

WM'00 Conference, February 27 – March 2, 2000, Tucson, AZ

**GLOBAL NUCLEAR MATERIALS MANAGEMENT
EDUCATIONAL PERSPECTIVES**

Clay Wright, Research Analyst & Scriptwriter, NETN
Paul Dickman, Special Assistant, Department Of Energy/ Albuquerque Operations
Richard CB Wright, MBA, Editor, Texas Tech University
Connie Callan, Director, The National Environmental Technology Network

ABSTRACT

The National Environmental Technology Network (NETN) of the University of New Mexico's School of Engineering and Waste Management Education & Research Consortium, with funding from Sandia National Laboratories, was initially asked to provide video documentation and subsequent written transcripts of the Conference on Global Nuclear Materials Management (GNMM) at the Center for Strategic & International Studies (CSIS) on July 22, 1999 in Washington DC.

A large volume of thought provoking material was collected at the conference, compelling NETN to do more than just document the conference. NETN has begun a multi-phased project to re-package the material in such a way as to make it more readily available to a wider audience and to stimulate greater interest in the area of global nuclear materials management. This effort is undertaken so as to draw more students into this particular field of study.

This paper describes the three phases of NETN's efforts to introduce students to new careers in global nuclear materials management. Phase One occurred on July 22, 1999 when NETN documented the Conference on Global Nuclear Materials Management at the Center for Strategic & International Studies. Phase Two continued the information dissemination with a video production that featured key policy makers. Based upon the knowledge obtained from the conference and the video production, Phase Three will build upon the information acquired to date and develop an hour-long presentation for an educational audience.

INTRODUCTION

The issue of global nuclear materials management is complex and ever changing. No matter which vantage point one views the issue from be it industry, medical research, military or scientific research, global nuclear materials management may be one of the most important issue mankind has ever faced. [1]

Even if from this day forward no one builds even a single nuclear weapon, or constructs a nuclear power generating station, or generates a single kilowatt of electricity from existing plants, or uses one radioisotope in research or science, there are vast stores of fissionable material from

WM'00 Conference, February 27 – March 2, 2000, Tucson, AZ

nuclear weapons, demilitarized weapons, research facilities, nuclear powered generating stations and medicine already in existence. To date, 174.3 metric tons (MT) of Highly Enriched Uranium (HEU) have been declared excess to national security needs. HEU, is a nuclear material, which contains greater than 20 percent of the uranium in isotope 235 (^{235}U). At high levels of enrichment, the material becomes suitable for weapons use. [2] Russia is thought to have at least as much if not more HEU. On September 1, 1998 the United States and Russia agreed to remove some 50 metric tons each of surplus plutonium from their weapons programs.[3] Surplus material is that deemed not necessary to national security. Exactly how much is deemed necessary is classified.

While there are many differing views on global nuclear materials management, there appear to be two key points. 1) Given the fact that nuclear material does exist and will continue to do so for a very long time, some form of responsible stewardship is necessary to safeguard humanity, and 2) As stewardship is necessary, who will provide that stewardship in the future?

Of specific concern are dwindling numbers of undergraduate students enrolled in nuclear related fields.[4] As current researchers, scientists and experts in the field retire, there are fewer and fewer qualified people to replace them. Since nuclear material will continue to exist for centuries, this lack of students today may pose grave consequences in the future.

The National Environmental Technology Network of the University of New Mexico's School of Engineering and Waste Management Education & Research Consortium has undertaken a multi-phased project to document issues surrounding global nuclear materials management, and how those issues may present specific career opportunities to students.

This paper will review the work done to date and look at efforts currently under development.

PHASE ONE

NETN's first step was to document the Global Nuclear Materials Management (GNMM) Conference at the Center for Strategic & International Studies (CSIS) on July 22, 1999 in Washington DC. The conference was chaired by former US Senator Sam Nunn who also serves as Chairman of the Board of Trustees, (CSIS) and Chairman, (GNMM) Senior Policy Panel.

Opening remarks were presented by Richard Fairbanks, President and CEO (CSIS). Mr. Fairbanks defined the focus of the conference, titled *The Emerging Nuclear Era - Policy Recommendation*.[5]

Last year CSIS embarked on a multi-phased initiative entitled Global Nuclear Materials Management. The first phase of this effort included an international conference that benchmarks where we stand globally in the evolving nuclear era and identified key issues and opportunities for continuing US leadership. This conference (July 22, 1999), which represents the second phase of this ambitious undertaking, is the culmination of an

WM'00 Conference, February 27 – March 2, 2000, Tucson, AZ

in-depth analysis of these issues and opportunities and offers specific recommendations for policy action and direction.

The in-depth analysis mentioned in Mr. Fairbanks's comments was presented as task force reports. Those task force reports focused on five key areas:

Funding Nuclear Security - presented by Matthew Bunn, Assistant Director Of the Science, Technology and Public Policy Program, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University

An International Spent Fuel Facility and the Russian Nuclear Complex - presented by Atsuyuki Suzuki, Professor of Nuclear Engineering, Department of Quantum Engineering and Systems Science, University of Tokyo

Commercializing the Excess Defense Infrastructure - presented by Roger Howsley, Head of Security Safeguards and International Affairs, British Nuclear Fuels Limited

Transparency - presented by Roger L. Hagengruber, Senior Vice President of the National Security and Arms Control Division, Sandia National Laboratories

US Domestic Infrastructure and the Emerging Nuclear Era - presented by John J. Taylor, former Vice President of the Nuclear Power Group, Electric Power Research Institute

A NETN camera crew videotaped all of the task force presentations. Computer generated graphics were then added to each presentation. Each hour long report was then packaged as an individual videotape presentation. Additionally, complete written transcripts of the task force reports were also made. All of this material is now available through NETN,^[6] and is also available through the CSIS website.^[7]

PHASE TWO

In phase two of the program NETN Director and Executive Producer Connie Callan conducted one-on-one videotaped interviews with key policy makers attending the GNMM conference.

Those interviewed included:

Thomas Blejwas, Nuclear Energy Technology Center, Sandia National Laboratories, Albuquerque

WM'00 Conference, February 27 – March 2, 2000, Tucson, AZ

Dale E. Klein, Vice Chancellor, University of Texas System, Austin

Roger Hagenruber, Senior Vice President National Security & Arms Control Division, Sandia National Laboratories, Albuquerque

Atsuyuki Suzuki, Professor of Nuclear Engineering, University of Tokyo

Robert McFarlane, Former National Security Advisor to President Reagan

Ernest Moniz, Under Secretary U.S. Department of Energy

Daniel Poneman, Former Special Assistant to the President for Nonproliferation and Export Controls

James Schlesinger, Former Secretary of Defense

Matthew Bunn, Assistant Director, Science Technology & Public Policy Program, Harvard University

Lucia M. Chavez, former staff member Senate Arms Services Committee for Senator Sam Nunn

A. David Rossin, Center Affiliated Scholar, Center for International Security and Cooperation, Stanford University

Peter Lyons, Science advisor to US Senator Pete Domenici

Based on information from those interviews, a 12 minute video was created using broadcast quality production techniques including: eye catching computer graphics, creative use of music, interesting video technique, crisp writing and solid narration. Hundreds of copies of this video are now being sent to GNMM Conference attendees, Senior Policy members and others interested in the subject.

PHASE THREE

Phase Three resulted from the compelling information learned in Phases One and Two. During the GNMM conference and the interviews conducted by NETN Director Connie Callan, a recurring concern emerged, best described by Dale Klein, Vice Chancellor University of Texas:

When you look at the United States, it's very difficult for us to take a lead in nuclear nonproliferation if we do not also take a lead in nuclear technology. One of the difficulties that's occurring in the United States is our future work force. For example, if we look at how many students are going

WM'00 Conference, February 27 – March 2, 2000, Tucson, AZ

into nuclear engineering, nuclear education, we're not seeing those numbers, those kinds of people...[8]

Our own research suggests that of the nearly 2.3 million degrees awarded by America's Title IV eligible, degree granting institutions, only 703 were specifically related to nuclear materials management issues.[9]

Degrees conferred by Title IV eligible, degree-granting institutions, by level of degree, and by discipline specialty: 50 states and the District of Columbia, 1996-97				
	Associate's	Bachelor's	Master's	Doctor's
Nuclear Engineering	2	162	185	113
Radiation Biology	0	0	34	13
Chemical & Atomic / Molecular Physics	0	21	1	5
Nuclear Physics	0	0	2	3
Industrial Radiologic Technology / Technician	20	1	0	0
Nuclear Power Technology /Technician	81	0	10	3
Nuclear and Radiologic Technologies / Technicians Other	0	8	0	0
Health Physics / Radiologic Health	10	5	24	0

The reasons students aren't entering nuclear studies are complicated and diverse, and certainly more research needs to be done. However one possible reason that students may not be entering this field of study is a lack of glamour of the profession. Many engineering students want to enter the lucrative world of high tech, GNMM isn't considered as exciting. Part of this may be due to a lack of proper packaging. It's a simple advertising principle - if you want people to buy your product... in this case getting students to enter nuclear fields... you have to create desire for the product... make people want it.

Phase Three is aimed specifically at addressing that principle. NETN is currently developing a two hour long broadcast aimed at helping generate interest among students about GNMM, and identifying career opportunities for them. Specifically, to let them know that the nuclear industry

WM'00 Conference, February 27 – March 2, 2000, Tucson, AZ

is alive with a myriad of high paying jobs. Research conducted by University of New Mexico Professor Bob Busch suggests that these efforts be targeted at a specific audience:

The target audience must be sophomores and juniors in high school. Our experience at UNM indicates that students choosing engineering do so as they enter college. There are only a handful of students who transfer into engineering from other disciplines after their freshman year. On the other side, there are probably 20 to 40% who transfer out of engineering to business or arts and sciences. Many do so because they don't want to work as hard, but many also do so because business is seen to have more prestige, money, and jobs. I would say our biggest hurdle in educating sufficient engineers is their lack of sufficient math background. About 50% of our entering freshman spend two or more semesters getting prepared to take calculus. This automatically means that it will take them a minimum of 5 years to graduate. We need to reach down to the high school level and convince the students that there is enormous opportunity and good salaries in the nuclear area. After they are convinced of that, then we need to get them into the math courses so they are calculus ready when they arrive on campus. [10]

To reach this population, a production done in much the same way as the Conference Overview tape is advisable. It will need to be visual, fast paced and be written for our target audience. Our current plans are to preproduce visual segments, and combine those with a panel discussion. Our method of reaching students is to offer programs, both video and live to educational outlets.

CONCLUSION

While NETN has begun some noteworthy efforts to help publicize the importance of GNMM, clearly more needs to be done. Research confirms that the base of skilled and knowledgeable people in the field is dwindling, while at the same time fewer students are entering the pipeline. It's a situation that makes it increasingly difficult for the U.S. to influence how nuclear materials will be managed abroad. Many who spoke at the CSIS / GNMM conference suggested that to turn things around, the United States needs to take a leadership role. Key to that policy is providing skilled and knowledgeable people. To do that, students at the high school level must be informed about opportunities available to them. Dissemination of this information is the focus of the work being done by NETN.

REFERENCES

[1] Interview with Kelly Herron, Ph.D., Professor, University of New Mexico, Institute for Public Policy, 9.13.99

WM'00 Conference, February 27 – March 2, 2000, Tucson, AZ

[2] US Department of Energy, Office of Fissile Materials Disposition, *Surplus HEU Disposition*, Web posting <http://twilight.saic.com/md>, 1.10.2000

[3] The White House, Office of the Press Secretary, *Fact Sheet / Plutonium Disposition Statement*, 9.1.98

[4] US Department of Education, National Center for Education Statistics,[E.D. Tabs] *Degrees and other Awards Conferred by Title V Eligible, Degree-granting Institutions: 1996-97*, CES 2000-174, by Frank B. Morgan, Washington DC: 1999

[5] Opening remarks of Richard Fairbanks, President & CEO, Center for Strategic & International Studies, CSIS Global Nuclear Materials Management, 7.22.99.

[6] National Environmental Technology Network, The University of New Mexico, School of Engineering, Bldg EECE L21, Albuquerque, NM 87131, 1-800-292-7051, netn@unm.edu

[7] WWW.CSIS.ORG

[8] Interview with Dale E. Klein, Vice Chancellor, University of Texas System, Austin, 7.22.99

[9] US Department of Education, National Center for Education Statistics, [E.D. Tabs] *Degrees and other Awards Conferred by Title V Eligible, Degree-granting Institutions: 1996-97*, CES 2000-174, by Frank B. Morgan, Washington DC: 1999

[10] Interview with Dr. Bob Busch, Professor, University of New Mexico, Chemical and Nuclear Engineering Department, 1.18.00