Health Physics Society's Professional Development School
2009 Faculty bios and chapter abstracts

Faculty	Biographical summary	Topic(s)	Abstract
Steven Collins	**Steven C. Collins** earned a Bachelor's degree in Math with a minor in Chemistry from Arkansas Tech University in May 1970, and a Master of Science in Radiation Sciences (Health Physics) in June 1972 from the University of Arkansas School for Medical Sciences. In July 1972 he began work as a health physicist for the Arkansas Radiation Control Program. After supervising and directing programs in Louisiana and Florida he began work as the manager of the Division of Radioactive Materials for the Illinois Department of Nuclear Safety (IDNS) in 1986. He now serves as the Supervisor of Radioactive Materials Licensing. Steve served as Chairman of the Conference of Radiation Control Program Directors, Inc. (CRCPD) during May 1998 - May 1999 and was on the CRCPD Board of Directors from 1997 to 2000. Steve served from 2004 until 2007 on the Organization of Agreement States (OAS) Executive Board as the Director of the Rulemaking and Compatibility Committee. While Chairman he served as the CRCPD's liaison to the National Conference of State Legislators and the National Governors Association. Steve serves as a state Liaison on the U. S. Nuclear Regulatory Commission's Management Review Board and as a member of the Control of Solid Materials Steering Committee (clearance rule). He was the first state member of the Advisory Committee on the Medical Uses of Isotopes (ACMUI). He also served on the Part 40 Rulemaking Working Group.	**Suggested State Regulations (CRCPD SSRCR Part N)**	A summary of the Conference of Radiation Control Program Directors, Inc. (CRCPD) Suggested State Regulations for Control of Radiation (SSRCR), Part N, for Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) will be provided along with the associated Implementation Procedures document. The summary details what the rule covers and why certain items were included and other items not included, how definitions were used to narrow the scope of what would be considered TENORM for the model rule at the time it was published, the threshold or below regulatory concern level for radium, the use of quick inexpensive field measurements to screen many items to determine applicability of Part N or whether the material could be disposed, and explanation of the "dose based" standard rather than "concentration based" standard, the flexibility allowed for implementation of Part N, specification of how clean is clean, when radon is included in calculations of dose, and why ALARA was excluded from the regulations although the principle is included

Masoud Beitollahi	**Masoud Beitollahi** is a Health Physicist in the Radiological Health Department at the University of Utah. He graduated with B.Sc. in Geology in 1990 followed by a Masters in Sedimentology and Sedimentary Petrology (Geology) in 1996. He earned his Ph. D. in Health Physics from Idaho State University (ISU) in 2007. He has over 28 years experience in the field of radiological monitoring of the environment, radiochemical analysis, measurement and analysis of natural and man-made radionuclides in environmental samples including terrestrial and marine environment. Masoud is an editorial member for the Journal of Radiation Protection Dosimetry (RPD). He is also a plenary member of the Health Physics Society and has more than 30 publications in scientific journals and proceedings of national and international conferences.	**The Geologic Origins and Environmental Behavior of NORM Nuclides**	Naturally occurring radioactive material (NORM) has always been a part of our environment since the creation of the universe. NORM, for our purpose, includes all natural radioactive elements that have origin in earth's crust and its mantle. These terrestrial radionuclides can be found in many geological formations and may be brought to the surface from the deepest layers or strata of the earth via different geological and /geochemical processing. Therefore NORM is widespread and dilute in many natural resources including rocks, soil, water, gas and minerals. However elevated concentrations of these radionuclides are often seen in certain geological materials, namely igneous and sedimentary rocks and ore minerals. The different geochemical properties of these elements cause nuclides to be fractionated in different geological environments. Human activities such as manufacturing, water treatment or mining operations may increase the concentrations of these radionuclides. This chapter is a brief review on the geological origins of NORM and understanding of the biological, chemical, geochemical and other factors that may control the mobility and behavior of NORM in our environment.
Ray Johnson	**Raymond Johnson** directed the Radiation Safety Academy from 1985 until merging with Dade Moeller & Associates in 2007 where he now serves as VP for Training. He previously served as a Commissioned Officer in the US Public Health Service on a permanent assignment to the US Environmental Protection Agency from 1970 to 1985, where he served as Chief of the Radiation Surveillance Branch. Ray began working on NORM issues in 1973 and wrote EPA's first population risk estimate for radon exposures. In	**Communicating NORM/TENORM to the Media and Public** **Case Studies**	Virtually everyone is afraid of radiation, especially of radiation which shows up in places where it is not expected, such as radon in homes, uranium in granite countertops, other naturally occurring radioisotopes in consumer products, and radium in pipe scale. Fears of radiation are a significant underlying factor in all naturally occurring radioactive material (NORM) risk communications. This talk will explore general concerns about radiation and how radiation mythology affects what people believe. When

	1986 he was a charter member of the American Association of Radon Scientists and Technologists and served as President from 1995-1998. He was also a charter member and President of the Health Physics Society's (HPS) Radon Section in 1995-1996. He was the Founder and first President of the National Radon Safety Board in 1997-1999. He was the director of a radon measurements laboratory from 1986 to 2005. He taught radon measurement classes at Rutgers University from 1991-1998. Ray is a past President of the HPS, and served on the Executive Committee as Secretary, Treasurer, and President from 1992-2001. Ray is also a specialist in radiation risk communication and has written over 500 book chapters, articles, papers, training manuals, and presentations on radiation safety, measurements, and risk communication. Ray is a Certified Health Physicist and licensed professional engineer.		one has had no real experience of radiation, fears are based on what people imagine as unacceptable consequences of radiation exposure. Fears are always shaped by images. The most helpful communications on NORM issues will hear, identify, and reflect people's feelings (fears) about radiation. The most powerful tool for effective risk communication is active listening. This approach is to paraphrase and reflect the content and one of four perceived feelings (mad, sad, glad, or afraid). This discussion will provide guidance on how to answer NORM questions and what to say, when you do not know what to say. Lastly we will review an actual NORM communication case study of concerned workers at a paper mill.
		Incidental NORM	Four areas of incidental NORM will be reviewed: 1) radon in houses, 2) radioactivity in tobacco, 3) radioactivity in glassware and ceramics, and 4) radioactivity in granite countertops. Radon in houses will review what is radon, what happens to radon in houses, radon risk assessment, BEIR IV and VI risk models, radon measurement devices (advantages and disadvantages of the primary methods), measurement protocols, and radon mitigation. Radioactivity in tobacco will look at how Pb-210 and Po-210 get into tobacco leaves, deposition in the lungs from cigarette smoking, individual lung dose, and population dose from cigarettes. Radioactivity in glassware and ceramics will consider the historical use of uranium oxides as coloring agents and potential doses to individuals and the population from use of these materials. The discussion on radioactivity in granite countertops will primarily focus on misinformation and misunderstanding of radioactivity in granite, measurements, testing protocols, health risks, and guidelines for safety.

			A great deal of internet information on granite countertops is based on misuse of various radiation detectors and misinterpretation of measurement data.
Phil Egidi	**Phil Egidi** is an Environmental Protection Specialist/Health Physicist with the Radiation Management Unit of the Colorado Department of Public Health and Environment (CDPHE) and has over 20 years experience with characterization and remediation of natural radioactivity in both Federal and State service. He is based in Grand Junction, CO. Phil has an Associate's Degree in Applied Science from Mesa State College in Grand Junction. At CDPHE, his primary duties are as a safety and security inspector and license writer for users of man-made radioactive materials in industry, medicine, and research; he is also the Project Manager for the regulation of the Cotter Cañon City Uranium Mill Superfund Site, the Uravan Superfund site, and the proposed Piñon Ridge Uranium Mill (one of the first new uranium mills to apply for a license in 25 years), and also is the point man for TENORM at CDPHE. He is a principle author of the Colorado Policy and Guidance on TENORM, primarily geared for management of drinking water treatment residuals. Phil is also active on several committees, including the HPS/ANSI N13.53 committee on Control and Release of TENORM, and chairs the CRCPD working group SR-U on the Agreement State template regulations for uranium and thorium recovery. Phil is webmaster of TENORM.com and moderator of the TENORM discussion group.	**Radiological characteristics of NORM/TENORM, Surveys and Instrumentation**	This talk will focus on the physical and chemical characteristics of NORM and TENORM in industrial byproducts. Chemistry plays the major role in fate and transport of radionuclides in the environment. Chemistry also plays a when radionuclides are subjected to industrial processes. All tangible products ultimately come from one of two methods of harvesting natural resources: either they are grown or they are mined. Natural radioactivity comes along for the ride via either method, and may become concentrated when processed. These processes generate either large amounts of residue containing very low levels and concentrations of radioactivity, or small quantities of residues containing relatively high concentrations of radioactivity. It is also possible that associated processes at the same site could be producing both classes of TENORM. When compared with the amount of declared radioactive waste that is disposed in radioactive waste repositories, the amounts of NORM containing residues are orders of magnitude larger. Management of such large amounts of residues poses a significant challenge for these industries. The basic purpose of surveys is to identify the nuclides of interest at a facility, determine what level or extent of contamination exists, quantify exposure rates and determine soil concentrations, if necessary. Instrumentation and its use for detection of NORM/TENORM will be reviewed, suggested survey protocols will be provided, as well as methods for collecting samples for

		Radiation Management Programs and Transportation of NORM/TENORM	laboratory analysis. Different levels of data quality may be required, depending on corporate risk management positions. As can be expected, the higher the requirement for data quality, the higher the cost of making the measurement. Whether by regulatory requirements, corporate policy, the trend toward litigation, or concern for health and safety of workers and the public, the need for effective radiation management is real for industries that generate radioactivity in their wastes, or expose workers to elevated levels of radiation. Most NORM/TENORM is not subject to NRC or Agreement State Radiation Control Regulations. Mining of ores also is not traditionally regulated by NRC or the States, but rather by the Mine Safety Health Administration (MSHA). Nonetheless, environmental insults and worker radiological safety are important, and so are somewhat addressed in this session. NORM/TENORM is subject to State control under general provisions of protection of public health and safety. The licensing approach to a radiation control program is designed for parties who want to possess source, byproduct, or special nuclear material. They have the resources (personnel and equipment) to implement and maintain ALARA programs, waste management, etc. Transportation of radioactive materials in the U.S. is regulated by the Department of Transportation, the U.S. Nuclear Regulatory Commission, and for some special commodities, the U.S. Department of Energy. The U.S. regulations are based on the International Atomic Energy Agency's regulations for safe transport of radioactive material. The IAEA regulations are risk-based pertaining to risks to transportation workers and

			for accident scenarios. This portion of the session will focus on DOT regulations for transporting NORM/TENORM. NRC regulations will be discussed briefly for those situations where licensed NORM is being shipped (e.g., 11(e).3 byproduct material.) Radioactive materials forms, packages, activity limits, restrictions, markings, labeling, shipping papers, training and quality requirements will be introduced.
Ralph Johnson **Lynn McKay**	**Ralph H. Johnson** began his career in radiation litigation 30 years ago as an Assistant United States Attorney in Salt Lake City, Utah, where he successfully defended the federal government in the first Nevada Test Site downwind cases. Eventually, as a senior trial attorney and assistant director in the Justice Department, he led the radiation litigation team that successfully defended the United States in thousands of radiation cases. He received numerous awards from the Attorney General for his achievements in radiation litigation. In 1988, he entered private practice and defended Chevron, Shell and other major oil companies in many naturally-occurring radioactive material lawsuits. In 1990, the Justice Department requested that he return as a Special Attorney to the Attorney General to defend the government in hundreds of cases filed by Nevada Test Site employees or their families alleging radiation-related diseases. After successfully defending the NTS workers' claims, he returned to private practice, representing corporations in cases alleging tritium leaks, nuclear worker exposures, residential exposures from nuclear power plants, depleted uranium exposures, and NORM property contamination. He has been named as one of the leading attorneys in Washington, D.C. by two different publications and has received the highest possible rating by Martindale-Hubbell. He was	**Expert Testimony in Litigation Involving NORM and TENORM**	Health physicists who serve as expert witnesses, consultants or advisers in NORM litigation must be aware of the legal standards and requirements that may be applied to their work. While many of the requirements are common sense or consistent with best scientific practices, it is important to be aware of certain legal rules and expectations that may also apply to research and studies that are conducted for, or may be used in litigation. Using examples from recent radiation cases, we will review health physics evidence prepared and presented in those cases, and will evaluate that evidence using the requirements for admissibility articulated in Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 592 (1993) and state and federal evidentiary rules. We will also discuss the influence that the health physicists' work had on the outcome in each case. Through this discussion, we will clarify issues that typically arise in litigation involving injuries associated with radioactive materials and the role that radiation science plays in resolving those issues.

	nominated for plenary membership in the Health Physics Society (HPS) in 1986 by Lauriston Taylor and has been a frequent lecturer at HPS meetings. **Lynn McKay** has focused her practice on radiation litigation for nearly 20 years. She has defended a variety of lawsuits involving oil and gas NORM, nuclear power plants, depleted uranium and atomic weapons testing. Her work on these cases includes the first defense verdict by a jury in an oil field NORM case, dismissal of personal injury claims by contract workers at nuclear power plants, and denial of class certification in an oil field NORM pipe yard case. She also counsels clients on matters involving compliance with NRC regulations, and other state and federal controls for radioactive materials. Ms. McKay is a plenary member of the Health Physics Society, and has given presentations at Health Physics Society meetings on legal topics such as expert witnesses, radiation litigation, and terrorist events involving radioactive materials. She is a member of Women in Nuclear (WIN) and is a co-chair of the energy special interest group for the Women's Council on Energy and the Environment (WCEE).		
Richard Kouzes	**Richard Kouzes** earned his Ph.D. in physics from Princeton University in 1974 and did postdoctoral work at Indiana University. He is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and a Fellow of the American Association for the Advancement of Science (AAAS). He is a founder and past chair of the IEEE Committee for Computer Applications in Nuclear and Plasma Sciences, a member of the IEEE Nuclear and Plasma Sciences Society (NPSS) Administrative	**NORM Impact on Interdiction at Borders**	Detection and interdiction of nuclear, chemical, and biological weapons of mass destruction/disruption has become a priority for nations around the world. Large numbers of vehicles pass through international border crossings each day. The desire to interdict radiological material, including weapons and weapons material, has led to multiple deployments of instrumentation to detect radiation signatures at borders and within nations. The

	Committee, and the webmaster for NPSS. Richard is currently a Laboratory Fellow at the Department of Energy's (DOE's) Pacific Northwest National Laboratory (PNNL) working in the areas of neutrino science, homeland security, non-proliferation, and computational applications. He was the director of the Radiation Detection and Analysis Laboratory for PNNL as part of the Homeland Security Initiative. He is an adjunct Professor of Physics at Washington State University, and formerly a Professor of physics at West Virginia University. Richard was also a Senior Research Physicist and Lecturer at Princeton University, where for 15 years he was a leading researcher in solar neutrino and nuclear structure experimentation. He is the author of over 380 papers		presence of naturally occurring radioactive material in the normal flow of commerce can have a negative impact on the methods for interdiction of radiological threats, and thus must be addressed with the instrumentation used.
David Kocher	**David C. Kocher** is a senior scientist at SENES Oak Ridge, Inc., Center for Risk Analysis. He has more than 30 years of experience in environmental health physics, assessments of radioactive waste disposal, and assessments of human health risks from exposure to radiation. He has published and lectured widely on regulations to control exposures of the public to radionuclides and hazardous chemicals in the environment, with particular emphasis on the fundamental difference in the approach to regulating radionuclides under the Atomic Energy Act and the approach to regulating radionuclides and hazardous chemicals under other laws and development of a risk-based framework to harmonize regulations developed under different laws. He has authored or co-authored more than 200 publications and has presented more than 80 short courses and lectures on a variety of topics in health physics and radioactive waste management and disposal. He	**Federal Laws and Regulations on Control of Exposure to Naturally Occurring and Accelerator-Produced Radioactive Materials (NARM).**	This presentation discusses federal laws and regulations concerned with control of exposure of workers and the public to naturally occurring and accelerator-produced radioactive material (NARM). Regulations that apply to entities other than federal agencies, referred to as the non-federal sector, are emphasized. Essentially all occupational exposures to NARM in the non-federal sector are regulated by federal agencies. However, not all sources of public exposure to NARM in the environment are regulated by federal agencies. An understanding of how public exposures to NARM in the non-federal sector are regulated by federal agencies thus is important to identifying types of NARM in the environment that can be regulated only by the states. In addition to describing federal laws and regulations that apply to NARM in the workplace or the environment, this presentation discusses the fundamental difference in approaches to

	is a Fellow of the Health Physics Society.		regulation under the Atomic Energy Act and other laws and the lack of unified systems for radiation protection of workers and the public under federal laws and regulations.
Dan Strom	**Daniel C. Strom** earned a Ph.D. in Radiological Hygiene from the University of North Carolina at Chapel Hill in 1984. He was certified by the ABHP in 1980, chaired the Part II Panel of Examiners for the 1993 Exam, and served on the AAHP board of directors. Dan's work experience includes over 5 years as a medical and academic radiation safety officer, 8 years as a faculty member in health physics at the university of Pittsburgh, and more than 15 years as a staff scientist in Radiological Sciences and Engineering Group at the Pacific Northwest National Laboratory. Dan was Associate Editor of Health Physics 1994-2003, a Fellow of the HPS since 2001, Director of HPS (2008-2011), and a Council Member of NCRP starting in 2002 where he chaired the committee that wrote Report 146, Approaches to Risk Management at Radioactively Contaminated Sites. Dan's active research interests include quantitative risk analysis for radiological and chemical hazards, models relating radiation and detriment (cancer and heritable ill-health), radiation doses from intakes of radionuclides, and applied statistical inference in support of these topics. He has worked on the DOE Mayak Worker Dosimetry project since 2006.	**Properties of Natural Radiation and Radioactivity**	Ubiquitous natural sources of radiation and radioactive material (naturally occurring radioactive material, NORM) have exposed humans throughout history. To these natural sources have been added technologically-enhanced naturally occurring radioactive material (TENORM) sources and human-made (anthropogenic) sources. This presentation describes the ubiquitous radiation sources that we call background, including primordial radionuclides such as 40K, 87Rb, the 232Th series, the 238U series, and the 235U series; cosmogenic radionuclides such as 3H and 14C; anthropogenic radionuclides such as 3H, 14C, 137Cs, 90Sr, and 129I; radiation from space; and radiation from technologically-enhanced concentrations of natural radionuclides, particularly the short-lived decay products of 222Rn ("radon") and 220Rn ("thoron") in indoor air. These sources produce radiation doses to people principally via external irradiation or internal irradiation following intakes by inhalation or ingestion. The effective doses from each are given, with a total of 3.11 mSv y-1 (311 mrem y-1) to the average US resident. Over 2.5 million US residents receive over 20 mSv y-1 (2 rem y-1), primarily due to indoor radon. Exposure to radiation from NORM and TENORM produces the largest fraction of ubiquitous background exposure to US residents, on the order of 2.78 mSv (278 mrem) or about 89%. This is roughly 45% of the average annual effective dose to a US resident of 6.2 mSv y-1 (620 mrem y-1) that includes medical (48%), consumer products and

			air travel (2%), and occupational and industrial (0.1%). Much of this chapter is based on National Council on Radiation Protection and Measurements (NCRP) Report No. 160, "Ionizing Radiation Exposure of the Population of the United States," for which the author chaired the subcommittee that wrote Chapter 3 on "Ubiquitous Background Radiation."
Brian Vetter	**Brian J. Vetter** is the Radiation Safety Officer for the University of Minnesota and its medical center's University hospital. Prior to this appointment in 2007 he was a health physicist in the University's Department of Environmental Health and Safety for fifteen years. He earned a Master of Science in Nuclear Engineering from the University of Missouri in 1992, completing the program under a fellowship granted by the Institute of Nuclear Power Operations, National Academy for Nuclear Training. Since 1994 Brian has participated in Minnesota's Radiological Emergency Preparedness Program as a technical advisor of radiological health to the state's Homeland Security and Emergency Management division. He is active in the regional chapter of the Health Physics Society, including holding various executive offices and participating in the chapter's outreach and education efforts.	**Administrative Dean**	

Andy Karam	**P. Andrew Karam** is a certified health physicist whose career in radiation safety began in 1981 when he enlisted in the Navy's nuclear power program; where, among other things, he was in charge of radiation safety on a nuclear submarine. Since that time, he has worked for the State of Ohio, an environmental consulting company, the Ohio State University, the University of Rochester, where he spent 5 years as the Radiation Safety Officer, and most recently as a private practice consultant and an author. He is board-certified in health physics and has earned a Ph.D. in Environmental Science from the Ohio State University. Andy is currently Chair of the Health Physics Society's International Collaborations Committee and he has previously served on the HPS Board of Directors and as Chair of the HPS ad hoc Committee on Media Relations. Other professional work includes serving on two NCRP committees, a National Academies of Science subcommittee on depleted uranium, and has completed several missions on behalf of the IAEA. He has recently accepted a position with the New York City Department of Health and Mental Hygiene where he will work on issues related to radiological and nuclear emergency preparedness and response.	**Academic Dean**	