American Nuclear Society

Nuclear Criticality Safety Division Newsletter

Summer 2010

Table of Contents

Message from the Chair **2**
Program Committee **3**
Education Committee **8**
Executive Committee **9**
NCSD Website **11**

Editor: Larry L. Wetzel

Website: http://ncsd.ans.org

Message from the Chair

Greetings to the members of the ANS Nuclear Criticality Safety Division (NCSD). It is my great pleasure to write to you as the new chair of this vibrant Division. The membership of NCSD continues to grow, and we now have approximately 850 members, with nearly 100 student members, which is a great credit to the work of our Membership committee. At the June meeting in San Diego, I was given the opportunity to make a brief presentation on the success of our Division to the ANS Board of Directors. In addition to our membership growth, I was pleased to report the great work of our members who develop strong technical papers, based on topics generated by our Program committee, for some of the best-attended technical sessions in the Society. I also described the work members who are involved in developing consensus standards and Education committee who develop white papers that serve the international criticality safety community. I was pleased to report that the efforts of our members are recognized with the annual service and technical excellence awards from our Honors and Awards committee, and all of these successes are report through bi-annual newsletters (such as this one) and our website at http://ncsd.ans.org, both of which are coordinated by our Newsletter, Publications and Website committee.

The area that received greatest recognition from the Board of Directors is our ability to attract and retain young members. One avenue for attracting young members to criticality safety is the Pioneers scholarship, coordinated by our Scholarship committee. Another avenue is a free ticket to our annual awards banquet for student members and first-time attendees. However, getting someone through the door is not sufficient to keep him or her interested in the work of the Division. The most valuable resource we have for attracting and retaining new talent to the area of criticality safety is our membership, and by membership I mean you. I am very proud of the respect new members are given in technical presentations and the welcoming environment presented when new members express an interest in Division governance, especially as committee volunteers. I want to encourage each of you to continue to reach out to prospective new members and welcome those who come through our door.

Along these lines, NCSD is one of the only Divisions to elect a student member to an officer position. Allison Barber, who has now graduated to become a young member, was elected as NCSD secretary as a student member this spring. I look forward to working with Allison during my brief term as chair.

To continue to encourage bright and energetic student and young members to participate in NCSD, the Executive committee has decided to work towards the establishment of an endowed scholarship. Past NCSD chair Robert Frost as agreed to lead a new special committee to make this long-term goal a reality.

As you can see from the great work described above, there many great aspects of NCSD, and I want to thank all those who make this possible. For those of you looking to be more engaged in the Division, there are nearly endless opportunities to help our hard-working committees, even if you cannot attend every meeting. If you are interested in becoming more involved, please contact me or any of our Division leaders listed later in this newsletter.

I look forward to seeing each of you in the near future.

Brad Rearden, *NCSD Chair*

Program Committee

Chair: Larry Wetzel

Highlights of the San Diego Meeting

There were five sessions at the San Diego meeting. There were 9 papers in the Data, Analysis and Operations sessions and 5 give in the Computational Advances sessions. There was a two sessions tutorial on Hazards Analysis. The presenters were from the DOE complex, NRC licensees and from the UK.

The presentations given in San Diego are available in the NCSD website at http://ncsd.ans.org/site/San_Diego_Annual2010.html

Incoming Division Chair Brad Readen presents Outgoing Chair Rob Frost with a plaque of appreciation.

"Lively" participation in the committee meeting

Networking

Technical Session

Upcoming Meetings (at a glance)

Dates and locations of upcoming ANS meetings are listed below:

Dates	Location
Nov. 7 - 11, 2010	Las Vegas, NV (ANS Winter Meeting)
June 26-30, 2011	Hollywood, FL (ANS Annual Meeting)
Sept. 19 -22, 2011	Edinburgh, Scotland (ICNC 2011)
Oct 30-Nov 3, 2011	Washington, DC (ANS Winter Meeting)
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)
Nov. 10-14, 2013	Washington, DC (ANS Winter Meeting)

Las Vegas Winter Meeting

The ANS Winter meeting will be held in Las Vegas, NV at the Rivera Hotel on November 7th to 11th. There are a total of 21 papers that will be given. The scheduled sessions and papers are:

Data, Analysis, and Operations for Nuclear Criticality Safety—I, Tues. a.m.

- HEU Cylinders Reflected by Concrete and Cylinders Surrounded by Vermiculite and Reflected by Polyethylene, Mackenzie L. Gorham (Idaho State Univ)
- Updates and Improvements to the NCSP Bibliographic Database, Brian L. Koponen (LLNL, retired), David Heinrichs (LLNL)
- New ALARP Residues Recovery System—Design Concept to Operation, Lauren Kate McDonald (National Nuclear Lab)
- Modeling Uranium Slurry Experiments with the MCNP5 Stochastic Geometry Card, Jerry J. Lichtenwalter, Jennifer Carney (Y-12 NSC)
- Adding Realism to Spent Nuclear Fuel Dissolving Analysis, Brittany Meriwether Williamson (SRNS)
- Adjoint-Based Eigenvalue Sensitivity to Geometry Perturbations, and a Warning, Jeffrey A. Favorite (LANL)
- Effect of Fission Spectrum Data Uncertainty on Criticality Benchmark Calculations by McCARD, Ho Jin Park, Hyungjin Shim, Han Gyu Joo, Chang Hyo Kim *(Seoul Natl Univ)*, Choong Sup Gil *(KAERI)*

Data, Analysis, and Operations for Nuclear Criticality Safety—II, Tues. p.m.

- Criticality Experiment Capabilities Located at the Nevada Test Site, William L. Myers, John A. Bounds, Steven D. Clement, Derek R. Dinwiddie, Joetta M. Goda, David K. Hayes, Rene G. Sanchez *(LANL)*
- NQA-1 Vendor Support of Criticality Safety at the MOX Fuel Fabrication Facility, Michael Joseph Shea *(Shaw AREVA MOX Services)*
- Dispelling the Myth of Super-Moderators, Shean P. Monahan, Mark V. Mitchell, Charles D. Harmon *(LANL)*

- Regulatory Uncertainty in Spent Fuel Pool Criticality License Amendment Requests, Kent Alan Lee Wood *(NRC)*
- Integral Cross Sections and Other Useful Information Extracted From Spent Fuel Data, Hans Toffer *(Consultant)*, Warren Wittekind, Raymond Puigh, David Erikson *(Fluor Government Group)*, Michael Westfall *(Consultant)*
- Verification of K-Eigenvalue Sensitivity Coefficient Calculations Using Adjoint-Weighted Perturbation Theory in MCNP,
- Brian C. Kiedrowski, Jeffrey A. Favorite, Forrest B. Brown *(LANL)*
- Enhancements in SCALE 6.1, Bradley Thomas Rearden *(ORNL)*
- Criticality Safety Engineer Training at Savannah River Nuclear Solutions LLC, John Schlesser, David G. Erickson, Joye Brotherton *(SRNS)*

A Special Session on "LLNL Plutonium Facility," Wed. a.m.

- Criticality Safety Process Improvement at LLNL, John S. Pearson, Kevin Mahoney *(LLNL)*
- LLNL Standard Criticality Controls—History, Features, and Advantages, Debdas Biswas, John S. Pearson, John Scorby *(LLNL)*
- History of Criticality Safety Advisory Committee at the Lawrence Livermore National Laboratory, Song Huang, David Heinrichs, Brian Koponen, Charles Barnett, Debdas Biswas *(LLNL)*
- The Idea of "Dispersible" in Criticality Safety, Brian L. Koponen *(LLNL, retired)*, Andrew Wysong, Alan Krass *(LLNL)*
- LLNL Plutonium Facility Criticality Alarm System, Soon Sam Kim, Edward Orham *(LLNL)*
- Hands-on Nuclear Criticality Safety Training at Lawrence Livermore National Laboratory, Catherine M. Percher *(LLNL)*
- Lawrence Livermore National Laboratory Security Category I/II SNM De-Inventory Status, David Riley, Debdas Biswas, Karen Dodson *(LLNL)*
- Criticality Safety Controls and Disposal of TRU Drums Generated by the LLNL Pu Facility, Shang-Chih P. Chou, John S. Pearson, John S. Wolf *(LLNL)*

Nuclear Criticality Safety Standards–Forum, Thurs. a.m.

NCSD Awards Dinner

We are pleased to announce that the 2010 NCSD Awards Banquet will be held at Joe's Seafood, Prime Steak & Stone Crab restaurant in Las Vegas on Tuesday, November 9. We respectfully request that you consider contributing as a sponsor of the event. Your sponsorship will help provide complimentary tickets for students and first time attendees in addition to providing reduced price tickets for our members. We offer the following standard levels of sponsorship:

		
Platinum Sponsor - $500 (receives four dinner tickets)	**Gold Sponsor - $300** (receives two dinner tickets)	**Silver Sponsor - $150** (receives one dinner ticket)

If you wish to donate additional amounts or sponsor specific items, we will work to accommodate your request.

If you believe you can help sponsor this event, please contact Maria LeTellier by September 30, 2010 (letellierms@ornl.gov). A separate announcement will be sent when ticket sales open.

Donation checks should be made payable to ANS (NCSD Dinner in the memo line) and submitted to:

Maria LeTellier
9525 Trails End Road
Knoxville, TN. 37931

Hollywood, Florida Call for Papers

The **2011 ANS Annual Meeting** will be held June 26-30, 2011at the Westin Diplomat Hotel in Hollywood, FL. The deadline for summary submission is January 14, 2011, and the Call for Papers for the meeting is available on the Internet at http://www.new.ans.org/meetings/file/203

1. Data, Analysis, and Operations for Nuclear Criticality Safety – Contributed

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.
Session Organizer: Larry Wetzel, Babcock & Wilcox NOG-L, (434) 522-6580, llwetzel@babcock.com.

2. Nuclear Criticality Safety Standards Forum – Panel

Subcommittee ANS-8, Operations with Fissile Material Outside Reactors, meets to discuss various technical and administrative aspects of the approximately 20 national consensus standards under its purview. In addition to status and progress updates by representatives of individual working groups, formal presentations on the technical bases of numerical values such as subcritical limits and experiences with applications of particular standards are solicited. Agenda topics such as new and expanded standards are also encouraged.
Session Organizer: Davis Reed, ORNL, (865) 576-6359, reedda@ornl.gov

3. Nuclear Criticality Safety Issues Related to Conduct of Operations

The Los Alamos report, LA-13638, "A Review of Criticality Accidents," concluded that conduct of operations issues, ineffective personnel communication, incomplete understanding of abnormal conditions, lack of awareness of criticality hazards, untrained operating personnel, and lack of self-reporting of process upsets, for example, contributed to many of the process criticality

accidents. The intent of this session is to share lessons learned between nuclear criticality safety programs related to conduct of operations issues in operations with fissionable material outside reactors.
Session Organizer: Doug Bowen, LANL, (505) 667-5939, dgbowen@lanl.gov

4. Proper Applications of Benchmarking in Criticality Safety

Use of codes and calculational techniques in criticality safety requires proper comparison to experimental values. This session will discuss how new critical experiments are designed, planned and executed and important measurements to be made and data to be collected during critical experiments. The development of benchmark evaluations for incorporation in the International Criticality Safety Benchmark Evaluation Program Handbook (ICSBEP Handbook) from experiments will be discussed. The methods for collapsing differential cross section measurements will be described, and the effect of the cross section collapse assumptions on criticality safety calculations will be discussed. Advantages and disadvantages of various cross section libraries for criticality safety will be presented.
Session Organizer: Jerry Hicks, DOE, (505) 845-6287, jhicks@doeal.gov

5. Improvements in NCS Controls

One of the objectives of NCS is to establish controls that are not likely to fail. This includes utilization of technology, training, and changes in equipment design to make the mesh the controls with the normal operations. The objective is to make it easy to do it right and hard to do it wrong. In this session, papers should focus on how NCS controls have been improved or developed to improve the robustness of the controls. Specific examples would be beneficial.
Session Organizer: Sandi Larson, Nuclear Safety Associates, (865) 574-4659, sandi.larson@nuclearassociates.com

ICNC 2011, Edinburgh, Scotland, September 19 – 22, 2011

The draft technical program is available for ICNC 2011. The full details of the meeting can be found at www.icnc2011.com .

ICNC 11 – Draft Technical Programme

1. Development of Standards and Assessment Methodology
2. Operational Practise
3. Criticality Codes and Nuclear Data
4. Criticality Experiments
5. Uncertainty Analysis
6. Analysis of Criticality Accidents and Incidents
7. Burnup Credit
8. Waste Management Issues
9. Professional Development Issues

Education Committee

Chair: Katherin Goluoglu

With the conclusion of the meeting in San Diego, Sedat Goluoglu completed his term as chair of the Education Committee. The new chair will work closely with the past chair since the new chair is Katherin Goluoglu. The Division thanks Sedat for his work.

Education Committee is working on white papers on "Integrating Criticality Safety into Design" and "Criticality Accident Alarm systems and Immediate Evacuation Zones". The following table shows a list of white papers currently published by the NCSD.

The current white papers are listed below and they can be viewed and downloaded at the White Paper webpage.

Whitepaper Topic	Primary Author(s) Revision Status
NCSD Whitepaper Approval Process In 2001, the NCSD Executive Committee endorsed use of whitepapers to relate guidance on pertinent issues or examples of good practices in the practice of Nuclear Criticality Safety. The whitepaper process is intended to be a venue for all members of the division to promote best practices, lessons learned or to explore meaningful discussions on issues of importance to the criticality safety community. Whitepapers are intended to be living documents that could and should change as practices improve.	Mikey Brady-Raap, Lon Paulson Revised 6/06 (Rev 1)
Education Committee Overview The following initiatives (i.e., development of White Papers) were identified by consensus to implement the mission statement: • Overview of the ANS/NCSD Education Committee • Establish guidance on a definition of a criticality safety engineer specialist • Establish guidance on a successful nuclear criticality safety mentoring program • Establish guidance on an acceptable evaluation of nuclear criticality safety • Establish guidance on a criticality safety engineer specialist training and qualification program • Establish guidance on proper implementation of the double contingency principle	Lon Paulson Revised 6/06 (Rev 0)

Whitepaper Topic	Primary Author(s) Revision Status
Successful NCS Mentorship Program As the Nuclear Criticality Safety Community grows older and large numbers of experienced criticality safety engineer specialists retire, there is a need for young aspiring criticality safety engineer specialists to fill the gap. It is very important that the lessons-learned over the past ~50 years are passed on to the "next generation." This can be effectively accomplished utilizing a nuclear criticality safety mentorship program. A more experienced criticality safety engineer specialist (i.e., Mentor) should educate the lesser-experienced criticality safety engineer specialist (e.g., Trainee, or Engineer). Mentorship should not end once the Criticality Safety Trainee becomes a qualified Criticality Safety Engineer or Senior Criticality Safety Engineer at his/her nuclear facility. It is an ongoing, continuous process while an active member of the Nuclear Criticality Safety profession.	Bonnie Rumble Revised 6/06 (Rev 0)
Nuclear Criticality Safety Evaluations One of the more difficult tasks of a criticality safety engineer (CSE) is to develop the rationale for the establishment of controlled parameters and the proper documentation of the basis for subcritical limits derived for the controlled parameters. In addition, clear specifications of associated control and functionality requirements to safely operate a process or facility that contains fissile material must be clearly communicated to operating personnel.	Lon Paulson, Jim Mormon Revised 11/09 (Rev 1)
Nuclear Criticality Accidents In The Workplace: Fact Sheet A nuclear criticality accident is the occurrence of a self-sustaining neutron chain reaction that is either unplanned or behaves unexpectedly. Only a few special nuclear materials such as enriched uranium or plutonium are capable of supporting a self-sustaining neutron chain reaction, hereinafter called nuclear criticality. Nuclear criticality results in the same reactions that occur in a nuclear reactor. The products of nuclear criticality are heat, radiation, and radioactive materials called fission products.	Richard Taylor Revised 6/06 (Rev 1) Minor Revision (4/09)

Executive Committee

Division Officers	
• **Chair:** Brad Rearden, Phone: 865-574-6085, Oak Ridge National Lab	• **Treasurer/Finance:** Sedat Goluoglu Phone: 865-574-5255, Oak Ridge National Lab
• **Vice Chair:** Doug Bowen Phone: 505-667-5939 Los Alamos National Lab	• **Secretary**: Allison Barber Phone: 505-301-7426 Sandia National Lab, Inc

Executive Committee		
Through June 2011:	**Through June 2012:**	**Through June 2013:**
• Julie G. Ezold Phone: 865-574-9594 Oak Ridge National Lab	• Jerry Hicks Phone: 505-845-6287 DOE, Albuquerque	• Chris Robinson Phone: 865-574-8509 BWXT Y-12, LLC
• David P. Heinrichs Phone: 925-424-5679 Lawrence Livermore National Lab	• Deborah A. Hill, Phone: (+44) 1772 764359 National Nuclear Laboratory	• Aldolf Garcia Phone: 208-526 4420 DOE, Idaho
• Larry L. Wetzel Phone: 434-522-6580 Babcock & Wilcox - NOG	• Ronald E. Pevey Phone: 865-974-7573 University of Tennessee	• Nick Brown Phone: 423-753-0209 Nuclear Fuel Services

NCSD Executive Committee Meeting Summary

The meeting was held at the Town and Country Hotel and Resort in San Diego, CA on June 13, 2010 during ANS Summer Meeting. The highlights are given below. The minutes of the meeting will be posted on the website.

- ANS is moving toward more use of electronic means of doing business
- The new ANS President has changed the Board meeting to Saturday. NCSD did make a short presentation to the Board on our division's status. This presentation is available on our website.
- NCSD's metrics are good.
- The division is in good financial shape.
- There was discussion on having more workshops. Workshop requires participants to pay to attend where a tutorial is free.
- Ideas were discussed regarding the establishment of an endowed scholarship. We have to place 20 times the amount of the scholarship into the account to endow the scholarship. Possible sources of funding for the scholarship were considered. They included corporate sponsorship, a marketing drive to NCSD members and challenge donations. The target amount is $60,000. That will fund an annual scholarship of $3000.
- No nominations for the Service Award were received. Please look at the criteria and consider nominating a worthy person.

NCSD Website

Webmaster: Larry Wetzel

To help support the nomination for the Service Award, Sandi Larson developed a database of past officers and committee members. This will be added to the website.

If you have suggestions for improvements to the website, please email them to Larry Wetzel.