A 5-Day Short Course

Technical Management Services, Inc.

Internal Dose Assessment

August 25-29, 2025 ◆ Live Instruction Online

This 5-day course has been developed for health physicists, Radiation Safety Officers, regulators, program auditors and anyone having responsibilities relating to personnel dose assessment.

The course takes the student through the fundamentals of internal dosimetry, including historical and current dose models, to the analysis of actual intakes. The focus of this course is the utilization of both in vitro and in vivo bioassay results in the determination of intake and dose. A significant amount of time is devoted to calculations using actual intake scenarios. Practical applications of data and interpretation of bioassay results are stressed. Discussions include identifying the source term, collection of pertinent data, application of retention functions, and determination of required bioassay technique sensitivities and identification of analytical parameters which impact the validity of in vivo and in vitro bioassay results.

The student will become familiar with the use of current documents and references. Bioassay program development and Quality Assurance for bioassay programs will also be discussed. Importantly, the course will consider application and use of perhaps the most powerful internal dosimetry software package currently available: The Integrated Modules for Bioassay Analyses (IMBA). Customization of the course to address site specific applications is optional for on-site courses, please contact TMS for further information.

The course has application to commercial power reactors, pharmaceutical manufacturers, regulatory agencies, university programs, government laboratories, private industry, fuel fabricators, in short; any program involved in handling dispersible radioactive materials where there is a potential for intakes. Students are encouraged to provide scenarios to the instructor prior to or during the course for review and discussion during the course.

This short course will help you....

- Understand what you are really signing when you put your signature on the “reviewed by” line on the in vivo or in vitro bioassay report or that dose assessment.
- Identify bioassay techniques and analysis sensitivities appropriate for the source term and bioassay counting/sampling schedule.
- Appropriately apply dose models, retention functions and dose coefficients to the estimation of intake and dose.
- Interpret real world bioassay data, including the analytical parameters which impact the validity of the data.
- Understand and apply NRC and/or DOE regulatory guidance in the estimation of dose.
- Design a bioassay program which is appropriate to the site, including bioassay methods, bioassay frequencies, quantifying potential missed dose, reporting requirements, identifying Data Quality Objectives for bioassay and Quality Assurance.

Course Outline....

Fundamentals

Dose Models

- Historical models and the central theme of internal dosimetry
- ICRP 26 and ICRP 60 guidance

The current internal dosimetry system: ICRP 30, 60, 66, 67, 78, 100 and the future!

- Structure of the models
- Application of the models
- Interpretation of Bioassay Measurements and application of intake retention fuctions
- Regulatory guidance

Integrated Modules for Bioassay Analysis (IMBA)[1]

- Examples, examples, examples

Bioassay programs

- Approaches to in vivio and vitro sampling and analysis
- Detection Limits and Sensitivity
- Bioassay Programs
- Calibrations
- QA/QC

[1]The Health Protection Agency of the United Kingdom (HPA) has committed to providing limited license software for particpants during the class period with special pricing options thereafter.

Course Agenda:

August 25……Introduction and Fundamentals
August 26……Fundamentals continued
August 27……Fundamentals continued and MDA/MDC, DIL
August 28……IMBA training and brief introduction to the logic of the Eurados IDEAS concept
August 29……Completion of IMBA and IDEAS and time permitting, training on Taurus

Course Instructor

Dr. Richard Brey

Dr. Brey received his Ph.D. from Purdue University in Health Physics in 1994, his M.S. awarded in 1990 was also from Purdue University and in the discipline of Health Physics. He was the recipient of the Elda E. Anderson award in 2002. He has substantial expertise in internal dosimetry; and has over the years engaged on various collaborative efforts including the evaluation of historical exposures, evaluation of animal experimental data, and redefining/ evaluating radioactive material translocation models and model transfer coefficients using IMBA and other propriety software. He teaches Health Physics fundamentals, internal dosimetry, radiation detection instrumentation theory and laboratory practice and has published on various topics including various internal dosimetry topics, radiation dose and dose rate effects on chemical and biological systems, and in the physics and modeling of hazardous material transport through porous media. He has done a substantial number of consulting projects with respect ANSI/HPS N13.1-199 compliance considering sampling and aerosol behavior, and he has, since 1995, been the director of an environmental radioanalytical laboratory which performs approximately 1,200 sample analyses per quarter. He has conducted professional training in instrumentation, external dosimetry and internal dosimetry throughout North America. He served as the Idaho State University Radiation Safety Officer and Director of the ISU Technical Safety Office between 2005 and 2011 while simultaneously engaged as a full-time professor along with other administrative assignments. Dr. Brey has also served in a number of administrative roles including Department Chair of Physics, later Chair of the Nuclear Engineering and Health Physics Department, Dean of the College of Science and Engineering, and Associate Vice President for Academic Affairs. Dr. Brey is an elected member of the Council of the National Council of Radiation Protection and Measurements serving his second six-year term, he is a Fellow of the Health Physics Society and he is a certified Health Physicists under the auspicious of the American Board of Health Physics.

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