



## Message From The Chair

Members of the Fuel Cycle and Waste Management Division encompass all aspects of the nuclear fuel cycle including mining, enrichment, fuel fabrication, fuel design, reprocessing, used fuel storage, repository design, waste processing, waste form testing, fuel cycle evaluations, fissile material management, and national fuel cycle policy. They work in industry, national laboratories, academia, public policy institutes, and government.

As a division, we have done remarkable work in organizing successful national international meetings such as Global and IHLRWM, organizing innumerable technical sessions and panel discussions, supporting ongoing education and workforce development, generating public policy documents. In general, we have done a steady good job over the years. However, we may have been somewhat lacking in recognizing the outstanding contribution from our members. Very often we can see the excellent work of our colleagues but we take it for granted and we fail to recognize it. If we do not do it nobody will do it for us.

This year we have instituted two national awards from our division and two divisional awards to publicly recognize the exceptional contributions of our members. Namely, Significant Contribution to the FCWM Mission, Lifetime Achievement, Distinguished Service on behalf of the FCWM Division, and Outstanding

Published Work. Details and nomination forms can be found at [fcwmd.ans.org/awards.html](http://fcwmd.ans.org/awards.html) and the ANS website.

I would also encourage nominations for Fellow of ANS, the most prestigious ANS award. Several of our members had received this highest ANS honor but probably not as many as should.

Recently, a colleague from AIChE forwarded a paper published in the AIChE journal (Vol. 59, 8, August 2013) entitled "Chemical Engineers Must Focus on Practical Solutions". I am a chemist and not an engineer but I found some of the ideas discussed very interesting. Several technologies related to the nuclear fuel cycle and waste management arena came to mind after reading it.

As always, all members are welcome to contact our division officers and to attend the FCWMD Executive and Program Committee meetings on Sunday at each national meeting. We need your participation and input. Our next meetings are on Sunday June 15 at the Grand Sierra Resort in Reno Nevada starting at noon.

Your feedback on this newsletter, current topics in fuel cycle and FCWMD activities is always most welcome. Please send short articles on your field of work to share with all of our members.

Hope to see you in June in Reno,  
Guillermo Daniel DelCul  
FCWMD Chair  
[delculgd@ornl.gov](mailto:delculgd@ornl.gov)



## New Awards

An important activity of the Fuel Cycle and Waste Management Division is sponsoring awards to acknowledge the contributions of members to the field. To this end, FCWMD is pleased to establish four new division awards in 2014. Recipients of these awards will receive an award plaque and recognition in RadWaste Magazine, Nuclear News, and/or the ANS Nuclear Café Blog. Additional details can be found at [fcwmd.ans.org/awards.html](http://fcwmd.ans.org/awards.html) along with nomination forms. These awards each have an annual nomination deadline of April 1.

### Significant Contribution to the FCWMD Mission

The [Fuel Cycle And Waste Management Significant Contribution Award](#) recognizes “individuals or teams for a successful accomplishment that significantly advanced the scientific, engineering, societal, or regulatory aspects of the nuclear fuel cycle and/or the nuclear waste management.” Awards may be given to an individual or collectively to a team for success on a single project, activity, contribution, or sustained initiative related to the nuclear fuel cycle and/or nuclear waste management.

### Lifetime Achievement Award

The [Fuel Cycle and Waste Management Division Lifetime Achievement Award](#) recognizes “individuals who have made major lifetime contributions that significantly

advanced the scientific, engineering, societal, or regulatory aspects of the nuclear fuel cycle and/or the nuclear waste management mission.”

### Distinguished Service on Behalf of the FCWMD Mission

The [Fuel Cycle and Waste Management Award for Distinguished Service on Behalf of the FCWMD Mission](#) recognizes “outstanding participation in the leadership of the Division or in public outreach activities representing the division.”

This award for distinguished service is intended for active members of the FCWMD and will, accordingly, be presented at the FCWMD Committee Meeting within the ANS National Meeting.

### Outstanding Published Work

The [FCWMD Award for Outstanding Published Work](#) recognizes “individuals or teams for a combination of best full-length paper and oral presentation in a FCWMD sponsored topical meeting/session.”

In addition to other benefits, this distinction includes a monetary award of \$250 to be presented at the FCWMD Program Committee Meeting. This award will be presented at the FCWMD Committee Meeting within the ANS National Meeting.



## Highlights from the ANS Winter Meeting in DC

### FCWMD John Randall Scholar



The 2013 FCWMD John Randall Memorial Scholar was Vanessa Holfeltz. She is a graduate student in radiation health physics at Oregon State University.

Vanessa's current research interests are in advanced aqueous fuel separations, particularly in lanthanide-actinide separation and the thermodynamics and complexation in these systems. She has previously performed research on the biosorption properties of chitosan toward various radionuclides within the context of biomedical and environmental contamination remediation.

Vanessa was at one time a senior reactor operator and the associate director of the Reed Research Reactor, a 250 kW TRIGA research reactor in Portland, Oregon.

She attended the 2013 ANS Winter Meeting in Washington DC. There, at the FCWMD executive meeting, she received the FCWMD John Randall Memorial Scholarship award of \$5000 in recognition of the success of her early career.

### Student Section Support

FCWMD and many other divisions traditionally support the student program for the ANS conference. This year, the division received many thank you letters from students who attended. We were very pleased to receive these gracious notes.

The support of the student program facilitated travel to the ANS Winter conference for many students. The students we received thank you notes from include:

- 9 from the University of Wisconsin – Madison
- 20 from the University of Florida
- 1 from Idaho State University
- 2 from Pennsylvania State University

These students expressed an array of thanks for the opportunity to attend the meeting, noting that they were able to present their research in many fields and that they enjoyed finding “unparalleled networking opportunities” as well as compelling technical presentations.

We additionally received a note from the Student Sections Committee Chair, Alexis Kaplan. Kaplan summarized the impact of student section support as “truly an investment in the future of our industry.”

Copies of all of the thank you notes are included as attachments to this newsletter to give an indication of the impact of our efforts to support the student sections of ANS.



## 2014 ANS Meeting: FCWMD Events to Watch For

Date	Event
6/15	FCWMD Executive Meeting
6/15	FCWMD Program Meeting
6/15	FCWMD Technical and Operating Standards Committee Meeting
TBD	Session: Advanced Fuel Cycle Technology
TBD	Session: Experiments in Used Fuel Disposition, Storage, Transport, and Disposal
TBD	Session: Recycle and Reuse of Components from Used Nuclear Fuel
TBD	Session: Fuel Cycle and Waste Management: General I and II
TBD	Session: Fuel Cycle Simulators and Systems Analysis
TBD	Session: Hybrid Energy: Combining Nuclear and Other Energy Sources
TBD	Session: SRS Plutonium Disposition Projects Update

## ANS Annual Meeting in Reno

FCWMD sponsored sessions and division meetings occur before and during the annual ANS meeting. The executive, technical, and program committee meetings are essential to division activities. All conference attendees are welcome to these meetings, so we hope you'll participate and bring others along.

On behalf of the ANS Fuel Cycle and Waste Management Division, we look forward to seeing you at these great events in Reno, NV.

## ANS IHRLWM

*Contributed by: Stephen Turner*

International High Level Radioactive Waste Management Conference (IHRLWM)

The International High Level Radioactive Waste Management Conference is a bi-annual meeting that began in the 1980's with organization through various professional organizations but evolved into an ANS topical meeting sponsored by FCWMD and organized by ANS Headquarters in the late 1990s. The meeting has enjoyed long-term support from many domestic and international leaders.



In the early years the meeting focused primarily on fundamental repository science issues reflected in the key topics of Natural Systems, Engineered Systems, Biosphere, and Total Repository Systems. But the topics evolved to include regulatory issues and institutional issues as repositories advanced from concept to deployment.

The meeting has always included a strong international following with about 40% of the registrants from other countries with Honorary Chairs and keynote speakers from various international projects. Recent meetings have included key sessions to focus on the progress in Sweden and China to further expand the international cooperation.

The meeting was routinely held in Las Vegas. There, in 2008, the highlight was a coincidental announcement on the first day meeting, by Ward Sproat of OCRWM, that the license for the Yucca Mountain project had been accepted for review by the NRC.

The Las Vegas meetings included a tour of Yucca Mountain that was graciously and aptly organized by Abe VanLuik. With the shutdown of the Yucca Mountain Project in 2009 the meeting was moved to Albuquerque where the meeting enjoyed the strong support of Sandia National Laboratory. The Albuquerque meetings in 2011 and 2013 included a tour of the WIPP facility.

The meeting usually has about 180 technical papers and 250 participants and has enjoyed corporate sponsorships from Areva, SKB, URS,

Southwest Research Institute, and others. Despite the slowdown of progress in the US, the meeting continues to have vitality and importance.

The 15th IHLRWM conference is scheduled for the spring of 2015 and is tentatively planned for southeast US. If you are interested in helping organize or sponsor the meeting please contact the IHLRWM 2015 Technical Chairs Andrew Sowder or Ruth Weiner or [the FCWMD Chair Bill DelCul](#).

## **Research Highlight: Decontamination and Recycle of Zirconium from Used Nuclear Fuel Cladding**

*Contributed by: E. D. Collins, G. D. Del Cul, and B. B. Spencer*

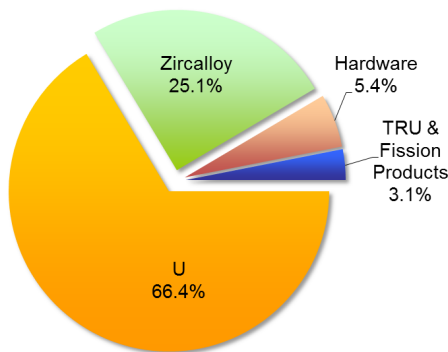
Process development studies are being conducted to recover, purify, and reuse the zirconium

(~ 98.5% by mass) in used nuclear fuel (UNF) zirconium alloy cladding. The objective of the zirconium recycle task is to develop a cost-effective technology to separate and recover purified zirconium from contaminated UNF zirconium alloy cladding. The cost of the recovery process must be less than the combined costs of the current compaction treatment of UNF cladding and the planned method of its disposal in a geologic repository. The residual contamination of the purified product must be sufficiently low to allow for remanufacturing and reuse, recognizing that



the recovered zirconium will inherently contain one radioactive isotope,  $^{93}\text{Zr}$ , which has a half-life of  $\sim 1.5$  million years and a weak beta radiation emission. Alternatively, at a minimum, the recovered zirconium must meet specifications for disposal as low-level waste.

Traditional nuclear fuel recycling processes remove the fuel matrix from the zirconium alloy cladding in which it is sheathed. The cladding ( $>98\%$  zirconium) is the second-largest mass ( $\sim 25\%$  on average, Fig. 1) in the US inventory of light water reactor UNF. The United States currently generates  $\sim 2,700$  MT/year of UNF assemblies ( $\sim 2,000$  MT/year of heavy-metal components), and the quantity may increase in the next 50 years.



**Fig. 1. Recycle of zirconium from zirconium alloy cladding is a major element of waste reduction.**

Recovery and reuse of the hafnium-free zirconium would provide material cost savings (\$40/kg) that could exceed  $\sim \$25$  M/year. An even greater cost benefit can be obtained by diverting the zirconium from radioactive waste, which is currently destined for emplacement in a geologic repository, because the volume of the compacted metal or grouted cladding waste

is equal to or greater than the volume of vitrified high-level waste.

The goal of the recovery/purification processes is to remove chemical and radioactive element impurities from the zirconium contained in UNF zirconium alloy cladding. Radioactive impurities include uranium, transuranium elements, fission products, and activation products other than  $^{93}\text{Zr}$ . Chemical impurities that will require removal for reuse in nuclear fuel cladding include alloying elements, such as tin, niobium, iron, nickel, and chromium, and nonmetals, such as nitrogen, oxygen, and carbon.

Feasibility studies began in the United States in FY 2010 using empty cladding hulls that were left after fuel dissolution or after oxidation to a finely divided oxide powder (voloxidation). In FY 2012, two industrial teams (AREVA and Shaw-Westinghouse) were contracted by the US Department of Energy Office of Nuclear Energy (NE) to provide technical assistance to the project. Significant progress has been made since the project began.

Newsletter Prepared by  
Katy Huff  
FCWMD Secretary-Treasurer





**American Nuclear Society**  
Fuel Cycle and Waste Management Division

Winter 2014 Newsletter

American Nuclear Society  
University of Florida Student Section  
202 Nuclear Sciences Building  
Gainesville, FL 32611  
ufl.ans.president@gmail.com

January 31, 2014

ANS Fuel Cycle & Waste Management Division  
Dr. Guillermo Daniel DelCul  
1401 Wineberry Rd.  
Powell, TN 37849-2922



Dear Dr. DelCul,

In November, over twenty students from our American Nuclear Society student section were able to attend the ANS Annual Meeting in Washington, DC. This was due in part to the contributions from the ANS Fuel Cycle & Waste Management Division, and we would like to thank you for your thoughtfulness and assistance in funding our travel.

The ANS national conferences present students, such as ourselves, with unparalleled networking opportunities, and we cannot express enough our gratitude to you for allowing us this experience.

Once again, we greatly appreciate your consideration and look forward to continued interactions between the American Nuclear Society at UF and the ANS Fuel Cycle & Waste Management Division.

Thank you,

American Nuclear Society at the University of Florida

*Guillermo Daniel DelCul*  
*Harold*  
*Paul Johns*  
*Joseph Antares*  
*Kimberly Brown*  
*Patricia Miller*  
*John Fintona*  
*James Fintona*

*Chris Scullion*  
*Alex*  
*Allyse Sanlock*  
*Lucas Rolison*  
*Kelley*



**American Nuclear Society**  
Fuel Cycle and Waste Management Division

Winter 2014 Newsletter

**Brycen Wendt**  
Idaho State University  
RISE Complex  
1999 Alvin Ricken Dr.  
Pocatello, ID 83202  
January 27, 2014

**Fuel Cycle & Waste Management**  
**Dr. Guillermo Daniel DelCul**  
Distinguished Research Scientist  
1401 Wineberry Rd.  
Powell, TN 37849-2922

Dear Dr. Guillermo Daniel DelCul,

Thank you for the Fuel Cycle & Waste Management division's support of the Student Programs at the ANS 2013 Winter Meeting in Washington, D.C. The contribution helped provide the resources for many students, myself included, to participate in the conference and benefit from attendance.

I thoroughly enjoyed the technical sessions. There were so many concurrent sessions that I wanted to attend that I often found myself scurrying from session to session to hit my favorite presentations. The Tech Expo was also an excellent forum for networking and learning about the opportunities available to students.

My personal conference highlights were: 1) the opportunity to help as a student session assistant for The Best of CONTE 2013 panel, 2) any presentation involving nuclear fuels and materials, 3) the Advanced/Gen-IV Reactors sessions, and 4) the Dinner Celebrating 75 Years of Nuclear Fission with Richard Rhodes.

Once again, thank you for your commitment to the students of ANS and the future of nuclear engineering.

Sincerely,

A handwritten signature in cursive script that reads "Brycen Wendt".

**Brycen L. Wendt**  
Graduate Student





**American Nuclear Society**  
Fuel Cycle and Waste Management Division

Winter 2014 Newsletter



**American Nuclear Society**  
Fuel Cycle and Waste Management Division

Winter 2014 Newsletter



American Nuclear Society, UW-Madison Student Section  
1550 Engineering Drive  
Madison, WI 53706

To: Dr. Guillermo Daniel DelCul  
Distinguished Research Scientist  
1401 Wineberry Rd.  
Powell, TN 37849-2922

2/7/2014

**Thank You For Supporting the ANS Student Program**

Dear Dr. Guillermo DelCul

Thank you for the Fuel Cycle & Waste Management Division's support of the ANS Student Program at the latest winter meeting. With your help our ANS Student Section was able to send our members to conference. Providing a means of funding student travel is helpful to both the individual students and our ANS Student Section. The program lessens the financial burden of travel on the student and reduces the coordination and fundraising our Student Section must perform. The nine students sent to conference is the largest group our section has sent to a winter meeting, and we are grateful for the student program's help in achieving this.

The Student Program opens up conference to a larger variety students. Of the University of Wisconsin-Madison students at conference, many were first time attendees. Our students presented original research, became involved in ANS governance, participated in student section meetings, and more. Our speakers and exhibitors presented on topics ranging from MCNP modeling to experimental thermal hydraulics.

This year our ANS Student Section was able to send our own leaders to conference. Being interested in ANS governance and the logistics of running a conference, our section President, Vice-President, and Treasurer were able to attend. Generally such students find it difficult to attend conference, as they are without traditional research or work based travel allowances. The student program eliminates this financial difficulty while providing a networking opportunity through work and participation requirements.

We at the University of Wisconsin-Madison's ANS Student Section are grateful for all the support and opportunities presented by ANS. As an ANS section your donations and correspondence with students are valued.

Thank you greatly,

2013 Student Program Participants:

*Danny d. Blinn* *Zai Ma*  
*Kalvin Kuehling* *Matthew B. Pucci*  
*Alvaro M. M. M. M.* *Andrew Schuel*  
*Chelsea J. Amzel* *Gary M. Lange*  
*Matt Gold*

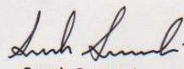


January 27, 2014

Dr. Guillermo Daniel DelCul,

We would like to sincerely thank you for your contribution to funding the Student Program at the November 2013 American Nuclear Society Winter Meeting. As graduate students at The Pennsylvania State University, the ANS meetings present a rich environment for academic and professional development. We are very grateful for the opportunity to participate in the program and we are happy to report that the conference was very successful. Thank you again for making it possible for students to get more involved with ANS.

Sincerely,

  
Sarah Sarnoski

  
Luis Ocampo-Giraldo



**American Nuclear Society**  
Fuel Cycle and Waste Management Division

Winter 2014 Newsletter

January 28, 2014

Dr. Guillermo Daniel DelCul  
Distinguished Research Scientist  
1401 Wineberry Rd.  
Powell, TN 37849-2922

Dear Fuel Cycle & Waste Management Division,

We would like to express our gratitude for your support of the professional development of students at the ANS national meetings. Ideas and connections made at this meeting can provide many opportunities and even initiate career-long relationships. Students who attend the meetings and get involved at the national level or more likely to continue working with ANS throughout their careers, and it all starts with your generous support. We hope that you continue to see increased student participation in your division and that their attendance at these meetings helps achieve that goal.

We would like to recognize your division for playing such a vital role in supporting student attendance at the ANS meeting through sponsorship of student program and travel reimbursement funding. Your contribution to the student members of the American Nuclear society is truly an investment in the future of our industry. The students who attended the conference had very valuable experiences at this Winter Meeting in Washington, DC.

Thank you,

A handwritten signature in cursive script that reads "Alexis Kaplan".

Alexis Kaplan  
Student Sections Committee Chair

ATTN: ALEXIS KAPLAN  
839 FOREST ROAD 286  
JEMEZ SPRINGS, NM 87025