ORNL; and ANSI N42.35: Evaluation and Application of Radiation Detection Portal Monitors for Use in Homeland Security, chaired by Brian Rees, LANL. The scope, purpose and some details of each of these standards will be discussed in this interactive review. Audience participation is a must in this case.

3-H Radiation Epidemiology for the Health Physicist. ***J.D. Boice, Jr., International Epidemiology Institute and Vanderbilt University Medical Center***

Epidemiology from a radiation perspective will be presented with kaleidoscope coverage of past and present studies of interest to the health physicist. Epidemiology is the study of the distribution and determinants of disease in human populations; but not all studies are equal. Experimental studies (clinical trials) and cohort studies (e.g., atomic bomb survivors) identify individuals with and without exposure and then follow them forward in time to determine cancer outcome. Case-control studies (e.g., prenatal x-ray, indoor radon) identify persons with and without the disease of interest, and then prior radiation exposures are determined and compared. Ecological studies (e.g., cancer risk living near nuclear facilities) compare cancer rates of populations living in geographically defined areas with potential for exposure to cancer rates in populations living in other areas with supposedly lower exposure potential. Actual exposure to individuals, however, is unknown in geographical correlation studies. Epidemiology is an observational science (non-experimental) and is thus susceptible to confounding factors (e.g., smoking) and biasing factors (e.g., differential recall) that can distort study results. Cohort studies are the least susceptible to biases and ecological studies the most. Strengths and limitations of specific radiation studies will be discussed.

3-I Operational Accelerator Health Physics. ***S. Walker, B. May; Los Alamos National Laboratory, Thomas Jefferson National Accelerator Facility***

This class will address general accelerator health physics. Accelerators offer unique and challenging problems for the Health Physicist. Newer and more powerful accelerators are constantly being developed. Monte Carlo codes and other tools are used to predict the outcome of high energy subatomic particles that are accelerated to very high energies. This course will give a broad overview of the various types of accelerators, such as electron, proton and spallation sources, their uniqueness, and the special health physics challenges of working with accelerators. Specific topics to be addressed include accelerator interlock systems, proton accelerators, electron accelerators, spallation targets, ancillary X-ray hazards, prompt and residual radiation hazards, isotope production expectations, rules of thumb for dose expectation, radiation measurements, neutron hazards, dosimetry considerations, beam stop design, radiation measurements inside beam tunnels, and handling of high dose rate targets. The course is directed at the CHP but would also serve as an excellent basis for those studying for the CHP who wish to obtain an overview of accelerator health physics.

Monday - 12:15 - 2:15 PM

M-1 ***Why You Can't Analyze for ^{228}Ra Directly. R. Litman; Radiation Safety and Control Services***

^{228}Ra is the first decay product of naturally occurring ^{232}Th. It is a beta emitter, with a 5.8 year half life. The presence of these isotopes (and their progeny) has in recent years been identified as potential health hazards in drinking water.

The beta and gamma particles emitted by ^{228}Ra are low energy and this provides a significant challenge to the analyst performing routine analytical determination of this isotope.

This presentation identifies a commonly used method for the chemical separation and analysis of ^{228}Ra. The chemistry of the precipitation and separation of radium will be discussed. The most significant aspect of this is the critical timing of the chemical separation steps. The connection of this analysis to other radiochemical analyses for radium on the same sample will be shown.

The concepts of secular equilibrium and time to achieve maximum activity will be discussed with this specific analysis. The final analytical formulas used to determine the actual activity of the isotopes will be constructed from the analytical separation method. The concept of supported/unsupported radioisotopes will be discussed in light of gross alpha analysis and why it does not always represent the true activity in the sample.

M-2 ICRP-66 Applications and Software: Software and Applications of the ICRP Human Respiratory Tract Model (ICRP66) for Health Physics and Industrial Hygiene. ***A.C. James, M.D. Hoover; ACJ and Associates, Centers for disease Control-National Institute for Occupational Safety and Health***

This PEP course illustrates practical applications of the *International Commission on Radiological Protection Publication 66* Human Respiratory Tract Model (HRTM) (ICRP 1994). Radiological dose assessment examples include implementation of new software developed for the U.S. Department of Energy and the National Institute for Occupational Safety and Health /Office of Compensation Analysis and Support (OCAS) (background information on these software projects can be found at http://www.imbaexpert.com). Industrial hygiene examples include respiratory tract deposition of beryllium and anthrax. We will assume that attendees have taken an introductory PEP on the HTRM or are otherwise familiar with its basic characteristics. The new HTRM is a general update of the Lung Model in ICRP Publication 30 (ICRP 1979) for adult workers, and is significantly broader in scope. It applies explicitly to workers and all members of the public, for (1) inhalation of particles, gases and vapors; (2) evaluation of dose (or material retention) in sensitive regions of the respiratory tract, for a given intake or exposure, and; (3) interpretation of bioassay data. The HTRM provides a physiologically realistic framework for modeling respiratory tract retention and excretion characteristics, and the resulting respiratory tract and systemic organ doses. It enables knowledge of the aerosol characteristics, dissolution and absorption behavior of specific materials to be used in a realistic manner, and calculates meaningful doses in relation to the morphological, physiological, and radiobiological characteristics of the various tissues of the respiratory tract. Approaches for obtaining needed aerosols properties will also be illustrated in this PEP course.

M-3 Skin Injuries and Interventional Fluoroscopy — Why They Occur and How to Reduce the Risk. ***L.K. Wagner; The University of Texas – Houston Medical School***

Fluoroscopically guided complex interventional procedures have been a terrific advance in the medical care of very sick people, many with life-threatening conditions. The procedures are minimally invasive and the patient's recovery time is very short compared to that of conventional surgery. These benefits must not be compromised by concerns about radiation exposure. However, on relatively rare occasions, some patients have developed severe radiation injury as a result of their radiation exposure during these procedures. To advance the benefit-risk potential of these procedures by reducing the likelihood of these adverse events, it is necessary to understand the characteristics of these injuries, why they occur, and what we can do to diminish their likelihood. This course will investigate the conditions that have lead to these events, assess the current state of the practice, and provide recommendations for future improvement.

M-4 Assessment of Radiological Emergencies. ***W.G. Rhodes III; Sandia National Laboratories***

This PEP will present the Federal Radiological Monitoring and Assessment Center (FRMAC) methods for assessing radiological emergencies. In February 2003, the National Nuclear Security Agency published updated manuals and methods, and a new volume of example assessment problems. The updated methods will be reviewed, and changes will be highlighted. The majority of this presentation will focus on the new volume of the Assessment Manual, that includes basic scenarios and assessment results of 6 example radiological emergencies. Last, a review of weapon of mass destruction assessment will be presented using responder emergency management tools. Students will actively participate in this PEP, and will be provided copies of the FRMAC Assessment Manual on a CD, worksheets, class notes, and report outputs from example problems.

Tuesday - 12:15 - 2:15 PM

T-1 Health Physics Archeology: Dose Reconstructions Conducted by the Centers for Disease Control and Prevention. ***E.H. Donnelly, E.B. Farfan; Centers for Disease Control and Prevention, South Carolina State University***

Since 1990, the Centers for Disease Control and Prevention (CDC) has been conducting research to address the health effects associated with environmental radiation exposures from nuclear weapons production facilities in the United States. This course is an introduction to the overall methods and processes that have been used for dose reconstruction efforts involving project goals, definitions, critical assumptions, public input, brief history of nuclear weapons development and CDC involvement, and specific dose reconstruction processes. The course gives an overview of the current and completed CDC projects, including the Hanford Environmental Dose Reconstruction (HEDR) project, the Idaho National Engineering & Environmental Laboratory (INEEL) project, the Republic of the Marshall Islands (RMI) fallout study, the Los Alamos National Laboratory (LANL) project, the Nevada Test Site (NTS) fallout study, the Savannah River Site (SRS) project, and the Fernald Feed Materials Production Center Project. Special emphasis is placed on the dose reconstruction project conducted at the Hanford facility, including history of the site and region, collection and analysis of data, special consideration of diet and lifestyle specific to the Native American Indian Tribes in the assessment domain, reconstruction methods specific to HEDR, results, and conclusions. Finally, the course presents a summary of lessons learned during dose reconstruction efforts at these different facilities.

T-2 Shielding Of Medical Radiation Therapy Facilities – From Design To Construction. ***N.E. Ipe, A. Boyer, M. Staniford, E. Pampel; Consultant- Shielding Design, Dosimetry & Radiation Protection, Stanford University School of Medicine, Rudolph and Sletten***

This course is designed to prepare the shield designer to specify effective shielding for medical radiation therapy facilities and to handle issues related to implementation of shielding during construction. Perspectives from both shield designer and contractor are provided.

The course content includes an introduction to treatment modalities such as Intensity Modulated Radiation Therapy (IMRT), Total Body Irradiation (TBI), derivation of workloads, and basics of photon and neutron shielding. The latter includes methodologies from NCRP 49, 51 and 79, primary and secondary barriers, laminated barriers, neutron production, mazes, direct-shielded doors, skyshine, handling of ducts and penetrations.

Additional topics include regulatory requirements, design limits, interaction with architect in room layout, machine orientation and associated features, and review of architectural drawings. Key elements of an effective shielding report are provided.

Close communication and collaboration between the designer and contractor is crucial for a successful transition from the design to construction phase. The shield designer will also play an integral role in reviewing construction shop drawings and making routine onsite inspections to review the installation. The shield designer must also be prepared for design changes that occur due to constructability issues.

Special issues related to laminated barriers are addressed such as the specifics of the coordination and installation of lead shielding. Subcontractor selection, types/limitations, support systems, coordination issues with other trades, and case specific issues encountered during installation are also addressed. Practical examples and site photographs associated with the various stages of construction of a large cancer center housing seven linear accelerators are included.

T-3 Closing the Loop on Audit Corrective Actions. ***J.M. Hylko; WESKEM, LLC***

The purpose of an audit should be to identify system failures so the auditee can initiate appropriate corrective and preventive actions to fix the problem for good. However, somewhere between the audit report and "closing the loop" on

PRELIMINARY PROGRAM

48th Annual Meeting of the Health Physics Society

(American Conference of Radiological Safety)

19th Biennial Campus Radiation Safety Officers Meeting

July 20-24, 2003
Town and Country Resort and Convention Center
San Diego, California