

LOS ALAMOS NATIONAL LABORATORY HUMAN CAPITAL DEVELOPMENT STUDENT PROGRAM CAREER DEVELOPMENT PHILOSOPHY

**Nuclear Security Education: The Intersection of Policy,
Science, and Technology**

**University of Tennessee / Howard H. Baker Jr. Center for Public Policy
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Next Generation Safeguards Initiative Task Sponsored by DOE/NNSA NA-24

Next Generation of Safeguards Initiative (NGSI)

- **Oct 2007: NA-24 urged national labs to create projects for improving:**
 - Human capital + training for nuclear safeguards as part of NGSI – FY’09: ~\$2M
- **Technical safeguards courses developed by LANL/LLNL/TAMU**
 - Model curriculum, lecture materials and laboratory exercises
 - Can be taught at many universities around the nation and world
- **Staff recruiting/lecture visits / engagement with universities**
 - Development of fuel cycle course/safeguards series for Penn State
- **N-4 hosted 20+ students this summer**
 - Participated in safeguards courses
 - Travel to INMM
 - NM trips to URENCO USA / WIPP and Trinity Site
- **N-4 Lecturers for University/Student Courses**
 - Monterey MIIS safeguards course
 - BNL Nonproliferation workshop
 - UCSD PPNT
 - UNLV Nuclear Forensics Course



Phil Hypes Instructing Student Practicum



2008 Pilot Safeguards Course



Rick Wallace at Monterey

NGSI 2010 Student Intern Profiles

Interns are undergraduates, post bachelors, graduate, post masters, and PhD students with diverse fields of study:

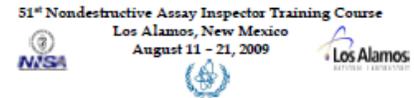
- Nuclear Engineering
- Electrical Engineering
- Physics
- International Relations
- Mathematics
- Management
- Geology
- Health Physics
- Radiochemistry
- Government
- Biology
- Peace Studies
- English
- Digital Technology
- Mechanical Engineering
- Biophysics
- Biochemistry



LANL Training/Education Expertise Base

- **International:**

- State Systems of Accounting for & Control of Nuclear Material (SSAC)
- Small Quantities Protocol (SQP) Course
- MC&A Workshops
- Expert support to IAEA APCA inspector training course at BNL



- **Domestic:**

- Additional Protocol training for DOE complex - BNL-LANL effort – 2008 prep for U.S. entry in force
- University Collaborations for Safeguards Education
 - Inform university faculty nationwide regarding NNSA and national laboratory programs to strengthen nuclear safeguards education
 - Nuclear Safeguards/Nonproliferation Education Conference
 - August 10-13, 2009 – In Santa Fe with LANL lab tours
- NNGSI Sponsored Lectures by LANL experts
 - LANL staff at MIIS, BNL, and ORNL and LANL summer safeguards courses
 - University outreach – R.P.I., Penn State, Cal Berkeley, TX A&M, L.S.U., etc...



University Collaborations for Safeguards/Nonproliferation Education Workshop, Santa Fe, NM – Aug 2009

- **Local:**

- Nuclear Fuel Cycle Seminar Series – NNGSI mid-career outreach by NNSA
 - Introduce LANL technical and policy experts to nonproliferation aspects of the civilian fuel cycle
- NNGSI Summer Technical Safeguards courses (2008-2010) - LANL expert lectures



LANL Summer SGs Courses 2010

LANL N-Division Staff

- **LANL staff areas of excellence**

- Detector design
- System analysis
- Training
- Software for safeguards
- Virtual Reality for simulation and training
- Nuclear safeguards textbooks



The screenshot shows an NPR news article. A yellow banner at the top right says 'N Division Featured on NPR and in Science – Spring 2010'. The article title is 'At Los Alamos, Working Against Their Own Creation' by Mike Shlester. It includes a 'Listen to the Story' button and a photo of a nuclear reactor core. The text mentions 'An Unending Mission to Contain The Stuff of Nuclear Nightmares' and discusses the challenges of nuclear weapons proliferation.

<http://www.npr.org/templates/story/story.php?storyId=126110308>

- **Key LANL Staff**

- Management – Key Line Manager – Stacey Eaton, N-4 Deputy GL
 - Brian Boyer, Program Manager / Jim Doyle, P.I. / Aimee Blanchard
- Summer Courses – Phil Hypes / Peter Santi
- Lead Mentors – B. Boyer/ S. Tobin / K. Michel / J. Doyle

Program Goals

- **University partners use Lab strengths to enhance educational experience**
 - University of New Mexico – Faculty = E. Arthur, A. Hecht
 - Texas A& M – Faculty = W. Charlton – Summer Safeguards Courses – Student Research
 - Penn State – Faculty = J. Brenizer, D. Farber, E. Klevans – Fuel Cycle Safeguards Course
 - University of Glasgow (UK) – Faculty = J. Howell – Process Monitoring and GCEPs Safeguards
 - R.P.I. – Faculty = Y. Danon – VR simulation
 - UNLV – Faculty = K. Czerwinski – Forensics Course
 - U.C. Berkeley – Faculty = P. Peterson, J. Vujic – Spent Fuel Detector Design
 - University of the Incarnate Word (San Antonio TX) – Faculty = A. Watkins - VR simulation
- **Provide opportunities for student/faculty interactions with LANL staff**
 - Faculty
 - Sabbatical opportunities / Summers at LANL – Present examples – Watkins and Charlton
 - Student
 - Undergrad opportunities for work and study
 - Graduate – Post BS, Post MS, Post Doc - Incorporate thesis research into LANL experience
- **Mentoring Role of LANL Staff – Key to success**
 - Career development – advice, assistance, advancement
 - Nurturing of mid-career shifts by LANL weaponeers to safeguards

Mentoring Philosophy at LANL

- Students are our product not just an asset to get work done
- Promote learning with staff/student interaction: pass down art/craft of safeguards
- Teach students what it means to be a professional
- Promote students – publish work, provide travel opportunities, introduce to peers
- Assist students – show possibilities for further education and employment



Lithuania –
ESARDA 2009



Tucson –
INMM 2009



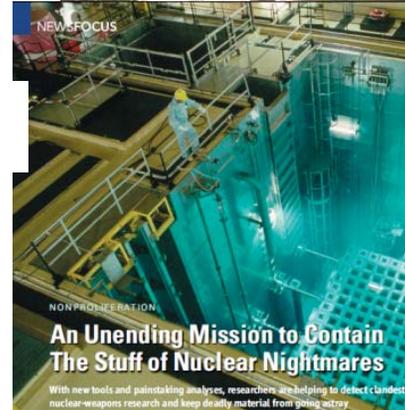
N-4 Student Picnic –
Los Alamos 2009

Three Examples of LANL Student Successes

- **Dr. Karen Miller** – TAMU UG to TAMU grad student to LANL Staff
- **Rosalyn Leitch** – Seattle Pacific grad to CRDF staff and future Georgetown grad student and USNRC student co-op
- **Eva Uribe** – Yale U. undergrad – LANL summers, DOE Nuclear and Radchem school Fellow

Graduate Student- Ph.D. Candidate Dr. Karen Miller Student Opportunities at LANL

- World Nuclear University in Canada - 2008
- INMM/ESARDA Tokyo Workshop – 2008
- MIIS NGSF Safeguards Course - 2009
- Japan GCEPs detector – 2009/2010
- TAMU Graduation in Spring 2010
- Converted to Staff Spring 2010
- AAAS SCIENCE Article June 2010

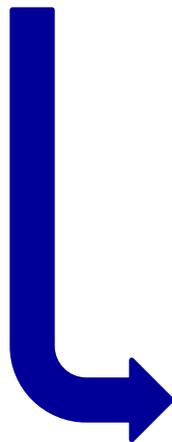
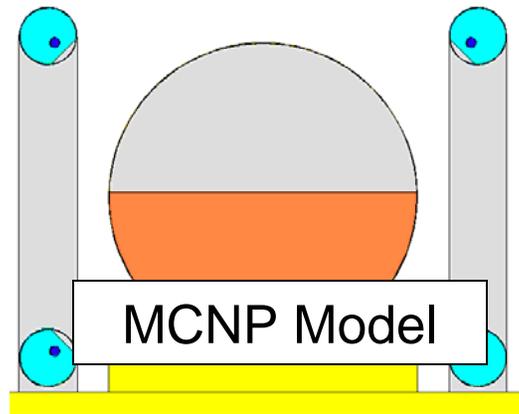


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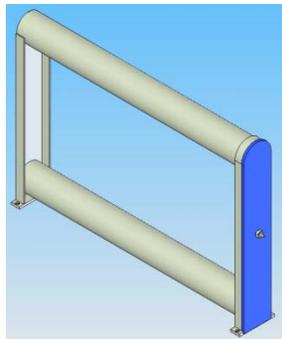


Developed by Martyn Swinhoe, Karen Miller, and others at LANL and other

Karen Miller Project for GCEPs Safeguards Neutron Detection of UF6 Mass



Mechanical Design



Field Testing in Japan

Interactions with Japanese and U.S. Embassy Personnel



Karen Miller
With Howard
Menlove, Johnna
Marlow and Martyn
Swinhoe in JAPAN

Post – Bachelors – Rosalyn Leitch –Summer Student to CRDF Staff

- **Seattle Pacific Honors Grad – did internship in Moscow**
- **LANL N-4 Summer of 2009**
- **Hired at CRDF in Fall 2009 as intern**
- **Promoted to staff that Fall 2009**
- **Will Attend Georgetown Fall 2010**
 - Georgetown's School of Foreign Service
 - Security Studies Program
 - Unconventional Weapons and Nonproliferation
- **NRC Student Co-op Fall 2010**
 - Office of Nuclear Security & Incident Response
 - Security Specialist



Eva Uribe – Yale Chemistry Major From Freshman to Radchem Fellow

- **After Freshman year – LANL – N-4**
 - Student team that assisted in DOE AP CA Training Exercises
- **After Sophomore year – LANL – N-4**
 - Lead Author on INMM Paper and presentation in Tucson

A COMPARISON OF THE ADDITIONAL PROTOCOLS OF THE FIVE NUCLEAR
WEAPON STATES AND THE ENSUING SAFEGUARDS BENEFITS TO
INTERNATIONAL NONPROLIFERATION EFFORTS

Eva Uribe¹, Maria Analisa Sandoval², Marisa N. Sandoval³, Rosalyn M. Leitch⁴, Brian D. Boyer⁴.
¹Yale University, New Haven, CT, USA, ²University of Notre Dame, Notre Dame, IN, USA,
³Washington State University, Pullman, WA, USA, ⁴Los Alamos National Laboratory, Los Alamos,
NM, USA

- **After Junior year – San Jose State**
 - Undergraduate Fellowship in Nuclear Chemistry & Radiochemistry
 - LANL provided recommendation



Other Examples of Continuing LANL Student / Mid-Career HCD Successes

- **Mike Fensin** 
 - Post Doc – converted to LANL staff working in D Division
- **Betsy Meek**  **and Melissa Schear** 
 - Post Masters – converted to LANL staff
- **Adrienne Lafleur** 
 - TAMU PhD Student – Project: SINRD neutron interrogation system
 - 2010 LANL Full-time PhD student – 75k NGSF funds FY11
- **Heather Erpenbeck**  **and Carolynn Scherer** 
 - Mid-career shifts from weapons-related work to safeguards
 - Bring **needed** skills to N-4 - **Scherer** (Fuels)/ **Erpenbeck** (Pu/Analysis)
- **Elise Elfman** 
 - Computer Graphics / 3-D Virtual Reality – converted from student to staff

Summary

- **LANL NGSi Program provides growth opportunities**
 - Summer students investigate what safeguards is
 - Continued contact with students for career growth
 - Year-round students – thesis topics or career knowledge
 - Conversion of students to staff
 - Encouragement for further education / student opportunities
 - Partnerships with university faculty and staff
 - Mid-career staff integration of skills – “N-4 Plowshares”
- **Documented success for LANL, DOE, and safeguards**
- **University, Lab and DOE cooperation = success**
- **N-4 philosophy = build teams at LANL and across complex**