HPS Midyear – PEP Abstracts
SUNDAY, FEBRUARY 1, 2015
8:00 am – 10:00 am

PEP 1-A
FRMAC Dose Assessment Methodology as it relates to the Revised EPA PAG Manual - Part I
Thomas Laiche

The Department of Energy's Federal Radiological Monitoring and Assessment Center (FRMAC) is an asset comprised of representatives of multiple federal agencies that are available on request to support a response to nuclear/radiological accidents and/or emergencies. The FRMAC works with multiple agencies such as the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA) to establish consistent radiological dose assessment methods to support public protection guidance provided by the EPA's and FDA's Protective Action Guides (PAG). The revised EPA PAG Manual references the FRMAC Assessment Manual (FAM) for radiological dose assessment methods in support of protective action decisions. This presentation provides an overview of the FRMAC Assessment Manual, describes the default methods for radiological dose assessment and introduces the Turbo FRMAC software tool that automates these assessment methods.

Attendees should go to the following website to register to obtain a free copy of the Turbo FRMAC software:

https://nirp.sandia.gov/

Attendees should plan on bringing a laptop with the software loaded to the class.

Part 1: Introduces the FRMAC function, organizational structure and support capabilities; Introduces the EPA and FDA Protective Action Guides; Introduces the FRMAC Assessment Manual format and tables; Presents several mathematical concepts used in the dose assessment methods; Introduces the software tool, Turbo FRMAC. Students are encouraged to attend all three sessions as each builds upon lessons and information presented in the previous class.

Part 2: Presents an overview of the dose assessment methods and mathematical calculations used for Public Protection; Demonstrates the use of the software tool Turbo FRMAC to generate Public Protection dose assessments. This presentation is follow-on to Part 1 and builds on the information presented there.

Part 3: Presents an overview of the dose assessment methods and mathematical calculations used for the Ingestion Pathway; Demonstrates the use of the software tool Turbo FRMAC to generate ingestion dose assessments. This is a follow-on to Parts 1 & 2.

PEP 1-B

The Essentials of Health & Safety at the Boundaries of Radiation Safety:

A Three Part PEP Course Series (PART I)

Robert Emery, DrPH, CHP, CIH, CBSP, CSP, CHMM, CPP, ARM and Janet Gutierrez, DrPH, MPH, CHP

In actual practice, there is virtually no work setting where the health and safety risks are limited solely to radiological agents. Fire safety, occupational safety, and chemical safety risks are ubiquitous in laboratory and production settings, and potentially infectious agents can also be present. Issues regarding insurance coverages and policy limitations also play an important role in decision making. Given the diversity of possible risks and exposures, it is prudent for radiation safety professionals to familiarize themselves with the essential aspects of these other specialty areas of loss control. This course series is designed specifically for the radiation safety professional to afford a baseline orientation to a series of parallel health and safety professions with which a radiation safety professional commonly interacts. Each section begins with a discussion of the relative public health impact of each specialty area presented, and ends with a description of the simple things a radiation safety professional can do to assist keeping the overall organization safe and compliant. Ample time will be allocated for questions, answers and discussion. The PEP series consists of three 2 hour segments:

Part 1 will address "The Basics of Risk Management & Insurance" and "The Basics of Fire & Life Safety". The risk management & insurance portion of the session will address the issues of retrained risks (those which are not covered by insurance) and transferred risks (those covered by a financial vehicle), and how these aspects impact radiation safety operations. Included in the fire & life safety segment will be a discussion on the basic elements of the life safety code and the fire detection and suppression systems. The requirements for means of egress will also be discussed

Part 2 will examine "The Basics of Biological & Chemical Safety" and "Radiation Safety's Role in Mitigating the 'Insider Threat' Risk". The first part of this session will address the classification of infectious agents and the various assigned biosafety levels. Aspects of chemical exposures, exposure limits, monitoring and control strategies will also be discussed. The second part of the session will focus on the security threat 'insiders' represent to an organization and radiation safety's unique opportunity to mitigate such risks.

Part 3 will focus on "Radiation Protection Program Metrics That Matter (to Management)". Radiation protection programs typically accumulate data and documentation so that regulatory officials can assess compliance with established regulations. The implicit logic associated with this activity is that compliance equates to safety. But in this era of constricted resources, mere regulatory compliance is no longer sufficient to justify all necessary programmatic resources. Radiation protection programs are now expected to readily demonstrate how they add tangible value to the core missions of an organization. The demonstration of this value is expected to be in the form of some sort of performance metrics, but this is an area in which many radiation safety professionals have not been trained. The issue is further compounded by the need to display the metrics in manners that are succinct and compelling, yet

another area where formal training is often lacking. This session will first describe a variety of possible radiation protection program performance measures and metrics, and then will focus on the display of the information in ways that clearly convey the intended message. Actual before and after data display "make-overs" will be presented, and ample time will be provided for questions, answers, and discussion.

Each PEP segment is designed so that participants can take any session individually, although the maximum educational benefit will be derived from the participation in all three sessions. The particular topics included in the PEP series have been consistently identified as extraordinarily useful to participants in the highly successful week-long "University of Texas EH&S Academy". Ample time will be allotted for questions answers and discussion, and each segment will be supplemented with key reference information.

PEP 1-C
Basic Training for the NRRPT exam – Theory
Tom Voss and Paul Steinmeyer

This class presents the theory behind the operation of radiation detection instruments. The primary reference materials are taken from Glenn Knoll "Radiation Detection and Measurement",James Turner "Atoms, Radiation, and Radiation Protection", and the wide experience of the instructors. The instructors have many years of experience with radiation detection instruments. The lead instructor began his career in radiation instrumentation in 1967, working at a commercial nuclear power plant (then under AEC rules). The co-instructor has more than 30 years of experience in developing radiation detectors and programming software for their use. Between the two instructors their experience covers working with the AEC, NRC, DOE, US Military, Research, and the commercial world. The types of instruments covered include – ion chambers, plastic scintillators, ZnS scintillators, solid scintillators (NaI, HPGe, CsI, CLYC, etc.), liquid scintillators, solid state detectors, GM detectors, gas proportional detectors, air proportional detectors, and sandwich detectors. In addition to the theory of the operation of radiation detectors, their mechanical construction will be presented. Examples of various radiation detectors will be on display.

PEP 1-D
Title: Fundamentals of Gamma Spectroscopy
Instructor: David Pan

This course offers a fast-paced review of the basic principles of gamma spectroscopic analysis. The course includes a review of the nature and origins of gamma emitting radioactivity, basic physics of gamma interaction with matter, consequences of gamma interactions on gamma spectra, gamma spectroscopy system components and calibrations, gamma spectroscopy analysis methods, and interpretation of gamma spectroscopy data.

10:30am – 12:30 pm
PEP 2-A
FRMAC Dose Assessment Methodology as it relates to the Revised EPA PAG Manual – Part 2
Thomas Laiche
See description above

PEP 2-B
The Essentials of Health & Safety at the Boundaries of Radiation Safety:
A Three Part PEP Course Series (PART II)
Robert Emery, DrPH, CHP, CIH, CBSP, CSP, CHMM, CPP, ARM
Janet Gutierrez, DrPH, MPH, CHP
See description above

PEP 2-C
Basic Training for the NRRPT exam - Practical Applications
Tom Voss
Paul Steinmeyer

This class presents the practical applications of the use of radiation detection instruments and radiation protection. The primary reference materials are taken from Dan Gollnick "Basic Radiation Protection Technology" and the wide experience of the instructors. The instructors have many years of experience with radiation detection instruments. The lead instructor began his career in radiation instrumentation in 1967, working at a commercial nuclear power plant (then under AEC rules). The co-instructor has more than 30 years of experience in developing radiation detectors and programming software for their use. Between the two instructors their experience covers working with the AEC, NRC, DOE, US Military, Research, and the commercial world. Radiation instrumentation calibration techniques will be presented. Radiation survey techniques will be explored. The connection between radiation instrument calibration and radiation instrument usage will be discussed. The limitations and interferences for various detector types will be explored in detail. Remember; almost every type of radiation detector responds to almost every type of radiation!

PEP 2-D
Integration of Health Physics into the Medical Management of Radiation Incident Victims
Stephen L. Sugarman, MS, CHP, CHCM

In the event of a radiation incident it is essential that the radiation dose a patient may, or may not, have received is rapidly assessed so that proper medical treatment can be planned. The initial information needs to be easily obtained and able to provide a realistic potential of dose magnitude. Various techniques can be employed to help gather the necessary information needed. Evaluation of nasal swabs and wound counts can help with ascertaining the potential for significant intakes of radioactive

materials, and mathematical dose estimations can help with determining the potential magnitude of external doses. Externally contaminated areas must be assessed so that treatment and decontamination priorities can be determined. As time goes on and more information, such as bioassay or biological dosimetry data, is received the health physicist will be called upon to interpret that data and communicate its meaning to the healthcare staff. Support duties can also include assistance with communicating with the patient, other medical staff, or external entities such as regulators and the media. Coupled with a good event history and other data, health physicists and physicians can develop a strategy for providing proper medical care to individuals who may have been involved in a radiological event. It is, therefore, essential that health physicists are able to seamlessly integrate themselves into the patient care environment. This PEP will describe methodologies to rapidly assess radiation doses and use real case reviews to reinforce the teaching points.

PEP 3-A
FRMAC Dose Assessment Methodology as it relates to the Revised EPA PAG Manual – Part 3
Thomas Laiche
See description above

PEP 3-B
The Essentials of Health & Safety at the Boundaries of Radiation Safety:
A Three Part PEP Course Series (PART III)
Robert Emery, DrPH, CHP, CIH, CBSP, CSP, CHMM, CPP, ARM
Janet Gutierrez, DrPH, MPH, CHP
See description above

PEP 3-C
Basic Training for the NRRPT exam - Review of the applicable CFRs
Tom Voss
Paul Steinmeyer

This class presents the interpretation of the CFRs applicable to radiation protection. The class concentration is on 10CFR19, 10CFR20, 10CFR30, 10CFR34, 10CFR35, 10CFR835, 29CFR1910, and 49CFR100-199. The CFRs are the federal laws that govern our work with radiation, an in-depth knowledge and understanding of those CFRs is vital to the radiation professional. The instructors have many years of experience with radiation detection instruments. The lead instructor began his career in radiation instrumentation in 1967, working at a commercial nuclear power plant (then under AEC rules). The co-instructor has more than 30 years of experience in developing radiation detectors and programming software for their use. Between the two instructors their experience covers working with the AEC, NRC, DOE, US Military, Research, and the commercial world.

PEP 3-D

How Randomness Affects Our Decisions for Radiation Safety

Ray Johnson, MS, PSE, PE, FHPS, CHP
Radiation Safety Counseling Institute
Rockville, MD

As health physicists we understand that radiation is a random phenomenon. We also understand that our practice of ALARA is to minimize the future random chance of cancer. Thus, dealing with randomness is a normal part of our practice as specialists in radiation safety. Unfortunately, most of the rest of the world wants to deal only with absolutes and does not want to know about uncertainty or probabilities. Most people want specific answers to questions such as, "Am I safe or not safe?" "Will I be harmed or not harmed?" Most people do not want to hear about risk estimates. When presented with a probability of cancer as a risk of one out of some number of those exposed, they will often conclude that they are the one. Or, not understanding risk probabilities, they may substitute an easier question, such as, "How do I feel about getting cancer?" This is a question they can readily answer without any knowledge of radiation science or statistics. This approach eliminates any concerns for randomness or probabilities. Everyone knows of someone who has had cancer and they are aware of the horrible consequences. The prospects of radiation causing cancer become an overwhelming influence on decisions for radiation safety. Our natural human instincts for safety are not well suited to situations involving randomness or uncertainty. Thus, while people may not be certain about the risks of radiation effects, they are certain that they do not want to become a victim of cancer.

How do people make judgments and decisions when faced with imperfect, incomplete, or uncertain information? Research has shown that when chance is involved, people's thought processes are often seriously flawed. What are the principles that govern chance, the development of ideas about uncertainty, and how those processes play out in decisions for radiation safety? We will look at how we make choices and the processes that lead us to make mistaken judgments and poor decisions when confronted with randomness and uncertainty. When information is lacking, this invites competing interpretations. Unfortunately, misinterpretation of data may have very negative consequences. How often is past performance a good indicator of the future? The human mind is built to identify a definite cause for each situation and it can have a hard time accepting the influence of unrelated or random factors. According to Mlodinow, "Random processes are fundamental in nature and ubiquitous in our everyday lives, yet most people do not understand them or think much about them." This PEP session will explore the role of chance in the world around us and how chance affects our decisions for radiation safety.