover = $2,105K
4. Actual spending for 1st Quarter FY 2023 = $591K
5. Actual spending for 2nd Quarter FY 2023 = $534K
6. Actual spending for 3rd Quarter FY 2023 = $656K
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $0

NOTE: Some funding will be transferred to other tasks as needed and the spend rate should be lower in Q4.

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 all Nuclear Data measurement activities (ND1)		
Q1	Provide a status report 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)		

Q1	Complete cross-section measurement deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND1)		
Q1	Provide a status report on all Nuclear Data evaluation and testing activities (ND2)		
Q1	Provide a status report 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 (ND2)		
Q1	Complete cross-section evaluation deliverables per the nuclear data schedule in Appendix B (ND2)		
Q1	Provide a status report on all isotopic sample lease activities (ND3)		
Q1	Provide a status report on all thermal neutron scattering measurement and analysis activities (ND4)		
Q1	Provide a status report on all SAMMY nuclear data evaluation code modernization activities (ND6)		
Q1	Provide a status report on evaluation of thermal and resolved resonance ranges of UO2 and PUO2 activities (ND9)		
Q1	Provide a status report on thermal neutron scattering measurements and evaluations for DHS applications at temperature activities (ND11)		
Q2	Provide a status report on all Nuclear Data measurement activities (ND1)		
Q2	Provide a status report on ORNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest (ND1)		

Q2	Complete cross-section measurement deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND1)		
Q2	Provide a status report on all Nuclear Data evaluation and testing activities (ND2)		
Q2	Provide a status report 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 (ND2)		
Q2	Complete cross-section evaluation deliverables per the nuclear data schedule in Appendix B (ND2)		
Q2	Provide a status report on all isotopic sample lease activities (ND3)		
Q2	Provide a status report on all thermal neutron scattering measurement and analysis activities (ND4)		
Q2	Provide a status report on all SAMMY nuclear data evaluation code modernization activities (ND6)		
Q2	Provide a status report on evaluation of thermal and resolved resonance ranges of UO2 and PUO2 activities (ND9)		
Q2	Provide a status report on thermal neutron scattering measurements and evaluations for DHS applications at temperature activities (ND11)		
Q3	Provide a status report on all Nuclear Data measurement activities (ND1)		
Q3	Provide a status report on ORNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest (ND1)		
Q3	Complete cross-section measurement deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND1)		

Q3	Provide a status report on all Nuclear Data evaluation and testing activities (ND2)		
Q3	Provide a status report 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 (ND2)		
Q3	Complete cross-section evaluation deliverables per the nuclear data schedule in Appendix B (ND2)		
Q3	Provide a status report on all isotopic sample lease activities (ND3)		
Q3	Provide a status report on all thermal neutron scattering measurement and analysis activities (ND4)		
Q3	Provide a status report on all SAMMY nuclear data evaluation code modernization activities (ND6)		
Q3	Provide a status report on evaluation of thermal and resolved resonance ranges of UO2 and PUO2 activities (ND9)		
Q3	Provide a status report on thermal neutron scattering measurements and evaluations for DHS applications at temperature activities (ND11)		
Q4	Provide a status report on all Nuclear Data measurement activities (ND1)		
Q4	Provide a status report on ORNL participation in US and International Nuclear Data collaborations, and for foreign travel, provide a brief trip summary report to NCSP Manager on items of NCSP interest (ND1)		
Q4	Complete cross-section measurement deliverables per the nuclear data schedule in Appendix B of the 5 Year Plan (ND1)		
Q4	Provide a status report on all Nuclear Data evaluation and testing activities (ND2)		
Q4	Provide a status report 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 (ND2)		

Q4	Complete cross-section evaluation deliverables per the nuclear data schedule in Appendix B (ND2)		
Q4	Provide a status report on all isotopic sample lease activities (ND3)		
Q4	Provide a status report on all thermal neutron scattering measurement and analysis activities (ND4)		
Q4	Provide a status report on all SAMMY nuclear data evaluation code modernization activities (ND6)		
Q4	Provide a status report on evaluation of thermal and resolved resonance ranges of UO2 and PUO2 activities (ND9)		
Q4	Provide a status report on thermal neutron scattering measurements and evaluations for DHS applications at temperature activities (ND11)		

ACCOMPLISHMENTS

- **Status report on all nuclear data support activities.**
  - Attendance of several ND personnel at the annual **WPEC meeting** at NEA Data Bank with several presentation, 15—17 May 2023
  - Participation in **mini-CSEWG** meeting at Livermore, 25—27 April 2023
  - NCSP **Integral Experiment** and **Mission and Vision** Meetings at Livermore, 1—5 May 2023
  - **Consultancy Meeting** to Update the Pu-239 Resonance Evaluation up to 5 keV, **IAEA** headquarters, 8—12 May 2023
  - 2023 **R-matrix workshop** on methods and applications, Ohio University, Athens, 20—23 June 2023
  - Participation in **DOE/EURATOM** meeting to present progress on action sheet 66, 29—30 June 2023, Luxembourg
  - ND time-of-flight measurements work presented at **NSSC summer school** at UC-Davis
  - Participation in the **WONDER2023** meeting with two presentations.
  - ORNL contributions to new **ENDF/B-VIII.1 library paper** have been written up.
- ND1 - Nuclear Data Measurements: Complete cross-section measurement and evaluation deliverables per the nuclear data schedule in Appendix B of the 5-year plan.
  - No **Zr-92** experiments performed due to budget constrains to operate GELNA and performance issue of the GELINA electron gun. Expect to perform experiments by the end of 2023 (October – December).
  - Malfunction of the flux ion chamber for **Zr-91** capture experiment. Evaluation to use different flux shape from previous experiments.
  - **Zr-90** capture yield finalized.
- ND2 – Nuclear Data Evaluations and Testing
  - Biweekly meetings to discuss status of evaluation work at ORNL.
  - **V** capture and transmission data analysis and evaluation for data using various sample thickness continued.
  - **140,142Ce** –Report of the evaluation is in review. Evaluation is being tested for inclusion into ENDF 8.1
  - **239Pu** evaluation in the Resolved Resonance Region was updated to improve the performance of criticality benchmarks together with depletion calculation as a function of the burn-up. In the sub-thermal and thermal energy region, the focus was also to improve the

performance within the suite of MISTRAL benchmarks. Moreover, this work identified inconsistencies between the current (adopted) value of thermal scattering cross section and low-energy thick-target transmission measurements. When fitted, the thick-target measurements predict a value of the thermal scattering cross section about 1 barn larger than the currently adopted value. The generated 239Pu ENDF file was released for testing and validation within the ENDF beta2 release. This work was partially supported by the IAEA.

- Work of **88Sr** consisted in the generation of an ENDF file based on the resonance parameters published by Koheler in Phys. Rev. C62 055803 (2000). In that work, the quantification of the external function was performed without negative levels but using energy dependence R-matrix contribution calculated with the neutron pole strengths or equivalently neutron strength functions. This formalism is allowed by the ENDF format, but it is unclear processing codes can already handle this formalism. When optimized, the ENDF file will be submitted anyway to ENDF repository.
- **63,65Cu**: For the angular distributions in copper, the discrepancy between the evaluated angular distributions and experimental values has been investigated further. This was discussed at the mini-CSEWG meeting that took place in Livermore, CA, as well as with INDEN collaborators throughout the quarter. The findings will be written in a report in the next quarter. Additionally, the covariance analysis is progressing.
- Criticality performance of the **63,65Cu** evaluations depends on angular distribution that are reported in evaluated nuclear data files (ENDF)s as Legendre polynomials (LP). Work was performed to fit available LP for natural copper measured by Popov as an additional information in evaluating the resonance parameters for both copper isotopes. Since Popov LPs were measured for an average neutron spectrum, experimental corrections such as Gaussian filtering or energy dependent resolution function should be adopted when fitting those data. This represents a crucial point in predicting the theoretical LP that are to be reported in ENDF. The quantification of these experimental corrections is in progress.
- For the **139La** evaluation, another iteration was performed to improve the fit of low-lying resonance parameters to experimental data.

- ND3 - Isotopic Sample Leases to Support ND1 ND Measurements
  - Zr92 has been shipped end of March 2023 to GELINA.
- ND6 – SAMMY Nuclear Data Evaluation Code Modernization
  - SAMMY was initially written for a computer with a lot less memory than current computers, hence had initially a complicated internal program flow. As reported in the last quarter, we have started to update this flow, start off with the set of alphanumeric user input of which there are about 300 different options. The initial update using a new C++ class to keep track of the user input was reviewed and has been merged into the SAMMY main branch.
  - The reading of resonance parameters and covariances was moved from ENDF to AMPX reading routines. Reading ENDF data instead of regular SAMMY input information results in a new SAMMY style input and parameter file. Previously the format of these two files dependent on the format flag in the ENDF file. This is no longer the case and only the more modern mode is supported. This affected a lot of test cases because of the formatting change. In addition, some results changed due to some ENDF flags that SAMMY previously didn't take into consideration. Since the AMPX reading routines can already support GNDS for resonance parameters, this will bring the same support to SAMMY. However, supporting reading resonance parameters covariance data from GNDS will need a user input change.

- RPI summer intern from RPI started to incorporate SESH into SAMMY. This begins the process to allow fitting of un-corrected experimental data in the unresolved resonance region. Changes to SAMMY have been incorporated to correct self-shielding with SESH. Work is ongoing to develop derivatives to enable Bayesian updates to URR parameters.

- ND9 – Evaluation of Thermal and Resolved Resonance Ranges of UO_2 and PUO_2
  - Performed thermal inelastic neutron scattering (INS) measurements of UO2; analysis of the data is ongoing. Additionally, we attempted to modify set up to allow for measurement of 6.67 eV resonance, but data was deemed not sufficient to use for evaluation or validation purposes.
  - Based on previous literature review, two methods for simultaneously including thermal & resolved resonance effects in the thermal range were chosen to be studied. Preliminary implementation of these methods in an independent code system is nearing completion, and the plan is to study the merits of both over the remainder of the FY. Once a method is chosen, work will begin on properly implementing it into SAMMY.
- ND11 – Thermal neutron scattering measurements and evaluations for DHS applications at temperature.
  - Initial analysis of transmission data for hydrated cement and concrete from RPI has been completed. Final analysis is pending on the accurate determination of composition of the samples (i.e. how much water has evaporated). This is in progress.
  - New samples for both hydrated cement and concrete were prepared for new INS measurements at the beginning of August 2023. The composition has been tracked closely and will be continued to be tracked until the measurements time.
  - Development of transmission capability at ORNL has been continued with additional testing in June 2023. This capability is being developed to benefit NCSP in general, with extra motivation to carry out additional transmission measurements of different hydrated cement and concrete compositions if developed in time.
  - Additional INS measurements of different types of polyethylene have been carried out in June 2023 at VISION instrument. These measurements will provide additional validation of different polyethylene TSLs (ORNL, ENDF/B-VIII.0). The difference in the intensity of the observed experimental spectra is due to thicknesses of the samples (i.e., multiple neutron scattering, 6 mm vs 0.6 mm samples), but the shape is consistent.
  - Additional polyethylene samples have been procured for further validation and will be measured in August 2023. The appropriate thicknesses have been chosen to minimize multiple neutron scattering contributions to the spectra.
  - ORNL polyethylene TSL has been updated according to the new measured data, and it is being reviewed as part of TSL review process for inclusion in ENDF/B-VIII.1 library.

PUBLICATIONS

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Chris Chapman, "Thermal Neutron Scattering Research and Development at Oak Ridge National Laboratory", 242nd ECS Meeting, Atlanta, GA, Oct 2022.
	Dorothea Wiarda, Jesse Brown, Goran Arbanas, Marco Pigni, Jordan McDonnell, Chris Chapman, "SAMMY Modernization Efforts," CSWEG, Upton, NY, Nov 2022.

	Chris Chapman, Kemal Ramic, Goran Arbanas, Jesse Brown, Alexander Kolesnikov, Matthew Stone, Luke Daemen, Yongqiang Cheng, Anibal Ramirez Cuesta, Yaron Danon, Dominik Fritz, "Proposed Methodology for Evaluating and Validating TSLs," CSWEG, Upton, NY, Nov 2022.
	Marco Pigni, "On the Uranium and Plutonium Nuclear Data Evaluations," CSWEG, Upton, NY, Nov 2022.
	Jordan McDonnell, Marco Pigni, " Evaluation and Validation of the n+63,65Cu Cross Sections," CSWEG, Upton, NY, Nov 2022.
	Marco Pigni, "Theoretical and calculable dependent variables and their covariance in nuclear data libraries," Nuclear Data Uncertainty Quantification Working Meeting, Virtual Los Alamos, NM, Sep 2022.
	Marco Pigni, Jordan McDonnell, "Brief Update for Evaluation of Neutron Reactions on 63,65Cu," INDEN consultants' meeting, Vienna, Austria, Aug 2022.
	Marco Pigni, R. Capote, "Status of fissile and light nuclei evaluations towards ENDF/B-VIII.1 neutron sub-library release," INDEN consultants' meeting, Vienna, Austria, Aug 2022.
	Klaus Guber, Jesse Brown, Carlos Paradela Dobarro, Stefan Kopecky, Jan Heyse, Peter Schillebeeckx, "ORNL Neutron Cross Section Measurements of 90Zr," Transactions of the American Nuclear Society, Vol 127, 662-665 (Nov 2022).
	Chris Chapman, Dorothea Wiarda, "Proposed Generalized Header File for TSLs," CSWEG, Upton, NY, Nov 2022.
Q2	Marco Pigni, "Quantification of the 35Cl (n,p) reaction channel," Progress in Nuclear Energy, Vol 157, March 2023, https://doi.org/10.1016/j.pnucene.2022.104551
	Chris Chapman, Goran Arbanas, Jesse Brown, Douglas Abernathy, Alexander Kolesnikov, Luke Daemen, Yongqiang Cheng, Anibal Ramirez Cuesta, Garrett Granroth, Yaron Danon, Dominik Fritz, Daniel Siefman, "Status of ORNL TSL evaluations," CSWEG, Upton, NY, Nov 2022.
	Dorothea Wiarda, Jesse Brown, "Covariance Data in Unresolved Range," CSWEG, Upton, NY, Nov 2022.
	Dorothea Wiarda, Jordan McDonnell, Jesse Brown, Chris Chapman, Bk Jeon, Kang Seog Kim, Andrew Holcomb, "RECENT AMPX developments," IAEA Technical Meeting on Nuclear Data Processing, Vienna, Austria, Nov 2022.
	Chris Chapman, Kemal Ramic, Goran Arbanas, Jesse Brown, Alexander Kolesnikov, Matthew Stone, Luke Daemen, Yongqiang Cheng, Anibal Ramirez Cuesta, Yaron Danon, Dominik Fritz, "Applying Methodology for Evaluating and Validating TSLs to Materials of Interest to NCSP," Technical Program Review, Albuquerque, NM, February 2023.
	Kemal Ramic, Chris Chapman, Goran Arbanas, Jesse Brown, Luke Daemen, Klaus Guber, Douglas Bowen, Douglas Abernathy, Alexander Kolesnikov, Yongqiang Cheng, Anibal Ramirez Cuesta, Daniel Siefman, Yaron Danon, Dominik Fritz, "Status of ORNL TSL evaluations - TPR2023,"Technical Program Review Meeting, Albuquerque, NM, February 2023.
	Marco Pigni, "FY22 NCSP accomplishments for U and Pu Evaluations," Technical Program Review Meeting, Albuquerque, NM, February 2023.
	Jordan McDonnell, Jesse Brown, Chris Chapman, Marco Pigni, "ORNL R-matrix Analyses for Non-Fissile Materials within NCSP," Technical Program Review Meeting, Albuquerque, NM, February 2023.
	Goran Arbanas, Jesse Brown, Dorothea Wiarda, Andrew Holcomb, "Bayesian Evaluation Framework for Imperfect Differential and Integral Data or Models," Technical Program Review Meeting, Albuquerque, NM, February 2023.
	Dominik Fritz, Y. Danon, Kemal Ramic, Chris Chapman, Jesse Brown, Goran Arbanas, M Rapp, Tim Trumbull, Michael Zerkle, Jesse Holmes, Peter Brain, Adam Ney, Sukhjinder Singh, Katelyn Cook, Benjamin Wang, "Total thermal neutron cross section measurements of hydrogen dense polymers from 0.0005–20 eV," Annals of Nuclear Energy, Vol 183, Issue 1, April 2023.
	Douglas Bowen, "NCSP Nuclear Data Program," WANDA, Washington DC, March 2023.

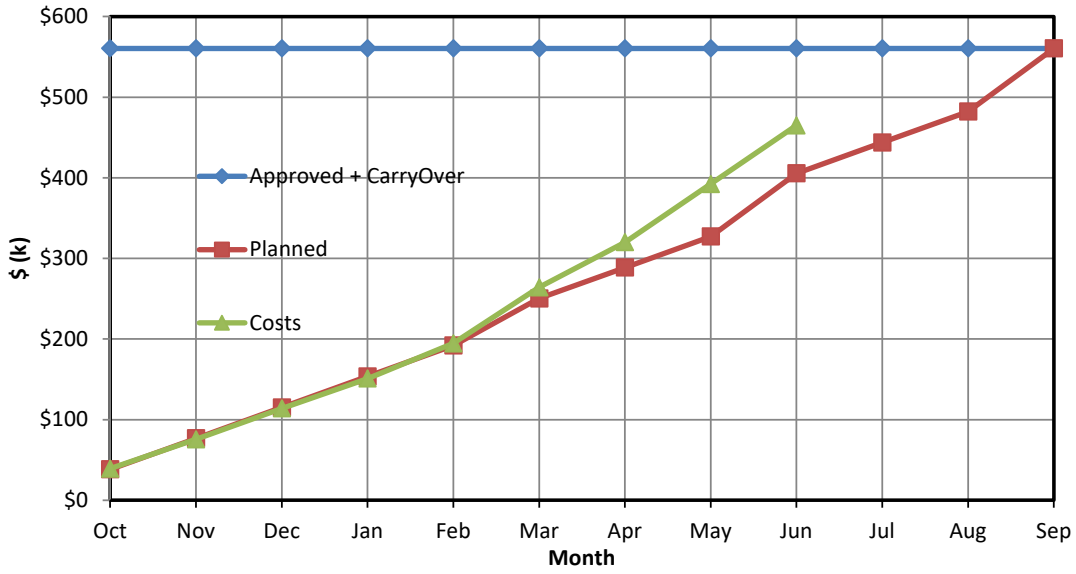
	Jordan McDonnell, Jesse Brown, Chris Chapman, Bk Jeon, Kang Seog Kim, Dorothea Wiarda, William Wieselquist, Rike Bostelmann, "AMPX and SCALE Nuclear Data Libraries for Depletion," WANDA, Washington DC, March 2023.
Q3	Paraskevi Dimitriou, Zhenpeng Chen, R deBoer, G. Hale, Satoshi Kunieda, H. Leeb, M. W. Paris, Marco Pigni, Thomas Srdinko, Pierre Tamagno, I. Thompson, "Evaluation of light-element reactions in the resolved resonance region," 15th International Conference on Nuclear Data for Science and Technology (ND2022), 284, (May 2023).
	Marco Pigni, Dorothea Wiarda, Goran Arbanas, Jesse Brown, Jordan McDonnell, Chris Chapman, Kemal Ramic, Klaus Guber, "Nuclear Data Evaluations in the Resolved Resonance Region and Proposed Updates to R-matrix Modeling in the SAMMY Code," 2023 R-matrix Workshop on Methods and Applications, Athens, OH, June 2023.
	Marco Pigni, R deBoer, Paraskevi Dimitriou, "International Nuclear Data Evaluation Network (INDEN) on the Evaluation of Light Elements (4)," Summary Report of the IAEA Consultants Meeting, June 2022, IAEA Headquarters, Vienna, Austria
	Goran Arbanas, Jesse Brown, Dorothea Wiarda, "Advancing the Theory of Nuclear Data Evaluations," 6th edition of the International Workshop On Nuclear Data Evaluation for Reactor Applications (WONDER-2023), Aix-en-Provence, France, June 2023.
	deBoer, R. J., Gula, A., Febbraro, Michael T., Brandenburg, K., Brune, C. R., Görres, J., Gyürky, Gy, Kelmar, R., Manukyan, K., Meisel, Z., Odell, D., Pigni, Marco T., Shahina, None, Stech, E., Tan, W., and Wiescher, M. First near-threshold measurements of the C13(α,n1)O16 reaction for low-background-environment characterization. United States: N. p., 2022. Web. doi:10.1103/physrevc.106.055808
	Chris Chapman, "Protecting Against Potential Issues in Thermal Neutron Scattering," WPEC SG48, Paris, France, May 2023.
	Kemal Ramic, Chris Chapman, Goran Arbanas, Jesse Brown, William B.J. Marshall, Luke Daemen, Douglas Abernathy, Alexander Kolesnikov, Yongqiang Cheng, Anibal Ramirez Cuesta, Daniel Siefman, Yaron Danon, Dominik Fritz, "ORNL's continuing efforts in evaluating and validating TSLs," WPEC SG48, Paris, France, May 2023.
	Jordan McDonnell, Jesse Brown, Chris Chapman, Dorothea Wiarda, Andrew Holcomb, "Status of GNDS Support in AMPX," WPEC SG48, Paris, France, May 2023.
	Goran Arbanas, Jesse Brown, Dorothea Wiarda, "Advancing the theory of nuclear data evaluations," International Workshop On Nuclear Data Evaluation for Reactor Applications (WONDER-2023), Aix-en-Provence, France, June 2023.
	Jesse Brown, Goran Arbanas, Hany Abdel-khalik, Ugur Mertyurek, William B.J. Marshall, William Wieselquist, "Generalized Bayesian Framework for Evaluation of Integral Benchmark Experiments," ANS Winter Meeting and Technology Expo (2022), 732-735 (Nov 2022).
	Marco Pigni, R-MATRIX ANALYSIS AND STATISTICAL PROPERTIES OF DYSPROSIUM ISOTOPES IN THE NEUTRON ENERGY RANGES UP TO A FEW KEV, ORNL/TM-2023/2925, UT-Battelle, LLC, Oak Ridge National Laboratory (June 2023).
	Jordan McDonnell, Jesse Brown, Chris Chapman, Bk Jeon, Kang Seog Kim, Dorothea Wiarda, "AMPX and ENDF/B-VIII.1 Thermal Scattering Library," mini-CSEWG, Lawrence Livermore National Laboratory, Livermore, CA, April 2023.
	Kemal Ramic, Chris Chapman, Goran Arbanas, Jesse Brown, William B.J. Marshall, Luke Daemen, Douglas Abernathy, Alexander Kolesnikov, Yongqiang Cheng, Anibal Ramirez Cuesta, Daniel Siefman, Yaron Danon, Dominik Fritz, "On integral benchmarks for resolving TSL conflicts for ENDF/B-VIII.1 release," mini-CSEWG, Lawrence Livermore National Laboratory, Livermore, CA, April 2023.
	Chris Chapman, Dorothea Wiarda, "Format Proposal for Isotopic Distribution in TSL Files for ENDF/B-VIII.1," mini-CSEWG, Lawrence Livermore National Laboratory, Livermore, CA, April 2023.
	Marco Pigni, "Proposed updates to Pu evaluation for ENDF/B-VIII.0β2," mini-CSEWG, Lawrence Livermore National Laboratory, Livermore, CA, April 2023.

	Jordan McDonnell, Jesse Brown, "ENDF/B-VIII.1 and AMPX," 2023 SCALE Users' Group Workshop, Oak Ridge, TN, April 2023.
	Kemal Ramic, Chris Chapman, Goran Arbanas, Jesse Brown, Luke Daemen, Douglas Abernathy, Alexander Kolesnikov, Yongqiang Cheng, Anibal Ramirez Cuesta, Daniel Siefman, Yaron Danon, Dominik Fritz, "Advancements in Validation of TSLs through Inelastic Neutron Scattering and Transmission Measurements," International Workshop On Nuclear Data Evaluation for Reactor Applications (WONDER-2023), Aix-en-Provence, France, June 2023.
	Jesse Brown, William Wieselquist, Steve Skutnik, Rike Bostelmann, Jordan McDonnell, Germina Ilas, "Fission Product Yields: SCALE/ORNL Perspective," WANDA, Washington DC, March 2023.
	Jesse Brown, Goran Arbanas, Ugur Mertyurek, William B.J. Marshall, William Wieselquist, Hany Abdel-khalik, "Generalized Bayesian Framework for Evaluation of Integral Benchmark Experiments," American Nuclear Society Winter Meeting, Phoenix, AZ, November 2022
	Goran Arbanas, Jesse Brown, Dorothea Wiarda, Andrew Holcomb, Peter Brain, Devin Barry, Yaron Danon, "Parameterization of Direct and Doorway Processes in R-Matrix Formalism," 15th International Conference on Nuclear Data for Science and Technology (ND2022). 284, (May 2023).
	Chris Chapman, Goran Arbanas, Jesse Brown, Kemal Ramic, Yongqiang Cheng, Douglas Abernathy, Alexander Kolesnikov, Matthew Stone, Luke Daemen, Anibal Ramirez Cuesta, Xunxiang Hu, Jiao Lin, "Advanced Modeling and Simulation Methods for Evaluation of Thermal Neutron Scattering Materials," 15th International Conference on Nuclear Data for Science and Technology (ND2022). 284, (May 2023).
	Chris Chapman, Marco Pigni, Klaus Guber, Goran Arbanas, "140,142Ce Neutron Cross Section Resolved Resonance Region Evaluation," 15th International Conference on Nuclear Data for Science and Technology (ND2022). 284, 08003, (May 2023).
	Jesse Brown, Klaus Guber, Carlos Paradela, Peter Schillebeeckx, Stefan Kopecky, "Zirconium Nuclear Data Campaign: Measurement of 90Zr (n, γ) cross section," 15th International Conference on Nuclear Data for Science and Technology (ND2022). 284, 1-3, (May 2023).
	Jesse Brown, Goran Arbanas, Dorothea Wiarda, Klaus Guber, Andrew Holcomb, Vladimir Sobes, "Bayesian Monte Carlo Evaluation of Imperfect (n, 233U) Data and Model," 15th International Conference on Nuclear Data for Science and Technology (ND2022). 284, 1-3, (May 2023).
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: ND 1, 3 **M&O Contractor Name**: RPI **Point of Contact Name:** Yaron Danon **Point of Contact Phone:** 518-276-4008	**Reference:** DP0909010 **Date of Report:** July, 2023

BUDGET



1. Carryover into FY 2023 = $ 100,591 (ND1)
2. Approved FY 2023 Budget = $ 360K(ND1)+100K(ND2)
3. Total FY 2023 Budget w/Carryover = $560,591
4. Actual spending for 1st Quarter FY 2023 = $113,888
5. Actual spending for 2nd Quarter FY 2023 = $150,152
6. Actual spending for 3rd Quarter FY 2023 = $200,976
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $ 0K

NOTE: Include commitments as part of spending

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 resonance region nuclear data measurement activities. (ND1)		
Q1	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)		
Q1	Complete analysis of measurement from previous year (ND1)		

Q1	Provide status report on all LINAC refurbishment activities (ND3)		
Q1	Complete condition and qualification of one set of high-power Radio frequency (RF) windows to support SOL 1 Accelerator Section site acceptance testing. (ND3)		
Q2	Provide status reports on all resonance region nuclear data measurement activities. (ND1)		
Q2	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)		
Q2	Provide status report on all LINAC refurbishment activities (ND3)		
Q2	Complete condition and qualification of one set of high-power Radio-frequency (RF) windows to support TPV Accelerator Section site acceptance testing. (ND3)		Windows for TPV have lower priority than SOL section test.
Q3	Provide status reports on all resonance region nuclear data measurement activities. (ND1)		
Q3	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)		WPEC meeting
Q3	Complete nuclear data measurements (transmission/capture or scattering) per the nuclear data schedule in Appendix B of the 5 year plan. (ND1)		
Q3	Provide status report on all LINAC refurbishment activities (ND3)		
Q3	Complete SOL #1 Accelerator Section Site acceptance testing. (ND3)		Deferred due to cross section measurements
Q3	Start fabrication of 2nd batch of speed of light structures 2, 3 and 4 (ND3)		Deferred, until funds are identified.
Q4	Provide status reports on all resonance region nuclear data measurement activities. (ND1)		
Q4	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)		
Q4	Complete measurements data analysis and provide the data to ORNL as needed to support the evaluation effort per the nuclear data schedule in Appendix B of the 5 year plan (ND1)		
Q4	Provide status report on all LINAC refurbishment activities (ND3)		
Q4	Complete delivery of solenoids and quadrupoles components (ND3)		
Q4	Complete TPV Accelerator Section Site acceptance testing. (ND3)		

ACCOMPLISHMENTS

- **ND1 – Resonance Region Nuclear Data Measurement Capability at RPI**
  - **Fe-54**
    - Continued work towards generating a covariance matrix for the RPI Fe54 capture experiment.
    - Worked on quantifying and understanding the effect of the pulse height weighting technique on the RPI capture yield.
    - Performed further testing and validation on the neutron beam imager in preparation for use in a TOF experiment.
    - Helped prepare and upgrade the high-energy scattering system for measurements of Ta and Teflon
  - **URR improvements to SAMMY**
    - Capture Yield correction factor was implemented in SAMMY.
    - Improved capture multiple scattering physics
    - Implemented self-shielding correction and fitting of URR transmission measurements in SAMMY.
  - **Zr evaluation**
    - Identified and addressed discrepancy between ORNL and nTOF Zr90 capture experiments and fully reduced ORNL data to production level.
    - Obtained final resonance parameters for Zr90 evaluation to 200 keV and preliminary evaluation to 500 keV
  - **Fast Neutron Scattering**
    - Completed digitization, structural, and documentation updates to RPI high energy scattering system in preparation for quasi differential measurements of Ta-181 and Teflon.
  - **Pb evaluation**
    - Completed covariance work for Pb-206, Pb-207, and Pb-208.
    - Completed final formatting of ENDF files for submission in ENDF/B-VIII.1b2.
    - Completed final validation of lead isotopes against suite of shielding, critical, and scattering benchmarks.
    - Presented at ANS 2023 Annual Meeting*, won 2nd place for Young Members Group Ph.D. research pitch.

- **ND3 – RPI/ORNL: LINAC 2020 Nuclear Data Capabilities Maintenance Plan**
  - SOL modulator was tested up to 30% of full power (to be continued after cross section experiments).
  - Site acceptance test of modulator one was completed.

PUBLICATIONS

Any publications that have
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	• D. Fritz, Y. Danon, K. Ramic, C. W. Chapman, J. M. Brown, G. Arbanas, M. Rapp, T. H. Trumbull, M. Zerkle, J. Holmes, P. Brain, A. Ney, S. Singh, K. Cook and B. Wang, "Total thermal neutron cross section measurements of hydrogen dense polymers from 0.0005–20 eV", Annals of Nuclear Energy, vol. 183, pp. 109651, 2023, DOI:10.1016/j.anucene.2022.109651. • D. Fritz, Y. Danon, M. Rapp, T. H. Trumbull, M. Zerkle, J. Holmes, C. W. Chapman, G. Arbanas, J. M. Brown, K. Ramic, X. Hu, S. Singh, A. Ney, P. Brain, K. Cook and B. Wang, "Total thermal neutron cross section measurements of yttrium hydride from 0.0005 - 3 eV", Annals of Nuclear Energy, vol. 181, pp. 109475, 2023, DOI:10.1016/j.anucene.2022.109475. • Y. Danon, R. Block, K. Cook, S. Singh, B. Wang, "Overview of Nuclear Data Measurement and Analysis at RPI", CSEWG meeting, November 2022. • P. Brain, Y. Danon, D. Brown, D. Barry, A. Lewis, T. Kawano, "Fast Region Evaluations of Pb-206 and Pb-208", CSEWG meeting, November 2022. • Y. Danon, "RPI - Nuclear Data for structural materials", International Nuclear Data Evaluation Network (INDEN) Evaluated Nuclear Data of the Structural Materials, IAEA, December 6-9, 2022.
Q2	
Q3	• Singh, Sukhjinder, Danon, Yaron, Ney, Adam, Cook, Katelyn, Fritz, Dominik, Wang, Benjamin, Brain, Peter, Daskalakis, Adam and Rapp, Michael, "Neutron Capture and Transmission Measurements of ^{54}Fe at the RPI LINAC", EPJ Web of Conf., vol. 284, pp. 01039, 2023, https://doi.org/10.1051/epjconf/202328401039 • Fritz, Dominik, Danon, Yaron, Rapp, Michael, Trumbull, Timothy, Zerkle, Michael, Holmes, Jesse, Chapman, Chris, Arbanas, Goran, Brown, Jesse, Ramic, Kemal, Hu, Xunxiang, Ney, Adam, Brain, Peter, Singh, Sukhjinder, Cook, Katelyn and Wang, Benjamin, "Thermal Cross Section Measurements At The RPI LINAC", EPJ Web of Conf., vol. 284, pp. 01020, 2023, https://doi.org/10.1051/epjconf/202328401020 • Danon, Yaron, Fritz, Dominik, Wang, Benjamin, Cook, Katelyn, Singh, Sukhjinder, Ney, Adam, Brain, Peter, Blain, Ezekiel, Rapp, Michael, Daskalakis, Adam, Barry, Devin, Trumbull, Timothy, Chapman, Chris and Arbanas, Goran, "Experimental validation of thermal scattering evaluations", EPJ Web of Conf., vol. 284, pp. 17001, 2023, https://doi.org/10.1051/epjconf/202328417001

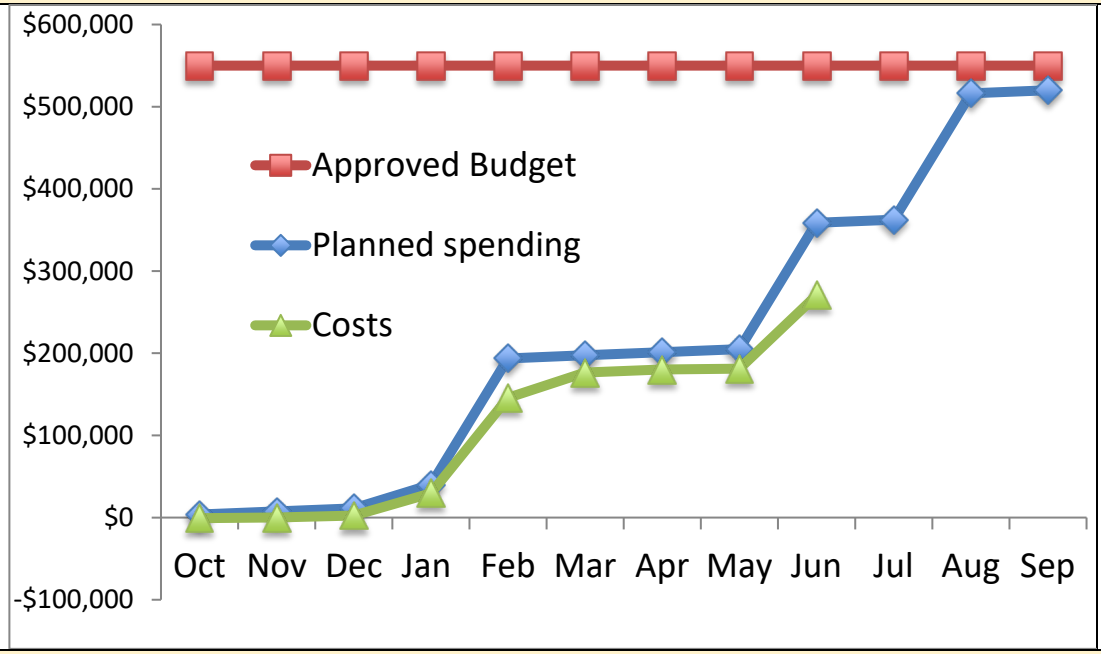
	• Brain, Peter, Danon, Yaron, Brown, Dave and Barry, Devin, "Resolved resonance region analysis of 206Pb, 207Pb, and 208Pb for next generation lead-cooled fast systems", EPJ Web of Conf., vol. 284, pp. 14005, 2023, https://doi.org/10.1051/epjconf/202328414005 • Peter Brain, Yaron Danon, Dave Brown, Devin Barry, "Isotopic Lead Neutron Evaluations for Future Fast Spectrum Systems", Submitted to ANS Annual Meeting, June 10-14, Indianapolis, IN, 2023. • Y. Danon, P. Brain, K. Cook, D. Fritz, A. Golas, G. Siemers, S. Singh, B. Wang1, A. Lewis, A. Daskalakis, M. Rapp, D. Barry, and T. Trumbull, "Recent Nuclear Data Activity at the RPI Gaerttner LINAC Center", WONDER 2023, 6th International Workshop on Nuclear Data Evaluation for Reactor Applications, June 5-9, Aix-en-Provence, France, 2023.
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TE3, 6, 8
M&O Contractor Name: LANL
Point of Contact Name: Joetta Goda
Point of Contact Phone: 505-667-2812

Reference: DP0909010
Date of Report: July 9, 2023

BUDGET



1. Carryover into FY 2023 = $
2. Approved FY 2023 Budget = $550,000
3. Total FY 2023 Budget w/Carryover = $

	Spending	Commitments	Total
Q1	$2,467	$91,520	$93,987
Q2	$174,015	$31,275	$205,289
Q3	$94,016	$22,329	$116,344
Q4			$0

8. Projected carryover into FY 2024 = $

NOTE: Include commitments as part of spending

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 all hands-on criticality safety training activities (TE3)		
Q1	Provide a status report on the development of a university pipeline for CS professionals (TE6)		
Q1	Provide a status report on all reactivity simulation aids activities (TE8)		

Q2	Provide a status report on all hands-on criticality safety training activities (TE3)		
Q2	Provide a status report on the development of a university pipeline for CS professionals (TE6)		
Q2	Provide a status report on all reactivity simulation aids activities (TE8)		
Q3	Provide a status report on all hands-on criticality safety training activities (TE3)		
Q3	Provide a status report on the development of a university pipeline for CS professionals (TE6)		
Q3	Provide a status report on all reactivity simulation aids activities (TE8)		
Q4	Provide a status report on all hands-on criticality safety training activities (TE3)		
Q4	Provide a status report on the development of a university pipeline for CS professionals (TE6)		
Q4	Provide a status report on all reactivity simulation aids activities (TE8)		

ACCOMPLISHMENTS

- TE3 – Conduct Hands-On Criticality Safety Training Course at NCERC
  - Conducted January NCSP Class
  - Conducted June NCSP Class
  - Nancy Watts at NCERC-FO supports DAF access for students.
- TE6 – Development of University Pipeline for Criticality Safety Professionals
  - Commitment is UNM contract
- TE8 – Reactivity Simulation Aids
  - No update

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter

AND

- Are publicly releasable

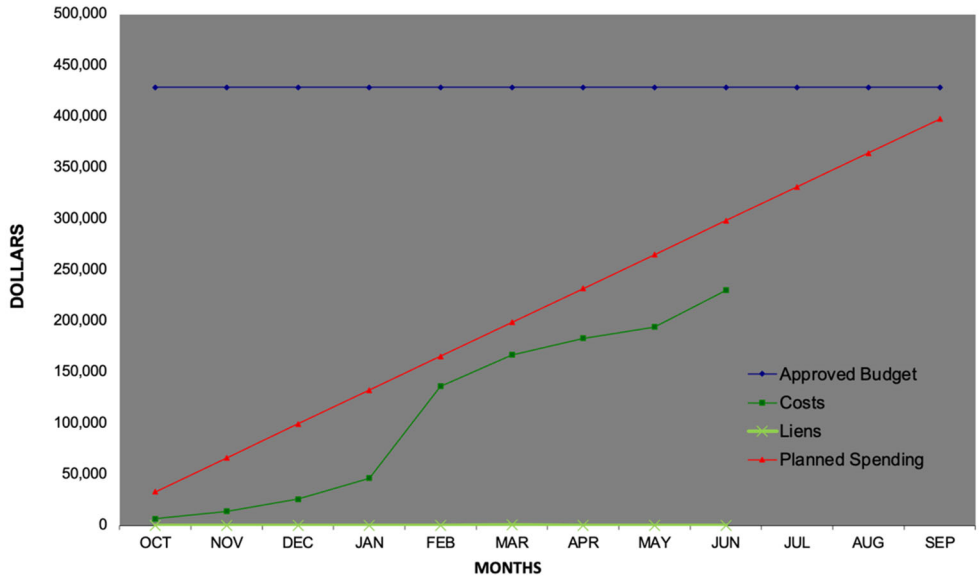
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TE1, 3, 8 **M&O Contractor Name**: LLNL **Point of Contact Name:** Catherine Percher **Point of Contact Phone:** (925) 579-4226	**Reference:** DP0909010 **Date of Report:** July 26, 2023

BUDGET



1. Carryover into FY 2023 = $38,730
2. Approved FY 2023 Budget = $390,000
3. Total FY23 Budget w/Carryover = $428,730
4. Actual spending for 1st Quarter FY 2023 = $28,798
5. Actual spending for 2nd Quarter FY 2023 = $141,111
6. Actual spending for 3rd Quarter FY 2023 = $63,220
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $ 31,200 (8%)

NOTE: Include commitments as part of spending

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 hands-on training at the DAF (TE1)		
Q1	Provide a status report classroom criticality safety training (TE3)		

Q1	Provide a status report on development of university pipeline for CS professionals. (TE8)		
Q2	Provide a status report on hands-on training at the DAF (TE1)		
Q2	Provide a status report classroom criticality safety training (TE3)		
Q2	Provide a status report on development of university pipeline for CS professionals. (TE8)		
Q3	Provide a status report on hands-on training at the DAF (TE1)		
Q3	Provide a status report classroom criticality safety training (TE3)		
Q3	Provide a status report on development of university pipeline for CS professionals. (TE8)		
Q4	Provide a status report on hands-on training at the DAF (TE1)		
Q4	Provide a status report classroom criticality safety training (TE3)		
Q4	Provide a status report on development of university pipeline for CS professionals. (TE8)		

ACCOMPLISHMENTS

- TE1 – Conduct Hands-on Training at the DAF (TACS)
  - Participated in all T&E telecons
  - Provided lectures and TACS instruction for June Managers/CSOs 1 week training course
- TE3 – Classroom Criticality Safety Training
  - Participated in all T&E telecons
- TE8 - Development of University Pipeline for Criticality Safety Professionals
  - No activity this period- course is taught in the Fall

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

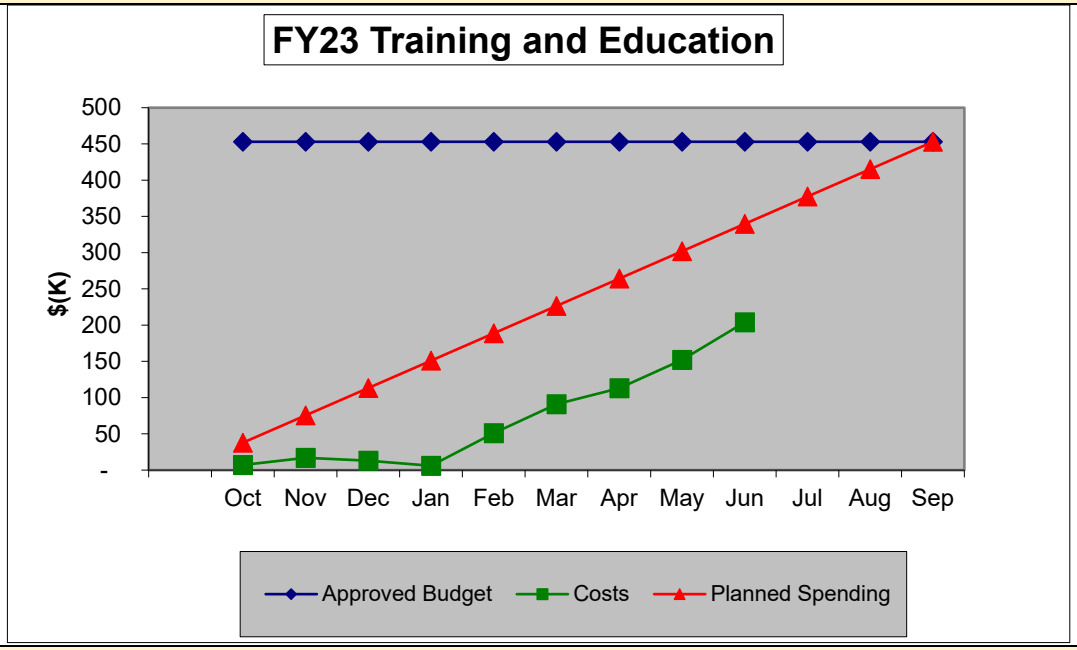
NCSP Quarterly Progress Report (FY-2023 Q3)

Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.	
Quarter	**Publication Reference** **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	none
Q2	Coleman, S. and M. Fratoni, “Nuclear Criticality Safety Pipeline Course with Hands-On Experimental Training at Lawrence Livermore's Inherently Safe Subcritical Assembly Training Center,” Presented at the Conference on Nuclear Training and Education (CONTE 2023), Amelia Island, FL, February 2023, LLNL-ABS-841056.
Q2	Coleman, S., “Nuclear Criticality Safety Pipeline Course- LLNL,” Presented at the 2023 EFCOG Nuclear Facility Safety Annual Workshop, March 14, 2023, LLNL-PRES-819441.
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TE1, 11, 14 **M&O Contractor Name**: ORNL **Point of Contact Name:** Doug Bowen **Point of Contact Phone:** (865) 576-0315	**Reference:** DP0909010 **Date of Report:** July 26, 2023

BUDGET



1. Carryover into FY 2023 = $113K
2. Approved FY 2023 Budget = $340K
3. Total FY 2023 Budget w/Carryover = $453K
4. Actual spending for 1st Quarter FY 2023 = $13K
5. Actual spending for 2nd Quarter FY 2023 = $78K
6. Actual spending for 3rd Quarter FY 202 3= $113K
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $75k

NOTE: Include commitments as part of spending

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 implementation of the NCS training program (TE1)		
Q1	Provide a status report on revision of LA-12808 Nuclear Criticality Safety Guide. (TE11)		

Q1	Provide a status report on nuclear criticality safety training and pipeline development (TE 14)		
Q2	Provide a status report on implementation of the NCS training program (TE1)		
Q2	Provide a status report on revision of LA-12808 Nuclear Criticality Safety Guide. (TE11)		
Q2	Provide a status report on nuclear criticality safety training and pipeline development (TE 14)		
Q3	Provide a status report on implementation of the NCS training program (TE1)		
Q3	Provide a status report on revision of LA-12808 Nuclear Criticality Safety Guide. (TE11)		
Q3	Provide a status report on nuclear criticality safety training and pipeline development (TE 14)		
Q4	Provide a status report on implementation of the NCS training program (TE1)		
Q4	Provide a status report on revision of LA-12808 Nuclear Criticality Safety Guide. (TE11)		
Q4	Provide a status report on nuclear criticality safety training and pipeline development (TE 14)		

ACCOMPLISHMENTS

- TE1 - Manage and Provide Instruction for the DOE Nuclear Criticality Safety Training & Education Program
  - Bowen worked with site program managers to post FY24 course dates due to enhanced demand in the course. Bowen is working with Sandia to find solutions to recent challenges with DBIDS and delays experienced in the April course - SNL management is assisting with this effort as well. Planned and executed the June Manager/CSO course and started preparations for the August 2-week hands-on course. ORNL worked to update 2-week course presentations into new NCSP PowerPoint templates and several modules were updated based on student feedback.
- TE11 - Revision of the LA-12808 Nuclear Criticality Safety Guide
  - The revision to the LA12808 update is late but is being drafted by Bowen. Content will be standards based and will include information from literature, CSSG tasking reports and newly published subcritical limits.

- TE14 - Nuclear Criticality Safety Training and Pipeline Development
  - For ORNL, Walid Metwally and Doug Bowen are supporting this task. Progress in Q3 was steady. Walid Metwally supported in a lead role for ORNL and Doug Bowen provided input on various aspects of the work. The following tasks were completed:
    - Course outline
    - Objectives of each module
    - Presentation template
    - Assignment of staff responsible for preparing each course module
    - A detailed timeline for completion of the preparation of the presentations and recordings
    - General guidance on preparing the presentations
  - Most of the presentations were completed. Peer-review of some of the presentations was conducted. The plans for recording the lectures were made. Late July, or mid-August, is the target period to complete the peer- review of all the presentations and completion of the recordings.
  - Participated in bi-weekly conference calls of the team
  - Gathered necessary information for all lectures assigned to the TAMU team to complete
  - Began developing the original lecture content for the assigned lectures
  - Put together the presentation template for use in this program.
  - Began putting together lectures with planned completion of recordings by the end of July.
  - The work to be conducted under this proposal focuses on the development of a new university-based nuclear criticality training certificate program with the intent to develop a pipeline of nuclear criticality specialists into Department of Energy Laboratory complex. This program will attract students across the United States but will have a regional focus on the Southeastern United States.
  - Work in this quarter focused on the accumulation of nuclear criticality training material at both Texas A&M University and Georgia Institute of Technology. Completed work.
    - Attend coordination meetings between Oak Ridge National Laboratory, the Office of Criticality Safety, Texas A&M, and Georgia Institute of Technology.
    - Drafted nine Power Point lectures that Georgia Institute of Technology is responsible for.
    - Tested recording options. Zoom was selected.
    - Started recording of lectures.

PUBLICATIONS

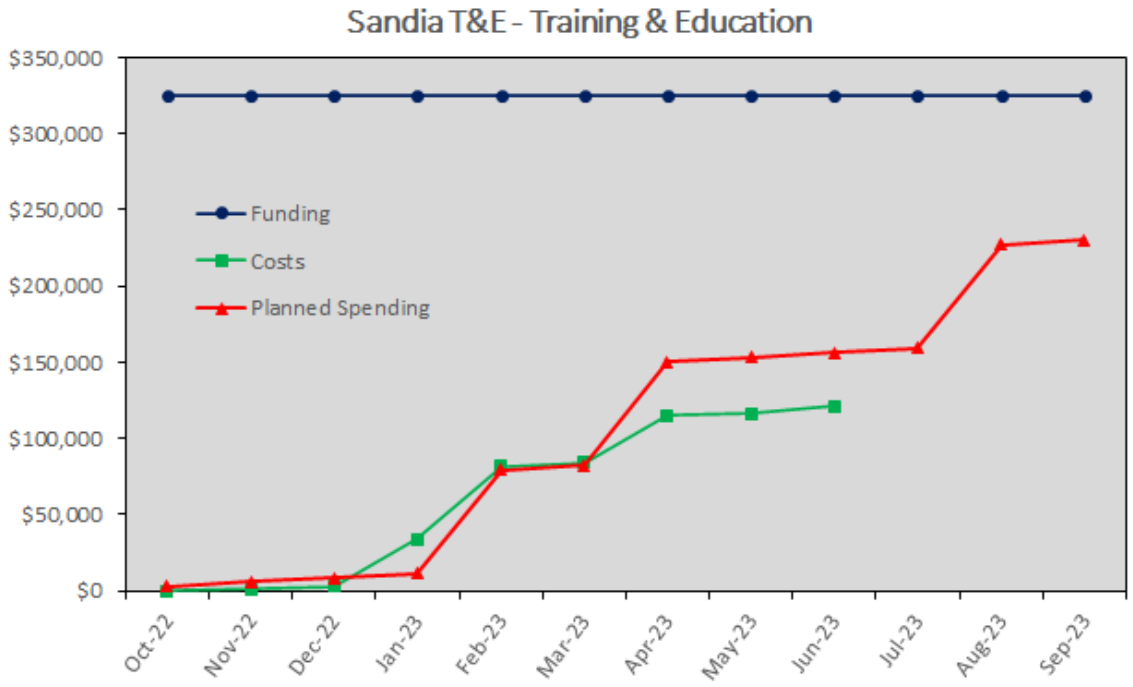
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Mathieu Dupont, "Health Physics Research Reactor Criticality Accident Alarm System Benchmark Overview," Transactions of the 14th International Conference on Radiation Shielding and 21st Topical Meeting of the Radiation Protection and Shielding Division (ICRS 14/RPSD 2022), Vol II, 406-409 (Sep 2022).

	Mathieu Dupont, Alex Lang, Douglas Bowen, "Current Progress of the Final Design of a Subcritical Assembly at the Oak Ridge National Laboratory," Transactions of the American Nuclear Society, Vol 127, 717-720 (Nov 2022).
	Mathieu Dupont, "Health Physics Research Reactor Criticality Accident Alarm System Benchmark Overview," 14th International Conference on Radiation Shielding (ICRS 14/RPSD 2022), Seattle, WA, Sep 2022.
	Alex Lang, Mathieu Dupont, Douglas Bowen, "Subcritical Assembly at ORNL," Oak Ridge, TN, Sep 2022.
Q2	Douglas Bowen, Mathieu Dupont, Alex Lang, Shane Hart, Andrew Holcomb, Proposed Subcritical Assembly for Nuclear Criticality Safety Training at the Oak Ridge National Laboratory, ORNL/TM-2022/2748, UT-Battelle, LLC, Oak Ridge National Laboratory (January 2023).
	Douglas Bowen, "ORNL NCSP Training and Education Support for FY2022," Technical Program Review Meeting, Albuquerque, NM, February 2023.
	Douglas Bowen, "DOE/NNSA Nuclear Criticality Safety Program NCS Engineer Resource Pipeline Activities," EFCOG N&FS Workshop, Albuquerque, NM, March 2023.
Q3	Douglas Bowen, Mathieu Dupont, "Current Progress of the Final Design of a Subcritical Assembly at Oak Ridge National Laboratory," 2022 ANS Winter Meeting and Technology Expo, Phoenix, AZ, Nov 2022.
	Alex Lang, Mathieu Dupont, Douglas Bowen, "Oak Ridge Subcritical Assembly Final Design and Current Progress," 2023 Annual NCSP Technical Program Review, Albuquerque, NM, Feb 2023.
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TE1 **M&O Contractor Name**: Sandia National Laboratories (SNL) **Point of Contact Name:** Gary A. Harms **Point of Contact Phone:** (505)845-3244	**Reference:** DP0909010 **Date of Report:** July, 2023

BUDGET



1. Carryover into FY 2023 = $95,119
2. Approved FY 2023 Budget = $230,000
3. Total FY 2023 Budget w/Carryover = $325,119
4. Actual spending for 1st Quarter FY 2023 = $2,870
5. Actual spending for 2nd Quarter FY 2023 = $81,226
6. Actual spending for 3rd Quarter FY 2023 = $37,183
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $

NOTE: Include commitments as part of spending

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 Sandia and provide Human Factors and Equipment Reliability module support to the LANL training classes in accordance with the approved schedule. (TE1)		

Q2	Conduct hands-on training classes at Sandia and provide Human Factors and Equipment Reliability module support to the LANL training classes in accordance with the approved schedule. (TE1)		
Q3	Conduct hands-on training classes at Sandia and provide Human Factors and Equipment Reliability module support to the LANL training classes in accordance with the approved schedule. (TE1)		
Q4	Conduct hands-on training classes at Sandia and provide Human Factors and Equipment Reliability module support to the LANL training classes in accordance with the approved schedule. (TE1)		

ACCOMPLISHMENTS

- TE1 - Prepare for and Conduct Hands-on Criticality Safety Training at SNL
  - The Sandia Hands-on portion of the training course for NCS professionals was delivered Jan. 30 – Feb. 4.
  - The Sandia Hands-on course for Managers/CSOs was delivered April 3 – 7.
  - Preparations are underway for a Hands-On criticality safety class for NCS professionals to be presented in August.
  - Adjustments made to replace a long-standing instructor that recently retired from SNL and is no longer involved with the Sandia portion of the training course.

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

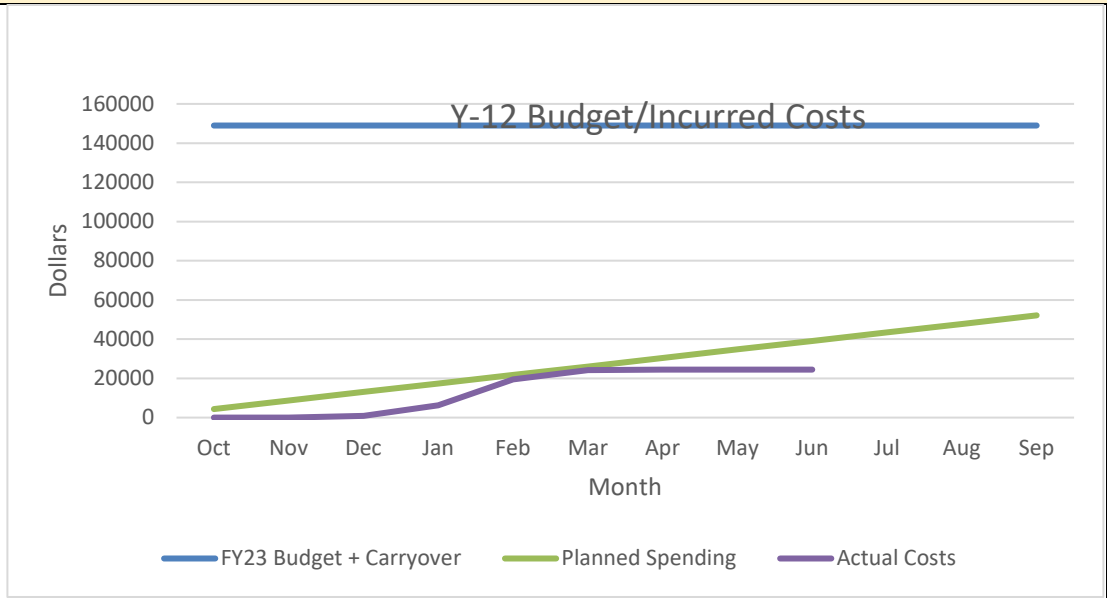
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	**Publication Reference** **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TE1 **M&O Contractor Name**: Y12 **Point of Contact Name:** Kevin Reynolds **Point of Contact Phone:** (865) 241-9067	**Reference:** DP0909010 **Date of Report:** July 17, 2023

BUDGET



1. Carryover into FY 2023 = $ 148,968.58
2. Approved FY 2023 Budget = $0.00
3. Total FY 2023 Budget w/Carryover = $148,968.58
4. Actual spending for 1st Quarter FY 2023 = $813.62
5. Actual spending for 2nd Quarter FY 2023 = $23,324.86
6. Actual spending for 3rd Quarter FY 2023 = $ 328.49
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $

NOTE: Include commitments as part of spending

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 of Y-12 activities to support the hands-on training courses. (TE1)		No travel
Q2	Provide a status report of Y-12 activities to support the hands-on training courses. (TE1)		
Q3	Provide a status report of Y-12 activities to support the hands-on training courses. (TE1)		No travel
Q4	Provide a status report of Y-12 activities to support the hands-on training courses. (TE1)		

NCSP Quarterly Progress Report (FY-2023 Q3)

ACCOMPLISHMENTS

- TE1 - Conduct Hands-On Criticality Safety Training Course
  -

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

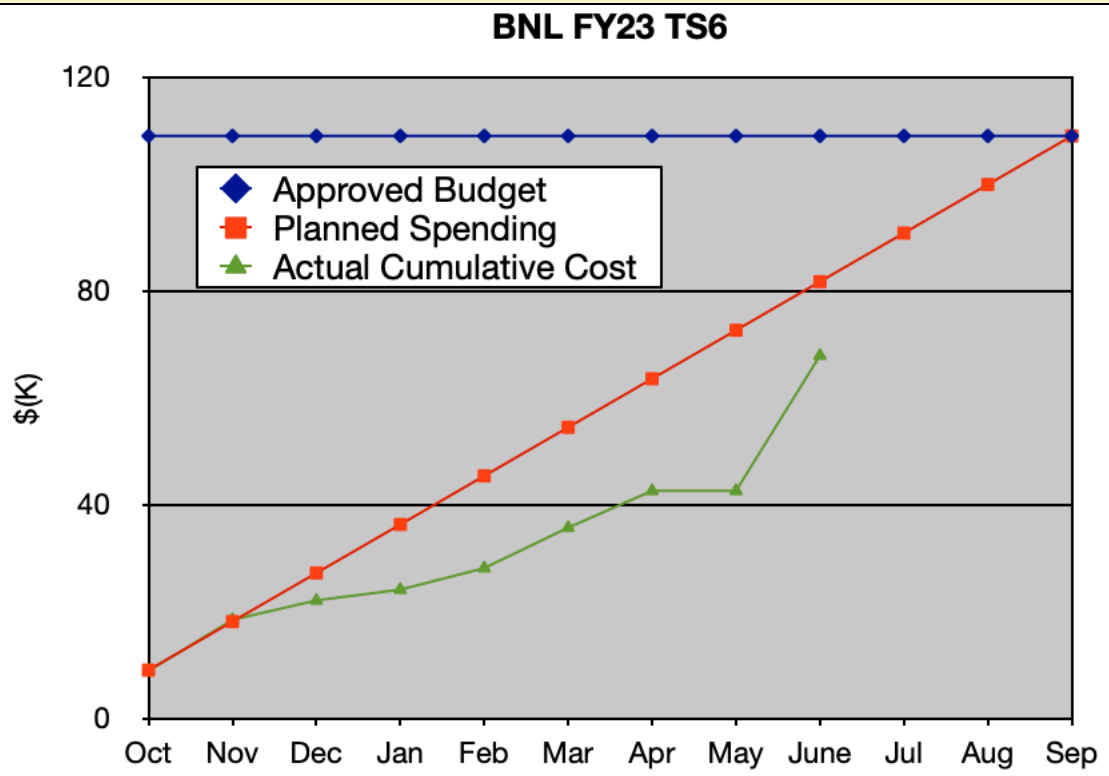
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TS6 **M&O Contractor Name**: BNL **Point of Contact Name:** Gustavo Nobre **Point of Contact Phone:** 631-344-5205	**Reference:** DP0909010 **Date of Report**: 26 July, 2023

BUDGET



1. Carryover into FY 2023 = $ 9,027
2. Approved FY 2023 Budget = $100,00
3. Total FY 2022 Budget w/Carryover = $109,027
4. Actual spending for 1st Quarter FY 2023 = $22,135
5. Actual spending for 2nd Quarter FY 2023 = $13,609
6. Actual spending for 3rd Quarter FY 2023 = $32,189
7. Actual spending for 4th Quarter FY 2023 = $0
8. Projected carryover into FY 2024 = $5,451

NOTE: Include commitments as part of spending

MILESTONES

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	TASK	STATUS	ISSUES/PATH FORWARD

Q1	Provide NCSP Manager annual report of succession planning efforts. (TS6)		Mentored two students who started working on the successor of the manuscript submitted last quarter (arXiv: 2209.14403). This work will use and make predictions on real 238U data instead of synthetic data.
Q2	Provide NCSP Manager annual report of succession planning efforts. (TS6)		Mentored one student to work on final calculations for a second paper on resonance spin classification with machine learning. Planning for three more students for 2023 Summer program from SULI (DOE).
Q3	Provide NCSP Manager annual report of succession planning efforts. (TS6)		Finalized work with Spring intern and started working with 3 interns through the DOE SULI and BNL SURP Summer programs.
Q4	Provide NCSP Manager annual report of succession planning efforts. (TS6)		

ACCOMPLISHMENTS

- Finalized Spring mentorship on using real 238U resonance data to train machine-learning classifier to recommend resonance reassignments.
- Started mentoring three interns, two of whom are URM, for the summer internship program on projects related to the Bayesian Resonance Reclassifier.

PUBLICATIONS

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

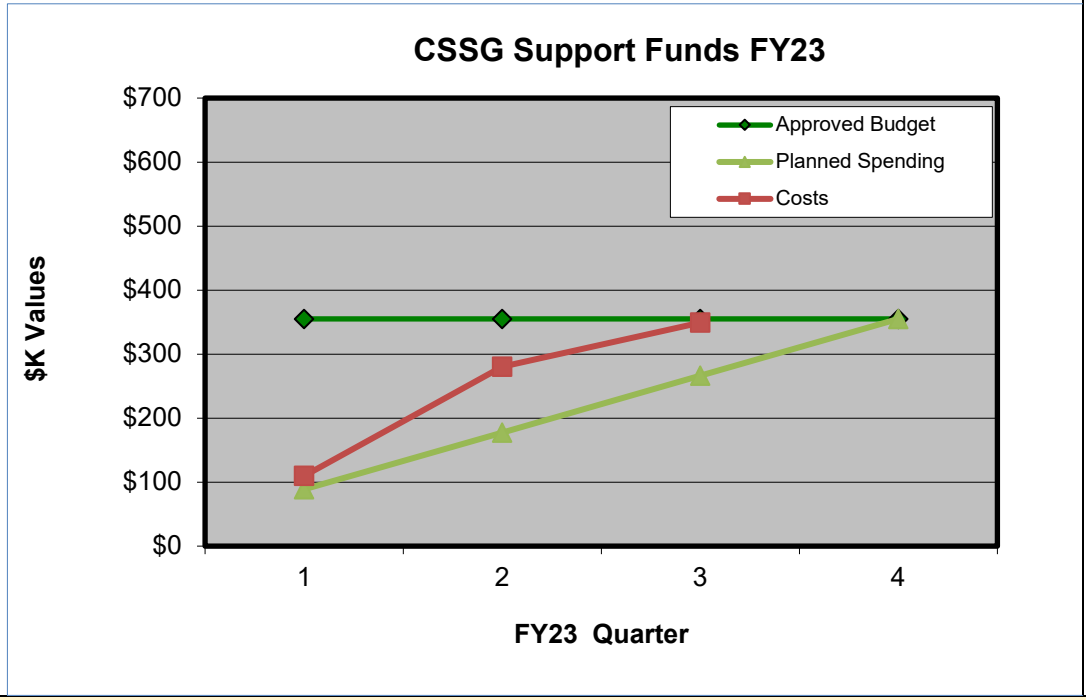
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019	Sent to NCSP? Yes/no	If no, status of submittal
Q1			
Q2	G. P. A. Nobre et al., “Novel machine-learning method for spin classification of neutron resonances”, Physical Review C 107, 034612 (2023)	Yes	
Q3			

Q4			

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TS1 **Task Title**: CSSG Support **Point of Contact Name:** David Hayes **Point of Contact Phone:** 505-667-4523	**Reference:** DP0909010 **Date of Report:** August, 2023

BUDGET



1. Carryover into FY 2023 = $ 0
2. Approved FY 2023 Budget = $ 355,000
3. Actual spending for 1st Quarter FY 2023 = $109,061
4. Actual spending for 2nd Quarter FY 2023 = $170,889
5. Actual spending for 3rd Quarter FY 2023 = $68,649
6. Actual spending for 4th Quarter FY 2023 = $
7. Projected carryover into FY 2024 = $

NOTE: Include commitments as part of spending

MILESTONES

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Provide NCSP Manager report of activities. (TS1)		Jim Morman will likely run out of budget early second quarter. Plus up?
Q2	Provide NCSP Manager report of activities. (TS1)		None
Q3	Provide NCSP Manager report of activities. (TS1)		None

Q4	Provide NCSP Manager report of activities. (TS1)		

ACCOMPLISHMENTS

- TS1 – CSSG – Support for the Criticality Safety Support Group
  - Face to Face meeting in conjunction with ANS
  - Regularly scheduled Teams Meetings

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

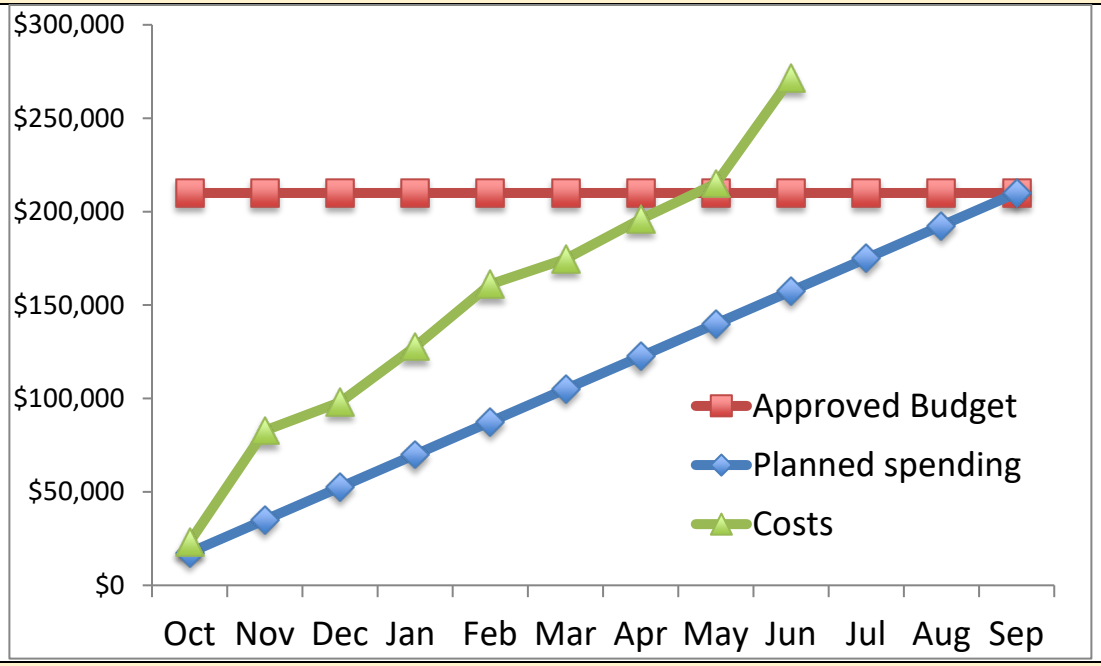
Quarter	**Publication Reference** **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TS4
M&O Contractor Name: LANL
Point of Contact Name: Joetta Goda
Point of Contact Phone: 505-667-2812

Reference: DP0909010
Date of Report: July 9, 2023

BUDGET



1. Carryover into FY 2023 = $ 100,000
2. Approved FY 2023 Budget = $ 110,000
3. Total FY23 Budget w/Carryover = $ 210,000

	Spending	Commitments	Total
Q1	$97,985	$0	$97,985
Q2	$76,632	$0	$76,632
Q3	$96,924	$0	$96,924
Q4			$0

8. Projected carryover into FY 2024 = $0

NOTE: Include commitments as part of spending

MILESTONES

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Provide NCSP Manager report on succession planning efforts. (TS4)		
Q2	Provide NCSP Manager report on succession planning efforts. (TS4)		
Q3	Provide NCSP Manager report on succession planning efforts. (TS4)		

Q4	Provide NCSP Manager report on succession planning efforts. (TS4)		

ACCOMPLISHMENTS

- TS4 – AM, IE, ND Succession Planning
  - Students working in person during summer.

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

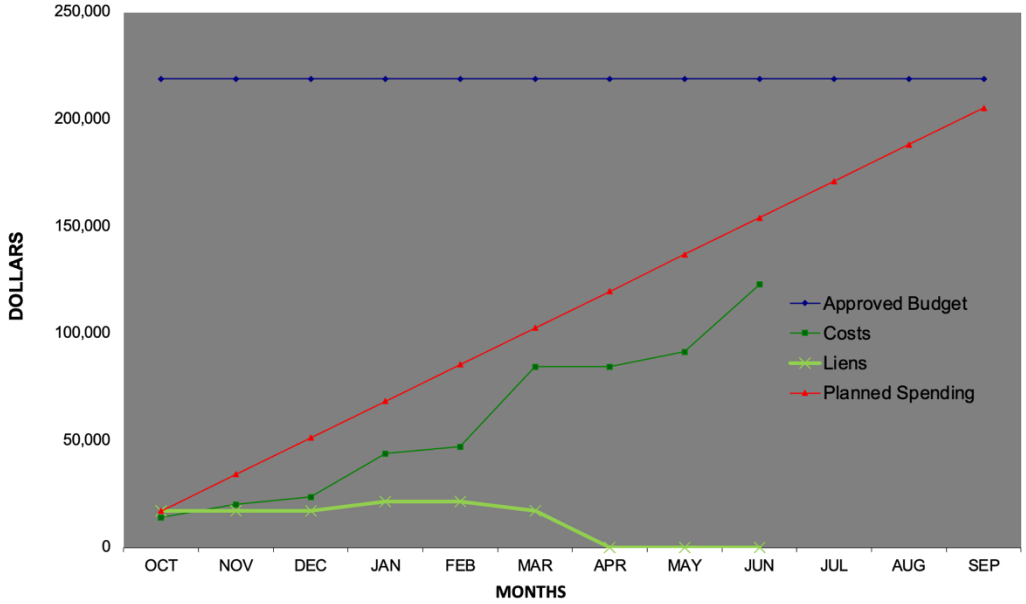
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	**Publication Reference** **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TS5 **M&O Contractor Name**: LLNL **Point of Contact Name:** Catherine Percher **Point of Contact Phone:** (925) 579-4226	**Reference:** DP0909010 **Date of Report:** July 26, 2023

BUDGET



1. Carryover into FY 2023 = $48,922
2. Approved FY 2023 Budget = $120,000 + $50,000 (CSSG)
3. Total FY23 budget w/Carryover = $218,922
4. Actual spending for 1st Quarter FY 2023 = $23,643
5. Actual spending for 2nd Quarter FY 2023 =$60,802
6. Actual spending for 3rd Quarter FY 2023 = $38,512
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $13,600

NOTE: Include commitments as part of spending

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 succession planning efforts. (TS5)		
Q2	Provide a status report on succession planning efforts. (TS5)		
Q3	Provide a status report on succession planning efforts. (TS5)		
Q4	Provide a status report on succession planning efforts. (TS5)		

NCSP Quarterly Progress Report (FY-2023 Q3)

ACCOMPLISHMENTS

- TS5 - AM, IE, ND Succession Planning
  - R. Rahman and E. Hudec- summer students hired in June 2023- both are planning to work with the division during the academic years on IE benchmarking as part of their degree programs
  - J. Norris attended IE meetings
  - R. Araj attened ANS conference in June 2023

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

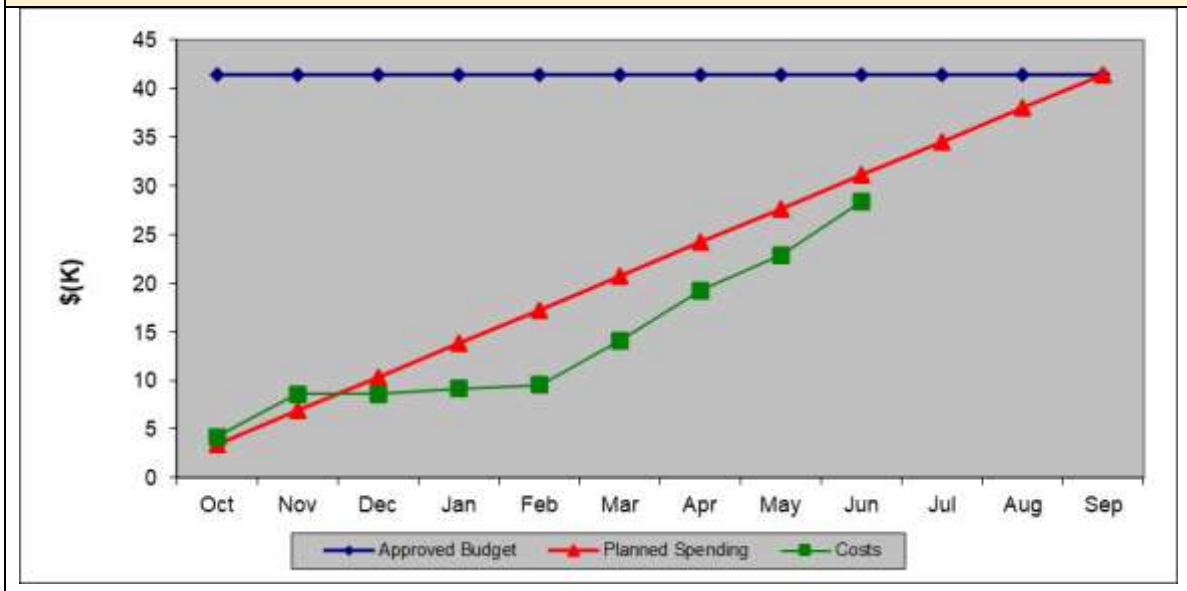
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	None
Q2	None
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q2)

NCSP Element and Subtask: TS9 **M&O Contractor Name**: NNL **Point of Contact Name:** Mike Zerkle **Point of Contact Phone:** (412) 476-6188	**Reference:** DP0909010 **Date of Report:** August 14, 2023

BUDGET



1. Carryover into FY 2023 = $26K
2. Approved FY 2023 Budget = $15K
3. Total FY 2023 Budget with Carryover = $41K
4. Actual spending for 1st Quarter FY 2023 = $9K
5. Actual spending for 2nd Quarter FY 2023 = $5K
6. Actual spending for 3rd Quarter FY 2023 = $14K
7. Actual spending for 4th Quarter FY 2023 = $7K
8. Projected carryover into FY 2024 = $6K

NOTE: Include commitments as part of spending

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 report on all NDAG chair activities (TS9)		
Q2	Provide status report on all NDAG chair activities (TS9)		
Q3	Provide status report on all NDAG chair activities (TS9)		
Q4	Provide status report on all NDAG chair activities (TS9)		

ACCOMPLISHMENTS

- TS9 – Support for NDAG Chair activities
  - Participate in 2023 ICSBEP/IRPhEP/SINBAD TRG Meeting (Apr 3-7, 2023)
  - Participate in mini-CSEWG Meeting, chair validation sessions (Apr 25-27, 2023)
  - Participate in NCSP TEX 2.0 Meeting (May 1-2, 2023)
  - Participate in NCSP Mission & Vision update meeting (May 3, 2023)
  - Participate in NCSP Spring IE Face-to-Face meeting (May 4, 2023)
  - Participate in 2023 WPEC and Subgroup Meeting (May 15-17, 2023).
    - Provided SG48 presentation entitled “Update on NNL TSL Validation Efforts”
  - Coordinate update of NCSP Nuclear Data Measurement and Evaluation Plan for FY2024-FY2028 (Appendix B)
  - Perform reviews of draft ICSBEP benchmark evaluations and subgroup pre-publication reviews (ongoing)
  - Serve on CSEWG Executive Committee and Chair of the CSEWG Validation Committee (ongoing)
  - Support CSEWG phase1 TSL evaluation reviews for ENDF/B-VIII.1 (ongoing)
  - Participate on several IER teams

PUBLICATIONS

Any publications that have

- Completed your institution’s review cycle during the quarter
  AND
- Are publicly releasable

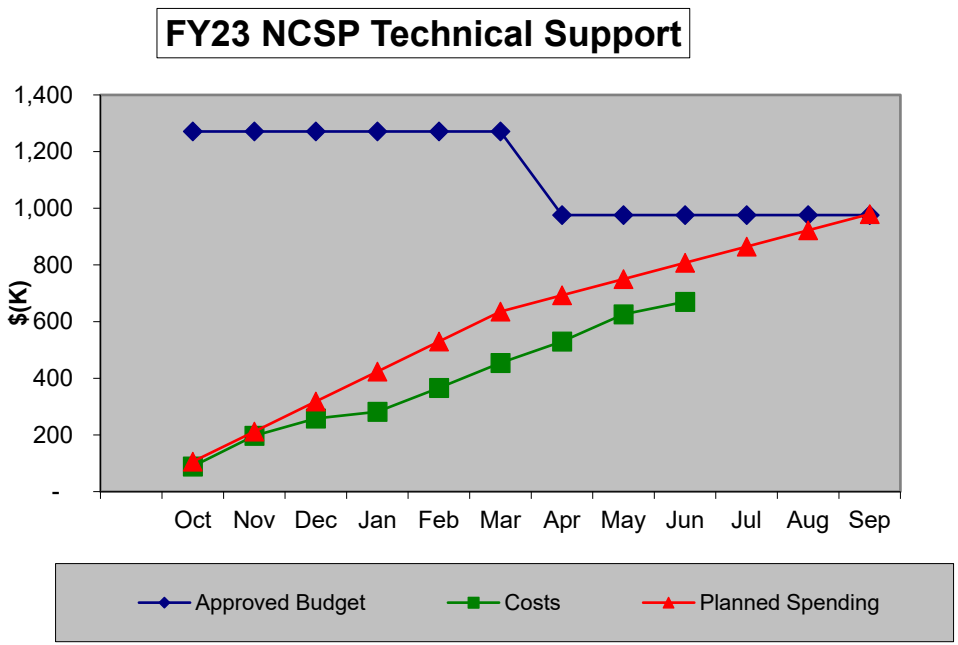
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	D. Fritz, et al., “Total thermal neutron cross section measurements of yttrium hydride from 0.0005 - 3 eV,” *Annals of Nuclear Energy*, 181, 109475 (2023). https://doi.org/10.1016/j.anucene.2022.109475 D. Fritz, et al., “Total thermal neutron cross section measurements of hydrogen dense polymers from 0.0005–20 eV,” *Annals of Nuclear Energy*, 183, 109651 (2023). https://doi.org/10.1016/j.anucene.2022.109651
Q2	
Q3	M. L. Zerkle, J. L. Wormald, J. C. Holmes, M. Rapp, A. Daskalakis, D. Barry, “Update of NNL TSL Validation Efforts,” SG48 Meeting, WPEC, OECD/NEA, Paris, France, May 11, 2023.
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TS2, 7, 8, 13 **M&O Contractor Name**: ORNL **Point of Contact Name:** Doug Bowen **Point of Contact Phone:** (865) 576-0315	**Reference:** DP0909010 **Date of Report:** July 26, 2023

BUDGET



1. Carryover into FY 2023 = $391K
2. Total FY 2023 Budget w/Carryover = $976K
3. Actual spending for 1st Quarter FY 2023 = $258K
4. Actual spending for 2nd Quarter FY 2023 = $196K
5. Actual spending for 3rd Quarter FY 2023 = $216K
6. Actual spending for 4th Quarter FY 2023 = $
7. Projected carryover into FY 2024 = $40K
8. TS budget decreased by $130k in 12/2023 - $30K recalled to HQ for G2 IER database work and $100K transferred to NNSS to cover over-spending.

NOTE: Include commitments as part of spending

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	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)		

Q1	Manage 5-year plan development and maintenance and oversee the CEDT process and manage main 5-year plan and Integral Experiment Request Milestones. (TS2)	[redacted]	
Q1	Provide NCSP Manager annual report of succession planning efforts (TS7)	[redacted]	
Q1	Provide NCSP Manager a status report of progress on the new IER system in G2 (TS8)	[redacted]	
Q1	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)	[redacted]	
Q2	Maintain up-to-date spreadsheet of proposed tasks for NCSP Manager after the NCSP proposal review meeting and through the final task prioritization effort by the NCSP Management Team. (TS2)	[redacted]	
Q2	Manage 5-year plan development and maintenance and oversee the CEDT process and manage main 5-year plan and Integral Experiment Request Milestones. (TS2)	[redacted]	
Q2	Provide NCSP Manager annual report of succession planning efforts (TS7)	[redacted]	
Q2	Provide NCSP Manager a status report of progress on the new IER system in G2 (TS8)	[redacted]	
Q2	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)	[redacted]	
Q3	Maintain up-to-date spreadsheet of proposed tasks for NCSP Manager after the NCSP proposal review meeting and through the final task prioritization effort by the NCSP Management Team. (TS2)	[redacted]	
Q3	Manage 5-year plan development and maintenance and oversee the CEDT process and manage main 5-year plan and Integral Experiment Request Milestones. (TS2)	[redacted]	

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

ACCOMPLISHMENTS

- TS2 - Support for Lead Lab to Execute the NCSP
  - FY23 Five-Year Plan:
    - Final addendum were completed to reflect changes to the NCSP funding profiles. Marsha Henley provided a significant amount of support to this effort in FY23Q3.
  - CSCT Scribe – took minutes for the monthly meetings in April, May, and June.
  - Spring Newsletter generated and published.
  - Quarter 2 Reports:

        - Sent requests to each TM for their Q3 reports.
        - Posted non-IE version of the Q2 report on the website
        - Requested foreign trip reports based on Appendix C. Updated the website with the reports/information received.
    - Access Database:
        - FY23 budget changes were made so that reports and Excel spreadsheets can be generated.
        - Quarterly publications – each quarter I am adding the publications to the Access database for easy search and extract of records. A spreadsheet of all the quarterly publications is created and provided to OSTI along with the publications themselves.
        - Pulled FY23 tasks from my database including information about which are ongoing and when tasks should end. Sent this information to Doug for our FY24 5YP planning.
        - Pulled proposals that haven't been accepted from my database. Sent this information to Doug for our FY24 5YP planning.
            - Marsha received an Excel file from Jake Nicholls with all the BCR detailed data that he created from 2014 – 2023 of BCR PDFs. I added new records and updated data I had with more information Jake provided in the Excel file. We now have all BCR data in Access. This can be related to the IERs for showing changes in deliverables over the years. was missing into my Access table.
        - Added Mission and Vision data to support revision
        - Appendix B – began task of creating tables to update with FY23 Appendix B data.
    - CSSG Support:
        - Supported meetings as necessary; attended virtual meetings and in-person meeting at the June ANS meeting.
    - Lead FY23 Q1 quarterly report video teleconference and summarized NCSP accomplishments. Posted accomplishments to the NCSP website, sans IE data.
    - Executed the Mission and Vision meetings held at LLNL the same week as the TEX 2.0 meetings. Teams are now working on their M&V goal and attribute revisions.
    - MGT Team (Miller) led IE status update meetings, as necessary. Bowen and Henley assisted with this effort as needed.
    - Conducted NCSP Management Team meetings to discuss the status of NCSP execution work.

- TS7 - AM, ND Succession Planning
    - Utilized succession planning funding for new staff development for AM and ND ORNL NCSP tasks
    - There is one new ND team member (Luiz Leal). Iyad Al-Qasir will be starting in the ND group early in FY24. New NCS staff are being brought onto the team.
- TS8 - NCSP Program Management Tools Development
    - No work to support this effort in Q3. No significant updates to G2 has been completed by ORNL G2 staff in Q3. Late in Q3 more bugs were found for Bowen/Miller to find.
- TS13 - NDA Technical Support Group and NDA Technical Infrastructure Project
    - Worked with Angie Lousteau's NDA group to plan a hold up workshop in Q4 at ORNL. Henley/Bowen worked with LLNL on NDA website updates to reflect new training and education activities for the NDA program. More courses are planned in FY24.

PUBLICATIONS

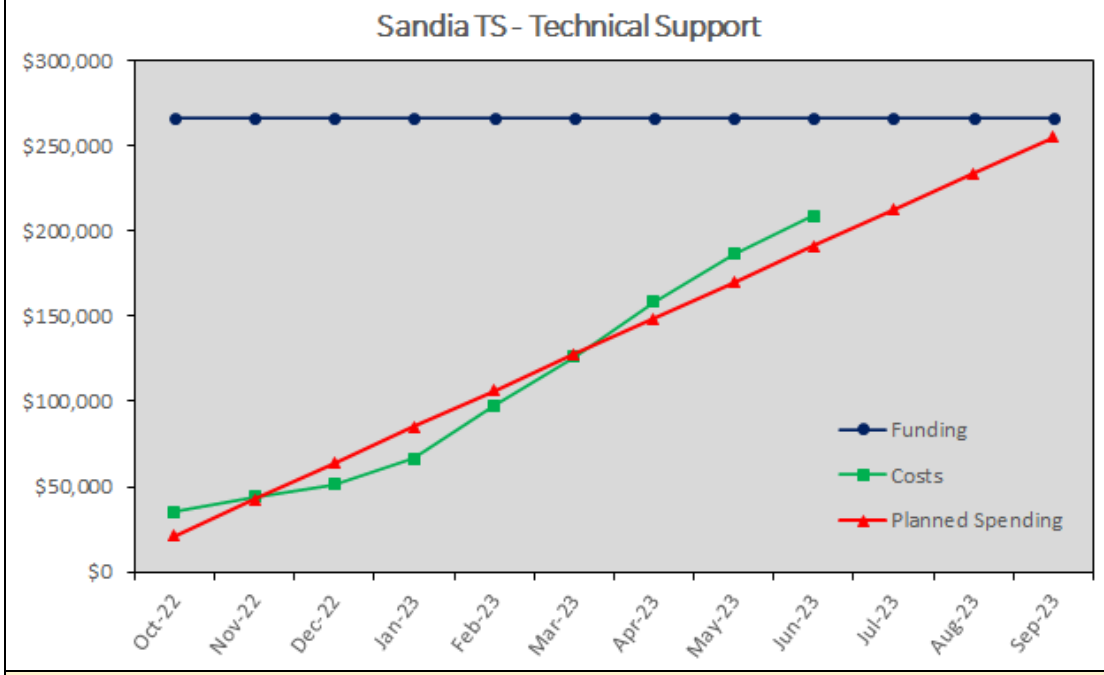
NCSP Quarterly Progress Report (FY-2023 Q3)

Quarter	**Publication Reference** **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Douglas Bowen, "Brief Overview of the DOE/NNSA Nuclear Criticality Safety Program", 2022 ANS Winter Meeting and Technology Expo, Phoenix, AZ, Nov 2022.
Q2	Douglas Bowen, "The meaning of the Terms “Credible” and “Unlikely” for Nuclear Criticality Safety Purposes," LANL Nuclear Criticality Safety Division Discussion, Los Alamos, NM, June 2022
	Douglas Bowen, "ORNL NCSP FY 2022 Budget Summary and Highlights," Technical Program Review Meeting, Albuquerque, NM, February 2023.
	Douglas Bowen, "The Purpose of the DOE/NNSA Nuclear Criticality Safety Program Technical Program Review," Technical Program Review Meeting, Albuquerque, NM, February 2023.
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: TS3, 12 **M&O Contractor Name**: Sandia National Laboratories (SNL) **Point of Contact Name:** Gary A. Harms **Point of Contact Phone:** (505)845-3244	**Reference:** DP0909010 **Date of Report:** July, 2023

BUDGET



1. Carryover into FY 2023 = $11,226
2. Approved FY 2023 Budget = $ 255,000
3. Total FY 2023 Budget w/Carryover = $266.226
4. Actual spending for 1st Quarter FY 2023 = $51,463
5. Actual spending for 2nd Quarter FY 2023 = $74,828
6. Actual spending for 3rd Quarter FY 2023 = $82,298
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $

NOTE: Include commitments as part of spending

MILESTONES

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Provide NCSP Manager with report of succession planning efforts. (TS3)		
Q1	Provide the NCSP manager with a summary of NCSP CEdT support (TS12)		

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

ACCOMPLISHMENTS

TS3 – Support for Experimentalist Succession Planning

- The Year-round Ph.D. student intern that has been supporting the critical experiment team has transitioned to a SNL staff member.
- Matrixed employee performing as an experimenter.
- Actively participating in the NCS community by attending conferences and publishing papers.

TS12 - NCSP IE Manager Support

- Performed duties as the IE Manager in support of the IE program element.
    - Interacted with the site task mangers to track and assist progress on various IER milestones and MIHLs:
    - Interacted with NCSP Management Team, provided technical advice, and assisted on a broad scope of items (e.g., 5 year plans, TEX-2.0 meeting, IE priorities, MIHL lists items).
    - Run monthly IE meetings, distribute agenda and notes.
    - Participate in various IER team meetings and assisted IER team members with requested items.
    - Project and report final milestone completions as well as IERs moved out to future or into the current FY.
    - Process BCR submissions.
    - Reviewed reports and processed through approval in IER database (team members and NCSP manager) or ensured BCR submission.
    - Track Non-NCSP IERs and work with site and NCSP management team to initiate new ones, as added.
    - Updated team memberships per site leads direction.
    - Facilitated discussions between LANL, LLNL and NCSP management team on use of NCSP materials for non-NCSP IERs.
    - Worked in the IER database, assisted others with issues using database, work with G2 developers on database improvement items.
- Specific Q3 progress/updates on milestones and MIHL items:
    - ZPPR Plate Characterization report completed by LLNL.
    - IER 153: MIHL completed. 3B moved to FY24 and passed-back IER into 3A with a Q4 due date.

- IER 297: 4B report in final approval stages.
- IER 305: 4A report completed; 4B initiated.
- IER 329: CED-2 moved to Q4.
- IER 441: 3A moved to Q4, 3B still in Q4.
- IER 452: CED-1 moved to Q4, CED-2 moved to FY24.
- IER 499: 3A and 3B moved to FY24 (redesign efforts ongoing). Passed-back IER into CED-2 with a Q3 due date.
- IER 518: 3B report in final approval stages.
- IER 519: Moved 3A and 3B from FY24 into FY23, but then 3A moved to Q4 with 3B started in Q4 but ending in FY24. Added MIHL item.
- IER 523: CED-1 moved to Q4, CED-2 moved to FY24.
- IER 532: 3B report in final approval stages.
- IER 537: 3A moved to Q4 (but in approval stages). MIHL on target.
- IER 551: CED-1 report in final approval stages.
- IER 555: Completed approval of 3A report. Moved 3B to Q4.
- IER 574: CED-3B and MIHL completed prior to Q4 due dates.
- IER 575: Removed MIHL item due to manufacturing issues.

- Minor progress on NCSP IE Manual Revision.

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter
  AND
- Are publicly releasable

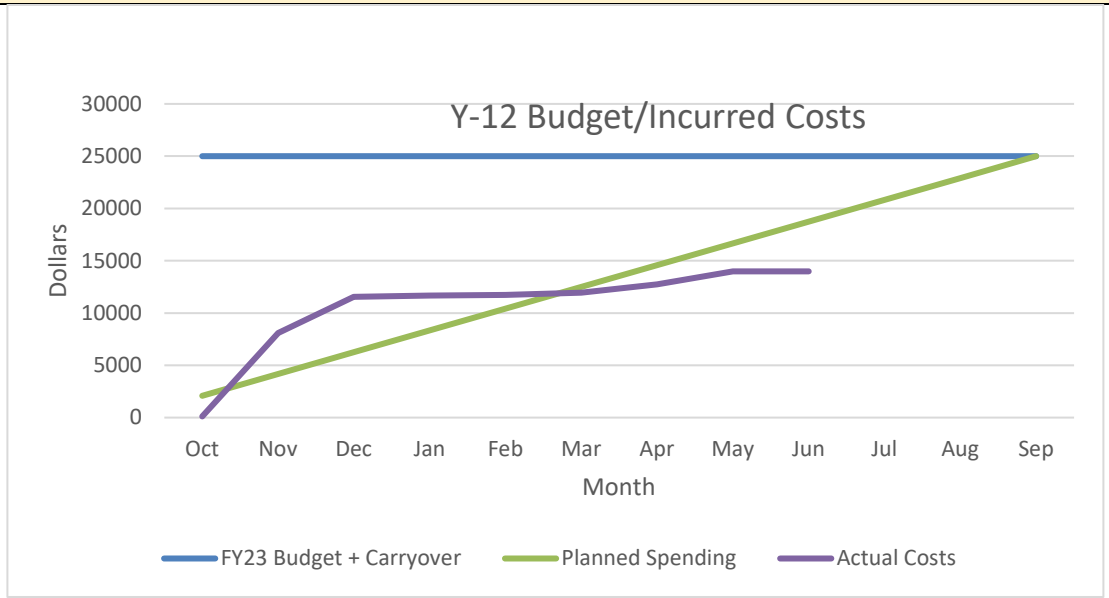
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	D.E. Ames, G.A. Harms and E.C. Lutz, "Design of Critical Experiments Targeting Epithermal Cross Sections of Tantalum," SAND2022-8816 C, presented at the 2022 ANS Winter Meeting, Nov. 13 – 17, 2022.
Q2	D. E. Ames, M. Dupont, G. Harms, A. Chapa, and E. Lutz, "IER 441: Experiments to Measure the Effect of Tantalum on Critical Systems (SNL/ORNL)," SAND2023-12567PE, presented at the NCSP TPR, Feb. 21-23, 2023.
Q2	W. Cook, E. Lutz, D. Ames, A. Raster, J. Cole, G. Harms, and J Miller, "IER-523: Design of a UO_2-BeO Critical experiment at Sandia," SAND2023-12611PE, presented at the NCSP TPR, Feb. 21-23, 2023.
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q3)

NCSP Element and Subtask: Technical Support & CSSG (TS) **M&O Contractor Name**: Y12 **Point of Contact Name:** Kevin Reynolds **Point of Contact Phone:** (865) 241-9067	**Reference:** DP0909020 **Date of Report:** July 17, 2023

BUDGET



1. Carryover into FY 2023 = $0.0
2. Approved FY 2023 Budget = $25,000.00
3. Total FY 2023 Budget w/Carryover = $25,000.00
4. Actual spending for 1st Quarter FY 2023=$11,545.61
5. Actual spending for 2nd Quarter FY 2023 = $403.82
6. Actual spending for 3rd Quarter FY 2023 = $2,253.81
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024= $

NOTE: Include commitments as part of spending

MILESTONES

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

Complete	On Schedule	Behind Schedule	Missed Milestone

QUARTER	TASK	STATUS	ISSUES/PATH FORWARD
Q1	Provide the NCSP manager an update of Program activities (including CSSG)		
Q2	Provide the NCSP manager an update of Program activities (including CSSG)		
Q3	Provide the NCSP manager an update of Program activities (including CSSG)		
Q4	Provide the NCSP manager an update of Program activities (including CSSG)		

NCSP Quarterly Progress Report (FY-2023 Q3)

ACCOMPLISHMENTS

- Travel to BEM and NCERC Futures Meeting
- Attendance at several CSSG meetings (virtual or email votes).

PUBLICATIONS

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

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

Summary of MCNP Classes in FY 2023 – Q3

M.E. Rising[1], A.R. Clark[1]
[1] Monte Carlo Codes (XCP-3), LANL

FY2023 – Q3 classes are highlighted in red.

Total Students

- **FY2023 – Q1** **82 students** **(Intro, Intermediate, ~~VR~~, Criticality)**
- **FY2023 – Q2:** **34 students** **(Intermediate, Advanced)**
- **FY2023 – Q3:** **73 students** **(Intro, ~~Intermediate~~, Criticality, Safeguards)**
- **FY2023 – Q4:** **? students** **(Intro, NJOY)**
- **FY2023 – TOTAL thus far:** **189 students**

In FY23, a balanced mix of in-person and online classes are offered.

Classes sponsored by DOE-NNSA-NCSP

- **Criticality Calculations with MCNP6 (LANL-AM1)**
  - **November 7-10, 2022** **in-person @ Y12** **15 students**
  - **June 19-23, 2023** **in-person @ LANL** **15 students**

  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)**
  - **TBD** **TBD** **TBD students**

  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.

Other Classes - supported by student registration fees.

- **Introduction to MCNP6** **(**includes 1/2 day on criticality calculations, without NCS validation & Whisper)
  - **Oct 24 – 28, 2022** **online** **41 students**
  - **Jun 5 – 9, 2023** **online** **44 students**
  - **Aug 21 – 25, 2023** **in-person @ LANL** **TBD students**
- **Intermediate MCNP6**
  - **Oct 3 – 7, 2022** **online** **26 students**
  - **Feb 27 – Mar 3, 2023** **in-person @ OECD-NEA** **20 students**
  - ~~**Apr 10 – 14, 2023** **online** **TBD students**~~
- **Variance Reduction with MCNP6**
  - ~~**Dec 5 – 9, 2022** **in-person @ LANL** **TBD students**~~
- **Advanced MCNP6 Features & Utilities**
  - **Mar 6 – 11, 2023** **in-person @ OECD-NEA** **14 students**
- **MCNP6 for Nuclear Safeguards Practitioners**
  - **June 26 – 30, 2023** **in-person @ LANL** **14 students**
- **NJOY**
  - **Aug 28 – Sep 1, 2023** **in-person @ LANL** **TBD students**

2023 Q3 – SCALE Training Courses Report for the Nuclear Criticality Safety Program

Class Name	Frequent Fulcrum Functions: The Basics of SCALE's Graphical User Interface Tutorial
Class Dates	April 26, 2023
Location	Virtual – SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	18
Short Description	This tutorial introduced the Fulcrum graphical user interface and the basic functions that enhance the common activities of creating, editing, navigating, executing, and visualizing SCALE input files. The tutorial helped attendees become familiar with the Fulcrum input file text editor and the integrated input development environment features of autocompletion, automatic checking, cursor context, and input navigation. In addition, the Fulcrum and SCALE runtime environment was reviewed to improve understanding of job execution workflow. No prior experience with SCALE was required. Attendees could follow along using SCALE 6.2.4 or SCALE 6.3.0 (beta14 or later).

Class Name	LWR Decay Heat Analysis with SCALE Tutorial
Class Dates	April 26, 2023
Location	Virtual – SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	21
Short Description	This tutorial walked users through different approaches for decay heat analysis in LWR spent fuel using fuel depletion and decay capabilities in SCALE. Attendees learned how to determine decay heat based on fast simulations with ORIGEN under the ORIGAMI graphical user interface for LWRs, how to use ft71 files obtained with different SCALE depletion sequences as input for standalone ORIGEN simulations to determine decay heat as function of burnup and cooling time, and how to visualize the results with Fulcrum. No prior experience with SCALE was required. Attendees could follow along using SCALE 6.2.4.

Class Name	ORIGEN Library Generation with TRITON Tutorial
Class Dates	April 26, 2023
Location	Virtual – SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	30
Short Description	This tutorial guided users through the process of generating one-group ORIGEN depletion libraries for reactor fuel assemblies using TRITON. This included a basic introduction to the process of generating libraries via TRITON neutron transport sequences and using the ARP sequence to interpolate existing reactor data libraries for standalone depletion calculations using ORIGEN. Finally, users gained familiarity with the use of the SLIG template system (provided with SCALE) for developing complete "interpolation grids" of fuel assembly configurations needed to perform rapid depletion calculations based on problem-specific conditions. Attendees participated using SCALE 6.2 or any SCALE 6.3 beta release. Prior experience with SCALE (particularly familiarity with ORIGEN and/or ORIGAMI) was highly recommended.

Class Name	SCALE Utilities for Nuclear Data Interrogation, Comparison, and Visualization Tutorial
Class Dates	April 26, 2023
Location	Virtual – SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	29
Short Description	This tutorial was an introduction to the tools available to interrogate, compare, and visualize the SCALE nuclear data. Fulcrum was used to plot continuous energy and multigroup cross section data, multigroup scattering matrices, covariance matrices, and correlation matrices. Instructors also demonstrated how to use Fulcrum to compare cross section and uncertainty data from different evaluated nuclear data releases. Users were given the chance to use a new tool, OBIWAN to view/patch/diff/convert data found on F33 and F71 files. Lastly, a variety of AMPX tools were used to compare covariance libraries, compare working and master libraries, and print/manipulate the data stored on a multigroup library. No prior experience with SCALE was required. Attendees could follow along using SCALE 6.2.4 or SCALE 6.3.0 (beta14 or later).

Class Name	Activation Analysis with ORIGEN/MAVRIC for Advanced Reactors Tutorial
Class Dates	April 26, 2023
Location	Virtual – SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	41
Short Description	This tutorial demonstrated the application of ORIGEN and MAVRIC for activation analysis for an advanced reactor concept. ORIGEN was used to generate the activation source terms and MAVRIC was employed to calculate dose rates due to activated materials. No prior experience with SCALE was required. Attendees could follow along using SCALE 6.2.4 or SCALE 6.3.0 (beta14 or later).

Class Name	SCALE Modelling & Simulations for Nuclide Inventories and Source Terms in Spent Nuclear Fuel Tutorial
Class Dates	April 26, 2023
Location	Virtual – SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	34
Short Description	This tutorial walked users through different approaches and relevant files for neutron and gamma source terms analysis in LWR spent fuel using fuel depletion and decay capabilities in SCALE. Attendees learned how to determine neutron and gamma sources with ORIGEN under the ORIGAMI graphical user interface for LWRs, how to use ft71 files obtained with different SCALE depletion sequences as input for standalone ORIGEN simulations to determine these sources, and how to visualize the results with Fulcrum. A hands-on example looking at the impact on modeling assumptions (0D vs 1D) for the fuel assembly on the predicted sources was provided. No prior experience with SCALE was required. Attendees could follow along using SCALE 6.2.4.

Class Name	SCALE Sensitivity Tutorial
Class Dates	April 26, 2023
Location	Virtual – SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	27
Short Description	This tutorial was a survey of sensitivity and similarity capabilities within SCALE, covering SAMS, TSURFER, TSUNAMI, TSAR, and TSUNAMI-IP. Attendees performed eigenvalue and reactivity sensitivity analyses, data adjustment, and similarity analysis, and had the opportunity to ask questions about current and future capabilities. Attendees could follow along using SCALE 6.2.4 or SCALE 6.3.0. A demonstration of the new ORIGEN sensitivity capability in SCALE 6.3.0 was demonstrated.

Class Name	Obiwan from A to Z Tutorial
Class Dates	April 26, 2023
Location	In-Person - SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	6
Short Description	The OBIWAN command-line interface is a "power user" tool intended to facilitate common analysis tasks involving ORIGEN binary files, such as ORIGEN reactor data libraries (f33) and ORIGEN nuclide inventory files (f71). The tutorial introduced users to the multitude of capabilities in the OBIWAN command-line tool, including inspecting ORIGEN reactor data libraries and inventory files, generating useful output for follow-on analysis, and performing advanced tasks such as library interpolation and blending of nuclide inventories. Attendees could follow along using SCALE 6.2.4 or SCALE 6.3.0, although some capabilities (such as blending) are new to 6.3.0. Prior experience with ORIGEN and/or ORIGAMI was highly recommended.

Class Name	New Sensitivity Features and More in Sampler Tutorial
Class Dates	April 26, 2023
Location	In-Person - SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	2
Short Description	This tutorial introduced the application of the Sampler sequence to perform sensitivity and uncertainty analysis for high-assay low-enriched uranium (HALEU)/high burnup (HBU) and accident tolerant fuel (ATF) concepts. Participants learned how to use recent features in Sampler to identify similarities and differences in decay heat and k-eff trends, as well as the major contributors to the identified differences, for light water reactor (LWR) fuel. No prior experience with SCALE was required. Attendees could follow along using SCALE 6.3.0 (beta14 or later).

Class Name	Fulcrum Data and Geometry Visualization Tutorial
Class Dates	April 27, 2023
Location	In-Person - SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	4

Short Description	This tutorial reviewed the data plotting and geometry visualization capabilities in the Fulcrum graphical user interface. This tutorial helped attendees become familiar with Fulcrum's 2D plot, and 2D and 3D geometry visualization features. Attendees will learn how to identify plottable data items, compose and export plot and plot data for SCALE plot formats (SDF, Ampx MG/CE, PLT, F71, PTP, SPF, ORIGEN gamma data, etc.) and visualize, navigate, cut, hide, and export the geometry and spatial data (fission map, dose map, etc.) overlays in 2D and 3D. No prior experience with SCALE was required. Attendees could follow along using SCALE 6.3.0.

Class Name	Molten Salt Reactor Analysis with SCALE Tutorial
Class Dates	April 27, 2023
Location	In-Person - SCALE Users' Group Workshop, Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	6
Short Description	This tutorial demonstrated SCALE 6.3 capabilities for reactor physics and fuel cycle analyses of liquid-fueled systems, such as molten salt reactors. This used the TRITON module and leverage new input definitions to define elements being fed into and removed from an irradiated mixture. The tutorial included the development and testing of a computational model, verification activities for complex material flow scenarios, and postprocessing to perform fuel cycle analyses. Resolving additional short-time phenomena was briefly discussed.

Class Name	SCALE TRITON Lattice Physics and Depletion Training
Class Dates	May 22–26, 2023
Location	OECD/NEADB, Paris, France
Number of Attendees	11
Short Description	The TRITON reactor physics sequence in SCALE simulates the time-dependent transmutation of various materials in 1D, 2D, or 3D depletion models by coupling neutron transport solvers with the depletion and decay code ORIGEN. TRITON coordinates all steps involved, including nuclear data processing, neutron transports for 1D, 2D, and 3D configurations, and transmutation and decay to estimate nuclide compositions of depleted mixtures, mixture-wise powers, neutron flux, and other important quantities as a function of burnup. Attendees of this course learned how to use TRITON, with focus on 2D depletion analysis that uses the NEWT deterministic kernel for neutron transport. Besides the material and geometry model development, capabilities like branching and time-dependent perturbations of densities and temperatures were covered in detail. Advanced capabilities such as ORIGEN library generation for rapid spent fuel characterization calculations, the application of KENO for 3D depletion, and using SCALE's Sampler sequence to perform uncertainty analysis for model parameters and nuclear data in the TRITON input were also demonstrated in this training. This training was taught with SCALE 6.2.4. Previous experience with SCALE was not required.

STATUS REPORT
on the
International Collaboration with the Atomic Weapons Establishment (AWE)

Reference			AWE Contributions and POCs			
AWE Reference	**Task Description**	**NCSP Reference**	**FY2022 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	C. HODKINSON	D. BOWEN C. PERCHER	ORNL LLNL
AWE effort currently on hold due to lack of resource.						
INTEGRAL EXPERIMENTS						
AWE-IE2	Development of Passive Neutron Spectrometer (PNS)	LLNL-IE1	Fully commission TLD version of the PNS; Perform validation irradiations at NPL; develop unfolding tools for directionality	P. ANGUS	P. MAGGI	LLNL
Passive Neutron Spectrometer has been developed and deployed alongside LLNL sphere et al at the Godiva intercomparison in both gold and TLD configurations. Discussions have now been recently held regarding presentations regarding the SPECTRA-UF unfolding code and access for international labs.						
AWE-IE3 **IER 406**	Cf-252 CAAS benchmark	LLNL-IE1	Perform/support PNS(TLD) measurements with a shadow cone	P. ANGUS	D. HEINRICHS F. TROMPIER	LLNL IRSN
Dependent on completion of IE2.						
AWE-IE5	Correction factor for dosimetry linked to orientation of the victim	LLNL-IE1	Participate in experiment design; use PNS data to determine directional components of neutron fields (Godiva, Flattop, LLNL RCL)	P. ANGUS	P. MAGGI F. TROMPIER	LLNL IRSN
Dependent on completion of IE2 (unfolding tools for directionality). Linked with IE11 (International inter-comparison)						
AWE-IE6	ICSBEP shielding benchmark for shipping containers	Proposal FY20-25 (Low priority Experiment for FY2022)	Participate in experiment design; PNS(TLD) could be deployed as primary measurement device AWE to do some preliminary design	P. ANGUS	S. KIM	LLNL
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.	P. ANGUS	T. CUTLER	LANL
Contact made regarding AWE involvement; would like to contribute regarding providing access to our unfolding tools to increase user base. Discussions being held with UKAEA to set up a session to discuss the code and our applications.						

Reference			AWE Contributions and POCs			
AWE Reference	**Task Description**	**NCSP Reference**	**FY2022 AWE Contribution**	**AWE Technical POC**	**Collaborator POC**	**DOE Lab**
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	W. ZYWIEC	LLNL
AWE experiments suggest that further measurements on bulk metal and oxide systems are worthwhile. A measurement campaign at DAF is therefore planned for the last quarter of 2023.						
AWE-IE9	AWE/LLNL NCT 5 year measurement campaign	LLNL-IE1	Participate in experiment design, measurements and reporting	N. KELSALL	W. ZYWIEC	LLNL
DAF measurement campaign undertaken on bulk metal systems during November 2022, with the next campaign planned for the first quarter of 2024.						
AWE-IE10	NAD Research & Development	LLNL-IE1	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 **(IER 538)**	NAD Exercise	LLNL-IE1	Produce experiment design; participate in exercise; produce final report. Repeat even years.	P. ANGUS	P. MAGGI	LLNL
Next international inter-comparison is anticipated in 2024.						
AWE-IE12	CIDAAS testing	Proposal FY19-20	Deploy AWE CIDAAS for test irradiation. Repeat odd years as needed	T. BIRKETT S. GARBETT	D. HEINRICHS P. MAGGI J. GODA	LLNL LLNL LANL
Next test planned for late 2023/early 2024.						
AWE-IE13	Characterization of AFRRI TRIGA reactor radiation field AWE will provide onsite measurement	LLNL-IE1 SNL-IE1ST2	Provide support to experiment design	P. ANGUS	A. ROMANYUKHA G. HARMS	LLNL SNL
AFRRI visit undertaken in February 2023 to discuss experimental plan with participants. Characterisation planned for August 2023.						
INFORMATION PRESERVATION AND DISSEMINATION						
AWE-IPD1	Conduct benchmark evaluations of legacy IEU integral experiments.	LLNL-IPD1	Assess feasibility of sponsoring PhD; determine availability of data.	C. HODKINSON	C. PERCHER	LLNL
Considered unlikely to make any material progress.						
TRAINING AND EDUCATION						
AWE-TE1	Hands-on criticality safety training	ORNL-TE1	AWE personnel to attend training course	C. HODKINSON	D. BOWEN B. MYERS D. HEINRICHS G. HARMS	ORNL LANL LLNL SNL

Reference			AWE Contributions and POCs			
AWE Reference	**Task Description**	**NCSP Reference**	**FY2022 AWE Contribution**	**AWE Technical POC**	**Collaborator POC**	**DOE Lab**
Four criticality assessors attended courses during the previous quarter.						

APPENDIX E: International Collaboration with the Institut de Radioprotection et de Sûreté Nucléaire (IRSN) for FY2023

IRSN has an active and growing program of collaboration with the NCSP that aims to underpin and enhance IRSN's nuclear criticality safety. IRSN will provide its expertise and capabilities to support the NCSP's mission and vision so that the collaboration is mutually beneficial to both organizations.

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
ANALYTICAL METHODS						
IRSN-AM5	Update of the slide rule	ORNL-AM6 LLNL-AM3 AWE-AM1	Contribution to final report	J. HERTH	D. BOWEN D. HEINRICHS R. JONES	ORNL LLNL AWE
Q1 status A meeting is going to be scheduled to identify work to be done this year to close the action. **Q2 status** In line with IRSN's goal to provide a final report on the Slide Rule project on Q4 FY2023, a doll has been proposed for a meeting in order to make progress on the next steps (end of May or beginning of June). **Q3 status** As discussed during June 8 meeting, IRSN is updating the former technical report (IRSN 2019-00266), which combines results for phase 1 and 2. New version will include results of phases 3 (shielding materials) and 4 (Pu DFG). Draft version will be sent to ORNL and LLNL in September.						
IRSN-AM8	Analytical Methods Working Group	LANL-AM1 ORNL-AM2 LLNL-AM3	IRSN participation to NCSP Analytical Methods Working Group, NDAG meeting, and TPR meeting	S. PIGNET	J. ALWIN B.J. MARSHALL D. HEINRICHS	NCSP
Q1 status Participation of IRSN to TPR meeting. Needs to set up an intercomparison between MACSENS and TSUNAMI/TSURFER for bias estimation.						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
Q2 status No update **Q3 status** No update						
IRSN-AM9	Cross sections processing validation	ORNL-AM3	AMPX training - Development of an interface between GAIA and AMPX and test interface capabilities.	V. JAISWAL	A. HOLCOMB D. BOWEN	ORNL
Q1 status First tests of covariance matrixes generation with in-house code GAIA, comparison with AMPX to be done. **Q2 status** Benchmark of NJOY/AMPX/GAIA(IRSN) covariances matrixes using SERPENT code (in progress). **Q3 status** Benchmark NJOY/AMPX/GAIA(IRSN) covariances matrixes using SERPENT code completed and published at Wonder 2023 (6-9 June, France)						
IRSN-AM13	Benchmark intercomparison study	(FY21 5 YP) LLNL-AM5 ORNL-AM10 LANL-AM5 Y12-AM1 FY22-02	Definition of common set of developed benchmark models. Extension 2022-2024	J. BEZ	D. HEINRICHS B.J. MARSHALL J. ALWIN	LLNL ORNL LANL
Q1 status The report on the intercomparison study on keff has been sent on January 19th to the NCSP partners.						

	REFERENCE		IRSN Contribution / POC			
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Q2 status

Presentation has been held during TPR meeting. Waiting for review/feedback from LLNL, LANL, ORNL.

Q3 status

ORNL remarks received and included in the report. Waiting until end of August for other comments from LANL and LLNL. Final report to be released in September.

INTEGRAL EXPERIMENTS						
IRSN-IE25 IER 296	TEX-MOX	LLNL-IE1	Leading the design, supplying materials if needed. In 2023, working on CED2	M. BROVCHENKO	C. PERCHER	LLNL

Q1 status

CED-1 report sent to CED Team.
Mechanical/thermal mock-up to demonstrate the heat removal design shared with the CED Team during the meeting on 12th January 2023.
Inputs from LANL calculations. New meeting scheduled during TPR week.

Q2 status

Regular CED team (LALN, LLNL, Sandia) meeting to progress on the thermal design of the experiments. Comparison of LANL and IRSN thermal calculations. Plates analysis foreseen in Q3 with IRSN staff participation. CED-1 report uploaded to G2.
Completion of thermal design scheduled mid-May
Final Neutronics optimization to be launched after measurements.

On track to provide a draft of CED2 for review in September.

Q3 status

Jeremy Bez participated to measurements campaign in May, Joetta transmitted a draft report, IRSN comments sent to Joetta July 21st.

	REFERENCE		IRSN Contribution / POC			
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CED2 progress: Passive cooling design enough to meet safety requirements. Active cooling system foreseen for better physical results. Neutronics optimization of design in progress, completion of calculations scheduled for mid-August. Writing of report has started. Still on track for a draft sent to LANL and LLNL mid-September.						
IRSN-IE30 IER 538	Full dosimetry exercise around GODIVA	LLNL-IE1	Participation to the experiment in 2022. Provide support for CED4a in 2023.	F. TROMPIER	D. HEINRICHS	LLNL AWE
Q1 status IRSN's results from the last exercise (Godiva IV, august 2022) have been sent on time. Note that this exercise was not a "full exercise". Depending on the visit at AFFRI, it could be also foreseen to organize it at AFFRI and to advantage of the cytogenetic laboratory available at AFFRI. **Q2 status** CED4A report published by ORNL and received. **Q3 status** No update – action completed						
IRSN-IE30 IER 484	Dosimetry collaboration with Armed Forces Radiobiology Research Institute (AFRRI)	LLNL-IE1 AWE IE13	Participation to the characterization work in 2023.	F. TROMPIER	D. HEINRICHS	LLNL AWE
Q1 status						

	REFERENCE		IRSN Contribution / POC			
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IRSN participation to visit AFFRI facility (scheduled early 2023) in order to participate to preliminary measurements and discussions on the organization of the next national US exercise **Q2 status** IRSN participation to visit the facility in February Dosimetry Characterization scheduled in August, IRSN will participate **Q3 status** No update						
IRSN-IE46 IER 518	High Multiplication Subcritical (Multiplicity) Benchmark Experiments	LLNL-IE1 SNL-IE1 LANL-IE3	Review of CED4a.	W. MONANGE	G. HARMS/C. PERCHER	SNL/LLNL
Q1 status Discussion about the submission of an abstract at ICNC **Q2 status** CED3B draft received, IRSN inputs in progress **Q3 status** CED3B finalized. Meeting to be scheduled						
IRSN-IE51 IER 479	TEX HEU with poly at very low temperatures	LLNL-IE1	Contribution to design, supplying materials if needed, participation to the experiment	J. BEZ	C. PERCHER	LLNL

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
Q1 status Discussion about LLNL's abstracts for ICNC and about the technical delays for thermal surrogate testings **Q2 status** Visit of LLNL staff at IRSN March 31st Status on surrogate testing discussed. **Q3 status** No update						
IRSN-IE53 IER 551	True Intermediate Energy System with Pu-239 and Pu-240	LANL IE3 (Funded as low priority IER for FY2022)	Contribution to design and CED-1 report	M. BROVCHENKO	J. GODA D. BOWEN	LANL ORNL
Q1 status No update **Q2 status** No update **Q3 status** No update						
IRSN-IE7 IER 305	Critical Experiments with UO2 Rods and Molybdenum foils	SNL-IE1	Contribution to ICSBEP evaluation of baseline experiments.	J. BEZ	G. HARMS	SNL

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
Q1 status IRSN started reviewing of parts of CED-4 report (ICSBEP evaluation). To be continued as soon as new parts are available. **Q2 status** IRSN external review of ICSBEP benchmark done, participation to ICSBEP subgroup scheduled. **Q3 status** No update						
IRSN-IE11 IER 532	TEX-Hf experiments	LLNL-IE1	Contribution to the analysis of the experiments (CED-4)	M. BROVCHENKO	C. PERCHER	LLNL
Q1 status No update **Q2 status** No update **Q3 status** No update						
IRSN-IE27 IER 498	GODIVA CAAS benchmark	ORNL-IE1	Participation to the experiments in 2024	F. TROMPIER	D. BOWEN R. CUMBERLAND	ORNL

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
Q1 status No update **Q2 status** No update **Q3 status** No update – task not funded in FY2023						
IRSN-IE45 IER 517	Integral Experiments for Validation of Molybdenum Neutron Cross Sections on the whole energy spectrum	LANL-IE3	Participation in experiments design, external review of CED1	J. BEZ	N. THOMSON	LANL
Q1 status CED1 External review CED1 completed in October 2022 **Q2 status** No update Due to Nicolas Leclaire position change, please include Jérémy Bez in futures exchanges. **Q3 status** No update						
IRSN-IE41 IER 499	Thermal/Epithermal Experiments (TEX) with Chlorine	LLNL-IE1	Participation to the experiments.	M. BROVCHENKO	C. PERCHER	LLNL
Q1 status LLNL shared the CED 2 report with IRSN.						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
Q2 status No update **Q3 status** Technical exchanges with LLNL in June.						
IRSN-IE34 **IER 488**	MUSIC (HEU) critical and Subcritical measurements.	LANL-IE3	Analysis of results, contribution to CED4	J-B. CLAVEL	J. HUTCHINSON	LANL
Q1 status ICSBEP benchmark received from LANL early January. External review in progress, to be completed for February 15th, schedule is very tight. **Q2 status** IRSN External review of critical experiment completed, participation to subgroup work scheduled **Q3 status** The main geometrical simplifications have been received for critical configurations. IRSN will performed new calculations for the new geometry beginning of August. Waiting for updated ICSBEP benchmark.						
IRSN-IE47 **IER 537**	Copper Critical Experiment	LANL-IE3	Participation to the experiments	J-B. CLAVEL	T. CUTLER K. AMUNDSON	LANL
Q1 status No update **Q2 status** No update						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
Q3 status No update						
IRSN-IE56 IER 578	Jupiter ZPPR high 240 plates benchmark report	LANL-IE3	Independent review of the ICSBEP evaluation.	M. BROVCHENKO	J. GODA	LANL
Q1 status No update, waiting for LANL inputs **Q2 status** No update, waiting for LANL inputs **Q3 status** No update						
INFORMATION PRESERVATION AND DISSEMINATION						
IRSN-IPD1	ICSBEP reviewing	LLNL-IPD1	IRSN ICSBEP reviewing tasks are reported in the IE tasks	S. PIGNET	D. HEINRICHS	LLNL
IRSN-IPD2	LFE Database	ORNL-IPD4	Sharing experience on French LFE database	A. BARDELAY	D. BOWEN	ORNL
Q1 status ICNC Abstract on IRSN LFE database to be submitted. **Q2 status** ICNC 2023 paper on IRSN criticality safety assessment methodology (including in-house LFE database use) to be submitted **Q3 status**						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
ICNC paper submitted and accepted						
NUCLEAR DATA						
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

Q1 status

Participation of 2 IRSN staff on August session.

Q2 status

Registrations to be done very soon for Aurélie Bardelay and Raphaelle Ichou.

Q3 status

IRSN participants refused due to lack of availability.