

Next Generation Safeguards Initiatives at Los Alamos National Laboratory

Strengthening Human Capital for International Safeguards - 2009

- In October 2007, NNSA’s Office of Nonproliferation and International Security (NA-24) urged the national laboratories to create projects devoted to improving human capital and training for nuclear safeguards as part of the Next Generation Safeguards Initiative (NGSI).

- To meet this need, Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and Texas A&M University (TAMU) launched a pilot technical nuclear safeguards training course for students and early career staff in 2008.

- The purpose of this pilot course was to provide vital background on the history and science behind nuclear safeguards and to increase both interest in and an understanding of this field. It is hoped that students who completed this course better appreciate the need for these skills and be better prepared to begin a career in nuclear safeguards and security.

- In 2009 NNSA’s Office of Nonproliferation and International Security (NA-24) again sponsored summer courses and summer interns under the umbrella of NGSI.

- In 2009, 17 summer students from 16 different universities attended the 2009 NGSI safeguards class.

- During the 2009 course the cohort of 17 students completed one week containing 15 hours of technical safeguards training lectures followed by a one-week intensive practicum of safeguards laboratory exercises at LANL.

- The course was divided into Classroom and Laboratory modules with each classroom lecture being taught by LANL safeguards experts in each of the following 10, three-hour lectures.

- In addition, many of the students will also attend the annual meeting of the Institute of Nuclear Materials Management (INMM) and participate in special activities of the Institute’s student chapter. Several students will be presenting technical papers at the INMM meeting.



LANL Students with mentors Brian Boyer and Steve Tobin

2009 NGSI Technical Safeguards Training Class – Lecture Series

June 15 – 19, 2009

- Domestic Safeguards Systems
- DA and Environmental Sampling
- Statistics and Safeguards
- State Level Approach and Open Source Analysis
- Containment and Surveillance
- Process Monitoring and Unattended Systems
- Safeguards Approaches – LWR and Centrifuge
- Safeguards Approaches LEU/MOX Fuel Fabrication and Reprocessing
- IAEA Future Challenges
- Advanced Module on Open Source Analysis



2009 NGSI Technical Safeguards Training Class – Laboratory Practicum

June 22 – June 26, 2009

Monday	Tuesday	Wednesday	Thursday	Friday
Gas Centrifuge Enrichment Plan Safeguards Approach	Uranium Enrichment Measurements	Gamma Spectroscopy of Plutonium	Neutron Coincidence Measurements of Plutonium	Verification Exercise
Gamma Spectroscopy Basics	Reprocessing Plant Safeguards Approach	Neutron Detection Basics	Neutron Coincidence Measurements of Uranium	Tour: Calorimetry Lab/Microcalorimetry Nanodetectors for gamma detection Portal monitors
Attribute Tests				
Active Length Measurements				



Development of Nuclear Safeguards Curriculum and “World-Class” Reference and Teaching Materials Technical Safeguards Curriculum for University Students

Los Alamos National Laboratory is collaborating with safeguards specialists across the national laboratory system to create and update reference and teaching materials for use in educating the next generation of safeguards specialists across the globe. These materials include a recently completed graduate textbook for safeguards policy and technology, an update to the premier manual for the measurement of nuclear materials, and a major chapter on safeguards in a forthcoming reference document on nuclear energy.

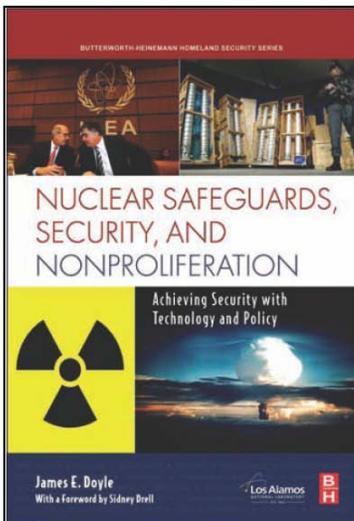


The pilot technical safeguards course in 2008 and the follow-up in 2009 developed by Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Texas A&M University is producing a valuable model curriculum, along with lecture materials and laboratory exercises that can be taught at many universities around the nation and the world. These materials can help strengthen and expand our national capacity to educate and train nuclear safeguards specialists for careers in government, industry, and at the International Atomic Energy Agency (IAEA).

University Collaborations for Safeguards Education

LANL/TAMU NGS Human Capital Development Conference: LANL and TAMU will be hosting a faculty workshop August 10-13, 2009 entitled “University Collaborations for Safeguards Education;” the LANL/TAMU NGS Human Capital Development Conference will be held in Santa Fe, NM and at Los Alamos National Lab August 10-13, 2009. The conference is intended to inform university faculty nationwide regarding NNSA and national laboratory programs to strengthen nuclear safeguards education and to gather academic perspectives on making these activities as effective as possible. In addition, we will collectively develop course materials and assess various learning tools for this vital area of study. We have an exceptionally strong cadre of nuclear security specialists and university instructors who have already expressed their willingness to participate in this event.

LANL Publications and Reference Texts

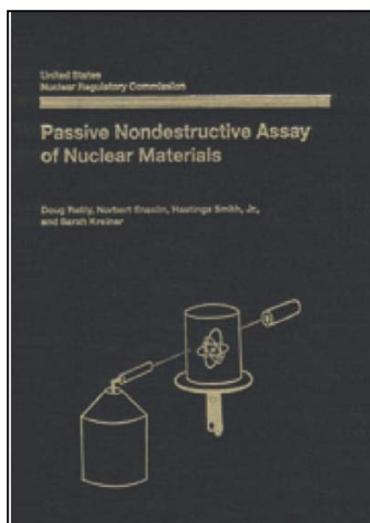


Nuclear Safeguards, Security, and Nonproliferation: Achieving Security with Technology and Policy

“...is encyclopedic in introducing the reader to the broad range of important concepts and techniques that constitute nuclear security policy and science. As such, this volume will be invaluable to members of the two communities of natural and social sciences who seek to enter into careers in these fields. It is essential for both the scientific and policy communities to understand the daunting challenges each faces so that they can work together effectively. More broadly, this volume will be valuable for all who seek simply to understand one of the major problems facing the world.”

- From the foreword by Sidney Drell

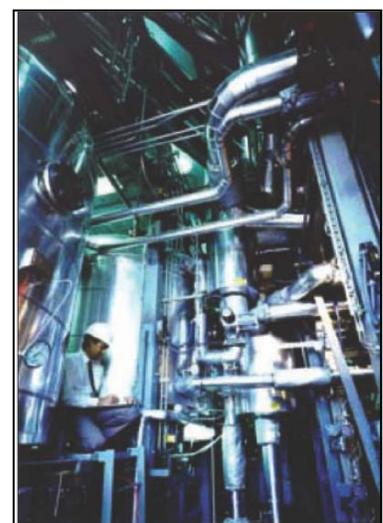
http://www.elsevier.com/wps/find/bookdescription.cws_home/714662/description#



Passive Nondestructive Assay of Nuclear Materials

The update of this volume will be available in 2009. The manual is used by people across the DOE complex, at the IAEA, and other facilities around the world. It is the standard reference on Nondestructive Assay nuclear materials for safeguards. IAEA inspectors have been asking informally for years for an updated volume.

<http://www.lanl.gov/orgs/n/n1/panda/index.shtml>



Nuclear Engineering Handbook - 2009

Los Alamos Safeguards Specialist Scott Demuth will edit a major section on "Proliferation Resistance, Safeguards and Physical Security" for the new "Handbook of Nuclear Engineering," to be published by SPRINGER USA. This will be a comprehensive reference document covering all aspects of nuclear energy systems.



LA-UR 09-04378

Technical Nuclear Safeguards Course

Los Alamos National Laboratory - Summer 2009 – Student Profiles



Ben Dabbs is a rising senior at the University of Tennessee studying Nuclear Engineering. Following graduation, he plans to attend graduate school in order to obtain a Master's Degree in Nuclear Engineering and pursue a career in safeguards and nuclear nonproliferation. Eventually, he aspires to

work in Vienna for the IAEA. At LANL, Ben conducts research on Gas Centrifuge Safeguards.



Michael Fensin received his PhD from the University of Florida's Nuclear and Radiological Engineering Department in March '08. As a postdoc, for the Nonproliferation Division, N-4, at Los Alamos National Lab, Michael worked in the area of advanced modeling and simulation in support of the integrated Pu assay strategy for spent fuel. Michael has recently been

converted to a Los Alamos staff member and works both for the MCNPX code development team, D-5, and the spent fuel assessment team, N-4.



Metodi Iliev is a graduate student at Cal State Northridge studying Electrical Engineering. He received his BS from UC Berkeley. Metoldi is interested in analog circuits, circuits for wireless communications, and signal processing.



William (Will) Koehler is a rising junior pursuing a Bachelor of Arts in physics at Kenyon College. Currently, he works at Los Alamos National Laboratory helping with nuclear safeguards and security, assisting with Delayed Neutron Counting and Passive Gamma techniques. His future plans include possibly pursuing a graduate degree in nuclear physics or engineering and continuing to conduct research either at an academic institution or national laboratory.



Rosalyn Leitch graduated from Seattle Pacific University in March 2009 with a B.A. in International Relations and a minor in French. She is currently working with the Safeguards and Security Group at LANL to analyze global trends in the implementation of the Additional Protocol to the Nuclear Nonproliferation Treaty. Rosalyn plans to attend graduate

school for a Master's Degree in International Security Studies. After a recent internship with the US Embassy in Moscow, Russia, she hopes to join the Foreign Service and pursue a career in diplomacy and international security.



Claire Longo is an undergraduate student at the University of New Mexico. She is a junior majoring in mathematics and management. At LANL, Claire works for the nuclear materials accounting program. Claire plans on obtaining a MSc in Statistics. Her interests are in risk analysis and financial analysis. Claire is taking Actuarial exams and looks forward to

applying actuarial science to NMA for Safeguards as well as finance at LANL and the IAEA.



Elizabeth Meek received a B.S. in Geology from University of Washington in 2000. She will receive her Master's of Science in Health Physics with a focus on Nuclear Weapons Nonproliferation from Georgetown University in December 2009. Elizabeth's current

research focuses on disarmament verification technology to support the evolving international policy and treaty environments. Her future aspirations include assisting nonproliferation efforts by acting as a liaison between science and policy to facilitate political momentum for disarmament. She has had experience in health physics internships at facilities at Georgetown University, in Maryland, and in England.



Karen A. Miller is Ph.D. student in Nuclear Engineering at Texas A&M University where she received her B.S. in Nuclear Engineering in 2004. At LANL, Karen is currently working on gas centrifuge enrichment plant safeguards. Her latest project involved designing a neutron detector for Rokkasho Enrichment Plant. She is also working on a POTAS task to explore state-of-the-art methods for measuring UF₆ cylinders. This year, NGSF funded several professional development activities for her such as the 2008 INMM/ESARDA Tokyo Workshop and the 2009 International Safeguards Policy and Information Analysis Course at the Monterey Institute of International Studies. Karen's immediate career goal is to finish her Ph.D. and obtain a position at a national laboratory. Her research interests are in both the technical and policy aspects of nonproliferation and international safeguards or work in the Safeguards Department of the IAEA. Long term, she would like to continue working in the field of nuclear nonproliferation whether it is for the government, a national laboratory, or in academia.



Vladimir Mozin is a Ph.D. student at the University of California – Berkeley in Nuclear Engineering. In 2002, he graduated with M.S. in Radiochemistry from the Moscow Engineering Physical Institute. Vladimir has obtained several years of industrial experience as a technological engineer at a reprocessing and isotope production facility. He is working at LANL in the area of safeguards and nonproliferation planning to make it his PhD dissertation and a future career.



Laura Musgrave is an undergraduate student at the University of Redlands in Southern California. She is studying political science and psychology. After receiving her undergraduate degree she plans to attend graduate school or law school to focus on foreign policy, counterintelligence, and/or national defense, with nuclear nonproliferation as a focus. From this her work at LANL, she has gained knowledge regarding the history, tools, and practices of nuclear safeguards and nonproliferation to better future education and career goals, as well as added to her growing knowledge of nonproliferation.



Josh Richard is a rising senior at the University of Florida where he is earning his Bachelor of Science in Nuclear Engineering. At LANL, he is working on safeguarding spent nuclear fuel, characterizing the neutron source term. In the future, Josh plans on applying technical and policy expertise to national security challenges and international safeguards support efforts.



Analisa Sandoval is an undergraduate student at the University of Notre Dame; she will graduate in May 2010 with dual degrees in Biological Sciences and Peace Studies. Upon graduation, she hopes to continue her education and explore the fields of international politics and public health. While at Los Alamos, she assisted in the Nuclear Nonproliferation division aiding in preparation of U.S. DOE laboratories for the entry into force of the Additional Protocol and the development of a comparison of nuclear weapons states' Additional Protocol.



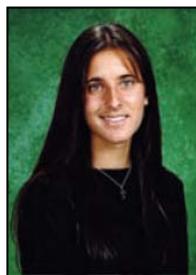
Marisa Sandoval is an undergraduate student at Washington State University. As a double-major in English with an emphasis on Rhetoric and Professional Writing and Digital Technology and Culture, she plans on attending graduate school in English Composition. Marisa aspires to work as a professional writer for a small publishing operation, specializing in media authoring and design or teaching writing at the secondary education level. At LANL, Marisa assists fellow students and faculty members with open source research, writing, and editing articles for publication.



Nathan Sandoval graduated from Texas Tech University with a Bachelor of Science in Mechanical Engineering and minors in Mathematics and Spanish. For the past year, Nathan has been working as a post baccalaureate student in the Nuclear Nonproliferation division at Los Alamos National Laboratory. His focus at LANL has been to perform monte carlo simulations (MCNPX) to quantify multiple nondestructive assay techniques to determine the fissile content in commercial grade spent fuel. Of the thirteen proposed NDA techniques, he has studied the Passive Neutron Albedo Reactivity and delayed neutron techniques. In addition to computer simulation, Nathan has used VBA to develop methods to automate the MCNPX input files and output data acquisition. He has to spend a year gaining safeguards work experience and looks forward to graduate studies.



Melissa Schear earned her M.S. in Nuclear Engineering from the University of Illinois at Urbana-Champaign in the fall of 2007. Her master's work focused on the Monte Carlo modeling of neutron transport in the californium shuffler. She is currently a post-Master's graduate student researcher in the non-proliferation division at Los Alamos National Laboratory, where she is investigating the differential die-away self-interrogation technique to quantify plutonium in spent fuel assemblies.



Eva Uribe is a junior at Yale University working on a degree in Molecular Biophysics and Biochemistry. For the past two summers she has worked as an NGS summer intern at Los Alamos National Laboratory, researching the implementation of the Additional Protocol in the United States and comparing the Additional Protocols of the five nuclear-weapon states. In the future she hopes to attend graduate school and continue pursuing her interest in nuclear nonproliferation and safeguards.



Julia White is an undergraduate student at Texas A&M University studying Nuclear Engineering. While at LANL, she assists with projects in x-ray fluorescence to measure plutonium content in spent fuel. In the future, Julia plans on working in safeguards, hopefully at a national laboratory, or potentially teaching at a university.

