NCSP Activities and Accomplishments in FY14

Analytical Methods (AM)

LANL AM

- Attended the 1ˢᵗ Research Coordination Meeting (RCM) for the IAEA's Radiation Damage Coordinated Research Project; reviewed NJOY's Radiation Damage calculation methodology and developed a custom patch to allow processing of the IAEA's "DXS" file into MCNP Dosimetry ACE format. A meeting summary report, INDC(NDS)-0648 is available at https://www-nds.iaea.org/CRPdpa/INDC%28NDS%29-0648.pdf.

- Led the Validation session at the Fall 2013 CSEWG meeting and reported on NJOY status during the Formats session.

- Provided consultation to onsite and off-site NJOY Users. NJOY2012 has now been distributed to Users on all continents except Africa and Antarctica!

- Planning for an NJOY update to create Version 2 ACE files is complete. Code implementation has been deferred and will be coordinated with the next MCNP6 release.

- Because of the possibility of a prolonged US government shutdown, LANL cancelled planned travel for our methods staff to the OECD/NEA Working Party on Nuclear Criticality Safety.

- MCNP6 Modernization & Performance Improvements: Initial efforts to modernize MCNP6 and improve the code performance have resulted in speedups for criticality problems ranging from 30% to 220%, depending on problem characteristics. While very much remains to be done, initial results are encouraging.

- Supercomputing in Nuclear Applications + Monte Carlo 2013 was a worthwhile & well-attended meeting. Around 400 researchers attended (~75% Europe & far east, ~25% US). [Note: No NCSP funds were used for this meeting. Kiedrowski's trip was disallowed by LANL; Brown's trip was ASC-funded.] Observations from Brown include:

  - There was much interest in using adjoint-weighted continuous-energy MC for sensitivity-uncertainty calculations. The French (CEA, Tripoli code), South Koreans (McCard code), and ORNL people (Scale, Clutch method) presented papers in this area & were very interested in what LANL is doing now, since the methodology originated with LANL. They are catching up, but still behind.

  - There was a special session on MC codes -- 22 different MC code groups from around the world presented posters & papers on their codes. Countries included US, Britain, France, Germany, China, S. Korea, Japan, Russia, Finland. For reactor calculations, the codes of choice these days are Serpent (VTT, Finland), Openmc (MIT, US), McCard (S. Korea), MVP (Japan). These codes are much newer than MCNP (hence have much greater flexibility on large parallel computers), are targeted specifically to reactor calculations, and do not have export-control restrictions. All of these codes have borrowed methods & data from MCNP. While they do not have the generality & features of MCNP, they can accommodate very much larger problems for the specific case of reactor calculations.

- Three talks were presented at the NCSP Technical Review:

  - "Data Processing for Criticality Safety at LANL: ENDF/B-VII.1 and Beyond," by Jeremy Conlin.

- • "MCNP Progress & Performance Improvements," by Forrest Brown.
  - • "MCNP Continuous-energy Sensitivity / Uncertainty Progress and Application," by Brian Kiedrowski (selected as a best paper).

- Completed the following V&V report: "Verification of MCNP6.1 and MCNP6.1.1 for Criticality Safety Applications," by F.B. Brown, B.C. Kiedrowski, and J.S. Bull, LA-UR-14-22480 (2014).

- Training slides on the use of the new sensitivity features in MCNP have been prepared, and used in recent MCNP criticality classes.

- Taught MCNP class at Los Alamos in March 2014. Another is scheduled for August 2014. No current requests in 2014 from other sites.

- Continuing R&D and performing testing on improved capabilities for convergence acceleration using the fission matrix method. Target is 2015 release of MCNP6.

- MCNP-2020 improvement plan in initial stages of implementation.

- Three reports related to burn up credit calculations in MCNP were issued in 2013 – LA-UR-13-25937, LA-UR-13-26010, and LA-UR-13-26059. Follow-up, evaluation, and recommendations are planned for FY14.

- Provided NJOY2012 technical support to in-house and external users.

- Initial effort on modernizing NJOY (the NJOY21 project) has commenced with initial development of an ENDF6 reader.

- Four talks were presented at the ANS summer meeting:
  - • "Bias and Uncertainty Under-Prediction in MCNP6.1 Lattice Physics Calculations with Depletion," Alexander S. Bennett (Penn State), Brian C. Kiedrowski, Forrest B. Brown (LANL)
  - • "Comparison of Iterative Time-Eigenvalue Methods with Discrete Ordinates and Monte Carlo," Brian C. Kiedrowski
  - • "Comparison of Prompt Kinetics Models Derived from Alternate Eigenvalues," Brian C. Kiedrowski
  - • Also presented the following talk on behalf of RPI grad student who could not attend: "A Temperature Dependence Study of Alpha/Beta Cumulative Distribution Functions Based on $S(\alpha,\beta)$ Data"

- Completed the MCNP6.1.1 update release package for RSICC. This update is a "beta" version, but includes all of the MCNP6 performance improvements made to date under the MCNP-2020 task. MCNP6.1.1 runs 1.2x - 4x faster than MCNP6.1 (released last year) for criticality applications.

- Issued a report on a specific algorithm (part of MCNP-2020) that gives 20x speedup in a critical section of MCNP6: F.B. Brown, "New Hash-based Energy Lookup Algorithm for Monte Carlo Codes," LA-UR-14-22480, submitted to ANS Winter meeting. Longer report is in progress.

- Updated the MCNP website. Added ~50 reports to the MCNP Reference Collection on the website.

- Provided extensive methods & calculation support to the LANL NCS Division for criticality safety analysis for PF-4 operation. Established new methodology for verification/validation and determining USL's.

- Developed a utility program to work with MCNP6, for reading ACE covariance data and computing uncertainties in k-eigenvalue. This will be released with next year's update to MCNP.

- Prepared a detailed 84-page report on the use of MCNP6 for sensitivity-uncertainty analysis for criticality safety, to be put on MCNP website & submitted to Nuclear Science & Engineering journal when complete.

- An MCNP Criticality Class is scheduled at Hanford/PNNL for July 28 - Aug 1. Another LANL Criticality Class is scheduled for Aug. 4-8.

- Collaborated with external NJOY Users (Sublet, CCFE and Trkov, IAEA) on NJOY code improvements to support IAEA Coordinated Research Projects on Radiation Damage and Dosimetry Cross Section processing/data testing.

- Provided NJOY Consultation and Support to external and internal LANL Users.

- NJOY modernization has begun with code to read an ENDF-6 formatted file. The entire file can be read generically, i.e., everything is read as a TEXT record and work is progressing on reading the different Files specifically. Next up will be to add unit testing and an improved build and test framework.

- Organized a special session at the 2014 ANS Winter meeting this fall. The session will be a panel discussion on new nuclear data formats and new capabilities of processing codes.

- Conducted an MCNP Criticality Class at Hanford (19 attendees).

- Conducted an MCNP Criticality Class at LANL (15 attendees; also part of required training for 4 LANL NCS analysts).

- Participated in OECD-NEA Expert Group meetings for sensitivity/uncertainty & advanced Monte Carlo techniques. Gave presentation on recent MCNP improvements (speedups and new energy lookup scheme), LA-UR-14-27037.

- Worked closely with PhD student from RPI on developing new method for handling temperature dependence of S(alpha, beta) thermal neutron scattering. Report: LA-UR-26856, Presentation: LA-UR-14-26956.

- Worked with PhD student from MIT on developing new method for handling temperature dependence of unresolved resonance treatment for Monte Carlo.

- Tested MCNP6 on several latest-generation computers, focusing on threaded parallel performance and cache memory limits.

- Continued user-support for criticality calculations - MCNP Forum & direct help to LANL & other DOE labs.

- Continued support for MCNP website & MCNP Reference Collection.

- Journal paper on sensitivity/uncertainty submitted to Nucl. Sci. Eng.: B.C. Kiedrowski, F.B. Brown, et al., "Whisper: Sensitivity/Uncertainty-Based Computational Methods and Software for Determining Upper Subcritical Limits", (2014).

- Journal paper on progress with fission matrix published in Annals of Nuclear Energy by Sean Carney (Univ. Michigan PhD student): S.E. Carney, F.B. Brown, B.C. Kiedrowski, W.R. Martin, "Theory and Application of the Fission Matrix Method for Continuous-Energy Monte Carlo" (Nov. 2014).

- Provided NJOY end-user consultation to internal LANL, US and international users (this includes consultation with IAEA and UK users related to ongoing IAEA Coordinated Research Projects on Dosimetry and Radiation Damage Cross Sections).

- Developed an NJOY patch to accommodate normal processing of future ENDF files including p(nu) and chi(nu) data.

- Developed NJOY patches that allowed LANL to provide Sandia (Harms) with MCNP formatted water (h bound in h2o) thermal kernels from 5C to 95C in 5C temperature steps.

- Modernization of NJOY (NJOY21) is moving forward. Efforts are concentrated on creating an ENDF-6 reader/writer as all processing capabilities will be dependent on reading the evaluated data.

- Worked with Livermore in support of WPEC SG38; the subgroup to create a successor to the ENDF format. The in-person meetings—both at LANL and LLNL—were very effective in moving this effort forward.

LLNL AM

- Presented LLNL-PRES-655506, "Three Analytic Benchmarks in COG" on June 17, 2014 at the ANS Annual Meeting in Reno, NV.

- Published LLNL-TR-655365, "Alpha Transport in COG," which is available on-line at http://cog.llnl.gov/publications. This report provides a summary of the methodology and includes the results of sample calculations compared to experimental data for thick target neutron yields. COG results are also compared to SOURCES and AlfaMC code calculations.

- Provided RSICC with CSAM 14-034, "COG Library Maker (LibMaker) Codes for RSICC Distribution." Also included with this letter are three DVDs containing the README files and source codes, which are approved for limited distribution as unclassified export controlled information.

- Provided RSICC with CSAM 14-041, "COG Supplemental Libraries for RSICC Distribution" and three DVDs containing the ENDL2011 and MCNP6.1-ENDF/B-VII.1 libraries, which are approved for limited distribution as unclassified export controlled information.

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- Successfully completed COG11.1 pre-release production testing, which included 503 ICSBEP benchmarks on LINUX, MAC and Windows platforms requiring ~16,000 CPU-hours.

- Processed and implemented the JEFF-3.2 cross-section library into COG11.1.

- Completed initial implementation of deuteron transport including fusion reactions.

- Provided COG11.1 to AWE.

- Provided a (draft) report of the delayed fission gamma methodology implemented in COG11.1 to IRSN for "slide rule" calculations.

ORNL AM

- RSICC activities: See rsicc.ornl.gov for monthly newsletters.

  - Distributed 905 software packages and updated 35 software packages.

  - 93 SCALE and 369 MCNP packages distributed.

  - RSICC quarterly report issued.

- SCALE activities: See scale.ornl.gov for newsletters
  - Annual SCALE maintenance report submitted to NCSP Manager.
  - SCALE 6.2 Beta2 distributed with the following enhancements for criticality safety:
    - Continuous-energy (CE) calculations for TSUNAMI-3D
    - Many updates for CE calculations in KENO including: problem dependent temperature, significantly improved computational efficiency, and updated fission source convergence diagnostics
    - New *Sourcerer* hybrid deterministic/Monte Carlo sequence added to accurately quantify the starting fission source distribution for KENO
  - 270 requests for user assistance answered through scalehelp@ornl.gov e-mail.
  - Three SCALE training courses conducted at ORNL.
  - Half-day SCALE tutorial provided at NCSD2013, with 40 attendees.
  - Presentations at the ANS Winter Meeting on technical accomplishments of ORNL AM tasks (SCALE/AMPX) as well as new CE sensitivity methods.
  - An invited paper on SCALE Monte Carlo capabilities and another paper on CE sensitivity methods presented at the SNA-MC 2013 conference.
- AMPX
  - Completed draft AMPX annual report.
  - Participated in November 2013 CSEWG Meeting and chaired ENDF Formats and Process Session and provided status report on AMPX development.
  - Completed CE library improvements and reduced memory footprint by 40%.
  - Regenerated ENDF/VII.1 MG and CE libraries and continued testing the libraries for release with SCALE 6.2 beta package.
  - Corrected collision kinematics processing in AMPX after testing with new ENDF/VII.1 multi-group (MG) libraries revealed some errors in the processing for gamma data.
  - Modernized AMPX MG processing module by converting to C++ and implementing modern QA tests—initial 252-group library generated to assess performance of new processing capability.
  - Participated in WPEC SG38 meeting and gave presentation on QA requirements for new ENDF library and format.
- RSICC activities: See rsicc.ornl.gov for monthly newsletters.
  - Distributed 1261 software packages and updated 8 software packages.
  - 129 SCALE and 577 MCNP packages distributed.
  - RSICC quarterly report issued.
- SCALE activities:

- Preparation of SCALE 6.2 Beta3 package in final stages of deployment and testing with key enhancements for criticality safety:

  ° Problem-dependent temperature corrections for CE KENO S(α,β) data in addition to previously implemented temperature treatment for the resolved and unresolved energy ranges

  ° Modernized resonance self-shielding methods in XSProc, providing 3 - 1800x speedup and significantly reduced memory footprint

  ° Improved continuous-energy (CE) calculations for TSUNAMI-3D

  - 318 requests for user assistance answered through scalehelp@ornl.gov e-mail.

- AMPX Maintenance and Modernization:

  - Completed development and testing of updated CE and MG libraries for release with SCALE 6.2 Beta 3 package (also includes AMPX package for release).

  - Completed rewrite of MG averaging module in C++ and completed extensive testing of new module.

  - Completed rewrite of module that assembles all components of a MG library (SIMONIZE) in C++, includes modern QA tests.

  - Updated AMPX GUI library generation templates to use latest MG modules.

  - Added prototypical capabilities to generate URR MG self-shielding factors from probability tables—required rewrite of module in C++ with modern QA tests.

  - Added prototypical capability to generate MG self-shielding factors for in-group removal cross-section calculations.

  - Generated 252-group library to test performance of new processing capabilities.

- Presented 3 presentations at NCSP TPR: Overview of SCALE QA and modernization activities; Overview of ORNL activities in WPNCS; and AMPX maintenance and modernization status report.

- Established university subcontract with University of Tennessee to generate sensitivity profiles for ICSBEP benchmarks:

  - Completed the 3 cases within the MIX-SOL-THERM-002 benchmark.

  - Initiated sensitivity evaluation for the 17 cases for LEU-COMP-THERM-008 benchmark and the 7 cases within the MIX-SOL-THERM-005 benchmark.

- RSICC activities: See rsicc.ornl.gov for monthly newsletters.

  - Distributed 738 software packages and updated 4 software packages.

  - 134 SCALE and 305 MCNP packages distributed.

  - RSICC quarterly report issued.

- SCALE activities:

  - SCALE Newsletter distributed to 5800 users in 51 nations - http://scale.ornl.gov/newsletters.shtml.

  - SCALE 6.2 Beta3 package released with the following enhancements for criticality safety:

- Problem-dependent temperature corrections for CE KENO S(α,β) data in addition to previously implemented temperature treatment for the resolved and unresolved energy ranges
- Improved continuous-energy (CE) calculations for TSUNAMI-3D
  - 191 requests for user assistance answered through scalehelp@ornl.gov email.
- AMPX Maintenance and Modernization:
  - Added capability to process exit energy covariance matrices ($\div$) from File 35 data in ENDF, for which data are newly available in ENDF/VII.1.
  - Generated a prototypical covariance library containing the $\div$ covariance matrices processed from ENDF/VII.1 for testing.
  - Added a C++ resource with FORTRAN bindings to read and write SCALE covariance library—new resource can be used by AMPX and SCALE.
- Completed revisions to WPNCS benchmark specifications for Advanced Monte Carlo Methods Expert Group and Uncertainty Analysis for Criticality Safety Assessment Expert Group.
- University of Tennessee sensitivity profile generation task for ICSBEP benchmarks:
  - Completed MST-002 benchmark and initiated QA review.
  - Completed sensitivity profile generation for the 17 cases for LCT-008 and initiated VALID document preparation.
  - Continued sensitivity profile analysis of 7 MST-005 cases and initiated sensitivity evaluation for 9 MST-004 cases and single HMF-052 case.
  - UTK Student completed and submitted a 2014 ANS Winter Meeting summary documenting validation work with SCALE.
- RSICC activities: See rsicc.ornl.gov for monthly newsletters.
  - Distributed 1829 software packages and updated 6 software packages.
  - 180 SCALE and 1163 MCNP packages distributed.
  - RSICC quarterly report issued.
- SCALE activities:
  - Four weeks of SCALE training courses provided at ORNL.
  - Modernization enhancements implemented in SCALE 6.2 Beta4:
    - New user interface Fulcrum—replaces GeeWiz, KENO3D and Javapeno
    - Cross-section processing module XSProc implemented in several sequences—preparing cross sections for shielding sequence MAVRIC up to 2000 times faster than SCALE 6.1
    - Implemented new Multi-group cross-section data in modern binary format replacing the 40-year old legacy formats
    - ENDF/B-VII.1 nuclear data libraries are available for testing
  - Answered 260 requests for user assistance through scalehelp@ornl.gov.

- AMPX Maintenance and Modernization:
  - Updated to provide total chi to SCALE libraries.
  - Updated procedure to generate perturbation libraries for SCALE/Sampler and created ENDF/B-VII.1 libraries for testing.
  - Generated updated ENDF/B-VII.1 covariance libraries for testing.
  - Updated AMPX GUI to 1) read all ENDF incident particle data and 2) generate data libraries compatible with latest SCALE requirements.
- Participated WPNCS Advanced Monte Carlo Methods Expert Group and Uncertainty Analysis for Criticality Safety Assessment (UACSA) Expert Group—Brad Rearden elected to chair the UACSA expert group.
- University of Tennessee sensitivity profile generation task for ICSBEP:
  - MST-002 (3 cases) submitted to ICSBEP.
  - LCT-008 and HMF-052 complete and awaiting internal QA review.
  - Completed analyses for HMM-017 and MST-007 (7 cases)—initiated documentation of sensitivity profile generation and analysis.
  - Initiated SCALE input development for 9 MST-010 cases.
  - Completed FY14 status report and submitted to NCSP Manager.

Integral Experiments (IE)

LANL IE

- OJT was performed with various NCERC assemblies as part of NCERC operations to gain proficiency to maintain qualifications and to help complete certifications of operators.

- Final report for IER CED-4 was generated and distributed for review and approval.

- Provided experimental support for execution of steady-state measurements for IER.

- Operations in support of determining the proper/optimal setup of the burst measurement system for Godiva IV was performed (IER).

- Draft versions for CED-4 final reports for IERs were generated.

- Final report for FY2013 LANL IE subtask4 was generated for distribution.

- Performed simulations in support of generation of IER CED-1 and CED-2 documentation. A draft version of IER CED-1 was generated.

- Comments for IER CED-2 were generated by the CED team and revisions to the document were made. The new revision was distributed for review and approval.

- The NCERC experiment plan for IER was submitted to the Los Alamos Criticality Experiments review committee for review and solicitation of comments.

- The Comet assembly was defueled and the reflector removed in preparation for execution of IER.

- Began Performance of simulations in support of generation of documentation of IER CED-4ab.

- Had meeting at ANS 2013 Winter meeting to address issues associated with making progress towards completion of IERs.

- Supported CED Efficiency Meeting in Washington, DC in December 2013.

- Three talks were presented at the ANS 2013 Winter meeting.

- Helped evaluate the proposed inner container packaging design for the Idaho ZPPR plates.

- Preliminary Piping & Instrumentation Diagram is complete. Review by the LANL Pressure Safety Committee (PSC) to begin Jan. 2014.

- System layout within reactor facility progressing.

- Quotes for 1.5" tube assemblies received from vendor. Procurement to proceed upon PSC approval.

- Valve configurations and vendors identified. Procurement to proceed upon PSC approval.

- Sample loading mechanism design has been initiated.

- Sample capsule fabrication initiated.

- IER: An updated version of CED-1 for was generated for review and approval.

- IER: Provided experimental support for execution of burst measurements. A presentation was given at the NCSP technical seminar about the NRDS and LLMM.

- IER: Provided experimental support for execution.

- IER: Performed further simulations to support generation of CED-1 and CED-2 documentation. A revision to the original draft version of CED-1 was generated.

- IER: A final version of CED-2 for was distributed for approval. Support hardware to be used for the experiment was mounted on the Comet Assembly. Reflector components were moved to NCERC from the warehouse in anticipation of advancing to phase CED-3. The NCERC experiment plan for execution was approved for use.

- IER: An updated draft version of CED-1 for was generated.

- IER: Submitted a rough draft of the benchmark evaluation for external review. A talk was presented at the NCSP technical seminar.

- IER: CED-4 was approved. A presentation was given at the NCSP technical seminar.

- IERs : Final versions for CED-4 final reports for were generated for distribution. Talks were given at the NCSP technical seminar associated with IERs.

- IER: Provided support to review CED-1 documentation.

- With LANL as the "official host"---Helped plan and execute the NCSP mid-year review and technical seminar in Los Alamos.

- Further adjustments to the Godiva IV burst measurement system were made as more operating experience was gained at NCERC.

- Preparations for operational testing of the four barrel fission chambers were initiated to support Rossi-alpha measurements.

- Participated in conference associated with supporting shipment of the Idaho ZPPR plates.

- Two other talks associated with the methodologies on how to compare subcritical measurements with simulations capabilities for benchmarking purposes were presented at the NCSP technical seminar.

- Pneumatic system design nearing completion.

- Control system design initiated.

- System layout in facility ongoing.

- Sample loading design progressing.

- Presentation given at NCSP TPR to provide update on status of rabbit system.

- Continuing to refine the HMI control console layout.

- IER: Provided experimental support for execution of burst measurements.

- IER: Provided experimental support for execution.

- IER: Performed further simulations to support generation of CED-1 and CED-2 documentation. Reference memos were generated to document the updated simulation results. An updated revision to the original draft version of CED-1 was generated.

- IER: CED-2 and CED-3A were approved hence moving to CED-3B. Benchmark data for two of the four planned configurations was measured. Rossi-Alpha measurements were performed on these configurations. An update to the NCERC experiment plan for IER was generated awaiting review and approval.

- IER: CED-1 was distributed to the CED team for review and approval. Simulations were performed to support generation of a CED-2 document.

- IER: Benchmark evaluation for IER was generated and presented at ICBEP meeting Paris. Progress was made to generate responses to comments from meeting and to generate a new revision for benchmark.

- IERs: CED-4 final reports were approved.

- IER: Provided support to review CED-1 documentation.

- IER: Provided Experimental support for execution.

- IER: Provided experimental support for execution.

- Papers were presented at the ANS summer Meeting:

  R.G. Sanchez, et al., "Prompt Neutron Decay Constant in a Highly Enriched Uranium Copper Reflected System."

  T. Cutler, et. al. "Unusual Behaviors Resulting from Unusual Control Schemes in Criticality Safety."

  J. Hutchinson, et.al. "Investigation of keff Versus Fraction of Critical Mass."

- Participated in conference calls associated with supporting shipment of the Idaho ZPPR plates.

- Comet Operations (IER).

- NCSP Criticality Safety Course (IER).

- Source Measurements (IER).

- Godiva Operations (IER).

- NCNS R-value Experiment (IER).

- Material moves in support of approved operations.

- FY15 – FY17 Krusty Project funding approval by NASA.

- LANL certification of NCERC Cognizant System Engineers.

- Approval of NSTec Nuclear Material Review Board for shipment of LANL Hex Pellets.

- All required Surveillances, ISIs, and preventive maintenance.

- Operator Training (IER).

- ER Criticality Training Class (IER).

- NCNS Fission Counting (IER).

- Comet Ops (IER).

- Material Moves (IER).

- NCNS Experiments (IER).

- NA42 Measurements (IER).

- Material Receipt (IER).

- Quarterly MC&A Inventory Support (IER).

- NPOD Certifications (IER)

- Building decontamination (IER).

- OJT was performed with various NCERC assemblies as part of Q4 scheduled NCERC operations to gain proficiency to maintain qualifications and to help complete certifications of operators.

- Two new operators gained certifications for Comet Operations.

- IER: Awaiting further request for action from requestor.

- IERs: Planning and execution impacted by Godiva IV unavailability

- IER: Performed further simulations to support generation of CED-1 and CED-2 documentation. Due dates for CED-1 and CED-2 were deferred to FY2015.

- IER: Benchmark data for two of the four planned configurations was measured. Acquisition of data for a third benchmark configuration was begun and impacted by Comet un-availability.

- IER: CED-1 was revised and approved. Documentation for CED-2 was generated, reviewed, and approved.

- IER: Simulation work, sensitivity studies, and analysis of data were begun for the benchmark evaluation for IER (Berpball reflected with tungsten). Deliverables for IER deferred into FY2015.

- IER: Met deadlines to submit the benchmark evaluation to the subgroup (in July) and final submission (in September). Final version published in ICSBEP 2014 edition (available at http://ncsp.llnl.gov/ICSBEP/handbook/2014_eval/new_2014_eval.html and https://www.oecdnea.org/science/wpncs/icsbep/handbook.html).

- IER: Provided support to review CED-2 documentation.

- IER: Flattop Pu Core operations were finally authorized at the end of Q4 by approval CN4.

- IER: Provided ND support.

- IER: Operations were not scheduled for execution.

- IER: Planning and execution impacted by Godiva IV unavailability.

- Succession Planning: UNLV Phd student passed thesis proposal exam. Thesis topic will be a combination computational/experimental thesis involving the dynamics of spatially separate neutron chain reacting systems.

- Papers were presented at the Physor2014 Meeting Held in Kyoto, Japan:

  R.G. Sanchez, et al., "Reaction Rate, Fission Product Yield and Rossi‐alpha Measurements Using a HEU metal, Copper Reflected critical assembly"

  This paper was voted one of the best papers presented at the conference and was nominated to be included in a special edition of the Journal of Nuclear Science and Technology.

J. Hutchinson, et.al. "Caliban and Godiva‑IV Measurements Using Helium‑3 Detector Systems"

This paper was a collaborative effort between CEA Valduc and LANL.

- Electronic equipment was purchased that will be used for data acquisition for future Rossi‑Alpha, detector, and fission chamber measurements for experiments on the critical assemblies at NCERC. Additional work was performed on refurbishing the TA-18 legacy fission chambers.

- LANL has assembled a causal analysis team to help evaluate the radcon issues to help resume operations.

- A program integration board for NCERC has been created to discuss safety basis and other programmatic issues.

- Mechanical drawings are nearing 90% complete.

- Mechanical fabrication of some items in process.

- Control system hardware was received.

- Control system programming has been initiated.

- Sample loading design complete with about 50% hardware fabricated/procured.

- Pneumatic system components procurement in process with ~10% received.

- On the authorization front, Forms 2339: DAF User Activity Introduction Checklist (12 pages) and 2068: Readiness Applicability and Review Level Determination (12 pages) were completed during the quarter.

- Changes to CEF-PLA-014: NCERC Administrative Practices for Nuclear Criticality Safety were drafted to Encompass operations associated with the pneumatic transfer system.

- Several questions from Safety Basis personnel working on DAF/NCERC CN8 were fielded, and it was decided that a formal system design description (SDD) document was needed for guidance.

- Personnel have begun work on the SDD.

LLNL IE

- LLNL-ABS-648313, COG Validation for Lead and Polyethylene Reflected SILENE Criticality Excursion Benchmark Experiments, submitted to ANS for publication in transactions at the ANS National Meeting in Reno, NV. This paper provides the results for all foils and TLD in Collimator A for the 2nd and 3rd pulses. The results for the 1st pulse were published in FY2013 (LLNL IE2).

- LLNL provided ND support to SNL for 0.855 7uPCX Hc (IER) Preliminary Design (CED-1) (LLNL IE3).

- Liaised with DOE/EM and SRS to develop a TEX Pu thermal benchmark concept sensitive to Ti absorption (LLNL IE4).

- Liaised with DOE/NR, Bettis and IRSN to develop TEX HEU benchmarks sensitive to Hf in the fast, intermediate and thermal regimes (LLNL IE4).

- Completed a detailed "as built" model of ZPPR PANN plates (LLNL IE4).

- Completed a design concept for TEX alignment/support feature with input from LANL IE personnel on design requirements (LLNL IE4).

- Located and performed dimensional measurements on Tantalum ZPPR diluent plates at NCERC warehouse (LLNL IE4).

- Provided written CEdT and IER recommendations for process improvement prior to participation in the CEdT/IER process review meeting on December 17-18, 2013, in Washington, DC (LLNL IE8).

- LLNL has an agreement in principle with AWE on an exchange of personnel (AWE to LLNL) to develop the improved NAD (LLNL IE9).

- Completed IER CED-3b (Part 1) steady-state subcritical measurements with participation from AWE, LANL, LLNL and SNL. All equipment has been returned and laboratory reports are in preparation (LLNL IE13).

- An IER BCR was submitted on March 21, 2014, to extend the CED-3b completion date to September 30, 2014. IER high power supercritical pulse operations scheduled for the weeks of April 21 (an add on to NCNS), May 19 and May 27 (LLNL IE13).

- The IER CED-1 Report was approved by the NCSP Manager on April 4, 2014 and published as LLNL-TR-652532, "Preliminary Design for an International Intercomparison Exercise for Nuclear Accident Dosimetry at the DAF Using Godiva-IV" (LLNL IE3).

- The IER CED-2 Report was approved by the NCSP Manager on April 2, 2014 and published as LLNL-TR-652032, "LLNL Final Design for PDV Measurements of Godiva for Validation of Multi-Physics Simulation." PDV (and alpha-box) measurements scheduled for April 14-17 (LLNL IE3).

- The IER CED-1 Report was approved by the NCSP Manager on April 4, 2014 and published as LLNL-TR-652601, "LLNL Preliminary Design for BeRP Ball with Composite Polyethylene and Nickel Reflection" (LLNL IE3).

- In conjunction with the NCSP Technical Program Review Meeting at Los Alamos, the following CEDT meetings were convened:
  - IER (TEX) (LLNL IE4).
  - IER (Godiva Field and NAD Exercise) (LLNL IE13).
  - IER (BeRP/Ni and W subcritical benchmarks) (LLN IE3).

- LLNL provided CEDT support (LLLNL IE3) to LANL and SNL for completion of:
  - IER CED-3b (BeRP/Ni).
  - IER CED-0 (Mo99/Tc99m).
  - IER CED-2 (BUCCX Redux).
  - IER CED-3a (7uPCX 0.800 cm pitch).

- LLNL succeeded with JLON assistance in increasing the escort ratios from 1:1 to 5:1 (Q) and 3:1 (P/L) (LLNL IE13).

- LLNL-ABS-648313, "COG Validation for Lead and Polyethylene Reflected SILENE Criticality Excursion Benchmark Experiments," has been accepted for presentation at the ANS Annual Meeting in Reno, NV (LLNL IE2).

- IER high power supercritical pulse measurements were completed by AWE, LLNL and SNL during the weeks of April 14 (an add on to NCNS), May 19 and May 27. LLNL also coordinated irradiation and return of IRSN dosimeters (LLNL IE13).

- Input from eight labs (AWE, LLNL, LANL, PNNL, SNL, SRS, Y-12 and IRSN) specifying a POC, participants, NADs (for placement near Godiva) and counting equipment (for use in the Mercury NAD Lab) have been incorporated into the (draft) IER CED-2 report (LLNL IE3, IE9).

- LLNL and IRSN met to discuss LLNL results of TEX (IER) thermal calculations and discussed the design alternatives requiring active cooling, passive cooling, or no cooling (LLNL IE4).

- LLNL recertified and provided 9975 Type B shipping containers to INL to expedite shipment of ZPPR PANN fuel to NNSS. This activity supports TEX (IER) (LLNL IE4).

- LLNL and LANL met to discuss design alternatives for the lifting fixtures and BeRP composite reflector (IER) (LLNL IE3).

- The IER (PDV) CED-3b feasibility measurements were completed during the week of May 27. Changes in progress based on lessons-learned and follow-on measurements will be scheduled in Q4 (LLNL IE11).

- IER foil (Godiva) irradiation measurements were completed by LLNL and PNNL for NCNS (non-NCSP) during the week of June 2. The results met all five criteria for success and fulfilled a NCNS milestone.

- LLNL provided CEDT support (LLNL IE8) to LANL and SNL for:
  - IER CED-3a (NCT#2) completion.
  - IER CED-4b (BeRP/Ni) in progress.
  - IER CED-2 (Horizontal split table) in progress.
  - IER CED-1 (7upCX at various pitches) completion.

- WCI (JLON) scheduled a meeting with GS, O&B and WCI stakeholders to discuss LLNL interests in DAF (LLNL IE3).

- "COG Validation for Lead and Polyethylene Reflected SILENE Criticality Excursion Benchmark Experiments," LLNL-PRES-655578, was presented on June 16, 2014 at the ANS Annual Meeting in Reno, NV (LLNL IE2).

- IER experimental results characterizing the Godiva radiation field are undergoing analysis by LLNL, AWE and SNL with a draft CED4a report in development (LLNL IE13).

- Completed the IER CED-2 for the Godiva NAD exercise, which was approved by NCSP Management. CED3a initiated. (LLNL IE3, IE3).

- Provided the IER CED-2 draft report for TEX to the CEdT on August 25 for review. A revised final draft incorporating all comments received was issued on September 12. Comments from LANL were received on September 22 and 25. A teleconference is scheduled for October 9 to resolve the remaining issues (LLNL IE4).

- Completed drawings for the BeRP composite reflector (IER) for incorporation into the CED-2 report (LLNL IE3).

- Preliminary alpha box experimental results for IER (PDV) have been analyzed and results look good. Actual PDV measurements on hold due to Godiva shutdown (LLNL IE11).

- LLNL provided CEDT support (LLNL IE8) to LANL and SNL for:
  - IER CED-3a (NCT#2) completion.
  - IER (BeRP/W) CED-3b completion (and CED-4a initiation).
  - IER CED-4b (BeRP/Ni) completion.
  - IER CED-2 (split table) meeting in Las Vegas.
  - IER CED-1 (7upCX at various pitches) completion.
  - IER CED-0 development (and CED-3b initiation).

- LLNL met with AWE and IRSN on September 22-23, 2014 to discuss the status and plans for IERs and discussed proposals for future collaborations in other areas (LLNL IE3).

- IRSN (lead), AWE and LLNL submitted an abstract to the International Conference on Individual Monitoring of Ionizing Radiation, IM2015, summarizing the results of recent NAD testing with Caliban and Prospero.

NNSS IE

- Supported NCERC Critical Assembly Machine and Nuclear Material Handling & Measurement activities. Completed material movements and unpacking in preparation for training activities. (NNSS IE1 Subtask1).

- Began seismic calculations to address the PISA associated with the NCERC Storage not being in compliance with the credited Seismic Analysis.

- Worked with LANL to resolve issues related to seismic calculations for the NCERC Vault Storage Racks.

- Submitted the Evaluation of the Safety of the Situation (ESS) for the NCERC Storage Lockers PISA to NNSA/NFO.

- The NSTec NCSP Task Manager conducted a planning/estimating meeting for the NCERC Rapid Sample Transfer System (Rabbit) installation on November 5, 2013. (NNSS IE2; IER)

- The NSTec NCSP Task Manager participated in the NNSA/HQ CEdT Process Review Meeting via teleconference on December 17-18, 2013. (NNSS IE3)

- Provided support to Material Moves (IER); Godiva Hot Operations (IER); N-Pod Certifications (Non-NCSP - IER); Criticality Safety Course (IERs); Emergency Response Training (Non-NCSP - IER); Comet Hot Operations (IER); and Planet Defuel (IER).

- Supported NCERC Critical Assembly Machine and Nuclear Material Handling & Measurement activities. Completed material movements and unpacking in preparation for training activities. (NNSS IE1 Subtask1)

- The Acting NSTec NCSP Task Manager participated in the NNSA/HQ NCSP Program Review on March 26-27, 2014. Discussions were held during the NNSS NSTec briefing

regarding the following issues: safety basis revisions, the lack of a Rabbit final design, drainage problems at Warehouse 06-150, and the stop work issued on the Romeo experiment. (NNSS IE1 Subtask 1)

- The Acting NSTec NCSP Task Manager discussed the status of the NCERC Rapid Sample Transfer System (Rabbit) installation with the LANL Project Manager on March 27, 2013. (NNSS IE2; IER)

- The drainage issue at the Area 6, CP-150 Warehouse, was resolved. (NNSS IE1 Subtask 1)

- Completed implementation of DAF DSA/TSR Change Notice 2/1. (NNSS IE1 Subtask 1)

- Provided support to the following NCSP/NCERC activities: Material Receipt (IER); Material Operations (IER); RTO Operations (Non-NCSP – IER); Godiva Operations (IER); Operator Training (IER); Inventory Support (IER); DoD Advanced Testing (Non-NCSP – IER); Hot Operations (IER); NFO Criticality Safety Class (IER); Flattop NCNS Foil Irradiations (Non-NCSP – IER); and Flattop Configuration Change (IER).

- Supported NCERC Critical Assembly Machine and Nuclear Material Handling & Measurement activities. Completed material movements and unpacking in preparation for training activities. (NNSS IE1 Subtask1)

- The NSTec Task Manager participated in a teleconference with NNSA/HQ on May 27, 2014, and discussed the 2nd quarterly progress report and current funding status. (NNSS IE 1 Subtask 1)

- Submitted the NCERC Evaluation of the Safety of the Situation (ESS) and Change Notice 4 to NFO in June. The approved Safety Evaluation Report (SER) was received from NFO on June 11, 2014. (NNSS IE1 Subtask 1)

- Began work on the NCERC Change Notice 8 revision in support of the Rabbit Transfer System installation. (NNSS IE2)

- Began work on the NCERC Criticality Safety Evaluation for the INL ZPPR Support materials shipment expected in September 2014. (NNSS IE1 Subtask 1)

- Participated in the second NSTec Nuclear Material Review Board for the proposed INL ZPPR Support plates shipment. (NNSS IE1 Subtask 1)

- Provided support to the following NCSP/NCERC activities: Material Move (IER); Godiva Operations (IER); LLNL Short Irradiations (IER); LLNL NAD Lab Support (IER); Material Move (IER); Comet Operations (IER); Source Measurements (IER); (Non-NCSP) DTRA Operations (ISIS) (IER); Material Move (IER); Criticality Safety Course (IER); (Non-NCSP) Godiva Modeling and Experiments (IER); (Non-NCSP) Activation Foils on NCERC Critical Assemblies (IER); and (Non-NCSP) NA-42 Measurements (IER).

- Supported NCERC Critical Assembly Machine and Nuclear Material Handling & Measurement activities. Completed material movements and unpacking in preparation for training activities. (NNSS IE1 Subtask1)

- The NSTec Task Manager, RTBF Division Manager, and NOD personnel participated in a discussion with NNSA/HQ and Laboratories representatives on July 28, 2014. This discussion focused on mission and budget issues. (NNSS IE 1 Subtask 1)

- The NSTec Task Manager participated in the NNSA/HQ FY15 Budget Execution Meetings on July 29-30, 2014. (NNSS IE 1 Subtask 1)

- Addressed the two conditions of approval on Change Notice 4. Proposed resolutions transmitted on 7/31/14, and approved 8/30/14. (NNSS IE 1 Subtask 1)

- Continued work on the NCERC Change Notice 8 revision in support of the Rabbit Transfer System installation. Completed NCERC DSA/TSR Change Notice 8 Safety Basis Strategy and transmitted to NNSA/NFO. The SBS was approved with comments by NNSA/NFO; addressing the comments with stakeholders. (NNSS IE2)

- Completed work on the NCERC Criticality Safety Evaluation for the INL ZPPR Support materials shipment. (NNSS IE1 Subtask 1)

- Provided support to the following NCSP/NCERC activities in the 4th quarter: Comet Operations (IER); Material Moves, Hot Operations, and Inventory Support (ER); Operator Training (IER); NCSP Class (IER); N-Pod Certifications (IER); NCNS Short-Lived Fission Operations (IER); ER Criticality Class (IER); NA-42 Measurements (IER); and MC-15 Measurements (IER). (NNSS IE1 Subtask1)

- Provided support to a total of 18 Integral Experiment Requests (IERs) through 57 separate activities during the course of FY14. (NNSS IE1 Subtask 1)

ORNL IE

- Completed CEdT and IER process review and provided written recommendations to NCSP Management Team for improving the IER process and website.

- Participated in the CEdT efficiency improvement meeting in Washington, D.C. December 17-18, 2014.

- Participated in IER team meetings at LANL during NCSP TPR in March 2014 for the following IERs and TEX.

- Completed review of IER uncertainty analysis methodology and participated in February 2014 VTC to discuss analysis methods.

- Participated in / observed some of the IER pulsed experiments performed at NCERC in May.

- Completed CEdT Analytical Methods Support and CEdT NDAG Chair Support.

SNL IE

- The capability and authorization of the Sandia Critical Experiments was maintained.

- Staff proficiencies were maintained by performing critical operations.

- IER CED-2 work is in progress.

- IER CED-3a work is in progress.

- IER CED-2 work is in progress.

- Development of the preliminary design for a split-table machine (IER CED-1) was completed and is awaiting NCSP approval.

- IER CED-1 was initiated.

- Participated in the NCERC safety review process.

- Sandia provided written recommendations and participated in the IER process review meeting in December.

- The capability and authorization of the Sandia Critical Experiments was maintained.

- Staff proficiencies were maintained by performing critical operations.

- IER CED-2 work was completed.

- IER CED-3a work was completed.

- IER CED-1 work continued. A BCR was submitted to move completion of CED-1 to the end of Q3.

- Participation in the NCERC safety review process has been at a low level.

- The capability and authorization of the Sandia Critical Experiments was maintained.

- Staff proficiencies were maintained by performing critical operations.

Information Preservation and Dissemination (IPD)

LLNL IP&D

ICSBEP Accomplishments

- Jim Mormon (ANL) completed internal review of Rich Lell's ICSBEP evaluation (PU-MET-FAST-047) for ZPR-3/58 (IER) completing CED-4a.

- Jesson Hutchinson (LANL) provided measurement data for the BeRP/Ni (IER) and BeRP/W (IER) subcritical experiments to Sean Walston (LLNL) to resolve methodology issues (as a long lead item).

- Deployed ICSBEP content received from OECD/NEA on the ncsp.llnl.gov/ ICSBEP website completing a milestone; including:

  - Updated the "2013 New Evaluations to include the final versions.

  - Produced/distributed 70 ICSBEP 2013 DVDs to NCSP users.

  - Updated the on-line version of the handbook.

  - Deployed downloadable OCED/NEA DICE software and data.

- Provided summary report to NCSP Manager on items of NCSP interest from the Monte Carlo code workshop of the SN+MC conference.

- Catherine Percher (LLNL) provided external review (CED-4a) comments to Rich Lell (ANL) for the following ICSBEP evaluations:

  - PU-MET-FAST-043 for ZPR-3/58 (IER).

  - PU-MET-INTER-003 for ZPR-3/59 (IER) .

- Sean Walston provided external review (CED-4a) comments to Jesson Hutchinson (LANL) for the following ICSBEP evaluation:

  - SUB-PU-MET-FAST-003 for BeRP/Ni (IER).

- External review included independent processing of LANL measured data and comparison to additional independent LLNL measurements validating the LANL results.

- Coordinated with OECD NEA to inform them that the NCSP evaluations listed above will be ready for presentation and review at the ICSBEP TRG meeting on May 15-16, 2014.

- NCSP evaluators and reviewers from ANL, LANL and LLNL attended the 2014 annual ICSBEP Technical Review Group (TRG) meeting convened at OECD Nuclear Energy Agency (NEA) Headquarters in Paris, France, on May 15-16, 2014, as described in LLNL-MI-656333, "Report of Foreign Travel to Paris, France."

- Three NCSP evaluations were submitted and approved for publication in the "International Handbook of Evaluated Criticality Safety Benchmark Experiments" subject to satisfactory completion of the review comments. These evaluations are:

  - SUB-PU-MET-FAST-003 for BeRP/Ni (IER).

  - PU-MET-FAST-043 for ZPR-3/58 (IER).

  - PU-MET-INTER-003 for ZPR-3/59 (IER).

- Note that SUB-PU-MET-FAST-003 may be re-categorized as a fundamental physics benchmark.

- Provided NCSP Management with recommendations for new ICSBEP and classified equivalent benchmark evaluations for FY-2015 on May 8, 2014.

- Liaised with OECD regarding governance, ICSBEP publication support, DVD formats and their limitations, DICE features, SINBAD, etc.

- Three NCSP evaluations were completed and are ready for publication in the "International Handbook of Evaluated Criticality Safety Benchmark Experiments" with satisfactory completion of the review comments. These evaluations are:

  - FUND-NCERC-PU-HE3-MULT-001 for BeRP/Ni (IER).

  - PU-MET-FAST-043 for ZPR-3/58 (IER).

  - PU-MET-INTER-003 for ZPR-3/59 (IER).

- Note that FUND-NCERC-PU-HE3-MULT-001 was previously categorized as SUB-PU-MET-FAST-003.

- These 3 NCSP evaluations and 2 additional evaluations by IRSN (France) and IPEN (Brazil) are available on the NCSP ICSBEP webpage under "2014 New Evaluations."

- Initiated discussions with AWE, LANL and Y-12 regarding priorities for the evaluation of legacy classified benchmark experiments.

- Liaised with OECD regarding ICSBEP publication support, DVD and on-line formats, methods of distribution, DICE features, SINBAD, etc.

- <u>Website and Red Net Accomplishments</u>

- Removed the IER form's facility buttons and programing logics for Valduc and VNIITF from CED-0, CED-1, CED-2, CED-3a, CED-3b, CED-4a, and CED-4b.

- Granted Doug Bowen full access to IER CEdT process web pages.

- Implemented fixes to resolve Daemon spam email (Denial-Of-Service attacked) from LLNL Computer Security Program security scans.

- Updated LANL, NCERC, and Sandia's travel logistics and syllabus on Hands-on Training & Education web pages.

- Attended the CEdT Efficiency Improvement Meeting in Washington, DC December 17 - 19, 2013.

- Worked with LANL and DOE COR to close and transfer LANL COMSEC account to LLNL COMSEC account. JLON/LLNL will provide COMSEC duties for both LANL and LLNL needs in Nevada.

- Completed and submitted Annual Self-Assessment and Annual Contingency Plan Testing for NTS-SLAN.

- Added new sorting functions and "Display All IER" to the "NCSP Approval (DOE HQ Only)" CEdT process web page.

- Enhanced IER file upload email notification capabilities to the CEdT process.

- Presented "IP&D Website Statistics" at the NCSP Technical Seminar at LANL on March 26-27, 2014.

- Added "Memorials of Our Friends and Colleagues" web page in memory of Richard D. McKnight and Joseph T. Thomas.

- Upgraded 2 NTS-SLAN TACLANES network equipment to Gig-E model to improve network throughput.

- Continued work with LANL cyber security to extend NTS-SLAN to the NSF facility in North Las Vegas.

- Worked with LLNL/LANL/NSTec personnel for PTS design/installation at DAF for future Computed Tomography (CT) experiment (LLNL).

- Added a new facility access data field to provide supervisory read only access to all IERs on the "CEdT Members Limited Access Only" CEdT process web page.

- Installed security patches on both classified and unclassified webservers and adjusted security posture to thwart continued hacking attempts.

- Completed CEdT Efficiency Improvement Meeting Action 33: Add a column on status page to indicate an IER as an NCSP or non-NCSP task.

- Created a FY-2014 DOE NCSP Accomplishments webpage with NCSP Technical Program Review presentations from the meeting held at Los Alamos National Laboratory, March 26-27, 2014.

- Added six class dates in FY-2015 to the Training & Education hands-on class registration webpage.

- Supported NCSP and NCNS programmatic work at DAF by providing escorts and assisting in configuring and obtaining approvals for electrical and data acquisition systems used for IER (Godiva field), IER (PDV) and IER (NCNS). Electronically transferred data collected at DAF to LLNL and working with LLNL (WCI) to create a file-share system to more easily distribute data to LLNL.

- Installed security patches on both classified and unclassified NCSP webservers to fix "Bash/Shellshock" security vulnerabilities.

- Completed CEdT Efficiency Improvement Meeting: File attachment listed and sorted by most recent upload date.

- Completed CEdT Efficiency Improvement Meeting: Send out email when file uploaded, signature notification, phase gate changes, and approvals.

- Presented full paper and viewgraph presentation title "The Official Website of the U.S. Department of Energy's Nuclear Safety Program" at the 19th Pacific Basin Nuclear Conference, PBNC 2014, Vancouver, Canada, August 24-29, 2014.

- Added a waiting list to the Training and Education's registration web page for the January 5-16 two-week criticality safety practitioner course.

- Completed annual account revalidation for all classified accounts at DAF.

- Completed installation of PTS for CT project at DAF

- Continued working with LANL PADGS on Level III computer security plan – precursor to NTS-SLAN Level IV plan.

- Completed annual COMSEC audit.

Nuclear Data (ND)

BNL ND

- ADVANCE has been ported to a more robust computer and a distributed code execution framework (BuildBot).   Execution has also been sped up dramatically with aggressive use of parallelization.

- A peer reviewed article describing ADVANCE was published: R. Arcilla, D. Brown, M. Herman, Nuclear Data Sheets 118 (2014) 422–425.

- ADVANCE version 0.8.1 has been released including the ability to generate complete ACE and ENDF library tarballs. Deployment issues with the BNL web system have been straightened out. New version of Fudge installed.

- Begun collecting, vetting and validating new evaluation for CIELO (16O,56Fe,245U,239Pu) and other NCSP evaluations (180-186W).

LANL ND

- Los Alamos participated in the November CSEWG and NDAG meetings. Several presentations were made by LANL staff describing ongoing nuclear data evaluation accomplishments and plans. Presented data validation and testing results.

- Los Alamos staff attended the CIELO collaboration workshop, held in November 2013 at Geel, Belgium. Presentations were made during discussions of the light-isotope and actinide collaborations.

- An ENDF file has been made containing the new n+9Be angular distributions and modified elastic and inelastic cross sections up to 10 MeV. This file will be matched to the existing one above 10 MeV and given to Skip Kahler for processing and testing.

- New work on the n+16O cross sections was reported at the NEMEA-7 (Cielo) workshop in Geel, Belgium. The analysis now includes total cross section data at energies over the first resonance that have been corrected for hydrogen content, which lowers the calculated thermal scattering cross section by 2.6%. Theoretical and experimental considerations of the scale of the 16O(n,alpha) cross section continue without a definite resolution at this point.

- Work continues on the n+12,13C reactions, including a revised thermal value for the n+12C capture cross section from Firestone's group. The representation of the 12C(n,n') cross section from the 13C analysis is greatly improved thanks to new data from Geel, but questions raised by the analysis about the normalization and energy scale of that measurement are presently under review by the experimental group.

- Skip Kahler presented a talk titled "Data Testing Revised 235U, 239Pu and 63,65Cu Cross Sections with ICSBEP Benchmarks," co-authored by L. Leal, at the NCSP Technical Program Review.

- 9Be - An ENDF-formatted file was constructed that has complete angular distribution information (as Legendre coefficients) and updated cross sections at energies up to 14 MeV. An Ace file has been created and initial data testing with Be-reflected critical assemblies is underway.

- Work continued on the data and analyses for the 12C and 16O reactions as part of the standards and CIELO evaluation efforts. Collaborated with ORNL to develop and test "starter" CIELO files for 16O and 56Fe.

- Calculations have been performed for 63Cu and 65Cu and compared with compiled sets of experimental data.

- Calculations for the multiplicity-dependent fission neutron spectra have been performed for Pu-239 and U-235, and the extension to U-238 is in progress. Looking into different options for storing this information into the current ENDF-6 format. Produced preliminary ENDF-formatted files that contain the Pu-239 data, including P(nu) up to 20 MeV.

- Attended the CIELO Sub-Group and annual WPEC meetings. Presented criticality data testing results on preliminary 235,238U and 239Pu files.

- Skip Kahler presented an ENDF/B-VII.1 data testing report at the NCSD Dick McKnight memorial session during the summer 2014 ANS meeting.

- The paper "Applications of Integral Benchmark Data," describing LANL use of ICSBEP Benchmarks in data testing, has been accepted for publication in NS&E.

- A new 16O evaluation at energies below 6.2 MeV has just been submitted for consideration by the CIELO-Oxygen working group. This evaluation is based on an updated R-matrix analysis of reactions in the 17O system that was supported by the NCSP.

- Progress on the Cu evaluations remains as reported last quarter.

- Completion of an updated 9Be evaluation.

- Looked at theoretical descriptions of multi-body states using hyper-spherical coordinates.

- Processed the latest available CIELO data files and run MCNP calculations with ICSBEP benchmarks. Much of this is a continuing effort and the next CIELO-related meeting to discuss these results will occur at BNL during the annual "nuclear data week" meetings.

- A peer-reviewed paper, "A Re-Analysis of Historical Los Alamos Critical Assembly Reaction Rate Measurements," expanding upon Kahler's oral presentation at the 15th International Symposium on Reactor Dosimetry, has been accepted for publication in the conference proceedings (in the European Physical Journal).

- Calculated the prompt neutron multiplicity distributions P(nu) and multiplicity-dependent fission spectra for neutron-induced fission reactions on U-235 and Pu-239.

- A general R-matrix treatment of multi-body breakup channels in hyper spherical coordinates has been developed, and its implementation has begun in an experimental version of our R-matrix code, EDA.

- Work has continued on the n+16O (17O system) analysis leading to improved evaluated cross sections for 16O as part of the international CIELO collaboration.

LLNL ND

- Full funding of $80,000 available to NCSU as of January 22, 2014, by means of a Cost-Reimbursement-No Fee Standard Research Subcontract (No. B606928).

- NCSU has identified a post-doctoral student and another student who will participate in the project.

- NCSU is hosting a Symposium on Neutron Thermalization in Matter: Nuclear Data and

- NCSU hosted a Symposium on Neutron Thermalization in Matter: Nuclear Data and Applications in Raleigh, NC, on March 11-12, 2014.

- Finalized the ENDF/B libraries for thermal neutron scattering in SiC.

- Developed a classical molecular dynamics (MD) model for Lucite. The model is currently being validated against physical observables (e.g., density versus temperature). The MD code LAMMPS is being used for this work. Once the validation is complete, the excitation density-of-states spectrum will be generated.

- Validation of the classical molecular dynamics (MD) model for Lucite continued. Initial excitation (e.g., vibration, rotation, etc.) density of states (DOS) have been generated (using the velocity auto-correlation approach) and compared to experimental data in the energy range extending to approximately 12 milli-eV (meV). This is the range of experimental data. Reasonable agreement was found. Analysis is underway to understand the components of the DOS in the energy range extending to 500 meV. This would enhance the ability to diagnose and validate the DOS prior to the calculation of the inelastic thermal scattering cross sections.

- Silicon carbide thermal scattering libraries were generated in the ACE (continuous energy) format and tested to verify utility in Monte Carlo codes. The testing has indicated that the libraries are ready for submittal to NNDC.

- During this quarter, further analysis of the Lucite density of states (DOS) was performed. It was concluded that three groups of hydrogen atoms exist in the Lucite structure each with a distinctive contribution to the DOS. An effective DOS was generated based on combining the contribution of each group. The effective DOS was used in the LEAPR/NJOY code system to generate the first inelastic thermal neutron scattering cross sections for Lucite. At this stage, the generated data is being analyzed to ensure its physical validity and ENDF type libraries are being generated.

- Silicon carbide thermal scattering libraries were generated in the ACE (continuous energy) format and tested to verify utility in Monte Carlo codes. The testing has indicated that the libraries are ready for submittal to NNDC. During this quarter, the libraries were submitted to NNDC. Feedback from NNDC indicated the data passed the standard checks.

- NCSU has received matching funds from DOE/NR (Bettis).

- Ayman Hawari (NCSU) attended PHYSOR2014 in Kyoto, Japan, where he presented a paper on the pulsed neutron slowing-down-time technique for benchmarking $S(\alpha,\beta)$ nuclear data libraries. He also presented a second paper on reactor benchmarks and co-authored a third on a small modular reactor concept. Items of NCSP interest from the meeting are also summarized in the trip report provided to the NCSP Manager.

ORNL ND

- Klaus Guber participated as a consultant in a meeting about the international experimental data storage format (EXFOR) in October at IAEA Headquarters in Vienna—new format will facilitate improved data exchange for the NCSP.

- ORNL experimentalist traveled to IRMM in Belgium in October/November to perform cross section experiments for the NCSP:

  - IRMM accelerator refurbishment activities took longer than planned and prevented operation of the accelerator during visit.

  - Completed data reduction tasks for thin natural Ce sample data by working with IRMM staff and using IRMM data analysis software.

- Developed new resonance representation for 56Fe by extending the resonance range up to 2 MeV using RPI high-resolution transmission data—processed the new 56Fe evaluation with AMPX and NJOY and performed self-consistency tests by comparing the reconstructed cross-section data with the resonance cross-section data from SAMMY.

- ORNL evaluator traveled to CEA/Cadarache, France to perform work on the 235U resonance evaluation and perform testing with proprietary CEA integral benchmark data to improve the resonance evaluation.

- ORNL evaluator traveled to IRSN to perform work on the 56Fe resonance evaluation and perform testing with proprietary IRSN integral benchmark data to improve the resonance evaluation.

- Performed SAMMY analysis of the recently released 184W transmission data from IRMM.

- Presented ORNL/NCSP evaluation work on 56Fe, 16O, and 235U at NEMEA-7 Workshop in November 2013 and participated in discussions to improve these evaluations as part of the CIELO project effort.

- Organized and led NDAG meeting on November 19, 2013 at BNL—initiated effort to update the charter to revise the NDAG membership policy and procedure to select NDAG Chair.

- Participated in November 2013 CSEWG Meeting at BNL and presented ORNL nuclear data measurement report and evaluation report.

- ORNL experimentalist traveled to RPI to complete 186W transmission measurements to provide total cross-section data in the low keV region—will address issue with previous IRMM transmission experiments having Na filter in the neutron beam—RPI measurements used different filter combination.

- Transmission factors generated and tested for inclusion in W evaluations.

- ORNL experimentalist initiated work at IRMM in Belgium to resume cross section measurements for the NCSP:

  - IRMM accelerator refurbishments completed—measurements resumed and measurements for neutron capture on Ca finalized and Ce continued.

  - Started new data reduction tasks for "thin" natural Ce sample data and "thick" Ca sample data—required collaboration with IRMM staff and utilization of IRMM data analysis software.

- Using new 56Fe resonance evaluation completed in Q1, performed benchmark validation new evaluation in 2-4 MeV energy range—updated and completed preliminary evaluation for testing as part of OECD/NEA CIELO project.

- ORNL evaluator traveled to LANL to work with NJOY developers to update processing capability to compute angular distributions from resonance parameters—used new 56Fe evaluation to test processing capability.

- Completed preliminary 235U for testing as part of the CIELO project.

- Initiated university subcontract with Ga Tech to improve resonance analysis capabilities in unresolved resonance region.

- Participated in NCSP TPR and provided two presentations: ORNL resonance evaluation status report and NDAG status report.

- Co-organized Thermal Scattering Workshop with NCSU in March 2014—ORNL gave two presentations: status of ORNL thermal scattering evaluation capability development and NCSP and ND Program Element Overview.

- ORNL experimentalist performed work at IRMM (Belgium) in April/May to perform the following nuclear data tasks for the NCSP:

  - Continued data reduction tasks for "thin" natural Ce sample data and "thick" Ca sample data.

  - Performed neutron transmission measurements for thick Ca sample and thin/thick natural Ce samples at 50 m flight path.

  - Started neutron capture measurements at 60 m flight path for thick Ca sample and thin/thick natural Ce samples.

- Sorted and processed previously measured natural cerium capture data to produce measured cross-section data for the ORNL evaluators.

- Vanadium samples identified and analyzed for planned neutron transmission and capture measurements at IRMM in Q4 and FY15.

- ORNL evaluator performed work to develop new 16O resonance evaluation to improve benchmark calculations by including differential angular cross section data from the resonance parameters—worked performed as part of OECD/NEA CIELO project.

- Performed testing with new 56Fe evaluation by modeling new quasiintegral-differential measurements recently completed at RPI.

- ORNL evaluator initiated work with Ga Tech student to develop methodology to improve resonance analysis capabilities in the unresolved resonance region (URR)—additional task included efforts to develop new AMPX capability for generating angular cross-section data from resonance parameters.

- Submitted two invited summaries for the NCSP Accomplishments Session at the 2014 ANS Winter Meeting: 1) ORNL FY13 nuclear data work accomplishments and 2) the status of the NDAG.

- Participated in annual OECD/NEA WPEC Meeting, including working group participation in the following subgroups (SG): 1) CIELO (SG40), 2) development of a new, modern ENDF Data Format (SG38), 3) use of experimental data to produce resonance evaluations (SG36), and 4) data adjustment methods to improve nuclear data evaluations (SG39).

- Completed NDAG charter update to clarify membership and NDAG chair election procedure.

- ORNL experimentalist performed work at IRMM (Belgium) in and completed the following measurement tasks:

    - Finalized neutron capture and transmission measurements for natural Ca and Ce.

    - Continued data reduction tasks for "thin" natural Ce sample (n,γ) data and "thick" Ca sample (n,γ) data—required collaboration with IRMM staff and utilization of IRMM data analysis software.

    - Started data reduction tasks for "thin" natural Ce transmission data.

    - Performed data reduction tasks for "thick" natural Ca transmission data.

    - Produced transmission factors up to 800 keV for thick Ca sample.

- Determined sample properties for planned FY15 zirconium neutron capture and transmission experiments using enriched isotope samples.

- Completed task for generating angular data from 56Fe resonance parameters—abstract submitted for presentation at the WINS2014 meeting in FY15 Q1.

- Completed and submitted 56Fe evaluation to BNL—NNDC and OECD/NEA CIELO testing initiated.

- Completed and submitted 182W, 183W, 184W, and 186W evaluations to BNL/NNDC.

- Submitted 16O evaluation to NNDC for testing with CIELO—evaluation work will continue in FY15 for fitting new thermal data and generation of covariance data for CIELO project.

- Completed and submitted 235U evaluation to BNL—NNDC and OECD/NEA CIELO testing initiated.

- Initiated work on Ca-40 resonance evaluation.

- Initiated 1.5-month collaboration visit at IRSN to complete and test new resonance evaluations for the NCSP.

- NDAG Chair:

    - Completed NDAG Charter updates and provided recommendations to NCSP Manager—charter updates approved in Q4.

    - Completed election to elect 4 new members to NDAG.

    - Completed election.

RPI ND

- Prepared a new setup for 35m transmission for W-186 samples provided by ORNL.

- Experiments to characterize the room gamma background at the 45m station were completed. The background was found to MeV gammas from thorium and uranium decay chains and K-40.

- Presented NCSP work on Fe-56 and U-238 scattering at the NEMEA/CIELO meeting (11/2013), ANS meeting in DC (11/2013) and CSEWG meeting (11/2013).

- The molecular dynamics code LAMMPS was used to produce a calculated scattering kernel for polyethylene. Comparison with ENDF/B-VII and experiments is in progress.

- A MCNP simulation of the SNS SEQUOIA spectrometer was used to study the experimental resolution. The simulation was used for comparison with the experimental data for polyethylene.

- Beam time of 3 days was approved at the Wide Angular-Range Chopper Spectrometer (ARCS) at SNS.

- A proposal for a study to form the LINAC update and refurbishment plan was submitted to KAPL.

- Performed a week-long transmission measurements of ^{186}W as part of ORNL-ND task. Preliminary analysis was delivered to ORNL.

- Performed a 72-hour capture experiment with ^{net}Fe and $^{92/94}$Mo samples.

- Presented technical report at the last NCSP meeting at LANL.

- All four capture detectors are back from repair and operational.

- Software dead-time and loss-time were characterized and resulted in addition of a separate neutron monitor DAQ to help keep values under control.

- Full MCNP simulation of the beam-line neutron collimation was completed and presented at the RPI undergraduate research program symposium.

- Recruited one of our undergraduate students working on NCSP research to graduate school in the nuclear data program. She will work at the ORNL-ND group during the summer.

- Performed thermal neutron scattering measurement of SiO_2 at SNS with samples at temperatures of 20, 300,550,600 C and two thicknesses; 1.6 mm and 3.2 mm.

- Performed thermal neutron scattering measurements of HDPE at SNS with samples temperature of 5 and 295 K and thickness of 0.15 mm.

- Processed experimental data to obtain phonon spectra for HDPE and SiO_2 to enable processing by NJOY.

- Recent experimental data on HDPE and SiO_2 was shared with ORNL ND group.

- Interacted with ORNL ND group to help ORNL establish molecular dynamics code LAMMPS and phonon spectrum processing.

- Participated at the NC thermal scattering symposium on March 11-12.

- Started analysis and comparison of the experimental data with new SiO_2 evaluation.

- Contract with SLAC consultants was signed.

- First meeting with SLAC group was held at RPI in March.

- RFQ from KAPL to RPI for purchase of klystrons is expected in 3-4 weeks.

- Performed neutron beam mapping measurements at capture detector location for sample and collimator alignment.

- Performed energy-dependent signal-to-background measurements of mid-energy capture detector for 3 neutron production target configurations.

- Constructed detailed MCNP geometry of capture detector setup for weighting function determination and neutron sensitivity calculations.

- Completed circular buffer DAQ routines to increase data transfer rate (zero losses at 115 events/detector/LINAC pulse).

- Compared ORNL new Fe evaluation with experimental neutron scattering data below 2 MeV.

- Performed modifications to LEAPR module of NJOY2012 and created initial evaluations of SiO_2 thermal scattering law using experimental phonon spectrum.

- Started MD simulations for SiO_2, and obtained phonon spectrum that will be used with modified LEAPR module to generate new thermal scattering law.

- Updated MCNP model to be a more physically accurate representation of the experiments done on SEQUOIA at the SNS.

- SLAC deliver a preliminary report on LINAC refurbishment and upgrade design.

- Klystron vendor selection was made by RPI.

- RPI submitted klystron order to KAPL, waiting for funding approval.

- Performed high-resolution measurements on Natural Fe in the 1-850 keV region. Extension of results into the MeV region may be possible with additional correction for inelastic scattering.

- Developed methods to correct for time-dependent in-beam gamma background.

- Developed computational methods for weighting function determination.

- Performed point wise cross section measurements on Natural Ta in the unresolved resonance region using Fe-filtered beam techniques.

- Used Fe-filtered beam techniques to verify system insensitivity to scattered neutrons.

- Work with ORNL on new Fe evaluation with experimental neutron scattering data below 2 MeV.

- Quantified SEQUOIA instrument resolution in time and energy, with values agreeing with experimental values.

- Created an ACE evaluations with NJOY 2012 that replicate the MCNP 6.1 S(a,b) thermal neutron library for water, poly and quartz.

- Confirmed that the MCNP 6.1 library is made by the most up-to-date process in NJOY 2012, but the discrepancies between our experimental data and the evaluations persist.

- Processed experimental data to obtain phonon spectra for $H_2 0$ to enable processing by NJOY.

- Applied for and granted computational time at NERSC (National Energy Research Scientific Computing Center) in joint collaboration with Dr. Arbanas from ORNL, in order to perform faster MD simulations.

- RPI purchasing is negotiating the klystron purchase order with the vendor (Thales).

- Klystron purchase was approved by NR, LINAC 2020 refurbishment and upgrade contract with KAPL is in place.

Training and Education (T&E)

LANL T&E

- Participated in scheduled NCSP T&E conference calls.

- March 31 - April 3: Participated and hosted week 1 of 2 week CS practitioner's course at LANL.

- Included revised schedule with fully revised and condensed human factors module.

- April 7 - 11: Participated in Week 2 of CS practitioner's course at NCERC.

- Updated modules and schedule for CS manager's course at NCERC (with Inclusion of Godiva IV demo).

- Coordinated and confirmed instructors and training for CS manager's course at NCERC.

- Revised LANL presentation materials for the LANL week one class room training and the NCERC "hands-on" training based upon reviewer and student and reviewer comments collected in FY2014 Q1.

- Supported execution of two week Criticality Safety Training for Criticality Safety Analysts (LANL and at NCERC).

- Executed NFO leaders' one-day NCERC training course.

- Participated in regularly scheduled NCSP T&E conference calls.

- For LANL week one training (for criticality safety analysts):

  - Completely revised process evaluation exercise.

  - New process and eval.

  - Incorporated hand calcs and handbooks into eval process.

  - Completely revised human factors module.

  - Shorter, now integrated within other modules.

  - Include relevant infractions with human factors implications.

  - Included human factors on facility tour.

  - Added NDA discussion to facility tour.

  - Revised hand calcs module.

  - Now includes example in-class exercises.

  - Moved facility tour to afternoon so day is better utilized.

- Participated in scheduled NCSP T&E conference calls.

- March 31 - April 3: Participated and hosted week 1 of 2 week CS practitioner's course at LANL.

- Included revised schedule with fully revised and condensed human factors module.

- April 7 - 11: Participated in Week 2 of CS practitioner's course at NCERC.

- Updated modules and schedule for CS manager's course at NCERC (with Inclusion of Godiva IV demo).

- Coordinated and confirmed instructors and training for CS manager's course at NCERC.

- Participated in scheduled NCSP T&E conference calls.

- Supported execution of the CS Manager's course at NCERC in August 2014.

- Participated in lesson's learned discussions from the CS Manager's course to help improve communications, logistics, course content, and demonstration execution of future classes.

- Participated in discussions for development of a new module on Heterogeneity for use in future classes.

LLNL T&E

- Provided registration and logistics support for the 1-week Manager's course at SNL for LANL personnel held on November 18-22, 2013.

- Provided registration and logistics support for the 2-week NCSP course held at LANL on December 2-6 and NCERC and SNL on December 9-13, 2013.

- Provided hands-on instruction with TACS in support of the 2-week NCSP course portion at NCERC.

- Provided review comments on the V&V training module.

- Completed IER (non-NCSP) first responder and forensics training for the FBI.

- Provided registration and logistics support for the 1-week Manager's course at SNL held on February 24-28, 2014.

- Provided registration and logistics support for the 2-week NCSP course held at LANL on March 31- April 4, 2014, and NCERC and SNL on April 7-11, 2013.

- Upgraded the TACS assembly table to increase the gear ratio. Replaced TACS detector electronics to include audible count rates. Updated the NMO TACS work package under the LLNL Secondary RE/OP.

- Removed all TACS equipment from the LLNL building to accommodate facility maintenance activities; and, when completed, returned LLNL equipment reestablishing readiness.

- Provided hands-on instruction with TACS in support of the 2-week NCSP course portion at NCERC on April 7-8, 2014.   Also provided the lectures on Modules 1-4.

- Provided registration and logistics support for the 2-week NCSP course held at LANL on March 31- April 4, 2014, and NCERC and SNL on April 7-11, 2013.

- Provided registration and logistics support for the one-week NCSP Managers' course held at SNL on May 5-9, 2014, for LANL personnel.

- Updated the NCSP website to include course dates in FY-2015.

- Participate in all T&EP teleconferences.

- Provided hands-on instruction with TACS in support of the 1-week NCSP Managers course at NCERC on August 18-22, 2014. Provided the lectures for Modules 1-4. This course included 3 personnel from NFO.

- Provided registration and logistics support for the 1-week NCSP Managers course.

- Assisted AWE in scheduling a 1-week hands-on course at NCERC.

- Liaised with Mike Zerkle (Bettis) to develop a 2-day VIP course for NR-1 at NCERC.

- Updated the NCSP website to include course dates in FY-2015 and added a waiting list for the January 5-16 course.

ORNL T&E

- Coordinated planning and preparation of the additional SNL Manager's courses for LANL fissile material operators, supervisors, and managers with NCS responsibilities – one additional course in Nov. 18-22, 2013 was successfully executed for 15 LANL staff. The course was very successful and received many positive comments. Another will be offered Jan. 27-31.

- Initiated work to release recordings of previous courses at LANL and SNL. SNL recordings have been cleared for release. LANL recordings are still in review.

- Two-week T&E class for Criticality Safety Professionals was executed Dec. 2-13, 2013. The course was very successful and received many positive comments.

- Identified improvements/modifications for both the regular and Manager's courses—improvements are currently being implemented in FY14. Specifically, an instructors meeting is scheduled at SNL to plan better incorporation of human factors module into the course.

- Initiated development of a new class module on Validation for Criticality Safety Professionals.

- Coordinated planning and preparation of the additional SNL Manager's courses for LANL fissile material operators, supervisors, and managers with NCS responsibilities – one additional course in Jan. 27-31, 2014 was successfully executed for 15 LANL staff. The course was very successful and received many positive comments.

- Organized one more LANL-only Managers Course for May 5-9, 2014 at SNL.

- One-week T&E class for Managers was executed Feb. 24-28, 2014 at SNL—while this regularly scheduled Managers course was not dedicated to LANL, 11 LANL managers attended the course.

- Successfully executed a special NFO Managers training course on Feb. 25, 2014.

- Participated in NCSP TPR Meeting at LANL on March 26-27, 2014 and presented status report on T&E courses.

- Identified improvements/modifications for both the regular and Manager's courses—improvements are continuously being implemented.

- In order to better incorporate the human factors (HF) module into the course, a tour of PF-4 facility for HF instructor together with instructors for Accident modules and LANL POCs was organized. As a result, course materials were revised and the course schedule was

modified. New materials and schedule were implemented in the 2-week course for Criticality Safety Professionals on March 31-April 11, 2014. Comments from students were positive.

- Continued development of a new class module on Validation for Criticality Safety Professionals.

- Organized and led weekly T&E conference calls to coordinate execution of the FY14 training courses.

- Two-week T&E class for CSPs was successfully executed Mar. 31-April 11, 2014 with 13 students and 1 observer.

- Successfully executed LANL-only Managers Course on May 5-9, 2014 at SNL.

- Coordinated selection of FY15 course dates with all involved sites while taking into account NCSP-related activities.

- Initiated work to develop sensitivity/uncertainty training course for experimentalists.

- T&E Coordinator transition completed (Sedat Goluoglu to Doug Bowen)—transition meeting conducted at ORNL in August 2014.

- Initiated development of procedure to standardize the T&E course registration, course materials/changes, logistics, and evaluation.

- Initiated the development of two draft modules: Validation and Heterogeneous Systems (includes potential new experiment at NCERC using the Planet Handstack/foils experiment)—new modules may be added to the T&E classes if approved by NCSP Manager.

- NCERC-only Managers Course for managers successfully executed Aug. 18-Aug. 22, 2014 with 6 participants.

SNL T&E

- The Sandia Managers Hands-On Training Course was delivered to a group of LANL material managers on November 18-22, 2013.

- The Sandia NCSE Hands-On Training Course was delivered on December 9-13, 2013.

- Sandia supported the delivery of the LANL portion of the NCSE Hands-On Training Course with human factors personnel and a trainer on December 2-6, 2013.

- The construction contract has been awarded.

- The Sandia Managers Hands-On Training Course was delivered to a group of LANL material managers on January 27-31, 2014, and to a more general audience on February 24-28, 2014.

- Sandia supported the delivery of the LANL portion of the NCSE Hands-On Training Course with human factors personnel and a trainer beginning on March 31, 2014.

- The Sandia half of the NCSE Hands-On Training Course is scheduled to begin on April 7, 2014.

- A Sandia Managers Hands-On training course for a group of LANL personnel is scheduled to begin on May 5, 2014.

- Construction of the modifications was initiated in March.

- Sandia supported the delivery of the LANL portion of the NCSE Hands-On Training Course with human factors personnel and a trainer on March 31 – April 4, 2014.

- The Sandia half of the NCSE Hands-On Training Course was delivered on April 7-11, 2014.

- The Sandia Managers Hands-On Training Course was delivered to a group of LANL material managers on May 5-9, 2014.

- Sandia will support the delivery of a Managers Hands-On Training Course at NCERC on August 18-22, 2014.

- The HVAC modifications were completed in June.

- Floor/wall treatments are in process.

- Sandia supported the delivery of a Managers Hands-On Training Course at NCERC on August 18-22, 2014.

- The HVAC modifications were completed in June.

- The planned classroom upgrades are complete.

NCSP TECHNICAL SUPPORT

- Created and initiated all new FY14 IERs per the NCSP Five Year Plan.

- Organized and led CEdT Efficiency Improvement meeting in Washington D.C. Dec. 17-18, 2013:
  - Prior to meeting, collected CEdT efficiency improvement input from IE sites and prepared agenda and content for meeting.
  - Participants included sites that support the CEdT process: LLNL, LANL, SNL, Bettis APL, ORNL, and NNSA.
  - Identified 42 actions to improve the CEdT process (including CEdT Manual and website)—initiated work to complete actions.

- Coordinated IER processing in accordance with Five Year Plan—includes 3 approvals by NCSP Management.

- Worked with LANL/NSTec on non-NCSP IERs and funding—completed IE section of Five Year Plan and distributed plan to sites.

- Led FY2013 Q4 closeout review teleconference.

- Published NCSP FY2014-2023 Mission and Vision Document.

- Initiated development of NCSP brochure per direction of NCSP Manager.

- Participated in NCSP Management Team meeting at DOE/GTN on November 12, 2013.

- Participated in ANS Meeting and chaired Special Session on FY2013 NCSP Accomplishments.

- Prepared CSSG Career Service Award plaque for Calvin Hopper and provided to NCSP Manager for presentation at the November 15, 2013 CSSG Meeting.

- ND and AM Succession Planning Task (TS7):
  - Initiated ND succession planning and hired post-doc to begin working with ORNL Coordinated and managed NCSP quarterly report teleconferences in accordance to the NCSP Five-Year Execution Plan, led FY2014 Q3 closeout review teleconferences.

- Managed and provided oversight for 3 LANL IE Conference calls

- Managed and provided oversight/coordinate efforts for multiple NCSP IERs in accordance with the NCSP IE 5-year plan (including classified reports) – includes 8 approvals from NCSP management in Q3.

- Printed out additional Mission and Vision Brochures and NCSP Information Flyers for Nichole Ellis visit to AWE and IRSN.

- Website and manual modifications in progress initiated action resolutions from the CEdT efficiency improvement meeting held in FY14, Q1.

- Prepare and maintain elements of NCSP Plan and associated activities:
  - Monitor 5-Year Plan progress.
  - Review/revise task list.

- Schedule/participate meetings and teleconferences.

- Coordinate and schedule integral experiments and oversee execution of the integral experiments per the NCSP IER and CEdT processes.

- Manage and provide oversight/coordinate efforts for the NCSP Information, Preservation, and Dissemination task element.

- Manage and provide oversight/coordinate efforts for the NCSP Training and Education Program task element.

- Manage and provide oversight/coordinate efforts for the NCSP Integral Experiments task element.

- Manage and provide oversight/coordinate efforts for the NCSP Horizontal Split-Table Preliminary Design Team. Distributed data Split-Table Experiment Design and started discussions.

- Worked with LANL to create a detailed proposal for a Solution Reactor, worked with CSSG to create a task to further follow-up recommendation for NCSP. Manage and provide oversight/coordinate efforts for the NCSP Pu Solution Reactor Design Team.

- Manage and provide oversight/coordinate efforts for the NCSP IER and CEdT processes.

- Cross-train new Manager for FY 2015 and Deputy Manager for current and succession planning of the Critical Subcritical Experiment Design Team (CEdT) to improve the process and activities associated with new and progressing Integral Experiment Requests (IERs).

- Manage and provide oversight/coordinate efforts for the NCSP International.

- Collaboration with IRSN and AWE.

- Prepared invitations for Best Paper Award Winners and the winner certificates from the annual NCSP Technical Program Review meeting held at LANL, March 25-28, 2014. Coordinated abstract submittal to the ANS to ensure paper submittal deadlines were met.

- Continued work for the ongoing review of the NCSP Website.

- Developed high-level organizational structure files for our international collaborators reference.

- Planning annual NCSP Budget Execution Meeting and tour at NCERC for HQ Staff to be held in Las Vegas Nevada (July 28 – August 1, 2014), including the meeting logistics for 16 individual meetings and facilitating AWE and IRSN foreign national visitor security clearances for four people. Work included developing the NCSP budgets and 5-year plan for FY15. Prepared formal letters to NR, AWE, and IRSN for invitations to the FY 2015 Budget Execution Meeting.

- Reviewed Q2 progress reports from Task managers. Led NCSP Q2 Quarterly Report Call and updated all milestone status and budget profiles.

- Prepared an electronic version of the NCSP Self Improvement Workshop binder from 1999 and uploaded a PDF version onto the NCSP website.

- The NCSP Management team (Dunn, Scott, Ellis and Bowen) attended the ANS meeting in Reno, Nevada June 14-19.

- Worked on multiple individual tasks for the NCSP International Collaboration Meeting with IRSN and AWE. Performed preliminary work for establishing/reinforcing the NCSP International Collaboration Technical Exchange Agreements for AWE and IRSN. Worked with AWE and IRSN to obtain listing of NCSP tasks of interest for NCSP/IRSN/AWE International Collaboration efforts, Split Table Progress, and other items of NCSP interest.

- Traveled to AWE and IRSN to provide details of current NCSP/IRSN/AWE International Collaboration efforts, update Split Table Progress, and other items of NCSP interest.

- Nichole Ellis traveled to DC to provide details of current NCSP/IRSN/AWE International Collaboration efforts, update NCSP Federal Management on Split Table Progress, and other items of NCSP interest. Worked with Task Managers to submit new FY 2015 NCSP Proposals for International Collaborations.

- Worked on NCSP Out year NCSP funding profile prediction for proposals.

- Prepared FY 2014 NCSP Supplemental Plan.

- Managed $2.8M distribution of federal funds for NSRD and NCSP for June fiscal plan.

- Worked on draft summary report of Hands on Training Class attended in April 2014.

- Completed task proposal with CSSG for further follow-up recommendation for NCSP.

- Provided the NCSP Manager on a detailed listing of NCERC and NSO Issues for further discussion and resolution in July 2014.

- Performed work for ANSI/ANS-8.20 and -8.28 technical standard working groups.

- Coordinated and managed NCSP quarterly report teleconferences in accordance to the NCSP Five-Year Execution Plan, led FY2014 Q3 closeout review teleconferences.

- Managed and provided oversight for 1 LANL IE Conference call.

- Managed and provided oversight/coordinate efforts for multiple NCSP IERs in accordance with the NCSP IE 5-year plan (including classified reports).

- Website and manual modifications are continuing to resolve efficiency improvement suggestions from the CEdT efficiency improvement meeting held in FY14, Q1.

- Manage and provide oversight/coordinate efforts for the NCSP Integral Experiments task element.

- Train a new CEdT Manager for FY 2015 and Deputy Manager for current and succession planning of the Critical Subcritical Experiment Design Team (CEdT) to improve the process and activities associated with new and progressing Integral Experiment Requests (IERs).

- Manage and provide oversight/coordinate efforts for the NCSP International Collaboration Meeting with IRSN and AWE.

- Continued work for establishing/reinforcing the NCSP International Collaboration Meeting with IRSN and AWE.

- Reorganized NCSP Out-year NCSP funding profile prediction for out years as reflected in the Master Task List (multiple changes through the period)Conducted the annual NCSP Budget Execution Meeting and tour at NCERC for HQ Staff in Las Vegas Nevada (July 28 – August 1, 2014).

- Worked on Budget for FY 2015 NCSP (MASTER Task List) with new 20.5M budget and 20.8M budget.

- Re-updated all 5-Year Plan Charts from Master Task List.

- Re-updated NDAG prioritization of FY 2015 Task List in ND GANTT Charts.

- Performed work for ANSI/ANS-8.20 Technical Working Party.

- Generate the general and IE Section of the NCSP 5-Year Plan.

Criticality Safety Support Group (CSSG)

- Support/Review/Complete CSSG Tasking 2013-01 (Fire).

- Support/Close Tasking 2014-01 (LANL Technical Support).

- Drafting/Support of Tasking 2014-02 (Validation).

- Drafting/Support of Tasking 2014-03 (Pu Handbook).

- Drafting/Support of Tasking 2014-04 (Solution Reactor).

- Drafting of Tasking 2014-05 (Evacuation and CS).

- General review of normal CSSG correspondence.

- Support CSSG Telecons.

- CSSG/CSCT liaison activities.

- Supporting/Coordinating/Attending CSSG Meeting and NCSP Technical Seminar.

- CSSG Chair Meeting at LLNL.

- Attending CSSG Meeting and NCSP Technical Seminar.

- Support to attend ANS Annual Meeting.

- Seismic review issues.

- NCSP/CSSG Meeting in Las Vegas, Split Table meeting.

- Review of NNSA Technical Bulletin.

- CSSG Retrospective paper for EFCOG/CS SAWG.