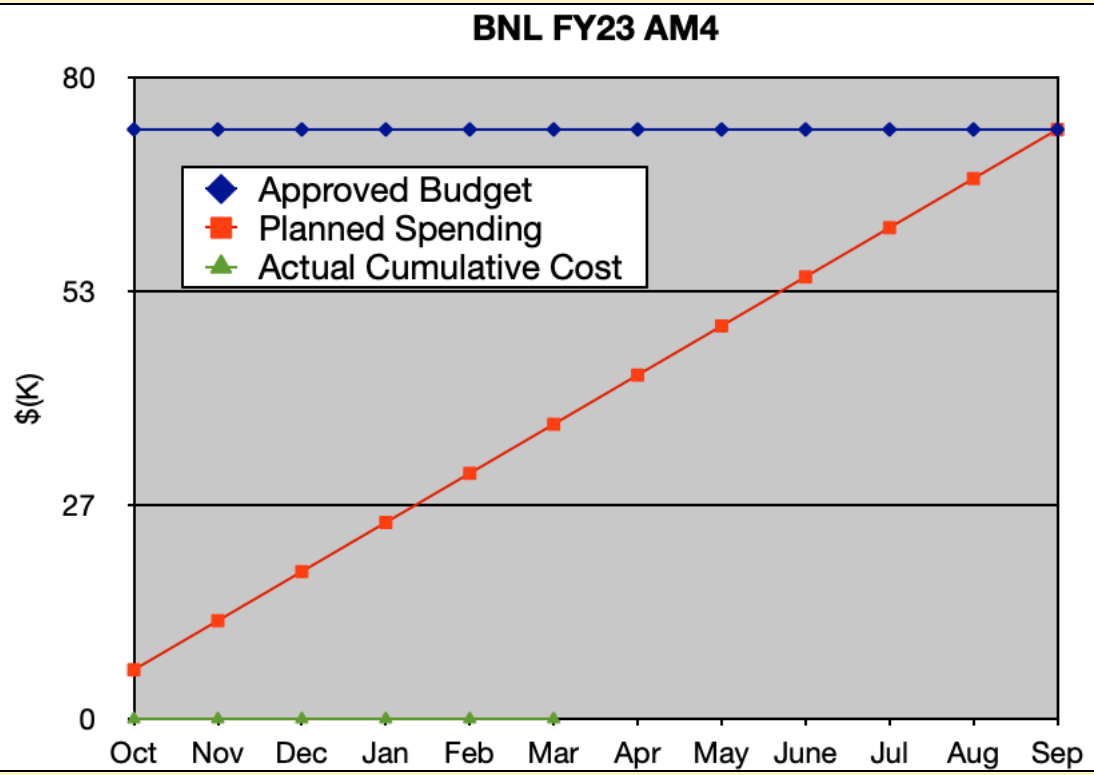
NUCLEAR CRITICALITY SAFETY PROGRAM (NCSP)

FY2023 2nd QUARTER REPORTS

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** 19 April, 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 = $3,676

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

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.

PUBLICATIONS

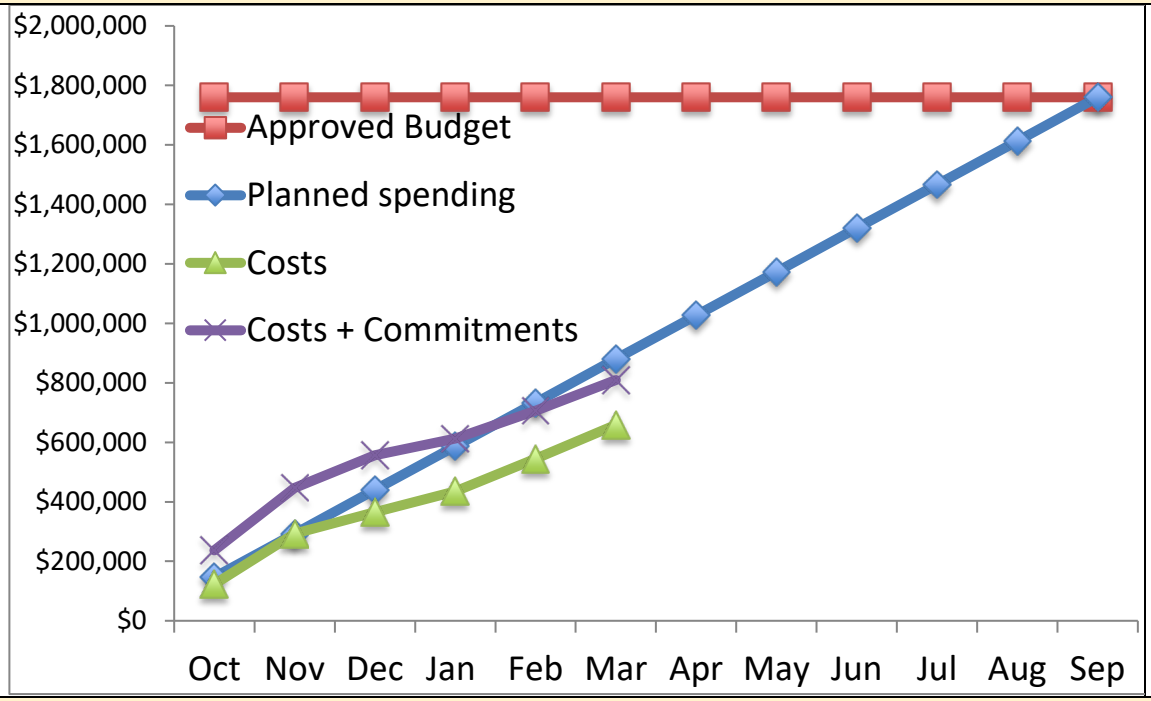
Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

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 Q2)

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:** April 19, 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 = $
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 (AM1, TE4)**

- Two in-person MCNP6 classes taught at the OECD-NEA with 34 students: See separate summary of MCNP classes.
- Mentorship of year-round graduate research assistant jointly between XCP-3 and XCP-7.
  - Served on the thesis committee for a UNM graduate student who successfully defended their PhD thesis in March 2023.
- Worked toward setting up an internship for RPI graduate student working on on-the-fly temperature treatment of thermal neutron scattering.
- Research mentorship of two UNM graduate students working on plutonium solution density predictive capabilities.
  - Served on the thesis committee for UNM graduate student who successfully defended their M.S. thesis and accepted position at LANL Nuclear Criticality Safety Division starting in May.

- **R&D Work (AM1)**
  - **The complete MCNP6.3 code package was sent to RSICC.**
    - A new page on the MCNP website was created to keep up-to-date information on the latest MCNP code releases. It can be found here: https://mcnp.lanl.gov/release_630.html.
    - All V&V benchmarks have been processed through the final production release versions of the MCNP6.3 code. The NCSP V&V report detailing all of the MCNP6.3 calculations is under construction. A general report will be issued as well as a summary of the results for the 2023 ICNC conference.
  - We discovered an interesting fact about previous MCNP6 documentation: The publication "Initial MCNP6 Release Overview" is the most cited article ever published in any of the three American Nuclear Society (ANS) technical journals with 717 citations! The article was published in the ANS journal *Nuclear Technology* in 2012. The reference for the article is: T. Goorley, M. James, T. Booth, F. Brown, J. Bull, L. J. Cox, J. Durkee, J. Elson, M. Fensin, R. A. Forster, J. Hendricks, H. G. Hughes, R. Johns, B. Kiedrowski, R. Martz, S. Mashnik, G. McKinney, D. Pelowitz, R. Prael, J. Sweezy, L. Waters, T. Wilcox & T. Zukaitis (2012) Initial MCNP6 Release Overview, Nuclear Technology, 180:3, 298-315, DOI: 10.13182/NT11-135. The full article may be found on the MCNP web site. Three other articles related to MCNP6 were published in that same issue of *Nuclear Technology*.
  - Region-dependent sensitivity-uncertainty data for NCS validation. A journal article submission is in progress (UNM).
  - 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. Due to the delay from FCI in processing the open-source release request, the Whisper-1.1 code is distributed with MCNP6.3.
  - Prepared and presented at the Nuclear Criticality Safety Technical Program Review (NCSP TPR). Provided updates on MCNP, Whisper, and all other activities.
  - 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 will be a part of an ICNC 2023 paper submission. See LA-UR-23-21143 abstract in the publication section below.
  - 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 planned to be a part of an ICNC 2023 paper submission. See LA-UR-23-21142 abstract in the publication section below.

        - Continued studying the application of empirical density laws for aqueous plutonium chloride and impacts in MCNP calculations. See LA-UR-23-20040 abstract in the publication section (submitted last quarter).
    - **MCNP Support and Maintenance**
        - Support MCNP6 users. MCNP Forum, website, email, direct interactions, etc.
        - MCNP public website re-designed and updated online.
            - The latest release page has been created: https://mcnp.lanl.gov/release_630.html
            - The reference collection has been overhauled: https://mcnp.lanl.gov/reference_collection.html
        - Updating V&V testing framework for consistency, extensibility, and automation.
        - Consolidating and archiving past V&V results in repository
    - **MCNP Data (AM1)**
        - The release of the processed ENDF/B-VIII.1 beta 1 was not complete until after FY23Q2 was complete. The beta 1 version of the ENDF/B-VIII.1 data will be tested with MCNP6.3 in FY23Q2.
        - ENDF/B-VIII.0 Covariance Library for Whisper
            - Work continues on the development of a processed covariance library.
            - Started converting and testing the NJOY-processed ENDF/B-VIII.0 covariance data into the ACE format for Whisper to use. As these data are processed, they will begin to be tested within Whisper. Some Python-based tooling around Whisper is being developed to support this effort.
- AM2 - NJOY Development and Maintenance, Uncertainty Analysis Development, and Modernization
    - **NJOY 2016**
        - One update to NJOY2016 was released: NJOY2016.69 (the work on this update was completed in Q1 but released in Q2). This update fixes a number of minor issues:
            - PURR now writes Bondarenko data obtained from the probability tables to MF2 MT152 instead of the Bondarenko data obtained from the direct sampled cross sections (for very low dilutions, the Bondarenko data obtained using these two methods does not align, with the direct sampled data leading to extremely low P1 values). When comparing with the Bondarenko data at low dilutions obtained with UNRESR, the Bondarenko data obtained from the probability table directly seems to be the best.
            - MF6 LAW=2 represents discrete two body scattering in which only angular distribution data is given (knowing that the outgoing energy of the secondary particle can be determined through kinematics when the angle is known). When calculating heating numbers based on LAW=2, ACER assumes that the yield of the secondary particle is 1, which is correct in all cases except when MT5 is used as a lumped reaction. Heating numbers in ACER for photonuclear files using LAW=2 in an MT5 entry are now correctly multiplied by the yield. A warning message is printed out whenever this situation is detected. Test 78 was added as part of this correction.
            - Previously, ERRORR would segfault for LRF=7 resonance evaluations when MF33 was present without MF32. A check for this situation now avoids this.
            - Fixed an issue in GROUPR when reading some of the FENDL3.2 evaluations.
        - Another update (NJOY2016.70) is ready for release as well (awaiting approval of a PR prior to releasing the version). This update fixes a number of minor issues:
            - Fixed an issue in HEATR when reading evaluations with large multiplicity tables in MF6.

- Fixed an issue in HEATR when calculating the average outgoing energy from a distribution that uses multiple interpolation ranges in TAB1 records (test 79 was added to detect this issue in the future). Mainly nuclides using MF5 instead of MF6 are impacted by this change (e.g. Sn119 and Sn122 from ENDF/B-VIII.0).
- Fixed an issue in HEATR where the photon recoil needed to be multiplied by the photon multiplicity to obtain the photon recoil per interaction.
- Fixed a crash in THERMR when asking for S(a,b) processing (iinc=2) while no ENDF tape is given (nendf=0).
- Multiple ERRORR calls can now be made in the same input file without crashing. This is of interest to users that wish to process MF34 and MF35 (where ERRORR needs to be called for each sub-subsection and incident energy group). The issue was related to arrays being allocated but not unallocated in the previous ERRORR run in NJOY's Sammy routines (evaluations using MF2 LRF=7 had this issue).
- Fixed an issue in ACER where the number of photons given in the ENDF file was larger than the hardcoded limit. The new limit is now adaptive.
- Fixed an issue in ACER where NaN values were produced in the postscript file for the checking plots.

  - 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)
    - A prototype implementation for photoatomic and photonuclear ACE files is complete and tested on all available ACE files. Testing of this capability will continue in Q3 (in the framework of photonuclear data processing in which we will compare the evaluated data in the ENDF files with the processed data in the ACE file).
    - we are looking into a release of ACEtk (all development work is done with the exception of the eprdata format, currently undergoing QA code review but this will take quite some time due to the amount of unreviewed code).
  - **ENDFtk (NJOY21)**
    - Support for MF32 covariance data is now complete
    - Dependency updates (removed the hana library dependency)
    - Added more convenience interface functions (e.g. has section(mf,mt) in addition to has file(mf) and has section(mt), etc.)
    - Looking into releasing ENDFtk v1.0 (all development work is done, currently awaiting QA code review) and are preparing a major publication on the toolkit
- AM3 - Development of an Adaptive-in-temperature Method for fast on-the-fly Sampling of Thermal Neutron Scattering Data in MCNP6 (RPI)
  - Additional basis functions were created and a more robust investigation of their fitting abilities was conducted.

- Sampling of the coefficient-based data now supports the conversion to and use of the (E, E', μ) domain values.
- Sampling functions were created for ACER based data that would be used in MCNP6 and used to compare against the coefficient-based data.

- AM5 - Proposed Benchmark Intercomparison Study
  - Worked on review of several benchmarks, including independent review PST-028 revision presented at recent ICSBEP meeting in Paris.
- Four presentations of NCSP-funded work at LANSCE were presented at the TPR in February (not attached):
  - Mike Rising "FY22 MCNP Updates for the Nuclear Criticality Safety Program"
  - Jen Alwin "Critical Benchmarks Modeled with MCNP Unstructured Mesh"
  - Wim Haeck "Overview of NJOY work for NCSP FY22"
  - Wei Ji "Fast on-the-fly Monte Carlo sampling of temperature dependent thermal scattering"

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.

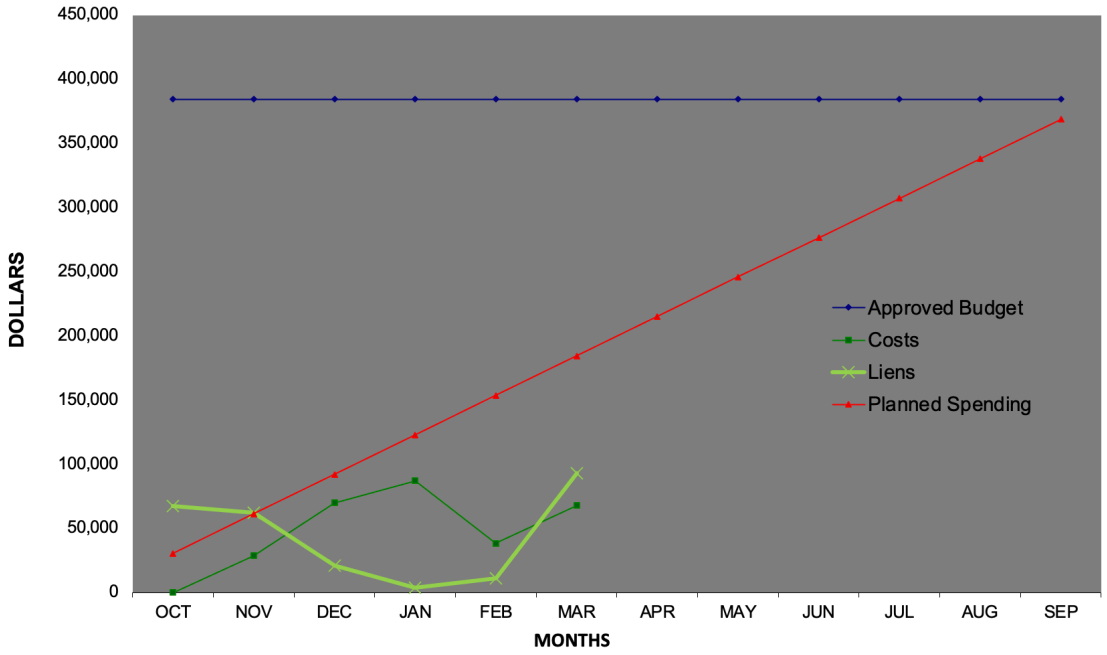
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Jennifer L. Alwin, Jerawan Armstrong, Simon R. Bolding, Alexander R. Clark, Chelsea D'Angleo, Micky R. Dzur, Robert A. (Art) Forster III, Avery S. Grieve, Esteban Gonzalez, Wim Haeck, Colin Josey, Karen C. 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	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April 19, 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 = $
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
  - All LLNL calculations were completed in previous FY and the final report is in preparation by IRSN.

- AM4 - Thermal Scattering and Self-Shielding in GNDS/FUDGE
  - LLNL used FUDGE to process the ENDF-VIII.1 beta1 candidate release, including generating unresolved region probability tables and cross section pdfs. Results are currently being tested in the Metis V&V suite, and will be reported at the mini-CSEWG meeting April 25-27.
  - Following the ENDFB-VIII.1 beta-1 release, a second update was just announced including new TNSL evaluations. We are in process of processing and testing those files.
  - We are preparing a format proposal for the next meeting of EG-GNDS (the committee in charge of the Generalized Nuclear Database Structure definition) to improve the connection between TNSL evaluations and fast neutron evaluations, allowing evaluators to specify what isotopic mixtures should replace TNSL targets at higher incident neutron energy.
- AM5 - Proposed Benchmark Intercomparison Study
  - To date, a total to 3,410 high-precision COG (k-eff) ICSBEP benchmark results, and 21 beta-eff benchmark results, using ENDF/B-VII.1, ENDF/B-VIII.0 and JEFF-3.3 have been provided to Nicolas Leclaire (IRSN) for inclusion in the study as follows:

Pu	U233	MIX	HEU	LEU	SPEC	β-eff
766	193	356	1054	807	10	32

  - Shielding benchmarks completed:
    - Baikal-1 skyshine
    - KSU Co-60 silo skyshine
    - KSU Cs-137 air-over-ground/concrete
    - FNS liquid oxygen slap
    - OKTAVIAN nickel sphere
    - OKTAVIAN aluminum sphere
    - Silene activation benchmarks (unreflected, reflected by Cd-lined CH2, and reflected by Pb)
  - LLNL established a Government Use Agreement (GUA) providing COG11.3 executables, data, and source code to NNL for use in subcritical multiplicity and shielding analyses.

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.

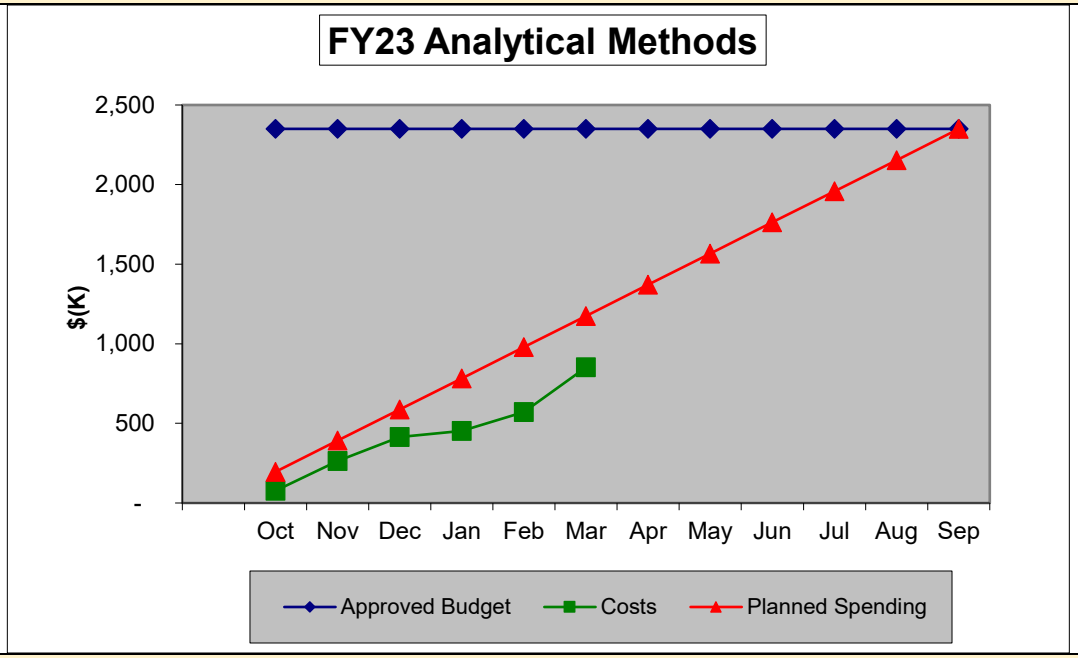
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Heinrichs, D. et al, "COG Beta-Effective Benchmarks," LLNL-TR-843852, December 20, 2022

	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	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April 19, 2023

BUDGET



1. Carryover into FY 2023 = $50K
2. Approved FY 2023 Budget = $ 2300K
3. Total FY 2023 Budget w/Carryover = $2350K
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 = $
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	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 821 software packages.
  - 189 SCALE, 369 MCNP®, and 1 COG packages distributed.
  - RSICC quarterly report issued.

FY2022 University Distributions		
Month	MCNP®	SCALE
October	105	26
November	56	28
December	58	33
January	26	26
February	85	34
March	54	25
April		
May		
June		
July		
August		
September		
Total	384	172

- AM2 - SCALE/KENO/TSUNAMI Maintenance and Support/Cross-Section Generation/Modernization
  - Provide status on TSUNAMI upgrades
    - Focusing on scattering sensitivity convergence improvements, some related to under convergence of sources. Some methodology improvements will be pursued continuing into Q3. Report comparing SCALE/TSURFER, TSUNAMI, trending, and Whisper methodology is on OSTI: https://www.osti.gov/biblio/1969824.
  - Provide status on VADER
    - No major efforts.
  - Provide status on Sampler improvements
    - No major efforts
  - Provide status on CSAS improvements
    - Continuing investigation of source convergence metrics and keff estimators. Extensive review of MCNP vs Shift vs. KENO keff estimators and their handling of uncertainty, addressing the appearance of higher uncertainty per particle report by Shift.
  - Provide status on SCALEHELP
    - Minor efforts. Updating website for SCALE 6.3 release.
  - Provide status on SCALE 7.0 support
    - Pursuing commercial copyright to enable beta version sharing with government institutions. Pursuing open source copyright so SCALE data can be freely distributed (instead of bundled with code). Combining SCALE with data leads to large (17 DVD) distributions.

- Provide status on SCALE training (other than stats)
  - SCALE spring training was successfully given in person with nearly full training courses including criticality safety and shielding plus criticality safety.
- Publish a quarterly newsletter.
  - Newsletters will resume in Q3.

- AM3 - AMPX Maintenance & Modernization
  - Instructions for building the open source, public version of AMPX were updated and made available to the public.
  - FY 2022 work on AMPX was presented at the NCSP Technical Program Review in Albuquerque, New Mexico, in February.
  - Several team members presented at the WANDA workshop meeting in Washington, D.C., in March at a session about Nuclear Data Processing and Preservation.
  - In coordination with the SCALE 6.3.1 release, several small bugs were identified and fixed in AMPX.
  - With the release of the ENDF/B-VIII.1 Beta 1, team members have begun processing the Beta library, especially with a view to uncover any maintenance or bug fixes that AMPX would need. This also includes testing of the covariance data in the beta release.
- AM6 – Slide Rule Application
  - IRSN plan provided at the beginning of Q3. No activity in Q2 due to lack of IRSN engagement.
    - (from Johann HEARTH via 4-17-2023) In line with IRSN's goal to provide a final report on the Slide Rule project, I would like to propose scheduling a meeting in order to make progress on the next steps. On the agenda for this upcoming meeting, we could discuss:
      - Which key data should we retain and include in the comprehensive report based on the results from all laboratories?
      - What format and deliverables can IRSN provide in terms of implementing the results as an updated Slide Rule?
      - Assessment of any additional data needed to support the implementation of the updated Slide Rule?
      - Roadmap and timeline for completing the remaining project tasks?
- AM10 – Proposed Benchmark Intercomparison Study
  - No work was performed on AM10 in Q2 of FY23. Work in Q3 is likely to include reviewing the draft report and supporting expansion of the intercomparison into beta effective calculations.
- AM17 – Expansion of the Verified, Archived, Library of Inputs and Data (VALID)
  - Two new staff members have been added to the project: Lisa Reed and Veronica Karriem, with both beginning the process for becoming qualified Originators and Reviewers for VALID.
  - Lisa Reed has completed 25 models for LEU-SOL-THERM-016, -017, -018, and -019. All models have been reviewed and are currently in the sensitivity/uncertainty phase of the model addition process.
  - Veronica Karriem has completed 28 models for LEU-COMP-THERM-060. These models are currently in review so that the sensitivity/uncertainty phase of the model addition process can begin.
  - LEU-COMP-THERM-096 and -097, originated by Alex Shaw, are currently in the final review stages before being ready for the Quality Assurance Coordinator review: 19 models in LCT-096 and 24 in LCT-097
- AM18 – Determination of Appropriate Integral Parameters for Critical Experiment
  - Previous work included analysis of bias misprediction trends as a function of minimum correlation coefficient thresholds for 140 LEU-COMP-THERM cases. Correlation coefficient data was generated for nine additional fissile system categories spanning 288 evaluations, and analysis was performed on bias misprediction. The new additions include:

        - 50 HEU-MET-FAST cases
        - 52 HEU-SOL-THERM cases
        - 13 IEU-MET-FAST cases
        - 19 LEU-SOL-THERM cases
        - 2 MIXED-COMP-FAST cases
        - 49 MIXED-COMP-THERM cases
        - 10 MIXED-SOL-THERM cases
        - 12 PU-MET-FAST cases
        - 81 PU-SOL-THERM cases
    - Data for the integral parameter E was also generated for trending analysis in future work
- 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 TPR meeting in Albuquerque, NM in February 2023.
    - Slides were sent to Travis Zipperer for incorporation in the TPR presentation with additional meetings to discuss content.
    - The current results for the project were presented by Travis Zipperer at the TPR meeting, with all members of the team present, excluding Andy Pritchard.
    - Travis Greene is currently 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 abstracts detailing the validation efforts of ORNL have been accepted for the ICNC conference in Sendai, Japan with conference papers currently being written.

PUBLICATIONS

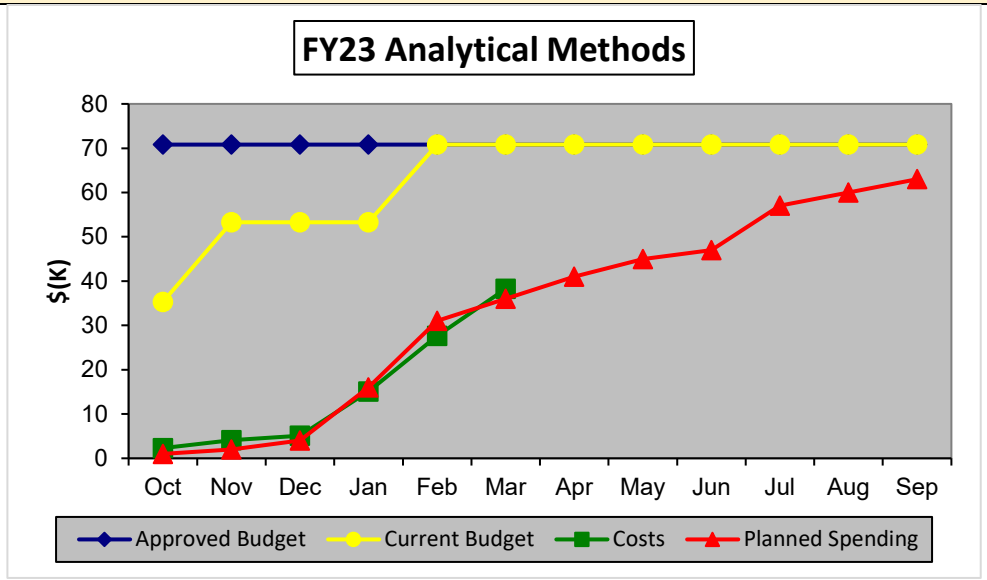
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Jordan McDonnell, BK Jeon, Kang Seog Kim, Dorothea Wiarda, Jesse Brown, Chris Chapman, Andrew Holcomb, "AMPX," CSWEG, Upton, NY, Nov 2022.
	William B.J. Marshall, Travis Greene, Alex Shaw, "Updated Gadolinium 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	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April, 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 = $
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $5,563

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 Q2)

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.

PUBLICATIONS

Any publications that have

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

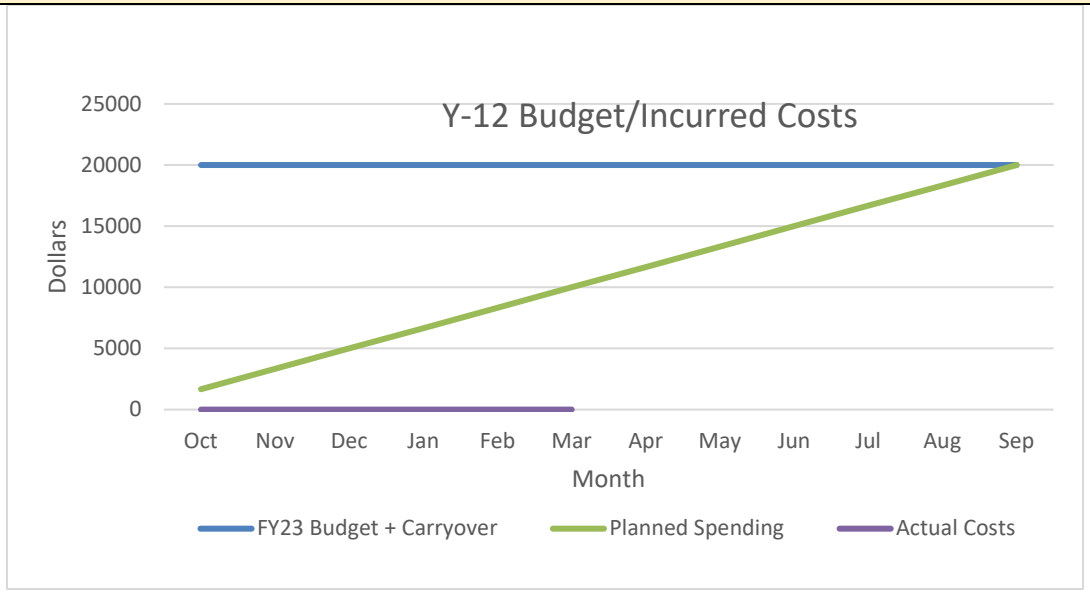
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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 Q2)

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:** April 19, 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 = $
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)		

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.

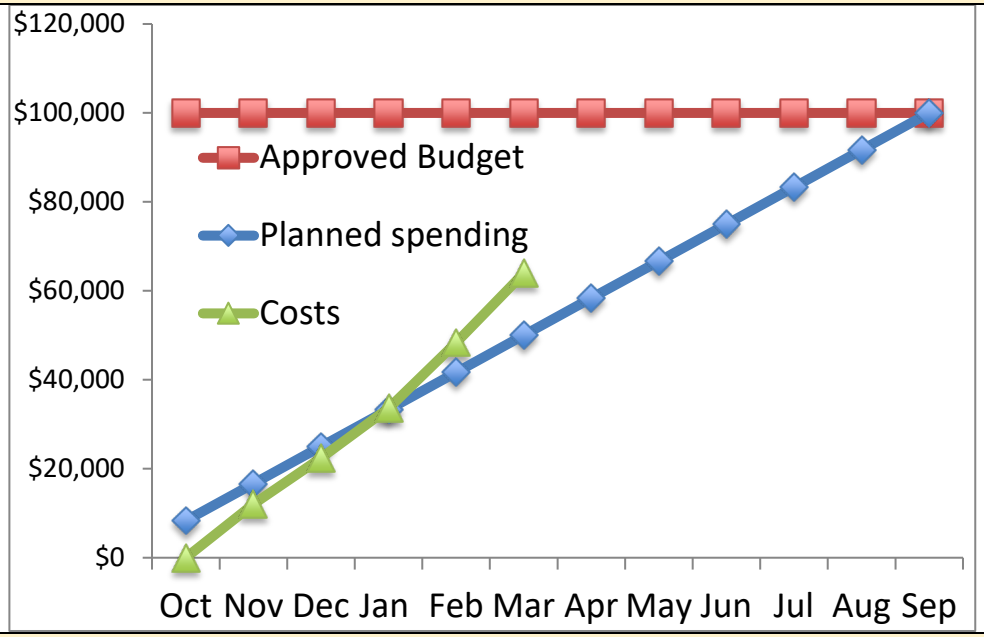
Quarter	**Publication Reference** **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q1)

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: April 19, 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			$0
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
  - 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

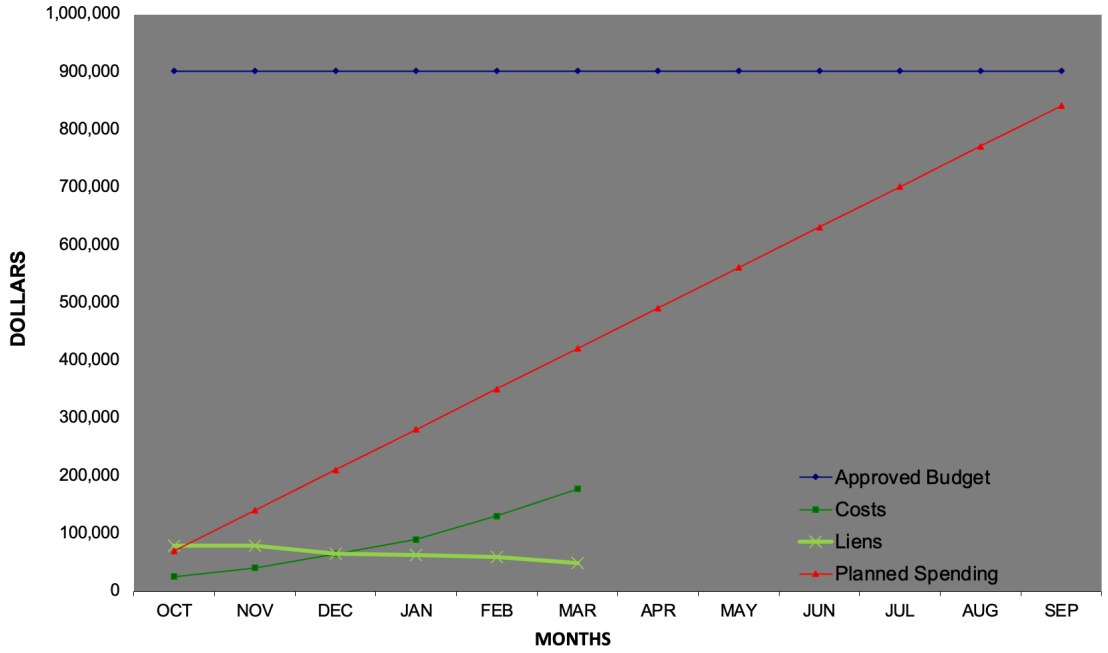
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April 18, 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 = $
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $60,000

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	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 distributed to the ICSBEP Technical Review Group in March 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.
  - Created 2023 Annual TPR Cvent registration site and TPR presentation site
  - Built out 16 Cvent T&E course registrations for 2024. Consisted of 8 courses and 8 course waitlists. All have been published.
  - Created and published NCSP Meetings at LLNL (TEX 2.0, M&V, and IE in-person meeting) registration web page
  - 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**
  - 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
  - NCERC equipment inspection – IER 466, IER 574
  - NTS Contingency Plan test and update BIA
- **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 developed volumetric source for benchmark based on high-fidelity COG model of deutron beam on tritiated target to allow other codes to easily run the benchmark. He also included additional modeling details never before incorporated to pulsed sphere models of the experimental set-up based on original drawings and measurements. Assessment of their impact is ongoing

PUBLICATIONS

Any publications that have

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

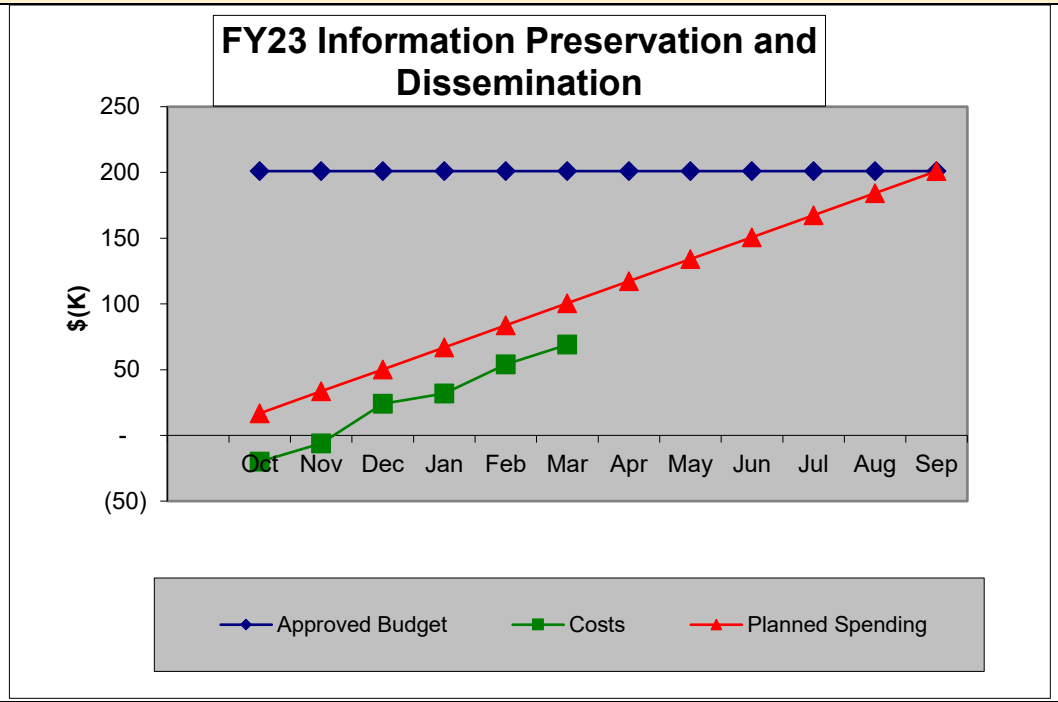
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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 Q2)

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:** April 19, 2023

BUDGET



1. Carryover into FY 2023 = $ 161K
2. Approved FY 2023 Budget = $40K
3. Total Approved FY 2023 Budget w/Carryover = $201K
4. Actual spending for 1st Quarter FY 2023 = $24K
5. Actual spending for 2nd Quarter FY 2023 = $45K
6. Actual spending for 3rd Quarter FY 2023 = $
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 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 Q1 through FY20 Q1 have been completed. The NCSP team finished the first 10,000 searches of the "Seventy-Five Years of Nuclear Criticality Safety Documents – A Bibliography" (LLNL-TR-760080) document and did a thorough analysis of the records found, breaking down the data into usable and unusable records, record types, foreign and domestic records, records with or without a full text, etc. It was found that OSTI's collection already contains 7,366 potential matches of the first 10,000, with 4,938 usable records, 2,603 of which already contain a full text. Unusable records include those with certain access limitations (i.e., OUO), source input types (i.e. INTLWEB), and statuses (i.e. Saved). The team also imported metadata from the PDF bibliography into a spreadsheet, which improved overall efficiency in searching for records; our total search count is over 15,500 with 7,354 of them searched in Q2.

Product Type	Existing Curated	New Curated	Q2 Totals	Project Cumulative
Tech Reports	118	26	144	206
Conference Products	76	95	171	513
Accepted Manuscripts	22	10	32	63
Books	1	0	1	1
Patents	1	0	1	1
Totals	**218**	**131**	**349**	**784**

  - 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 FY23Q2 records are expected soon. Since the first 10,000 records have been successfully analyzed, the team is in the process of curating available records that have full texts available. As of now, around 200 legacy technical records and 214 legacy conferences have been fully curated.
  - With the analysis of the first 10,000 records complete, curation of all available records will continue steadily. As stated, the FY23Q2 records for the NCSP project are expected soon and shall be prioritized for curation when they are released to the team. Team members will also continue to search for matching records that exist in the OSTI.GOV system until all 23,136 records listed on the "Seventy-Five Years of Nuclear Criticality Safety Documents – A Bibliography" (LLNL-TR-760080) document have been located or identified as not present.
- IPD4 – Learning from Experience (LFE) database
  - Doug Bowen, Charlotte Davis (NTS Global – UK), Deb Hill (NNL - UK), and Liam Payne met on four occasions to discuss the LFE database project. A new ORNL subcontractor was brought on board (Andy Prichard) to assist with this project. The NCSP manager sent PNNL funding for FY23 ($50k) to ORNL to provide funding support to Bowen/Prichard. PNNL did not support Prichard supporting this task as a subcontractor even though Prichard was a co-lead for the proposal with ORNL. Topics discussed in Q2 focused on the level of information on NCS infractions, events, and incidents that will be shared in the database. Database content security issues for a database such as this was discussed with information security staff at ORNL (Bowen) and PNNL (Prichard) and no association issues were anticipated if database content is kept site agnostic with only lessons learned information provided. Two meetings with LLNL were held in Q2 about hosting this new database – the main issues here dealt with functionality concerns – these were ruled out in the second meeting. LLNL did mentioned the information added to the database, including links and attachments, are released for unlimited distribution to the public. The database will be shared on some DOE website and the NCSP website is the desired location – the LLNL NCSP website appears to be feasible. The remaining work in Q2 dealt with sharing issues in the UK to ensure the level of information shared will not identify key players and sites. More discussion on these concerns will be held in Q3 in our monthly meetings.
- IPD5 – Oak Ridge Health Physics Research Reactor CAAS Benchmark Evaluation
  - The HPRR evaluation update was finalized with the measurand as the "neutron fluence from a bare and Lucite-shielded pulse" and submitted to the different reviewers and the ICSBEP TRG (Dupont)

PUBLICATIONS

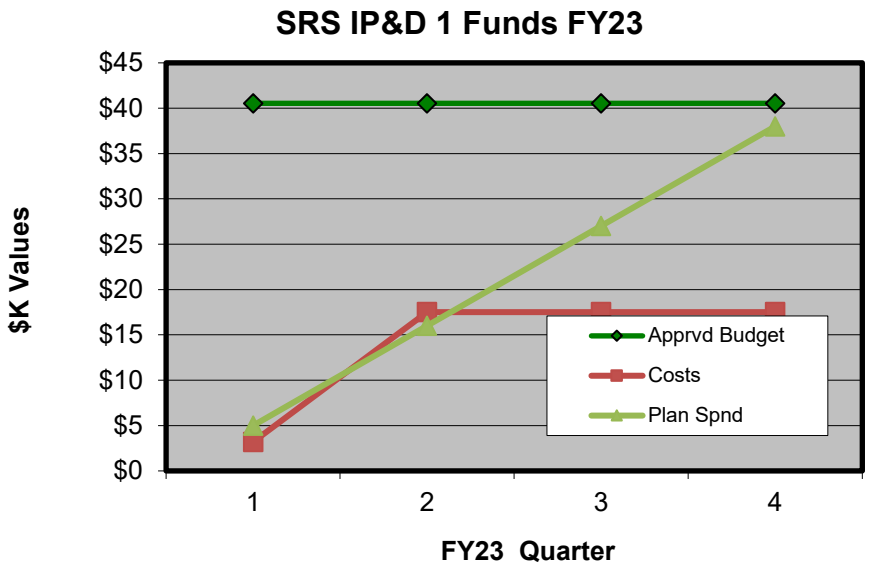
NCSP Quarterly Progress Report (FY-2023 Q2)

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 Q2)

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:** April, 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 = $14.3
6. Actual spending for 3rd Quarter FY 2023 = $
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)		
Q3	TBD based on Approved Scope. (IPD1)		
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

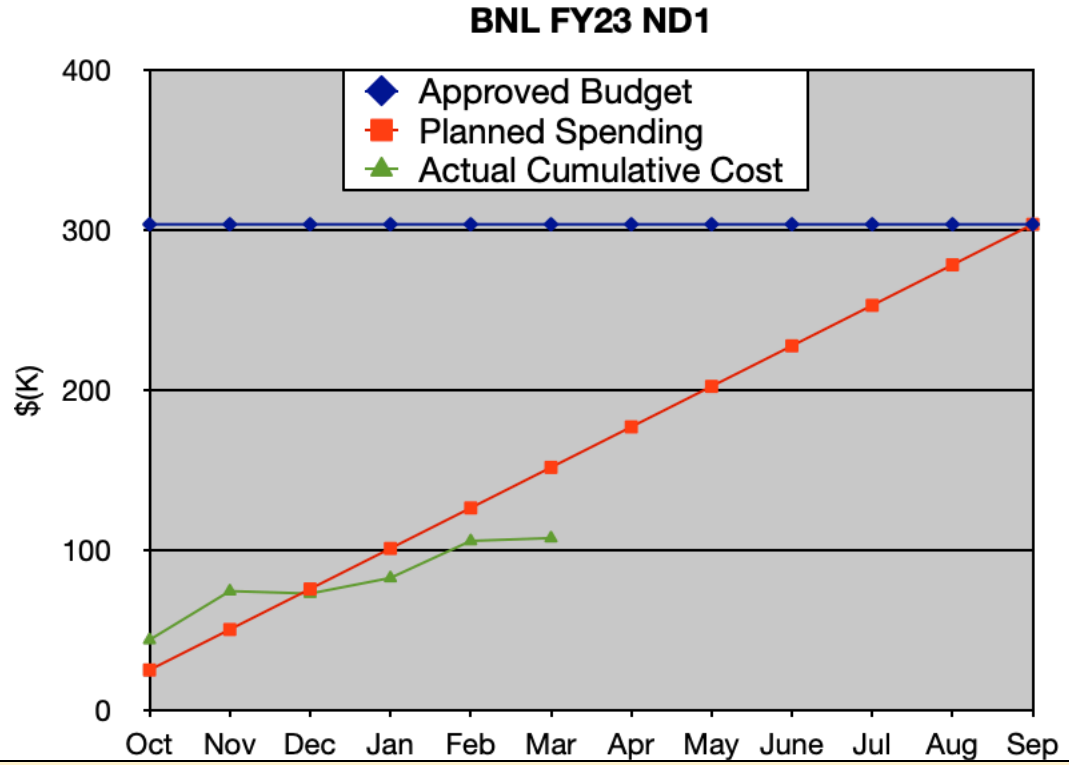
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** 19 April, 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 = $0
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 build reports contain information only on the changeset of a

	on all nuclear data activities in the NCSP Quarterly Progress Reports. (ND1)		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)		
Q3	If mandated by CSEWG, release new ENDF library. (ND1)		
Q4	Maintain and upgrade ADVANCE code system by performing data verification of new NCSP evaluations and performing quality assurance on the data as required. 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 for broad testing from the community. This release included important updates in the neutrons sublibrary such as for actinides, structural materials, light elements, etc., encompassing, among others, evaluations from the INDEN collaboration and evaluations funded by NCSP. The Beta1 release also included uncertainty updates in both spontaneous and neutron-induced fission yields sublibrary as well as contributions to the alphas sublibrary. This was one of the items in the Make-It-Happen List.
- Collected feedback from the community and coordinated to address the shortcomings that were being reported
- Coordinated the review of evaluations for the thermal neutron scattering law (TSL) sublibrary.
- Redefined release timeline, planning for mini-CSEWG, Hackathon and Beta2.
- Began coordination for the writing of the upcoming ENDF/B-VIII.1 release paper.
- Continued the evaluation review process.
- Rebecca Coles has joined the BNL NCSP project and has spent the last few quarters simplifying the ADVANCE build reports and streamlining the core ADVANCE coding. In parallel, Ramon Arcilla has been working to resolve the final issues with the Kubernetes virtual cluster. As of the end of Q2, most of the smaller ENDF subilbraries are being continuously integrated using ADVANCE.

PUBLICATIONS

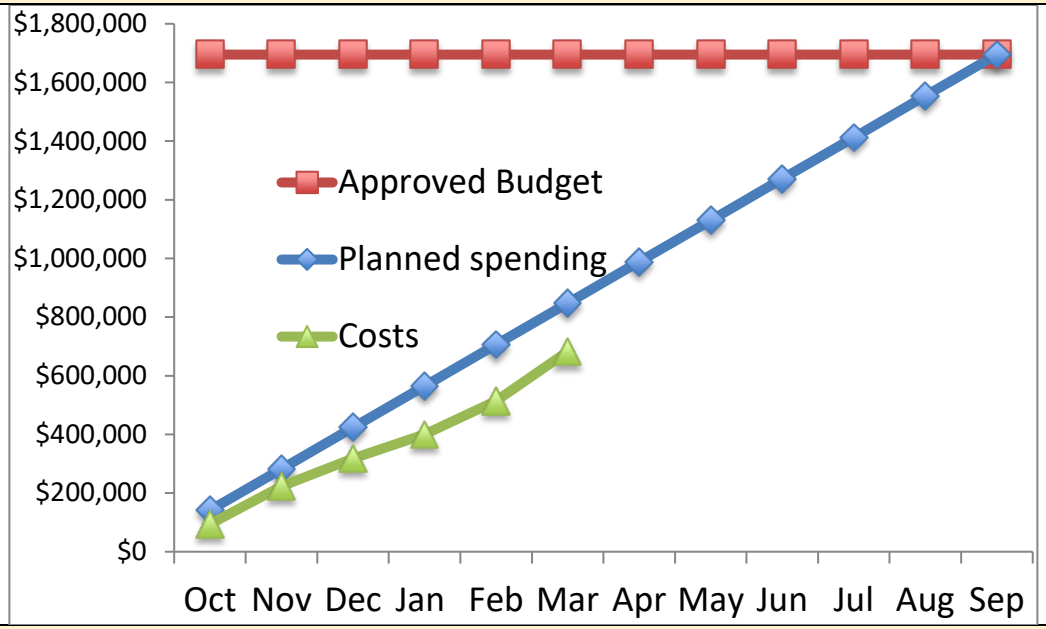
Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

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			
Q4			

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April 19, 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 = $
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 have submitted evaluations for ENDF/B-VIII.1-beta1 for several light nuclei, including n+^{6}Li, n+^{9}Be, n+^{10}B, n+^{12}C, and n+^{16}O. The files are undergoing extensive data testing, and we have kept "in the loop" for the testing results. One notable change was made in the n+^{9}Be capture cross section, which took into account more recent data, and was adjusted in the resonance range to agree with results from the Flattop integral assembly.
    - We have developed and tested a fully relativistic version of the SPECT code that calculates spectra for three-body final states using a Faddeev-like resonance model. We recently used the code to calculate center-of-mass spectra for the T(d, gamma)n alpha reaction, and compared the results to the non-relativistic version of the code, which uses an approximation for zero-mass particles such as photons. The results were quite similar, as expected, but now no approximations are necessary to describe zero-mass particles in either the initial or final states.

- La-139: Following the total cross section evaluation, we have directed our attention to the capture cross section. The preliminary results are shown in Fig. 1. We reproduce well with our model the capture cross section below ~1.2 MeV. Above that, our calculation is a bit lower than the data and the current evaluation. We are currently assessing the quality of the data, and we'll consider additional fitting, if our assessment shows the data to be reliable.

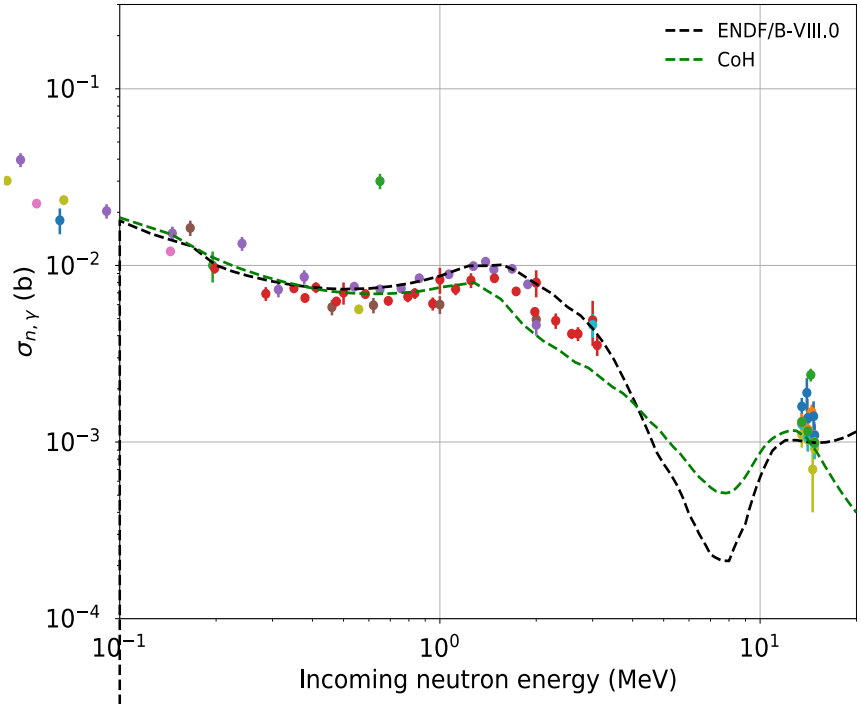


Figure 1: ^{139}La(n,g) cross section: comparison of our calculation based on code CoH, current evaluation, and existing data.

- 35Cl (leveraging funding from TerraPower)
  - Model calculations performed for LENZ experimental data [Phys. Rev. C102, 024623 (2020)] of 35Cl were extended to 20 MeV. The calculated results were used to create an interim ENDF file for data testing purpose. Although we have not performed fine tuning of model parameters, this evaluation already gave reasonable fit to existing experimental data outside the LENZ data range. Our initial trial was to include all the gamma-ray production as the discrete level decay matrix data. However, due to an array size limit in MCNP, we decided to put them as a discrete gamma-line spectrum, which required some upgrades in the data post-processing code.
- 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 worked on computing a better baseline for 238-242Pu(n,f) nubar with CGMF (adjusting multi-chance fission probabilities and the total kinetic energy compound mass parametrization). An updated code to calculate parameter sensitivities has been

written and is running. We also finished the experimental uncertainty quantification for 238Pu and 242Pu nu-bar, and started on 240Pu nu-bar.

- 238U "Finalize prompt fission neutron spectra based on LANSCE Chi-Nu Data"
  - We received the final Chi-Nu U-238 PFNS data for the evaluation late in Q1. We have been concentrating on experimental data uncertainty quantification.
- 236U
  - We have revisited the ^{236}U capture evaluation.
- 233U
  - We have run a few benchmarks for ^{233}U, in which we have used an evaluation for capture cross section consistent with the resonance region. Such an evaluation is significantly higher than existing data (including the recent measurement by DANCE).

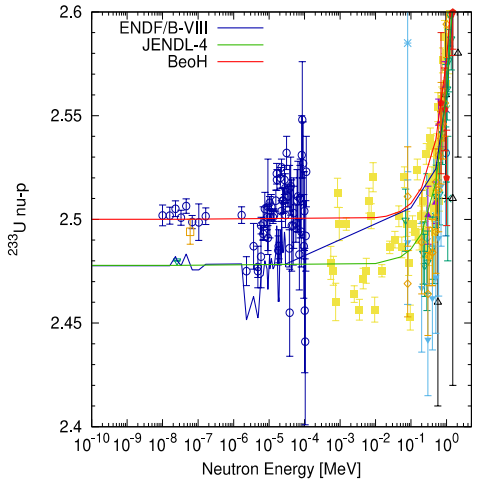


Figure 2: Nubar evaluations (ENDF/B-VIII.0 and JENDL-4) for 233U(n,f) compared with data, and our (BeOH) calculation.

However, we have discovered some inconsistencies in the evaluation of nubar as well, which is low compared with some of the datasets in Fig. 2.

- U-235/ Pu-239 PFNS covariances that were obtained from last-years ENDF/B-VIII.1 were formatted using ENDFtk and counter-checked internally and externally. There were some validation and verification iterations needed due to format ambiguities.
  - Related presentation: D. Neudecker, A. Lovell, K. Parsons, N. Gibson, P. Talou: "Release of 239Pu and 235U PFNS and nu-bar Covariances" LA-UR-23-20728 (2023).

- Data Testing
  - Pulsed-sphere validation was presented at fall CSEWG and reported for Q1. We are currently testing VIII.1beta1 with pulsed spheres and will present at mini-CSEWG during Q3. We are doing the same for crits. We also provided in-house feedback on light-elements evaluations (Li, Be).
- Three presentations of NCSP-funded evaluation work were presented at the TPR in February (not attached):
  - Denise Neudecker and Amy Lovell "Evaluations for 235,238U and 239Pu fission-source term observables"

- Mike Herman "Internally consistent 181Ta evaluation"
- Mark Paris "Light element evaluations for neutrons on 6Li, 9Be, and 16O"

- ND2 – Nuclear Data Measurements at LANSCE
  - Work Towards Fabricating a ^{239}Pu Sample for Measurements with DICER
    - One batch of highly enriched ^{239}Pu ("Clinton Pu") has been chemically purified. An aliquot of this solution was assayed from which it was determined to contain 3 mg of ^{239}Pu. This is about three times more ^{239}Pu than needed for the thinnest DICER sample we anticipate. We are working to fabricate this material into a sample suitable for DICER measurements. A second batch of this stock material, containing about 5 mg of ^{239}Pu is being purified. This should be enough ^{239}Pu for the intermediate-thickness DICER sample. Our colleagues at TA-55 have located a source of >99.5% enriched ^{239}Pu, as an oxide. We are awaiting results of chemical and isotopic analyses and exploring suitable methods for fabricating the thickest DICER sample from this material.
  - Measurement and 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
    - *R*-matrix analysis of DICER and DANCE data on ^{143}Nd and ^{147,149}Sm as well as previous data on ^{143}Nd [1] is ongoing to understand how the new data impact the criticality benchmark discrepancies identified in Ref. [2]. Although ^{147}Sm was not identified as a concern in Ref. [2], we included these data in this analysis because the DICER ^{147}Sm sample contained a small amount of ^{149}Sm and hence allows us to better characterize the large ^{149}Sm resonances near 0.097 and 0.87 eV. The region below 100 meV is proving challenging to fit so we are exploring using negative-energy resonances and/or *R*-external functions to improve the fit. The EXFOR entry [3] containing the previous ^{143}Nd total cross section data is unclear as to the proper sample thickness to use in the *R*-matrix analysis. Therefore, we are exploring the impact of this potential uncertainty.

[1] H. Tellier, *PROPRIETES DES NIVEAUX INDUITS PAR LES NEUTRONS DE RESONANCE DANS LES ISOTOPES STABLES DU NEODYME*, CEA-N-1459 (1971).
[2] L. C. Leal *et al*., *Assessment of Fission Product Cross-Section Data for Burnup Credit Applications*, ORNL/TM-2005/65
[3] H. Tellier, EXFOR entry 20118.4 (1971)

- ND2a – Prompt Fission Neutron Spectra (PFNS) Measurement of Plutonium 240
  - Spontaneous fission data analysis for Li-glass detector data collected prior to the 2022 in-beam data collection period is nearing completion. These results will allow for validation of low-energy (<800 keV) data from the spontaneous fission data for liquid scintillators, and by extension the in-beam data as well.
  - Analysis of spontaneous fission data from both gains of liquid scintillator data is being carried simultaneously utilizing the data obtained between WNR macropulses. These data will be compared with Li-glass spontaneous fission data when ready, and MCNP-based corrections will primarily be adjusted to match Li-glass and liquid scintillator data in the extended overlap region ideally down as low as 300-400 keV.
  - Following validation of the full liquid scintillator dynamic range via spontaneous fission, this component will be removed based on total time difference for in-beam and spontaneous fission data, and in-beam analysis will continue similar to those established methods in past Chi-Nu PFNS measurements.
  - This project is on track to be completed in FY23 as planned.
- ND2b - Unresolved and Fast Measurements of U233 (n, gamma)

- The result on the 233U capture to fission cross section ratio for incident neutron energies from 0.7 eV to 250 keV was presented at the 2023 Annual NCSP Technical Program Review held in Albuquerque from the 21st-23rd of February 2023.
- The paper, ”Measurement of the neutron-induced capture to fission cross section ratio in 233U at LANSCE,” was submitted to Physical Review C.

- Three presentations of NCSP-funded work at LANSCE were presented at the TPR in February (not attached):
  - Esther Leal Cidoncha “Measurement of the neutron-induced capture-to-fission ratio in 233U at LANSCE”
  - Paul Kohler “95Mo neutron capture and transmission final results”
  - Matt Devlin “Status of the measurement of the 240Pu(n,f) prompt fission neutron spectrum at LANSCE”

PUBLICATIONS

Any publications that have

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

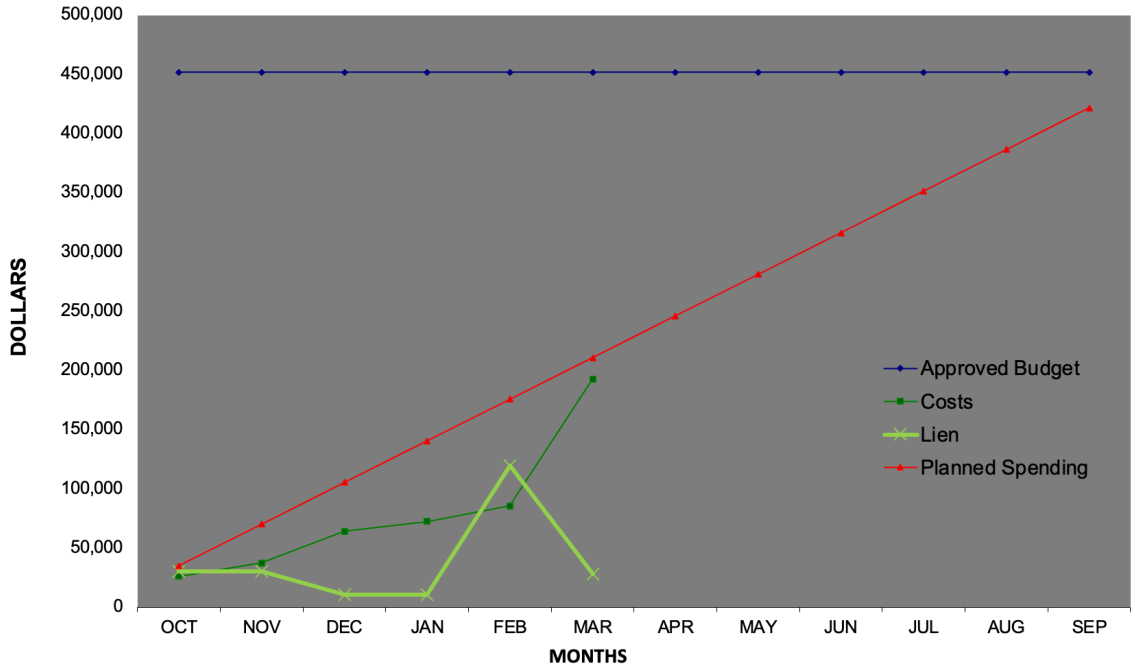
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April 19, 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 = $
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**
  - Detector development group has updated their simulation processing software to assess if Li-6 neutron captures can improve the discrimination of fission events from elastic and inelastic scatter events, and if these captures can also improve the accuracy of the neutron multiplicity measurements.
- **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 continued work on the DOS for the TSL evaluation of paraffin (NCSP's Appendix B material for FY 2022 and 2023). In this case, crystalline and periodic effects are being investigated to determine if such behavior may impact various components of the DOS and the related TSL.
- The review process for the TSL libraries to appear in the beta 1 release of ENDF/VIII.1 has been completed. All the TSL evaluations submitted by NCSU (see last QPR) have been passed to the next phase and will be released as part of ENDF/B-VIII.1.beta1.

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

- NCSU continued work to integrate the entire Doppler broadening operation into the *FLASSH* code. Preparations are underway for the release of *FLASSH* 1.0 in coordination with the ENDF/B-VIII.1 release.

Development and Implementation of Machine Learning Methods for Thermal Scattering Law Evaluations

- NCSU continued development of NeTS modules for crystalline beryllium and graphite. This quarter the focus was on creating and training the CDFs that are needed to link the NeTS for a particular material into a neutronic simulation tool such as a Monte Carlo code. This component is currently being conducted in two stages, where the NeTS modules are independent of the code. Further investigation will be performed of integrating the module into the code.

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter

AND

- Are publicly releasable

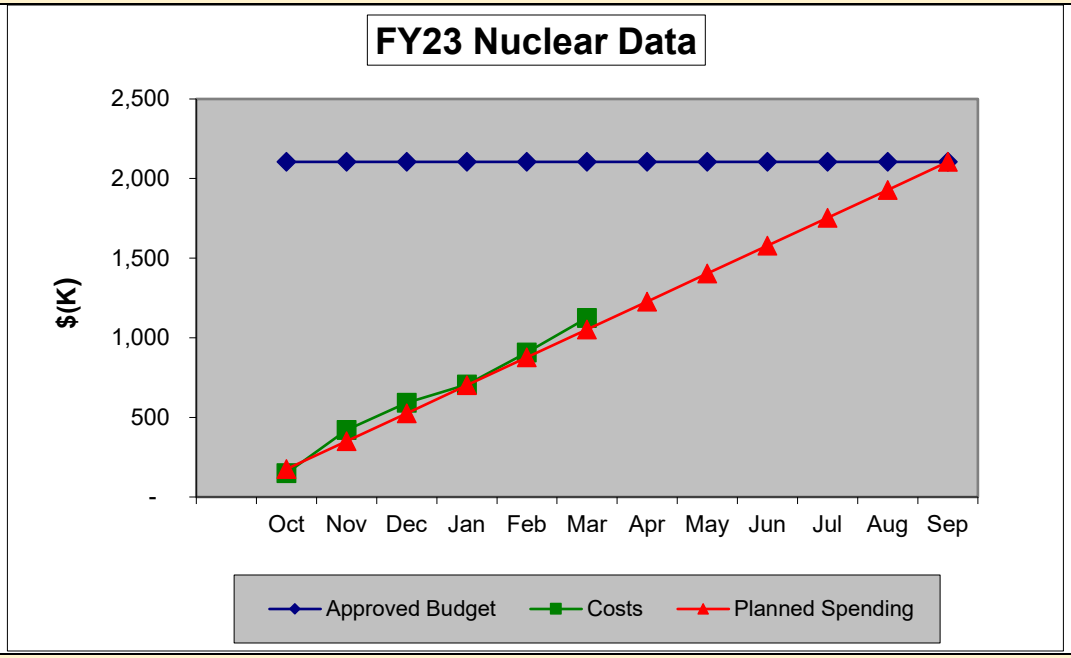
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April 19, 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 = $
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 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

- ND1 - Nuclear Data Measurements
  - Data reduction for Zr-90 and Zr-91 continues. Preliminary Zr-90 capture data show a discrepancy with current evaluations. Investigation of yield normalization is ongoing. (Brown)
- ND2 – Nuclear Data Evaluations and Testing
  - Continuing simultaneous evaluation of transmission and capture vanadium data sets. (Arbanas)
  - Preparation of technical report of cerium evaluation nearing completion. (Chapman)
  - The status of the evaluation of neutron reactions on 63,65Cu was presented at the Nuclear Criticality Safety Program's Technical Program Review (Albuquerque, NM) as a part of a status report of ORNL nuclear data evaluations. The INDEN version of the file was submitted to the NNDC for ENDF/B-VIII.1. Early feedback has led me to focus again on a discrepancy in the angular distributions between the evaluation file and experimental data. The challenge is that angular distributions that agree well with experimental data in the 50 – 200 keV region do not lead to good integral benchmark performance. The status of the evaluation of neutron reactions on 139La was also presented at the same NCSP TPR. The TPR also presented another opportunity to discuss the evaluation with Ionel Stetcu at LANL, who is performing the high energy region evaluation. (McDonnell)
  - Covariance generation for three major fissile nuclei 233,235U and 239Pu to be included and tested in the ENDF/B-VIII.0 beta1 release. Due to the large size of the resonance files, this work was important for setting the covariance procedure (SAMMY+AMPX) in preparation to the final ENDF/B-VIII.1 release. Additional work was devoted to test the 239PU file extended up to 5 keV (not yet included in the ENDF repository). Updates to the strontium evaluation including the generation of a ENDF file to be included in the ENDF/B-VIII.0 beta2 release are in progress. In February, two presentations on work for FY22 were reported at the NCSP. The first presentation was about the evaluation work on 233,235U, and 239Pu, the second one about the chlorine and strontium. Following the NCSP TPR meeting, the programmatic meeting WANDA was attended. (Pigni)
- ND3 - Isotopic Sample Leases to Support ND1 ND Measurements
  - Zr-92 was shipped at the end of Q2 (Brown)
- ND4 - Thermal Neutron Total Cross Section Measurements for Improvement of Criticality Calculations and Propagation of Scattering Kernel Uncertainties
  - Report is in preparation and is nearly complete.

- ND6 – SAMMY Nuclear Data Evaluation Code Modernization
  - Sammy has two types of parameters, one that is adjusted directly and one that is not adjusted for a specific run, but the covariance data is kept and propagated to the final results (pup'ed parameters). Previously the covariance data for the final ENDF file of a SAMMY evaluation was wrong if pup'ed parameters were include. This was not previously discovered as only directly adjusted parameter were used for the final ENDf file. However, as newer evaluation started using more parameters and more isotopes in the evolution it is advantageous to allow the use of pup'ed parameters and parameters for more isotopes (not to be included in the final ENDF file). The writing of the ENDF file in SAMMY has be completely rewritten in C++ and it can now accommodate this features for most ENDF file formats. One format (LRF=7) still only works if only one isotope is present. Support has been deferred as it requires a change in one of the SAMMY input files, for which we wanted to find a more user-friendly option in conjunction with SAMMY users. Once the input format is decided, adding the support will be simple as the writing routines already support it If the correct parameters are passed to it.
  - Gave the SAMMY overview at the NSCP TPR meeting.
  - SAMMY still has a complicated internal program flow owing to the fact that it was initally written for a computer with a lot less memory than current computers. We have started to update this flow, starting with the set of alphanumeric user input of which there are about 300 different options. We started to centralize the handling of these alphanumeric cards in a new C++ class. This allowed us to eliminate some scratch file as well as some duplicated code, as these input is currently read once to set up the SAMMY run and then, in a different piece of the code, to set the actual parameters for the desired run. Work on this consolidation will continue, and duplicated code will be deleted.
- ND9 – Evaluation of Thermal and Resolved Resonance Ranges of UO_2 and PUO_2
  - Continued literary review to ensure all possible methods are being considered.
  - Possible measurements of low-lying resonances at the SNS were brought up, discussions are ongoing.
  - Confirmed that implementation of scattering contribution to CLM module of SAMMY has room for methods improvement.
- ND11 – Thermal neutron scattering measurements and evaluations for DHS applications at temperature.
  - Analysis of inelastic scattering data measured at VISION for hydrated cement and concrete was carried out.
  - Ab-initio modeling for different structures of hydrated cement has been carried out.
  - We started incorporating ab-initio modeling results with a large-scale machine learning model for prediction of inelastic spectra developed by our colleagues at SNS. This model enables prediction of inelastic spectra, including phonon spectrum, based on a structure provided. This will be extremely useful for hydrated cement because it does not have precisely determined structure.
  - Hydrated cement and concrete samples were fabricated for transmission measurements at RPI.
  - Transmission measurements or hydrated cement and concrete were performed at RPI. Analysis is ongoing.
  - Chris and Kemal presented at TPR status of ORNL evaluations including the work done for this project.

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.

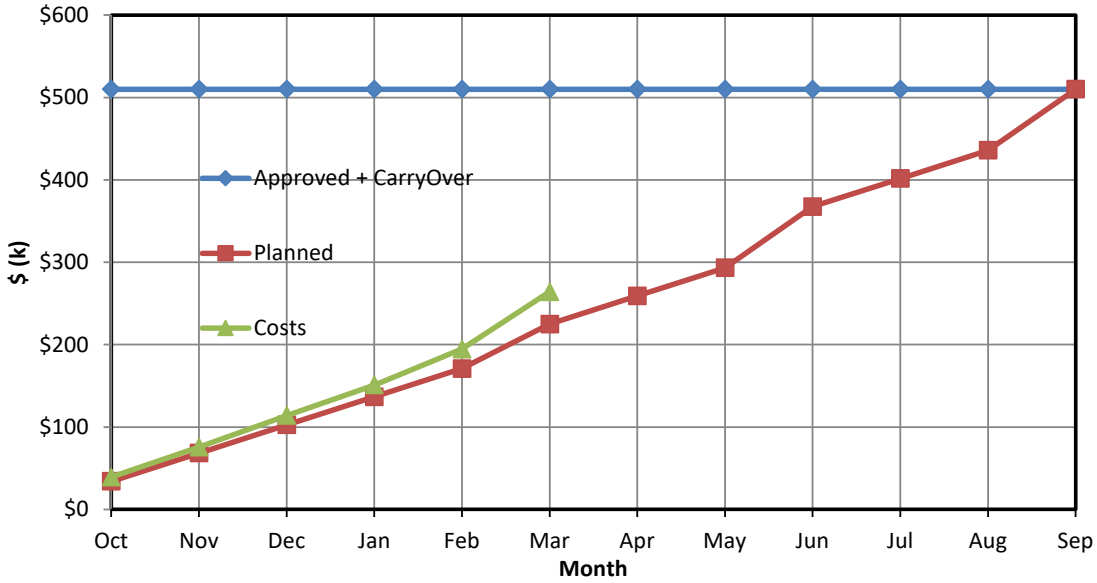
	Dominik Fritz, Y. Danon, Kemal Ramic, Chris Chapman, Jesse Brown, Goran Arbanas, M Rapp, Tim Trumbull, Michael Zerkle, Jesse Holmes, Peter Brain, Adam Ney, Sukhjinder Singh, Katelyn Cook, Benjamin Wang, "Total thermal neutron cross section measurements of hydrogen dense polymers from 0.0005–20 eV," Annals 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	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q2)

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: April, 2023

BUDGET



1. Carryover into FY 2023 = $ 50,000
2. Approved FY 2023 Budget = $ 460,000
3. Total FY 2023 Budget w/Carryover = $510,000
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 = $
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $ -30K

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)		
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)		
Q3	Start fabrication of 2nd batch of speed of light structures 2, 3 and 4 (ND3)		
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**
    - Completed covariance matrix generation for the RPI Fe-54 transmission experiment.
    - Started work towards generating a covariance matrix for the RPI Fe-54 capture experiment.
    - Examined impact of implicit data covariance inclusion on SAMMY fit of resonance parameters to the RPI transmission experiment.
    - Continued development work on neutron beam imager, including examining the performance of different light absorbing foils.
  - **URR improvements to SAMMY**
    - Rewrote Doppler Broadening Subroutine to ensure open-source compliance.
    - Integrated SESH's Transmission Correction Factor into SAMMY
    - Began integrating SESH's Capture Correction Factor into SAMMY
  - **Zr evaluation**
    - Identified reactions and energy range to improve Zr evaluations based on benchmark sensitivity.
    - Working to resolve disagreement between new JRC-GEEL/ORNL Zr-90 capture measurement and Tagliente, et al. n-TOF Zr-90 capture measurement.
  - **Pb evaluation**
    - Completed preliminary covariance for Pb-208.
    - Developed methodology for angular distribution covariance using SAMMY and NJOY.
- **ND3 – RPI/ORNL: LINAC 2020 Nuclear Data Capabilities Maintenance Plan**
  - Working to complete RF test setup in LINAC target room.
  - Working to complete site acceptance test of one of the modulator.
-

PUBLICATIONS

NCSP Quarterly Progress Report (FY-2023 Q2)

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

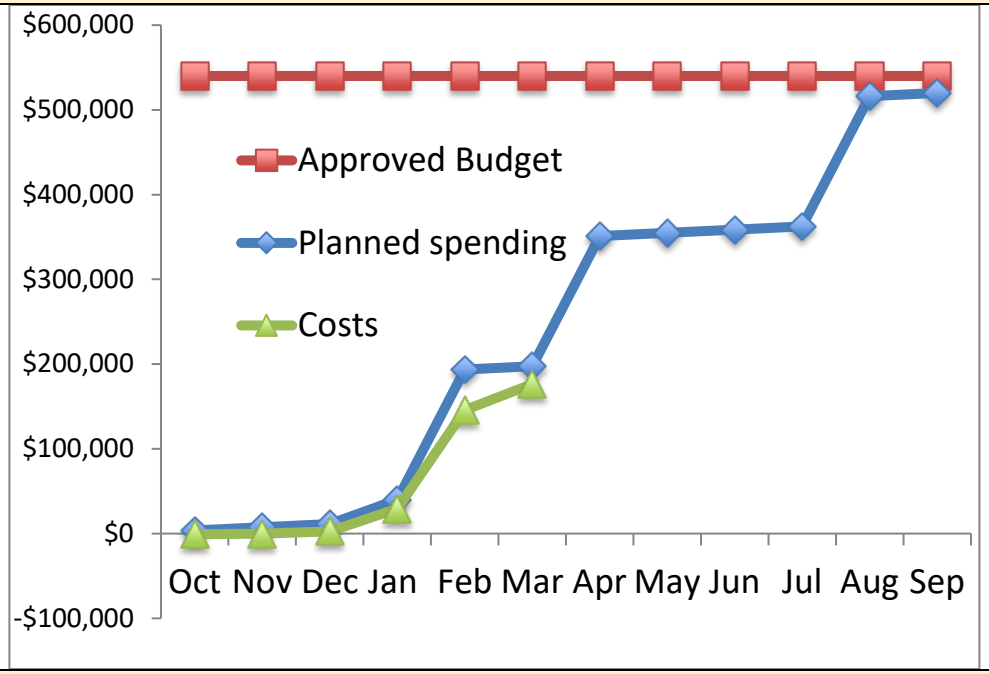
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	• D. Fritz, Y. Danon, K. Ramic, C. W. Chapman, J. M. Brown, G. Arbanas, M. Rapp, T. H. Trumbull, M. Zerkle, J. Holmes, P. Brain, A. Ney, S. Singh, K. Cook and B. Wang, "Total thermal neutron cross section measurements 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	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q1)

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: April 19, 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			$0
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
  - Preparations for January NCSP Class
- 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

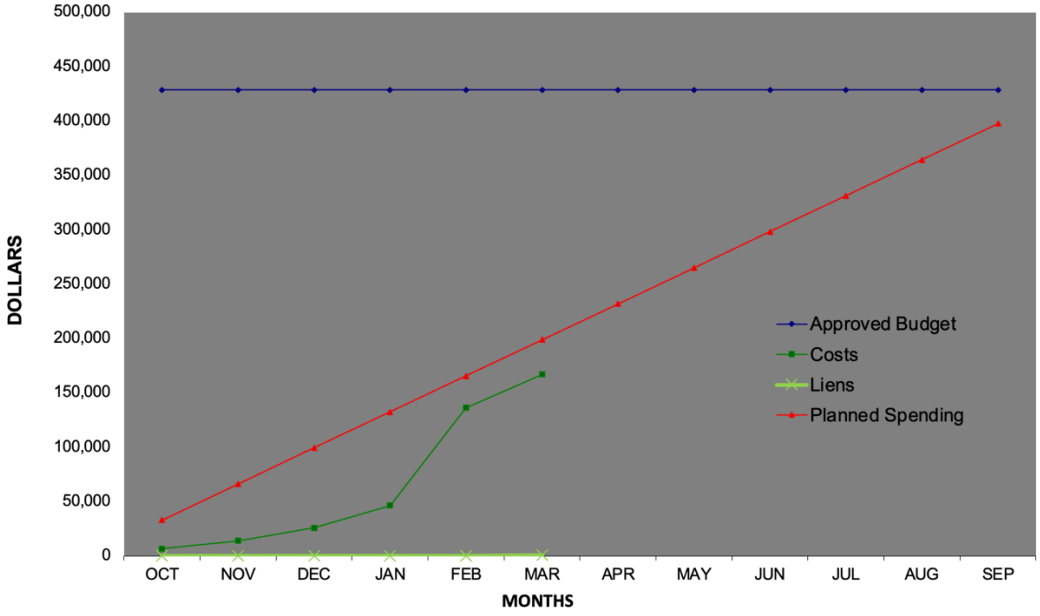
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April 19, 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 = $
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 TACS instruction for Jan/Feb 2 week training course
- TE3 – Classroom Criticality Safety Training
  - Participated in all T&E telecons
  - Provided instruction for Jan/Feb 2 week training course
- TE8 - Development of University Pipeline for Criticality Safety Professionals
  - S. Coleman presented on UC Berkeley Pipeline course at CONTE 2023, February 2023, and EFCOG Meeting, March 2023

PUBLICATIONS

Any publications that have

- Completed your institution's review cycle during the quarter

AND

- Are publicly releasable

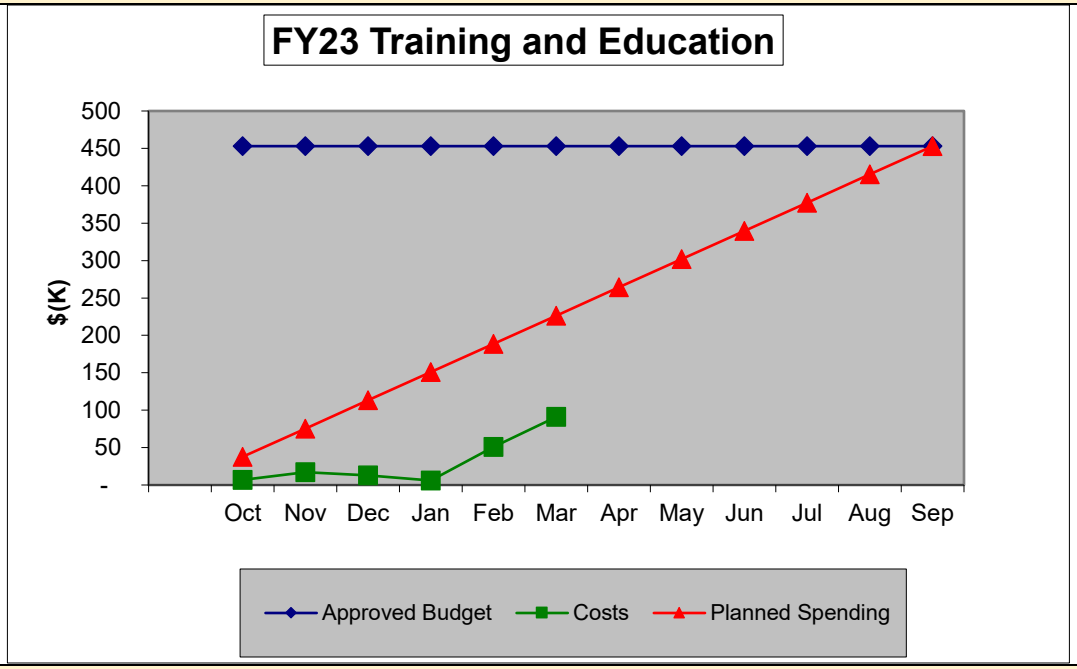
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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

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:** April 19, 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= $
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 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
  - Work in FY23 Q2 involved completing preparations for the first 2-week Hands-on course at the National Atomic Testing Museum, Sandia National Laboratory, and the National Criticality Experiments Research Center. Planning telecons were completed with all site logistics personnel and instructors participating in the course. Aug. 2022 student feedback was distributed and discussed as necessary to prepare for the course. The course was successfully executed with 27 students in Jan/Feb 2023. Once time consuming aspect for this course was the inclusion of 4 foreign nationals from AWE that needed RWII training. Delays at MSTS were eventually overcome and security plans and RWII training was provided to these students, and they successfully completed the course. This was the largest course ever done for the NCSP T&E program. Another positive aspect of this course was providing coffee to the NATM students the first week with NCSP manager approval. This was a big hit. For ORNL, Doug Bowen, B.J. Marshall, and Susan Smith provided instructor support for the course. Marsha Henley provided

registration support and support for all other aspects of the preparation process for the course. Jake Nichols at ORNL provided some support for course binder preparations.

- TE11 - Revision of the LA-12808 Nuclear Criticality Safety Guide
  - The document is in the process of being drafted. Significant progress will be made in Q3 toward a goal of finishing a draft in Q4 for independent review.
- TE14 - Nuclear Criticality Safety Training and Pipeline Development
  - For ORNL, Walid Metwally and Doug Bowen are supporting this task. Progress in Q2 was steady. Walid Metwally supported in a lead role for ORNL and Doug Bowen provided input to the outline and course module content. At the end of Q2 Walid was asking for the course outline to be completed along with input on the proposed instructors from each site and module course objectives to be included. <<GA Tech and TAMU input to follow>>
  - 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.
    - Completed Course Outline
    - Defined Objectives for each module.
    - Examined lecture recording formats.
    - Started draft lectures in Power Point.

PUBLICATIONS

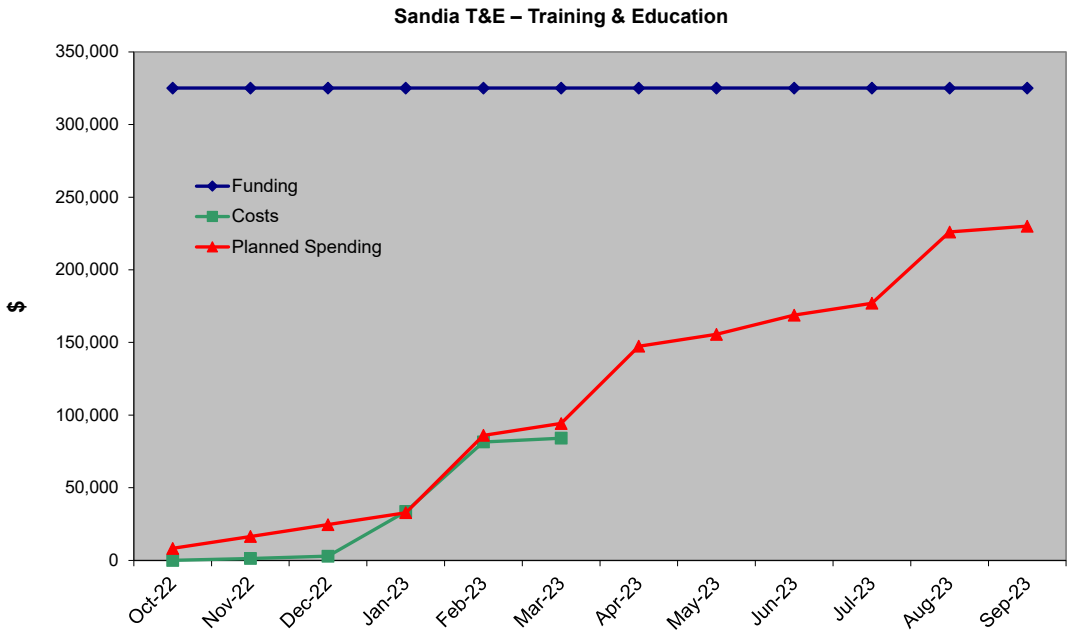
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	Mathieu Dupont, "Health Physics Research Reactor Criticality Accident Alarm System Benchmark Overview," Transactions of the 14th International Conference on Radiation Shielding and 21st Topical Meeting of the 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	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** March, 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 = $
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.
  - Preparations are underway for a Hands-On criticality safety class for Managers to be presented in April.
  - 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 courses.

PUBLICATIONS

Any publications that have

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

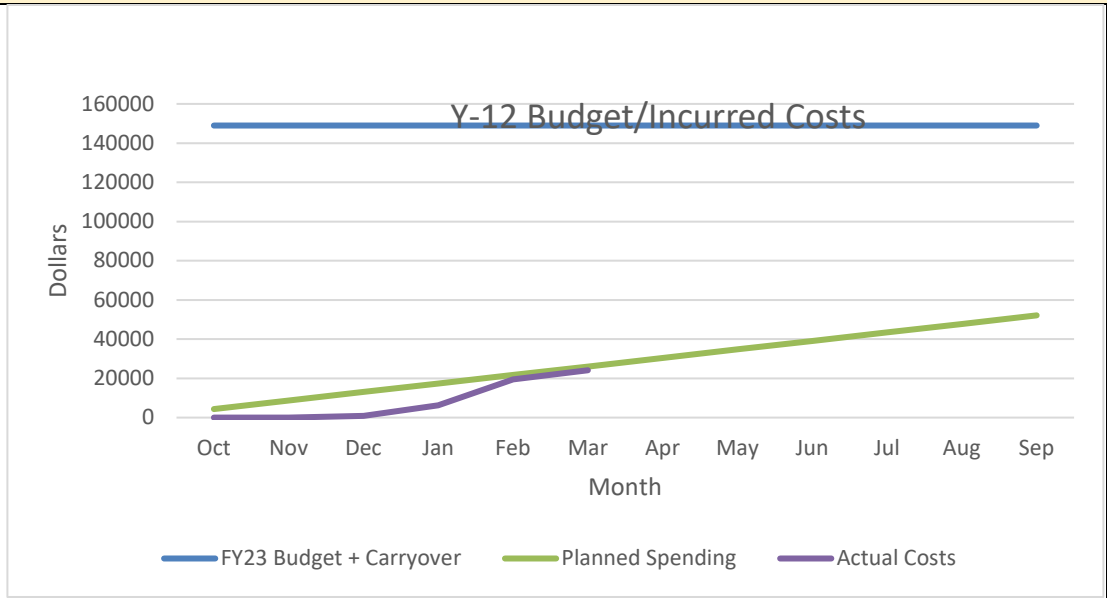
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April 19, 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 = $
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)		
Q4	Provide a status report of Y-12 activities to support the hands-on training courses. (TE1)		

NCSP Quarterly Progress Report (FY-2023 Q2)

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.

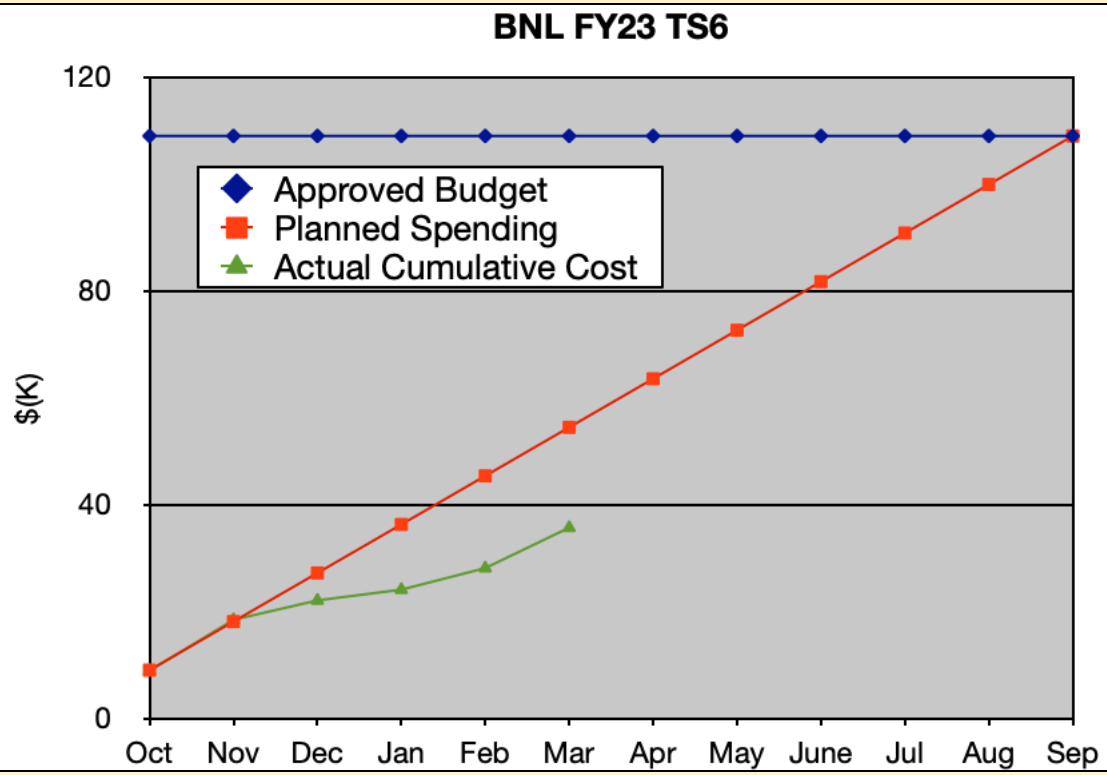
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q2)

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: 19 April, 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 = $0
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)		
Q4	Provide NCSP Manager annual report of succession planning efforts. (TS6)		

ACCOMPLISHMENTS

- The article "Novel machine-learning method for spin classification of neutron resonances" was published in Physical Review C 107, 034612 (2023), having previous interns as co-authors.
- Mentored one intern in the project related to resonance spin reclassification. Mentored one intern in the project related to resonance spin reclassification. He worked on extrapolating the method so the machine-learning classifier can be trained with real 238U data instead of synthetic data like previous projects.
- Secured three interns for the Summer, two of whom are from URM.

PUBLICATIONS

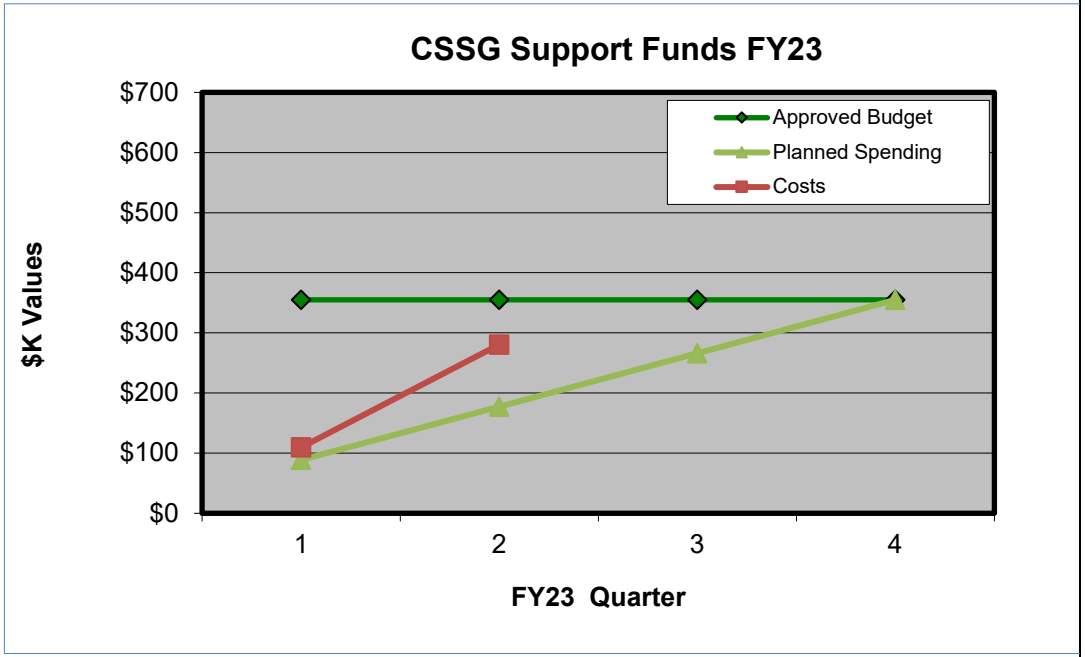
Any publications created during the quarter should be submitted to Marsha Henley, henleym@ornl.gov.

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 Q2)

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:** April, 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 = $
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)		
Q4	Provide NCSP Manager report of activities. (TS1)		

NCSP Quarterly Progress Report (FY-2023 Q2)

ACCOMPLISHMENTS

- TS1 – CSSG – Support for the Criticality Safety Support Group
  - Face to Face meeting in conjunction with TPR
  - Regularly scheduled Teams Meetings
  - Tasking 2022-03 LANL Site Visit and Completion of Tasking

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.

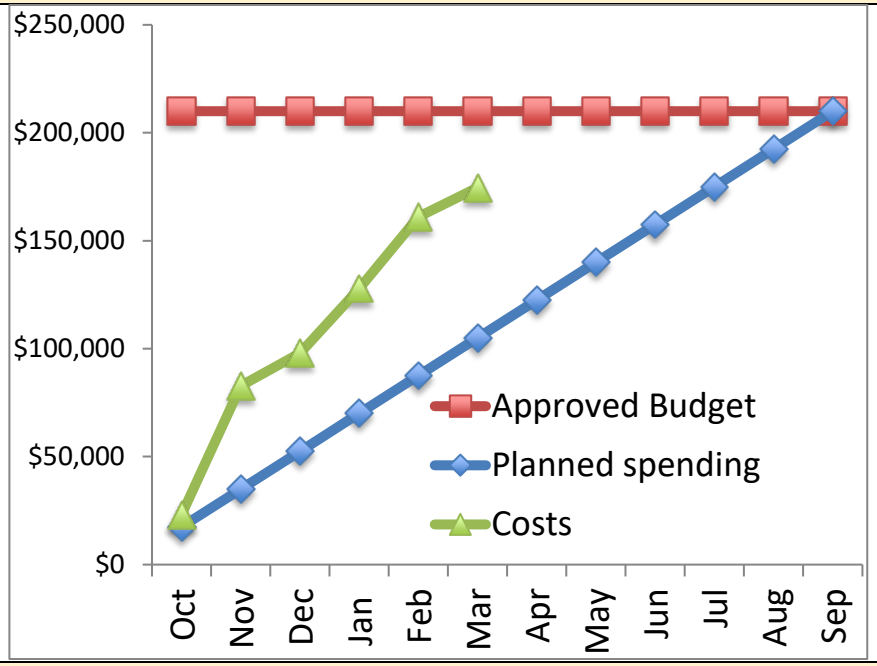
Quarter	Publication Reference **Example:** Author, "Title", LA-UR-18-27731, October 1, 2019
Q1	
Q2	
Q3	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q1)

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

Reference: DP0909010
Date of Report: April 19, 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			$0
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
  -

PUBLICATIONS

Any publications that have

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

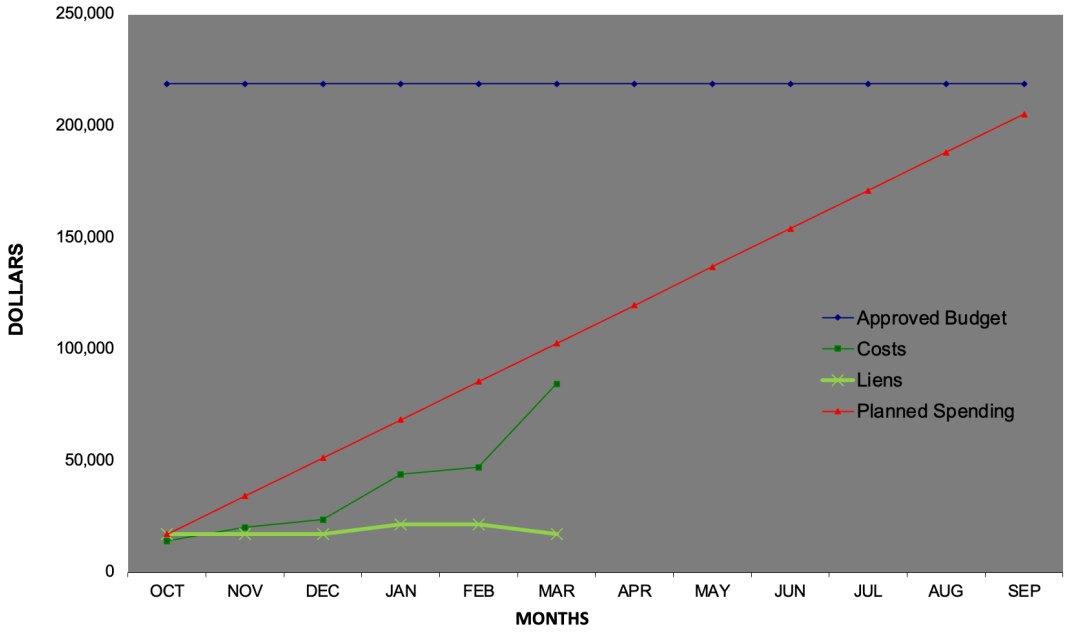
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April 17, 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 = $
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)		

ACCOMPLISHMENTS

- TS5 - AM, IE, ND Succession Planning
  - Hired J. Glesmann to support IE, IPD, and AM tasks, in January 2023
  - J. Norris attended Q1 QPR meeting, January 2023
  - D. Siefman attended IE monthly meeting, January 2023
  - J. Norris, D. Siefman, R. Araj, A. Aboud, A. Tamashiro, J. Glesmann attended TPR in February 2023

PUBLICATIONS

Any publications that have

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

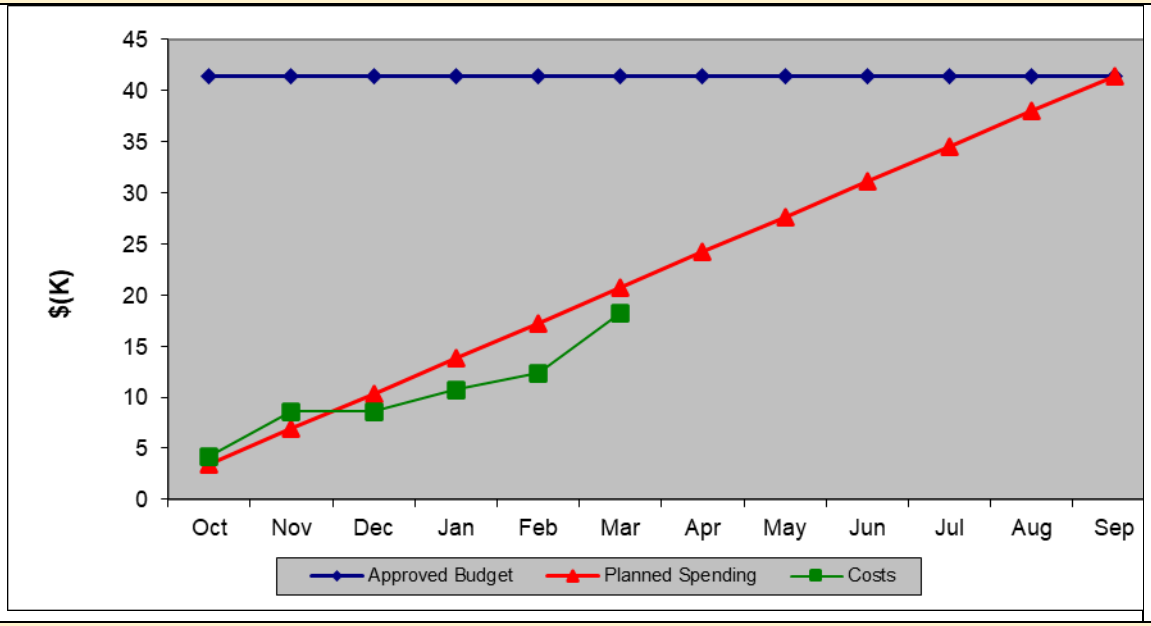
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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:** April 20, 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 = $10k
6. Actual spending for 3rd Quarter FY 2023 = $
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 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)		

NCSP Quarterly Progress Report (FY-2023 Q2)

ACCOMPLISHMENTS

- TS9 – Support for NDAG Chair activities
  - Participate in NCSP TPR (Feb 21-23, 2023)
  - Chair NDAG meeting (Feb 23, 2023)
  - Participate in CSSG Meeting (Feb 24, 2023)
  - Participate in WANDA 2023 Workshop (Feb 27-Mar 3, 2023)
  - Participate in 2023 ICSBEP/IRPhEP/SINBAD TRG Meeting (Apr 3-7, 2023)
  - Perform reviews of draft ICSBEP benchmark evaluations (ongoing)
  - Serve on CSEWG Executive Committee (ongoing)
  - Support CSEWG phase1 TSL evaluation reviews for ENDF/B-VIII.1 (ongoing)
  - Organize mini-CSEWG Validation Session and ENDF/B-VIII.1 data testing (ongoing)
  - Participate on several IER teams

PUBLICATIONS

Any publications that have

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

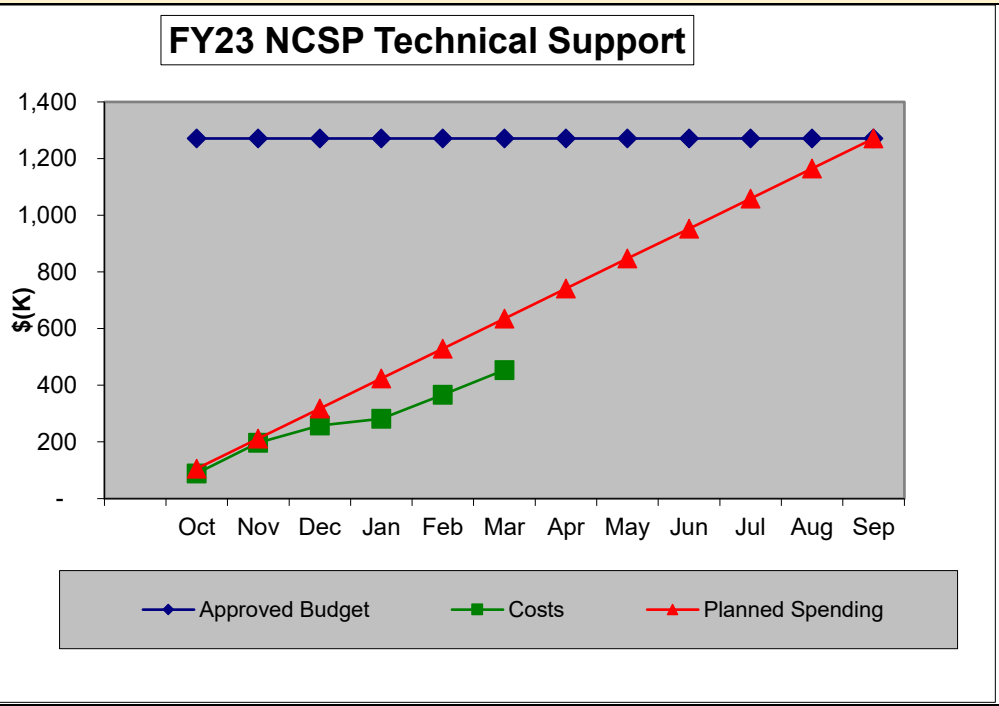
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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	
Q4	

NCSP Quarterly Progress Report (FY-2023 Q2)

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:** April 19, 2023

BUDGET



1. Carryover into FY 2023 = $391K
2. Approved FY 2023 Budget = $1010K
3. Total FY 2023 Budget w/Carryover = $1401K
4. Actual spending for 1st Quarter FY 2023 = $258K
5. Actual spending for 2nd Quarter FY 2023 = $196K
6. Actual spending for 3rd Quarter FY 2023 = $
7. Actual spending for 4th Quarter FY 2023 = $
8. Projected carryover into FY 2024 = $
9. 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)		
Q1	Provide NCSP Manager annual report of succession planning efforts (TS7)		
Q1	Provide NCSP Manager a status report of progress on the new IER system in G2 (TS8)		
Q1	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)		
Q2	Maintain up-to-date spreadsheet of proposed tasks for NCSP Manager after the NCSP proposal review meeting and through the final task prioritization effort by the NCSP Management Team. (TS2)		
Q2	Manage 5-year plan development and maintenance and oversee the CEDT process and manage main 5-year plan and Integral Experiment Request Milestones. (TS2)		
Q2	Provide NCSP Manager annual report of succession planning efforts (TS7)		
Q2	Provide NCSP Manager a status report of progress on the new IER system in G2 (TS8)		
Q2	Provide the NCSP manager an update of NDA Technical Support Group and NDA Technical Infrastructure Project activities. (TS13)		
Q3	Maintain up-to-date spreadsheet of proposed tasks for NCSP Manager after the NCSP proposal review meeting and through the final task prioritization effort by the NCSP Management Team. (TS2)		
Q3	Manage 5-year plan development and maintenance and oversee the CEDT process and manage main 5-year plan and Integral Experiment Request Milestones. (TS2)		

Q3	Provide NCSP Manager annual report of succession planning efforts (TS7)		
Q3	Provide NCSP Manager a status report of progress on the new IER system in G2 (TS8)		
Q3	Provide the NCSP manager 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:
    - Rev 3 of the Main Plan, Addendum 1 was created based on changes to travel in Appendix C, and multiple budget changes. Using Access/Excel, a graphic of the revised FY23 budget was included.
    - Rev 1 of the IE Plan – Addendum 1 was created based on multiple budget changes. Using Access/Excel, a graphic of the revised FY23 budget was included.
  - CSCT Scribe – took minutes for the monthly meetings in January, February, and March.

- Spring Newsletter:
  - Doug identified achievements and people to contact for their input. I followed up and incorporated their information. After receiving Angela's input and approval, it will be posted on the website and an email sent to the newsletter distribution list.
- Quarter 1 Reports:
  - Sent requests to each TM for their Q1 reports. Created new FY23 templates for each site's TPE including the new budget they received.
  - Posted non-IE version of the Q1 report on the website
  - Requested foreign trip reports based on Appendix C. Updated the website with the reports/information received.
- 2023 TPR planning and execution (hosted by SNL):
  - Created a planning list for all the tasks need to carry off a successful TPR.
    - Agenda
    - Announcements
    - Presentations
    - Website
    - Closeout
    - Lessons Learned for Next Year's TPR
    - Food
    - IT Support
    - Logistics – Attendees
  - Trish St John was the Sandia POC to work with on location, food, IT support. Doug and I held Teams meetings with Trish and exchanged emails to ensure she knew our expectations/requirements on the location and IT support, food including beverages/snacks during the meeting, and a group dinner the first night of the meeting.
  - Worked with LLNL web programmer to create a web page, registration form, updates to the home page and scrolling banner to announce the TPR and provide helpful information to attendees.
  - Created weeklong agenda.
  - Sent announcements about the meeting and registration to attendees based on last year's registration.
  - Handled registration.
  - Handled questions.
  - Handled communication and registration for the group dinner.
  - Communicated with site's TMs about the presentations and information that should be presented at the TPR. Requested they send a list of presenters.
  - Built detailed agenda based on presenters/presentations that the site TMs provided.
  - Communicated with presenters and TMs about information their presentations should include and the agenda for any updates.
  - Gathered presentations and had them ready to present during the meeting.

- Sent the detailed agenda to all attendees and had it posted on the website.
- After the TPR:
  - Requested final presentations in case updates were made to original presentations.
  - Provided presentations, agenda, etc. to the web programmer for posting on the website.
  - Emailed all TPR attendees with a link to the 2023 TPR presentations.
  - Made appropriate website updates so all years of TPR presentations are available.
  - Made notes on comments about improvements for the 2024 TPR.

- 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 from FY2018 plan.
    - I created the data structure for several tables to hold added FY19 -FY28 Mission and Vision (M&V) data. The data comes from a Word document.
    - After creating the M&V tables, I also created a relationship table between the goals and the FY23 and FY22 5-year plan (5YP) tasks. Doug had this information in an Excel table. I was able to pull FY23 and FY22 M&V data that connected to 5YP tasks in an Excel spreadsheet. I was also able to pull tasks not covered by those years in the M&V plan.
    - Next steps will be to add connection to FY21, FY20, and FY19 5YP tasks. This will give us more ability to do statistics and show gaps between goals and accomplishments.
    - Doug will use the data to:
      - Write Chapter 1 in the 5-year plan
      - Help with the review of the next Mission and Vision plan coming in this FY.
  - Appendix B – began task of creating tables to update with FY23 Appendix B data.
- CSSG Support:
  - Requested new CSCT ex-officio member's photo and bio. When received, requested it be posted on the website.
  - Requested the new charter be posted on the website.
  - Bowen supported CSSG meetings as *ex officio* member and worked with NCSP manager, as necessary.

- Lead FY23 Q1 quarterly report video teleconference and summarized NCSP accomplishments. Posted accomplishments to the NCSP website, sans IE data.
- Began planning efforts for the Mission and Vision meetings to be held at LLNL the same week as the TEX 2.0 meetings.
- 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 and two new NCS staff starting to support NCSP work
- TS8 - NCSP Program Management Tools Development
  - This work is to support the NNSA G2 system that the NCSP uses for its IER database. This last quarter, support was provided by Henley, Miller, and Bowen, working with NNSA HQ G2 staff to fix an issue with the IER database where the scrollbar functionality was lost and when IER database documents started to disappear. It turns out the links to the uploaded documents were somehow lost or modified such that it appeared the documents were deleted. This bug was fixed and files added back into the system. In Q3, funding will likely be used for some other tasks as the funding is accumulating and new capabilities on the NCSP G2 to-do list are not being added to upcoming revision campaigns.
- TS13 - NDA Technical Support Group and NDA Technical Infrastructure Project
  - No activity in Q2. Activities planned in Q3 and Q4 include the planning and execution of 1 or 2 NDA workshops with the incorporation of NCS content. The courses are planned for late in FY23.

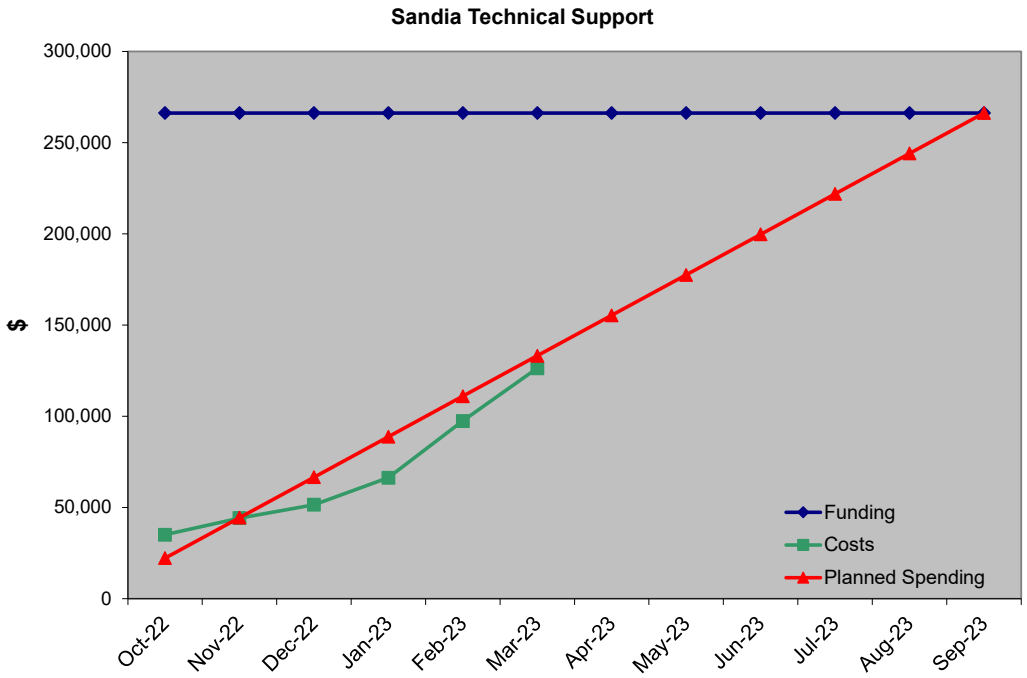
PUBLICATIONS

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 Q2)

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:** March, 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 = $
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 C_EdT Manager Support
  Performed duties as the C_EdT (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:
  - Run monthly IE meetings, distribute agenda and notes.
  - Project and report final milestone completions as well as IERs moved out to future or into the current FY.
  - Processed 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.
- Tracking progress/updates on experiments and MIHL items. Items with specific milestones in Q2
  - 297 CED-4B; 305 CED-3B and 4A; 423 CED-3B; 452 CED-1; 480 CED-4A; 488 CED-4A
  - 518 CED-3B; 523 CED-1; 532 CED-3B & MIHL; 538 CED-4A; 555 CED-3A; 574 CED-3A
- Assisted IER team members with requested items, and participated in several different IER team meetings:
- 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).

- Worked in the IER database, assisted others with issues using database, work with G2 developers on database improvement items and issue resolution (scroll bar issues, lost document issues, etc.)
- Worked on TPR planning items.
- 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

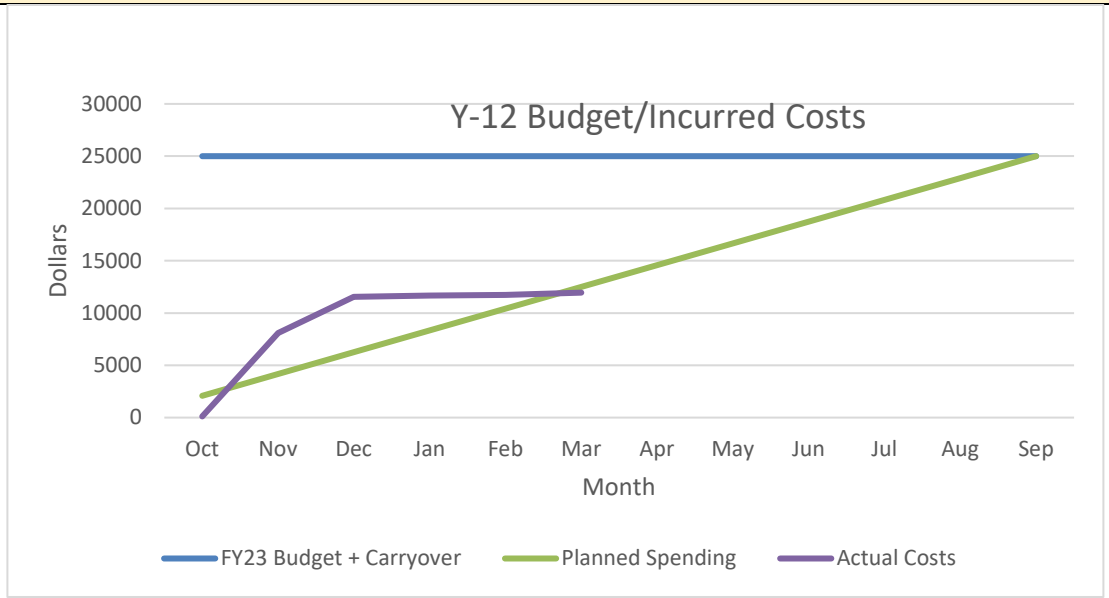
Should be submitted to Marsha Henley, henleym@ornl.gov with your quarterly report.

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 Q2)

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:** April 19, 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 = $
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 Q2)

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 – Q2

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

FY2023 – Q2 classes are highlighted in red.

Total Students

- **FY2023 – Q1** **82 students** **(Intro, Intermediate, Criticality)**
- **FY2023 – Q2:** **34 students** **(Intermediate, Advanced)**
- **FY2023 – Q3:** **? students** **(Intro, Criticality, Safeguards)**
- **FY2023 – Q4:** **? students** **(Intro, Criticality)**
- **FY2023 – TOTAL thus far:** **116 students**

Due to COVID-19 and travel restrictions, many classes are currently being conducted online. Importantly, offering online classes has significantly increased class enrollment. We conducted our first on-site class at Y-12 in Q1 and are offering in-person classes at LANL beginning in June

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** **TBD 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.
- **Criticality Calculations with MCNP6 (LANL-AM1)**
  - **June 19 - 23, 2023** **in-person @ LANL** **TBD students**

  MCNP criticality class for NCS & reactor physics practitioners, with focus on best practices. Includes 1 day on NCS validation using MCNP6-Whisper.
- **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** **TBD 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**
- **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** **TBD students**
- **NJOY**
  - **Aug 28 – Sep 1, 2023** **in-person @ LANL** **TBD students**

2023 Q2 – SCALE Training Courses Report for the Nuclear Criticality Safety Program

Class Name	IFE SCALE Training Part IV: Depletion, Activation and Decay
Class Dates	January 18–February 2, 2023
Location	Virtual - Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	9
Short Description	This training covered SCALE depletion, activation, and decay calculations, including generation of source terms for shielding analysis. These types of calculations are also useful for bounding fissile inventories for fertile isotopes used in some fuel samples. This training included the following topics: • Reference inventory and source term calculations with MG and CE MC • Fast spent fuel inventory calculations using ORIGEN reactor libraries • New ORIGEN reactor libraries development • Decay and activation analysis • Uncertainty quantification of depleted inventory calculations • Validation of depleted inventory calculations The main SCALE sequences included in this section were TRITON for reference inventory calculations, ORIGAMI for fast inventory calculations, ORIGEN for decay and activation calculations, and Sampler for assessing the impact of operating history uncertainty on inventory and source terms. The methodology for generating ORIGEN reactor libraries was demonstrated (using TRITON) to enable fast inventory calculations with ORIGAMI for special reactor systems such as those at IFE (Norway). This section of the training covered the theoretical basis and included hands-on exercises to demonstrate the implementation of the techniques. Extra time was allotted to address participants' questions on reactor physics/depletion problems of interest and to discuss possible computational tools and verification methods.

Class Name4	NRC Training
Class Dates	February 6–9, 2023
Location	Hybrid from NRC Headquarters
Number of Attendees	18
Short Description	In this training course, participants learned how to generate the core inventory for a number of advanced reactor systems and how to analyze and post-process this data for use in other codes. Participants learned how to use SCALE's TRITON reactor physics sequence to generate core inventory (source terms) in the form of ORIGEN concentration files (F71). The TRITON portion of this training focused on the TRITON 3D sequence with the KENO and Shift Monte Carlo neutron transport codes. The ORIGEN code was used to perform decay calculations of the determined inventory. The F71 files were interrogated with the OBIWAN utility to assure a thorough understanding of the available cases, the data at each position, and applied normalizations. The data post-processing included the generation of an easy-to-use inventory interface file (II.JSON) and examples for further post-processing. The class included best practices for the generation of F71 files and taught multiple ways to interrogate and modify the output. Much time was spent on discussing SCALE capabilities and approaches for non-LWR modeling.

	This training was the first training taught with SCALE 6.3. Previous experience with TRITON or ORIGEN with any SCALE version was recommended. However, most participants had little or no previous knowledge of SCALE.
Class Name4	NRC Training
Class Dates	February 2023
Location	Virtual - Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	
Short Description	

Class Name	SCALE Criticality Safety and Radiation Shielding
Class Dates	March 13–17, 2023
Location	Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	17
Short Description	This course provided instruction on the use of the KENO-VI Monte Carlo code for criticality safety calculations and the MAVRIC (Monaco with Automated Variance Reduction using Importance Calculations) shielding sequence with 3-D automated variance reduction for deep-penetration problems. KENO-VI is a 3D eigenvalue Monte Carlo code for criticality safety and Monaco is a 3D fixed-source Monte Carlo code for shielding analysis. Both codes use the SCALE Standard Composition Library and the SCALE Generalized Geometry Package (SGGP), which allows for versatile modeling of complex geometries and provides convenient, efficient methods for modeling repeated and nested geometry configurations such as lattices. The MAVRIC sequence is based on the CADIS (Consistent Adjoint Driven Importance Sampling) methodology. For a given tally in a Monte Carlo calculation that the user wants to optimize, the CADIS method uses the result of an adjoint calculation from the Denovo 3D deterministic code to create both an importance map for weight windows and a biased source distribution. MAVRIC is completely automated in that from a single user input, it creates the cross sections (forward and adjoint), computes the adjoint fluxes, creates the importance map and biased source, and then executes Monaco. An extension to the CADIS method using both forward and adjoint discrete ordinates calculations (FW-CADIS) is included in MAVRIC so that multiple point tallies or mesh tallies over large areas can be optimized (calculated with roughly the same relative uncertainty). Both KENO and Monaco use ENDF/B-VII.0 or ENDF/B-VII.1 cross-section data distributed with SCALE to perform continuous energy (CE) or multigroup (MG) calculations. Both codes can also be used with the Fulcrum consolidated SCALE user interface and KENO3D for interactive model setup, computation, output review, and 3-D visualization. Instruction is also provided on the SCALE material input and resonance self-shielding capabilities and the data visualization capabilities within Fulcrum for visualizing fluxes, reaction rates, and cross-section data as well as mesh tallies. KENO-VI and MAVRIC can be applied together to perform an integrated criticality accident alarm system (CAAS) analysis. No prior knowledge of SCALE was required.

Class Name4	SCALE/ORIGEN Standalone Fuel Depletion, Activation, and Source Term Analysis
Class Dates	March 20–24, 2023
Location	Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	22
Short Description	This was a hands-on class that covered the use of ORIGEN for isotopic depletion, decay, decay heat, and radiation source-terms calculations. The course featured the use of the Fulcrum consolidated SCALE graphical interface and its' plotting capabilities for displaying nuclear data and results. Participants learned about ORIGEN's capabilities and nuclear data, how to generate ORIGEN libraries, and how to use ORIGEN for activation, spent fuel, and nuclear safeguards applications. This class introduced the ORIGAMI tool for convenient characterization of spent nuclear fuel with radially and axially varying burnup. Advanced applications including simulation of chemical processing, continuous feed and removal were also covered. No prior knowledge of SCALE was required.

Class Name	SCALE Criticality Safety Calculations
Class Dates	March 27–31, 2023
Location	Oak Ridge National Laboratory, Oak Ridge, TN
Number of Attendees	10
Short Description	This course provided instruction on the use of the KENO Monte Carlo codes for criticality safety calculations and is appropriate for beginning through advanced users. KENO V.a is a fast and easy-to-use code that allows users to build complex geometry models using basic geometrical bodies such as cuboids, spheres, cylinders, hemispheres, and hemicylinders. KENO-VI is a 3-D generalized geometry Monte Carlo code that allows for versatile modeling of complex geometries. Both versions of KENO provide convenient, efficient methods for modeling repeated and nested geometry configurations such as lattices. Both versions of KENO use ENDF/B-VII.0 or ENDF/B-VII.1 cross-section data distributed with SCALE to perform either continuous energy (CE) or multigroup (MG) calculations. KENO includes a 2D color plotting capability and produces easy-to-navigate HTML output. This class uses the Fulcrum user interface for interactive model setup, visualization, computation, and output review. The KENO3D tool is still used in SCALE 6.2 for 3-D visualization. Instruction is also provided on the SCALE material input and resonance self-shielding capabilities and Fulcrum capabilities for visualizing fluxes, reaction rates, and cross-section data. No prior knowledge of SCALE was 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	R. JONES	M. DULUC M. DUPONT/C. CELIK D. HEINRICHS	IRSN 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	D. STONE	ORNL
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	D. STONE 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 J. GODA	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	D. HEINRICHS	LLNL
AWE experiments suggest that further measurements on bulk metal and oxide systems are worthwhile. A measurement campaign at DAF is therefore being 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	D. HEINRICHS	LLNL
DAF measurement campaign undertaken on bulk metal systems during November 2022.						
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	D. STONE	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	D. HEINRICHS D. STONE	LLNL
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.						
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.	R. JONES	D. HEINRICHS	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	R. JONES	D. BOWEN	ORNL
Four criticality assessors attended courses during the 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	M. DULUC	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).						
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. **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**
IRSN-AM9	Cross sections processing validation	ORNL-AM3	AMPX training - Development of an interface between GAIA and AMPX and test interface capabilities.	R. ICHOU	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).						
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	N. LECLAIRE	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. **Q2 status** Presentation has been held during TPR meeting. Waiting for review/feedback from LLNL, LANL, ORNL.						
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.						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
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.						
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.						
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 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						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
Q2 status IRSN participation to visit the facility in February Dosimetry Characterization scheduled in August, IRSN will participate						
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						
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
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.						
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

	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						
IRSN-IE7 IER 305	Critical Experiments with UO2 Rods and Molybdenum foils	SNL-IE1	Contribution to ICSBEP evaluation of baseline experiments.	N. LECLAIRE	G. HARMS	SNL
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.						
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						
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						
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	N. LECLAIRE	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.						
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. **Q2 status** No update						
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						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
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						
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						
IRSN-IE56 IER 578	Jupiter ZPPR high 240 plates benchmark report	LANL-IE3	Independent review of the ICSBEP evaluation.	J. BEZ	J. GODA	LANL
Q1 status No update, waiting for LANL inputs **Q2 status** No update, waiting for LANL inputs						
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	M. DULUC		ORNL
Q1 status						

	REFERENCE		IRSN Contribution / POC			
IRSN Reference	**Task Title**	**DOE Reference**	**FY 2022 IRSN Contribution**	**IRSN Technical POC**	**DOE Technical POC**	**DOE LAB**
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						
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.						