# University Currents

A Newsletter For and About the University Nuclear Engineering and Science Community

*U. S. Department of Energy* *Fall 2004*


## Pittsburgh Public Schools First To Acquire Nuclear Science Teaching Module

In a ceremony Friday, October 22, 2004, the Department of Energy announced a new nuclear science and technology partnership with the Pittsburgh Public Schools System. William D. Magwood, IV, director, DOE's Nuclear Energy, Science and Technology, and his staff visited the advanced placement physics class of Ed Henke at Langley High School to announce the new partnership.


William D. Magwood, IV, Director with students and their teacher, Ed Henke, at Langley High School in Pittsburgh, PA, introducing the "Harnessed Atom" teaching module

Bill Magwood, a Pittsburgh native and Carnegie-Mellon University graduate, represented the agency at the kickoff ceremony. "It is our expectation that the collaboration between the Pittsburgh Public School System and the Department of Energy will be the model for similar partnerships all over the country," stated Magwood, . "As the students will learn in this course, commercial nuclear power was born in Pittsburgh and it makes sense to start this education initiative where it all began."

The program, which is called "The Harnessed Atom: a new curriculum in nuclear science and technology," will be taught over a two-week period this school year as part of the Pittsburgh Public Schools AP Physics Course. Public high school students participating in this unique coursework will benefit from interactions from internationally-recognized experts from industry and DOE's national laboratories. Through hands-on experiments, interactive learning and focused reading, students will explore the fundamentals of energy physics, atomic structure, power plant design and operation, safety and environmental protection. The curriculum also emphasizes important social factors like economics and understanding risk.

The collaboration between the Department of Energy and the Pittsburgh Public schools will serve as a model for similar partnerships all over the country. The Department plans to host a workshop in late Spring with parties interested in facilitating these partnerships for the 2005-2006 school year.

Director Magwood speaks about nuclear energy to an Advanced Placement Physics class at Langley High School

# Oregon State University
# Awards and Contacts for the Future Garnered at ANS Student Conference

Eight undergraduate students from Oregon State University accompanied Assistant Professor Brian Woods to the ANS Student Conference held in Madison Wisconsin in early April. Brian Collins, Anthony Elliott, Kati Gray, Brian Johnson, Sarah Kleeb, Adam Robinson, Mark Shaver, and Kristen Smith traveled for a variety of reasons, but all enjoyed the experience.

The consensus from the students – it was a good time. OSU student chapter Treasurer, Kristen Smith said, "it was a good thing I went." Coming back with two graduate school interviews, Smith was also encouraged by interest in hiring her from a national lab and power industry provider. "It was very productive for me" she says smiling.

Adam Robinson, another graduating senior, also went to make contacts for the future. "It was a good experience with lots of people who seemed interested in talking [with me]. There was a wide range of companies there, from national labs to private companies and utilities. I would recommend anyone attending to take a stack of résumé's because most people asked for them."

Two juniors who made the trip, OSU ANS student chapter President Sarah Kleeb and Vice President Kati Gray, brought well deserved recognition to the department by winning the *Outstanding Presentation in Policy & Outreach*. In their presentation, "The Footprints of Radiation: Spreading the Word" they spoke about their experiences teaching middle school students in the Saturday Academy.

Award Winners Kati Gray and Sarah Kleeb present radiation and nuclear power to middle schoolers

In late February Kleeb and Gray spent several hours with about 12 middle school students who had enrolled in the Saturday Academy. Meeting at the OSU Radiation Center, the two college students took the younger kids on a tour of the building showing them the reactor and one of the labs, and had the children perform several experiments. Said Gray about winning the award, "after getting such positive feedback, I'm ready to take our class to more student groups and hopefully a broader age range."

# University of Florida's Enrollment Continues To Climb

Undergraduate and graduate student enrollment continues to be high in the University of Florida's (UF) Nuclear & Radiological Engineering (NRE) Department. "Our student recruitment last fall was successful," said Dr. Alireza Haghighat, chairman and professor of UF's Nuclear & Radiological Engineering Department. "The fall 2003 enrollment increased once again by about 30%, resulting in a department total of 63 graduate students and 67 undergraduates.

But that's just one facet of student enrollment, according to Haghighat. The other important factor is the quality of students entering the department's programs. "NRE has recruited excellent undergraduates," he said. "Our senior class has an average GPA of 3.5. This is solid proof that we are training highly qualified individuals for the nuclear industry," said Haghighat. The continued addition of new students necessitated adding faculty to the department.

# Oregon State and Western Nuclear Science Alliance

Through DOE funding, Oregon State University's Department of Nuclear Engineering and Radiation Health Physics as been updating its facilities and increasing its research opportunities. OSU is the lead university in a consortium of five western universities and seven national laboratories known as WNSA, or the Western Nuclear Science Alliance. The consortium is funded under the Innovations in Nuclear Infrastructure and Education (INIE) program, which in the second year of funding has allowed for the building of a new Neutron Radiography Facility in the TRIGA reactor bay, as well as various updates in laboratories and a classroom. Total funding for the first three years of WNSA is $4.0 million.


Increasing the radiochemistry research opportunities at OSU, the Radiochem lab received new equipment in the form of a Cobra Autogamma counter, and an HPLC/electronspray/ MS/MS. Senior Researcher and Assistant Professor Alena Paulenova, herself an addition made possible through WNSA, said of the equipment, "It is very exciting to have this new equipment for research and study with students."

Three PerkinElmer single-sample liquid scintillation counting systems were purchased and installed in the undergraduate laboratory used to teach nuclear instrumentation and detection methods. In addition, eight NaI gamma spectrometry systems will be installed soon. These are the first major upgrades in this equipment since the 1970s and 1980s and will greatly enhance classes and teach the students the fundamentals and theory of radiation detection. Seminar speaker Darryl Kaurin, Chief Medical Physicist at Oregon Health and Science University, said of the lab, "Your radiation detection instrumentation lab was wonderful. Unfortunately, your students probably won't appreciate it until they get out in the real world."

The real world is coming closer in the C104 classroom as it is now fully equipped for distance education classes and enhanced multimedia presentations. WNSA Administrator and Emeritus Professor Steve Binney has been teaching the spring Nuclear Radiation Shielding course with streaming video from the Radiation Center – something the other professors who taught OSU Extended classes could not do.

The new system has microphones throughout the room, two remotely controlled cameras, a sympodium ("high tech monitor with touch screen"), a document camera, and DVD/VCR players. Says Binney, "It's been great to simply walk down the hall to teach, rather than having to cross campus to use an enhanced classroom."

The upgraded room helps address the WNSA program's goals of developing highly skilled nuclear scientists since graduate students who can not come to campus for class can take advantage of our offerings, and it will further enhance our ability to share our expertise with others.

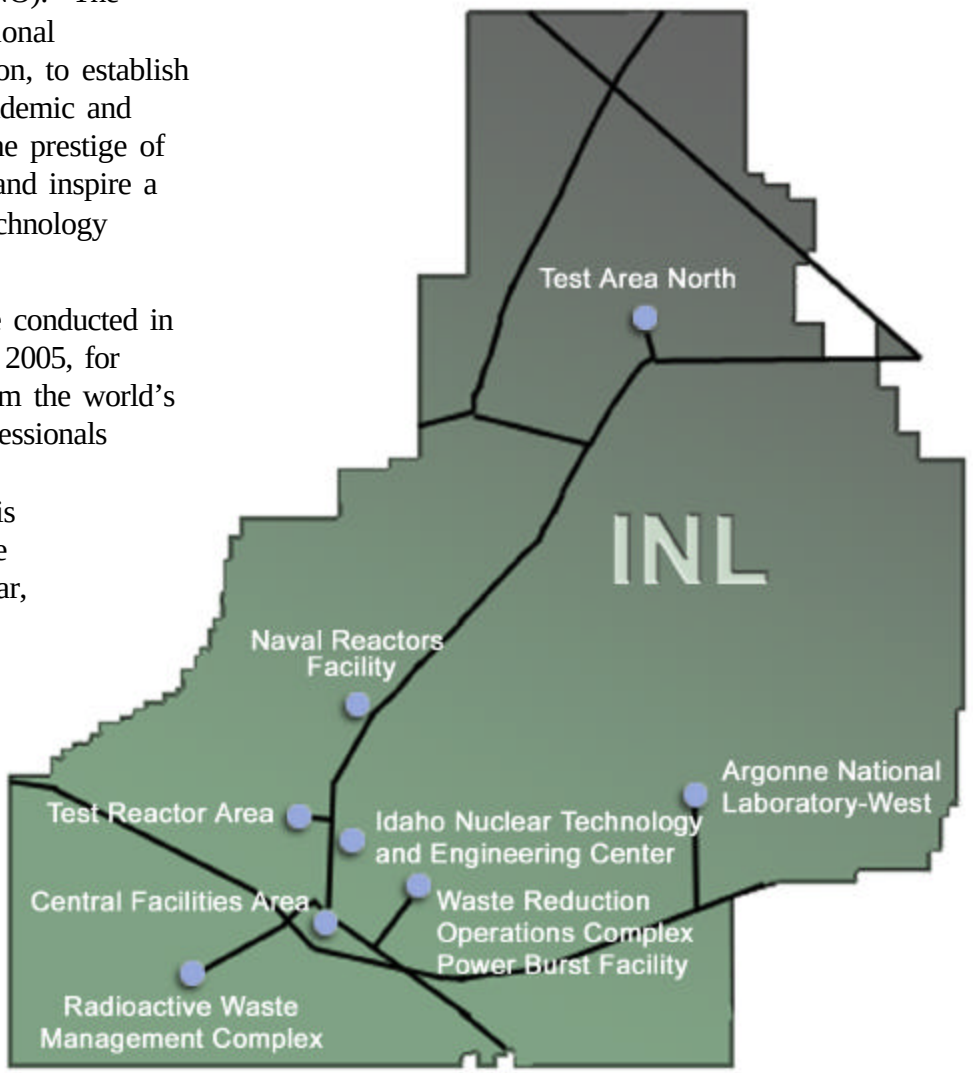
# World Nuclear University's (WNU) Summer

The U.S. Department of Energy's Office of Nuclear Energy, Science and Technology will host the first World Nuclear University's (WNU) summer Institute at the Idaho National Laboratory. The WNU partnership was established in 2003, which comprises 30 nations, with major international nuclear organizations supporting the program. The "Founding Supporting Organizations" include the International Atomic Energy Agency, The OECD's Nuclear Energy Agency, the World Nuclear Association (WNA), and the World Association of Nuclear Operators (WANO). The WNU mission is to foster inter-institutional cooperation to enhance nuclear education, to establish widely accepted global standards in academic and professional qualification and elevate the prestige of the nuclear profession, and to develop and inspire a new generation of leaders in nuclear technology worldwide.

The WNU Summer Institute will be conducted in Idaho Falls at INL July through August 2005, for approximately 60 fellows – selected from the world's leading nuclear student and young professionals – to participate in this unique training experience. The Institute's curriculum is being developed to provide cutting edge presentations from world renown nuclear, environmental and industry experts, authors and policymakers on what's currently relevant in nuclear to the future of nuclear technology. The four focus areas are: Global Setting, International Regimes, Technology Innovation and Nuclear Industry Operations.

The WNU qualification criteria for the WNU fellowship are (1) proficiency in English, particularly oral communication; (2) master's level or equivalent experience in science or engineering, with knowledge of nuclear fundamentals; (3) demonstrated academic or professional excellence; and (4) maximum age of 32 years old. The fellowship application will be distributed in late October to UN missions in Vienna, to the WNA and WANO member companies, and participating institutions in the WNU network. The deadline for applications is December 2004.

While in Idaho attending the Institute Fellows' will participate in various outing to promote teambuilding and networking. Upon completion of the fellowship the fellows will receive a Certificate, as well as, some universities may award credit for the coursework performed.



# Idaho State University Institute for Nuclear Science and Engineering

The Idaho State University has established an Institute of Nuclear Science and Engineering (INSE) with approval from the Idaho State Board of Education in 2003. The Institute is closely tied to the College of Engineering, the Idaho Accelerator Center, and the Health Physics programs, and has affiliations with the departments of Chemistry, Biology, and Political Science at ISU. Regionally, the INSE is associated with the Western Nuclear Science Alliance (WNSA) schools, and the Inland Northwest Research Alliance (INRA)/Subsurface Sciences Program. Courses are also being offered in medical and radiological physics. While INSE calls Idaho State its administrative home, it will also support nuclear science and engineering at schools across Idaho. Active collaboration with the University of Idaho and Boise State University is anticipated.

The vision for the Institute is to play a meaningful role in the revitalization of nuclear engineering and science in the U.S. In this regard, the vision is in harmony with that for operation of the new Idaho National Laboratory (INL), coming into existence in February 2005.

The mission of the INSE is threefold:

- Revitalize and expand nuclear research at the Idaho universities
- Educate a next generation of professionals in nuclear science and engineering
- Provide educational programs for the work force of the INL

Under the direction of Dr. Michael Lineberry (ANL/ISU), this Institute will facilitate research collaboration between ISU and other entities, especially the INL but including other organizations that will be involved in work in Idaho because of DOE's desire to center U.S. nuclear R&D there. The second faculty member, Dr. Mary Lou Dunzik-Gougar, also has a national lab/university joint appointment (INEEL/ISU). "Joint appointments are the way of the future for nuclear research and education, at least here in Idaho," says Lineberry.

The universities benefit from an effectively larger faculty as lab professionals instruct and advise both undergraduate and graduate students. Further, the academic community gains technical and laboratory capabilities through access to the collaborators' research facilities.

National laboratories and the nuclear industry will receive similar benefits from these arrangements. University research facilities, including the Idaho Accelerator Center, become more accessible and research teams expand to include students and professors who bring with them new ideas and perspectives. Increased opportunities arise for recruiting bright, young minds into the nuclear industry.

Students are being attracted to the Institute because of the expectation of access to research facilities that are increasingly hard to find on the university campus. In recognition of the fact that nuclear science and engineering is becoming increasingly multi-disciplinary, the Institute seeks to attract and support students from a variety of backgrounds who have a common interest in "things nuclear." When asked about opportunities for students with the Institute, Dunzik-Gougar said, "This is an exciting time in the field of nuclear science and engineering. Students entering the field can look forward to a wide variety of stimulating career opportunities. In addition to traditional nuclear engineering, students may choose to pursue research and study in the areas of nuclear energy policy analysis, nuclear/radiochemistry, and nuclear materials, for all of which there is a significant demand." Further, the Institute hopes to act as host to students from other universities by helping to facilitate their research activities with the INL, and by arranging for needed courses in conjunction with their home institutions.

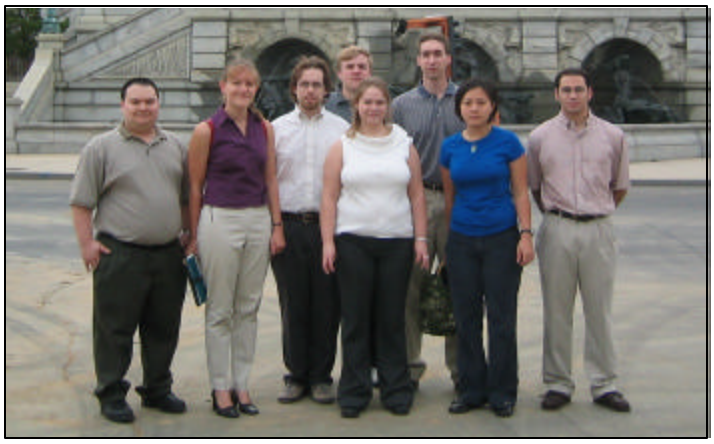
# DOE Announces FY 2004 Advanced Fuel Cycle Initiative (AFCI) Fellowship Awardees

After an extensive search to identify outstanding young scientists and engineers, the Advanced Fuel Cycle Initiative of the U.S. Department of Energy, Office of Nuclear Energy, Science and Technology, announces the awarding of eight fellowships to master's degree students.

To select these outstanding students, the AFCI program sought applicants from 169 universities throughout the United States.

The fellowship recipient from The Georgia Institute of Technology Department of Mechanical Engineering is Kathryn Harper who acquired her undergraduate degree in mechanical engineering from Georgia Tech. Harper is interested in heat transfer and energy systems and identifying new fuel sources and new methods of getting energy.

The fellowship recipient from North Carolina State University Department of Nuclear Engineering is Cody Peeples who acquired his undergraduate degree in nuclear engineering from Texas A&M University. Peeples is interested in power and multi-purpose systems of fission reactors, long core life, minor actinide burning, and designs. He is also interested in fuel reprocessing and minor actinide burning fuels and accelerator-driven transmutation reactors.



AFCI Fellowship Recipients

From Texas A&M University (TAMU), Department of Nuclear Engineering, Robert Candalino was selected. He acquired his undergraduate degree in nuclear engineering at TAMU. Candalino is interested in new reactor designs such as high temperature gas cooled reactors and new naval reactors. He is also interest in improving efficiency on current designs through improved heat transfer.

The University of Florida, Department of Nuclear and Radiological Engineering recipient is Cindy Fung, who acquired her undergraduate degree from The University of Florida in nuclear engineering. Fung's research interests include using computer science to improve the speed/efficiency/accuracy of nuclear codes. She is also interested in improving graphical user interfaces.

Thomas Patten from the University of Illinois at Urbana-Champaign (UIUC) Department of Nuclear Plasma and Radiological Engineering is another recipient. Thomas acquired his undergraduate degree in nuclear engineering from UIUC. Patten is interested in nuclear fuel modeling and research reactor design.

The fellowship recipient from the University of Michigan Department of Nuclear Engineering and Radiological Sciences is Neal Ham, who acquired his undergraduate degree in nuclear engineering from Oregon State University. Ham is interested in TEM analysis of microstructure and microchemistry of irradiated steels.

The University of New Mexico (UNM) Department of Chemical and Nuclear Engineering recipient is Andrew Goldmann who acquired his undergraduate degree in nuclear engineering from UNM. Goldmann is interested in detail radiation transport modeling, life-cycle risk analysis, accident consequence analysis, repository/releases to the biosphere analysis, nuclear cross-section processing, and advanced spent fuel burnup analysis.

The University of Wisconsin Department of Nuclear Engineering and Engineering Physics is represented by Hannah Yount, who acquired her undergraduate degree in nuclear engineering from The University of Missouri-Rolla. Yount is interested in nuclear materials with three areas of particular interest: lead-bismuth eutectic; radiation effects on materials, specifically materials already influenced by other types of corrosion; and the strength properties of materials after exposure to severe temperatures and coolants.

To date, the Advanced Fuel Cycle Initiative has supported 20 students through the AFCI University Fellowship Program and graduates are presently working at national laboratories and in industry. Some graduates are acquiring Ph.D.'s or additional master's degrees in fields such as policy.

# President Harry S. Truman Fellowship In National Security Science and Engineering

Sandia National Laboratories is seeking applicants for the President Harry S. Truman Fellowship in National Security Science and Engineering to attract the best nationally recognized new Ph.D. scientists and engineers. Truman Fellowship candidates are expected to have solved a major scientific or engineering problem in their thesis work or will have provided a new approach or insight to a major problem, as evidenced by a recognized impact in their field.

Eligibility criteria include: U.S. citizenship, the ability to obtain a DOE "Q" clearance; research in areas of interest to national security; the candidate must have been awarded a Ph.D. within the past 3 years at the time of application or will have completed all Ph.D. requirements by commencement of appointment; and, candidates seeking their first national laboratory appointment.

The Truman Fellowship is a three-year appointment normally commencing on October 1,


The Fellowship provides the opportunity for recipients to pursue independent research of their own choosing that supports the national security mission of Sandia National Laboratories. The appointee is expected to foster creativity and to stimulate exploration of forefront science and technology and high-risk, potentially high-value R&D.

Sandia has research focus areas in: Biotechnology; Chemical & Earth Sciences; Computing, Mathematics and Information Sciences; Electronics and Photonics; Microsystems and Engineering Sciences; Manufacturing Science and Technology; Materials Sciences; Pulsed Power/Directed Energy; and Robotics and Intelligent Systems.

although exceptions may be made to accommodate special circumstances. For Fellows beginning their appointments in 2005, the salary is $94,200. The number of appointments is limited. A panel of senior scientists and engineers at Sandia will review candidates. Application deadline is December 5, 2004. For more details, visit our Web Site at: ***http://www.sandia.gov/employment/employment/special/truman/***.

# Battelle Energy Alliance Selected to Head Idaho National Laboratory

It has been a while in the making, but the Idaho National Laboratory will become a reality on February 1, 2005. In April 2003, the Secretary of Energy made the decision to re-compete the Idaho National Engineering & Environmental Laboratory (INEEL) contract and separate the distinct missions of the site -- to revitalize U.S. nuclear energy research and development, and accelerate the important site cleanup work -- into two contracts. With that decision a DOE-NE Source Evaluation Board developed a Request for Proposals (RFP) that would split the nuclear energy and other R&D activities from the INEEL contract and combine this with the Argonne National Laboratory-West (ANL-W) workscope (currently a separate contract) to form the new Idaho National Laboratory (INL). DOE's vision is for the INL to enhance the Nation's energy security by becoming the preeminent, internationally-recognized nuclear energy research, development, and demonstration laboratory within ten years. The INL will also establish itself as a major center for national security technology development and demonstration. This requires that the INL be a multi-program National Laboratory with world-class nuclear capabilities. The INL will foster new academic, industry, government and international collaborations to produce the investment, programs and expertise that assure this vision is realized."

The statement of work in the RFP emphasized that the new contractor for the INL will lead the U.S. research, development and exploration of the Next Generation Nuclear Plant (NGNP) technologies and carry out this mission in cooperation with other national laboratories, universities, international partners and the private sector. The INL will be the lead systems integrator for DOE-NE for the near and long-term missions to develop GEN IV nuclear technologies and advanced fuel cycles. The new contractor for the INL will also assume a major role in revitalizing nuclear engineering and science education in the U.S., which includes establishing a Center for Advanced Energy Studies.

After releasing a draft RFP for comment in February 2004, a final RFP was issued on May 26, 2004, and four proposals to manage and operate the new INL were received by DOE on July 26, 2004. The DOE Source Evaluation Board thoroughly reviewed the written proposals and conducted oral presentations with the four offerors. On November 9, 2004, DOE announced that Battelle Energy Alliance (BEA) had been selected as the contractor to achieve the DOE vision for the new INL. The Battelle Energy Alliance team includes the Battelle Memorial Institute; with BWXT Services, Washington Group International, and the Electric Power Research Institute. The BEA team also includes a national consortium of nuclear universities led by the Massachusetts Institute of Technology and involving North Carolina State University, Ohio State University, Oregon State University, the University of New Mexico and a regional consortium of the three Idaho universities (University of Idaho, Idaho State, and Boise State) The contract signed by BEA and DOE includes a ten-year base term with up to five additional years in options. The estimated value of the base term and options is over $7-Billion. Members of the BEA team have committed resources to the INL to enhance nuclear energy, national security, science & technology, as well as science and engineering education programs. BEA is currently transitioning with the existing contractors at the INEEL and ANL-W. The new INL will be formed when BEA takes over on February 1, 2005, and will have over 3300 employees. For more information about the new Idaho National Laboratory contract, go to www.id.doe.gov. For more information about the new INL contractor, Battelle Energy Alliance, go to www.battelleenergyalliance.com.

# Building an Effective Educational Bridge Between Tuskegee University and the University of Cincinnati Nuclear and Radiological Engineering Program

The University of Cincinnati-Tuskegee University Partnership Program students visited Washington D.C. in July. During their trip the students toured the NRC Operations Center and the National Institute for Standards. They also visited the Westinghouse Nuclear Training facility at the Company's Waltz Mills site in Pennsylvania.

The partnership between the University of Cincinnati Nuclear and Radiological Engineering (UCNRE) Program and Tuskegee University (TU) is designed to build an effective educational bridge between TU and the UCNRE. The collaboration began in Autumn 2001 with support from the DOE Nuclear Engineering University Partnership (NEUP) Program. More than fifty percent of the DOE award is used for TU student support and travel.

The objective of the project is to increase the number of minority engineers and professionals in the nuclear industry by building an educational bridge between TU and the UCNRE Graduate Program. Tuskegee students crossing the bridge are able to earn a UC Master's Degree in either Nuclear Engineering or Health Physics, and then are in a position to enter the nuclear industry as professionals or to pursue further graduate work. The program has been highly successful — training thirteen TU students in the field of nuclear engineering and resulting in the entry of three TU BS graduates into the UCNRE Graduate Program starting in the 2004 Autumn Quarter.


From left to right: Agin El-Amin, TU graduate student, Cleveland, OH; Professor Shoaib Usman, UC; Carl Walz, NASA Astronaut & Project Prometheus Executive; Kerita Williams, TU Electrical Engineering undergraduate, Evergreen, AL; Bill Magwood, Director, Office of Nuclear Energy, DOE; Utishia Matthews TU Chemical Engineering undergraduate, Mobile, AL; Monica McCoy, TU Chemical Engineering undergraduate, New Orleans, LA; Lawayndra Little, TU Chemical Engineering undergraduate, Decatur, AL; and Chuck Dugger, Vice-President, NEI.

# Gen IV Initiative Fuels University of Wisconsin-Madison Research

With approximately $9 million in Department of Energy funding over the last five years, engineering physics faculty and staff are helping create the future of nuclear power. Their work falls under the DOE Office of Nuclear Energy, Science and Technology's Generation IV initiative, which aims to design safer, more efficient and reliable plants that minimize waste and resist proliferation.

Argonne National Laboratory-West

Idaho National Engineering and Environmental Laboratory (Central Facilities Area)

In supercritical water reactor studies, researchers are developing reliable materials for the proposed reactor, which cools via water at very high temperatures and pressures. They have identified ways to modify structural surfaces so that in the presence of the high-temperature, high-pressure water, corrosion rates are substantially reduced. Additionally, they are determining how radiation fields affect water chemistry and the associated corrosion. They are conducting heat-transfer experiments and have developed a model that verified test results on flow stability. In addition, they developed a unique "mixed-spectrum" supercritical water reactor design that burns waste as it produces power; early results indicate that such a reactor could be devised with no net production of minor actinides.

In projects that focused on the liquid metal reactor design, researchers dynamically imaged two-phase flow where water vaporized in the presence of liquid metal. They measured the local heat-transfer coefficients and compared them with traditional measurements of volumetric heat transfer. And applying their results to current reactors, they developed a technique of heat transfer in which they demonstrated coolability under a worst-case accident scenario. They also are studying corrosion behavior of structural materials in the presence of molten lead.

Collaborators on various projects include Argonne National Laboratory, Sandia National Laboratories, Idaho National Engineering and Environmental Laboratory, Notre Dame University, the University of Michigan, Westinghouse Corporation, and the Korea Atomic Energy Research Institute. UW-Madison's researchers include Wisconsin Distinguished Professor Michael Corradini, Assistant Professors Todd Allen and Paul Wilson, Senior Scientist Kumar Sridharan, Associate Scientist Mark Anderson and Reactor Director Bob Agasie.

# International Knowledge Management Conference

## *International Youth Nuclear Congress Perspective*

In September 2004, the International Atomic Energy Agency and the Commissariat à l´Energie Atomique (CEA), Government of France, organized a first-of-its-kind conference on nuclear knowledge management in Saclay, France. The conference objective was *to reach a clear, common understanding of the topic, and to develop a plan to move forward in nuclear knowledge management*. The conference was attended by representatives from universities, utilities, government labs/agencies from around the world; while most participants were established professionals, the conference organizers had an attentive ear to young professional perspectives – inviting several young panelists to participate in a discussion on "The Young Generation in the Nuclear Sector."

A successful knowledge management strategy must engage the younger generation. The nuclear field must be seen as an interesting, forward looking, socially responsible industry to capture young talent. This requires members of the industry, government organizations, research institutes, etc. to develop alliances with universities. Providing *real* projects that need *real* solutions, and allowing students and young professionals to work with experts in the field extends relevance to the work and offers real-world experience to young scientists and engineers – making them feel a significant part of a dynamic, cutting edge industry. Because the future of the nuclear industry is in the hands of the young generation, a dedicated panel discussion with representatives of young generation networks around the world – the United States (Shannon Bragg-Sitton), France (Isabelle Phillipe), Argentina (Martin Rivarola), Italy (Elvina Finzi), and South Africa (Reuben Mogafe) – was held on the final day of the IAEA conference. From their various cultural, educational and professional backgrounds, the panelists reflected on the presentations made earlier in the week, providing insight on the knowledge management problem from the perspective of the young generation – the recipients of the nuclear legacy.

Professionals often speak of knowledge management with a singular, top-down approach – with information and knowledge being transferred from the older generation to the younger generation. However, knowledge transfer is not a one-way street. Young professionals also have the responsibility to seek out that critical knowledge. For information to evolve into knowledge, a young professional must be motivated and willing to absorb that knowledge. On the other hand, young professionals also have a lot of new things to offer to the field – uninfluenced by years of experience – leaving the door open for innovation.

Reuben Mogafe (South Africa), Isabelle Phillipe (France), Martin Rivarola (Argentina), Elvina Finzi (Italy), and Shannon Bragg-Sitton (United States)

The young generation is dedicated to the future of the nuclear industry – because it is *our* future. Young generation networks around the world bring together nuclear professionals in their own countries and regions to promote nuclear science and technology and to enable knowledge transfer and preservation. The motivated individuals in these networks recognized the further benefit of an international network, establishing the International Youth Nuclear Congress (IYNC, see www.iync.org for more details). IYNC offers an ideal forum for knowledge transfer to the young generation and networking among the young generation through technical presentations, workshops and high-level keynote speakers, making it a useful stage for accomplishing the many objectives of international knowledge management programs.

*To review the presentations & closing statements made at the conference, please visit* ***www.iaea.org/km***.

# News from the Nuclear Engineering & Engineering Physics Program at Rensselaer

There are many noteworthy events at Rensselaer Polytechnical Institute. Here are just a few:

**Dr. Yaron Danon** is using Rensselaer's Linear Accelerator in novel ways to conduct several new research projects:

- The development of new, ultra compact accelerators – A new DOE NEER grant is supporting Dr. Danon's work using pyroelectric crystals to generate the acceleration potential needed to create compact accelerators capable of accelerating electrons and ions. These accelerated particles can be used for the generation of X-rays and neutrons.
- The development of a new type of intense quasi-monochromatic X-ray source. These x-rays are obtained by passing relativistic electrons from the RPI LINAC through crystals such as LiF and silicone, creating parametric x-rays. Dr. Danon and his research team demonstrated for the first time the use of such a source for imaging with photons of about 18 KeV. An x-ray source of this type has many applications including new and safer modalities of medical imaging. A DOE NEER grant awarded to Dr. Danon also supported this research.

Rensselaer Polytech - Southside Courtyard

One of Dr. Danon's research assistants, **Dr. Bryndol Sones**, received his PhD from Rensselaer in June and has joined the faculty of the U.S. Military Academy at West Point. Dr. Sones joins another recent RPI alum, Dr. Edward Naessens, who is the Program Director of the Nuclear Engineering program at West Point.

As another example of Rensselaer's connection with West Point**, Dr. Robert C. Block**, Director of RPI's 100 MeV Linear Accelerator, has been asked to serve on a committee to review and provide input on the military academy's new Nuclear Engineering program. Also, Dr. Block has been appointed to the Los Alamos National Lab's 2004 Neutron Program Advisory Committee (NPAC), which will be meeting shortly in Los Alamos.

**Dr. Richard T. Lahey** will be co-chairing the NSF/JSPS sponsored Japan/US Seminar in Two-Phase Flow Dynamics at Lake Biwa, Japan in December. This invitation-only seminar will cover many different topics in the field of Two-Phase flow, including CMFD simulations and Bubble Fusion. All of the papers from the seminar will be peer reviewed and published in the *Journal of Multiphase Science and Technology*.

Current undergraduate students **Sean Puskas** (class of 2005) and **Rian Bahran** (class of 2006) were part of the 2004 Nuclear Engineering Student Delegation to Washington, D.C. from June 19-23. The delegation was made up of 10 students from 8 major research universities across the U.S. who traveled to the nation's capital to convey their views on nuclear science, policy, and education to lawmakers and others influential in public policy. The major areas of concern to the students were: 1) increased funding for education and research in the nuclear sciences; 2) need for university nuclear research infrastructure; 3) support for ITER as well as the non-electric applications of fusion; 4) support for a comprehensive waste management strategy; 5) support for university scholarship programs; 6) increased public education and awareness of nuclear technology; and 7) global nuclear energy development and increased access for international students.

**Rensselaer's Student ANS Chapter** recently received an Honorable Mention from the American Nuclear Society in their annual recognition of the best student chapters in the country. Rensselaer students were recognized for their Nuclear Awareness Day event, which was held on campus in April to provide their fellow non-nuclear students with fair and balanced information about nuclear-related issues.

# "Water Instead of Fuel" (Reproduced Courtesy of *The Times and Democrat*)

In an effort to interest high school students in nuclear technology, William D. Magwood, IV, director of the U.S. Department of Energy's Office of Nuclear Energy, Science and Technology, spoke to 120 students at Orangeburg-Wilkinson High School, in Orangeburg, South Carolina.

Mr. Magwood remarked, "We actually have the basic technology to the point where we can actually put water instead of gasoline into a vehicle and have it go."

Then Martin Scott and Ted Motyka of Savannah River Technology Center demonstrated a remote-controlled model car powered by hydrogen.

"What we have is an actual fuel cell vehicle," Magwood said. "You put distilled water into the container, and it uses a solar cell to do electrolysis to convert the water to hydrogen and oxygen."

DOE Officials, SCSU Staff and Students

The oxygen is released into the air and "thy hydrogen is fed into a PEM (polymer electrolyte membrane) fuel cell. That's a fuel cell we're very interested in for the future. It could be used for future vehicles, Magwood added.

A hydrogen powered vehicle "emits nothing more than water vapor," he said. "I'm optimistic that this is something that the kids we'll talk to today will see in their lifetimes."

"Maybe even some of the people we'll talk to today will become the scientists that really bring this technology home 15 to 20 years from now," Magwood continued.

"And that's really what we're trying to get here. We're trying to really show these students, not jus how it might apply to the long-term, but how they can build careers to try to solve these technical issues, " he said.

This will require "advanced materials, advanced electronics and advanced chemical technologies," he said.

"There's a lot of work that needs to be done. These kids may be the people who get us there. We'll see."

"We're just getting started. The president stared the national hydrogen fuel initiative just a little more than a year ago. This program is now galvanized to put the kinds of research in place to get this done," Magwood said.

"If this is successful, we will have seen the peak of oil use in the United States," he said. "It doesn't mean you'll ever completely eradicate the use of foreign oil, but I think in the long-term future, we'll see our dependency on foreign oil go down."

Magwood asked the students what came to mind when they thought of nuclear power. Most did not reply; two or three said they thought of nuclear bombs.

"South Carolina gets more than half of its electricity from nuclear plants and they can't blow up."

Before meeting with the O-W students, Magwood said he'd noticed students are making career choices "a lot earlier than I though they would. By the time they get to be sophomores and juniors in high school, they're pretty much sure what they want to do." Many aspire to careers in the areas of life sciences, he added.

Based on Magwood's conversations with various students, this was also true of the group at O-W. None indicated an interest in becoming a scientist.

"I'd like to see more interest in the physical sciences -- engineering, electronics, physics," Magwood said.

Those areas do offer "promising careers," said Dr. James A. Anderson, retired dean of the School of Engineering Technology and Sciences at South Carolina State University.

"Right now in the technology and science areas, we're hundreds of thousands of jobs short, and it's getting worse," Anderson said. SCSU is trying to "turn that around," he continued.

The goal of such programs is to encourage students to consider and prepare for careers in the sciences or technology, said Henry West, a physics teacher at O-W.

"A lot of times, they don't realize the opportunities that we have right here in town. We want to expose them early to South Carolina State and the fact they do have a nuclear engineering programs and the fact it's such a hot field. Just the fact that we have it here in town makes such a difference," West said.

"And then to have such great people like Dr. Magwood come out and do presentations for us, that really helps a lot. It shows us we have the potential to grow."

Magwood's entourage also included Eduardo Farfan of SCSU's nuclear engineering program and John Gutteridge, head of the nuclear education programs at the Energy Department's office of Nuclear Energy.

# A New Neutron Radiography Beam Hall At Oregon State University

When the Nuclear Engineering and Radiation Health Physics department at Oregon State University made the proposal to the DOE's Innovations in Nuclear Infrastructure and Education (INIE) program to become part of WNSA, the Western Nuclear Science Alliance, they wanted to accomplish three things – upgrade the facilities of the Radiation Center, start new initiatives, and develop scholarships. To fulfill a couple of these goals, two research and infrastructure programs in neutron radiography and real-time neutron radiography were included as part of the proposal. When construction in the Oregon State TRIGA Reactor (OSTR) bay started the end of March, these programs came closer to reality.

Concrete is poured for the new Neutron Radiography Facility at Oregon State

Designed by the OSTR staff, the new Neutron Radiography Facility was constructed by general contractor Skanska USA Building. Approximately two stories high and made of rebar reinforced concrete, it has two massively heavy doors for sample placement and equipment check. A large door on the east wall weighs in at approximately 19 tons, while the "little" door on the west wall weighs approximately 4 tons! Originally designed to be built modularly so they could move the hall for use at one of the other beam ports, the cost was prohibitive by almost a factor of three. It was finely determined to be built in place, though the roof and doors arrived by truck from off campus, and tested the reactor crane's limit The Facility was completed in July 2004.

Section 4 of the roof for the Neutron Radiography Facility at Oregon State is lowered into place

# Research Not Required -- the Master of Health Physics at Oregon State University

The Department of Nuclear Engineering and Radiation Health Physics in the College of Engineering at Oregon State University is once again on the cutting edge with the first of its kind graduate degree in radiation health physics. The degree, a Master of Health Physics or MHP, will meet the requests by radiation protection professionals and managers from across the U.S. for a masters level degree without a research focus. This program will also help combat the anticipated retirements of many currently certified health physicists.

The Health Physics Society recently released a report which detailed the projected shortfall in sufficiently educated radiation safety professionals. The shortfall is expected to be a huge challenge in the near future as current radiation protection staff are expected to retire. The new MHP is designed in part with the needed replacements in mind. The program will provide an applied, professional degree for those individuals wishing the masters credential, but not requiring a research focus. It is similar to a Master of Public Health, and will consist of a minimum of 45 hours of coursework, with a required oral examination for graduation.

Last year OSU granted one-third of all the health physics degrees in the nation, and is one of only a handful of currently ABET accredited programs in the country. It is expected that people who might not otherwise have looked at OSU will consider the program, either traditionally, or through the OSU on-line E-Campus.

OSU has had a radiation health program since 1963. Since 1988 is has been housed under nuclear engineering, with the department name changing to Nuclear Engineering and Radiation Health Physics in the late 1990's. The department offers the BS, MS (thesis required), and PhD in nuclear engineering, and radiation health physics, as well as the new MHP. A new Master of Engineering (MEng) with a concentration in nuclear engineering is also offered starting this fall, and like the MHP does not require a thesis.

# The Sixth University Nuclear Program Partnership Has Been Established With Wilberforce University and Ohio State University

The Office of Nuclear Energy, Science and Technology has been funding a program entitled *University Partnership* for over four years. The program provides the opportunity for students at minority institutions to earn a B.S. or M.S. degree in nuclear engineering at a nuclear engineering institution while completing their other course work at their "home" institution. With the most recent award of a university partnership to Wilberforce/Ohio State, there are now 6 partnerships involving 13 institutions.

WILBERFORCE

The partnership between Wilberforce University, a historically black university in Wilberforce, Ohio, and Ohio State University in Columbus, Ohio, one of the Nation's premier engineering universities, was selected through a competitive award process to provide new educational opportunities for undergraduate engineering and science students at Wilberforce University. The grant award to the two universities is $375,000 to establish a collaborative nuclear engineering program

The Department's grant will allow Wilberforce University to establish an undergraduate minor in nuclear engineering and enroll several outstanding Wilberforce students in the master's and doctoral program in nuclear engineering at Ohio State University. Under this program, students will learn about the technical and scientific issues associated with nuclear science and engineering and

OHIO STATE

gain the opportunity to enter one of the highest-paying technical careers in the United States.

This initiative will assure that students at smaller schools — particularly minority students who are under-represented in nuclear engineering — have a chance to participate in one of the most challenging and exciting of all technical disciplines. This new partnership will involve a significant effort on the part of the faculty members and administrators from both institutions. The program will involve the establishment of a new set of core courses to support the Wilberforce minor degree program, and a distance education initiative. The program will emphasize both nuclear engineering and health physics. The students entering this program will have greater access to Department of Energy national laboratories, research programs, and educational assets.

DOE plans to award an additional partnership in FY 2005 and another partnership in FY 2006.

# Youssel Marzouk and Gregory Nielson Selected As First Truman Fellows

Two Massachusetts Institute of Technology (MIT) postdoctoral students have been selected as the first recipients of the President Harry S. Truman Research Fellowship in National Security Science and Engineering at Sandia.

Youssef Marzouk and Gregory Nielson were selected after an intensive nation-wide search. The Truman Fellowship is the only position at Sandia where the candidate proposes a research project, presents it, and, when selected, gets to do it for the next three years.

"We are indeed fortunate to have selected Youssef Marzouk and Gregory Nielson as Sandia Truman Fellows," says Sandia's Chief Technology Officer Pace VanDevender (1000). "Youssef and Gregory set a strong precedent for excellence as the first class of Truman Fellows. They will work with other engineers and scientists at both the New Mexico and California sites as corporate-wide fellows addressing the national security challenges of the new century."

Youssel Marzouk

Gregory Nielson

Truman Fellowship candidates are expected to have solved a major scientific or engineering problem in their thesis work or have provided a new approach or insight to a major problem, as evidenced by a recognized impact in their field.

Youssef will be working in Reacting Flow Research Dept. 8351 at Sandia/California, and Gregory will be in MEMS Device Technologies Dept. 1769 at Sandia/New Mexico. Their work is funded by Laboratory Directed Research and Development (LDRD).

Youssef says he excited to be joining Sandia as a Truman Fellow, and particularly excited to be chosen for the program's first year.

Gregory's research project at Sandia will be a continuation of his doctoral research. As part of his thesis, he invented and developed the theory for a completely new actuation technique for MEMS switches that will allow switching speeds 10 to a 1,000 times faster than current MEMS devices.

The new actuation technique also reduces the voltage and energy required for switching. For example, currently the fastest RF (radio frequency) MEMS switch operates at about one microsecond and needs 70 volts for actuation. His technique will allow an RF MEMS switch that switches in 100 nanoseconds and uses less than 10 volts.

While at Sandia, he will implement and refine the actuation technique and then apply it to both RF and optical MEMS switches.

## Important Dates to Remember

**2005**

- Reactor Sharing proposals due January 28, 2005
- Matching Grants proposals due January 28, 2005
- Radiochemistry proposals due February 15, 2005

For Additional Information Please Contact

John Gutteridge
NE-30/Germantown Building
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585-1290
john.gutteridge@nuclear.energy.gov