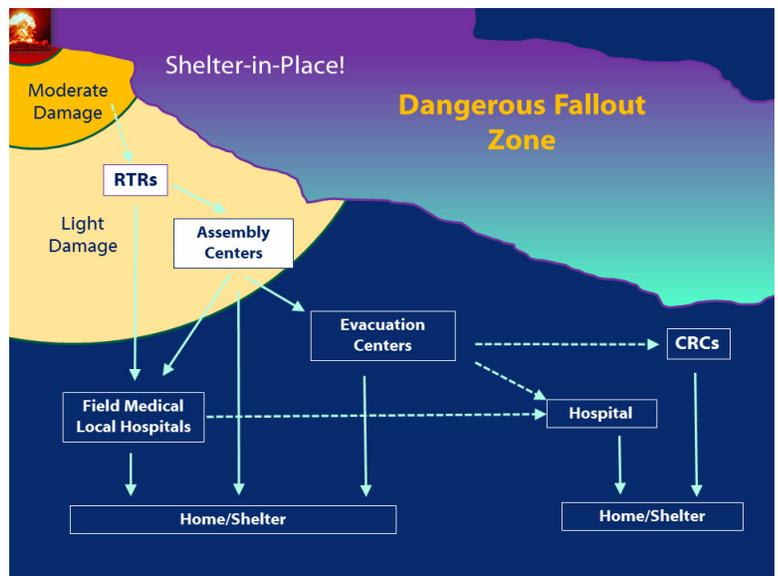


## Fifty-Third Annual Meeting Program

# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism: Is There a Need for Realignment to Close Remaining Gaps?



**March 6–7, 2017**

Hyatt Regency Bethesda  
One Bethesda Metro Center  
7400 Wisconsin Avenue  
Bethesda, MD 20814



**Front cover:** Schematic representation of the early phase of a coordinated response to a nuclear detonation. Can we pull off the unthinkable? (artwork courtesy of Armin Ansari)

## **NCRP Mission:**

To support radiation protection by providing independent scientific analysis, information and recommendations that represent the consensus of leading scientists.



NCRP Resource Development Committee is launching a series of efforts to increase the financial stability of NCRP. The first effort is to request Council members and friends who shop online at Amazon to make a simple (no cost) modification. Simply register at AmazonSmile (<https://smile.amazon.com/>), and the AmazonSmile Foundation will donate 0.5 % of the purchase price to NCRP at no charge to you! It's easy!

Follow the directions and be sure to select the National Council on Radiation Protection and Measurements (from the pull down list or searchable request) as the 501(c)(3) public charitable organization to receive the Amazon contribution for each purchase. Donations are anonymous. However, we would like to recognize your support and if you notify NCRP ([Laura.Atwell@ncrponline.org](mailto:Laura.Atwell@ncrponline.org)) we will add your name to the NCRP list of AmazonSmile contributors.

# *Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism: Is There a Need for Realignment to Close Remaining Gaps?*

## Fifty-Third Annual Meeting of the National Council on Radiation Protection and Measurements (NCRP)

The issue of radiological emergency preparedness has evolved in the last 20 y from a primarily nuclear power plant focus to a wider, more comprehensive focus that includes response to all types of radiological and nuclear emergencies including terrorism. In 1998, the National Council on Radiation Protection and Measurements (NCRP) formed a scientific committee, chaired by Dr. John Poston, to provide information and recommendations regarding the radiological health and safety issues related to the threat of terrorist activities involving radioactive materials. The work culminated in the publication of NCRP Report No. 138, titled *Management of Terrorist Events Involving Radioactive Material* (2001). That report has been used and referenced in a variety of publications and guidance documents since its publication. Coincidentally, NCRP Report No. 138 was published in its final form about a month after the horrific terrorist events that took place on September 11, 2001. NCRP devoted its annual meeting in 2004 to further exploring this topic and Dr. Poston delivered the very first Warren K. Sinclair Keynote Address at that meeting.

Much has happened at the national and international level since then. A great deal of effort has been spent in the development of plans, guidance, exercises, training, etc., at the local, state and federal level, aimed at improving nuclear and radiological emergency preparedness in the United States. The aftermath of Hurricane Katrina in 2005 resulted in a number of important changes in our national approach to catastrophic emergencies. The tragic consequences of the 2011 Great East Japan earthquake and the accident at the Fukushima nuclear power plant were another reminder about critical challenges a nation would face in responding and later recovering from such incidents. The volume of published literature and the level of activity in the radiation emergency preparedness has increased steadily over the last two decades, and the threat still remains.

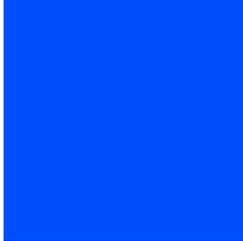
NCRP is devoting its annual meeting once again to this important topic. Unlike most other such conferences, this meeting will take an introspective and perhaps critical look at the advances that have taken place in the last 15 y, focusing on several key areas of preparedness, and will ask the questions:

- What are the remaining critical gaps in our ability to effectively respond to nuclear/radiological incidents?
- Are we doing enough to address these gaps?
- Are there areas where we have done enough and additional work will only achieve minimal, incremental gains? and
- Do we need to realign our national efforts?

The meeting has been divided into several topical areas that aim to explore these questions. The focus areas range from plans and guidance, training and exercising for both the first responder and the first receiver communities, recovery and return and communication, and in each area the selected speakers will take a critical look at the current state of that specific area and will conclude with suggesting three to five practicable priority actions/initiatives for future work.

The last session will take a comprehensive look at the proposed priority areas discussed earlier and will discuss overall priority areas that still need work. Our goal is to provide an informed footprint for where to focus our future efforts. We want to hear from you, the audience, and therefore have allowed plenty of time for questions and answers in each session. NCRP believes that these topics and gaps in knowledge are of such importance that a new commentary should be considered.

NCRP and the Radiation Research Society (RRS) are pleased to welcome the NCRP/RRS Scholars to this year's Annual Meeting. The three young scientists below received competitive travel awards made possible by the



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generosity of RRS. These awards are aimed at encouraging and retaining young scientists in the field of radiation science. Eligible applicants included junior faculty or students in the radiation sciences or junior health or medical physicists:

- Igor Koturbash, University of Arkansas for Medical Sciences, Little Rock
- Krishnanand Mishra, King Faisal Specialist Hospital and Research Centre, Riyadh
- Saloua Sahbani, University of Sherbrooke, Quebec

Questions can be submitted on cards during each session. Oral questions from the floor will not be accepted. The session chairs and speakers will address as many questions as time permits. All questions and answers will be published in *Health Physics* as part of the proceedings of the Annual Meeting.

The Fourteenth Annual Warren K. Sinclair Keynote Address will be given by Mr. Jack Herrmann, the Deputy Director of the Office of Policy and Planning within the Office of the Assistant Secretary of Preparedness and Response at the U.S. Department of Health and Human Services. Mr. Herrmann's presentation provides context

and will set the stage for remainder of the meeting. The Forty-First Lauriston S. Taylor Lecture will be delivered by Dr. F. Ward Whicker, Distinguished Emeritus member of NCRP and Professor Emeritus at Colorado State University. Dr. Whicker's lecture will underscore the omnipresent nature of radiation in our environment and in our lives.

NCRP President, Dr. John Boice, will conclude the meeting by presenting a brief overview of recent NCRP activities and his vision for the future direction of NCRP.

NCRP is grateful to:

- the Joint Armed Forces Honor Guard from the Military District of Washington D.C. who will open our Annual Meeting;
- Kimberly Gaskins of the U.S. Nuclear Regulatory Commission who will sing our National Anthem (<https://www.youtube.com/watch?v=DKTHosaa9do>);
- Major Kimberly Alston for coordinating the military volunteers; and
- Thomas E. Johnson and students from Colorado State University for recording the presentations and making them available after the meeting.

# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism

*Monday, March 6, 2017*

## Opening Session

8:10 am **Presentation of the Colors**  
Joint Armed Forces Honor Guard  
from the Military District of  
Washington, DC

**Singing of the National Anthem**  
Kimberly Gaskins  
*U.S. Nuclear Regulatory Commission*

**Program Welcome**  
Adela Salame-Alfie  
*Program Committee Co-Chair*

**NCRP Welcome**  
John D. Boice, Jr.  
*President, NCRP*

## Fourteenth Annual Warren K. Sinclair Keynote Address

8:30 am **Aren't We Ready Yet? Closing the Planning, Response and Recovery Gaps for Radiological Terrorism**  
Jack Herrmann  
*U.S. Department of Health & Human Services*

## Are Existing Plans Sufficient for the Evolving Threat Environment?

James Blumenstock & Frieda Fisher-Tyler,  
*Session Co-Chairs*

9:00 am **Preparedness is More Than a Plan: Medical Considerations for Radiation Response**  
John F. Koerner  
*U.S. Department of Health & Human Services*

**Radiological Preparedness in the Land of Lincoln**  
Joseph G. Klinger  
*Illinois Emergency Management Agency*

**The ROSS: A Rad/Nuc Emergency Subject Matter Expert Filling a Critical National Need**  
William E. Irwin  
*Vermont Department of Health*

9:45 am **Q&A**

10:00 am **Break**

## Guidance, Training and Exercises: Emergency Responders

Brooke Buddemeier & Stephen Musolino,  
*Session Co-Chairs*

10:30 am **Educating the Public About the Unthinkable: Development of a Preincident Nuclear Explosion Public Information Program**  
Robert M. Levin  
*Ventura County Public Health*

**Radiological/Nuclear Preparedness in the First Responder Community**  
David Pasquale  
*New Mexico State Emergency Response Commission*

**A Retrospective Look at Rad Resilient City, UPMC's 2011 Preparedness Checklist to Save Lives Following a Nuclear Detonation**  
Monica Schoch-Spana  
*Johns Hopkins Center for Health Security*

11:50 am **Q&A**

12:05 pm **Lunch**

## Guidance, Training and Exercises: First Receivers, Public Health

Cullen Case & C. Norman Coleman,  
*Session Co-Chairs*

- 1:30 pm **First Receiver Gaps**  
Cullen Case  
*National Marrow Donor Program*
- Triaging Thousands: Challenges in Survivor Screening After a Nuclear Detonation**  
John L. Hick  
*Hennepin County Medical Center, Minnesota*
- All-of-Nation Planning Approach to Medical Preparedness and Effective Response**  
C. Norman Coleman  
*National Cancer Institute*
- The Unmet Need to Engage/Train/Prepare the Medical Community for Mass Casualty Radiation Incidents**  
Judith L. Bader  
*U.S. Department of Health & Human Services*
- When the Walls Come Tumbling Down: Medical Surge Response to Nuclear Detonation**  
Dan Hanfling  
*Johns Hopkins Center for Health Security*

2:45 pm **Q&A**

3:00 pm **Break**

## Recovery, Resilience and Reality: Going Beyond NCRP Report No. 175

Gerilee W. Bennett & Sara DeCair,  
*Session Co-Chairs*

- 3:30 pm **Progress and Possibilities**  
Gerilee W. Bennett  
*Federal Emergency Management Agency*  
Jill A. Lipoti  
*Rutgers University*
- Contemplating Completion: Defining an Exit Strategy**  
John J. Cardarelli, II  
*U.S. Environmental Protection Agency*  
Sara DeCair  
*U.S. Environmental Protection Agency*
- 4:15 pm **Q&A**
- 4:35 pm **Break**

## Forty-First Lauriston S. Taylor Lecture on Radiation Protection and Measurements

- 5:00 pm **Introduction of the Lecturer**  
Jeffrey J. Whicker
- Environmental Radiation and Life: A Broad View**  
F. Ward Whicker  
*Colorado State University*
- 6:00 pm **Reception**  
Sponsored by Landauer, Inc.

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# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism

## *Tuesday, March 7*

8:15 am **NCRP Annual Business Meeting**

9:15 am **Break**

### **Communication, Education, and Public Information**

Jessica Wieder, *Session Chair*

- 9:45 am **Communication Challenges in Crisis and Transition**  
Michelle M. Laver  
*U.S. Department of Energy*
- Emergency Responder Communication Challenges Regarding Radiological Terrorism for the New Administration**  
Robert Ingram  
*Fire Department City of New York*
- Critical Areas for Improvement in Communications Regarding Radiological Terrorism**  
David P. Ropeik  
*Harvard School of Public Health*

10:30 am **Q&A**

11:00 am **Break**

### **Bringing it All Together: Conclusions and Path Forward**

Armin Ansari & Adela Salame-Alfie,  
*Session Co-Chairs*

- 11:15 am **Panel Discussion**  
Armin Ansari  
Adela Salame-Alfie  
*Session Co-Chairs*
- 12:00 pm **NCRP Vision for the Future and Program Area Committee Activities**  
John D. Boice, Jr.  
*President, NCRP*
- 12:30 pm **Adjourn**

# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism

## Monday, March 6, 2017

### Opening Session

8:10 am

#### **Presentation of the Colors**

Joint Armed Forces Honor Guard from the Military District of Washington, DC

#### **Singing of the National Anthem**

Kimberly Gaskins

U.S. Nuclear Regulatory Commission

#### **Program Welcome**

Adela Salame-Alfie

*Program Committee Co-Chair*

#### **NCRP Welcome**

John D. Boice, Jr., *President*

*National Council on Radiation Protection and Measurements*

## Fourteenth Annual Warren K. Sinclair Keynote Address

8:30 am

#### **Aren't We Ready Yet? Closing the Planning, Response and Recovery Gaps for Radiological Terrorism**

Jack Herrmann

*U.S. Department of Health & Human Services*



Following the tragic events of September 11, 2001 the nation has made significant strides in preparing for disasters and emergencies of all types. Federal funding to state, local, territorial and tribal public health and healthcare systems has required an all-hazards preparedness approach with special focus on those incidents that rise to the top of a jurisdiction's Threat and Hazard Identification and Risk Assessment. While disaster planners in many areas of the country have recognized the potential for nuclear accidents and radiological terrorism, these presumably rare events fall further down on their

list to plan for when funding and human resources are limited.

In 2009, at a time when the events of 9/11 and Hurricane Katrina were fading into the past, anecdotal surveys and discussions with state and local health department planners suggested that hurricanes, floods, wildfires, and other natural disasters were their most pressing threats. However later that year, and throughout 2010, the H1N1 influenza pandemic took them away from natural disaster planning and instead had them focusing on emerging infectious diseases that could result in millions of lives lost. Planning efforts

centered on how to distribute and disperse life-saving medical countermeasures and how health care systems would establish crisis standards of care in preparation for catastrophic patient surge and the resultant limitations of supplies, pharmaceuticals, and healthcare personnel.

Looking back over that decade from 2001 to 2010, one might conclude that our nation's experience with 9/11, Hurricane Katrina, and H1N1 adequately prepared us for anything. But the question still loomed out there—would we be prepared for a nuclear or radiological disaster the likes of which we had not seen since the 1979 Three Mile Island nuclear power station incident?

We may still not know the answer to that question today if it were not for the Fukushima Daiichi Nuclear Power Station accident following a devastating earthquake and tsunami in Japan on March 11, 2011. For the first time in our most recent history, a nuclear incident outside our country had consequences for the U.S. homeland. But even this incident, for its magnitude, did not measure up to the catastrophic damage and contamination of a large nuclear detonation. Fast forward to today, and the continued fear of terrorist actors with access to radiologic weapons of mass destruction, many are left wondering if our nation is truly prepared to respond to radiological terrorism.

In 2014, the Institute of Medicine convened public health, healthcare, emergency management, and other subject matter experts to address the nation's readiness to respond to an improvised nuclear detonation. The report, *Nation-wide Response Issues After an Improvised Nuclear Device Attack* summarizes a plethora of challenges that still plague us. While federal, state and local efforts to plan for, respond to, and recover from radiological terrorist incidents such as an improvised nuclear device are in most

cases in place, significant gaps remain in understanding the differences and nuances between planning for nuclear and radiologic events, command and control following these incidents, communicating with the public to mitigate public fear, clinical treatment and care for those exposed, and how to prepare for the longstanding recovery challenges of repatriating a contaminated city. Yet 2 y later, our nation is still largely focused on the response to two emerging infectious diseases—the Ebola and Zika viruses. It is also true that the risk of domestic and international violent extremism looms on the horizon, leaving many questions unanswered:

- Is the nation prepared to respond to an improvised nuclear device or other such act of terrorism?
- Are we confident our federal, state and local governmental leaders know who's in charge of responding to such events and do they have the legislative authorities and plans needed to protect the health and welfare of all Americans?
- Do members of the public know how to prepare and what to do in such an incident?
- Are our first responders and those on the front line of our public health and healthcare systems adequately trained and prepared for their roles during a radiation disaster?
- Have they sufficiently exercised these roles so they feel confident in their response to such incidents?
- Where do we need to advance the science so that we know the short-, intermediate- and long-term environmental effects of nuclear and radiologic incidents?
- And, what else don't we know that we should before we are faced with such a disaster?

# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism

## Are Existing Plans Sufficient for the Evolving Threat Environment?

James Blumenstock & Frieda Fisher-Tyler, *Session Co-Chairs*

9:00 am

### Preparedness is More than a Plan: Medical Considerations for Radiation Response

John F. Koerner  
*U.S. Department of Health & Human Services*



### Radiological Preparedness in the Land of Lincoln

Joseph G. Klinger  
*Illinois Emergency Management Agency*



### The ROSS: A Rad/Nuc Emergency Subject Matter Expert Filling a Critical National Need

William E. Irwin  
*Vermont Department of Health*



Since 9/11, the practice community has witnessed an evolving and expanding threat environment, taking emergency preparedness planning beyond fixed nuclear power plants, further into the realm of the terrorism nexus. Nationally, there has been significant investment into preparedness for radiological and nuclear terrorism. Are we ready as a nation to address the radiological terrorism threat at regional, state and local levels? How have prior efforts worked to improve preparedness, response and recovery capabilities across

regions, states and cities? Have investments in preparedness and response infrastructure been leveraged in ways that increase resilience? Is there a need for a strategic national network to integrate critical improvised nuclear device capabilities into existing plans already in place throughout the nation, to save lives in the aftermath of a radiological or nuclear terror attack? This session seeks to address questions such as these, and recommend specific actions to be taken to move us forward.

9:45 am

**Q&A**

10:00 am

**Break**

## Guidance, Training and Exercises: Emergency Responders

Brooke Buddemeier & Stephen Musolino, *Session Co-Chairs*

10:30 am

### **Educating the Public About the Unthinkable: Development of a Preincident Nuclear Explosion Public Information Program**

Robert M. Levin  
*Ventura County Public Health*



Experts suggest there may be a future detonation of an improvised nuclear device (IND) in one or more major cities in the United States. Ventura County lies to the north of Los Angeles County. When the threat of an IND detonation in Los Angeles County was considered by Ventura County to be a theoretical possibility, the County's Terrorism Working Group (TWG) considered what the impact on Ventura County might be.

Some 80 people from 30 different agencies met to plan for such an eventuality. The TWG ad hoc group determined that some two million evacuees would flee toward Ventura County in as many as one million vehicles. There are four highways which leave Los Angeles County heading through Ventura County. There are few connecting streets in Ventura County that run from town to town which would allow for an alternate parallel flow of traffic to the highway system. Eight lanes of highway are available to carry evacuees from Los Angeles into Ventura County. These eight lanes can carry 250,000 vehicles in a 24 h period. If all but one of the lanes on the southbound side of the highways were turned into northbound traffic ("contra flow"), this would allow for 13 northbound lanes and up to 400,000 vehicles per day. Under the best of circumstances it would take 2.5 d for the evacuees to clear Ventura County. At the northern end of the county all highways come together into one highway with only three lanes. This narrowing would slow traffic even further. Evacuees would leave the highways into

the cities looking for fuel, health care, decontamination, housing, food, water, and bathroom facilities. Traffic in all of the cities neighboring the highways would come to a standstill.

Ventura County decided on the need to formalize a strategic education initiative designed to make an "untalkable" issue easier to talk about. In 2012, Ventura County unveiled its pre-incident nuclear explosion public information program.

Ventura created a communications program that used traditional and social media to reach out to residents. The nucleus of the campaign was a series of town-hall meetings designed to put knowledgeable spokespeople in front of small groups, to answer questions and offer reassurance while presenting the educational message. A website was launched to serve as an informational resource for residents, health professionals, and first responders. Four educational videos were produced. Radio public service announcements were scripted. Direct mail assets and pamphlets were prepared. Thirty-five audiences were targeted and all materials translated into Spanish and Mixteco. Special efforts were expended to reach students and their parents.

Decision makers in the county were educated and involved in the project and given input into the shaping of the program. A series of unanticipated obstacles arose along the way. Our strategy and experience may be useful to other counties.

# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism

## **Radiological/Nuclear Preparedness in the First Responder Community**

David Pasquale

*New Mexico State Emergency Response Commission*



This presentation will focus on the nation's preparedness level by looking at guidance, training and exercises, along with available metrics that may be used for an analysis.

It is difficult, if not impossible, to predict preparedness levels for a specific threat such as radiological/nuclear incidents by taking a single snap shot of the nation. A more effective measure of preparedness may be achieved by looking at regional areas of the nation and then examining three distinct layers of the response community. Those layers include emergency management, agency policies, and concept of operations and finally, capability of the response forces. These areas can be looked at as a three legged stool with each leg representing an essential element of preparedness.

Looking first at emergency management, the role of these agencies in guiding operational planning and performing a threat and hazard identification and risk assessment will be examined. Emergency management agencies are a critical component in preparedness. They act as facilitators to their regions and quite often are the conduit for state and federal funding grants to response agencies.

Next, agency policies and concept of operations will be discussed. In this area, existing federal guidance available to agencies and potential gaps that exist when compared to other threats will be explored. Agencies must provide guidance and policies for personnel for a myriad of incidents that first responders may encounter. Without support and vision from an agency's administration the mission will not proceed.

The third area will provide an overview of the first responder community with emphasis on training and equipment. In this element existing guidance for training, such as the National Fire Protection Association standards and available metrics that may be used for analysis, will be explained. Findings from Level 1 and 2 assessments received from responders nationwide during training opportunities will be discussed.

Finally, an overview of current successes in training such as the National Wildfire Coordinating Group will be provided. Opportunities to enhance radiological/nuclear prevention and response related programs, guidance, training and exercises with a national, state and local focus will be examined and offered.

## **A Retrospective Look at Rad Resilient City, UPMC's 2011 Preparedness Checklist to Save Lives Following a Nuclear Detonation**

Monica Schoch-Spana

*Johns Hopkins Center for Health Security*



In 2011, the University of Pittsburgh Medical Center (UPMC) Center for Health Security produced "The Rad Resilient City Checklist," a local planning tool that could help save tens of thousands of lives following a nuclear detonation. As presented

to NCRP at the 2012 Annual Meeting, reducing exposure to radioactive fallout is the intervention that can save the most lives following a nuclear detonation. Yet, most Americans are not familiar with correct safety measures against fallout, and

many believe that nothing can be done to reduce the suffering and death inflicted by a nuclear attack. The Rad Resilient City Checklist attempted to reverse this situation by converting the latest federal guidance and technical reports into clear, actionable steps for communities to take to protect their residents from exposure to radioactive fallout. The checklist reflected

the shared judgment of a national advisory panel comprised of top decision makers, scientific experts, emergency responders, and leaders from business, volunteer and community sectors. This presentation will provide a retrospective look at this preparedness effort and the lessons that can help inform future radiological and nuclear terrorism response preparedness efforts.

11:50 am  
12:05 pm

## Q&A

## Lunch

# Guidance, Training and Exercises: First Receivers, Public Health

Cullen Case & C. Norman Coleman, *Session Co-Chairs*

1:30 pm

## First Receiver Gaps

Cullen Case

*National Marrow Donor Program*



The Army says train as you fight and train often. Since 9/11 the U.S. preparedness community has worked diligently to buy the right equipment, train on the equipment, and write the plans for how and when to use it. However, there are still many gaps with nuclear and radiological issues being particularly complex given their size, scope and no-notice characteristics. In the efforts to prepare there is an overwhelming amount of information available from many sources. Health and medical planners and responders need a straightforward source of essential information and also a consolidated location for reference to learn the latest updated

guidance, triage guidelines, treatment protocols, etc. Additionally, exercises outside of large state, regional, or national exercises have been isolated to single organizations (generally). Given the breadth of issues to be addressed, the lessons learned from the health and medical response need to be openly shared and, ideally, more organizations need to participate and do so in a coordinated manner. In response to a major radiological or nuclear incident, mass casualty radiological incident hospitals will need to work together. Key aspects of a response will be discussed along with tools available to help coordinate up-to-date knowledge.

## Triaging Thousands: Challenges in Survivor Screening After a Nuclear Detonation

John L. Hick

*Hennepin County Medical Center, Minnesota*



One of the most difficult challenges is sorting survivors that are at significant risk of complications from radiation exposure. Community reception centers meet this

need when resources allow, but in the immediate aftermath of a nuclear detonation, screening survivors with potential fallout exposure by their potential to

# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism

benefit from bone-marrow cytokine support and evacuation for definitive medical treatment can be extremely difficult. A

proposed sorting mechanism and discussion of some of the key issues will be presented.

## All-of-Nation Planning Approach to Medical Preparedness and Effective Response

C. Norman Coleman  
*National Cancer Institute*



The overwhelming size and scope of a major radiological/nuclear incident will produce tremendous stress on medical responders which is greatly amplified by the fear of radiation. It is expected that most first receivers and decision makers will have had limited experience with and knowledge in managing such an incident. There is the need for tools and knowledge to help them make sound and fair decisions and to provide as fair a decision-making process for the victims as possible. The Scarce Resources Project supported by the Assistant Secretary for Preparedness and Response (U.S. Department of Health and Human Ser-

vices) helped establish an ethical framework for decision making and triage. Since an appropriate diagnosis is critical for the correct treatment of each individual and also for the most effective utilization of medical countermeasures and other resources, biomarkers of radiation injury are highly desirable. With support from the National Institute of Allergy and Infectious Diseases and the Biomedical Advanced Research and Development Authority, and input from a wide array of experts, biomarkers are being evaluated. Notably, these may have a "civilian" use as biomarkers for tissue injury for cancer care.

## The Unmet Need to Engage/Train/Prepare the Medical Community for Mass Casualty Radiation Incidents

Judith L. Bader  
*U.S. Department of Health & Human Services*



A wide spectrum of medical and civilian support personnel would be involved in responding to a large mass-casualty radiation incident in the United States. Most potential responders have had no formal training in radiation and many may not want to participate in a response. Providing adequate training for these diverse sets of workers is challenging, especially if the training is not required and updated regularly. Currently radiation training uptake is minimal and updating training content is expensive. Both "just-in-time" (simple training) and more in depth training, tailored to response roles, will be required. In the United States, both classroom (synchronous) and online (asynchronous) training/information resources are

currently available, and several of these U.S. government-sponsored resources will be shown, including assets from the Assistant Secretary for Preparedness and Response, the Center for Radiological Nuclear Training, the Centers for Disease Control and Prevention, the Federal Emergency Management Agency, the Radiation Emergency Assistance Center/Training Site, and the Radiation Injury Treatment Network. Medical professional societies have not engaged significantly in fixing the training gap. A major national investment will be required to enable adequate numbers of both medical and nonmedical personnel to feel safe and adequately prepared to participate in a response.

### **When the Walls Come Tumbling Down: Medical Surge Response to Nuclear Detonation**

Dan Hanfling  
*Johns Hopkins Center for Health Security*



The medical community will be significantly overwhelmed in the setting of a mass casualty radiological incident. Few clinicians have experience in the management of radiologically contaminated patients, let alone the plans in place to manage them under surge conditions. The standards of care will have to change, requiring a shift in thinking in how to establish appropriate triage mechanisms immediately following an incident. We will review the anticipated casualty profiles

from a radiological disaster (trauma, radiation only, and combined injury), discuss triage systems available to the medical community as well as what planning gaps there are that need to be addressed before an incident occurs. We will also review lessons learned from an example of real world events where hospital staff were forced to implement triage decision-making protocols in order to meet the overwhelming surge in demand for healthcare services that they faced.

2:45 pm

**Q&A**

3:00 pm

**Break**

### **Recovery, Resilience and Reality: Going Beyond NCRP Report No. 175**

Gerilee W. Bennett & Sara DeCair, *Session Co-Chairs*

3:30 pm

#### **Progress and Possibilities**

Gerilee W. Bennett  
*Federal Emergency Management Agency*

Jill A. Lipoti  
*Rutgers University*



Published in December 2014, NCRP Report No. 175, *Decision Making for Late-Phase Recovery from Major Nuclear or Radiological Incidents*, emphasizes the importance of local, state and national plans addressing late phase issues and decision-making processes concurrently with emergency-response requirements. The Report includes eight recommendations ranging from a broad call for a national strategy promoting community resilience as a preferred approach for preparing to recover from nuclear or radiological incidents to more specific calls for research and strategies for cleanup and

waste management. This panel will discuss progress of several key recommendations since publication of NCRP Report No. 175 as well as highlight how ongoing all-hazards resilience building initiatives across the country may benefit preparedness for nuclear and radiological incidents. The panel suggests that aligning nuclear/radiological preparedness with all-hazards disaster preparedness planning, urban disaster preparedness, and coastal risk management efforts could ensure opportunities to improve resilience to and recovery after a nuclear/radiological incident are not lost.

# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism

## Contemplating Completion: Defining an Exit Strategy

John J. Cardarelli, II  
U.S. Environmental Protection Agency



Sara DeCair  
U.S. Environmental Protection Agency

The National Council on Radiation Protection (NCRP) published Report No. 175 which expands on the nation's radiation incident response and recovery guidance. The report recommends an inclusive stakeholder process for setting incident-specific goals, rather than prescribed standards for remediation. However, the process must include important considerations such as when government intervention may be terminated.

After the Windscale fires in the 1950s, monitoring for radioactivity in sheep's milk and meat was conducted. After 30 y of monitoring, repeated testing produced no results above background and there was no benefit to continued monitoring. However, farmers supported continuation of the monitoring at government expense since it assured their customers that the products were safe. In a future incident recovery, the stakeholders must discuss the parameters for cessation of monitoring, providing endpoints that are mutually agreeable. This presentation proposes new guidance for various metrics leading

to cessation of monitoring. Similarly, new guidance will be proposed that determines when the cleanup goal has been achieved based on stakeholder consensus using statistics and metrics. The process is designed to reduce public fear and improve decision making. This was demonstrated during Liberty RadEx exercise, when the Community Advisory Panel came back with a hybrid decision through consensus building. The U.S. Environmental Protection Agency has vast experience with community involvement which results in a community more informed of the risks and the caveats for risk reduction.

A second gap is the lack of *awareness* of guidance on optimization. While it is difficult to interest members of the public in these esoteric areas, with increased efforts to bring radiological/nuclear scenarios into regular disaster preparedness efforts, first responders have begun to grasp the basic behaviors which are necessary to protect public health.

4:15 pm

**Q&A**

4:35 pm

**Break**

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## Forty-First Lauriston S. Taylor Lecture on Radiation Protection and Measurements

5:00 pm

### Introduction of the Lecturer

Jeffery J. Whicker

### Environmental Radiation and Life: A Broad View

F. Ward Whicker

*Colorado State University*



Since the Earth's creation some 4.5 billion years ago, primordial radioactivity has been part of the planet, and radiations from space have continuously impinged on its surface. Primordial radioactivity has helped shape the Earth's surface through the heat from radioactive decay energy, and omnipresent natural radiation has likely influenced the origin, and certainly the evolution, of all life forms in our biosphere today. I will briefly review our natural radiation environment and its impacts, from the beginning of life to the present. Then I will provide a broad overview of present day radioecology, which includes the use of radioactive tracers to study ecosystem functions, the fate and transport of radionuclides in the biosphere, and radiation effects on plants and animals. Large releases of radioactivity, although tragic and regrettable, have been studied in ways that have increased our knowledge of Earth's basic processes and of radionuclide transport and accumulation

in the environment. On a much smaller scale, purposeful use of natural and anthropogenic radioactive tracers have contributed further to such knowledge. This information has underpinned basic concepts and provided data for constructing predictive models to calculate concentrations of radionuclides in, and radiation doses to, plants and animals. Sealed radiation sources have been used to study effects of chronic exposure on natural biotic communities. Existing transport models and knowledge on radiation effects provide the tools to evaluate human health risks and environmental impacts of radioactive releases. Applications have included guidance for environmental protection, radiation litigation, environmental cleanup decisions and informed responses to large releases of radioactivity. I will finish with a brief discussion of remaining knowledge gaps and potential new research approaches.

6:00 pm

### Reception in Honor of the Lecturer

Sponsored by Landauer, Inc.

**LANDAUER<sup>®</sup>**

# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism

## Tuesday, March 7

8:15 am **NCRP Annual Business Meeting**  
9:15 am **Break**

## Communication, Education, and Public Information

Jessica Wieder, *Session Chair*

9:45 am

### Communication Challenges in Crisis and Transition

Michelle M. Laver  
*U.S. Department of Energy*



Over the last 5 y, the federal community has made significant progress in preparing for coordinated and efficient public communication efforts during a radiological response. Preparations include the development of prescribed messages and plume simulations in the event that there is detonation of an improvised nuclear device or a radiological release from a nuclear power plant. However, challenges remain for improving crisis communications across federal agencies.

Interagency language barriers, as well as variances in federal-to-local vernacular, lead to communications challenges that in times of calm can be confusing, but in times of crisis could cause major disruptions. In addition to dealing with language

barriers, the federal community continues to work on overcoming the “stay in your lane” mentality that could impact the ability to identify a lead voice during a crisis.

Federal exercises over the past 2 y have identified the lack of a “lead” federal voice during an incident as a major challenge, and have attributed the problem to the nature of the authority structures of federal agencies, the desire of state and local leaders to maintain authority of an incident in their communities.

In a transition year, it will be key to review current guidelines based on law and on the precedent to be set by the new administration on communications procedure.

### Emergency Responder Communication Challenges Regarding Radiological Terrorism for the New Administration

Robert Ingram  
*Fire Department City of New York*



The emergency responder community trains for and responds to, many types of incidents on a daily basis, and has done so for years. This experience with fires,

emergency medical calls, chemical spills, confined spaces, and other common calls for assistance has helped responders develop an understanding of the problems

and a confidence in solving them. Radiation from an accidental release in a facility or during transportation, or from a terrorist event that causes radioactive materials to be released from their containment vessel, remains a cause of concern and fear.

Emergency responders are a segment of the general population and share some of the same fears of radioactive materials as the whole population. Radioactive materials incidents are not a common 911 call type. Radiation training has been included in emergency responder training standards for several decades and covers a broad range of topics from simple awareness and recognition to technical knowledge of the materials, detection and identification capabilities, self-protection, medical effects, and countermeasures to overall public and environmental safety and health. The safety factor of the radiation community has been very good, but without the actual response confidence in handling previous incident releases, many responders remain fearful of radiation. A single source site where responders can post and read after-action reports on actual radiation incidents may help communicate health and safety information, building responder confidence.

Competencies in standards do not always translate into compliance in training curriculum and exercises. The fire service has been the key local response agency to radiation accidents for many years and has developed training programs that meet the competencies found in 29CFR1910.120 [q], *How to Determine What Training is Required for Emergency Response Team Members*, and the National Fire Protection Associations Standard 472: *Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*. The majority of fire service responders in the United States are volunteers who often make decisions on what they train for based on the time available and their areas' hazard assessment. This has often caused

radiation training to be limited at best. Communicating timely and accurate hazards and risks associated with radiation threats and incidents may increase the amount, and level, of training in response to these types of incidents.

Many law enforcement and emergency medical services and other key disciplines did not address these standards requirements prior to 9/11 as they were considered outside their "normal" mission space. The change in the mission space caused by the new threat of radiological terrorism has required additional training and equipment. This training has started but will take time to impact the entire responder community, it will require funding for the training and equipment, and most of all, sustainment. Communicating the broad scope of capabilities necessary to safely manage a radiation incident and the requirement for all agencies to be involved may support the effort to train these disciplines in their new mission space.

The serious and much publicized radiological events that have occurred during the lifetime of many of today's responder community, Chernobyl, Fukushima, and Three Mile Island, have added to this fear within the responder community. The majority of today's responder communities are between 21 and 50 y of age. In studies conducted in recent years by federal agencies it was identified that this group did not receive the basics of nuclear information provided to the U.S. population at the start of the Cold War and the fear of a nuclear war. These studies have identified the gap that exists in understanding basic radiation terminology, protective actions including sheltering-in-place, informed evacuation, public messaging, and others. Despite studies like this, federal, state and local public officials have been slow to communicate emergency action plans to the public for radiological and nuclear incidents. Emergency management agencies at all levels have action plans for natural events such as

# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism

hurricanes, tornadoes, coastal storms, and now they are including biological events and active shooters. Nuclear and radiological incident plans and protective actions need to be included and communicated to members of the public (and responders) in all media streams.

Several federal agencies have been tasked with radiological and nuclear mission space but this appears to remain fragmented without an organizing agency. The Domestic Nuclear Detection Office (U.S. Department of Homeland Security) remains in a detection and prevention mission and has provided a good amount of equipment, training and coordination but primarily among law enforcement organizations. The Federal Emergency Management Agency remains in the response mission but has limited outreach to the majority of response organizations. The U.S. Department of Health and Human Services (Assistant Secretary for Preparedness and Response) has stepped up its efforts in medical countermeasures,

surge capabilities, and support services. All of this information and support comes to the responder community separately and it is left to the local-level planners to piece it together. It needs to be coordinated and communicated as one source.

Communications remains the top challenge for the responder community as we look to the new administration for a plan for radiological and nuclear preparedness:

- communicating radiation facts to alleviate fear;
- communicating public messaging on radiation terminology, how to protect themselves and expected public agency actions;
- communicating a coordinated response plan that includes all levels and agencies;
- communicating the necessary training; and
- communicating the recovery actions that will have to take place.

## Critical Areas for Improvement in Communications Regarding Radiological Terrorism

David P. Ropeik  
*Harvard School of Public Health*



The fear of ionizing radiation vastly exceeds the actual risk. In the event of a terrorist attack involving a radiological dispersal device (RDD)-the most likely form of nuclear terrorism-that fear poses a vastly greater threat to public health and safety than the radiation members of the public might be exposed to from such a device. Dramatic evidence from radiological events such as nuclear plant accidents (Three Mile Island, Chernobyl, Fukushima), or the theft or misuse of radiological material (Goiania), have firmly established that fear of radiation does far more harm than the radiation itself [see *The Dangers of Radiophobia, Bulletin of Atomic Scientists*, published online

August 10, 2016 (<http://dx.doi.org/10.1080/00963402.2016.1216670>)].

The academic, professional and government individuals and organizations who either study radiation safety or who are responsible for preparing against a radiological terrorist attack, understand this. Amongst themselves, they lament the public's excessive fear of radiation. Yet while a great deal of work has been done to minimize the likelihood of an RDD terrorist attack, practically nothing has been done by these professionals to proactively educate members of the public that the actual risk of ionizing radiation is far lower than commonly believed. Short of

preventing such an attack in the first place, perhaps the most important work that needs to be done to limit the damage of such an attack-public education to put the risk of radiation in perspective-is not being done, by the very people and organizations the public depends on to educate us about radiation risk, and keep us safe.

There are many ways this important work should be done, covering all phases of emergency planning: pre-event, during the event, and recovery from the event. Certainly it must be done before an RDD attack occurs, because the challenge of risk communication in high-stress circumstances is much more difficult, especially given the importance of trust in public safety officials at such times, which depends more on empathy from those officials than education and information alone. It is also imperative that risk communication during such an attack must include both actions and messages that help put the actual danger for ionizing radiation in perspective. And communicating about the actual threat from the radiation spread by an RDD will have a great

deal to do with how well, or poorly, the effected community recovers in the days and weeks following such an attack.

The biggest challenge in meeting this urgent need will not be figuring out the actions and messages that will help educate members of the public about the actual risk of ionizing radiation prior to, during, or in recovery from an RDD attack. The biggest challenge will be summoning the courage to do so in the first place. The task of trying to counter the public's deeply held fear of radiation is fraught with controversy and political cost, hurdles that to-date have proved too high for many individuals and organizations to dare attempt. It will take wisdom and true leadership, along with a carefully crafted risk communication program, to attempt to educate the public that their fear of radiation exceeds the risk, and poses a far greater threat than radiation itself.

But it is by far the most important work waiting to be done by the radiation emergency response community in order to minimize the danger of an RDD to public health and safety.

10:30 am

**Q&A**

11:00 am

**Break**

## Bringing it All Together: Conclusions and Path Forward

Armin Ansari & Adela Salame-Alfie, *Session Co-Chairs*

11:15 am

### **Panel Discussion**

Armin Ansari  
Adela Salame-Alfie  
Session Co-Chairs



# Assessment of National Efforts in Emergency Preparedness for Nuclear Terrorism

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12:00 pm

**NCRP Vision for the Future and Program Area  
Committee Activities**

John D. Boice, Jr.  
*President, NCRP*



12:30 pm

**Adjourn**

## Lauriston S. Taylor Lecture

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Dr. F. Ward Whicker has been selected to give the 41st Lauriston S. Taylor Lecture at the 2017 Annual Meeting of the National Council on Radiation Protection and Measurements (NCRP). The lecture, entitled “Environmental Radiation and Life: A Broad View,” will be the featured presentation at the 53rd Annual Meeting to be held March 6-7, 2017. The Lecture will be given in the Crystal Ballroom of the Hyatt Regency Bethesda, One Bethesda Metro Center, 7400 Wisconsin Avenue, Bethesda, Maryland at 5:00 p.m. on March 6, 2017. The lecture series honors the late Dr. Lauriston S. Taylor, the NCRP founding President (1929 to 1977) and President Emeritus (1977 to 2004). A reception sponsored by Landauer, Inc. follows the presentation and all are invited to attend.

Dr. Whicker is Professor Emeritus at Colorado State University (CSU), where he taught graduate level courses in radioecology and radionuclide transport modeling for over 40 y. He and his graduate students conducted research in these fields, leading to the development of approximately 175 open literature publications, dozens of technical reports, many book chapters, and five books. His formal teaching extended to organizations such as the International Atomic Energy Agency, the International Union of Radioecologists, and the U.S. Environmental Protection Agency. In 1989 he founded the Par Pond Radioecology Laboratory at the Savannah River Site, where he spent 3 y studying the behavior of radionuclides in aquatic ecosystems. Dr. Whicker is regarded as one of the founders of radioecology, the field addressing the fate and effects of radioactivity in the environment.

Dr. Whicker was elected as a Distinguished Emeritus Member of NCRP in 2004 after serving 12 y on the Council. His service to the NCRP includes the Board of Directors from 1994 to 2000; Scientific Vice President of Environmental Radioactive Waste; chairman of SC 64-23 on Cesium in the Environment; a member of SC 1 on Basic Criteria, Epidemiology, Radiobiology and Risk and SC 64 16 on Uncertainties in Application of Screening Models; and served on program committees for both the 1995 and 2001 annual meetings. He has served on review panels for many organizations, consulted for private organizations, and is frequently called as an expert witness on litigation issues concerning radioactivity in the environment. He served as Associate Editor for the Americas for the Journal of Environmental Radioactivity. His awards include the Sigma Xi CSU Chapter Honor Scientist, the CSU Glover Gallery of Distinguished Faculty, the Award for Significant Scientific Contributions from the Health Physics Society, the E.O. Lawrence Award from the U.S. Department of Energy, and the International Union of Radioecology's first V.I. Vernadsky Award. In “retirement,” he guides mountain trips for the Colorado Mountain Club, and volunteers time to lecture and advise graduate students at CSU.

## Annual Warren K. Sinclair Keynote Address

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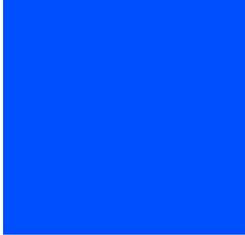


Jack Herrmann has been selected to give the 14th Warren K. Sinclair Keynote Address at the 2017 Annual Meeting of the National Council on Radiation Protection and Measurements (NCRP). The Address, entitled "Aren't We Ready Yet? Closing the Planning, Response and Recovery Gaps for Radiological Terrorism" will be a featured presentation at the 53rd NCRP Annual Meeting to be held March 6- 7, 2017. The Address will be given at 8:30 a.m. on March 6, 2017 in the Crystal Ballroom, Hyatt Regency Bethesda, One Bethesda Metro Center, 7400 Wisconsin Avenue. The keynote speaker series honors Dr. Warren K. Sinclair, NCRP's second President (1977 to 1991).

Jack Herrmann is currently the Deputy Director of the Office of Policy and Planning within the Office of the Assistant Secretary of Preparedness and Response at the U.S. Department of Health and Human Services. Under the direction of the Deputy Assistant Secretary for Policy, Mr. Herrmann is responsible for leading strategic planning and evaluation, preparedness and response policy development and analysis, and coordination and collaboration with domestic and international partners to reduce adverse health effects of public health emergencies and disasters.

Mr. Herrmann earned a bachelor's degree from St. John Fisher College; a master's degree in education in counseling, family, and work-life studies from the University of Rochester; and is currently certified by the National Board of Certified Counselors and is a licensed mental health counselor in the State of New York.

Mr. Herrmann has served in volunteer staff or leadership positions with the American Red Cross for the past 20 y and responded to such disasters as the Northridge Earthquake; the events of September 11, 2001; and Hurricanes Katrina and Sandy.



## Program Committee

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**Armin Ansari, Co-Chair**

*Centers for Disease Control & Prevention*

**Adela Salame-Alfie, Co-Chair**

*Centers for Disease Control & Prevention*

**Sally A. Amundson**

*Columbia University Medical  
Center*

**C. Norman Coleman**

*National Cancer Institute*

**James S. Blumenstock**

*Association of State & Territorial  
Health Officials*

**John F. Koerner**

*U.S. Department of Health &  
Human Services*

**Daniel J. Blumenthal**

*U.S. Department of Energy*

**Tammy P. Taylor**

*Pacific Northwest National  
Laboratory*

**Cullen Case, Jr.**

*National Marrow Donor Program*

### Registration

Monday, March 6, 2017

7:00 am – 5:00 pm

Tuesday, March 7, 2017

7:00 am – 11:00 am

**Register online: <http://registration.ncrponline.org>**

## 2018 Annual Meeting

### *Radiation Responsibility in Medical Imaging*

Donald P. Frush &

Lawrence T. Dauer, *Co-Chairs*

March 5–6, 2018

Bethesda, Maryland

## Biographies

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**Armin Ansari**, Program Committee Co-Chair, is the Radiological Assessment Team Lead at the Centers for Disease Control and Prevention (CDC) serving as subject matter expert in CDC's radiation emergency preparedness and response activities. He received his BS and PhD degrees in radiation biophysics from the University of Kansas, starting his career as a radiation biologist, and did his postdoctoral research in radiation-induced mutagenesis at Oak Ridge and Los Alamos National Laboratories. He was a senior scientist with the radiological consulting firm of Auxier & Associates before joining CDC in 2002. He has led the development of key national guidance documents including guides for population monitoring and operation of public shelters after radiation emergencies and a number of training products for public health professionals. He is a past president of the Health Physics Society, adjunct associate professor of nuclear and radiological engineering at Georgia Institute of Technology, member of Georgia East Metro Medical Reserve Corps and Gwinnett County Community Emergency Response Team, and provides consultancy to the International Atomic Energy Agency. Since 2014, he has served as a member of the U.S. delegation to the United Nations Scientific Committee on the Effects of Atomic Radiation. He is the author of *Radiation Threats and Your Safety: A Guide to Preparation and Response for Professionals and Community*, a book specifically directed at audiences without radiation protection expertise.



**Adela Salame-Alfie**, Program Committee Co-Chair, is a Senior Service Fellow in the Radiation Studies Branch in the National Center for Environmental Health, Centers for Disease Control and Prevention. Prior to this appointment, Dr. Salame-Alfie spent 22 y with the New York State Department of Health in various capacities including Director of the Division of Environmental Health Investigation, Director of Preparedness for the Center for Environmental Health, and Director of the Bureau of Environmental Radiation Protection.

Dr. Salame-Alfie is a member of NCRP and co-chairs the SC 3-1 charged with developing dosimetry guidance for radiation emergency workers. She is a Lifetime Member of the Conference of Radiation Control Program Directors where she served as Chair and member of the Board of Directors, and chaired several committees. She is a Fellow Member of the Health Physics Society.

Dr. Salame-Alfie has extensive experience in radiological emergency preparedness and has published and co-authored many publications on the subject, including the Handbook for Responding to a Radiological Dispersal Device - First Responder Guide.

Dr. Salame-Alfie obtained her Master's and Ph.D. in Nuclear Engineering from Rensselaer Polytechnic Institute in Troy, New York.



**Sally A. Amundson** is an associate professor of radiation oncology in the Center for Radiological Research at the Columbia University Medical Center in New York. She holds a doctorate in radiation biology and cancer biology from the Harvard School of Public Health. Her research uses functional genomics approaches to study low dose radiation and bystander effects, unique effects of space radiation, and the development of gene expression approaches for radiation biodosimetry. She is co-director of the Center for High-Throughput Minimally-Invasive Radiation Biodosimetry. Prior to joining the group at Columbia, Dr. Amundson worked on molecular radiation biology in the Division of Basic Science at the National Cancer Institute (NCI), where she helped to develop global gene expression profiling techniques, and where she was an adjunct investigator in the NCI Radiation Epidemiology Branch. She has served on NCRP since 2004 and on the Science Advisory Committee of the Radiation Effects Research Foundation (RERF) in Hiroshima since 2009, chairing the RERF scientific review for 2012. Dr. Amundson is an associate editor of *Radiation Research*, and has served on the organizing and program committees for numerous meetings, including two of the American Statistical Association Conferences on Radiation and Health, which aim to integrate radiation biology with epidemiology. She is a recipient of the Michael Fry Research Award from the Radiation Research Society (RRS), and she is also a member of the RRS Council.

## Biographies

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**Judith L. Bader** has a BA from Stanford University and an MD from Yale University School of Medicine. She has been board certified in Pediatrics, Pediatric Hematology-Oncology and Radiation Oncology. She is the author of scores of publications in various disciplines including clinical cancer trials, genetics and epidemiology, computer usability technology, and planning for and responding to mass casualty radiation emergencies. Dr. Bader was a Senior Investigator in many cancer clinical trials, genetics and epidemiology research projects, and communications technologies projects during her 22 y in the U.S. Public Health Service at the National Cancer Institute (NCI), National Institutes of Health. She has been the Chief of the Clinical Radiation Branch of the Radiation Oncology Branch at NCI, Chief of Radiation Oncology at the Bethesda Naval Hospital (now Walter Reed), and founding physician of two private radiation oncology practices. Since 2004, Dr. Bader has also served as a Senior Medical Advisor to various U.S. Department of Health and Human Services (HHS) and interagency entities charged with planning for and responding to medical aspects of mass casualty radiation emergencies. She is the Founding and Managing Editor of the HHS/Assistant Secretary for Preparedness and Response-sponsored website Radiation Emergency Medical Management (<https://www.remm.nlm.gov>). She has served on various committees for the American Society for Clinical Oncology and the American Society for Radiation Oncology.



**Gerilee W. Bennett** is the Director of the Federal Emergency Management Agency's (FEMA) Interagency Coordination Division within the Office of Response and Recovery.

Ms. Bennett began her FEMA career as an Emergency Management Intern in 1991. She managed the Hazard Mitigation Grant Program for the Federal Insurance and Mitigation Administration, and moved to the Recovery Directorate in 2003. Ms. Bennett's team was responsible for leading the development and implementation of the National Disaster Recovery Framework, published September 2011. She has supported an array of disaster assistance operations from headquarters and field offices, including the 2016 Louisiana Flooding and Hurricane Matthew, Hurricanes Isaac and Sandy in 2012, the 2010 Gulf Coast oil spill, 2004 and 2005 hurricanes, the 2001 World Trade Center attacks, Hurricanes Opal and Fran in the 1990s, and the 1993 Midwest floods.

Ms. Bennett completed a BA in political science and German at the University of Idaho. In 2015, she earned an MA in security studies at the Naval Postgraduate School Center for Homeland Defense and Security. Her thesis is titled, *Lessons from Fukushima: Relocation and Recovery from Nuclear Catastrophe*.



**James S. Blumenstock** holds the position of Chief Program Officer for Health Security for the Association of State and Territorial Health Officials (ASTHO). His portfolio includes the state public health practice program areas of infectious and emerging diseases, immunization, environmental health, and public health emergency preparedness and response (including pandemic influenza preparedness). Dr. Blumenstock also serves as a member of the Association's Executive Management Team responsible for enterprise-wide strategic planning, administrative services, member support, and public health advocacy.

Prior to his arrival at ASTHO on November 1, 2005, Dr. Blumenstock was the Deputy Commissioner of Health for the New Jersey Department of Health and Senior Services where he retired after almost 32 y of career public health service. In this capacity, he had executive oversight responsibilities for a department branch of over 650 staff, an operating budget of approximately \$125 million, which was comprised of the Division of Public Health and Environmental Laboratories; Division of Epidemiology, Occupational and Environmental Health; Division of Local Health Practice and Regional Systems Development; Division of Health Emergency Preparedness and Response, and the Office of Animal Welfare. During his tenure, Dr. Blumenstock also represented the Department on a number of boards, councils and commissions including the NJ Domestic Security Preparedness Task Force.

Dr. Blumenstock is the proud recipient of the ASTHO 2004 Noble J. Swearingen Award for excellence in public health administration and the Dennis J. Sullivan Award, the highest honor bestowed by the NJ Public Health Association for dedicated and outstanding service and contribution to the cause of public health.

## Biographies

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He is also a Scholar of the University of North Carolina Public Health Leadership Institute, a Fellow of the Harvard National Preparedness Leadership Initiative, and held an elected office serving his community for 12 y.

Dr. Blumenstock received his BS degree in Environmental Science from Rutgers University in 1973 and an MA degree in Health Sciences Administration from Jersey City State College in 1977. He is a native of New Jersey which is still his primary residence with his wife of 43 y, Lee. They have three children and three grandchildren.



**Daniel J. Blumenthal** manages the Consequence Management programs in the Office of Emergency Response at the National Nuclear Security Administration within the U.S. Department of Energy (DOE). The programs include atmospheric dispersion modeling, air and ground-based radiation monitoring, and radiation medicine. In 2009, he transferred from the U.S. Department of Homeland Security's Domestic Nuclear Detection Office where he was the Chief Test Scientist. He was responsible for designing and conducting field test campaigns for radiation detection systems as applied to the preventive radiological/nuclear detection mission as well as providing subject matter expertise on detector applications and performance. Prior to joining the Federal government he was a Senior Scientist at DOE's Remote Sensing Laboratory from 1996 to 2006 where he managed or provided scientific support to several DOE emergency response teams. Most recently Dr. Blumenthal led the initial DOE response team to Japan where he spent a total of seven weeks following the Fukushima Daiichi Nuclear Power Plant accident in March 2011. Since then he has supported many U.S. and international efforts related to lessons learned from Fukushima. These include documenting best practices associated with data management during an international response and writing the occupational dose section of the International Atomic Energy Agency's Fukushima Report.

Dr. Blumenthal's background is in nuclear physics - gamma-ray and charged particle spectroscopy. He received his undergraduate degree in physics from Columbia College in 1985 and his doctorate in nuclear physics from Yale University in 1994. He did a post-doctoral fellowship at Argonne National Laboratory from 1994 to 1996. He became an Certified Health Physicist in 2003.



**John D. Boice, Jr.**, *NCRP President* and Professor of Medicine at Vanderbilt University School of Medicine, Nashville, Tennessee. He is an international authority on radiation effects and currently serves on the Main Commission of the International Commission on Radiological Protection and as a U.S. advisor to the United Nations Scientific Committee on the Effects of Atomic Radiation. During 27 y of service in the U.S. Public Health Service, Dr. Boice developed and became the first chief of the Radiation Epidemiology Branch at the National Cancer Institute. Dr. Boice has established programs of research in all major areas of radiation epidemiology, with major projects dealing with populations exposed to medical, occupational, military and environmental radiation. These research efforts have aimed at clarifying cancer and other health risks associated with exposure to ionizing radiation, especially at low-dose levels. Dr. Boice's seminal discoveries and over 440 publications have been used to formulate public health measures to reduce population exposure to radiation and prevent radiation-associated diseases. He has delivered the Lauriston S. Taylor Lecture at the NCRP and the Fessinger-Springer Lecture at the University of Texas at El Paso. In 2008, Dr. Boice received the Harvard School of Public Health Alumni Award of Merit. He has also received the E.O. Lawrence Award from the Department of Energy - an honor bestowed on Richard Feynman and Murray Gell-Mann among others - and the Gorgas Medal from the Association of Military Surgeons of the United States. In 1999 he received the outstanding alumnus award from the University of Texas at El Paso (formerly Texas Western College). Dr. Boice directs the Million U.S. Radiation Workers and Veterans Study to examine the lifetime risk of cancer following relatively low-dose exposures received gradually over time.

## Biographies

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**Brooke Buddemeier** is an associate program leader in the Global Security Directorate of Lawrence Livermore National Laboratory (LLNL). He supports the Risk and Consequence Management Division in their efforts to evaluate the potential risk and consequence of radiological and nuclear terrorism. Mr. Buddemeier is a member of NCRP and served on the scientific committees which developed Commentary No. 19, *Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism* (2005) and NCRP Report No. 165, *Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers* (2010). From 2003 through 2007, he was on assignment with the Department of Homeland Security as the weapons of mass destruction emergency response and consequence management program manager for Science and Technology's emergency preparedness and response portfolio. He supported Federal Emergency Management Agency and the Homeland Security Operations Center as a radiological emergency response subject matter expert. He also facilitated the department's research, development, test and evaluation process to improve emergency response through better capabilities, protocols and standards. Prior to that, he was part of the LLNL Nuclear Counterterrorism Program and coordinated LLNL's involvement in the National Nuclear Security Administration's Radiological Assistance Program (RAP) for California, Nevada and Hawaii. RAP is a national emergency response resource that assists federal, state and local authorities in the event of a radiological incident. As part of RAP's outreach efforts, Mr. Buddemeier has provided radiological responder training and instrumentation workshops to police, firefighters, and members of other agencies throughout the nation and abroad. He has also provided operational health physics support for various radiochemistry, plutonium handling, accelerator and dosimetry operations. He is Certified Health Physicist who received his Master's in Radiological Health Physics from San Jose State University and a BS in Nuclear Engineering from the University of California, Santa Barbara.



**John J. Cardarelli, II** is a Captain in the U.S. Public Health Service detailed to the U.S. Environmental Protection Agency (EPA). He serves as a Health Physicist on the Chemical, Biological, Radiological and Nuclear (CBRN) Consequence Management Advisory Team (CMAT) to provide scientific and technical support for local and state governments, federal agencies, and international partners on radiological issues associated with (1) emergency response, (2) risk assessment, (3) policy development, (4) decontamination technologies, and (5) environmental characterization. He is the lead for developing and maintaining the EPA airborne radiological detection capability within the Airborne Spectral Photometric Environmental Collection Technology Program and serves as the radiation safety officer for the U.S. Nuclear Regulatory Commission (NRC) licensed materials within CMAT. He also is an Assistant Adjunct Professor at the University of Cincinnati, College of Medicine, Department of Environmental Health.

CAPT Cardarelli received a BS in Nuclear Engineering (1990), an MS in Health Physics (1992), and PhD in Industrial Hygiene (2000) from the University of Cincinnati. He holds a Professional Engineering License (nuclear specialty), and is board certified in both Industrial Hygiene and Health Physics. From 1992 until 2005, he worked for the Centers for Disease Control and Prevention at the National Institute for Occupational Safety and Health where he conducted dose reconstructions for epidemiologic studies of workers within the U.S. nuclear weapons complex and conducted numerous health hazard evaluations.

John enjoys coaching his daughter's (Maria) basketball team; cheering on the UC Bearcats with his son (Anthony), and traveling throughout the world with his wife (Melinda) and kids.



**Cullen Case, Jr.** is the Senior Manager of Logistics and Emergency Preparedness for the National Marrow Donor Program (NMDP)/Be the Match marrow registry and the Program Manager of the Radiation Injury Treatment Network. He is responsible for delivery of all cellular therapies the NMDP transports worldwide as well as organizational preparedness, crisis response, business continuity, and the exercising of all related plans for the NMDP. In his role with the Radiation Injury Treatment Network, he coordinates the preparedness activities of a group of 76 hospitals, blood donor centers, and cord blood banks preparing for a mass casualty radiological incident. While serving in the U.S. Army he managed the logistical response to Hurricanes Bertha (1996) and Fran (1996) in North Carolina as well as Hurricane Mitch (1998) in

## Biographies

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Nicaragua. Mr. Case has a BS in Industrial Engineering, is a Certified Emergency Manager, a Certified Healthcare Emergency Professional, is a Stanford Certified Project Manager, and is working on his Masters in Public Administration. He longs for the simple days when he was just a Divemaster in the Florida Keys.



**C. Norman Coleman** received his BA in mathematics, *summa cum laude*, from the University of Vermont in 1966 and his MD from Yale University in 1970. He is board certified in three specialties-internal medicine from University of California San Francisco, medical oncology from the National Cancer Institute (NCI), and radiation oncology from Stanford University. He served in the U.S. Public Health Service at the National Institutes of Health [O-4 (ret)]. He was Assistant and tenured Associate Professor of Radiation Oncology and Medical Oncology at Stanford and from 1985 to 1999 was Professor and Chairman of the Harvard Medical School Joint Center for Radiation Therapy. Since 1999, he has been Associate Director, Radiation Research Program and Senior Investigator, with a molecular radiation therapeutics laboratory in the Radiation Oncology Branch of NCI. Since 2004 he has also been a Senior Medical Advisor in the Office of the Assistant Secretary for Preparedness and Response in the U.S. Department of Health and Human Services. His focus is on radiological and nuclear preparedness and planning but the programs apply to all hazards. This includes the Scarce Resources for a Nuclear Detonation project and participation at the U.S. Embassy in Tokyo during the Japan disaster in March 2011. Among his honors are Fellowships in American College of Physicians, American College of Radiology, American Society of Radiation Oncology, and American Society of Clinical Oncology. He is recipient of an Honorary Fellowship, Royal College of Surgeons, Dublin; Honorary Fellow, Royal College of Radiologists (London); the Gold Medal from the American Society for Radiation Oncology; and the 2011 Samuel J. Heyman, Service to America Homeland Security Medal. In 2015 the University of Vermont awarded him a Doctor of Science (honoris causa) for his public service and contributions to society. He received the Failla Award from the Radiation Research Society in 2016.



**Sara DeCair** has been a health physicist with the U.S. Environmental Protection Agency's (EPA) Office of Radiation and Indoor Air since 2003. She works on policy, planning, training and outreach for EPA's radiological emergency preparedness and response program. She is the project and technical lead for revising the Protective Action Guides Manual.

She previously worked for 7 y with the State of Michigan's Department of Environmental Quality. She spent three of those years in nuclear power plant emergency planning and before that was an inspector of radioactive materials registrants and a radiation incident responder.



**Frieda Fisher-Tyler** directs the Office of Radiation Control in the Delaware Division of Public Health, which regulates the use of ionizing radiation sources in the State of Delaware. She is certified in comprehensive practice by the American Board of Industrial Hygiene, and worked as an Industrial Hygienist, Radiation Safety Officer, and Environmental Health and Safety Director in the chemical and pharmaceutical industries prior to transitioning to state service in 2002. She serves as the governor-appointed U.S. Nuclear Regulatory Commission State Liaison Officer and Alternate Commissioner for the Appalachian States Commission for Low Level Radioactive Waste for Delaware. She leads the Technical Assessment Team for the Delaware Radiological Emergency Preparedness Program managed by Delaware Emergency Management Agency, and acts as Administrative Agent to the governor-appointed Delaware Authority on Radiation Protection. She served on the Board of Directors of the Conference of Radiation Control Program Directors (CRCPD) from 2010 to 2013, chairing the Homeland Security/Emergency Response Council for the Board, and represents the CRCPD on the Governmental Coordinating Council - Nuclear Sector managed by the U.S. Department of Homeland Security, Critical Infrastructure Protection. She served on the Board of Directors of the American Board of Industrial Hygiene from 2000 to 2003, serving a term as Board Vice Chair. She received her MHS degree from the Environmental Engineering Department, Bloomberg School of Public Health, Johns Hopkins University, and her BS degree from the Institute of Environmental Health, Colorado State University. She resides in Magnolia, Delaware.

## Biographies

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**Dan Hanfling** is a consultant on emergency preparedness, response and crisis management. He is a Contributing Scholar at the Johns Hopkins Center for Health Security, Clinical Professor of Emergency Medicine at George Washington University and adjunct faculty at the George Mason University School of Public Policy. He currently serves as the Co-chair of National Academy of Medicine's Forum on Medical and Public Health Preparedness for Disasters and Large Scale Emergencies, and is a Special Advisor within the U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response, focused chiefly on the National Hospital Preparedness Program.

Dr. Hanfling spent 18 y as principal consultant to the Inova Health System (Falls Church, Virginia) on matters related to emergency preparedness and response. He continues to practice emergency medicine at Inova Fairfax Regional Trauma Center, and is an operational medical director for a regional helicopter emergency medical service (EMS). He was instrumental in founding one of the nation's first healthcare coalitions, the Northern Virginia Hospital Alliance, created in October 2002.

His areas of expertise include biodefense and mass casualty management, catastrophic disaster response planning with particular emphasis on scarce resource allocation, and the nexus between healthcare system planning and emergency management. In addition to his hospital and EMS clinical responsibilities, he serves as a Medical Team Manager for the Fairfax County based Federal Emergency Management Agency and U.S. Agency for International Development sanctioned international urban search and rescue team (VATF-1, USA-1), and has responded to catastrophic disaster events across the globe.

Dr. Hanfling received his undergraduate degree in political science from Duke University, including a General Course at the London School of Economics, and completed his MD at Brown University. He completed his internship in Internal Medicine at Brown University and his emergency medicine training at the combined George Washington and Georgetown University residency program. He has been Board Certified in Emergency Medicine since 1997.



**John L. Hick** is a faculty emergency physician at Hennepin County Medical Center (HCMC) and a Professor of Emergency Medicine at the University of Minnesota Medical School. He serves as the Deputy Chief Medical Director for Hennepin County Emergency Medical Services and Medical Director for Emergency Preparedness at HCMC. He is an Advisor to the Director, Hospital Preparedness Program, Office of Assistant Secretary for Preparedness and Response (ASPR)/U.S. Department of Health and Human Services, serves as lead editor for ASPR's TRACIE (Technical Resources, Assistance Center, and Information Exchange) website and has been involved in several national efforts to enhance planning for nuclear detonation scenarios.



**Robert Ingram** has been assigned as the Weapons of Mass Destruction Branch Chief at the Fire Department of New York's (FDNY) Center for Terrorism and Disaster Preparedness since 2007. Chief Ingram has worked with hazardous materials response since 1984 and was assigned as the Chief in Charge of the Hazardous Materials Operations Office shortly after 9/11.

In Chief Ingram's position, the Center for Terrorism and Disaster Preparedness has worked on several projects focused on radiation issues with federal agencies including the Federal Emergency Management Agency, National Institute for Occupational Safety and Health, U.S. Department of Defense, U.S. Department of Homeland Security, U.S. Department of Justice, and U.S. Environmental Protection Agency. Chief Ingram has worked on radiation standards as a representative of the FDNY and the responder community with the American Society for Testing and Materials, the National Fire Protection Association, National Institute of Standards and Technology, and NCRP.

Chief Ingram is in his 42nd year with the fire service, and 35th year with FDNY. He has been a Battalion Chief since 2000 and has over 30 y of hazardous materials response experience. He holds a BS degree in Fire and Emergency Management from State University of New York Empire College and an MS in Homeland Defense and Security from the Naval Post Graduate Schools' Center for Homeland Defense and Security.

## Biographies

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**William E. Irwin** leads the Radiological and Toxicological Sciences Program at the Vermont Department of Health. He is responsible for all aspects of the Vermont Radiation Control Program in the healing arts, industrial applications, environmental surveillance and emergency preparedness. He is Chair-Elect for the Conference of Radiation Control Program Directors. Prior to serving in government, Dr. Irwin was Laser Safety Officer and a Radiation Safety Officer at Harvard University and the Massachusetts Institute of Technology. During that time, he was a consultant to industry and government on measurements and the health effects of radiofrequency radiation, laser radiation, extremely low frequency and nuclear magnetic resonance electromagnetic fields, as well as ionizing radiations produced by machines and radioactive materials. Both his PhD and MS were earned at the University of Massachusetts Lowell.



**Joseph G. Klinger** has been the Assistant Director of the Illinois Emergency Management Agency (IEMA) since January 2007. From May 2010 to February 2011, he served as the IEMA Interim Director and as the Governor's Homeland Security Advisor. Mr. Klinger currently maintains a Department of Homeland Security Top Secret clearance and serves as the Illinois Governor's Deputy Homeland Security Advisor. As Assistant Director, he oversees the day-to-day operations of the agency, which has 228 employees and an annual budget of \$477 million.

A major component within IEMA is a robust nuclear safety program with many innovative programs. Illinois has 11 operating nuclear power reactors, more than any other state, and IEMA has been an Agreement State since 1987 with approximately 740 radioactive material licensees. IEMA also regulates 11,000 x-ray facilities, accredits over 13,000 radiologic technologists, and is one of four certifying states under the Mammography Quality Standards Act Program.

In June 2008, Mr. Klinger was appointed as a Commissioner on the Central Midwest Interstate Low-Level Radioactive Waste Compact Commission and currently serves as Chairman. The Commission oversees all low-level radioactive waste issues in the compact consisting of Illinois and Kentucky. He is currently the past-Chairperson for the Conference of Radiation Control Program Directors, Inc. (CRCPD) and serves as one of two representatives from the National Emergency Management Association for the National Alliance for Radiation Readiness.

Mr. Klinger has worked for IEMA for over 26 y. Prior to his role as Assistant Director, he served as the agency's Manager of the Radioactive Materials Program since 1996. He began employment as the Head of Radioactive Material Licensing in August 1988. From 1980 to 1988, Mr. Klinger was the Licensing Branch Administrator for the Texas Bureau of Radiation Control.

Mr. Klinger has been a consultant to the International Atomic Energy Agency (IAEA) and assisted IAEA in the development of the Radioactive Source Categorization document currently used globally for security efforts. He performed technical assist visits to Latvia and Panama in the global effort to control all significant sources of radioactive material. He has been a featured speaker at many state, national and international meetings, including a conference on the "Peaceful Use of Radioactive Materials" in Hanoi, Vietnam in March 1999. Most recently, in October 2013, he presented a poster session regarding CRCPD Orphan Source and Source Collection and Threat Reduction Program at the IAEA "Safety and Security of Radioactive Sources: Maintaining Continuous Global Control of Sources throughout Their Life Cycle" in Abu Dhabi, United Arab Emirates.

Joseph Klinger earned his BS in Microbiology/Chemistry and completed some graduate studies at the University of Texas at Austin, and his MS in Health Care Management/Public Administration at Southwest Texas State University (now Texas State University). He is currently enrolled in the Executive Leaders Program (ELP) through the Naval Postgraduate School - Center for Homeland Defense and Security. Over his 34+ y in Health Physics, he has completed extensive health physics training in courses at Oak Ridge Associated Universities, University of Texas, College of Engineering, and other institutions.

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In 1985, he was commissioned an Officer in the U.S. Navy Reserve as a Radiation Health Officer, Environmental Health Officer and Health Care Manager in the Medical Service Corps. He was deployed in 2004 to 2005 to the Middle East in support of Operation Enduring Freedom (Afghanistan) and Operation Iraqi Freedom. Mr. Klinger began his military career in 1967 as a U.S. Marine Corps Combat Infantryman in Vietnam and retired in 2008 as a Navy Captain.



**John F. Koerner** is an authoritative advisor in the Office of the U.S. Department of Health and Human Services Assistant Secretary for Preparedness and Response for all matters related to national medical preparedness and response to chemical, biological, radiological, nuclear and explosives (CBRNE) incidents. In that role, Mr. Koerner also leads the development of innovative, evidence-based interventions and guidance to support the Nation's medical and public health response to catastrophic disasters and terrorist incidents. He is broadly published as an internationally recognized expert in medical preparedness and response to radiation and other CBRNE incidents. He is a combat veteran and also serves as Board Member and Triage Chief during medical missions for a charitable organization. Mr. Koerner is a Board Certified Industrial Hygienist and received his Master's Degree in Public Health from the Johns Hopkins School of Public Health. He has spent two decades operating, researching and advising in the field of medical and public health response to terrorism.



**Michelle M. Laver** is the Director of Lab Outreach, Office of Public Affairs for the U.S. Department of Energy (DOE). In this role, Ms. Laver serves as a communications leader for the labs and as a communications strategy technical expert and single point of contact for all labs to better identify, coordinate and leverage media opportunities and to assist labs with sensitive communications issues. She also serves as a vital institutional resource and independent advisor for the Office of Public Affairs and the Department and as a strategic communications advisor to the National Labs, Secretary of Energy, Deputy Secretary, and senior leadership.

She previously served as the Deputy Director of Public Affairs for the National Nuclear Security Administration ensuring communication priorities and goals are met furthering public understanding of the National Nuclear Security mission.

Prior to joining DOE, Ms. Laver, a retired Air Force officer, served in a variety of military and national security positions. Commissioned through the Air Force Officer Training School in 1998, her first assignment was as an Occupational Therapist at Andrews Air Force Base, Maryland. She was then selected and served as an 89th Airlift Wing Protocol Officer prior to cross-training into public affairs. Her public affairs experience includes Armed Forces Network, wing, MAJCOM, joint staff and Headquarters Air Force, including two separate deployments to Iraq. Her final assignment while on active duty was as the Chief of Operations, Public Affairs Directorate, for Air Force Global Strike Command.



**Robert Levin** is the Health Officer/Medical Director for Ventura County Public Health. He has served in that capacity for the last 18 y. Most recently, Dr. Levin worked on nuclear preparedness including a written Nuclear Plan which delineates Ventura County's response to a nuclear explosion. He launched a public information campaign to educate his county on nuclear explosion preparedness in 2011. Dr. Levin received his medical degree from the University of Missouri in Columbia. He completed his pediatric residency at San Francisco General Hospital and the University of California, San Francisco. He is board certified in Pediatrics and Pediatric Infectious Diseases. He served as Chairman of Pediatrics at Natividad Medical Center in Salinas, California starting in 1983. In 1987 he moved his family to Chicago, Illinois, to become Program Director for Pediatric Residency Training at Christ Hospital in Oak Lawn, Illinois and then, in 1994 became Chairman of the Department of Pediatrics at Mount Sinai Hospital, Chicago. He went to Ventura County in 1998 to assume his current position as Ventura County's Public Health Officer. As Health Officer, Dr. Levin has been the Chief Medical Officer overseeing all Ventura County terrorism-related activities and threats. In October 2007 he published the *Ventura County Nuclear Explosion Response Plan*, which was

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revised and updated in 2011. In February of 2010, he spoke on the topic of nuclear detonation response at the National Association of County and City Health Officials conference in Atlanta and the National Center for Disaster Preparedness, Columbia University. In 2013 he was a speaker at conferences put on by NCRP and by the Institute of Medicine. In 2014 he spoke at the North Atlantic Treaty Organization workshop in Los Angeles.

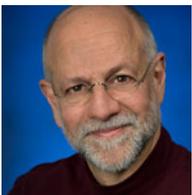


**Jill A. Lipoti** is an Assistant Teaching Professor, at the Department of Human Ecology at Rutgers University. She contributes to the development and implementation of the academic Minor in Sustainability. Dr. Lipoti also supports research in the areas of environmental, urban and societal sustainability.

Dr. Lipoti retired from the New Jersey Department of Environmental Protection in 2013. She was the Director of the Division of Water Monitoring and Standards, with responsibility for fresh water and marine water monitoring efforts. Prior to assuming this position, she was Director of the Division of Environmental Safety and Health with responsibility for directing the state's radiation protection programs, quality assurance, release prevention, pollution prevention, and right-to-know programs. Dr. Lipoti participated in nuclear emergency response planning and led an effort to improve planning for recovery from a nuclear accident. Under her direction, the effectiveness of the x-ray inspection program was improved through emphasizing the importance of measuring radiation exposure and image quality. She served as Chair of the Conference of Radiation Control Program Directors in 1999, and was presented with lifetime membership upon her retirement.

Dr. Lipoti was elected to the Council in 2001, and has served on the Board of Directors, Program Area Committee (PAC) 5, PAC 7, and Scientific Committee 5-1 which produced NCRP Report No.175, *Decision Making for Late-Phase Recovery from Major Nuclear or Radiological Incidents*.

Dr. Lipoti has provided advice to the International Atomic Energy Agency regarding radiation safety, traveling to Ethiopia and Uganda to consult with their radiation control program personnel. She has chaired the Radiation Advisory Committee of the Science Advisory Board, U.S. Environmental Protection Agency. Dr. Lipoti has MS and PhD degrees in environmental science from Rutgers, and received the George H. Cook Award for Distinguished Alumni from Rutgers in 2007.



**Stephen V. Musolino** is a scientist in the Nonproliferation and National Security Department at the U.S. Department of Energy's (DOE) Brookhaven National Laboratory (BNL) in Upton, New York. With more than 30 y of experience in Health Physics, his current research interests are in nonproliferation, counterterrorism, and planning for response to the consequences of radiological and nuclear terrorism. Since 1981, he has been part of the DOE Radiological Assistance Program as a Team Captain/Team Scientist and has been involved in developing radiological emergency response plans and procedures, as well as participating in a wide range of radiological and nuclear exercises and field deployments. During the Fukushima crisis, he was deployed in Japan as an Assessment Scientist with the DOE response team that was measuring the environmental consequences of the radioactive material released from the damaged nuclear power plants. Working with the first responder community in the New York metropolitan area, Dr. Musolino was involved with the development of guidance for response to the aftermath of a radiological dispersal device, and served on the scientific committee that developed NCRP Report No. 165, *Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers*. Earlier in his career at BNL, he was a member of the Marshall Islands Radiological Safety Program and participated in numerous field missions to monitor the populations living on islands affected by nuclear testing.

Dr. Musolino is a Fellow of the Health Physics Society, Distinguished Alumnus of Buffalo State College, and a member of the editorial board of the journal Health Physics. He earned a BS in engineering technology from Buffalo State College, an MS in nuclear engineering from Polytechnic Institute of New York University, and a PhD in health physics from the Georgia Institute of Technology. He is certified by the American Board of Health Physics.

## Biographies



**David Pasquale** (retired) has 38 y of fire service experience, 26 of those years were spent as a Chief Officer involved in all aspects of emergency response including deployments to many large scale incidents such as hurricanes, interface fires, and homeland security prevent and response operations. Chief Pasquale commanded a National Incident Management System (NIMS) Type 1 Hazmat/Chemical, Biological, Radiological, Nuclear, and Explosives Team that provided regional response to the State of New Mexico. He organized New Mexico's first Type 1 Preventive Radiological/Nuclear Detection (PRND) Team and Regional PRND effort. The Chief served as an adjunct instructor for the New Mexico Fire Academy and the New Mexico Law Enforcement Academy, providing classes in command, hazmat, rescue and fire operations, to law enforcement, fire, emergency medical services, and military personnel. He was appointed to the New Mexico State Emergency Response Commission by Governor Richardson. He holds numerous certifications in fire/arson investigation, hazardous materials, special operations, and incident command. He now serves as Western Regional and Technical Standards Manager with Counter Terrorism Operations Support providing guidance as a subject matter expert on emergency response, NIMS, ICS, planning for large scale incidents (radiological dispersal devices and improvised nuclear devices) and weapons of mass destruction prevent and response operations.



**David P. Ropeik** is an Instructor at Harvard University and consultant on risk perception, risk communication, and risk management. He is author of *How Risky Is It, Really? Why Our Fears Don't Always Match The Facts* (2010) and co-author of *RISK, A Practical Guide for Deciding What's Really Safe and What's Really Dangerous in the World Around You* (2002). He has written more than 50 articles, book chapters, and other essays on risk perception and risk communication in both the peer-reviewed literature and the general media, including the *New York Times*, *Washington Post*, *Los Angeles Times*, *USA Today*, *The Guardian*, *The Boston Globe*, *Nature*, and *Scientific American*. He blogs for Psychology Today and The Huffington Post.

Mr. Ropeik's extensive work in the nuclear field includes serving as a member of the Veterans Board on Dose Reconstruction, which oversaw the joint U.S. Department of Defense and Veterans Administration program to compensate veterans exposed to nuclear radiation. He has advised the International Atomic Energy Agency (IAEA) and several member states on risk communication, and wrote the curriculum the IAEA uses to train member states in risk communication. He has spoken on, taught, or consulted on risk communication and dealing with the news media to government officials, nuclear regulators and emergency managers, nuclear-related professional and trade organizations, journalism organizations, and academic audiences, in countries around the world.

Prior to his consulting career, Mr. Ropeik was the co-director and principal faculty member of the Harvard School of Public Health's professional education course "The Risk Communication Challenge."

Before joining Harvard, Mr. Ropeik was a television reporter for WCVB-TV in Boston from 1978 to 2000, where he specialized in reporting on environment and science issues. He twice won the DuPont-Columbia Award, often cited as the television equivalent of the Pulitzer Prize, a National Headliner Award, the Gabriel Award, and seven regional Emmy Awards. He wrote a science column for *The Boston Globe* 1998 to 2000. He was a Knight Science Journalism Fellow at the Massachusetts Institute of Technology (MIT) 1994 to 1995, a National Tropical Botanical Garden Fellow in 1999, and a member of the Board of Directors of the Society of Environmental Journalists from 1991 to 2000.



**Monica Schoch-Spana**, a medical anthropologist, is a Senior Associate with the Johns Hopkins Center for Health Security. She holds faculty positions with the School of Medicine at the University of Pittsburgh, the Department of Anthropology at Texas State University, and the National Consortium for the Study of Terrorism and Responses to Terrorism. Her areas of expertise include community resilience to disaster, public health emergency preparedness, public engagement in policymaking, and crisis and risk communication. Since 1998, Dr. Schoch-Spana has briefed federal, state and local officials, as well as medical, public health, and public safety professionals, on critical issues in health security. National advisory roles include serving on the Homeland Security Subcommittee of the Board of Scientific Counselors for the U.S.

## Biographies

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Environmental Protection Agency, the Resilient America Roundtable of the National Academy of Sciences and National Research Council (NRC), the Institute of Medicine Standing Committee on Medical and Public Health Research during Large-Scale Emergency Events, and the NRC Committee on Increasing National Resilience to Hazards and Disasters.

Dr. Schoch-Spana has led research, education and advocacy efforts to encourage authorities to enlist the public's contributions in epidemic and disaster management. Her studies have been influential in debunking myths about mass behaviors in the context of bioterrorism, reframing the management of catastrophic health events to include social and ethical-moral dimensions, and persuading leaders to share governance dilemmas with members of the public including how to allocate scarce medical resources in a disaster. She has chaired national working groups to produce peer-reviewed, evidence-based consensus guidance for authorities on how to partner with citizens and civil society in relation to bioterrorism response, influenza pandemic planning, and nuclear incident preparedness, and she has organized three national meetings on how to strengthen community resilience to extreme health events.

In 2003, Dr. Schoch-Spana helped establish the Center; prior to that she worked at the Johns Hopkins University Center for Civilian Biodefense Strategies starting in 1998. She received her PhD in cultural anthropology from Johns Hopkins University (1998) and a BA from Bryn Mawr College (1986).



**Tammy P. Taylor** is the Chief Operating Officer of the National Security Directorate at the Pacific Northwest National Laboratory (PNNL). Dr. Taylor leads the mission execution, capability development, and project management of the directorate of three divisions and four project management offices. Prior to joining PNNL in the summer of 2013, Dr. Taylor served in a number of positions over 14 y at Los Alamos National Laboratory (LANL). She served in positions as the Deputy Associate Director of Chemistry, Life and Earth Sciences, the Division Leader of Nuclear Engineering and Nonproliferation, a group leader, project leader, staff member and Director's Postdoctoral Research Fellow. From early 2007 to mid 2010 she was an Inter-governmental Personnel Act assignee from LANL in the Office of Science and Technology Policy (OSTP) in the Executive Office of the President. She managed the national science and technology portfolio on nuclear defense issues including nonproliferation, detection, render safe, and attribution, as well as nuclear detonation response and recovery issues such as preparedness, planning, medical countermeasures, decontamination, and long-term recovery within the National Security and International Affairs Directorate of OSTP for Dr. John Holdren and Dr. Jack Marburger, Science Advisors to President Obama and President Bush, respectively. Dr. Taylor has conducted research and performed program development activities on topics related to radiological/nuclear threat reduction and environmental restoration. She has expertise working with the emergency responder community to identify needs in support of radiological and nuclear terrorism preparedness and adapt traditional emergency response to response involving terrorism threats. Her research prior to September 2011 focused on environmental remediation of groundwater and safe handling, fate, and remediation of beryllium. Dr. Taylor has an MS and PhD in Environmental Engineering from the Georgia Institute of Technology. Her undergraduate degree in Civil Engineering is from New Mexico State University. She is a Council Member of NCRP and a long-time member and supporter of the American Nuclear Society, the American Society of Testing and Materials, the Health Physics Society, and the Institute of Nuclear Materials Management.



**Jeffrey J. Whicker** has worked at Los Alamos National Laboratory for over 25 y. He received a PhD in Environmental and Radiological Health Science from Colorado State University and is certified by the American Board of Health Physics. He is an author or co-author on over 125 scientific publications, invited talks, book chapters, and presentations mostly on indoor and outdoor radiological air quality and measurement that span issues ranging from worker protection, homeland security, public risk assessment, and environmental quality. His body of work has been cited in peer-reviewed journals over 500 times. Dr. Whicker served on the Editorial Board for the journal *Radiation Protection Dosimetry* and as President of the Environmental/Radon Section of the Health Physics Society.

## Biographies

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**Jessica S. Wieder** is a member of the U.S. Environmental Protection Agency's (EPA) Center for Radiation Information and Outreach and is the senior public information officer for EPA's Radiological Emergency Response Team. Ms. Wieder was part of the team tasked with communicating about EPA's efforts and radiation levels in the United States during the 2011 Fukushima Daiichi nuclear accident. She has facilitated international panels on public communication about radiation risks after terrorist incidents and was part of the contingency planning team for the 2011 launch of the Mars Science Laboratory. In 2010, Ms. Wieder was detailed to Federal Emergency Management Agency's Chemical, Biological, Radiological, Nuclear and Explosives Branch, where she helped establish their Improvised Nuclear Device Response and Recovery Program and created the intergovernmental Nuclear/Radiological Communications Working Group. With her guidance, this group developed the nuclear detonation messaging document *Improvised Nuclear Device Response and Recovery: Communicating in the Immediate Aftermath*. She was also the lead author for the communications chapter for the second edition of the White House's *Planning Guidance for Response to a Nuclear Detonation*. In 2013, she was awarded EPA's Exemplary Customer Service Award for her leadership in enabling all levels of government to provide quick, effective communications to the American people in response to large-scale radiological emergencies.



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