
51st Annual Meeting of the NCRP

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“Changing Regulations and Radiation Guidance: What Does the Future Hold?”—the 51st Annual Meeting of the National Council on Radiation Protection and Measurements (NCRP)—was held 16–17 March 2015 in Bethesda, Maryland.

Beginning this year, the lecture by the invited speaker at the members’ dinner (held the evening before the meeting) is being included in the proceedings. This year’s speaker, former Nuclear Regulatory Commission (NRC) Chair Allison Macfarlane, presented “Radiation and Regulation in a Post-Fukushima World.” Although a nuclear accident can affect large swaths of land and multiple countries, no international body sets safety standards applicable to all countries. International responses to the Fukushima Daiichi accident included requests to evacuate all U.S. citizens within 80 km, Canadian citizens also within 80 km, and French citizens within 240 km. Japanese responses began with immediate evacuation within the 3-km zone around the plant, later extended to 20 km, and finally to 30 km.

The accident produced a global reaction by many regulators, including emphasis on stress tests, changes initiated at all reactors, prepositioned safety equipment, spent fuel pool monitors, filtered vents, and better emergency procedures and communications. The accident was characterized by a lack of information available to the Japanese government and people and to the international community. Low-level contamination made it to Tokyo, and many people bought their own detectors, produced their own maps, and began monitoring Pacific seawater. The NRC had little information available to resolve the 80-km-evacuation-zone kerfuffle and did not disseminate information to the states. Overall there was little data collection, late coordination, many media questions, and much misinformation. We must use all lessons learned from previous events, work toward uniform international standards, communicate the truth without candy coating and patronizing (e.g., “you don’t have to worry”), provide information quickly, communicate often even if there is little new information, not make false claims, and if we are wrong, say so soon.

On Monday morning, 16 March, NCRP President John Boice welcomed the attendees to the 51st Annual Meeting and introduced the cochair of the Program Committee, Don Cool. Cool noted that as NCRP begins its second 50 years of providing independent radiation protection guidance to the United States, it is very timely to think about what the future holds. He thanked Cochair Kathryn Pryor and the Program Committee members, who would be serving as session chairs.
Boice then introduced the 12th annual Warren K. Sinclair Keynote Address, delivered by Kenneth R. Kase, "Influence of the NCRP on Radiation Protection in the United States: Guidance and Regulation." NCRP’s roots go back to 1928 and the 2nd International Congress of Radiology in Stockholm; the delegates discussed forming an advisory body for problems with the use of radium and x rays. The U.S. representative was Lauriston S. Taylor, from the National Bureau of Standards (NBS), who conveyed the recommendations back to the United States. In 1929 the Advisory Committee on X-Ray and Radium Protection was established with Taylor as chair. In 1931 the committee produced its first formal standard as NBS Handbook 15; measurements were standardized on the roentgen (R) and the limit was 0.1 R d\(^{-1}\). In 1936 NBS Handbook 20 set a limit for occupational exposure of 0.1 R week\(^{-1}\) as the tolerance dose.

The Advisory Committee was expanded and renamed the National Committee on Radiation Protection in 1946, with Taylor continuing as chair, and 16 reports were published from 1946 to 1958. The Federal Radiation Council (FRC) was formed to recommend public policy and reported that NCRP Reports 13, 17, 18, and 22 formed the basis for radiation protection guides and protective action guides (PAGs). Ten new reports (22–31) were published from 1959 to 1964, mostly providing guidance on operational radiation protection for implementation of the standards. In 1963–1964 the NBS made a recommendation to form the NCRP and separate it from the federal government as an independent advisory group; thus the NCRP became the NCRP.

As of today, NCRP has issued 175 reports and 23 commentaries, over 100 of which have been referenced in government regulations and guidance documents. The NRC in 10 CFR 35 relies upon NCRP Reports 102, 105, 107, 111, 123, and 134. The revision of the skin-dose limit was based on NCRP Reports 106 and 130 and Statement 9. Federal emergency planning guidance is based on NCRP Reports 111, 116, and 138 and Commentary 19 and was updated with NCRP Reports 161 and 165.

NCRP Committee 1 is charged to revise NCRP Report 116 and include unaddressed exposures such as patient and caregiver doses, naturally occurring and technologically enhanced naturally occurring radioactive materials (NORM and TENORM), and exposure to nonhuman species. A clear definition of the concept of detriment is also sorely needed. Report writing has begun and a draft is expected in 2017; the challenges and mission of the NCRP continue.

At the conclusion of Kase’s lecture, Boice presented the first Warren F. Sinclair medal to Kase.

**Session 1: Basic Standards**

Cochaired by Michael Boyd and Renate Czarwinski

The first speaker in Session 1: Basic Standards was Edward (Ted) Lazo, of the Organisation for Economic Co-operation and Development Nuclear Energy Agency, who presented “Evolution of the Radioprotection System and Its Implementation.” There have been numerous changes from International Commission on Radiological Protection (ICRP) Publication 60 to Publication 103—and even more from Publication 103 to the post-Fukushima era. Decision-making was a radiation protection process in Publication 60, with extensive stakeholder involvement added in Publication 103. However, the Fukushima Daiichi accident broadened the base of stakeholders and increased the emphasis on stakeholder input. Optimization is also evolving and becoming more central to the decision-making process. The ICRP approach was also broadened to include psychosocial aspects following the Fukushima accident. Decision making during and after an emergency is informed by science but driven by other things. The prevailing circumstances are extremely important and decisions will depend on site-specific circumstances; consequently, limitation of dose rather than specific dose limits may be the guiding principle. In planned situations, we use justification, optimization, and limitation, but in emergency and existing situations, optimization and justification drive limitation. Although the ICRP system is robust, experience suggests that practical applica-
tion is different from recommendations and depends on stakeholder engagement and prevailing circumstances.

The next speaker was Jonathan D. Edwards, U.S. Environmental Protection Agency (EPA), who presented “Federal Directions in Radiation Regulations: Making the ‘Old’ New Again.” The question for the future is, “Because change is rapid and inevitable, is the nature of our work and regulations correct?” One stressor is the rapid growth and expansion of technology, e.g., the Internet, computerized tomography (CT), fracking, and in-situ uranium leaching. Another is climate change as it affects next-generation nuclear and energy-sector growth. Aging plants need life extension, but there is no spent fuel repository; the belief was spent fuel would remain on site only 18 months. What about exposures of sensitive subpopulations? We also need to look at rule effectiveness, e.g., although speed limits are strictly enforced, compliance is still low. Are there better ways to write regulations? Can the as low as reasonably achievable (ALARA) concept be applied elsewhere? Are rules overly complicated? Rules need applicability and simplicity, compliance should be easier than noncompliance, and requirements should be protective, reasonable, clear, achievable, and enforceable. Thorny issues remain: how to incorporate age, gender, and individual susceptibility? How best to set standards and ALARA goals? Is collective exposure useful? How clean is clean? Is international consistency and use of International System (SI) units necessary? Some updates on the EPA agenda include nuclear power plant operations, in-situ uranium leaching, PAGs, transuranic (TRU) waste disposal, and standards for air pollutants. On NRC’s plate are tissue-weighting factors and remaining ICRP 2 standards in regulations. The Department of Energy’s (DOE) menu includes technical standards and incorporation of ICRP 60. Department of Homeland Security (DHS) efforts focus on terrorism recovery. A National Aeronautics and Space Administration issue is high atomic number and energy (HZE) particle radiation. All agencies are moving towards ICRP 103 and the basic safety standards, and safety culture may be a good way to move the regulations forward.

Session 2: Source Security
Cochaired by Isaf Al-Nabulsi and Ruth McBurney

The first speaker in Session 2: Source Security was Joseph Klinger, Illinois Emergency Management Agency, who presented "Enhanced Radioactive Material Source Security.” Back in 1998, 31 agreement states were regulating about 80% of the source licensees in the country. Source security was regulated as part of public health and safety, although some incidents involved orphan sources and some involved inadvertent melting of sources, with average cleanup costs of $12 million. The Conference of Radiation Control Program Directors (CRCPD) created a working group on orphan source strategy and set up a mechanism to find and dispose of sources, but the group could not get funding. The World Trade Center attacks changed the paradigm to include malevolent use of radioactive sources; funding was provided by the NRC, and over 400 sources have been disposed of since. The NRC identified the need for enhanced security including background checks of employees and issued orders in 1993 for licensed sources over 370 TBq, mostly irradiators. In January 2004, International Atomic Energy Agency (IAEA) TecDoc 1034 provided quantities of concern that were adopted into 10 CFR 37. Security requirements include access control, trustworthiness and reliability monitoring of employees, background checks and fingerprinting, Federal Bureau of Investigation criminal history checks, and a national source-tracking system. The requirements of 10 CFR 37 affect 1,400 radioactive material licensees and include personnel reliability checks, an
approved security plan, reporting requirements, and assessment of suspicious activity. The Off-Site Source Recovery Project (OSRP) operated by Los Alamos National Laboratory (LANL) recently removed the one-millionth curie (37th PBq) of unwanted radioactive material.

The next speaker was Kathryn H. Pryor of Pacific Northwest National Laboratory, who presented “End of Life Decisions for Sealed Radioactive Sources.” There are about two million sealed sources in the United States, with tens of thousands of them currently unused, but not disposed of. Over 100 sources worldwide (30 in the United States), mostly 137Cs and 60Co sources, have been accidently melted since 1982, and scrap metal recyclers now monitor incoming material. Contaminated consumer products include rebar, steel shovels, tissue box holders, and pet food bowls, and serious injuries can occur with inadvertent contact or possible malevolent use, as can environmental contamination. Contributing factors for source loss include the lack of an upper bound for activity of a generally licensed device and the large number of devices that may be possessed; although sources are required to be registered, registration is not licensing. There is no annual possession fee, disposal is expensive, and source recycling opportunities are limited; financial assurance guarantees need to cover actual costs. A CRCPD working group is considering a cradle-to-grave cost structure. Recommendations are to limit storage time, increase regulatory control over category 3 and higher sources, and support and expand opportunities for reuse and recycling. Waste disposal eased a bit when the Waste Control Specialists site in Texas began accepting out-of-compact waste. There is a need to improve availability of Type B shipping containers, encourage use of alternative technologies, and use existing programs for recovery and disposal of orphan sources. The OSRP, which focuses on TRU and high-activity beta-gamma sources, and the Source Collection and Threat Reduction Program partnership between CRCPD and the National Nuclear Security Administration have recovered more than 38,000 sources.
for greater-than-class-C waste other than Yucca Mountain; DOE also disposes of government-produced TRU waste at the Waste Isolation Pilot Plant site near Carlsbad, New Mexico (although this site currently is temporarily closed). Radiation protection experts can help by being sources of information for all.

The next speaker was John W. Herczeg of DOE, pinch-hitting for Peter B. Lyons, who was unable to attend. The topic was “Management of Used Fuel and the Nuclear Fuel Cycle.” The DOE is responsible for weapons complex, naval and research reactor, and commercial greater-than-class-C waste. A new project office has been formed to look at SNF storage and transport, and another office has been formed for SNF disposal. Recent reports asked if there could be certain advantages to disposing of DOE waste separately from commercial waste. DOE waste is only 15% of the total, half in the form of glass, and half in the form of treated calcined waste—very different from commercial SNF. High-level waste disposal is being investigated at the Hanford and Savannah River sites. Small capsules of mostly $^{137}$Cs and $^{90}$Sr may be candidates for borehole disposal. Defense waste is not as thermally hot as commercial SNF, so borehole disposal may be feasible. Borehole location options include salt, clay, and granite formations, but although the borehole concept has been around for a long time, not much scientific data are available. Consequently, DOE is looking for a test program on relatively large-diameter, deep (5 km) boreholes and is considering a phased approach with boreholes for waste that is not thermally hot.

**Session 4: Medical**

**Chaired by Donald L. Miller and Michael A. Noska**

The first speaker in Session 4: Medical was John P. Winston, state of Pennsylvania, who presented “Revision of Suggested State Regulations.” One CRCPD mission is to promote consistency among state regulations; 25 working groups are charged with developing suggested state regulations (SSR). A new SSR on medical events is under review and will cover diagnostic medical events, including unintended skin dose, dose to an unintended organ other than skin, dose to the wrong patient, and dose to the wrong site of the right patient. High doses during therapy procedures may well be intended, so the key word is now “unintended” dose. General and administrative requirements are included since radiation safety practice gets sloppy in the absence of rigorous review, and simple calibration is not sufficient. Digital systems do not eliminate the need for adequate record keeping and performance testing. Standards are provided for fluoroscopic systems where sterile fields or special procedures preclude the use of standard measures such as drapes. A qualified physicist must evaluate all modes clinically used on each fluoroscopic unit at least annually. For fluoroscopically guided interventional procedures, a radiation protocol committee is charged with implementation of substantial derived reference levels, evaluation of digital diagnostic equipment with quality management protocols, and annual evaluation by a physicist; protocols must be secured from unauthorized change. CT systems used solely for therapy planning are exempt from any requirements. Cone beam CT quality control tests should be provided by the manufacturer and performed by a qualified medical physicist (QMP), but annual evaluation of low-end systems (less than 100 kV or 20 mA) is not required. Review comments requested an alternative pathway for QMP reviews, and the term “qualified individual” was added after QMP. The draft SSR has been sent to the U.S. Food and Drug Administration for review, and comments are being resolved. The SSR Committee hopes to have a final version ready by the CRCPD meeting in May.
The final speaker of the afternoon session was Lawrence T. Dauer, of Memorial Sloan-Kettering Cancer Center, who presented “NCRP Guidance on Radiation Dose for the Lens of the Eye (SC 1-23 Commentary).” A draft of the document prepared by NCRP Scientific Committee 1-23 is currently under review. In 2012 ICRP recommended an annual limit of 20 mSv to the lens of the eye. Many questions remain: should the effect be considered stochastic or deterministic, what is the dose rate effect, what is the measure of detriment, and should the NRC change the dose limit? Lens epithelial cells migrate, elongate, and denude; radiation may shorten the processes, and some cells may retain a nucleus or line up improperly. The NCRP commentary covers the biology of the lens and radiation effects on it. General conclusions from review of the epidemiology literature are that there is a strong likelihood of a relation between ionizing radiation and lens opacities, but there is still much uncertainty, and there may be no threshold. Many studies of exposed populations do not provide dosimetry data, and it is not clear if the effect measured is detectable lens opacity or clinically significant opacity; confounding factors such as age may or may not have been considered. The Electric Power Research Institute has just finished a quality review of the epidemiology literature, concluding that 24 studies are informative or important, and 34 studies are unreliable. Of the former that provided odds ratios, only four exposed groups were included: atomic-bomb survivors, Chernobyl liquidators and cleanup workers, clinically exposed infants receiving radiation therapy, and radiography technologists. Posterior subcapsular, cortical, and mixed cataracts have a significantly positive odds ratio at about 1 Gy, but nuclear cataracts do not. Only the atomic-bomb and Chernobyl studies looked at thresholds, but there are too few data for specific conclusions. No new limit is needed for public exposure, but limits are needed for medical workers, nuclear facility workers, industrial radiographers, astronauts, and pilots. Personal protective equipment, e.g., face shields, can help with eye protection, but should a protection factor for this equipment be allowed in the regulations? Some studies indicate opacity is a stochastic effect, but the mechanism is unclear. The best epidemiologic data say there is a threshold, so this is recommended by SC 1-23, but a new value of the threshold cannot be estimated at this time. The committee recommends that until sufficient evidence is available to evaluate current dose limits, the ALARA concept should be applied. There is no sufficient justification yet to lower the lens dose limit.

Lauriston S. Taylor Lecture on Radiation Protection and Measurements

The first day of the meeting concluded with the traditional Lauriston S. Taylor Lecture on Radiation Protection and Measurements. The 39th Taylor lecturer was Keith F. Eckerman, of Oak Ridge National Laboratory (ORNL). He was introduced by Dick Toohey, who revealed one of the secrets of internal dosimetry: we roll all the numerous biological and physiological parameters that affect internal dose into a single number, the dose coefficient, which relates the intake of a radionuclide (in Bq) to an organ equivalent or effective dose (in Sv). Eckerman and his group at ORNL have been responsible for generating literally thousands of dose coefficients over the years; as an example, the latest ICRP compendium of dose coefficients in Publication 119 contains about 18,500 dose coefficients!
Eckerman’s lecture was “Dosimetry of Internal Emitters: Contributions of Radiation Protection Bodies and Radiological Events.” Computational dosimetry began with the availability of man-made radionuclides. In 1948 Leonidas Marinelli, Edith Quimby, and G.J. Hine developed a procedure that assumed betas were absorbed locally and gammas were absorbed over an extended range. Simplified geometries such as cylinders were used to represent tissues to calculate doses from radiopharmaceuticals. In 1946 the NCRP formed external and internal dose committees, headed by Gioacchino Failla and K.Z. Morgan, respectively. Morgan and ORNL took on the computational effort and produced NBS Handbook 52, which was taken forward in ICRP Publication 2, setting maximum permissible body burdens and maximum permissible concentrations for air. W.H. Ellett, A.B. Callahan, and G.L. Brownell in 1964–1965 were the first to use Monte Carlo methods to calculate absorbed gamma energy, enabling more complicated geometric models of various organs to be developed. The Society of Nuclear Medicine formed the Medical Internal Radiation Dose (MIRD) Committee in 1965 and developed a general and consistent formulation for absorbed dose that uses the absorbed fraction of the radiation energy, is applicable to all radiations, but depends on the type of the radiation. MIRD Pamphlets 1–5 were published in 1968–1969. ICRP Publication 30 and later revisions were generated by the ICRP Dose Calculation Committee (DOCAL), which expected to be disbanded after ICRP Publication 38 was published in 1983. Instead, DOCAL expanded to international representation, as Chernobyl showed that radionuclides cross national boundaries. The first set of public dose coefficients appeared in ICRP Publication 56 (1990). The Goiania accident in 1987 included children, and Mark Christy at ORNL extended the MIRD adult phantom to a series of phantoms for children of selected ages; we now use high-resolution voxel phantoms that are age- and gender-specific. The internal dosimetry methodology has gone beyond radiation protection to treatment planning, and the rigor and defensibility of the method has been scrupulously maintained. Eckerman concluded by acknowledging the ORNL team, the ORNL Center for Radiation Protection Knowledge (now led by Nolan Hertel), and his family, the late Patricia Eckerman and their children and grandchildren.

At the conclusion of Eckerman’s lecture, Boice presented the first Lauriston S. Taylor Lecture medal to Eckerman.

**Annual Business Meeting**

On Tuesday, 17 March, Boice called the annual business meeting to order. He began with memorials to members who passed away this year: Warren Sinclair and his wife Joy, Art Upton, and Arthur “Bill” Guy. Chris Whipple, chair of the Nominating Committee, then presented the committee’s report. Newly elected members of the NCRP include Armin Ansari, Daniel J. Barnett, Daniel J. Blumenthal, Eric M. Golden, William E. Irwin, Katherine A. Kiel, Mahadevappa Mahesh, and Donald M. Mayer. Members of the NCRP reelected to another term include William F. Blakely, Brooke R. Buddemeier, Christine A. Donahue, Patricia A. Fleming, Roger W. Howell, Adela Salame-Alfie, and Gayle E. Woloschak. Raymond A. Guilmette and R. Julian Preston were elected as distinguished emeritus members. The serving officers, President John D. Boice, Jr., Senior Vice-President Jerrold T. Bushberg, and Secretary-Treasurer David A. Smith, were reelected. Finally, Jerrold T. Bushberg, Jonine L. Bernstein, John D. Boice, Jr., James A. Brink, Lawrence T. Dauer, Donald P. Frush, William E. Kennedy, Jr., Ruth E. McBurney, Bruce A. Napier, Kathryn H. Pryor, Tammy P. Taylor, Richard E. Toohy, and Gayle E. Woloschak were elected as directors. President Boice expressed his appreciation to William F. Morgan, who completed his term on the Board.

Boice reported that this year NCRP issued Report 175, “Decision Making for Late-Phase Recovery From Major Nuclear or Radiological Incidents” (see S.Y. Chen’s article in the April 2015 issue of Health Physics News, page 20); Commentary 23, “Radiation Protection for Space Activities: Supplement to Previous Recommendations”; Statement 11, “Outline of Administrative Policies for Quality Assurance and Peer Review of Tissue Reactions Associated with Fluoroscopically Guided Interventions”; and a synopsis of Statement 12, “Where Are the Radiation Professionals (WARP)?” Initiatives in 2014 included the establishment of NCRP Committee 1 (Radiation Protection Guidance for the United States) and Committee 2 (Meeting the Needs of the Nation for Radiation Protection, or WARP to Infinity and Beyond, which coincidentally is the topic of the 2016 annual meeting).
The technical program resumed with the 1st Thomas S. Tenforde Topical Lecture. Cool introduced the first Tenforde lecturer, Jacques Lochard, director of the Centre d’Étude sur l’Évaluation de la Protection dans le Domaine Nucléaire (CEPN), vice-chair of ICRP, and past executive secretary of IRPA, whose lecture was “The Ethics of Radiation Protection.” Previous debate about the ethical basis of the radiation protection system centered primarily on abstract concerns about utilitarianism vs. other ethical systems. The objectives of the system are to prevent deterministic effects and reduce the risk of stochastic effects; these objectives correspond to the ethical principles of beneficence and nonmaleficence (do no harm). Prudence is the virtue of using deliberation and judgment in order to make choices without exact knowledge of the scope and consequences of actions. Prudence is closely related to acknowledging uncertainties, e.g., thresholds for deterministic effects, assuming the linear no-threshold model for stochastic effects, and although there is no evidence for hereditary effects in humans, evidence in animals leads to prudent inclusion of that risk in the system. Of the basic principles of radiation protection, justification refers to prudence and beneficence/nonmaleficence, optimization limits inequity among individuals, and limitation involves both prudence and justice. Dose limits reduce inequity and avoid unacceptable exposures. Equity requires that to the extent feasible, like cases be treated alike; the requisites include providing information to the exposed individual, assessing exposure, and involving stakeholders. Stakeholder engagement evolved after Chernobyl to take into account public concerns and expectations about prevailing circumstances, enable effective and fair decisions, and implement empowerment and autonomy. There is a continuous quest for reasonableness and tolerability; use of an objective basis such as cost-benefit analysis has generally failed.

Session 5: Emergency Preparedness
Chaired by Armin Ansari and John MacKinney

The first speaker in Session 5: Emergency Preparedness was Michiaki Kai (chair of ICRP Task Group 93), who presented “Update of ICRP Publications 109 and 111.” ICRP Publication 103 (2007) introduced the situation-based approach: existing exposures require characterization. Planned exposures (typically deliberate exposures) can and should be completely controlled. Emergency exposures require immediate action to analyze and control exposure. The previous approach in radiation protection was focused on planned exposures, but accident situations create numerous issues and have led to difficulty in management of exposures extending into the recovery phase. The necessary protective actions change with time, but stakeholder concerns do not. Some issues in the update of ICRP Publication 109 (2009) include the timing and justification of protective measures, optimization of protection strategies, and criteria for transition from an emergency to an existing situation. Key issues in the update of ICRP Publication 111 (2009) include living in a contaminated area as an existing situation vs. a higher natural background situation. Both measures imposed by authorities and self-help measures are required and a proper radiation protection culture needs to be developed among survivors; reference levels are needed, and nonradiological issues such as psychosocial aspects must be considered.

The next speaker was Sara DeCair of the U.S. EPA, who presented “Updated Dosimetry in the New PAG Manual.” The EPA is transitioning towards using ICRP 60 dosimetry for PAGs. The PAGs are currently based on a 1992 approach, and issues include considerations for using age-specific dose estimates to set different PAGs for different subpopulations. A new draft PAG manual has been distributed for comment. A question is whether the EPA should identify best practices for users of the PAGs? In the 1992 PAGs, age difference was not considered, with the exception of thyroid dose. Early-phase PAGs considered special risk groups that included fetuses and persons who are not very mobile. Intermediate-phase PAGs considered logistics and sensitive subpopulations. The NRC proposal for rulemaking in 10 CFR Parts 20 and 50 may include specific age groups. A
simplified approach is to provide potassium iodide to the entire community if 50 mSv to the thyroid of a one-year-old child is predicted. Age groups are also to be considered for drinking water and foodstuff PAGs. The final PAG document is expected later in 2015. Following that, consideration of ICRP Publication 103 (2007) will begin.

The final speaker was James Blumenstock, of the Association of State and Territorial Health Officials (ASTHO) and the National Alliance for Radiation Readiness (NARR), who presented “National Alliance for Radiation Readiness: Leveraging Partnerships to Increase Preparedness.” NARR has 17 member agencies and 10 federal partners; its goal is to serve as the “voice of health” in radiation preparedness to improve the nation’s ability to prepare for, respond to, and recover from radiation emergencies at the local, state, and national levels. NARR comprises a number of professional organizations including the ASTHO, CRCPD, the Health Physics Society, and others including federal agencies such as the Centers for Disease Control and Prevention, DHS, DOE, and others. The first tool to emerge is a clearinghouse at radiationready.org to share resources, tools, and best practices. NARR was organized in March 2011 and was immediately activated to respond to the Fukushima Daiichi accident. The organization reviewed U.S. public health and medical response to domestic concerns and identified key strengths, shortcomings, lessons learned, and opportunities for improvement. There is a need for stronger, more visible federal leadership; more proactive and timely public information; leveraging of public and private resources; and investment in the public health enterprise. A task group on emergency medical services (EMS) found a decreased willingness by responders to serve during a radiological/nuclear emergency. Information gathered from EMS focus groups included concerns about the effectiveness of training, key messages, and the low priority of radiological threats on hazard and threat analysis and determined that the ability of EMS to respond to contaminated patients varies by jurisdiction and geographic location. Other projects include development of traveler screening guidance, communications/public information templates, and guidance for medical use of Neupogen (filgrastim, a granulocyte-colony-stimulating factor) in an improvised nuclear device situation.

Final Summary

Cool, a member of NCRP and chair of ICRP Committee 4, summarized the meeting, noting that there had been a day and a half of excellent presentations and it would take time to digest all of the information presented. We need to have our foundations right; communicate, communicate, communicate openly and honestly; and value stakeholder input. We have to personally value and respect each individual; be protective, especially when looking forward; and be prepared to do the right things if something doesn’t go the way we expect. We must continue to improve protection with practical, enforceable standards that will accomplish our goals.

Boice summarized the meeting with the song “The Times They Are a-Changin’.” He acknowledged the efforts of the Program Committee and thanked the NCRP staff for their numerous contributions to ensuring the success of the annual meeting. He also expressed his appreciation of the supporting organizations, including military representatives, the Colorado State University audio/visual contingent, and the Hyatt Regency staff. He then reminded us that in less than one year’s time, we will return to explore meeting the needs of the nation in radiation protection. Finally, he thanked all attendees for their interest in the NCRP and radiation protection in the United States.