NAYGN

NORTH AMERICAN YOUNG GENERATION IN NUCLEAR

2013 Professional Development Conference Summary Report

Securing the Future of Nuclear: Safety, Technology, and Leadership

Washington, DC
May 12-14, 2013

2013 Conference Planning Committee

On behalf of North American Young Generation in Nuclear, we kindly thank all of the dedicated volunteers and organizations that helped make this event successful!

1. Security and Safeguards (Content Manager: Steve Ward – Entergy, Grand Gulf)

    - Mizuki Kojima* – IBEX Engineering Services
    - Maria Kriz* – Savannah River National Laboratory
    - Alejandra Villarreal* – Bechtel Corp.
    - Arihant Jain* – Enercon

2. Leadership Track (Content Manager: Maggie Collins – CB&I)

    - Steve Odell* – Westinghouse
    - Ben Fearing* – Strategic Talent Solutions
    - Greg Behneke* – Westinghouse
    - Vincent Williams – Southern Company
    - Alexandra Vazquez* – Duke Energy, Crystal River
    - David Sexton* – Southern Company

3. Technology Track (Content Manager: Bobby Ashworth – MPR Associates)

    - Albert Vargas - CB&I
    - Jennifer Reynolds* – MPR Associates
    - Aram Zare – Exelon Corp., LaSalle Station
    - Randy Schwartz* – Bechtel Corp.
    - Marc Nichol* – TRANSNUCLEAR

4. Safety Culture Track (Content Manager: Kathryn Davis – INPO)

    - Julie McClure – Entergy, Grand Gulf
    - Bristol Hartlage* – Curtiss-Wright Flow Control Company
    - Sarah Schaaf – Duke Energy
    - Will Bucholtz – Bruce Power
    - Todd Cervini* – CENG, Calvert Cliffs
    - Aria Behrouzi* – Savannah River National Laboratory

5. Special Events and Programs (Content Manager: Abbey Donahue – TRANSNUCLEAR)

    - Julie McClure – Entergy, Grand Gulf
    - Adam Howell* – AREVA
    - Todd Cervini – CENG, Calvert Cliffs
    - Alexandra Vazquez – Duke Energy, Crystal River

- Melissa Teague – Idaho National Labs
- Alejandra Villarreal – Bechtel Corp.
- Rahul Srinivasan – MPR Associates

6. Plenary Sessions (Content Manager: Brent Tolan – Duke Energy, Crystal River)

- Bobby Ashworth – MPR Associates
- Christine Csizmadia – NEI

* – Designates Session Lead

Summary Report Editor

Alejandra Villarreal, Bechtel

Summary Report Contributors

- Julie Atento, GE
- Laura Brown, GE
- Lee Causey, Duke Energy
- Michael Chen, Southern California Edison
- Leah Crider, GE
- Brett Dooies, GE
- Christine Johnsen, Duke Energy
- Colin Keleman, GE
- Maria Kretzing, GE
- Justin Lamy, GE
- Glen Lawson, Duke Energy
- Julie McClure, Entergy
- Maria McGregor, Southern California Edison
- Parastoo Muse, GE
- Maria Pfeffer, GE
- Michael Seely, Southern California Edison
- Stephanie Seely, Southern California Edison
- Alejandra Villarreal, Bechtel
- Steve Ward, Entergy

Thank You to Our 2013 NAYGN Sponsors!

Contents

Introduction

The 2013 NAYGN Annual Workshop and Conference, *Securing the Future of Nuclear: Safety, Technology, and Leadership*, was held May 12-14, 2013 at the Grand Hyatt Hotel in Washington D.C. Almost 400 NAYGN members attended the 2013 conference to learn more about the technology, regulations, and leadership skills that keep the nuclear industry safe, vibrant and growing

It is no secret that safety is top priority in the nuclear industry; however, young professionals early in their careers may be surprised of the common challenges faced by different sectors of the nuclear industry. Likewise, some young professionals may not yet appreciate just how deep the industry commitment to safety runs. As a result, the 2013 conference was intended to provide conference participants with perspectives on the different geo-political, technological, and personal ways that the industry approaches safety.

Conference participants were able to attend a variety of specialty breakout sessions that focused on one or more topics of safety, security, and/or professional development. In addition, the conference included a teambuilding event to promote networking and knowledge transfer amongst the young professionals. The conference concluded with a hill day visit for conference participants to visit federal policy makers and share our own perspectives.

Details of the conference are included as part of this summary report.

NAYGN Members Participate in Teambuilding Event

Conference Agenda

SUNDAY, MAY 12

General Session
8–10:30 a.m.
Constitution Ballroom

Welcome and Opening Remarks
8–8:15 a.m.

Kristin Zaitz
President
NAYGN

Nuclear Safety and Security: How We Got Here, What We're Doing and Where We're Going
8:15–10 a.m.

Michael Weber
Deputy Executive Director for Operations for Materials, Waste, Research, State, Tribal, and Compliance Programs
U.S. Nuclear Regulatory Commission

Herbert Richardson
Vice President, Security and Loss Prevention
AREVA

Joseph Pollock
Vice President, Nuclear Operations
Nuclear Energy Institute

Brent Tolan (Facilitator)
PD Committee Manager
NAYGN

Breakout Sessions 1
10:30 a.m.–12:30 p.m.

1.1 Nuclear Nonproliferation, Verification and Disarmament
Constitution Ballroom

Corey Hinderstein
Vice President, International Program
Nuclear Threat Initiative

Jane Purcell
Foreign Affairs Officer
U.S. Department of State

Donald Cook
Deputy Administrator for Defense Programs
National Nuclear Security Administration

Elina Teplinsky
Senior Associate
Pillsbury Winthrop Shaw & Pittman LLP

Alejandra Villarreal (co-Facilitator)
PD Committee Member
NAYGN

Mizuki Kojima (co-Facilitator)
PD Committee Member
NAYGN

1.2 Develop Yourself for Career Success
Conference Theatre

Debra Hager
Workforce Development Manager
Duke Energy

Alexandra Vazquez (Facilitator)
PD Committee Member
NAYGN

1.3 Preserving the Safety and Security at the Backend of the Fuel Cycle
Independence BCDE

Michael McMahon
President and Chief Executive Officer
TRANSNUCLEAR Inc.

Mark Lombard
Director, Division of Spent Fuel Storage and Transportation
U.S. Nuclear Regulatory Commission

John Massari
Engineering Supervisor, Nuclear Analysis Unit
Constellation Energy Nuclear Group LLC

Marcus Nichol (Facilitator)
PD Committee Member
NAYGN

1.4 Safety, Security and Safeguards Culture
Independence FGHI

Stephen Mladineo
Senior Adviser, Defense Nuclear Nonproliferation Programs Sector
Pacific Northwest National Laboratory

Paul Ebel
Vice President
BE Inc.

Anndria Gaerity
Director, Emergency Services
PSEG Nuclear, LLC

Susan Landahl
Senior Vice President, Operations Integration and Business Development
Exelon Nuclear

Todd Cervini (Facilitator)
PD Committee Member
NAYGN

Lunch
12:30–2 p.m.
Independence A

Breakout Sessions 2
2–3:30 p.m.

2.1 Nuclear Security and Material Control And Accounting
Independence BCDE

Peter Miner
Director, Nuclear Safety and Safeguards
USEC Inc.

David Godshalk
Lead Project Manager
ENERCON

Ray Landis
Senior Project Manager, Security
Nuclear Energy Institute

Martha Williams
Senior Consultant, Safeguards
Talisman International, LLC

Arihant Jain (Facilitator)
PD Committee Member
NAYGN

2.2 Tackling Tough Decisions: Perspectives From Industry Leaders
Constitution AB

Ben Waldrep
Vice President, Nuclear Corporate Governance and Operations Support
Duke Energy Corporation

Daniel Roderick
President and Chief Executive Officer
Westinghouse Electric Company

David Barry
President
CB&I

John Young
President and Chief Executive Officer
Energy Future Holdings

Ben Fearing (Co-Facilitator)
PD Committee Member
NAYGN

Stephen Odell (Co-Facilitator)
PD Committee Member
NAYGN

2.3 Cyber Security Technology
Conference Theatre

David Burford
Director of Security
Southern Nuclear Operating Company

Erik Dorman
Manager, Cyber Security Solutions
AREVA

William Gross
Senior Project Manager, Security
Nuclear Energy Institute

Jennifer Reynolds (Facilitator)
PD Committee Member
NAYGN

2.4 Safety Culture: Best Practices
Independence FGHI

G. Kenneth Koves
Senior Program Manager
Institute for Nuclear Power Operations

Charlie Williams
Executive Director
Center for Offshore Safety

Patricia Williams
Office of Safety and Emergency Management Evaluations
U.S. Department of Energy

Aria Behrouzi (Facilitator)
PD Committee Member
NAYGN

Breakout Sessions 3
4–5:30 p.m.

3.1 International Safeguards
Independence FGHI

Karen Owen-Whitred
Director, International Safeguards Division
Canadian Nuclear Safety Commission

Helly Diaz-Marcano
Program Manager for International Safeguards
Savannah River National Laboratory

Olli Heinonen
Senior Fellow
Belfer Center, Harvard Kennedy School

Maria Kriz (Facilitator)
PD Committee Member
NAYGN

3.2 Meeting Facilitation Skills
Independence BCDE

Andrew Collins
Director of Training and Development
Mitsubishi Nuclear Energy Systems, Inc.

David Sexton (Facilitator)
PD Committee Member
NAYGN

3.3 Physical Security Technology
Conference Theatre

Nassima Barrows
Office of Second Line of Defense
National Nuclear Security Administration
U.S. Department of Energy

Adam Graf
Architecture and Plans Directorate
Domestic Nuclear Detection Office
U.S. Department of Homeland Security

Ronald Teed
Fleet Nuclear Security Director
Constellation Nuclear Energy Group, LLC

Randall Schwartz (Facilitator)
PD Committee Member
NAYGN

3.4 Safety and Reliability of Plant Equipment
Constitution AB

Robert Cole
Manager, Integrated Procurement Solutions
AREVA

Keith Porter
Director, New Build
Curtiss-Wright Flow Control Company Nuclear Group

Sherry Bernhoft
Program Manager for Long-Term Operations
Electric Power Research Institute

Bristol Hartlage (Facilitator)
PD Committee Member
NAYGN

Scavenger Hunt Team Lead Pre-Job Briefing
5:30-6 p.m.
Constitution AB

NAYGN Welcome Reception
6–7:30 p.m.
Constitution CDE

MONDAY, MAY 13

Headshot Lounge
7 a.m.–7 p.m.
Roosevelt/Cabin John/Arlington

General Session
8–11:30 a.m.
Constitution Ballroom

Securing the Future of Nuclear: Developing the Next Generation of Nuclear Employees
8–9:30 a.m.

Rita Neer
Principal Organizational Development Specialist
Exelon Corporation

Maureen Tront
Principal Organizational Development Specialist
Exelon Corporation

Bobby Ashworth (Facilitator)
Professional Development Chair
NAYGN

Awards Ceremony
9:30–10:15 a.m.

P. Giovanna Montanes-Durand
Awards Committee Chair
NAYGN

Keynote Speech
10:15–11:15 a.m.

The Hon. Adam Kinzinger
Congressman
U.S. House of Representatives

Morgan D. Molenhouse (Facilitator)
Public Information Chair
NAYGN

Closing Remarks
11:15–11:30 a.m.

Christine Csizmadia
Vice President
NAYGN

Lunch and Scavenger Hunt
11:30 a.m.–5 p.m.

NEA Opening Reception and NAYGN Closing Reception
6–7:30 p.m.
Independence Ballroom

TUESDAY, MAY 14

Local Chapter Leadership Meeting
7:30–8:30 a.m.
Constitution Ballroom

Hill Day Pre-Job Brief
8:30–9:30 a.m.
Constitution Ballroom

Christine Csizmadia
Vice President
NAYGN

Adam Howell (Facilitator)
PD Committee Member
NAYGN

Hill Day Visits
Capitol Hill
9:30 a.m.–3 p.m.

NEA Special Event (ticketed event)
7–9:30 p.m.
National Air and Space Museum

Welcome and Opening Remarks

Outgoing NAYGN President Kristin Zaitz opened the 2013 Professional Development Conference by providing an overview of the conference theme, *Securing the Future of Nuclear: Safety, Technology, and Leadership***,** which was chosen to provide NAYGN members the opportunity to engage in nuclear issues in a broader context, and to take advantage of leadership development offerings.

Zaitz discussed several unique perspectives on the conference – the diversity of the attendees, the unique opportunity to learn and become more involved in the nuclear industry, and the relationships created at this unique gathering. She encouraged attendees to take full advantage of the opportunity to explore new subjects that may be unfamiliar and to meet and learn from fellow NAYGN members in various sectors of the industry.

> "Learning new things about nuclear science and technology opens up a world of opportunities to you. Many of you are just starting your career and learning what's out there will help you to plan for your future, to think about where you want to go and what you want to do. NAYGN will provide you with as many opportunities as you are willing to take on.
>
> Thomas Edison is quoted as saying, "We often miss opportunity because it's dressed in overalls and looks like work." Get engaged in NAYGN activities -at the local chapter level, regional level, or continental level. This last year, we've had more local chapter and regional events than ever before. From professional development activities, social events, community service events, advocacy events, not to mention IYNC2012 (International Youth Nuclear Congress). All together in 2012, our members performed a record-setting **96,898** man-hours towards our organization's mission. Keep up the good work by stepping up to leadership opportunities, by practicing and building your skills. And you don't have to dress in overalls, but I will say that those who put in the most work will realize the greatest rewards.
>
> If this is your first time at an NAYGN conference, you will find that you have to try very, very hard to not meet people that you get along with. Many of us here have built relationships through NAYGN that we will keep throughout our careers, and perhaps our lives. And I want that to be true for all of you. So make the most of these three days and meet some people!"

Nuclear Safety and Security: How We Got Here, What We're Doing, and Where We're Going

By: Alejandra Villarreal

Session Facilitator

Brent Tolan

Panelists:

- **Michael Weber,** Deputy Executive Director for Operations for Materials, Waste, Research, State, Tribal, and Compliance Programs, U.S. Nuclear Regulatory Commission
- **Herbert Richardson,** Vice President, Security and Loss Prevention, AREVA
- **Joseph Pollock,** Vice President, Nuclear Operations, Nuclear Energy Institute

Session Summary

Mr. Weber began his presentation with an overview of the U.S. Nuclear Regulatory Commission's (NRC's) mission, which is to ensure the safe use of radioactive material for beneficial civilian purposes while protecting citizens and the environment by regulating commercial nuclear power plants and other uses of nuclear materials through licensing, inspection and enforcement of its requirements. Weber discussed the "early days" of nuclear weapons and the process of pursuing atomic energy not only for national security purposes, but also to promote its safe and peaceful use for energy following President Eisenhower's *Atoms for Peace* speech in 1953. The Atomic Energy Commission (AEC) was formed to help promote and regulate peaceful uses of nuclear materials. He addressed the institutionalization of nuclear safeguards through the International Atomic Energy Agency (IAEA) and the Nuclear Nonproliferation Treaty (NPT), among other agreements and frameworks, before finishing his presentation with an overview of the current IAEA framework as it relates to the NRC's responsibilities. The NRC supports the U.S. Voluntary Offer Agreement, whereby facilities in the U.S. can be selected for application of IAEA safeguards. The NRC also supports the Nuclear Materials Management and Safeguards System (NMMSS) which tracks nuclear materials in the U.S.

As a backdrop for his discussion on nuclear security issues, **Mr. Richardson** discussed his experience as a principal deputy inspector general at the U.S. Department of Energy (DOE) and as chief of criminal justice investigative services for the Federal Bureau of Investigation (FBI), which included counterintelligence work with the National Security Agency (NSA), Director of National Intelligence

(DNI) and DOE. In his presentation, Mr. Richardson examined physical security protection, crisis management, and cyber security issues.

Richardson began his discussion by examining physical security protection, which includes evaluating and improving upon facility access protocols and building and site security, hardening security protocols, and evaluating and improving structural integrity of facilities. He noted the degree of diversity inherent in such requirements, mentioning his responsibilities at AREVA for U.S. enriched uranium plants as well as solar (and, potentially, nuclear) projects in India as examples among the 100 countries in which the company operates, each with their own unique security threats. He detailed several examples of facility and access security controls, including the stratification of employees, visitors and foreign nationals through a color coded structured badge access policy at sites in North America.

Richardson identified numerous approaches to crisis management challenges, including thorough evaluation of site evacuation plans and other emergency protocols, identification of best practices, the establishment and identification of continuity of operations plans, and the establishment of emergency response protocols within AREVA and with emergency operations centers, first responders and appropriate federal and state agencies. He noted that crisis management situations often involve severe weather disruptions and loss of proprietary information.

Digital warfare threats ranked among the highest priorities to Richardson, who reiterated FBI Director Robert S. Mueller's statement that "cyber warfare is the new terrorism," and discussed measures at the FBI and other agencies to mitigate and prevent attacks, such as prohibiting the use of thumb drives. In the context of industry response to cyber security threats, Richardson emphasized the importance of reviewing and enhancing inventory controls to prevent property loss and of reviewing security protocols to protect proprietary information and intellectual property. Richardson noted that it currently takes an average of 416 days to determine that a cyber attack occurred. However, he took pains to emphasize that there is no such thing as "perfect security." Citing a report by Mandiant indicating that 100% of victims have up-to-date anti-virus software, Richardson made clear that even companies that have made responsible and sustainable investments are compromised daily by cyber attacks. Because of this, it is essential to recognize that different threat actors have varying motivations and tactics; in order to combat advanced attackers, companies must know what information the attackers seek and how they operate. He warned that attacks on corporate assets hint of a potential "cyber Pearl Harbor" – essentially, an attack or series of attacks on energy infrastructure which could cause widespread blackouts and knock out the transmission grid. Richardson was particularly troubled by the vulnerability of electric utilities to cyber attacks.

In response to these threats, Richardson emphasized the importance of coordinating federal- and state-sponsored initiatives to improve cyber protection, liaising with FBI, Department of Homeland Security (DHS), NSA and Department of Defense (DOD) on intelligence-related state-sponsored attacks,

and maintaining strong international working relationships among nations. He also discussed the importance of education (staying current on malware, spam and phishing techniques and technologies), protection of both home and office resources, identification of potential problems and bad players, and reporting areas for concern immediately.

Mr. Pollock's presentation addressed the impact of the Fukushima incident on improving safety margins. In the discussion, he provided an overview of the U.S. nuclear industry response to the disaster, regulatory actions by the NRC, major accomplishments by the U.S. nuclear industry, remaining work in progress, the FLEX initiative and strategies for industry coordination and information sharing.

In the immediate aftermath of the Fukushima incident, U.S. nuclear industry response focused on confirming the safety of U.S. reactors and the operability of mitigation equipment, establishing communications among relevant entities including the Nuclear Energy Institute (NEI), Institute of Nuclear Power Operations (INPO), Electric Power Research Institute (EPRI), and facilities, and gaining a strong understanding of the events in Japan in order to establish a path forward for action.

In response to Fukushima, the NRC's regulatory actions included issuing several orders to address mitigation strategies for beyond design basis events (the three-phase "FLEX" approach), hardened containment vents for Mark I and II containments, and spent fuel pool water level instrumentation, and numerous requests for information from facilities regarding seismic and flooding preparedness and emergency measures. NRC recommendations were categorized into three tiers – immediate, intermediate, and long-term study.

Pollock detailed several U.S. nuclear industry accomplishments in response to Fukushima, including completed flooding and seismic vulnerability inspections, validated station blackout procedures, verification of periodic maintenance and drills for B.5.b equipment, enhanced spent fuel pool monitoring, and the approval of regional response centers.

Work in progress includes the development of site-specific FLEX strategies, designing reliable spent fuel pool wide-range level instrumentation, creating regional response centers, improving industry infrastructure, and evaluating seismic hazard methodologies currently in the approval process with the NRC.

Pollock also discussed the development of the FLEX strategy to implement NRC's Fukushima Task Force recommendations. The strategy addresses the primary challenges confronted at Fukushima, including the loss of cooling capability and electrical power resulting from a natural disaster, by utilizing portable equipment to address beyond design basis events. Pollock noted the flexible approach of the strategy enables each site to customize its planning to take into account regional conditions and events; for example, earthquake preparedness on the West Coast, and flooding in the Midwest. As a result of the FLEX strategy implementation, sites have already improved their safety margins.

Finally, Pollock said the nuclear industry has expanded existing sharing practices between utilities to include emergency equipment and the establishment of regional response centers to provide additional equipment and resources from outside the affected utility.

In response to an audience question, 'What keeps you up at night?" Weber and Pollock responded that complacency is their greatest fear in terms of threats to the industry, particularly sites that have achieved excellence in preparedness, as individuals become less attuned to the threat environment. Richardson stated that industry is still "playing catch-up" with cybersecurity, indicating it is "a matter not of if, but when" an attack will occur, and industry must be prepared to face it.

Nuclear Nonproliferation, Verification, and Disarmament

By: Lee Causey

Session Facilitator

Alejandra Villarreal and Mizuki Kojima

Panelists

- **Corey Hinderstein,** Vice President, International Program, Nuclear Threat Initiative
- **Jane Purcell,** Foreign Affairs Officer, U.S. Department of State
- **Donald Cook,** Deputy Administrator for Defense Programs, National Nuclear Security Administration
- **Elina Teplinsky,** Senior Associate, Pillsbury Winthrop Shaw & Pittman LLP

Session Summary

Ms. Hinderstein offered a definitive perspective on the risks associated with nuclear proliferation. "Proliferation anywhere is proliferation everywhere," Hinderstein stressed, explaining the domino effect a single event can have on the nuclear industry. "The actions of all other countries or groups have consequences within our industry." These include the actions of Pakistan, Israel, India and North Korea - four countries that are not part of the Nuclear Nonproliferation Treaty (NPT). The two main keys to preventing proliferation, according to Hinderstein, are strengthening global security and raising public awareness.

Ms. Purcell tied the nonproliferation perspective to the New Strategic Arms Reduction Treaty (New START) between the U.S. and Russia, emphasizing efforts to reduce nuclear arms. Ms. Purcell explained how the START treaty incorporates bilateral inspections, technology exchanges, and other measures to ensure each country complies with the treaty's requirements.

Dr. Cook provided a different view to the panel, stressing the function nuclear weapons play in deterring nuclear attacks from other countries. Dr. Cook addressed common misconceptions about the U.S. nuclear arsenal and encouraged attendees to stay informed about nuclear weapons issues.

Ms. Teplinsky came to the 2013 NAYGN conference with one, precise message: "Know up front what regulations exist." With the United States' keen interest in nonproliferation, there are many regulations associated with nuclear trade and export controls.

Teplinsky reemphasized that the three main agencies regulating nuclear trade in the U.S. are the Nuclear Regulatory Commission, the Department of Energy and the Department of Commerce's Bureau of Industry and Security.

While it may seem obvious that transporting nuclear fuel comes with its own set of regulations, Teplinsky also highlighted that regulations apply to more than just physical goods or products. Examples include the exporting of knowledge, such as through conversations, and also conducting benchmarks within the nuclear industry. Even nonnuclear materials, such as certain reactor components, are subject to export controls.

Develop Yourself for Career Success

By: Stephanie Seely

Session Facilitator

Alexandra Vazquez

Panelist

- **Debra Hager,** Workforce Development Manager, Duke Energy

Session Summary

An important point emphasized in this panel was that career success depends on the effort and time you devote to developing yourself, reviewing your role regularly and identifying job opportunities. You may feel satisfied in your current role, but it is important to think about the future, when you may want to pursue a promotion or even a complete career - and it is essential to be prepared.

So, where do you start?

Taking time to consider your personal strengths will help you to make key decisions about your career. Make both a short term and a long term career goal. Start by creating a list of everything that you excel at, and identify your key skills and strengths. It may be helpful to use the following headings as you make your list:

- Business Acumen
- Change Management
- Decision Making
- Leadership
- Operational Management
- Results Focused
- Communication Skills
- Learning and Adapting
- Planning and Organizing
- Respect for Others
- Self-Management
- Teamwork
- Safety Culture
- Technical Acumen

Using your results, identify which competencies you struggle with or areas in which you need more experience. Ask peers and mentors to evaluate your competencies and weaknesses as well to provide an unbiased viewpoint.

- **Prepare Yourself for Career Success Objectives (Handout)**
- **Career Success Activity Sheet – Actions (Handout)**
- **Mid-Career Competency Model-Supervisors (Handout)**
- **Mid-Career Competency Model-Individual Contributor (Handout)** **Career Success Activity Sheet – Needs (Handout)**

Preserving the Safety and Security at the Backend of the Fuel Cycle

By: Colin Kelemen and Justin Lamy

Session Facilitator

Marcus Nichol

Panelists

- **Michael McMahon,** President and Chief Executive Officer, TRANSNUCLEAR Inc.
- **Mark Lombard,** Director, Division of Spent Fuel Storage and Transportation, U.S. Nuclear Regulatory Commission
- **John Massari,** Engineering Supervisor, Nuclear Analysis Unit, Constellation Energy Nuclear Group LLC

Session Summary

Mr. McMahon began his presentation with a brief description of modern dry cask storage, which he likened to "highly engineered trashcans." The casks are arranged horizontally in concrete structures called Horizontal Storage Modules (HSMs). These structures allow plant workers to come within 30 feet without requiring protective equipment, and have proven robust in light of recent natural disasters. In evidence of this point, Mr. McMahon shared that casks located at North Anna moved only one inch during the 2011 earthquake that struck Virginia, an event which exceeded the cask design basis. Those located at Fukushima did not experience any damage after either the earthquake or subsequent tsunami, which left them covered in seaweed. The casks have also been engineered to resist being struck by the shaft of an aircraft engine, as demonstrated by video of an impact test. The engine shaft is simulated since, as Mr. McMahon pointed out, the rest of the aircraft is essentially a harmless, squishy bag of aluminum by comparison. He further underscored the strength of the casks by sharing that they employ 110 tons of material in their construction to protect just six tons of fuel.

Mr. McMahon also presented an alternative to dry cask storage – recycling. Being from AREVA initially, Mr. McMahon personally supports this approach given that nuclear fuel itself is not designed for long-term storage. As evidence, he pointed to the thin walls of the cladding which optimize heat transfer, but not long-term structural integrity. He mentioned France's three recycling platforms: La Hague,

FBFC Romans, and MELOX, and outlined the AREVA approach of encapsulating fission products extracted during the recycling process in a stable glass matrix.

Mr. McMahon then turned his attention to the future, noting that there is currently no ultimate path for long-term disposal in this country. Challenges include the long-term nature of the storage, at which point he quoted one of his engineers as having posed the question: if storage canisters are made out of stainless steel, how can we predict the behavior of the stainless steel over the course of 300 years if the material has only been around for 100 years?

Mr. McMahon also pointed to the security concerns of concentrating all used nuclear fuel in a single location, as well as the logistical challenges of transporting all the existing used nuclear fuel to that location as hurdles which will have to be overcome. He also noted that he is concerned by how long it is taking to generate solutions to these problems, as backlogs in waste disposal are only getting worse. Mr. McMahon then closed by challenging NAYGN to advocate for a path forward on waste disposal sooner, rather than later.

Mr. Lombard summarized the principles of good regulation as:

- Ensuring safety and security while appropriately balancing the interests of governing body stakeholders
- Affording independence in judgment but not isolation in thought
- Maintaining open channels of communication
- Exhibiting coherency, logic, practicality, and the perception of reliability

On the last point, Mr. Lombard reiterated his personal mantra of "reasonable, reliable, and predictable," which he uses to guide his daily work at the NRC. He went on to discuss the concept of "waste confidence," noting that the NRC can no longer issue a combined license (COL) or license renewals until it has the confidence that any nuclear waste produced by the facility applying for the license can be stored on-site safely.

Mr. Lombard outlined the major elements of the National High Level Waste Strategy, which was issued just recently in January of this year. Major elements include a consent based process with a pilot interim storage facility in operation by 2021. This is followed by a full-scale interim storage facility by 2025 and a geologic repository by 2048. Mr. Lombard also noted that Yucca Mountain is not completely off the table as a potential site for a geologic repository.

Mr. Lombard then elaborated on the status of the interim storage facility, for which NRC regulations are complete. At least four entities are currently interested in potentially hosting the facility: West Texas, Idaho, Savannah River, and New Mexico. The NRC is prepared to engage in pre-selection and pre-application meetings with these entities.

The focus of Mr. Lombard's presentation then shifted to the potential difficulties of transporting existing spent fuel to any sort of off-site storage facility, noting that additional licensing actions may be needed if the cask currently in use is not cleared for transport. He mentioned a current area of investigation within the NRC: extended storage and transportation. In this initiative, the goal is to determine the potential degradation phenomena for dry storage systems. Mr. Lombard pointed out the highest priority technical information needs are:

- Stress corrosion cracking of stainless steel canisters and welds
- Swelling of fuel over time
- Realistic thermal models
- Understanding of residual moisture effects
- In-service monitoring methods

Mr. Lombard then closed his presentation by polling the audience on whether or not nuclear fuel that has been discharged from the core should be referred to as "spent" or "used." The audience overwhelmingly selected "used," to which Mr. Lombard pointed out that such a selection is consistent with newly forming perspectives of the fuel cycle back end.

Mr. Massari then took the podium to offer his perspective on wet storage in the spent fuel pool. Even with dry cask storage available, wet storage is necessary because spent fuel needs 6-8 years to reach the 1kW decay heat threshold for dry cask storage.

Spent fuel pools are subject to both criticality and radiological safety regulations, with sites having to maintain a k_{eff} less than unity (or less than 0.95 if credit is taken for limited soluble boron). Additionally, fuel storage racks must incorporate a fixed neutron absorber. Radiological requirements center around shielding, with 9 feet of water required over freshly discharged fuel. Mr. Massari additionally noted that 23 feet of water provides a factor of 200 reduction in iodine release during a fuel handling accident.

Mr. Massari gave a brief timeline of changes in emergency planning and hardware requirements, with the Three Mile Island event bringing abnormal operating procedures for low spent fuel pool level, as well as the addition of a visual reference for wide range level. After the events of September 11, 2001, requirements to disperse high heat load fuel to an air coolable geometry were instituted, as was hardware to spray cool the fuel. Severe accident procedures were also developed. Finally, after the natural disaster at Fukushima, wide range level instrumentation was installed and action levels were defined.

Q&A

How can we avoid the mistake of Yucca Mountain where residents of the area are opposed to the siting of a potential Interim Storage Facility?

- Mr. Lombard: Utilize a consent-based process to get buy-in ahead of time.
- Mr. McMahon: Approach states which have already expressed interest.

What are the hurdles for recycling and reprocessing in the United States?

- Mr. McMahon: The United States is more awash in natural resources (coal, for example) than France, so the driver to pursue this approach is not the same. He cautioned against what he refers to as "R&DN," or "Research and Do Nothing," but noted that until it becomes economically advantageous, reprocessing may be a tough sell in this country since mining is more cost effective within the current framework. This would change when a repository opens since it will likely represent the most expensive real estate in the world and reprocessing will allow this space to be better utilized.

What was the main driver for TRANSNUCLEAR to choose horizontal dry storage as opposed to a vertical orientation?

- Mr. McMahon: TRANSNUCLEAR acquired the technology from a different company, but in effect the horizontal cask is already "tipped over," which yields good seismic response and does not require a crane to handle on-site.

What are the repository strategies of other countries?

- Mr. McMahon: Sweden and Finland have used a consent-based approach which led to towns bidding against one another for a deep geologic repository. France has picked a site 250km east of Paris with a 500m deep deposit of bentonite clay in which to place the vitrified/compacted metal waste from spent fuel recycling. Other countries are using dry storage to buy time until a more permanent solution is found.

Follow-on question from audience member: Could you describe how the activity of packages carrying used nuclear fuel (UNF) compares to packages carrying vitrified waste after recycling?

- Mr. McMahon: In France, the typical package for transporting vitrified waste (the TN28, which holds 28 vitrified waste canisters) has less than half (45%) of the activity of the typical package to transport UNF (the TN12, which holds 12 PWR or 32 BWR used fuel assemblies).

Safety, Security, and Safeguards Culture

By: Steve Ward and Julie McClure

Session Facilitator

Todd Cervini

Panelists:

- **Stephen Mladineo,** Senior Advisor, Defense Nuclear Nonproliferation Programs Sector, Pacific Northwest National Laboratory
- **Paul Ebel,** Vice President, BE Inc.
- **Anndria Gaerity,** Director, Emergency Services, PSEG Nuclear, LLC
- **Susan Landahl,** Senior Vice President, Operations Integration and Business Development, Exelon Nuclear

Session Summary

Mr. Mladineo stated his presentation by discussing the various International Atomic Energy Agency (IAEA) safeguards treaties and frameworks. He explained that safeguards are an important part of operating a facility, similar to safety and security. He then described his on-going research into the concept of a safeguards culture at a site. He proposed several definitions, which he noted have not been accepted yet. Mr. Mladineo highlighted Edgar Schein's model using three layers of culture. The bottom layer is the underlying culture. The middle layer is the espoused values. The top layer is the artifacts or what is seen in practice. He stressed that for any culture to thrive at a site, top level management must support the concept and act in accordance with the culture.

Mr. Ebel discussed nuclear security culture by raising several questions. What is it? Can it be measured? How do you measure something that's an abstract concept? Mr. Ebel described his work with the IAEA to create the first clear definition of nuclear security culture for the international community. He emphasized the idea of a top-down approach but stressed that what matters most is what people believe. Mr. Ebel also cited Edgar Schein's model and showed how the model influenced the development of an evaluation worksheet with 28 characteristics. While these characteristics are not absolute, Mr. Ebel showed how they provide a means for grading and measuring nuclear security culture at a site. He closed by sharing his work in Indonesia with BATAN, the Indonesian agency for

nuclear energy. BATAN completed a self-assessment of nuclear security culture using the new IAEA guidance and evaluation model.

Ms. Gaerity characterized security culture as protecting against a nuclear threat from an advisory who is willing to die for his cause. At the same time, nuclear security guards are the people who run into the fight to protect the plants. She cited the book *On Combat* by Dave Grossman for providing insights into the minds of police, military, and other security professionals who protect people by entering hazardous situations. The book describes three types of people, the sheep or those who are vulnerable, the sheep dogs who protect the sheep, and the wolves who threaten the sheep. Ms. Gaerity described the contradictions in nuclear security including the idea that we can't share information and become suspicious if people express interest in nuclear security. She recognized the need for maintaining a respectful attitude towards security professionals and ensuring the equipment issues at a plant related to security are prioritized properly.

Ms. Landahl provided an overview of the benefits of fleet operations. She described how in a fleet setting one can design one and install many to maximize efficiency. She discussed Exelon's history with security including the 2008 issue at Peach Bottom where guards were videotaped being inattentive on the job. At the time, the security force was an outside contractor. Within 60 days of the incident, Exelon brought security in house. Ms. Landahl recognizes how cyber security has changed security because you can't see the adversary in a cyber attack. She described the importance of securing safeguards information and the factors that drive nuclear security regulations.

Tackling Tough Decisions: Perspectives from Industry Leaders

By: Michael Seely

Session Facilitator

Ben Fearing and Stephen Odell

Panelists:

- **Dave Barry,** President, CB&I
- **Ben Waldrep,** VP Nuclear Corporate Governance and Operations Support, Duke Energy
- **Danny Roderick,** President and CEO, Westinghouse Electric Company

Session Summary

Mr. Barry, Mr. Waldrep and Mr. Roderick answered a series of questions on leadership and decision making from the facilitator, as well as questions from audience members. The following presents a selection of some of the questions from the session:

Describe a difficult decision in your career path and how you arrived at your decision.

- Roderick: Demonstrate your strengths and work on your weaknesses. Particularly as a young person, work with people who are older than you and show you have the same goals as they do.
- Waldrep: I moved around a lot, but did not expect to do so. I volunteered to go to Turkey Point from corporate and started in engineering. I was pushed into leading maintenance craft and had to adjust. Listen to the folks where the work gets done, be it in maintenance, operations, or engineering.
- Barry: I started as a mechanical engineer at North Anna. I learned to work with the craft; remember, you don't know everything and listen to what others have to say.

Describe a specific difficult decision you had to make.

- Roderick: Working at a plant, we developed a mechanical joint leak, but who do we know for sure that's what it is and not something more serious? The regulator was nervous, and

we decided to make the conservative decision and shutdown the plant. This gave us credit with the regulator later on for making safe decisions.

- Waldrep: A sealing joint was leaking in a steam generator replacement outage that was behind schedule, and on Dec 23. We decided to depressurize and repair the leak.
- Barry: A painters union strike lead to the question of whether or not to prepare carbon steel inside containment with sandblasting, rather than the original plan of performing the work outside containment.

Describe how you make an unpopular or impossible decision.

- All: Tell people what you can, and if you can't tell them, let them know that, too.

How do you get to the point of thinking ahead (e.g., 2 years out)?

- All: It comes with each career step (next outage -> next INPO evaluation -> etc.). Having a strategy or vision allows you to know where you are when you need to change course. Let your team make the day-to-day decisions.

How do you know when to make decisions and when to delegate?

- Roderick: Surround yourself with smart, high-performance people and trust them
- Waldrep: We have the slogan, "Challenge Good News," which is intended to make people think through results and not just accept them because they are what you want to hear.

In your career, did you pursue opportunity or let it come to you?

- Waldrep: Let it come to you. Put the company first and do the right thing for the company. People will notice.

Do you have any failures or regrets?

- Roderick: You have to be willing to accept failure. Be willing to own up to your mistakes and be accountable. The worst thing you can do is not accept responsibility.

What motivates you?

- Roderick: Love what you do. People notice every behavior you have as a leader and interpret it.

As many of you started in engineering, how did you acquire the business acumen?

- Roderick: Don't make excuses, get your MBA. If you want to be CEO, the MBA is worthwhile. If you want to be more in charge of the plant operations, get your SRO License.

Big Takeaways:

- Roderick: Realize that to move up, there will be tradeoffs. You will have to move around. Lose you inhibition and fear of failure.
- Waldrep: Never forget where the work gets done.
- Barry: Stay flexible, learn to be more of a generalist and don't be pigeonholed.

Nuclear Security Material Control and Accounting

By: Alejandra Villarreal

Session Facilitator

Arihant Jain

Panelists

- **Peter Miner,** Director, Nuclear Safety and Safeguards, USEC Inc.
- **David Godshalk,** Lead Project Manager, ENERCON
- **Martha Williams,** Senior Consultant, Safeguards, Talisman International, LLC

Session Summary

Mr. Miner began the panel discussion with a discussion on perspectives on nuclear security before 9/11. He noted that the current core nuclear security strategies existed before 9/11, but the heightened awareness of threats brought an increased level of scrutiny and more stringent security requirements. However, he emphasized that nuclear facilities were, and continue to be, some of the world's most secure facilities. He also discussed the U.S. Nuclear Regulatory Commission (NRC) regulatory framework for domestic safeguards, radioactive material security, and information security.

Miner examined the specifics of what comprises a protection strategy: a physical protection system, including physical barriers, access controls and intrusion detection, and protection against Design Basis Threat (DBT), including radiological sabotage and theft or diversion of special nuclear material. In this context, he emphasized that the requirements for protection strategies are far from static and require constant reassessment and reevaluation. Programmatic elements such as access authorization programs, which screen and perform background checks of individuals, fitness for duty programs, and emergency preparedness measures and risk assessments are key to ensuring a sound protection strategy. Facilities must guard against malevolent actors, including those within the facility itself. Security readiness involves ensuring that facilities are capable of defending against design basis threats, and are continually tested through force-on-force exercises.

Mr. Godshalk provided an overview of physical security at commercial nuclear power plants. After 9/11, a major effort commenced that resulted in changes in physical security and security strategies for nuclear facilities. Security is designed using a layered approach and multiple commercial systems that

must be carefully integrated to ensure optimal functionality. Facilities use the Design Basis Threat as guidance and seek to minimize response time in their strategies. Current security systems include intruder detection and assessment, vehicle barrier systems, personnel and vehicle access control points, alarm stations, security computer systems for access control, hardened defensive positions, and multiple delays to slow adversaries.

Warning that nuclear plants are "always awaiting the next event," Godshalk noted that plant designs and systems must be testable. To ensure readiness, plants run a constant series of drills, qualification requirements for officers, and tri-annual force-on-force drills in which Composite Adversary Force (CAF) teams attack the plants. Detailing upcoming changes to physical security at nuclear plants, Godshalk discussed the addition of remote operated weapons, the high probability of a Design Basis Threat change, and cyber security threats and preparedness efforts.

Explaining its complementary role to physical security, which protects plants from outside threats, **Ms. Williams** provided an overview of material control and accounting (MC&A), a method of providing "inside security" by defending against the theft or misuse of nuclear materials by an insider.

MC&A, which enables knowledge of nuclear material location and quantity, began as a basis for meeting the requirements and obligations of the Nuclear Nonproliferation Treaty (NPT), and every signatory nation has a state system of MC&A methodology. The International Atomic Energy Agency (IAEA) inspections rely on MC&A as they scrutinize records detailing how each facility has used its nuclear material.

Williams noted that unlike other industries, nuclear materials are highly scrutinized because of the enormous potential for threats on an international level. She stated that although physical measures can be taken to protect against theft, they cannot determine whether an item has already been stolen – this question can only be answered by an accounting system with complete and up-to-date records of the facility's nuclear material.

Basic MC&A system elements include a management structure with clearly defined responsibilities and a highly trained and qualified staff. Written procedures are essential to ensure consistency and reliability of information, and complete records of all activities involving nuclear material must be kept. A standard system of measurement for all nuclear material at the facility must be established, with periodic physical inventory taken annually, at a minimum. In the case of discrepancies or missing material, MC&A systems have a process for investigation and resolution of problems.

Williams detailed the basic control elements of MC&A, which involve permissions for authorized personnel, procedural rules for gaining access to controlled areas, and radiation monitors to detect unauthorized removal of nuclear material.

Williams then discussed several examples (safety, operations, shipping, and spent fuel problems) of systematic failures at various sites and examined how they could have been prevented with proper adherence to MC&A principles.

Cyber Security Technology

By: Brett Dooies

Session Facilitator

Jennifer Reynolds

Panelists:

- **David Burford,** Director of Security, Southern Nuclear Operating Company
- **Erik Dorman,** Manager, Cyber Security Solutions, AREVA
- **William Gross,** Senior Project Manager, Security, Nuclear Energy Institute

Session Summary

Mr. Dorman spoke about the breadth of cyber security issues; cyber security is needed to protect the assets of many different businesses and functions. He emphasized that not every asset requires protection, only those that are vital to the company. Therefore, protecting assets that are vital to safety systems, security systems, and systems needed to respond to a radiological emergency is the highest priority. After those items are covered, additional assets can be considered with what resources are left.

Mr. Burford talked about the different threats present in the cyber security world. There is an advantage to understanding the perpetrators' motives, targets, and tools. If you can understand these things, you can better protect your assets based on these threats. There is a balance to be struck as the internet preaches a culture of openness, but protection is also a necessity. The cyber war is currently focused in a "War of Denial" in which the offenders' goal is to deny access or ability of the company to do what they need.

Mr. Gross discussed the regulatory framework being developed to promote cyber security. He noted that different regulators cover different areas and industries, and that the Federal Energy Regulatory Commission (FERC), Department of Homeland Security (DHS), and the Nuclear Regulatory Commission (NRC) all make policies with the interest of public safety in mind, and not with regard to your business plan. He mentioned two attacks, one that destroyed information technology (IT) assets (computers), and one that destroyed physical assets (centrifuges). The high reliance on digital systems in newer

designs is especially concerning from a cyber security perspective, and the assets that you protect as your core business may not be what attackers are after.

Following a question and answer period, attendees participated in a cyber security activity. Tables were split into "attackers" and "defenders." Attackers were given time to develop a motive, a plan of attack, and the allocation of resources (i.e., focus more on planning, execution, or use of stolen info). The defenders were tasked with determining which assets to protect, how to adequately protect them, and how to allocate their resources. The results were interesting; most defenders focused on protecting physical systems important to safety and electricity delivery while most attackers focused on threatening employee personal information and using it for nefarious purposes. The exercise illustrated the wide variety of threats that a company must defend against and showed that sometimes protecting "critical assets" may still leave you vulnerable to cyber threats aimed at other information.

Safety Culture: Best Practices

By: Maria McGregor

Session Facilitator

Aria Behrouzi

Panelists

- **Kenneth Koves,** Senior Program Manager, Institute for Nuclear Power Operations
- **Charlie Williams,** Executive Director, Center for Offshore Safety
- **Patricia Williams,** Office of Safety and Emergency Management Evaluations, U.S. Department of Energy

Session Summary

Dr. Koves began the Safety Culture: Best Practices session by noting that the complexity of a nuclear power plant - its people, systems, and interactions - is mindboggling. He then asked a rhetorical question, "What is culture?" and explained that safety culture is not industrial, radiological, nuclear, security or production safety alone; it is all of these together. Ironically, he warned that when a nuclear plant receives an industrial safety award, personnel should maintain a higher state of alertness to the possibility of an event occurring due to complacency, since often upon receipt of an award, the group may think that it has "made it." Workers may assume that the facility is safe and are more prone to cut corners or neglect important activities. This happens all too often at nuclear plants.

Safety culture is not predictable - in personnel-related matters, the outcome of an interaction or process is never guaranteed because attitudes and behaviors are, by their very nature, unpredictable. In the realm of safety culture, it is insufficient to simply attempt to identify what is broken and attempt to apply a solution, because people do not immediately adapt to change on command. Rather, working with people in a complex environment is an ongoing process that must be consistently addressed and maintained.

Koves also warned to not fall for the poor choice of production over safety; safety should always come first, despite production pressures, and workers should not fear addressing the "chain of command" with legitimate concerns. He also noted that often, an individual outside the system has the ability to

ask the right questions, since an outsider observing behavior likely will not share the group's basic assumptions such as, "That's the way we do things around here."

Q&A

What are the leading things you see are indicative to a safety culture?

- Part of it is how the organization has learned to adapt to things over time. Leadership and their attitudes are most important. Are they emphasizing safety in what they say and what they do? Or if faced with a decision, are they cutting costs? Management's view and belief will drive the station toward safety and excellence. If leadership doesn't follow then no one will strive to work safe or no one will believe it is truly important.

Mr. Williams had many lessons learned to share with NAYGN and offered unique insights into the arena of safety culture. Williams explained the mission of offshore safety, which includes safety, environmental management systems, communications, teamwork and operations through effective leadership. Noting that the business of offshore drilling has experienced a decline in injuries - especially lost time incidents, Williams explained some of the reasons for this result. Williams began with the question, "What problem are we fixing?"

- Leadership
- Safety and environmental info
- Hazard analysis
- Management of change
- Operating procedures
- Safe work practices
- Training
- Mechanical integrity
- Pre-start up review
- Emergency response and control
- Audit
- Records and documentation

Establishing standards of safe work practices is where developing a safety culture starts. Williams noted that the key barrier to major incidents is a Safety Management System combined with strong safety culture. Good safety performance indicators are set around prevention barriers between the workers and the hazard. Williams said that the journey for the offshore industry is moving toward safety culture, noting that there are new regulatory required audits from the government that were not in place previously.

According to Williams, leadership engagement is the key to sustaining an effective safety culture. Systems must be in place to maintain, enhance and sustain capability, and employees must learn through actual experiences, not only training.

Ms. Williams began her presentation with a discussion of the Three Mile Island incident in 1980, explaining that it was caused by "management problems, not hardware problems." She said that safety culture has become an accepted concept in organizational life, but a significant divide exists between those who prefer abstract universal dimensions of culture that can be measured with surveys and questionnaires, and those who prefer to study the nuances, details and dynamics of particular cultures.

Williams offered advice on how to assess culture:

- Listen, don't judge.
- Follow the process.
- Let the evidence lead.
- Apply the model for analyses.
- Remember that employees are human, not machines, and can be unpredictable.

Williams warned about frequently-occurring issues that are detrimental to safety culture:

- Management and worker perceptions differ.
- Technical staff are primarily concerned about whether organization systems and culture supports them in doing quality work.
- Too often technical staff feel that management is not interested in their opinions and that they could be penalized for speaking up.

She also discussed indicators of a healthy safety culture:

- Effective communications – the message is consistent across the organization. From CEO to supervisor, the priorities should be consistent.
- Employees feel valued and that their professional opinions matter.
- Trust/respect up, down and across the organization.
- Everyone is encouraged and feels free to raise concerns, which are addressed in a timely manner.
- Roles, responsibilities, and expectations are clearly defined and understood.
- Rewards and disciplinary actions are perceived as consistent and fair.

Williams summed up her session with concluding statements and what she has learned:

- It's about people.
- Work in teams, designing a system for people to use.
- Leadership behaviors and actions matter.
- What you don't say is as important as what you say. Your actions and words must be clear, or performance will suffer.
- People's perceptions drive their behavior.
- It's a journey – continue learning.

Q&A:

Why do we not screen for safety culture when applying for a job at a nuclear facility? We screen for technical skills but not if they are going to work safe?

- McGuire does a screening as do many others. It may not be in job posting, but in each interview, they give him scenario questions, about safety, and he answered scenario based questions that would get into safety. We could do a better job, but in terms of power plants they do focus on safety upfront as part of the screening process.

What can we do to translate concerns to other newer generations? What are perceptions? Are they shifting?

- Leadership is the key; 5-10 years from now, what does leadership look like? Safety messages are important now and always will be, but it is important to do more than verbalize it; leadership must go out into field and actually do it – working safe, celebrating safety

Safety and Reliability of Plant Equipment

By: Leah Crider

Session Facilitator

Bristol Hartlage

Panelists:

- **Robert Cole,** Manager, Integrated Procurement Solutions, AREVA
- **Keith Porter,** Director, New Build, Curtiss-Wright Flow Control Company Nuclear Group
- **Sherry Bernhoft,** Program Manager for Long-Term Operations, Electric Power Research Institute

Session Summary

Mr. Porter discussed the need to focus early in design on ways to design 'in' obsolescence and ensure continued configuration management. He stressed that 60-year life does not imply that no maintenance is required, and that operators need to account for expected maintenance and spare parts of existing and future reactors.

Mr. Cole differentiated between qualification and dedication for safety-related components. Qualification provides evidence that equipment will operate on demand to meet system performance requirements during operations up through design basis events. Dedication allows the use of commercial grade items, provided they have acceptable 'critical characteristics.' Along with receipt inspection, dedication helps to identify counterfeit parts.

Ms. Bernhoft then spoke to 'Life Beyond 60' to support the existing U.S. fleets. She expects the U.S. Nuclear Regulatory Commission to issue a position paper to provide clearer guidance on expectations. She discussed four major areas of research. The first was potentially life-limiting aspects, including primary system metals, electrical cables, and concrete/containment. The second was opportunities for modernization, such as online monitoring and accident-tolerant fuels. Third, Ms. Bernhoft discussed enabling technologies like pilot plant projects and integrated life cycle management tools. Finally, she touched on aging management programs. She noted that for long-term programs, it is particularly important that the next generation lead and innovate. One example is the program to develop a non-Zirconium fuel, using a cladding like SiC instead, to prevent hydrogen explosions. This metal has

promising temperature and neutron tolerance. These advanced fuels would be expected to be compatible with the existing fleet and maintain near-zero-leaker statistics.

As the session moved on to the question and answer portion, Ms. Bernhoft received numerous questions regarding specific EPRI programs. She stated she did not currently see a fatal flaw to 60 years for BWRs and believes the ability to heat up and cool down may limit PWRs. For metals, solutions like water jet peening or laser peening may provide treatment. Other questions for Ms. Berhoft focused on how funding works. The EPRI program overall is integrated with MRP and BWRVIP. She also noted that utility investment is key. Ultimately, there is an economic question of upgrades compared to alternate power, and Ms. Bernhoft noted a growing trend toward the possibility of changing regulations to encourage load-following.

Questions for Mr. Porter and Mr. Cole discussed the often limited on modernization budget as a barrier to proactive obsolescence management.

Meeting Facilitation Skills

By: Julie Atento and Christine Johnsen

Session Facilitator

David Sexton

Panelist

- **Andrew Collins,** Director of Training and Development, Mitsubishi Nuclear Energy Systems, Inc.

Session Summary

Mr. Collins began the Meeting Facilitation Skills breakout session with an engaging question:

> *"What percentage of time do you think Executives spend in meetings and what percentage do they consider to be a waste of time?"*

The surprising results revealed that executives spend 75% of their time in meetings and consider 70% of meetings to be a waste of time. Participants also learned that many of us will spend one full year in meetings by the end of our careers.

Collins continued on the session with an activity where he asked all participants to stand up and sit down when they had to answer "no" to a question about their own meeting facilitation skills such as "Do you always have an agenda?" and "Do you always begin and end your meetings on time?"

The activity helped to highlight many meeting facilitation skills that can prevent a meeting from becoming a failure but at the end of this activity, there were only a few NAYGNers standing in the room. With the realization that everyone in the room had some facilitation skill that they could better develop, the room split up into small groups and read through office situations to determine if a meeting was really necessary to complete the task or convey the information.

Collins discussed meeting management with the group and how to choose the best meeting location, timing, invitees and ground rules. The group also discussed how to plan for "Rambling Rons" and other personalities who may move a meeting off track. The breakout session ended with general tips from the room about how to jumpstart stalled meetings, address conflict and refocus discussion. NAYGNers left the session ready to plan purposeful, effective and timely meetings.

Physical Security Technology

By: Michael Chen

Session Facilitator

Randall Schwartz

Panelists

- **Adam Graf**, Architecture and Plans Directorate, Domestic Nuclear Detection Office, U.S. Department of Homeland Security
- **Nassima Barrows**, Office of Second Line of Defense, National Nuclear Security Administration, U.S Department of Energy
- **Ronald Teed**, Fleet Nuclear Security Director Constellation Nuclear Energy Group, LLC

Session Summary

Mr. Graf's Domestic Nuclear Detection Office (DNDO) is a relatively new office established on April 15, 2005, and is a jointly staffed agency under the Department of Homeland Security. Its primary mission is domestic nuclear detection and coordinating response for radiological and nuclear threats, and integrating federal forensic programs. His department is in charge of coordinating the development of what he referred to as "Global Nuclear Detection Architecture" (GNDA) at all levels in government (local, state, federal, international) as well as the private sector. The 'architecture' that Adam describes is a system of systems that is developed through the continual evaluation of the likelihood of trafficking pathways (land, air, maritime, border, interior, and exterior). This architecture is used to help allocate governmental resources and concentrate on pathways where nuclear and radiological materials would most likely be transported.

DNDO creates a standard for threat assessments and also provides training and support for federal and non-federal partners. It works with these partners to "detect and report unauthorized attempts to import, possess, store, develop, or transport nuclear or radiological material for use against the nation, and to further enhance this capability over time." DNDO was formed to help centralize planning, integrate agencies, and advance government's nuclear forensics programs and protocols.

Mr. Graf briefly reviewed the DNDO's organizational structure, and mentioned that there is a division with DNDO that researches and designs nuclear detection tools that would be used in the field. DNDO

conducts its own research, development, test, and evaluation of nuclear and radiological detection technologies which are used by domestic agencies. Each tool is designed on the need for the personnel, and one example would be radiological pagers which provide warning to a field agent if there is a radiological health hazard in the search vicinity.

Ms. Barrows works in the Office of Second Line of Defense (SLD) Program under the National Nuclear Security Administration (NNSA), which is under the Department of Energy. SLD works to prevent trafficking of nuclear and radiological materials by securing international land borders, seaports, and airports that may be used as smuggling routes. Since the 1990's, NNSA has been working to secure nuclear materials and weapons primarily in Russia; however, Ms. Barrows stated that the SLD program has expanded throughout the globe based on obtained intelligence and analysis.
Ms. Barrows stated that the mission of SLD is to strengthen the capabilities of partner countries to deter, detect, and intersect trafficked nuclear and radiological materials. Her program involves identifying the entry points, deploying the best detection system, training partner agents, and enhancing governmental programs.

Ms. Barrows described that when working with a partner country, it typically takes 1-2 years to setup and install detection systems, depending on the scope and size of the entry point. It then takes another 2-3 years to sustain and train partner countries, and ongoing support thereafter in the post transition.

Some of the achievements mentioned are that the SLD program has installed over 2,500 portal monitors, 45 large container scanners for ports (mega ports), 95 airport monitoring systems, and 235 border protection system. Some of the installations are 'discrete portal systems,' which are detection systems that are hidden within the entry points. The funding for these installations has been primarily from the Unites States, but some of the more developed countries co-fund or sponsor the majority of the installations.

A key benefit in these nuclear portal detection installations throughout the globe is that it helps centralize information. The detection devices have a software that tracks data and sends it to the National Command Center, where analysis are made for possible trends in nuclear and radiological trafficking.

Although SLD has made great strides in developing partnerships and installing these portal detection devices, there are ongoing challenges. Some of those challenges include obtaining collaborations with countries such as Syria or Iran. SLD leverages relationships with partner countries to help initiate and develop relationships with these uncooperative nations. Another challenge is the continual changes in technology and trafficking methods. Ms. Barrows mentioned that Helium-3 is depleting, and it is a key element used in many current nuclear and radiological detecting devices. Therefore, new technologies must continually be created and evolved based on necessities and available resources.

SLD also provides consultative work and sharing best practices with partner agencies and nations. SLD utilizes other agencies such as the FBI to help coordinate training in subject areas such as investigative techniques.

Mr. Teed is the Fleet Nuclear Security Director at Constellation Nuclear Energy Group. He stated that since 9/11 over a billion dollars have been spent on nuclear security. The Nuclear Regulatory Commission (NRC) defines the requirements for physical protection against radiological sabotage for licensed activities in nuclear power reactors in Title 10 Code of Federal Regulations (10 CFR) 73.55 (2009). He stated that on average $110 million is spent on physical security costs.

Mr. Teed discussed the term Design Basis Thread (DBT) which is the fundamental principle of physical protection based on the current evaluation of the threat, which is formalized through a threat assessment process. The DBT outlines the set of adversary characteristics which Operators and State organizations have protection responsibility and accountability. The division of responsibilities may vary by State. The DBT defines and clarifies the Operators protection functions and responsibilities for protecting the nuclear site.

Furthermore, DBT's intended uses are specific in that they may be designed for Operator alone, State and Operator together, or Operator in association with another organization. A state may have multiple DBTs based on the nuclear and radioactive targets, facility types (power plants or research reactors), adversary objectives (theft, sabotage, economic disruption), or geographic regions. These DBTs are used to establish performance requirements and allows the State to assess the effectiveness of the systems that the DBT is designed to protect.

Mr. Teed discussed the "layered approach" and defense in depth, and reviewed how a plant is divided by Owner Controlled, Protected Area, and Vital Areas that all have a scale of defense. He mentioned ROWS - Remote Operated Weapons, a remotely operated turret system that is a growing technology in enhancing physical security.

In the 1990s, a plant would have a full force on force drill every 8 years. However, ever since Three Mile Island, this drill would be conducted once every 3 years. A "composite Adversarial Force (CAF) is a team of highly trained professionals that conduct the drills. The plants are notified when the drill will take place, but the method and plan of how the drill would be testing the site is not communicated.

Physical security concerns not only include external adversaries, but also internal adversaries. Programs such as Fitness for Duty, Emergency Preparedness, and Access Authorization, all play a role in protecting a plant from sabotage. Therefore, assessing the capabilities of the adversaries, both internally and externally, help determine the detection, delay, and response criteria for design and evaluation of an effective physical protection system.

Mr. Teed discussed how the threats are continually changing, and that some of the growing concerns in security relate to cyber security and protecting nuclear research and technology. Another growing concern is the nuclear spent fuel that is currently being held and protected at a various sites throughout the country. Centralizing this nuclear waste not only reduces costs, but also mitigates plant security burdens.

International Safeguards

By: Maria Pfeffer

Session Facilitator

Maria Kriz

Panelists

- **Karen Owen-Whitred,** Director, International Safeguards Division, Canadian Nuclear Safety Commission
- **Helly Diaz-Marcano,** Program Manager for International Safeguards, Savannah River National Laboratory
- **Olli Heinonen,** Belfer Center for Science and International Affairs, Harvard Kennedy School

Session Summary

Ms. Owen-Whitred provided a Canadian perspective on Nuclear Safeguards, drawing from her 10 years of experience in the Canadian Nuclear Safety Commission, all of which was spent on Safeguards.

Nuclear Safeguards is not safety and security, rather, it is a system of deterrence based on prevention. Safeguards keep track of nuclear material to ensure that material is not stolen or diverted in order to prevent proliferation of nuclear weapons.

The Nuclear Non-Proliferation Treaty (NPT), created in 1968, is an international treaty that is intended to promote the peaceful uses of nuclear energy and includes a comprehensive safeguards agreement. States that sign the treaty must also accept safeguards by the International Atomic Energy Agency (IAEA).

Following events in Iraq in the 1990s, a model known as Additional Protocol (AP) was put into place. The AP gives the IAEA greater rights and access to ensure that no undeclared nuclear activity is taking place in the State. A State that has demonstrated consistent compliance with the NPT and AP may be recognized for its compliance through issuance of a broader conclusion, a document that concludes the State is in full compliance with its treaty obligations for safeguards.

Mr. Diaz-Marcano presented International Nuclear Safeguards from the perspective of a former IAEA inspector.

The role of an IAEA inspector is to ensure that nuclear materials are not used to make nuclear weapons. The methods of inspection vary based on the form, amount, and strategic value of the material. Various methods include nondestructive analysis, containment, surveillance, and technical measures.

Safeguards are based on accounting. Inspectors must verify the nuclear material balance and ensure that Material Unaccounted For (MUF) is minimized.

IAEA inspectors are present around the world performing a wide range of tasks. Safeguarding nuclear material is a never ending process and the inspectors are always on the job.

Mr. Heinonen discussed the Nuclear Programs of Iran and North Korea. The path to nuclear weapons capability is parallel to civilian nuclear programs since reprocessing and enrichment technologies are developed.

Iran diverted nuclear material from the 1980's though 2003 and is non-compliant with the NPT. Additionally, Iran has not suspended its enrichment and heavy water reactor related activities requested by the United Nations (UN) Security Council.

Iran is virtually industrialized, with full fuel cycle capabilities, from mining to enrichment to reactors. Certain enrichment activities are possibly related to a nuclear weapons development program.

Withdrawal from the NPT is an option that Iran has discussed.

North Korea's nuclear program began in 1953 and was originally supported by the Soviet Union. North Korea accepted the NPT Safeguards agreement, but has since withdrawn and is currently in violation of IAEA requirements. Known proliferation violations include selling UF6 to Pakistan and Libya, reactor technology to Syria, and suspected other sales to Syria, Myanmar, and Iran.

North Korea, like Iran, has full fuel cycle capabilities, from mining, to two reactors and at least three nuclear weapons. It is estimated that North Korea has enough plutonium for at least half a dozen nuclear weapons.

Securing the Future of Nuclear: Developing the Next Generation of Nuclear Employees

By: Alejandra Villarreal

Session Facilitator

Bobby Ashworth

Panelists

- **Rita Neer,** Principal Organizational Development Specialist, Exelon Corporation
- **Maureen Tront,** Principal Organizational Development Specialist, Exelon Corporation

Session Summary

In this panel, **Ms. Neer** and **Ms. Tront** discussed the differences between management and leadership, and identified characteristics of each role to enable NAYGN members to evaluate their individual strengths and leadership styles.

In an interactive session, the panelists asked the audience to differentiate between management and leadership, arriving at the following descriptions:

Management	**Leadership**
Plan	Inspire
Manage	Transform
Coordinate	Energize
Organize	Influence
Maintain	Incentivize
Review	Manage
Communicate	Include
Inform	Anticipate
Control	Relationship-oriented
Direct	Intervening
Implement	Coach/Mentor
Changing times	Stable times
Do things right	Do the right things

The panelists also engaged in a discussion about leadership styles: directive ("you"), collaborative ("we"), controller ("I") and abdicator ("they").

Addressing the importance of feedback, Ms. Neer and Ms. Tront identified sources of feedback (360 reviews, external and internal assessments, employee/manager feedback and peer-mentor feedback), how each source differs, and the ways in which each can be useful for young professionals to assess their strengths and weaknesses and improve as leaders. Offering and receiving feedback is an essential part of professional development, they noted, and it is impossible to improve as a leader without it.

The panelists also emphasized the value of taking time to understand one's individual competencies and strengths; for example, assessing preference for individual or team approaches to projects and the ability to get along with and inspire others.

Rounding out the discussion, the panelists reminded the audience to build upon what they learn as they pursue and improve upon their leadership capabilities, and to bring those lessons back to their companies.

Next Generation of Nuclear Employees (Handout)

Keynote Speech: Rep. Adam Kinzinger

By: Alejandra Villarreal

Rep. Kinzinger Addresses NAYGN

As an Air Force veteran and one of the youngest and most dynamic Members of Congress, Representative Adam Kinzinger provided a unique and passionate perspective to the NAYGN conference in an hour-long keynote speech that addressed not only the political, economic and national security challenges the country faces, but also emphasized the extraordinary promise of nuclear energy and the importance of the industry to the nation.

Though he is the second-youngest serving Member of Congress, Kinzinger is no newcomer to public service. Kinzinger's path to politics began while he was still a student at Illinois State University, when he challenged an incumbent County Board member and won the seat, serving from 1998-2003. Kinzinger told the audience he felt a strong desire to serve the nation in the months following the September 11 attacks, and entered the U.S. Air Force, where he currently holds the rank of Major in the Air National Guard.

Kinzinger returned to politics in January 2011, when he was sworn in as a Member of Congress for the 16th district of Illinois. He explained his decision to run for office this way: "I thought, if I'm willing to fight for my country on the outside in war, I've got to be willing to fight for it here at home."

Kinzinger devoted a portion of his speech to the topic of leadership, encouraging NAYGN members never to allow the negativity of others prevent them from pursuing their goals, noting that all of his peers told him he would never defeat his incumbent opponent for a seat on the County Board. In lessons learned from his experience as a military leader and as a public servant, Kinzinger emphasized the importance of fighting for a cause and of becoming a leader who inspires the confidence and trust of others.

In a discussion of the current political climate, Kinzinger addressed the general frustration with Washington and politics across the country that has become a virtual epidemic in this day and age. He stressed the value of engaging with elected officials and reminded NAYGN members not to be shy when meeting with Members on Hill Day, saying "We are just people that come from all over the country, and we will listen to what you have to say."

Kinzinger provided some suggestions on topics for NAYGN members to raise with Members of Congress and their staffs, including advocating for a permanent storage solution at Yucca Mountain and the urgency of establishing or renewing 123 Agreements for nuclear cooperation with ally nations.

Concluding his remarks, Kinzinger reaffirmed his belief that there is a bright future ahead for the nuclear industry, but that "it is up to you right now to change the conversation" by engaging with the public and with political leaders to educate and inform them about the importance of nuclear energy and the contribution our industry makes to the nation.

Q&A:

One audience member asked Rep. Kinzinger how NAYGN members should approach their visits with Members and their staffs on Hill Day.

- Kinzinger acknowledged that while the issue of nuclear energy is very important, the sheer volume of priorities demanding Members' attention on a day-to-day basis is staggering, and it is often difficult for Members of Congress to gain the depth of knowledge in a given issue area because of these time constraints. Consequently, NAYGN members should never be afraid to make a strong, succinct case for their cause, but should immediately engage the audience to ensure Members and staff have a clear understanding and are engaged from the start. For individuals resistant to nuclear energy, Kinzinger said, educate them on how safe nuclear technology is, and inform them about the safety and security measures in place.

A second question referred to research and development funding at the Department of Energy, and how best to approach those Members of Congress and staffers who are not as open to additional government spending or to the prospect of regulation in general.

- Kinzinger acknowledged the trend in politics against federal government involvement in and funding of research and development efforts, noting that such opposition largely stems from the belief that the government should not be in the practices of picking 'winners and losers' in what should otherwise be a free market. While establishing that his conservative political beliefs led him to be skeptical of government overreach in regulation and spending levels, Rep. Kinzinger took care to emphasize that kick-starting research, science and innovation is something the Federal Government is capable of doing well, when approached properly. He specifically cited Argonne National Laboratory as an example of successful government involvement in research and development. He also noted that while government spending must be curtailed, it is important not to "throw out the baby with the bathwater" by implementing detrimental cuts to infrastructure and research and development spending.

Closing Remarks

Incoming NAYGN President Christine Csizmadia delivered closing remarks at the NAYGN conference, thanking attendees for their engagement and thanking the Professional Development Committee and NEI conference staff for their work in organizing the conference. She expressed her gratitude to the outgoing and incoming NAYGN Core members for their leadership and involvement.

Csizmadia directed a question to the audience: *What do you want to get out of your time in NAYGN? What career future do you want to set yourself up for?*

Acknowledging the uncertainties inherent in the nuclear industry - natural gas prices, plant closings, political unrest, technical problems, and the constant effort of engaging the public education on the facts about nuclear energy - Csizmadia expressed her desire to for NAYGN to help foster a network of leaders for the future of the nuclear industry.

> "I am pretty sure there are at least a half dozen future CEOs and CNOs in this room, so I propose to all of you to do exactly what Kristin Zaitz said yesterday – use NAYGN for every single asset we have, go to every networking opportunity, sign up for every webinar, join a committee and lead a project, build the relationships that will last into the next segments of our careers. I urge you to take advantage of NAYGN, here at this conference and when you're back at work, and set yourself up for success in your next career segments. The rate of return on investment in time and energy is absolutely worth it, I promise you."

Hill Day Activities

The NAYGN conference culminated in a day of advocacy on Capitol Hill, where 300 NAYGN members walked the halls of Congress and held over 200 meetings with Members of Congress and their staffs. NAYGN members attended a pre-job brief to prepare for their meetings on the hill, and reviewed best practices for how to engage with Members and staff, and important talking points to facilitate discussion.

NAYGN Participates in Hill Day

NAYGN's Incoming President Christine Csizmadia remarked that "NAYGN's Capitol Hill Day is a grassroots effort. We are there to show policy makers that there is a large contingent of young professionals who support a bright future for nuclear energy."

Smithsonian Air and Space Museum Event

By: Glen Lawson

Nuclear Energy Assembly (NEA) and North American Young Generation in Nuclear (NAYGN) attendees had the opportunity to browse the exhibits and enjoy drinks and hors d'oeuvres while mingling with a large variety of people all focused on nuclear energy. Their occupations ranged from engineers, operators, and professors to journal publishers, lawyers, chief nuclear officers, company presidents, and US representatives. For the evening, the hassle of scheduling a meeting through a secretary was out the window, everyone had carte blanche to meet and talk to a full spectrum of people from new employees to industry leaders.

In this exciting atmosphere, professors were describing ideas for new academic programs, lawyers were expressing current concerns with trading nuclear information internationally, and a journal publisher listened and immediately made introductions to people that could help and collaborate. Questions, answers, proposals, and insights were being passed around as fast as business cards among the migrating and morphing circles. Connections were made and solutions brainstormed, a productive mass meeting was taking place in the Smithsonian museum all beautifully lit and decorated with delicious cuisine being served by roaming servers.

This was a treasured moment where current and future leaders in the nuclear industry from across the country could connect, learn from each other, and share ideas. As was pointed out during the evening, the future of the nuclear industry, in large part, rested in the hands of everyone there. To be a part of that was inspiring and members of NEA and NAYGN should welcome the opportunity to attend these joint events in the future.

Email: naygn@naygn.org
Web: www.naygn.org

North American Young
Generation in Nuclear
P.O. Box 32642
Charlotte, NC 28232-2642