INTERNATIONAL CRITICALITY SAFETY BENCHMARK EVALUATION PROJECT
INL

- The annual ICSBEP Meeting was held in Chicago, Illinois, May 7 - 11, 2007. Representatives from 10 of the 19 participating countries attended. Twenty-eight new evaluations and one major revision were reviewed and simplified models of selected benchmarks were presented. Revisions to the uncertainty guide were also discussed. Twenty-one evaluations were approved for publication, subject to satisfactory resolution of all assigned actions. Seven evaluations are still in progress and were deferred until next year (two may be completed through subgroups).

- ICSBEP representatives supported several professional and programmatic meetings including ICNC-2007 (Ten papers presented), ISTC Project 815 Meeting, ND-2007, ANS Summer Meeting, NDAG, and the NCSP End Users Meeting.

- VNIITF plan to perform Vanadium experiments in August. INL is arranging a Technical Audit of the Program while these experiments are in progress.

- Two LANL Experimenters participated in French plutonium solution experiments. INL efforts to partner with IRSN on their Structural Material Experiment Program continue.

- Update of the ICSBEP Five-Year Plan was initiated.

- The ICSBEP Publication Team initiated work on the 2007 Edition of the ICSBEP Handbook.

ANALYTICAL METHODS DEVELOPMENT AND CODE SUPPORT
ANL

- Completed final editing of chapter on Resonance Theory (R. Hwang).

- Developed and documented rigorous methodology for evaluation of covariance data based on Monte Carlo (D. Smith).

- Produced and presented three papers on Source Convergence work and VIM/MCNP library verification and validation work at ICNC'07.

- Continued verification of new *xseditor* implementation in VIM.

LANL

- Presented "Introduction to MCNP" at Los Alamos in June to 26 students.

- Presented two papers on MCNP capabilities for criticality calculations at M&C+SNA-2007 (ANS Math and Comp Topical Meeting). At same meeting, presented an MCNP5 and Data Workshop attended by 25-30 people.

- F. Brown presented "Convergence Testing and Acceleration in MCNP5 Criticality Calculations" at the 8th ICNC. LANL also contributed to a paper presented at the conference on behalf of the NEA Expert Group on Source Convergence.

- Demonstrated a capability for MCNP to compute the dominance ratio for criticality calculations.

- Created a working prototype of a materials library capability for MCNP.

- Posted updates to NJOY99 on the t2.lanl.gov site resolving user issues including several found during QA process of MCNP ENDF/B-VII library.

ORNL

- C_edT Experiments Design Team: Initial technical support to LANL.

- TSUNAMI analysis for ^{233}U validation of ISOTEK operations included generation of sensitivity data for ~250 benchmark experiments.

- TSURFER development included methods for the calculation of bias uncertainties and improved inconsistent experiment rejection.

- Sensitivity/Uncertainty Methods Collaboration: B. Rearden participated in ISTC 815 program review in Moscow and Obninsk, Russia.

- ICNC 2007 participation: SCALE workshop and 8 technical papers.

- SCALE/KENO customer support: Provided 275 responses to SCALE users requesting technical assistance.

- SCALE/KENO development: Continuous energy and multigroup KENO comparisons made for over 400 benchmarks.

- SCALE/KENO software maintenance: Updates on six SCALE modules and program libraries. Dancoff factor correction update posted on SCALE website: http://www.ornl.gov/sci/scale/miplib_update.htm.

- RSICC customer support: Distributed 289 software packages; packaged six new software updates; electronic notebook entries for SCALE and MCNP; RSICC monthly newsletters to over 5000 customers.

- AMPX Maintenance and Library Generation:

  - Processed all ENDF/B-VII evaluations and prepared prototypic CE-KENO library.

  - Prepared covariance library update for SCALE 5.1 by processing new full-energy range covariance evaluations for ^{233}U, ^{235}U, ^{238}U, ^{239}Pu, and ENDF/B-VII.0 covariance evaluation.

  - Prepared SCALE ENDF/B-VI library update for ISOTEK operations that includes new ENDF/B-VII.0 ^{233}U cross-section data with recently developed ^{233}U covariance data.

NUCLEAR DATA

ANL

- Organized and chaired June NDAG meeting.

- Participated in the June planning meeting for the "Low-Fi" covariance data.

- Produced and presented two papers on Nuclear Data Needs for Advanced Fuel Cycles and Nuclear Data Validation at ICNC'07.

- Participated in the initial testing of the NCSP web implementation of NCSP Requests for Critical Experiments.

- Continued testing of ENDF/B-VII.0 data evaluations; extended validation analyses on Cr and presented additional results indicating poor performance of Cr data at June NDAG meeting.

BNL
- Participated in the meeting of four laboratories involved in the Low-Fidelity Covariance project, Boston, June 28, 2007. Reported preliminary results on covariances in fast neutron region for fission products.

- Completed the initial version of the computerized method for massive production of low fidelity covariances in the fast neutron region. The method was tested and implemented on a Linux cluster.

- Produced preliminary covariances for all fission products (219 materials) included in ENDF/B-VII.0 in the energy range 5 keV – 20 MeV.

LANL
- Finalized high-fidelity ^{233}U covariance data above the resonance region, including total, elastic, inelastic, (n,2n), (n,3n), fission, capture, and nubar. Evaluated covariance data in ENDF6 format were sent to ORNL.

- Presented several talks at ND2007 (International Conference on Nuclear Data for Science and Technology) including a plenary talk on "Recent nuclear data developments and need for improved simulation" and an invited talk on "ENDF/B-VII data testing with ICSBEP benchmarks."

- Performed GNASH calculations on ^{48}Ti based on GEANIE data. Extended the calculations to other isotopes. We are investigating the optical potential.

- Performed statistical Hauser-Feshbach coupled-channel calculations for ^{237}Np, which reproduced DANCE results and improved the capture data.

- Participated in NDAG and Low-Fidelity planning meetings during Boston ANS meeting in June.

- Submitted a paper on evaluations of actinides for ENDF/B-VII to NDS.

ORNL
Administration
- SAMMY: Prepared draft transition plan for training nuclear modeling specialist.

- Established 3rd party subcontract with retired ORNL evaluator to complete ^{39,40,41}K evaluation.

Data Evaluations and Covariance Development
- Preliminary ^{239}Pu evaluation complete -- dentified new integral benchmarks to investigate possible data adjustments needed for thermal energies.

- Prepared preliminary set of ^{55}Mn resonance parameters with resolved resonance covariance matrix -- awaiting data reduction of recent ORELA measurements.

- Completed Ti covariance evaluation to support SRS applications.

- Received high-energy ^{233}U covariance data from LANL -- initiated work to combine high-energy covariance data with resonance region covariance data.

- ^{233}U, ^{235}U, ^{238}U and ^{239}Pu resonance parameter covariance evaluations.

- Developed computational tool to produce ENDF/B File 33 cross-section covariance matrices from File 32 resonance parameter covariance matrices. Then produced File 33 cross-section covariance matrices for ^{233}U.

Meetings and Conferences
- OECD/NEA WPEC Meeting (April 18-20, 2007): Dunn participated as the ENDF/B Formats Chair and as Chairman of Subgroup 28 for processing covariance data.

- ND 2007 Conference (April 22-27, 2007): ORNL contributed nine papers including one invited paper, and three ORNL staff (Dunn, Larson, and Guber) participated in the meeting.

- ICNC 2007 Conference (May 27-31, 2007): Dunn served as one of three instructors for SCALE Workshop and presented a paper on recent ORNL ICSBEP benchmarking activities; Leal presented two papers covering NCSP Nuclear Data work activities.

- ANS Meeting (June 24-28, 2007): Dunn participated in NCSP Low-Fidelity Covariance Data Task meeting and NDAG meeting held on June 28.

DIFFERENTIAL MEASUREMENTS
ORNL
ORELA Operation
- Completed reliable ORELA operation for 500 to 600 hours with power levels between 4.5–6 kW, 525 Hz frequency, and 8 ns pulse width.

- Stable accelerator vacuum maintained at 10^{-8} torr.

Sample Procurement and Measurements
- Procured ^{52}Cr samples and initiated transmission and capture measurements—capture measurement 95% complete.

- Procured $^{58,\,60}$Ni samples and initiated transmission and capture measurements.

- Identified ^{53}Cr sample requirements for future measurements—enriched ^{53}Cr sample will likely be needed.

Measured Data Reduction
- Completed ^{41}K data reduction from the transmission measurement completed in 2nd Quarter.

- Initiated data reduction for the ^{55}Mn and ^{41}K capture measurements completed in 2nd Quarter.

INTEGRAL EXPERIMENTS
LANL

- Received approval of the nuclear material handling and measurement project thus facilitating the construction of Radiation Test Objects (RTOs) and performing subcritical experiments. Assembled the first RTO at the DAF – consisted of the BRP ball (4.5 kg α-Pu) reflected by 6-inches of polyethylene.

- Completed our first subcritical noise experiment using the BRP-ball RTO.

- Received authorization for the startup of the CEF warehouse and received first shipment.

- Successfully supported all required DAF TSR surveillances, maintenance activities.

- Completed the 1st training/proficiency exercise. Two personnel traveled to France to participate in experiments. Follow-on will occur in either 4th quarter FY07 or FY08. Discussions continuing with SNL for possible operator training in FY08 in conjunction with the planned burnup credit experiment.

ORNL

- Tim Valentine worked with LANL to assess equipment and adequate neutron sources in place for FY07 measurement.

INFORMATION PRESERVATION AND DISSEMINATION
Fluor Hanford

- Final steps are in progress to prepare a beta CritView package for release on the NCSP website.

- Documentation of CritView features is progressing.

LLNL

- Presented a poster session of NCSP website as described in UCRL-CONF-228333 at ICNC 2007, St. Petersburg, Russia.

- Implemented beta versions of the online Request for Integral Experiments form (CED-0).

- Presented an online demonstration of the CED-0 form at the Boston ANS June 2007 End Users Focus-Group Workshop.

- Procured a new Dell server as a NCSP backup web server.

- Presented the paper "COG – Publicly Available Now To Criticality Safety Practitioners" at ICNC 2007, St. Petersburg, Russia.

- Added a link to the OECD NEA Databank on the COG website (http://cog.llnl.gov).

ORNL
- Mike Westfall completed editing of the revised Oak Ridge Critical Experiments Facility (ORCEF) Heritage DVD's. The edited version contains 11 sessions with 32 topics and several hundred subtopics.

- Dr. Ray Murray, one of the principal ORCEF Heritage participants, prepared initial "voiceover" summaries of the 32 topics of the final DVD versions of the ORCEF Heritage sessions.

- The contract for Dr. Duane Larson, former Oak Ridge Electron Linear Accelerator (ORELA) Director, who organized and conducted the seven sessions of recording for the ORELA Heritage, has been extended to include his editing of the material.

TRAINING AND QUALIFICATIONS
LLNL
- Completed a class on 04/05/2007.

- Completed a class on 05/03/2007.

- Completed a class on 06/07/2007.

ORNL
- First three chapters of TSUNAMI primer in draft form. These chapters address (Topics 1, 2, 3) and they represent approximately (X) % of the content for the initial draft.

NUCLEAR CRITICALITY SAFETY PROGRAM SUPPORT
ANL
- Participated in the CSSG review of Y-12.

- Participated in CSSG meetings and conference calls; prepared summary notes from meetings and conference calls during the quarter.

- Completed the NCSET module on cross-section measurements and dataset preparation; published it via the NCSP website.

- Continued discussions with LLNL staff to finalize NCSET module on hand calculations and multimedia prototype module.

Fluor Hanford
- Participated in CSSG meetings, teleconferences, Spring CSSG Meeting (David Erickson and Hans Toffer, Boston).

INL
- Participated in the Summer ANS Meeting (NDAG/EndUser) and the Spring CSSG Meeting (Fitz Trumble).

- Completed CSSG evaluation of Hanford TRU drum criticality posture with Calvin Hopper in May.

LLNL
- Participated in numerous teleconferences, email exchanges, and all face-to-face meetings of the CSSG.

- Participated in the development of the response to CSSG Tasking 2007-05 (by teleconference and email) focusing on those portions pertaining to: (a) criticality control in Hazard Category 3 and Below Hazard Category 3 Facilities, and (b) elevation of criticality controls to TSRs.

ORNL
- Planned and participated in the CSSG survey of CY 2006 minor NCS deficiencies at ORNL (Westfall and Reed, May 2007).

- Participated in CSSG and NDAG meetings and the NCSP ENDUSERS Workshop, collocated with the ANS Annual Meeting, Boston, MA (Westfall and Hopper, June 2007).

- Participated in scheduled teleconferences of the CSSG, including the CSSG review of the YMP Pre-Closure NCS Strategy documentation (Westfall and Hopper, April–June 2007).