



Radiation Protection and Shielding Division (RPSD) Fall 2013 Newsletter

www.rpsd.ans.org: **The Radiation Protection and Shielding Division** of the **American Nuclear Society** is concerned with radiation protection and shielding aspects of nuclear science and technology -- including interaction of nuclear radiation with materials and biological systems, instruments and techniques for the measurement of nuclear radiation fields, and radiation shield design and evaluation.

Contents

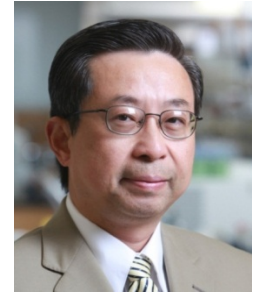
Message from the Chair.....	2
Meetings: SNA + MC 2013, Oct 27→31 2013	3
Meetings: RPSD2014 14→18 SEP 2014.....	4
2013 RPSD Everitt P. Blizzard Fellowship Awarded to Ryan Kelly, TAMU	5
75th Anniversary of the Discovery of Nuclear Fission.....	5
New Acting Director of the <i>Center for Radiation Protection Knowledge</i> at ORNL	6
Call for Nominations for Honors and Awards	6
RPSD Newsletter and Web Master Contributions Needed.....	7
Special Session for Winter 2013 Cancelled.....	7
2012 ANS Winter Meeting RPSD Student Paper Awards	8
2013 ANS Annual Meeting RPSD Student Paper Award	8
ANSI Approves Revision of ANS-6.1.2.....	8
Meetings: RPSD Program for ANS Annual Meeting in Washington, D.C.	9
Radiation Protection and Shielding Division Rockwell Lifetime Achievement Award.....	10
2013 RPSD Membership Data.....	10
ANS-6 Standards Subcommittee Update.....	11
Research Notables: <i>Working Around the ³He Shortage</i>	12
RPSD – 2013 Division Officers and Staff	13

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Vice-Chair of RPSD (2013-2014)
Georgia Institute of Technology

Message from the Chair

Dear RPSD Members:

As you read this issue of the newsletter, it is likely that the federal government is still in a sad state of shutdown (Are we finally too frustrated to even think about it?). Too bad that there is not much we as engineers could do at the moment. I have been getting emails from my university administration alerting the faculty “to avoid travels and equipment purchases” using federal research grants. Today I am informed by a colleague from another university that a planned multi-university reception at the ANS winter meeting in Washington D.C. might be in jeopardy. OK. This is perhaps a bad time to introduce myself as your new division chair. However, I have no plan to launch anything earth-shaking within the Division. I have been an RPSD member for nearly 20 years (started when I was a PhD student at Texas A&M) and I have actually thought about what I wanted to do as the chair – small things that make us a division of a professional society.



One priority is “honors and awards.” RPSD has nearly 1400 members – thank **YOU!** From this large pool, we should select recipients for the following awards each year: “Rockwell – Lifetime Achievement Award,” “Service and Professional Excellence Awards,” and “Best Professional and Student Paper Awards.” In addition, the division should nominate candidates for “Fellows” of the Society. I spent some time recently reviewing the lists of past awardees. I am convinced that RPSD should be doing a more diligent and thoughtful job in honoring our fellow RPSD members! To this end, I have formed a new “Honors and Awards (H&A) Committee” which consists of Arzu Alpan, Nick Tsoulfanidis, Peter Caracappa (current Program Committee Chair) and Joel Risner (current Secretary). I have asked the newly appointed H&A Committee to present to the RPSD ExCom a complete revision of the H&A Manual for approval at the ANS winter meeting on November 10. More importantly, I have asked them to compile a hopefully much longer list of candidates for these awards. Of course, we need **YOUR** help – please nominate your colleagues by contacting Arzu (alpanfa@westinghouse.com). If you are unsure, contact me or Arzu!

Despite a depressing political and economic atmosphere in Washington, I look forward to seeing many of you during the week of November 10. There is maybe one thing we could after all — let’s cheer ourselves up by recognizing what an excellent work our RPSD members have been doing! Enjoy this issue of the newsletter prepared by your chair-elect, Prof Glenn Sjoden.

A handwritten signature in black ink that reads "George Xu". The signature is written in a cursive style.

X George Xu Chair of RPSD (2013-2014)
Professor and Head, Nuclear Engineering Program
Rensselaer Polytechnic Institute, Troy, New York (<http://www.rpi.edu/dept/ne>)
Email: xug2@rpi.edu; Phone: 518-276-4014,

October 2013

Meetings: SNA + MC 2013, Oct 27→31 2013

*Joint International Conference on
Supercomputing in Nuclear Applications + Monte Carlo 2013, Paris*



The first edition of **SNA+MC 2010** was held in **Tokyo** in 2010. This joint international conference on "**Supercomputing in Nuclear Application (SNA)**" and "**Monte Carlo (MC)**" will be renewed; **SNA+MC 2013** is about to be held in **Paris** from **27 to 31 October 2013**.

The long-standing synergy that exists between the evolution of computers dedicated to scientific calculations and that of the Monte Carlo methods, from the theoretical point of view as well as its general usage, certainly legitimizes such a convergence.

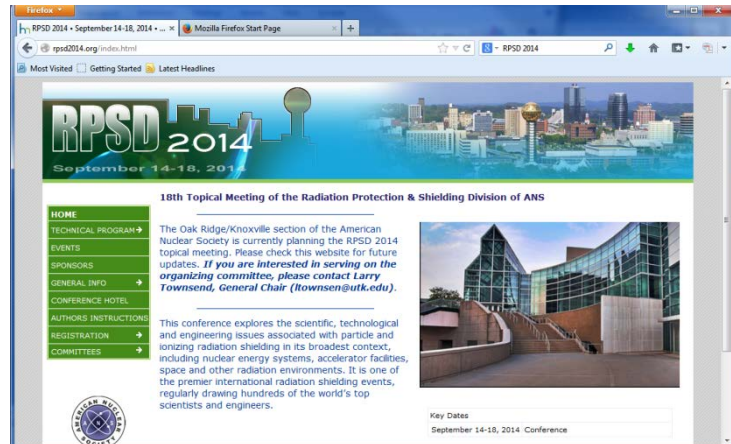
The first ambition of **SNA+MC 2013** is to review recent breakthroughs in HPC and in Monte Carlo, as well as in the usage made of them in the very varied fields of nuclear applications.

SNA+MC 2013 web site: <https://www.sfen.fr/SNA-and-MC-2013>

Meetings: RPSD2014 14→18 SEP 2014

18th Topical Meeting of the Radiation Protection & Shielding Division of ANS, Knoxville TN

The Oak Ridge/Knoxville section, which has hosted 10 topical meetings in the past 10 years, will hold RPSD 2014, with more information available on the web at <http://rpsd2014.org/>. Conference dates are from **September 14th – 18th, 2014**.



General Chair: Larry Townsend, UT; Assistant General Chair: Irina Popova, ORNL; Honorary Chair: Bernadette Kirk; Technical Program Chairs: Thomas Miller, ORNL; Joel Risner, ORNL; Hatice Akkurt, EPRI. Major sessions will include the following:

- | | |
|------------------------------------|---|
| Accelerator shielding | Low dose effects |
| Activation analysis | Medical treatment facility shielding |
| Aircraft dosimetry | Monte Carlo methods |
| Charged particle transport | Nonproliferation |
| Computational phantoms | Nuclear Data |
| Criticality accident alarm systems | Radiation detection & measurement |
| Deterministic methods | Radiation protection |
| Education & training | Radiation protection for target & user facilities |
| Environmental assessment | Safeguarding nuclear material & facilities |
| Experiments & benchmarks | Space Radiation protection & risk assessment |
| External dosimetry | Treatment planning |
| Fission facility shielding | Used nuclear fuel transportation & storage |
| Fuel cycle facility shielding | Visualization & user interfaces |
| Fukushima assessment & recovery | Y-12 uranium processing facility |
| Fusion facility shielding | |
| Hybrid methods | |
| Imaging | |
| Internal dosimetry | |

Additional details about the meeting will be posted on the RPSD 2014 website (which is rpsd2014.org) as they become available. If you are interested in helping organize RPSD 2014, particularly the technical program, please contact Lawrence Townsend (ltownsen@utk.edu).

2013 RPSD Everitt P. Blizzard Fellowship Awarded to Ryan Kelly, TAMU

Ryan Kelly, a Ph.D. candidate at Texas A&M from Baltimore was recently awarded the Everitt P. Blizzard Scholarship, sponsored by the American Nuclear Society (ANS). Kelly is currently pursuing a Ph.D. after completing his bachelor's degree in 2011 and his master's degree in 2013, all in nuclear engineering from Texas A&M. He said he plans to graduate in the summer of 2015.



Ryan

Kelly is a Rickover Fellow and has previously worked at the Knolls Atomic Power Lab as part of this fellowship. In addition, he has also completed two internships at Oak Ridge National Lab, an internship at Scientific Applications International Corporation, an undergraduate summer research program and an undergraduate thesis. The undergraduate research was focused on analysis of high-temperature reactor designs, including both pebble bed and prismatic block designs, and code verification using SCALE, MCNP and VESTA. His master's work focused on uncertainty quantification of concrete utilized in dry-cask storage analyzing how variations in standard concrete mixes influence shielding considerations.

The Everitt P. Blizzard Scholarship is awarded to a student enrolled in a course of study relating to a degree in nuclear science or nuclear engineering at a U.S. institution. The student must be enrolled in graduate-level studies in the field of radiation protection and shielding, and must be sponsored by an ANS local section, division, student branch, committee member or organization member. The Blizzard Scholarship, endowed by individual and corporate contributions, supports Master's and Ph.D. students pursuing specialization in the field of radiation protection and shielding. Ryan will be acknowledged for this the award by our RPSD Chairman, Dr George Xu, during RPSD proceedings at the annual meeting in Washington in November, 2013.

75th Anniversary of the Discovery of Nuclear Fission

The celebration of the 75th Anniversary of the Discovery of Nuclear Fission will be held in conjunction with the ANS Winter Meeting in Washington, D.C. When registering for the Meeting, don't forget to sign up for the special anniversary dinner on Monday evening, where author Richard Rhodes will give discuss his books and the role nuclear science has played in history. With cocktails, a menu of culinary delights, and the company of your nuclear colleagues, the evening promises to be a night to remember.

New Acting Director of the *Center for Radiation Protection Knowledge* at ORNL

The Center for Radiation Protection Knowledge was established in 2010 by a memorandum of understanding (MOU) signed by Oak Ridge National Laboratory and the Department of Energy, Department of Defense, the Environmental Protection Agency, the Nuclear Regulatory Commission, and the Occupational Safety and Health Administration. Keith Eckerman and Rich Leggett of the Human Health Risk & Environmental Analysis Group of ORNL Environmental Sciences Division led this effort to establish this center for the preservation of expertise in radiation dosimetry.

Dr. Nolan Hertel, Professor of Nuclear and Radiological Engineering at Georgia Institute of Technology, accepted a Joint Faculty Appointment in the Environmental Sciences Division in the Risk and Regulatory Analysis Team in the Human Health Risk and Environmental Analysis Group. Nolan will spend approximately 80% of the remaining calendar year in residence at ORNL, and now serves as the acting director of the Center for Radiation Protection Knowledge. He will assist in providing direction to the radiation protection dosimetry program as ORNL seeks to preserve and expand this important activity, which has a 50-year history of excellence in the development and use of models and methodology for radiation protection. The Center is responsive to the participating agencies and is administered by DOE. This MOU is intended to help maintain and preserve U.S. expertise in radiation dosimetry and to ensure that Federal radiation programs are based on the best available information, applied in a consistent manner. The Center's webpage, still being updated, is <http://crpk.ornl.gov/> and for those interested, the MOU can be found at <http://pbadupws.nrc.gov/docs/ML1005/ML100540805.pdf>.

Call for Nominations for Honors and Awards

We would like to encourage our members to nominate their peers to the following RPSD awards – email to Arzu Alpan at alpanfa@westinghouse.com :

Rockwell Award

The Lifetime Achievement award, also referred to as the Rockwell Award, is based on long-term contributions in research, development of technology, or education in radiation measurement, protection, shielding, and dosimetry. It is expected that most recipients will have been long-time active members of the American Nuclear Society. Moreover, most recipients will be authors of publications that made significant contributions to the science of radiation protection and shielding.

Call for Nominations for Honors and Awards.... Continued:

Professional Excellence Award

The basis for this award would usually be a major contribution to the state of the art, an important publication, a major technical achievement, or a sustained record of significant accomplishment and technical excellence.

Service Recognition Award

This award is in recognition of outstanding past or current service to the Society and/or Division by a member of the Division. This award may be characterized as a distinguished service award or outstanding service award.

RPSD Newsletter and Web Master Contributions Needed

The next newsletter is published in the Fall and Spring. If you have news items of interest to RPSD members, please send such contributions to the Vice-Chair, Prof. Glenn Sjoden (sjoden@gatech.edu).

The RPSD web site needs help! Several items need to be updated. If you can devote some time to update the web pages for our division, your assistance would greatly be appreciated.

Special Session for Winter 2013 Cancelled

The special session entitled “Transport Calculation Benchmark Solutions for Evaluated Shielding, Criticality, and Reactor Physics Problems” sponsored by the ANS Joint Benchmark Committee (co-sponsors RPSD, MCD, RPD) was established for researchers to submit papers on code calculations and solutions based on radiation shielding, criticality safety, or reactor physics evaluated benchmark problem experiments. Problems were to be selected from among numerous existing problems available in: SINBAD (www.oecd-nea.org/science/wprs/shielding/sinbad), ICSBEP(icsbep.inl.gov), or IRPHEP(irphep.inl.gov) to promote code evaluation, new methods development, as well as to increase awareness regarding evaluated benchmark utility in code/benchmark applications, and augment their potential for use in current/forward leaning research, training, and education. Because only one paper was received, the session was cancelled.

2012 ANS Winter Meeting RPSD Student Paper Awards

Ahmad Ibrahim and Justin Vazquez received a monetary award of \$100 and a certificate as recipients of the RPSD Student Paper Award for the following papers presented in RPSD sessions at the 2012 ANS Winter Meeting:

Automatic Mesh Adaptivity for Hybrid Monte Carlo/Deterministic Neutronics Modeling of Difficult Shielding Problems, Ahmad M. Ibrahim (ORNL), Paul P. Wilson, Mohamed E. Sawan (Univ of Wisconsin, Madison), Douglas E. Peplow, John C. Wagner, Scott W. Mosher, Thomas M. Evans (ORNL)

A Preliminary Study on the Use of Motion-Capture Technology and Computational Phantoms Towards Virtual-Reality-Based Nuclear Safety Simulations, Justin Vazquez, Ashley Rhodes, Peter F. Caracappa, X. George Xu (RPI)

2013 ANS Annual Meeting RPSD Student Paper Award

Justin Vazquez received a monetary award of \$100 and a certificate as a recipient of the RPSD Student Paper Award for the following paper presented in an RPSD session at the 2013 ANS Annual Meeting:

A Dose-Reconstruction Simulation of the 1999 Tokaimura Criticality Accident Using Motion Capture Data to Simulate Worker Posture, Justin Vazquez, Peter F. Caracappa, X. George Xu (RPI)

ANSI Approves Revision of ANS-6.1.2

“Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for Nuclear Power Plants”

The American Nuclear Society received approval of the American National Standards Institute for ANSI/ANS-6.1.2-2013, “Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for Nuclear Power Plants.” This standard supersedes ANSI/ANS-6.1.2-1999 (R2009), “Neutron and Gamma-Ray Cross Sections for Nuclear Radiation Protection Calculations for Nuclear Power Plants.” The ANS-6.1.2 standard specifies group-averaged neutron and gamma-ray cross sections and related group-averaged or derived data for the energy range and materials of importance in radiation protection and shielding calculations for nuclear power plants. Publication of ANSI/ANS-6.1.2-2013 is anticipated before the end of the year.

Meetings: RPSD Program for ANS Annual Meeting in Washington, D.C.

The ANS Winter Meeting is rapidly approaching and the Radiation Protection and Shielding Division has an interesting and diverse set of technical sessions, discussions, and tutorials planned. A successful meeting depends on your participation, so please take advantage of the following sessions at the upcoming meeting:

1. Radiation Protection and Shielding: General, Mon. p.m.
2. Radiation Protection and Shielding–Roundtable, Mon. p.m.
3. Shielding Problems for Fusion Devices, Tues. a.m.
4. Computational Tools for Radiation Protection and Shielding, Tues. p.m.
5. Illicit Trafficking Radiation Sensor Assessment Program (ITRAP 10) Highlights, Wed. a.m.
6. Best of ICRS/RPSD 2012, Wed. p.m.
7. Making Ethics Real in Nuclear Engineering–Panel, Thurs. p.m.

Radiation Protection and Shielding Roundtable

Of note in the list of sessions above is the Monday afternoon RPSD Roundtable session. If you have not attended one of these before, this session is designed as an opportunity for all members to present and discuss new work, preliminary results, or current problems that they are facing. Members are invited to make a 10 minute presentation each (scheduled first-come, first-served), followed by an open discussion. You never know what you are going to get in this session, but it is likely to feature some of the most cutting-edge work in the division. Bring a few slides of your own, or just come to join in the discussion!

Program Committee Meeting

All are welcome to the RPSD Program Committee meeting, scheduled for Sunday of the meeting from 12:30-1:30 (check the final program for location). If you have a suggestion for a session at a future meeting, have interest in chairing a session or a panel, or just want to help shape the technical content of the ANS meetings, please stop by. You can contact RPSD Program Chair Peter Caracappa at caracp3@rpi.edu.

Call for Reviewers

RPSD members are needed to review the summaries submitted to ANS meetings. Reviews are all completed electronically at your own convenience through the Electronic Submission and Paper Review system. Summaries are reviewed for content, clarity, validity, format, and appropriateness of subject, but you don't need to be an expert to participate. Each reviewer is assigned 3-5 summaries to review (based upon number of submissions and number of reviewers), generally with 2-3 weeks to complete the review.

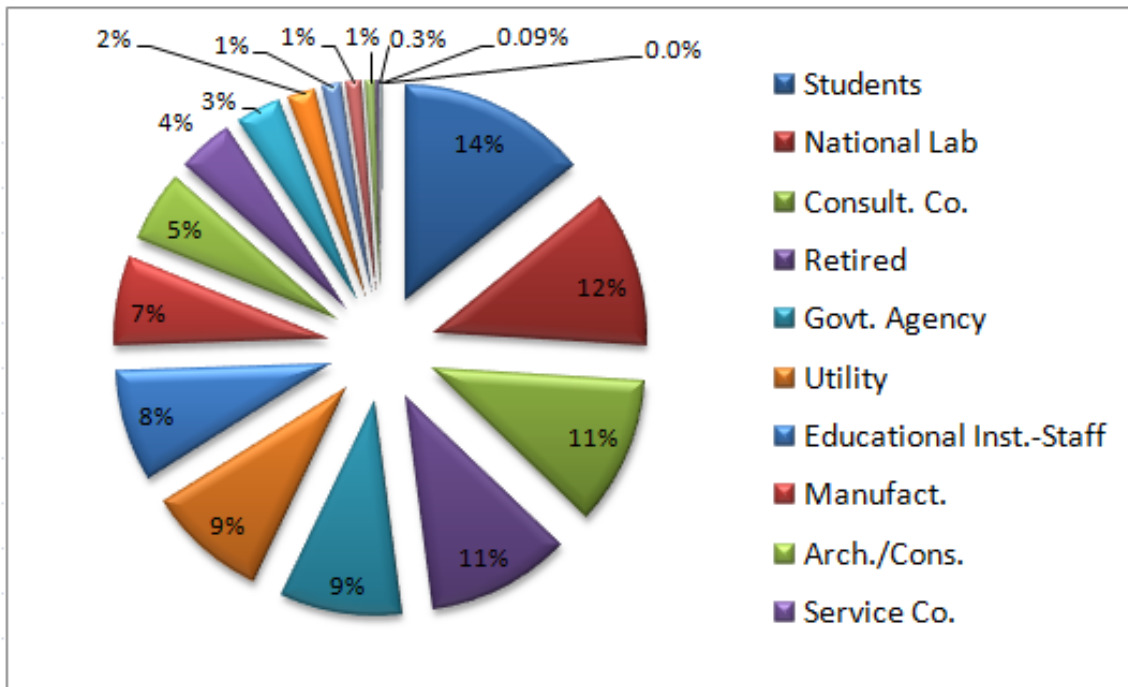
If you are interested in serving as a reviewer, please contact Peter Caracappa at caracp3@rpi.edu.

Radiation Protection and Shielding Division Rockwell Lifetime Achievement Award

J. Kenneth Shultis, Ph.D. For numerous contributions over the last 50 years to the practice of shielding, shielding analyses, skyshine methodology and computer algorithms, the education of students through teaching and research, the training of professionals through short courses, the publication of textbooks and technical articles, and service to the profession.

2013 RPSD Membership Data

Breakdown of our 1172 Members as of Fall 2013



ANS-6 Standards Subcommittee Update

Charlotta E. Sanders, Chair, University of Nevada, Las Vegas (UNLV),
Charlotta.Sanders@unlv.edu

“Weights and measures may be ranked among the necessities of life to every individual of human society. They enter into the economical arrangements and daily concerns of every family. They are necessary to every occupation of human industry.”

John Quincy Adams, 1821

The ANS-6 Standards Subcommittee supports RPSD related work/interest including *Specification for Radiation Shielding Materials* (ANSI/ANS-6.4.2), *Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants* (ANSI/ANS-6.4), *Gamma-Ray Attenuation Coefficients and Buildup Factors for Engineering Materials* (ANSI/ANS-6.4.3), *Neutron and Gamma-Ray Cross Sections for Nuclear Radiation Protection Calculations for Nuclear Power Plants* (ANSI/ANS-6.1.2), *Calculation and Measurement of Direct and Scattered Gamma Radiation from LWR Nuclear Power Plants* (ANSI/ANS-6.6.1), *Program for Testing Radiation Shield in Light Water Reactors* (ANSI/ANS-6.3.1), and *Neutron and Gamma-Ray Fluence-to-Dose Factors* (ANSI/ANS-6.1.1).

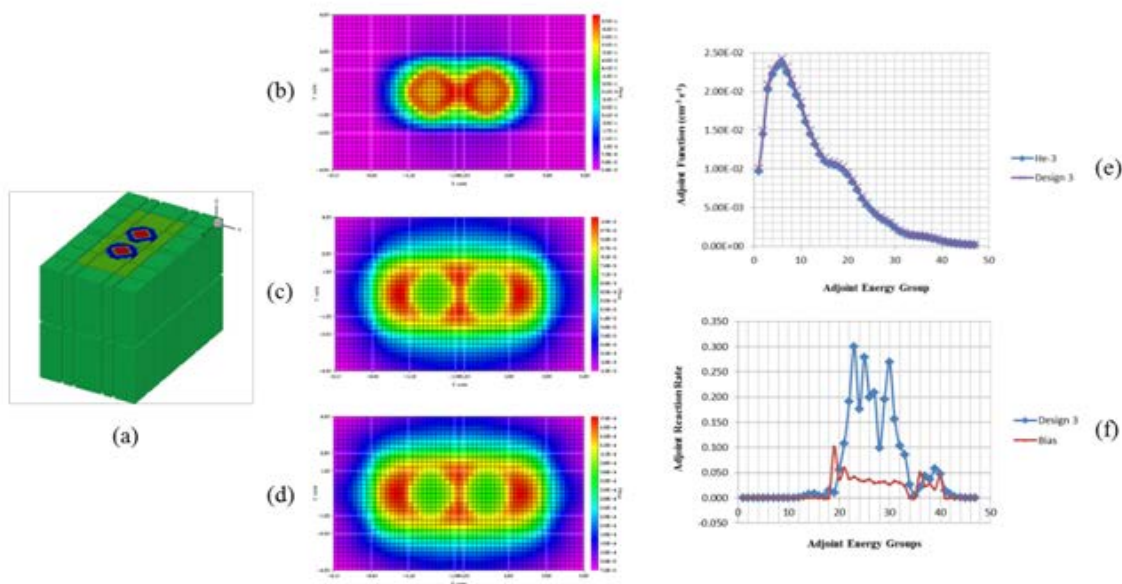
This exciting work is on-going through updates and revisions to the existing standards. For more information on these standards and/or how to join a working group, please stop by the RPSD Shielding Standards meeting at 12-12:30 P.M on Sunday, November 10, 2013, during the 2013 ANS Winter Meeting in Washington, D.C. Alternatively, you can also contact me or Patricia Schroeder, ANS Standards Administrator [pschroeder@ans.org] for more information.

I also want to mention that the ANS Standards Board recommended in June 2012 that the ANS Standards Committee should be reorganized. The reorganization was deemed necessary to more evenly distribute the workload, better align the consensus committees for the future, and promote an increase in proactive performance of the entire Standards Committee. As part of this reorganization, a Safety & Radiological Analysis Consensus Committee (SRACC) has been created. The ANS-6 activities will fall under the SRACC topical area/division of Shielding, which I have been asked to chair. Other SRACC topical areas/divisions include Mathematics & Computations and Reactor Physics. We will have our first meeting in November at the ANS Winter Meeting in Washington, D.C., so I will be able to provide more information on this endeavor in our next RPSD newsletter.

Research Notables: *Working Around the ^3He Shortage*

At present, there is a very limited supply of ^3He gas for neutron detection applications. This is attributed to a lack of tritium production for the nuclear weapons complex, along with a significantly increased demand for the gas in various neutron detection applications. Circa 2000, there were more than 200,000 liters (at STP) in the ^3He stockpile, but today, less than 45,000 liters remain, and USDOE is rationing the supply to only 8,000 liters per year. A number of research efforts have been conducted to determine if existing materials could serve as an adequate substitute for ^3He , and additional efforts have also evaluated new materials that might serve adequately as replacements.

Recent work at Georgia Tech by Scottie Walker of Sandia National Laboratory, and his thesis advisor, Glenn Sjoden, used hybrid computational radiation transport adjoint importance methods with the PENTRAN 3-D Sn code, confirmed by MCNP5, to design six distinct new “non- ^3He ” based neutron detector designs to very closely mimic the spectral performance of ^3He , with the intention . These designs, which match the neutron energy spectral importance (efficiency) and reaction rate of a 1-inch diameter ^3He tube (active length 10 cm, 4 atm pressure), are composed of single and dual detector configurations utilizing BF_3 gas, ^{10}B linings, and/or ^{10}B -loaded polyvinyl toluene (PVT) (Walker, 2013). This work shows that with computational transport theory, one can engineer a suitable substitute to closely mimic ^3He performance. For more information, contact sjoden@gatech.edu.



(a) Alternative n-detector design with Dual ^{10}B -Lined Tubes with ^4He carrier at 10 atm., (b – d) adjoint (efficiency) profiles at block mid-section, (e) adjoint function per unit source density in the forward air-filled coarse meshes adjacent to the polyethylene (toward a source), and (f) the adjoint reaction rate across all air-filled coarse meshes and the fractional bias with ^3He . Figures courtesy of Scottie Walker, graduating with his Ph.D. in December 2013.

RPSD – 2013 Division Officers and Staff



X. George Xu, Chair

Professor and Head, Nuclear Engineering,
Rensselaer Polytechnic Institute, Troy, NY



Glenn E. Sjoden, Vice Chair

Professor, Nuclear, Radiological and
Medical Physics Program, Georgia
Institute of Technology



Joel M. Risner, Secretary

Research and Development Staff Member,
Radiation Transport Group, Reactor and
Nuclear Systems Division, Oak Ridge
National Laboratory, Oak Ridge, TN



Shaheen A. Dewji, Treasurer

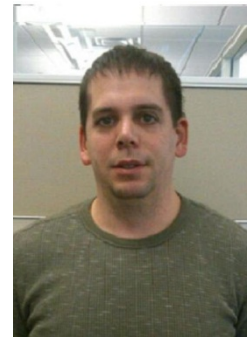
PhD Candidate, Nuclear & Radiological
Engineering Program, Georgia Institute of
Technology, Atlanta, Georgia and Metz,
France



Peter F. Caracappa

Executive Committee

Radiation Safety Officer and Lecturer,
Rensselaer Polytechnic Institute



Michael T. Wenner

Executive Committee

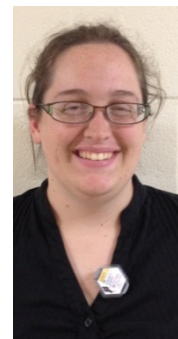
Senior Engineer, Westinghouse Electric
Company LLC, Cranberry Township,



Arkady Serikov

Executive Committee-Non US

Staff Research Scientist, Karlsruhe
Institute of Technology (KIT), Germany



Margaret K. Sudderth

Executive Committee-Student

Student, Georgia Institute of Technology

Radiation Protection & Shielding Division

2013-2014 RSPD Officers

2014 X. George Xu	Chair
2014 Glenn E. Sjoden	Vice Chair
2014 Joel M. Risner	Secretary
2014 Shaheen Azim Dewji	Treasurer

Members

2015 Eric A. Burgett	2016 Peter F. Caracappa
2015 Shaheen Azim Dewji	2014 Steven J. Nathan
2014 Douglas E. Peplow	2015 Irina I. Popova
2014 Joel M. Risner	2014 Arkady Serikov
2014 Erik F. Shores	2014 Glenn E. Sjoden
2014 Margaret K. Sudderth	2016 Michael T. Wenner
2014 X. George Xu	

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