# PEP Courses - 2016 HPS Midyear Meeting

## Sunday, January 31
## 8:00 AM – 10:00 AM

### PEP 1-A
### FRMAC Assessment Science Overview, Part 1
### Thomas Laiche, CHP

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.

> **Part 1:** Introduces the FRMAC function, organizational structure and support capabilities, the EPA and FDA Protective Action Guides, the FRMAC Assessment Manual format and tables; Presents several mathematical concepts used in the dose assessment methods; Introduces the software tool, Turbo FRMAC.

### PEP 1-B
### Radiation Safety's Role in Mitigating the "Insider Threat" Security Risk
### Emery, RJ and Gutiérrez, JM

While organizations typically maintain many layers of controls to prevent individuals outside the organization from gaining unauthorized access and causing loss or harm, persons who have been granted legitimate access can become an "insider threat", and because they are very difficult to detect, cause over $100 billon is losses annually. Although the typical insider targets money, assets or data, in some cases their actions can also have significant impacts on the health and safety of the workplace and the environment. Because much of an organization's radiation safety program activities are carried out directly with the workers in their workplace, this represents a unique opportunity to assist in the possible detection of insider threats, if aware of the risk factors and characteristics. The threats represented by insiders are discussed and their recognized traits are described so that radiation safety professionals can enhance their situational awareness and report any detected suspicions to the appropriate authorities.

## PEP 1-C
## Radiation dosimetry in nuclear medicine therapy
## Michael Stabin

A variety of radiopharmaceuticals are being used in nuclear medicine therapy. The use of radioiodines to treat thyroid diseases has been well established for decades, but many new agents are being developed to treat a variety of malignant diseases. Calculation of internal dose estimates from animal or human data sets requires knowledge of a number of important principles and relationships in kinetic analysis and dose assessment, and knowledgeable use of available software tools. Patient-individualized dosimetry should be performed for nuclear medicine therapy applications, as is done every day for external beam therapy, but unfortunately is not routine. The goal of any radiation therapy procedure is to maximize dose to malignant tissues while avoiding significant toxicity is normal tissues such as marrow and kidney. This program will give an overview of current radiopharmeceutical therapy applications, and a discussion of standard dose calculation techniques and models. Current issues in radiation biology that are pertinent to the interpretation of calculated dose estimates will also be presented

## PEP 1-D
## Fundamentals of Alpha Spectroscopy
## David Pan

This course offers a fast-paced review of the basic principles of alpha spectroscopic analysis for the Health Physicist. The course includes a review of the nature and origins of alpha-particle emitting radioactivity, basic physics of alpha particle interaction with matter, considerations and consequences of sample preparation for alpha spectroscopy, alpha spectroscopy system components and calibrations, and a primer on interpretation of alpha spectroscopy data.

**Sunday, January 31**
**10:30 AM – 12:30 PM**

## PEP 2-A
## FRMAC Assessment Science Overview, Part 2
**Thomas Laiche, CHP**

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.

**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.

## PEP 2-B
## Tools for Resolving Ethical Dilemmas Encountered by Health Physicists
**Emery, RJ, Gutiérrez, JM and Rios, J**

Because health physicists can encounter ethical dilemmas in the course of their work, guidance regarding ethical decision making has been promulgated by both the Health Physics Society and the American Academy of Health Physics. While these documents are very useful, they do not taxonomically catalog the types of ethical dilemmas a practitioner might encounter. For example, a common ethical dilemma is the conundrum of "dual loyalty", a situation where an individual holds simultaneous obligations to two parties. In the case of health physics, a practicing professional holds an obligation to the workers being protected and to the leadership of the organization, and if these obligations conflict, serious problems can arise. Other common ethical dilemmas include protecting confidentiality and the concept of "principled dissent". Each of these ethical dilemmas will be described and simple techniques for elimination of their occurrence or the mitigation of their effects will be discussed. The rationale for a suggested ongoing dialogue about ethical issues within the radiation safety profession will also be presented for consideration.

## PEP 2-C
## Telling the Truth and Possible Answers for Risk Communication
## Ray Johnson, Radiation Safety Counseling Institute

My studies with the Myers Briggs Type Indicator (MBTI - a trademark of Consulting Psychologists Press) for over 4,000 specialists in radiation safety show that, for most HPs, truth is what can be defended by logical analysis based on fundamental laws and principles and corroborated by peers according to the scientific method for determining the technical truth. However, for much of the general public, truth is determined by what is best for people, taking into account the circumstances, feelings, empathy, values, appreciation, and caring. These two approaches to determining the truth may lead to very different conclusions. While these two views of the truth can be poles apart, both groups will honestly believe they are right and will swear they are telling the truth in a courtroom. The question to consider today is whether telling the "technical" truth about radiation is working? Have public sentiments against radiation mellowed over the decades since the advent of nuclear weapons? I believe most will agree that the public is as concerned about radiation safety today as they were decades ago. After all we now have proof that nuclear technology can go wrong (Three Mile Island, Chernobyl, and now Fukushima Dai-ichi). Apparently the truth we are telling people about radiation risks is not generally accepted. This begs the question, "How do people determine the truth?" Insights on this question have been presented in a series of HPS News articles in 2012-2013. I have attempted to describe how people make decisions on truth for radiation safety based on processing information as normal functions of the subconscious mind. Our subconscious mind is wired to constantly search for signs of danger. However, since radiation does not give us any physical sensation, we have to rely on imagination to determine our safety. Our subconscious mind has been programmed by education and the media to automatically associate all radiation with "Deadly Radiation." Thus, the associations by normal subconscious functions for safety will likely lead to decisions based on images of unacceptable consequences of radiation exposures. This class will explore many questions on effective risk communications, such as: What is the truth? How does truth relate to beliefs, faith, and ethics? What is lying? How do we process data to determine the truth? How does randomness affect decisions for safety? How does radiation mythology affect people's views. And what are possible answers to effective radiation risk communication?

## PEP 2-D
## Fundamentals of Gamma Spectroscopy
## David Pan

This course offers a fast-paced review of the basic principles of gamma spectroscopic analysis for the Health Physicist. 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.

**Sunday, January 31**
**2:00 PM- 4:00 PM**

## PEP 3-A
## FRMAC Assessment Science Overview, Part 1
## Thomas Laiche, CHP

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**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.

## PEP 3-B
## Radiation Protection Program Metrics That Matter (to Management)
## Emery, RJ and Gutiérrez, JM

Radiation protection programstypically 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.

## PEP 3-C
## A Forgotten Nuclear Accident -- Bravo
## Casper Sun, PhD, CHP

This is a PEP presentation based on decades of personal experience from managing the Marshall Islands Radiological Safety Program (MIRSP) at Brookhaven National Laboratory (BNL).
It starts with the selection of Bikini Island for the US Pacific Test Ground in the Republic of Marshall Islands (RMI). Later, on March 1st 1954, the Bravo detonated. Since then, Bikini has never be the same -- space and the people. The catastrophic event was resulted (1) from unpredicted weapon yields and (2) by the nuclear debris and fallout reached to the east of many inhabited Atolls.

BNL scientists, played a important role on the radiological health and medical care of exposed populations funded by the Department of Energy (DOE) for about 40 years. The MIRSP was established for bioassay monitoring and internal dose assessment. The overview will explain the dose assessment methods include whole-body counting, urinalysis and LLNL's environmental and diet/intake studies.

Finally, the presentation summarized and analyzed the operational activity as lesson learned that could applied and implemented to modern emergency planning and accident preparedness.