



Nuclear Engineering Student Delegation
July 6-12, 2013
Final Report

Matthew Gidden (Chair)	University of Wisconsin-Madison
Mark Reed (Co-Vice Chair)	Massachusetts Institute of Technology
Nicholas Thompson (Co-Vice Chair)	Rensselaer Polytechnic Institute
Shelly Arreguin	University of Washington, Seattle
Samuel Brinton	Massachusetts Institute of Technology
Lane Carasik	Texas A&M University
Andrew Cartas	University of Florida
Erin Dughie	University of New Mexico
Tom Grimes	Purdue University
Thomas Holschuh	Oregon State University
Anagha Iyengar	University of Tennessee
Buckley ODay	Massachusetts Institute of Technology
Ekaterina Paramonova	Massachusetts Institute of Technology
Vishal Patel	Texas A&M University
Jeremy Pearson	University of California, Irvine
Benjamin Reinke	The Ohio State University

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1 Executive Summary

The 2013 Nuclear Engineering Student Delegation (NESD) spent July 6-12 in Washington, D.C. learning about the policy making process and advocating for issues related to students in nuclear science and technology. The delegation this year included sixteen students from twelve universities, and advocacy focused on continued funding of the Integrated University Program (IUP) and passage of the Nuclear Waste Administration Act (NWAA).

The first activity undertaken by the delegation was the drafting of a policy statement to be delivered to policymakers and their staffs later in the week. The delegation then met with a number of players in the policy-making realm, including AREVA and the Nuclear Energy Institute (NEI), representatives of the nuclear industry; the Department of Energy (DOE), Nuclear Regulatory Commission (NRC), and Office of Management and Budget (OMB), representatives of the executive branch; and legislative members and their staff. The delegation was fortunate this year to meet four out of the five commissioners of the NRC as well as Assistant Secretary for Nuclear Energy, Dr. Peter Lyons.

The 2013 NESD was successful in its twin purposes – to educate and inspire a group of talented, young nuclear scientists and engineers about the policy-making world of Washington, D.C., and to convey the thoughts, opinions, and interests of nuclear science and engineering students to policymakers. The delegates expressed their keen appreciation for such an opportunity and gratitude for the support received from NEI, ANS, and their respective universities.

2 Introduction

The 2013 Nuclear Engineering Student Delegation (NESD) was held in Washington, D.C., on July 6-12, 2013. Formed in 1994 to reinstate funding for research reactors, the delegation continues to express the views of the student population on nuclear science and engineering education. The delegation is independently selected and organized with funding and support provided by the Nuclear Energy Institute (NEI) and the American Nuclear Society (ANS). This year's delegation was comprised of sixteen students from twelve universities across the country. Pictures of the delegates are shown below in Figure 1 and biographies for each delegate follow.



Figure 1: The Delegation at the White House and National Academies

Matthew Gidden, University of Wisconsin - Madison (Chair)

Matthew is a Ph.D. graduate student at the University of Wisconsin - Madison studying nuclear engineering and energy policy. He previously attended Texas A&M University where he received a B.S. in nuclear engineering. Matthew currently works in the Fuel Cycle Research Group at UW - Madison under Professor Paul Wilson. His research interest is primarily fuel-cycle simulation and analysis and related policy topics, such as used-fuel recycling, long-term fuel storage, and nuclear nonproliferation.

Matthew is an active member of the American Nuclear Society, serving as the 2008

Student Conference Co-Chair as well as participating in the governance of ANS at the national level. He has previously held internship positions at both Oak Ridge National Laboratory working on the detection of illicit radioactive materials and Pacific Northwest National Laboratory working on automated verification techniques. He has also had the opportunity to work for AREVA in Paris, France on both the transportation of used nuclear fuel as well as nuclear reactor accident analysis.

Mark Reed, Massachusetts Institute of Technology (Co-Vice Chair)

Mark has received his S.B. degree in Physics as well as his S.B. and S.M. degrees in Nuclear Science and Engineering from MIT, and he is currently a Ph.D. candidate in Nuclear Science and Engineering at MIT. His past research includes magnetic confinement fusion and its application as a neutron source in fission-fusion hybrid systems, enhanced fission yield modeling techniques, and strategic plant siting in the context of seismic history. His current doctoral research focuses on the neutronic effects of geometric distortions in fast reactors.

He has performed reactor modeling at TerraPower and risk assessment for the Yucca Mountain Nuclear Waste Repository at the U.S. Nuclear Regulatory Commission. In his pre-nuclear life, he was an engineering project management intern for the iPhone 3G at Apple and a research assistant at the Princeton University Department of Astrophysical Sciences. Passionate about nuclear policy, he has published a series of six articles on the history of nuclear technology, served as a speechwriter for an elected official, and conceived the 2013 American Nuclear Society Student Conference theme “Public Image of the Nuclear Engineer”. In his spare time, he pursues his affinities for hiking, making random iPhone applications, and composing awkward third-person autobiographies.

Nicholas Thompson, Rensselaer Polytechnic Institute (Co-Vice Chair)

Nicholas is a Ph.D. student at Rensselaer Polytechnic Institute (RPI) studying Nuclear Engineering and Science. He graduated RPI in 2011 with a B.S. and an M.Eng. in Nuclear

Engineering. He has previously held two summer internships at Knolls Atomic Power Laboratory, and from 2010 to 2011, was an undergraduate researcher at the Gaerttner Linear Accelerator Center (LINAC) at RPI.

Nick's current research focuses on using a Lead Slowing-Down Spectrometer (LSDS) for measuring various nuclear data. In particular, two of the projects he is working on are to make capture cross section measurements and fission fragment distribution measurements, both with the LINAC and RPI LSDS. While working as an undergraduate researcher, Nick helped research and perform experiments with the RPI LSDS to assay plutonium and uranium with the goal of nondestructively assaying spent fuel. Nick was selected as a winner of the Innovations in Fuel Cycle Research Award and presented this research at the 2011 American Nuclear Society (ANS) Winter Conference. He was also the President of the RPI ANS section from 2012-2013. Nick was also an NESD delegate in 2012, and one of the Co-Vice Chairs in 2013. Some of Nick's research interests include nuclear data, reactor design, accelerator technologies and applications, and nuclear energy policy. Nick is an avid skier, enjoys playing billiards, and believes that cheap, clean, reliable, safe nuclear power can help the economy and the environment.

Shelly Arreguin, University of Washington

Shelly is a Materials Science and Engineering (MSE) Ph.D. student at the University of Washington in Seattle (UW). She obtained a M.S. in MSE from the UW and B.S. degrees in Chemistry from the University of Colorado at Boulder (CU) and Ecology, Evolution & Conservation Biology at UW. Her primary research interest involves investigating the relationship of processing and properties of materials and their performance under extreme conditions (nuclear, high temperature, accident scenarios, etc.).

Shelly has worked extensively on developing unique processing routes from preceramic polymers to test their capabilities in various energy applications such as: catalysts for fuel cells (CU), hydrogen storage (National Renewable Energy Laboratory), waste-to-energy in-

cinerators (UW) and now high temperature nuclear environments (UW). Previously, Shelly held an appointment at the Pacific Northwest National Laboratory (PNNL) as a Mickey Leland Energy Fellow where she designed chalcogenide glasses for the storage of nuclear waste streams with increased halide content. Currently, she is at PNNL exploring the microstructural evolution of irradiated porous and dense polymer derived SiC ceramics for her Ph.D. thesis. When not in the lab, Shelly enjoys: cave exploration, studying extremophiles and their associated geology, NASA's Kepler Mission, understanding the role of bio-indicators of environmental contamination, mushroom hunting, SCUBA and public outreach, exposing myths vs. realities in nuclear science and technology.

Sam Brinton, Massachusetts Institute of Technology

Samuel is completing a double M.S. program at Massachusetts Institute of Technology in Nuclear Engineering and the Technology and Policy Program. He is a graduate from Kansas State University with a B.S. in Mechanical and Nuclear Engineering and a B.A. in Vocal Music Performance and a minor in Chinese Language. His research interests are concentrated on nuclear fuel cycle system analysis with subtopics of interest including fuel cycle economics and dry cask storage analysis.

Samuel has had internships at the Argonne National Laboratory, Idaho National Laboratory, and Dow Chemical Company in various projects relating to nuclear engineering and systems analysis. He is a strong activist in a variety of civil rights and nonproliferation issues and finds that only with a constant interaction with our legislative representatives can we hope to make true and lasting impacts on policy. In his spare time Samuel enjoys running, singing with choirs and opera companies, and cheering for the K-State Wildcats and MIT Engineers.

Lane Carasik, Texas A&M University

Lane is a graduate student at Texas A&M University studying nuclear and mechanical engineering. He recently graduated with his B.S. in Nuclear Engineering from the University of Tennessee, Knoxville where he conducted nuclear thermal hydraulics research under Dr. Arthur Ruggles. Lane will be a part of the Nuclear Power Engineering Research group at TAMU under Dr. Yassin Hassan. His research interests are in nuclear reactor thermal hydraulics and methods development for computational fluid dynamics and heat transfer.

Lane is an active member of the American Nuclear Society and American Society of Mechanical Engineers. Lane is currently the Vice Chair of the ANS Student Section Committee and serving on the Executive Committee for the Thermal Hydraulics Division. Lane has previously been the Chair of the UTK ANS Student Section and the student chair for PHYSOR 2012. Lane has had previous internships at Westinghouse Electric Company and Tennessee Valley Authority working on reactor coolant systems. At Westinghouse Electric Company, Lane worked on steady state and transient analysis for Electricite de France reactor coolant system components and CFD method development.

Andrew Cartas, University of Florida

Andrew is a Ph.D. student at the University of Florida studying Nuclear Engineering where he obtained his B.S. in Nuclear Engineering in 2011. His current research focus is on nuclear fuel fabrication, utilizing depleted Uranium, and material performance under irradiation. Andrew has also focused his research efforts on Silicon Carbide as a fuel additive and matrix material for UO₂.

Andrew has been heavily involved in the University of Florida ANS student section having served two years as treasurer and is the outgoing section president. During the summer of 2011, he was selected to be the student chair for the 2011 ANS National Conference in Hollywood, FL. He is currently serving on ANS National Subcommittee for Disbursement of ANS Travel Funds to Students. Andrew has interned at Argonne National Lab and

participated in the Nondestructive Assay Applications for International Safeguards program held at Oak Ridge National Lab.

Erin Dughie, University of New Mexico

Erin is a Ph.D. graduate student at the University of New Mexico studying nuclear engineering. She recently graduated with her undergraduate and M.S. degrees from the University of Michigan in 2011 and 2012, respectively. Her research interests include radiation detection and measurements. In the past she has worked on detection techniques for non-proliferation, and semiconductor devices. Her current work focuses on the detection of dark matter.

Erin is an active member of IEEE and the American Nuclear Society. She has previously held internships at Los Alamos National Laboratory working on MCNPX code development, and space nuclear power. In her free time, Erin is involved in outreach activities at the local science museum. She also works with several programs at the University of New Mexico that facilitate K-12 science and technology activities.

Tom Grimes, Purdue University

Tom has received a B.S. degree from Purdue University in Nuclear Engineering and is currently a Ph.D. graduate student at Purdue University studying Nuclear Engineering as well as an MBA student with a focus on Entrepreneurship. Tom currently works in the Metastable Fluid and Advanced Research Lab under Professor Rusi Taleyarkhan. He is currently funded through the National Science Foundation Graduate Research Fellow Program. His research interests include nuclear non-proliferation, fluid dynamics, radiation transport, acoustics, and materials (he holds an international patent for PLA-based coatings).

Tom's current doctoral research focuses on developing a fundamental physics model to describe the operation of Metastable Fluid Detectors (with wider application toward general cavitation studies e.g. making quieter submarines or faster jet planes). His first brush with

nuclear policymaking came while evaluating Metastable Fluid Detectors for application in Radiation Portal Monitors. Since then he has maintained a strong interest in border security and non-proliferation policy.

Tommy Holschuh, Oregon State University

Tommy is currently pursuing a M.S. degree in nuclear engineering at Oregon State University in Corvallis, OR. He received a B.S. in nuclear engineering from OSU in 2013.

Tommy began performing research for Sandia National Laboratories in 2007 and Oregon State University in 2010. His previous research areas include magnetically-confined fusion, supercritical CO₂ Brayton cycle systems, irradiation experiments, and advanced diagnostics for the U.S. research reactor fuel conversion program. Additionally, he is involved in OSU's student chapter of the American Nuclear Society, in which he leads outreach programs for Boy Scouts and other local youth groups.

For his graduate work, he will be involved in the High Temperature Test Facility, a scaled gas reactor facility, as a research assistant under Dr. Brian Woods. Tommy enjoys living in Oregon and likes trail running, rock climbing, and soccer.

Anagha Iyengar, University of Tennessee

Anagha Iyengar is a Ph.D. student in the Nuclear Engineering department at the University of Tennessee, Knoxville. She received her B.S. in Nuclear Engineering from the University of California, Berkeley in 2012. Her research interests lie in nuclear security, nonproliferation technologies, international relations and energy policy. She is working on her graduate research in collaboration with Oak Ridge National Laboratories under Dr. Jason Hayward, and is a part of the Nuclear Materials Detection and Characterization group. Her current research focuses on developing a passive mobile neutron detection system for nonproliferation and security applications.

Anagha is an active member of the American Nuclear Society (ANS), Institute for Elec-

trical and Electronics Engineers (IEEE), and the Institute of Nuclear Materials Management (INMM). In the past, she has had internships working on developing and characterizing novel detection technologies at UC Berkeley, Lawrence Berkeley National Laboratories, Lawrence Livermore National Laboratories (Next Generation Safeguards Initiative Intern), and Sandia National Laboratories. She is passionate about outreach efforts in local communities and schools to advocate and encourage STEM education. She also writes for the Nuclear Literacy Project to help dispel myths about the nuclear industry. In her spare time, Anagha enjoys traveling, hiking, and baking.

Buck O'Day, Massachusetts Institute of Technology

Buck is a Ph.D. Graduate student at the Massachusetts Institute of Technology studying Nuclear Science and Engineering. He previously attended the Air Force Institute of Technology where he earned a M.S. in Nuclear Engineering, the University of Maryland University College where he earned a Master of International Management, and the United States Military Academy where he earned a B.S. in Civil Engineering. He currently studies nuclear materials detection under MIT Senior Research Scientist Dr. Dick Lanza. His research interests include detection of nuclear materials, nuclear policy & security, radiation effects, and nuclear nonproliferation.

Katia Paramonova, Massachusetts Institute of Technology

Ekaterina (Katia) Paramonova is a Masters graduate student at the Massachusetts Institute of Technology (MIT) studying Nuclear Science and Engineering (NSE). She completed her B.S. at MIT with a major in NSE and a minor in Public Policy. Katia is working on experimental materials research on mitigating the deposition of CRUD with Professor Michael Short. She plans on going to France for her Ph.D. in nuclear engineering to get a third view on the industry in addition to her US and Russian perspectives. After completing her studies, Katia then wants to work in the industry or at a think tank for some time before

moving on to international energy policy, with a focus on nuclear energy.

Katia is an active member of the American Nuclear Society (ANS). She is the 2013-2014 co-President of the MIT ANS section and was a co-Chair for the 2013 ANS Student Conference held at MIT. She has interned at Westinghouse, worked on various research projects at MIT including MCNP-Serpent benchmarking work, copper 63 and 65 capture cross section measurements, public perception of nuclear systems modeling, and a summer project at the Harvard Managing the Atom Center on nuclear materials in Russia. She also takes delegations of students from MIT to Russia in the summers for conferences, assists in the Russian SkolTech Institute nuclear center development, and is working on establishing a student exchange program between MIT and Russia universities. Her goal is to bring together nations as well as policy and technical experts together to help innovation flourish.

Vishal Patel, Texas A&M University

Vishal is a Ph.D. graduate student at Texas A&M University studying Nuclear Engineering. He has received an M.S. in Nuclear Engineering from Texas A&M and a B.S. in Physics from The University of Texas. Vishal currently works in the Advanced Energy Technologies group under Professor Pavel Tsvelkov. His research interests include advanced reactor concepts and reactor control.

Vishal previously performed undergraduate research in neutron activation analysis and was an undergraduate TA in a radiation detection lab at UT. He has done summer work at the Center for Space Nuclear Research at the INL developing a nuclear electric propulsion spacecraft. Outside of his academic pursuits, Vishal enjoys weightlifting, cooking, and searching for the perfect cup of coffee.

Jeremy Pearson, University of California - Irvine

Jeremy is a Ph.D. graduate student at the University of California - Irvine studying chemical engineering and used nuclear fuel recycling. He previously attended Brigham Young

University where he received a B.S. in chemical engineering. Jeremy currently works in the Nuclear Research Group at UC Irvine under Professor Mikael Nilsson. His research interest focuses on understanding the sensitivity of solvent extraction processes to radiolysis in an effort to create more robust, efficient, and economical processes which can be adopted in a future fuel cycle that includes recycling and advanced reactor technologies.

Jeremy is an active member of the American Nuclear Society, serving on the Education and Public Outreach committees in the San Diego ANS Local Section. In this capacity he has given lectures on nuclear science and technology at local high schools and worked to promote awareness of nuclear energy and technology, especially during the NRC's evaluation for restart of the local San Onofre Nuclear Generating Station, by organizing and hosting screenings of *Switch* and *Pandora's Promise* at UC Irvine with their respective directors. Jeremy has also participated with colleagues representing UCI in D.C. at the DOE's Better Building's Case Competition presenting energy efficiency solutions to the government's real estate portfolio managed by the GSA. In his spare time Jeremy enjoys playing guitar, wake surfing, and playing soccer and dirt biking with his family.

Ben Reinke, The Ohio State University

Benjamin Reinke is a Ph.D. student at the Ohio State University studying Nuclear Engineering. He graduated from OSU with a B.S. in Physics and French and Honors and Research Distinction in 2010. While an undergraduate, he worked in a High Energy Density Physics laser research laboratory.

Ben is a NASA Space Technology Research Fellow. His current research focuses on experimental and simulations for cryogenic irradiation damage tests. Specifically Ben is establishing a cryogenic irradiation facility at the Ohio State University Research Reactor for completing in situ damage tests on semiconductor materials and optical fibers. Ben also works with a Material Science professor to simulate the radiation damage in these experiments and develop a multi-scale model of defect annealing. Earlier in his graduate studies,

Ben worked on a Department of Energy Nuclear Engineering Program to develop a high temperature alpha particle detector with 4H-SiC. Ben also spends time as the president of the OSU student chapter of the American Nuclear Society and serving as the graduate/professional student member of the OSU Board of Trustees.

3 2013 Schedule

Saturday, July 6th

- 7:00pm - 9:00pm - Orientation Dinner, The Dubliner

Sunday, July 7th

- 8:00am - 12:00pm Policy Statement Writing, Hotel George
- 12:00pm - 1:30pm Lunch, Union Pub
- 1:30pm - 5:00pm Policy Statement Writing, Hotel George

Monday, July 8th

- 9:00am - 1:30pm - Meetings at AREVA
- 2:00pm - 5:00pm - Meetings at NEI
- 6:30pm - 9:00pm - Dinner with Senate Energy and Natural Resources Staffers, Lara Pierpoint and Ron Faibish, at Cafe Berlin

Tuesday, July 9th

- 9:00am - 11:30am - Meetings at the DOE
- 12:00pm - 1:30pm - Lunch with Dr. Peter Lyons
- 2:00pm - 6:00pm - Individual Meetings with NRC Chairman Macfarlane, Commissioner Apostolakis, and Commissioner Ostendorff
- 7:00pm - 9:00pm - Student Mixer

Wednesday, July 10th

- 9:00am - 12:00pm - Meetings at the Department of State with Dr. Gilbert Brown
- 12:00pm - 3:00pm - Lunch at the National Academy of Sciences
- 4:00pm - 5:00pm - Meetings at OMB with Christine MacDonald
- 6:00pm - 8:30pm - Dinner with NRC Commissioner Bill Magwood

Thursday, July 11th

- 8:00am - 5:00pm - Congressional Hill Visits
- 6:30pm - 8:30pm - Dinner with Senate Environment and Public Works Committee Staffer, Annie Caputo, and ANS Congressional Fellow, Vincint Esposito

Friday, July 12th

- 8:00am - 9:00am - Breakfast with Craig Piercy and Leslie Barbour
- 9:00am - 5:00pm - Congressional Hill Visits

4 Meetings & Events

Sunday, July 7th

Policy Statement Writing

The entire group gathered in a meeting room at the hotel and spent the first hour or so talking about what they considered to be the important issues facing nuclear engineering education. After everyone had a chance to express their thoughts, the Chairs gave a quick recap of everything that had been discussed. The delegates emphasized two subjects, continued funding of the Integrated University Program (IUP) and passage of the Nuclear Waste Administration Act (NWAA). A number of other issues were addressed, including domestic fusion research funding, energy policy, nuclear export agreements, and neutron detectors for port security. After the break for lunch, the delegates divided back into groups and drafted each section. At the end of the day the group edited the sections together. The delegates read the combined document agreed upon its content by consensus. The full policy statement is provided in Appendix C.

Monday, July 8th

AREVA Meeting

On Monday morning, the delegates had their first meeting with the governmental affairs staff of AREVA. It began with a general presentation by the Vice President of Governmental Affairs on AREVA's international business portfolio. The AREVA staff gave a presentation about the MOX project and the importance to our joint arms reduction commitments with Russia. They also discussed the business importance of being active in policy discussions in D.C. The morning concluded with a discussion with Mary Alice Hayward on her experiences in nonproliferation and the importance of technical expertise in international agreements.

NEI Meeting

On Monday afternoon, the delegation visited the Nuclear Energy Institute. Leslie Barbour and other staff members described the function of NEI and how the organization operates. They then discussed the importance of building and maintaining relationships with congressional staff. They also explained NEI's surveys and data on the nuclear workforce. We ended the meeting discussing our policy statement and received helpful feedback.

Dinner with Congressional Fellows

On Monday evening, the delegation had dinner with Lara Pierpoint (AAAS Congressional Fellow working for Senator Ron Wyden, D-OR) and Ron Faibish (Science Fellow for the Senate Committee on Energy and Natural Resources). These young scholars shared their experiences on the Hill and specifically spoke about their efforts in crafting the Nuclear Waste Administration Act.

Tuesday, July 9th

DOE Meeting

On Tuesday morning, the delegation visited the Department of Energy to meet with the Office of Nuclear Energy (NE). The program leads for NE's Fuel Cycle R&D, Light Water Reactor Technologies, and Nuclear Engineering University Program (NEUP) discussed the myriad of funding and programmatic opportunities for research provided by DOE NE. The staff discussed some of the priorities in specific research areas and the importance of IUP funding. Brad Williams spoke about the various forms of funding for graduate education, discussing the DOE NEUP Scholarships and Fellowships (funded through the IUP) and the research grants that provide graduate research assistantships at specific universities. We then had lunch with Dr. Pete Lyons, Assistant Secretary of Energy for Nuclear Energy, who shared his perspective on how D.C. operates and the importance of nuclear engineering

research to our nation's future.

NRC Meeting

On Tuesday afternoon, the delegation went to the Nuclear Regulatory Commission headquarters in Rockville, MD. The delegation met with NRC education staff, who described the various methods by which the NRC provides educational enrichment opportunities to universities - through graduate fellowships, undergraduate scholarships, and curriculum development grants. The staff discussed internal metrics used to ensure the effectiveness of the programs and reiterated that none of these programs would be possible without the IUP. We also had the great fortune of meeting with three of the commissioners: Chairman Allison Macfarlane, Commissioner George Apostolakis, Commissioner William Ostendorff. We had very robust discussions with all three commissioners about many different topics, including Small Modular Reactors, Gen-IV technology, Linear No-Threshold Dose, IUP funding, and commercial reprocessing. The commissioners shared diverse perspectives from varied backgrounds, but all are filtered through the lens of the NRC.

Wednesday, July 10th

Department of State Meeting

On Wednesday morning, the delegation met Dr. Gilbert Brown and Ryan Taugher at the Department of State. Dr. Brown, a professor at University of Mass.-Lowell and current Foster Fellow at the Department of State, explained the concept "Team USA" and the importance of the international framework on nuclear security. Mr. Taugher explained the structure of the Department of State and the framework for the Partnership for Nuclear Security (PNS). Through the PNS, the Department of State establishes cooperative partnerships with other nations to support the peaceful use of nuclear energy and achieve mutually beneficial nuclear safety, security, and nonproliferation objectives.

OMB Meeting

The delegation's annual meeting with the OMB on Wednesday afternoon was the most notable in recent memory. Ms. Christine MacDonald, one of the employees responsible for allocating DOE funds, discussed current budgeting. A representative from the National Science Foundation (NSF) discussed the President's STEM initiative, NSF fellowships, NEUP, and IUP. The delegation provided recent statistical evidence showing that the majority of nuclear engineering graduate students work for the U.S. Government after completing their studies, effectively communicated how NEUP and IUP have helped increase the attractiveness of the nuclear field to graduate students, and provided numerous examples of how IUP has allowed students to conduct important nuclear research that would not otherwise be funded.

Dinner with NRC Commissioner Magwood

On Wednesday evening, the delegation had dinner with Commissioner Magwood, who cares deeply about student issues. We discussed our meetings with the other three Commissioners, recent events in the nuclear industry (shutdown of San Onofre and Kewaunee), and the IUP and the NRC's role in education and workforce development. Magwood imparted wisdom from his past experiences as chairman of the Generation IV International Forum (GIF) and working with the Fast Flux Test Facility (FFTF).

Thursday, July 11th and Friday, July 12th

Hill Visits

On Thursday and Friday, the delegation accomplished its main objective on the Hill. Delegates met with or dropped by the offices of all 100 Senators and 42 Representatives. The full list of House offices visited is provided in Appendix A. The delegates also met with 5 senators (Maria Cantwell, D-WA; Patty Murray, D-WA; Jeff Merkley, D-OR; Mike Lee,

R-UT; Tom Harkin, D-IA) and 5 representatives (Ralph Hall, R-TX; Steve Stivers, R-OH; Chris Gibson, D-NY; John Garamendi, D-CA; Bill Flores, R-TX) in person. The remainder of meetings took place with congressional staffers and committees. The delegation's presence was well received and there were many conversations and an overall interest in learning more, leaving us with the impression that our efforts indeed left a mark of influence this year. In particular, as our visits earlier in the week to the NEI, DOE-ONE, and NRC showed broad support for the NWAA, many of the Congressional offices were interested in learning more about the bill or already supported it. Some memorable discussions included one with Senator Feinstein's office, which is working on the NWAA. They stated that nuclear waste storage issues are more political than technological, and they are open to implementing nuclear power in the future to reduce carbon emissions if a waste storage solution is adopted. In addition to discussion of our statement, delegates also had the opportunity to discuss other nuclear-related topics and applications such as nuclear desalination and nuclear development of U.S. oil shale. Delegates established relationships that will be extremely valuable in the future, and we look forward to observing the delegation's impact as the year progresses.

Thursday Dinner

Thursday night we were pleased to have dinner with ANS/AAAS fellow Vincent Esposito and Annie Caputo of the Senate Committee on Environment and Public Works. Mr. Esposito gave some great career advice and talked about some of the legislation he's been working on.

Friday Breakfast

The following morning, we had breakfast with Leslie Barbour of NEI and Craig Piercy, the ANS Washington Representative. Mr. Piercy talked about the ongoing challenges with Yucca mountain and the need for people with technical experience coming to Washington.

5 Conclusion

2013 was another successful year for the Nuclear Engineering Student Delegation. The group met with policy developers from the nuclear industry, policy implementers at the DOE, NRC, and State Department, and with policy makers in both houses of congress as well as OMB. Visiting the State Department was a new venture for the delegation this year and was very well received by both the delegates and our hosts. The OMB meeting this year included, for the first time, a OMB's NSF funding lead, allowing discussion to focus on the types of funding available for science students and students of nuclear science and technology more specifically. The delegation was also able to interface over dinner with two congressional aides on the Senate Committee on Energy and Natural Resources working specifically on the Nuclear Waste Administration Act as well as two aides on the House's Energy Committee, including the current ANS Fellow. Of special note, the delegation was able to meet with four out of the five commissioners of the NRC.

NESD's policy statement emphasized two subjects, continued funding of the Integrated University Program (IUP), which provides fellowships and scholarships through DOE/NE and NRC to nuclear science and engineering students, and passage of the Nuclear Waste Administration Act (NWAA). A number of other issues were addressed, including domestic fusion research funding, energy policy, nuclear export agreements, and neutron detectors for port security. The full policy statement is provided below in Appendix C.

NESD would like to thank our sponsors: NEI, ANS, and the universities of each delegate. Without your continued support, this venture would not be possible. As always, we look forward to next year's delegation, chaired by Nicholas Thompson (Rensselaer Polytechnic Institute).

A House Offices Visited

In addition to meeting with aides for the House Committee on Natural Resources, delegates met with the following representatives or members of the staffs:

Andrews D-NJ	Gibson R-NY	Ryan D-OH
Beatty D-OH	Hastings R-WA	Schrader D-OR
Blumenauer D-OR	Herrera-Beutler R-WA	Schweikert R-AZ
Bonamici D-OR	Kaptur D-OH	Shimkus R-IL
Brown D-FL	Kirkpatrick D-AZ	Simpson R-ID
Brownley D-CA	Latta R-OH	Smith D-WA
Campbell R-CA	Lujan-Grisham D-NM	Stewart R-UT
Cassidy R-LA	Lynch D-MA	Stivers R-OH
Chaffetz R-UT	McKeon R-CA	Stutzman R-IN
Crenshaw D-FL	Murphy R-PA	Tonko D-NY
DeFazio D-OR	Pocan D-WI	Turner R-OH
DelBene D-WA	Reichert R-WA	Walden R-OR
Foster D-IL	Rohrabacher R-CA	Yoho R-FL
Fudge D-OH	Rokita R-IN	

B Budget

Item	Location	Amount (\$)
Carryover from 2012	N/A	816.00
NEI Support	N/A	5000.00
ANS Support	N/A	2500.00
VistaPrint Postcard	N/A	(70.82)
Metro Fares	N/A	(800.00)
Saturday Dinner	Dubliner	(269.78)
Meeting Fees (Room + Breakfast)	Hotel George	(1543.90)
Sunday Lunch	Union Pub	(264.76)
Sunday After Dinner	Dubliner	(113.46)
Monday Dinner	Cafe Berlin	(677.30)
Monday After Dinner	DC Eagle	(113.67)
Tuesday Lunch	L'Enfant Plaza	(355.00)
Tuesday Dinner	Good Stuff Eatery/Meskerem	(247.96)
Tuesday Student Mixer	Dubliner	(277.08)
Wednesday Lunch	National Academies Cafeteria	(118.90)
Wednesday Dinner	Timpano Grill	(1218.13)
Thursday Dinner	Hunan Dynasty	(706.10)
Friday Breakfast	Bistro Bis	(597.86)
Total		941.28 ¹

¹This amount is larger than normal because no delegates required travel or accommodation assistance, and we had a cheaper-than-normal dinner at L'Enfant Plaza due to time restrictions. We are looking into the possibility of assisting the hosting of a social event at an ANS meeting to increase our visibility and future application pool.

C Policy Statement



2013 NUCLEAR ENGINEERING STUDENT DELEGATION

WASHINGTON, D.C. JULY 7TH – 12TH

WWW.NESD.ORG

POLICY STATEMENT

Matthew Gidden (Chair)	University of Wisconsin-Madison
Mark Reed (Co-Vice Chair)	Massachusetts Institute of Technology
Nicholas Thompson (Co-Vice Chair)	Rensselaer Polytechnic Institute
Shelly Arreguin	University of Washington, Seattle
Samuel Brinton	Massachusetts Institute of Technology
Lane Carasik	Texas A&M University
Andrew Cartas	University of Florida
Erin Dughie	University of New Mexico
Tom Grimes	Purdue University
Thomas Holschuh	Oregon State University
Anagha Iyengar	University of Tennessee
Buckley ODay	Massachusetts Institute of Technology
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Executive Summary

- The federal government is the single largest employer of nuclear engineering graduates and has a vested interest in maintaining high quality professionals in nuclear science and technology.
- The Integrated University Program (IUP) is the only source of funding specifically targeted at nuclear science and technology students, and maintaining its FY2013 funding level is vital to the continuation of nuclear education programs. **The House of Representatives has appropriated \$5.5M for the Department of Energy Office of Nuclear Energy (DOE-NE) and \$15M for the US Nuclear Regulatory Commission (NRC) in its 2013 Energy and Water Bill. The Delegation strongly urges the Senate to do the same.**
- To conduct innovative research and educate the next generation of nuclear scientists and engineers, US universities require continued investment in existing equipment and modern research infrastructure.
- The US requires a coherent, long term energy policy and any such policy should incentivize scalable, carbon neutral sources of power.
- The US would greatly benefit from a coherent used nuclear fuel disposition policy as outlined in the Nuclear Waste Administration Act of 2013.
- The US should implement export policies that facilitate innovation, while funding and fielding detection capabilities to ensure border security.

About the NESD

In 1994, the first Nuclear Engineering Student Delegation (NESD) to Washington, D.C. convened to reinstate funding for research reactors. Today, the Delegation continues to express the views of the student population on nuclear science, policy, and education. Each year, the Delegation comprises a diverse group of students from the nation's most prestigious nuclear engineering programs, representing various disciplines within the nuclear sciences. The students independently organize and run this trip to Washington, D.C. The Delegation does not represent any organization or university; the views expressed in this policy document are strictly those of the delegates.

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2013 NESD Policy Statement

Investing in Education

The United States has long demonstrated its proud commitment to nuclear science and education through investment in both intellectual and educational infrastructure. As the single largest employer of graduating nuclear engineers [1], the federal government not only has a vested interest, but also a responsibility to provide the nation with an educated nuclear science workforce. In order to ensure that nuclear energy continues to be a viable option, we must maintain appropriate investments in nuclear science and technology education. The primary vehicles through which these investments reach students and universities is the Integrated University Program (IUP) as well as infrastructure investments through the Department of Energy.

The Integrated University Program (IUP) provides the sole source of funding specifically targeted at nuclear science and technology students and their education. This competitive program supports undergraduate scholarships, graduate fellowships, curriculum development, and junior professor development. The IUP was established in the Energy and Water Appropriations Act of 2009 due to the “Committee’s concern for lack of stable support” [2] for such research, in accordance with the requirement of federal funding of nuclear science and technology programs as mandated by the Atomic Energy Act of 1946 (Sec.8A). Although the IUP was authorized \$450M over 10 years to achieve this legislative goal, neither the Department of Energy Office of Nuclear Energy (DOE-NE) nor the US Nuclear Regulatory Commission (NRC) has requested funding for the IUP in the Administration’s FY2014 budget. The Delegation endorses the House of Representative’s actions to reinstate the IUP at appropriate levels, echoing testimony of the Nuclear Engineering Department Heads Organization (NEDHO).

The US has historically assisted nuclear science and university programs through infrastructure maintenance grants. Research reactors within the university infrastructure provide nuclear engineering students practical exposure to industrial practices and cutting edge experimental techniques. The delegation finds recent lack of commitment to such programs, such as the MIT Alcator C-Mod tokamak fusion reactor, deeply troubling. Research reactors form the core basis by which students gain first-hand experience in the design and operation of sophisticated fission and fusion reactor systems, and their continued federal support is critical to maintaining the high quality of nuclear engineers produced by the United States.

Recommendation: The Delegation recommends that Congress maintain the IUP at or above its FY2013 level and reinstate critical educational infrastructure funding.

Domestic Energy Policy

The United States needs a sustainable, coherent, and effective national energy policy. Previous attempts have been made, exemplified by Carter’s “Crisis of Confidence” speech and Nixon’s 1974 State of the Union address. While short-term goals may have been met, the nation still lacks long-term, effective action. The current administration has begun a new discussion, placing climate change mitigation and long-term energy security as primary objectives of the nation’s proposed energy policy.

¹ “Nuclear Engineering Enrollments and Degrees Survey, 2010 Data,” Oak Ridge Institute for Science and Education.

² “Integrated University Program”, Ingrid Milton, DOE-NE. August 14, 2009.

Meeting these proposed goals will require an increase in market share from many energy sources. Natural gas, which emits approximately half the amount of greenhouse gases as coal, is scalable but prone to price volatility, requiring diversity in national energy production. Wind and solar provide carbon-neutral power but struggle to gain market penetration due to their intermittency and transmission requirements. As a stable, scalable source of carbon-neutral baseload power, nuclear energy can replace dirtier forms of baseload power. Incentivizing a robust clean energy portfolio (including nuclear, wind, and solar power) allows us, as a nation, to focus on both nascent and existing technologies to tackle the nation's energy objectives.

The U.S. can take a number of positive policy actions. Foremost is the Nuclear Waste Administration Act (NWAA) of 2013 (S. 1240). Structured on recommendations provided by the Blue Ribbon Commission on America's Nuclear Future, the NWAA is a bipartisan plan to address the critical concerns of used nuclear fuel disposition and should be enacted with continued academic, industrial, and popular support. Another positive policy action includes the Department of Energy's (DOE) loan guarantee program assisting new nuclear reactor projects. Current projects are on time and have maintained modest cost increases of less than 3%. Congress should remain committed to loan guarantees for existing nuclear builds. The DOE's support for Small Modular Reactor licensing is another effective policy initiative. This nascent technology provides a new and grid-appropriate way to replace aging, low-capacity coal-fueled power plants. Congress should continue to support this job-creating initiative.

Recommendation: The U.S. should define and commit to a stable and coherent energy policy, including incentivizing a clean energy portfolio, passing the NWAA, and continuing federal support for carbon-neutral, scalable power technologies.

Nuclear Exports and Safeguards

As the originators of nuclear technology, we Americans have an obligation and a vested interest to continue leading the world in its responsible management. This includes both export control and curtailment of nuclear proliferation.

Currently, American industry exports nuclear technology to foreign markets, providing jobs to Americans at home and stimulating foreign investment. In order to remain a world leader, we must invest in advanced nuclear technologies such as fast reactors, small modular reactors (SMRs), and reprocessing. If we do not innovate and export, our status as a global leader will diminish - we will cede our influence and expertise with respect to security and nonproliferation. Such expertise allows us to support critical international governance institutions, such as the International Atomic Energy Agency.

Responsible management of nuclear technology also includes its transport across international borders. More than 90% of the world's commerce moves via large cargo containers, in which one could conceal illicit or proliferative nuclear material. As the world's leading maritime trading nation, we must lead in bolstering port security. This requires investment in advanced detectors - innovative nuclear devices that routinely screen incoming cargo. Increased investment can prevent illegal diversion of nuclear materials, improve port security, and enhance response to radiological threats against the U.S. More efficient and economic detectors could be developed through novel funding opportunities that bring together universities, national labs, and industry to ensure technology transfer to field applications.

Recommendation: The U.S. should implement export policies that facilitate innovation and allow American industry to thrive on the global stage, while funding and fielding detection capabilities to ensure border security and safeguard nuclear materials.