# American Nuclear Society

# Nuclear Criticality Safety Division Newsletter

# Winter 2011

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**Editor: Larry L. Wetzel**
**Website: http://ncsd.ans.org**

# Message from the Chair

Doug Bowen, dgbowen@lanl.gov, (505) 667-5939, NCSD Chair

Greetings and Happy Holidays to everyone in the NCSD! It has been a privilege and a pleasure to serve as Chair of the NCSD. I would like to start out by thanking all the NCSD volunteers that keep the division running efficiently and moving in the right direction. It has been a great year and we are looking forward to 2012.

It was clear to me at the ANS Winter Meeting that the ANS is transitioning into a more modern professional society. In my role as NCSD Chair, I decided to spend more time learning more about the Society. One easy way to do this is to go to the ANS website (http://www.ans.org). The ANS website is a tremendous resource and I encourage all NCSD members to check it out. The following area: http://www.new.ans.org/about/officers/ provides presentations and letters from the current ANS President, Eric Loewen about his work for the Society. This location also identifies the ANS officers. There is also a other information about the Society, such as the Bylaws and Rules, Code of Ethics, Japan Relief Fund, Scholarship Donations, and the History of ANS. Other relevant website links involve the ANS standards (http://www.new.ans.org/standards) and the identification and description of the professional divisions (http://www.new.ans.org/const/divisions).

The 2011 International Conference on Nuclear Criticality (ICNC) Safety was held in Edinburgh, Scotland this last September. The ICNC conference was an ANS class IV topical meeting sponsored by the NCSD. More than 200 technical papers and posters were presented at the meeting in nine technical tracks and many NCSD members provided assistance and served as technical track leaders. The meeting was a huge success and attendance was outstanding. The ICNC organizers also had tours of the Edinburgh area, a great formal dinner, and a whiskey tasting event one evening. I heard one NCSD member say, “the whiskey in Scotland is good, but the Haggis is better!”

The ANS winter meeting was held in Washington DC at the Omni Shoreham hotel and was very well represented by the NCSD. Larry Wetzel has posted pictures from the Hollywood, FL and Washington, DC meetings on the NCSD website http://ncsd.ans.org). The NCSD had a strong showing at the conference with more than 30 papers presented in 4 main sessions including a session about recent advances in criticality safety at the Y-12 National Security Complex and a session about recent Nuclear Criticality Safety Program technical accomplishments. With the help of Allison Miller and Maria LeTellier, a great NCSD Dinner was organized and held Tuesday night (November 1st) at Maggiano’s Little Italy Restaurant in Bethesda, Md. This was a great time to recognize those that have made contributions to the Division, to catch up with old friends, and to meet new ones. I’d like to express my appreciation to our fine sponsors who helped make the dinner a great success. This NCSD dinner was turned into a fundraising event for the NCS Pioneers Scholarship Fund. The NCSD established an endowed scholarship to encourage well-qualified students to study criticality safety. We have a goal of raising $60,000 for the

permanent endowment with over $9,975 donated as of this writing. A video presentation and a donation link are available on the NCSD webpage (http://ncsd.ans.org), and I encourage everyone to donate so that we can begin awarding endowed scholarships in 2012. The gift is tax deductible.

I hope everyone has a great holiday season!

*Doug Bowen*

Chair, Nuclear Criticality Safety Division

## *NCSD Awards Dinner*

Our annual awards dinner was held at Maggiano's Little Italy Restaurant on Tuesday evening. We had almost 100 people attend. It started with a social and continued with a multi-course dinner.

We would like to acknowledge our sponsor who through their generous donations helped keep the cost of the dinner more affordable. Our sponsors this year were:

| Platinum | Gold | Silver |
|---|---|---|
| C.S. Engineering | Ron Pevey | Thomas McLaughlin |
| Nuclear Safety Associates | Katherin & Sedat Goluoglu | Croucher Group, Inc. |
| BWXT Y-12 | Jerry Hicks | Larry Wetzel |
| Paschal Solutions | Dr. Robert Busch | |
| Richard Taylor | USR Safety Management Solutions | |
| Nuclear Fuel Services | | |

This year we did not have a Service or Technical Excellence award. We encourage you to nominate people you feel are deserving of the recognition. The criteria and the nomination forms are available on the NCSD website (http://ncsd.ans.org/site/awards.html).

The Best Paper Awards for the last two meetings were presented. The awards went to Joseph Christensen and Shean Monahan.

Rob Frost talked about the focus of the evening, the NCS Pioneers Scholarship Fund. NCSD want to raise $60,000 to create an endowed scholarship that will be awarded every year. The video was created to promote the fund drive. It was shown at the dinner and you can see it at http://ncsd.ans.org/site/pictures/hollywood_2011/AA%20BackToTheFuture2.wmv. In the spirit of giving back to the future, miniature DeLorean cars were given to those who had contributed to the fund drive. A computer was set up for those who wanted to contribute that evening. Contributing is easy. There is a link on the NCSD main page that connects you to the ANS donation page. Select the Nuclear Criticality Safety Pioneers Scholarship (NCSD). You can make it in honor or memory of someone if you want. The form says in memory of, but it can be in honor of. Doug Bowen found that out when he answered the phone one day. It was Hugh Clark and he was a little frustrated that someone made the donation in memory of him. He said he is very much alive and plans to stay that way for at least 10 more years.

We have awarded the scholarship three times starting in 2008. The past recipients of the scholarship were:

- 2011 - Christopher (C.J.) Hurt
- 2010 - Jesse Holmes
- 2009 - Not awarded due to lack of funds
- 2008 - Allison Barber

You can read about the recipients on the Scholarship page of the NCSD website.
http://ncsd.ans.org/site/scholarship.html

As of the publication of the newsletter, the total amount contributed is $9975. With over 800 members in the division, if everyone would donate $75, the goal would be met. Please consider donating to the scholarship fund. The donations can be made online and are tax deductible.

## *Endowed Scholarship Drive*

**Chair: Rob Frost**

As Rob discussed at the dinner, the number of donors is growing. We need more donations. The scholarship is our legacy to the future (Yes, I sound like I work for your local PBS stations). The donor's so far are:

| **Supporter ($25-$99)** | **DeLorean Donor ($100-$499)** | **Professor ($500 - $999)** | **Time Traveler ($1,000+)** |
|---|---|---|---|
| Mr. Kevin Kimball<br>General Donation<br><br>Mr. Mark Jensen<br>General Donation<br><br>Mr. William Newmyer<br>General Donation<br><br>Mr.Lewis Kotredes<br>General Donation<br><br>Ms. Beverly Lomax<br>In honor of Robert (Bob) H. Lewis<br><br>Mr. David Lindenschmidt<br>In honor of Norm Provost | Mr. Calvin Hopper<br>General Donation<br><br>Mr. Joe Thomas<br>General Donation<br><br>Mr. Harry Felsher<br>General Donation<br><br>ANS 8.19 Working Group<br>In honor of - Mrs. Betty Davenport<br><br>Ms. Sandra Larson<br>General Donation<br><br>Mr. Brian Matthews<br>General Donation<br><br>Mr. Dennis Mennerdahl<br>General Donation<br><br>Mr. J. Chris Dean<br>General Donation | Ms. Elizabeth Plassmann<br>In honor of - Hugh Paxton<br><br>Dr. Robert Frost<br>In honor of - Dr. Hugh Clark<br><br>Mr. Michael J. Vehec<br>In honor of - Mr. Norman Pruvost<br><br>Mr. David & Mrs. Carol Cise<br>General Donation<br><br>Mr. Michael Corum<br>General Donation<br><br>Dr. Sedat & Mrs. Katherin Goluoglu<br>General Donation | Mr. George Bidinger<br>In honor of - Clarence L. Schuske<br><br>Dr. E. Charles Crume, Jr.<br>In honor of - Dr. A. Dixon Callihan<br><br>Dr. Ronald Knief<br>In honor of Dr. Raymond L. Murray, Elizabeth (Libby) B. Johnson, David R. Smith, Dr. Hugh C. Paxton, Dr. A. Dixon Callihan, Mr. G. Robert Keepin, Mr. Pierre LeCorche, Dr. Ryohei Kiyose, Mr. Kenneth R. Ridgway, Dr. John C. ("Jack") Courtney |

| Supporter ($25-$99) | DeLorean Donor ($100-$499) | Professor ($500 - $999) | Time Traveler ($1,000+) |
|---|---|---|---|
| | Ms. Barbara Krogfuss<br>General Donation<br><br>Mr. Andrew Prichard<br>In honor of Mr. Richard Libby<br><br>Mr. Larry Wetzel<br>In honor of Mr. Francis Alcorn<br><br>Mr. R. Chris Robinson<br>In honor of G. R. Handley, Richard G. Taylor and Gary D. Ellis<br><br>Mr. Randy Shackelford<br>In honor of Norman Pruvost<br><br>Mr. Adolf Garcia<br>In honor of Elizabeth (Libby) B. Johnson and David R. Smith<br><br>Dr. Douglas Croucher<br>General Donation<br><br>Dr. James A. Morman<br>General Donation<br><br>Mr. Harry W. Webb<br>In honor of Norman Provost | | Anonymous<br>in honor of Norm Pruvost<br><br>Mr. Jerry Hicks<br>In honor of David R. Smith |

With over 800 members in the division, if everyone would donate $75, the goal would be met. Please consider donating to the scholarship fund. The donations can be made online (https://secure.ans.org/about/scholarships/) and are tax deductible.

## *Executive Committee*

**Chair: Doug Bowen**

Doug Bowen convened the Executive Committee meeting at approximately 3:00 pm. All of the Nuclear Criticality Safety Division (NCSD) officers were present. The division officers are as follows:

| Position | Name | Phone | E-mail Address |
|---|---|---|---|
| Chair | Doug Bowen | (505) 667-5939 | dgbowen@lanl.gov |
| Vice Chair/Chair Elect | Larry Wetzel | (434) 522-6580 | llwetzel@babcock.com |
| Treasurer/Finance | Robert Maurer | (423) 735-5583 | rsmaurer@nuclearfuelservices.com |
| Secretary | Sandi Larson | (865) 483-8247 | sandi.larson@nuclearassociates.com |
| Past Chair (ex officio) | Brad Rearden | (865) 574-6085 | reardenb@ornl.gov |

A total of eight out of nine members of the Executive Committee were present. The Executive Committee members are as follows and those not able to participate are indicated with an asterisk (*):

| Term Ending June of (Year) | Name | Phone | E-mail Address |
|---|---|---|---|
| 2012 | Jerry Hicks | (505) 845-6287 | jhicks@nnsa.doe.gov |
| | Deborah Hill | (+44)1772 764359 | deborah.a.hill@nnl.co.uk |
| | Ronald Pevey* | (865) 974-7573 | rpevey@utk.edu |
| 2013 | Chris Robinson | (865) 574-8509 | robinsonrc@y12.doe.gov |
| | Adolf Garcia | (208) 526-4420 | garciaas@id.doe.gov |
| | Nick Brown | (423) 735-5519 | NWBrown@nuclearfuelservices.com |
| 2014 | Michael Corum | (803) 603-2349 | michael.corum@nuclearassociates.com |
| | Chris Haught | (865) 576-5522 | h7c@y12.doe.gov |
| | Allison Miller | (505) 845-3684 | admille@sandia.gov |

Approximately 27 additional NCSD members were present providing broad nuclear industry representation.

Doug announced that the Wilmington Area Local Section was chosen by Special Committee to host NCSD Topical in 2013. It will be held in Wilmington NC from September 30 to October 3, 2013. These dates are now on the ANS National calendar. Lon Paulson is the Technical Program Chair. Three proposals were received. They were from the Oak Ridge Section and the Trinity section. All three proposal were strong and we thank all three sections for their interest in hosting our next topical.

Pioneer Scholarship was discussed. Contributors are shown on the NCSD website. NCSD Awards Dinner on Tuesday at Maggiano's also served as a fundraiser. Thanks for Maria LeTellier and Allison Miller for helping to organize the NCSD Awards Dinner.

ANS Strategic Vision was handed out at Saturday meeting. Chair will distribute it to the Executive Committee by email for review. Comments are due in one month to ANS National.

Blue Ribbon Commission report from ANS to the Secretary of Energy was emailed out to Executive Committee members over the summer. No comments were received.

Larry Wetzel attended ANS President's meeting with Division Officers Sunday morning for the Chair. Board of Directors sets the policy and vision. ANS has an Interim Director at this time while searching for a new Executive Director. Executive Director works for Board of Directors as a go between to the staff.

Per Bob Maurer, NCSD is financially sound with funds of $26,459. Main expenditures have been for student conference and student travel.

### *Scholarship Committee: Julie Ezold*

Applications due Feb 1. Applications are available on-line along with testimonials from prior recipients. Number of applications received has been on the rise. Committee is discussing whether repeat scholarships should be awarded to the same person. Committee is looking for members. If you are interested in working on the committee, contact Julie (ezoldjg1@ornl.gov)

### *Education Committee: Katherin Goluoglu*

Lon Paulson gave report for Katherin Goluoglu. Three papers are in the works. The first, Integrating NCS into Design, will go through one more round within the committee before sending it to Executive Committee. The second, Realism in the Assessment of Fissionable Material Operation Outside Reactors, has been sent to Executive Committee. Third paper on CAAS and IEZ should be to Executive Committee before next meeting.

### *Publications/Newsletter/Web Site: Larry Wetzel*

Web site gets hits from all over the world averaging 40 visitors/day. Larry is still looking for the appropriate ANS standing committee that can change the current rules that limits the time paper presentations can remain on-line. Currently, the rules limit it to 6 months. Larry is meeting with Publications Steering Committee later this week. Newsletter publication has been slow and Larry is looking for someone to take over that task. ANS President has visited all division websites and found ours up to date.

### *Honors and Awards Committee: Maria LeTellier*

The Awards dinner Tuesday night as discussed above. There haven't been many nominations for awardees. Maria has been chair for about 4 years and is looking for a replacement. If you are interested in chairing or working on this committee contact Doug Bowen (dgbowen@lanl.gov) or Maria LeTellier (letelliermms@y12.doe.gov).

### *ICNC Meetings*

Deborah Hill gave an overview of ICNC 2011 held this past September. There were over 280 participants with 25% from US. There were approximately 180 papers such that 8 tracks plus a poster session were held. Committee is collecting suggestions and lessons learned for the next meeting.

Cecil Parks spoke on behalf of ICNC. The US will host the next ICNC meeting in 2015. It was last hosted in US in 1995. It should be a Class 1 Meeting with ANS as the domestic sponsor along with the OECD Working Party on Criticality Safety. Creating a special committee to write a request for proposals to determine host section was discussed. International personnel should be on the selection committee and although host section will likely do a lot of the arrangements, other positions will likely be from a broad US and International base. Cecil Parks, Calvin Hopper, Drew Barto, and Jerry McKamey are on the International Advisory Committee. Deb Hill will also serve or find another member of the ICNC 2011 planning committee to represent their experience, along with members of the recent topical selection committee. Jerry Hicks moved to form special committee and Brad Rearden seconded. The motion passed.

### *ANS Student Conference Presentation - UNLV*

Vanessa Sanders and Sherry Fey from UNLV gave an update on the 2012 student conference. Events will be held on UNLV campus at the Student Union. Tours of Nevada National Security Site, Atomic Testing Museum, etc and workshops on the Visual Editor and other topics are planned. Expenses are $430/student compared to the $25 charged. Sponsorship requested and NCSD budgeted funds will be dispersed to the UNLV ANS student chapter. They are also looking for session judges.

### *Old Business*

Fukushima re-criticality white paper discussed at the previous Executive Meeting was discussed. It was agreed that the time for this paper has passed but the Chair will find out if Professional Divisions Committee would like to see what was written.




## *Program Committee*

**Chair: Allison Barber**

## Highlights of the DC Meeting

There were three technical sessions with a total of 16 papers along with the ANS 8 forum. This was a reasonable number of papers considering ICNC will be held in September. The papers are listed below and some of the presentations are available on the NCSD website (http://ncsd.ans.org/site/papers_washington_2011.html)

**Data Analysis in Nuclear Criticality Safety-I,**

A Digital Criticality Safety Document Collection Available Through the U.S. Department of Energy's NCSP Web Site, Brian L. Koponen *(LLNL, retired)*, David P. Heinrichs, Chuck K. Lee *(LLNL)*

Study on Particle and Absorber Effects on Multiplication Factors of Debris Beds with MVP, Tsugio Yokoyama *(Toshiba Nuclear Engineering Services Corp)*, Taiki Fujishiro, Hisashi Ninokata *(Tokyo Inst Technol)*

Supercritical Transient Analysis in Weakly Coupling Systems, Haruka Kikuchi, Toru Obara *(Tokyo Inst Technol)*

Acceleration of Monte Carlo Criticality Calculations Using Deterministic-Based Starting Sources, Ahmad M. Ibrahim *(Univ of Wisconsin, Madison)*, Douglas E. Peplow, John C. Wagner, Scott W. Mosher, Thomas M. Evans *(ORNL)*

First Critical Experiment at Critical Experiment Facility, Rene Sanchez, David Hayes, Joetta Goda, William Myers *(LANL)*

Verification of Burnable Absorber Rod Worth Evaluation for Criticality Safety Analysis of a RAJ-II BWR Shipping Package, Tanya Sloma *(Westinghouse)*, Peter Vescovi *(Transport Logistics International)*

CritView: An Electronic Handbook for Criticality Safety, Scott H. Finfrock *(Fluor Federal Services)*, Mark B. Murphy *(CH2M HILL Plateau Remediation Company)*

The Analysis of the Radial Thermal Expansion of Clear Polyvinyl Chloride and Polyvinylidene Fluoride (Kynar®) Columns, Katherine A. Nagley *(Central Virginia Governor's School)*, Larry L. Wetzel *(Babcock & Wilcox-NOG)*

The Language of the Process Analysis Requirement and the Double Contingency Principle, Shean P. Monahan *(LANL)*, Thomas P. McLaughlin *(Consultant)*, Adolf Garcia *(DOE Idaho Operations Office)*, Calvin Hopper, G. Elliott Whitesides *(Retired)*

**Recent Advances in Criticality Safety Activities at the Y-12 National Security Complex-I**

Nuclear Criticality Safety Strategic Vision for Y-12 Enriched Uranium Operations, R. Scott Underwood, Jr. *(B&W Y-12)*

Improvements to the Interface Between Facility Safety and Criticality Safety at Y-12 NSC, Chris Haught *(B&W Y-12)*

The Evaluation of Infinite Thickness Reflectors for Neutron Generator Active Interrogation Measurements, Dennis A. Tollefson *(Navarro Research and Engineering, Inc.)*, Scott L. Creasey, Ralph V. DeMeglio *(B&W Y-12 Technical Services L.L.C.)*, John T. Mihalczo *(ORNL, UT-Battelle, LLC)*

Integration of Criticality Safety into the Uranium Processing Facility Design, Barbara Krögfuss *(B&W Y-12)*

Design Alternatives for Nuclear Criticality Safety Instrumented Systems, Julia W. Insalaco, Barbara I. Krogfuss, Danny A. Walker *(B&W Y-12)*

Method of Determining Subcritical H/D Ratios for Cylindrical Systems, Daniel F. Hollenbach, Richard G. Taylor, Cindy J. Shields *(Y-12)*

Transformation of the Y-12 Nuclear Criticality Safety Committee, Douglas W. Croucher *(The Croucher Group, Inc.)*, John Gertsen *(B&W Y-12)*

**Recent Advances in Criticality Safety Activities at the Y-12 National Security Complex-II,**

Productivity Techniques and Quality Aspects in the Criticality Safety Evaluation of Y-12 Type-B Fissile Material Packages, John F. DeClue *(B&W Technical Services)*

Small-Angle Compton Scattering to Determine the Attenuation of Gamma Rays from HEU, Rick B. Oberer, Cynthia A. Gunn, Lisa G. Chiang, Michael C. Mattmann *(Y-12 NSC)*

Improvements in Preventing Uranium Accumulations in Large Volume Machine Coolant Tanks, Bev A. Lomax, Jerry J. Lichtenwalter *(Y-12 NSC)*

Innovations in CAAS and Emergency Planning/Response at Y-12 NSC, Peter L. Angelo *(Y-12 NSC)*

**Data Analysis in Nuclear Criticality Safety-II**

US MOX IROFS Risk Ranking for Enhanced Criticality Safety, Michael J. Shea, Leslie E. Duncan, Robert G. Eble, Jeffrey R. Brault *(Shaw AREVA MOX Services)*

Thermal Total Cross Section Measurement for $^{63}$Cu and $^{65}$Cu at the MIT Reactor, Vladimir Sobes, Ruaridh Macdonald *(MIT)*, Luiz Leal *(ORNL)*, Benoit Forget *(MIT)*, Klaus Guber *(ORNL)*, Gordon Kohse *(MIT)*

MCNP6 Shielding Validation Suite: Past, Present, and Future, Brian C. Kiedrowski, Forrest B. Brown *(LANL)*, Nathan A. Gibson *(MIT)*, Alexander S. Bennett, Matthew A. Gonzales *(Univ of New Mexico)*

Criticality Safety Student Training Program at DOE-ID, Adolf Garcia *(DOE, Idaho Falls)*, Mackenzie Gorham *(Idaho State Univ)*, Joseph A. Christensen *(DOE)*

**Recent Nuclear Criticality Safety Program Technical Accomplishments**

US DOE NCSP Training and Education Program Plan, Calvin M. Hopper *(ORNL)*

Planning for CEF Experiments for Stockpile Stewardship and Global Security, Robert C. Little, Todd A. Bredeweg, Peter J. Jaegers, Albert C. Kahler III, William L. Myers, Morgan C. White, Charles W. Wilkerson Jr. *(LANL)*

MCNP Developments, Forrest B. Brown, Brian C. Kiedrowski *(LANL)*

Current CEF/DAF Operational Update and Schedule, William L. Myers, Steven D. Clement *(LANL)*

SILENE Benchmark Critical Experiments for Criticality Accident Alarm Systems, Thomas M. Miller (ORNL), Kevin H. Reynolds (BWXT Y-12, LLC)

Nuclear Accident Dosimetry Exercises at CEA-Valduc, Andrew R. Wysong, David P. Hickman (LLNL)

The sessions were well attended with up to 90 people in attendance. This makes for a full room at the Omni.

The speakers came from many different companies and facilities. We had presentations from Japan as well as the US. We even had one high school student present a paper.

## Sessions for Chicago Meeting:

**Advancing Criticality Safety Capabilities in a Growing Nuclear World:** The sharing of knowledge and experience between developers and nuclear criticality practitioners provides benefits to the overall community. Papers within this session are expected to focus on recent, state-of-the-art developments in production-level radiation transport simulation software (e.g., SCALE, MCNP) and nuclear data sets (e.g., ENDF, JENDL) that are relevant to the criticality safety practitioner. Also, papers relating the experience of practitioners on using new capabilities or those focusing on unaddressed current needs are strongly

encouraged.
**Session Organizer:** Brian C. Kiedrowski

**Benchmarking Experiments for Criticality Safety and Reactor Physics Applications:** The International Criticality Safety Benchmark Evaluation Project (ICSBEP) and the International Reactor Physics Experiment Evaluation Project (IRPhEP) were established to identify and evaluate a comprehensive set of criticality safety and reactor physics related experimental data and preserve the data in a form the will be easily accessible to users. The projects provide a basis for recording, developing, and validating computational and analytical methods. This tutorial will outline and discuss the benchmark process for the ICSBEP and IRPhEP. Topics consist of the importance of quality experimental measurements, benchmark model development, uncertainty quantification, and utilization of these benchmarks in real-world applications.
**Session Organizer:** John Bess

**Data, Analysis and Operations in Nuclear Criticality Safety**: The purpose of this session is to provide a forum for timely presentation of general issues in the area of nuclear criticality safety that are not covered in other special session topics.

Take a look at the topics and consider submitting a summary. As professionals, the exchange of information is essential to maintain a fresh prospective on work and help assure the safety of the workers and public. The deadline for submissions is January 13, 2012.

## Sessions for Winter Meeting in San Diego:

**Validation Tutorial:** This tutorial session will discuss the requirements and techniques for a successful validation effort. The tutorial will touch on several topics important to validating a code system. These topics include an overview of the requirements of ANS 8.24. The tutorial will discuss the use of a global validation versus process specific validations and the importance of defining an appropriate area of applicability for the validated code system. Statistical methods for determining a subcritical limit will be reviewed, as well as how much added margin is appropriate for a particular application. Appropriate sources of benchmarks will be discussed, and when it is appropriate to develop benchmark cases not currently available.
**Session Organizer:** Katherine L. Goluoglu

**FY2011 Nuclear Criticality Safety Program Technical Accomplishments** The Nuclear Criticality Safety Program (NCSP) has been doing lots of good, interesting, technical work supporting the DOE criticality safety enterprise, as well as benefiting the nuclear community as a whole. There are few opportunities to learn about these efforts since they cannot all be presented at an ANS meeting. However, an NCSP Technical Seminar is held annually in the spring at Oak Ridge National Laboratory. The goal of this seminar is to have each NCSP Task Manager present their technical results from the fiscal year. Specifically, the presentations provided a summary of: the work that was done; why the work was done; and who benefited from the work or could potentially benefit across the DOE as well as the nuclear complex.

This annual meeting leads to an opportunity for the NCSP to showcase outstanding NCSP technical accomplishments and as a result, the best technical results that will have the most benefit to the nuclear community as a whole have been compiled and those presenters will provide these technical results at the 2012 Winter American Nuclear Society Meeting.
**Session Organizer:** A. Nichole Ellis

**Data, Analysis and Operations in Nuclear Criticality Safety**: The purpose of this session is to provide a forum for timely presentation of general issues in the area of nuclear criticality safety that are not covered in other special session topics.

## Upcoming Meetings (at a glance)

Dates and locations of upcoming meetings are listed below:

| Dates | Location |
|---|---|
| June 24-28, 2012 | Chicago, IL (ANS Annual Meeting) |
| Nov. 11-15, 2012 | San Diego, CA (ANS Winter Meeting) |
| June 16-20, 2013 | Atlanta, GA (ANS Annual Meeting) |
| Sept 30 - Oct 3, 2013 | NCSD Topical (Wilmington, NC) |
| Nov. 10-14, 2013 | Washington, DC (ANS Winter Meeting) |
| June 15-19, 2014 | Reno, NV (ANS Annual Meeting) |
| November 9-13, 2014 | Anaheim, CA (ANS Winter Meeting) |
| June 7-11, 2015 | San Antonio, TX (ANS Annual Meeting) |
| | ICNC (TBD) |
| November 8-12, 2015 | Washington, DC (ANS Winter Meeting) |

## *ANSI/ANS-8 Volunteers Needed*

Several ANSI/ANS-8 Work Group chairs have indicated they could use additional volunteers to support standards revision or maintenance work. If you are interested in supporting one or more of the ANS-8 Work Groups listed below, please contact the listed Work Group Chair or Vice-Chair.

Please note that to become a member of an ANS-8 Work Group, the Work Group Chair must agree to your participation. Volunteers should have the endorsement by their management, since effective standards participation involves travel, labor effort, and potential use of company resources. ANS standard volunteers must also register with ANS (http://www.new.ans.org/standards/involved/).

ANSI/ANS-8.6 - Safety in Conducting Subcritical Neutron-Multiplication Measurements in Situ
Chair: Bill Meyers

ANSI/ANS-8.7 - Nuclear Criticality Safety in the Storage of Fissile Materials
Chair: Kevin Kimball

ANSI/ANS-8.12 - Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors
Chair: Debdas Biswas

ANSI/ANS-8.17 - Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors
Chair: Brian Kidd
NOTE: For ANS-8.17, volunteers for both working group members and for the Chair position will be considered.

ANSI/ANS-8.28 NDA Measurements (proposed new standard)
Vice-chair: Larry Berg

All of the ANSI/ANS-8 standards can be purchased through ANS at http://www.new.ans.org/store/.

## *International Standards for Nuclear Criticality Safety*

In addition to the ANSI/ANS standards in the US, there are international standards. The US has representation on these standards. These standards are not used by the US Regulators, but it is good for the practitioners to be familiar with them.

The following International Standards Organization (ISO) standards apply to nuclear criticality safety:

- ISO 27467:2009 (Ed.1), "Nuclear Criticality Safety—Analysis of a Postulated Criticality"
- ISO 11311:2011 (Ed. 1), "Nuclear Criticality Safety—Critical Values for Homogeneous Plutonium–Uranium Oxide Fuel Mixtures Outside of Reactors"
- ISO 27468:2011 (Ed. 1), "Nuclear Criticality Safety—Evaluation of Systems Containing PWR UOX Fuels—Bounding Burnup Credit Approach"
- ISO 11320:2011 (Ed. 1), "Nuclear Criticality Safety—Emergency Preparedness and Response"

The following ISO standard is in development:

- ISO/CD 16117, "Nuclear Criticality Safety—Estimation of the Number of Fissions of a Postulated Criticality Accident"

Details on the scope and content of these standards are provided in a paper by Calvin M. Hopper titled "Status and Value of International Standards for Nuclear Criticality Safety," published in proceedings of the International Conference on Nuclear Criticality 2011.

The approved ISO NCS standards may be purchased from http://www.iso.org/iso/iso_catalogue.htm (click on "By TC," "TC 85," then "TC85/SC 5").

# *US DOE Nuclear Criticality Safety Program's Nuclear Criticality Safety Engineer "Hands-On" Subcritical and Critical Experiments Training and Education Course*

**Facilities:** 1st Week at Los Alamos National Laboratory (LANL) TA55/PF4 and Classroom
2nd Week at either:
Sandia National Laboratories (SNL)
Sandia Pulsed Reactor Facility Critical Experiments (SPRF/CX)
or:
Nevada Nuclear Security Site (NNSS) Device Assembly Facility (DAF)
National Critical Experiments Research Center (NCERC)

**Points of Contact:**

**Program Coordinators:**

Calvin M. Hopper: Phone 865-576-8617 Email hoppercm@ornl.gov-
Sedat Goluoglu: Phone 865-574-5255 Email goluoglus@ornl.gov

**Registration Request: http://ncsp.llnl.gov/classMain.html**

**Brief Description of the Course**

The course is a comprehensive, two-contiguous week course. The basis of the course is derived from the American National Standards Institute American Nuclear Society (ANSI/ANS) national standard ANSI/ANS-8.26-2007 and the training and education Mission and Vision of the US DOE Nuclear Criticality Safety Program (NCSP). The DOE NCSP nuclear criticality safety engineer (NCSE) classroom education, facility training, and hands-on subcritical and critical experiments training provide education and training for entry-level NCSEs. The course content is limited to provide education and training in subjects and facilities that cannot, or are not, readily provided by the NCSE's employer. This limitation avoids overlap with NCSE site-specific education and training. Additionally, the course provides DOE guidance in the interpretation and application of its federal rules, directives, standards, and guides with emphasis on preparing nuclear criticality safety evaluations that meet DOE standards. Upon the successful execution of repeated courses during 2012, the content and duration of the course will be modified to address additional DOE training needs for individuals (e.g., safety managers, supervisors, military, personnel, etc.). The current education and hands-on training course will be provided four times in fiscal year 2012; six times in fiscal year 2013; and eight times per fiscal year thereafter.

**Course Content**

The first week is for education and facility training, and the second week is for hands-on subcritical and critical experiments training. Though there are two alternatives for the second week of hands-on subcritical and critical experiment training with very different experimental machines, the course has been designed to ensure that the same learning objectives are met.

**Los Alamos National Laboratory (classroom and facility tour)**

- Nuclear criticality safety history and fundamentals
- Time behavior of fissioning systems
- Process criticality safety accident discussion
- Hand calculation method discussion

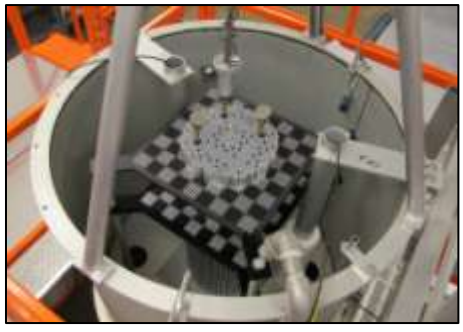
- Evaluation team breakouts (in preparation for facility tour and process criticality safety evaluation assignments)
- Guidance in the preparation of DOE STD 3007 compliant nuclear criticality safety evaluations
- Overview of ANSI/ANS Series 8 Standards
- Instruction on interpreting and applying US DOE rules, directives, standards, and guides
- Hazards analysis role in the safety evaluation process
- Tour of TA-55/PF-4 plutonium process facility with specific walkdown in preparation of safety evaluation assignment
- Instruction about human factors and equipment reliability influence upon criticality safety
- Interpretation and application of nondestructive analysis methods and results to nuclear criticality safety

Classroom exercises in completing nuclear criticality safety evaluations are based on operations observed in the walk-around tours of the LANL TA-55/PF-4 plutonium facility shown here to the left.

**Sandia National Laboratories (hands-on subcritical and critical water-moderated lattice experiments)**

- Fundamentals of criticality physics
- Critical-experiment accidents
- Critical-experiment design
- Critical-experiment execution
- Hands-on subcritical and critical experiments
- Analysis of experimental results
- Critical experiment benchmarking

The hands-on subcritical and critical experiments are performed in the SNL SPRF/CX lattice water tank shown below.



**National Critical Experiments Research Center (hands-on subcritical and critical machines)**

- Critical experiment accidents
- Experimental fission chain process
- Definition of reactivity and multiplication related to the delayed and prompt critical states
- Neutron life cycle for thermal and fast neutron systems
- Point reactor kinetics model, in-hour equation
- Reactivity measurement methods, feedback

The hands-on subcritical and critical experiments are performed at the NCERC DAF of the NNSS shown below.

Various subcritical and critical experiment assembly machines exist at the NCERC. They include the Planet vertical lift assembly machine (seen below on the left), the Godiva IV fast burst reactor, the Flattop horizontal assembly machine, and the Training Assembly for Criticality Safety (TACS) vertical lift machine (shown below on the right) previously used at the recent the Lawrence Livermore National Laboratory (LLNL) hands-on training courses.

ANS Meeting photographs by Larry Wetzel and Dave Faidley.

"Hands On" article photographs provided by the US DOE.