

Radiological Risk Assessment and Environmental Analysis

Last Updated Monday, 06 July 2009

22nd to 26th June 2009, Bristol, UK

This one-week course is presented by ITC in collaboration with the University of Bristol Environmental Risk Research Centre (BRISK) and Risk Assessment Corporation International, in conjunction with the editors/authors of the textbook “Radiological Risk Assessment and Environmental Analysis” (Oxford University Press, 2008). The course is designed principally for managers and scientists working in the nuclear industry, in site clean-up and remediation, or in regulating such activities, who are concerned with risk evaluation of radionuclides in the environment, including compliance, remediation, litigation and emergency response. The first part of the course looks at the basics of radiological risks and dosimetry, European and UK protection standards and the assessment process, before moving on to look in detail at radionuclide source terms from nuclear facilities and the behaviour and movement of radionuclides in the air, soil, surface waters and groundwaters. Food chain pathways and model uncertainty and validation are then considered, before moving on to a range of case studies and the issue of building credibility and trust in the assessment process.

The first and last days of the course will provide a comprehensive overview of the radiological risk assessment process and its role in supporting decisions related to environmental radioactivity. On the final day, two guest speakers will address these issues in a facilitated discussion designed to explore solutions for the future. During the week, the science of the underlying disciplines of radiological risk assessment will be taught by highly qualified and nationally recognised specialists in each area, providing participants with a step-by-step guide to the methods and examples of their applications.

The course will be held in an informal, workshop atmosphere and you will be encouraged to interact with and question the tutors at all times. In addition to the course notes, each participant will receive a copy of the textbook that provides the basis for the course and the two editors/authors will be present for the entire week.

Course Location

This course will be held at the University of Bristol Burwalls Centre for Continuing Education (<http://www.bristol.ac.uk/burwalls/>), which is situated in 5 acres of pleasant grounds and surroundings where deer and pheasant are seen regularly. It is situated on the Leigh Woods side of the famous Clifton Suspension Bridge and the views over the Avon Gorge and the City of Bristol are stunning. The meeting rooms are within the main building, and accommodation is located in a separate building within the grounds.

You are offered the choice of staying at Burwalls or making your own arrangements to stay in a nearby hotel or guesthouse. The study bedrooms at Burwalls are relatively simply furnished and do not have en suite facilities. If you prefer to make your own arrangements, there are, for example, 3 and 4 star hotels within five minutes walk of Burwalls and we will provide advice for those wishing to stay elsewhere.

Course Fees

The course fees are shown for resident and non-resident participants (see above). Resident fees cover accommodation, breakfast, lunch and morning and afternoon refreshments for five days (arriving Sunday 21st June, departing Friday 26th June), plus a course dinner on Wednesday evening and a welcome reception on Monday evening. Course notes, a copy of the background textbook and other materials are also covered by the fee. Non-resident fees do not include accommodation and breakfast, but otherwise cover the same items as resident fees.

Resident Fees

GBP 2170 - ITC Members

GBP 2395 - non-members

Non-resident Fees

GBP 1970 - ITC Members

GBP 2195 - non-members

The course fee is due within four weeks of your registration. Registration is not guaranteed until we have received the course fee. If you have to withdraw from the course after paying your fee, it will be refunded in full up to 22nd May 2009. After this date, it is not refundable.

Application form

You can register on-line using the registration form, accessible [here](#). Owing to lecture theatre size constraints at Burwalls, the number of places is limited, so we would advise you to register early for this course.
Provisional Timetable:

Monday 22nd June

0830 – 0915

Introduction to the training course and plan for the week

Course objectives; how the week is organized

0915 – 1030

Dealing with Radioactive Releases to the Environment – Issues and Challenges from a UK Perspective

The range of industries and situations concerned with environmental radioactivity will be presented and the different factors that can impact successful operations reviewed. Specific examples that highlight the situation in the U.K. will be discussed.

David Bennett

Environment Agency

1030 – 1045

Break

1045 – 1200

Risks from Exposure to Ionizing Radiation

The human health effects and environmental impacts associated with exposure to ionizing radiation are described and the current understanding of the underlying processes and mechanisms presented. The role of epidemiology in quantifying the risks of these health effects is covered.

Richard Wakeford

Editor-in-chief, Journal of Radiological Protection

1200 – 1315

Lunch

1315 – 1430

Radiological Risk Assessment and Environmental Analysis – Overview

The overall concepts and goals of radiological risk assessment and environmental analysis are reviewed. The basic steps of the assessment process are described and the way they relate to each other and the overall process explained. Specific examples are provided to highlight the multi-disciplinary nature of the process and the different methods to consider for successful completion.

John Till

Risk Assessment Corporation

1430 – 1445

Break

1445 – 1600

Regulations, Standards and the Assessment Process

The current national and European standards for controlling or limiting radiation exposures to the public as a result of planned or unplanned releases are reviewed. Releases from historical, current and future facilities are addressed. The laws that are concerned with public health and the environment and that regulate radiation exposures to the public are described. How the assessment analysis is framed to demonstrate that a specific regulation or standard is met is presented.

Marion Hill

Independent Consultant

1600 – 1630

Round-up discussion of Day 1

1630

Adjourn

Tuesday 23rd June

0830 – 1000

Internal and External Dosimetry

Methods used to estimate dose following exposure to external radiation or from an intake of radioactive material are described. The ICRP dosimetric models are reviewed and the availability and applicability of compilations of dose coefficients for exposure assessments discussed

John Harrison

Health Protection Agency

1000 – 1015

Break

1015 – 1200

Radionuclide Source Terms

The source term refers to the quantity of anthropogenic radionuclides released from a facility into the environment. Methods for monitoring and determining such releases and the potential biases associated with these measurements are discussed. Screening techniques often employed in radiological assessments to focus resources on the most important radionuclides are described.

Duncan Jackson

Enviros Consulting Ltd

1200 – 1315

Lunch

1315 – 1430

Atmospheric Transport of Radionuclides

A general overview is provided of atmospheric modeling principles used to account for the advection, dispersion and deposition of radionuclides released into the air. The range of computer models available to describe this process is reviewed together with the modeling assumptions and data requirements. Methods to determine the most appropriate model to use for a given assessment are described.

Arthur Rood

Risk Assessment Corporation

1430 - 1445

Break

1445 – 1600

Surface Water Transport of Radionuclides

Surface waters include rivers and streams, lakes, estuaries, and oceans which exhibit different physical and hydraulic behavior and are therefore modeled with different dimensionality. Basic processes (advection, dispersion, and reactions) that control radionuclide transport in surface waters are reviewed, and simple models developed. Available screening models and computer codes applicable to various surface-water environments including rivers, vertically stratified lakes, two-dimensionally stratified reservoirs, and variably stratified estuaries are reviewed. Case studies are presented to demonstrate the use of these models.

Peter Shanahan

MIT

1600 – 1630

Round-up discussion of Day 2

1630

Adjourn

Wednesday 24th June

0830 – 1015

Transport of Radionuclides in Ground Water

Modeling the fate and transport of chemicals in saturated ground water requires prediction of both ground-water flow and chemical transport. The basic principles of ground-water flow, contaminant transport in ground water, and their mathematical representation are reviewed. Available methods for calibrating models and evaluating model uncertainty are surveyed.

Peter Shanahan

MIT

1015 – 1030

Break

1030 – 1200

Transport of Radionuclides through the Vadose Zone

One of the most challenging problems in environmental analysis is modeling the movement of radionuclides through the vadose zone – the unsaturated terrestrial environment that lies above the water table. The basic principles of such flow are reviewed including the complex characterizations of relative permeability, moisture content, and pore pressure and their relation to soil texture and grain size. Governing equations that describe flow and transport are presented and simple analytical solutions to provide insight into the system’s long-term and transient behavior described. Numerical codes to simulate flow and transport through the vadose zone will also be described and demonstrated.

Peter Shanahan

MIT

1200 – 1315

Lunch

Excursion, field trip or something similar

Thursday 25th June

0830 – 1000

Food Chain Pathways

The basic principles of terrestrial and aquatic food chain modeling are described beginning with the development of compartmental models of these biological systems. The physical and biological processes that control the behavior of radionuclides in these systems are discussed. The various compilations of plant-soil concentration ratios, animal transfer coefficients, and fish bioconcentration factors are covered.

Arthur Rood

Risk Assessment Corporation

1000 – 1015

Break

1015 – 1200

Uncertainty in Assessment Models and Validation

The methods to evaluate the uncertainty in the overall assessment and that inherent in the computer models are presented. Evaluating the uncertainty in the overall assessment involves propagating the uncertainty in the source term and transport, exposure assumptions, and dose or risk coefficients to the final answer. Model uncertainty will cover parametric uncertainty and uncertainty in model formulation. The issue of validation for radiological assessments is discussed and a framework for establishing model validation presented.

Arthur Rood and Helen Grogan

Risk Assessment Corporation

1200 – 1315

Lunch

1315 – 1415

Optimization, ALARA and BAT

This lecture addresses the role, significance and potential pitfalls associated with optimization, the ALARA principle and BAT in radiological risk assessments relevant to nuclear site management, taking into account operational protection, planned off-site releases, emergency preparedness and response, and long-term site and solid radioactive waste management. These issues will be discussed in relation to how they impact decisions on acceptable management and control of radioactive materials.

Graham Smith

GMS Abingdon, Ltd

1415 – 1430

Break

1430 – 1600

Case Studies: Pulling it all Together

The different sciences discussed during the week are brought together using illustrative examples from RAC's experience over the past 30 years. Risk assessments of varying scope and duration are presented as case studies. Furthermore, participants may offer up specific studies for evaluation. The technical methods and approaches are reviewed and discussed in this session.

Arthur Rood and Helen Grogan

Risk Assessment Corporation

1600 – 1630

Round-up discussion of Day 4

1630

Adjourn

Friday 26th June

0830 – 1000

Public Involvement and Risk Communication – Building Credibility and Trust

Societal issues associated with the risk assessment process and the situations where it is applied are described. Risk communication and public involvement in the assessment process is a relatively new discipline that continues to evolve. A number of case studies are used to highlight advantages and pitfalls of various approaches, and the lessons learned.

John Till

Risk Assessment Corporation

1000 – 1015

Break

1015 – 1200

RACER: A Process and Tools for an Integrated Approach to Risk Assessment

How assessment techniques are applied in an open, transparent process to guide decisions on managing operating nuclear sites today: the RACER project at LANL

Helen Grogan

Risk Assessment Corporation

1200 – 1315

Lunch

1315 – 1500

Facilitated Discussion: Issues and Solutions for the Future

Guest speakers from contrasting organizations discuss the issues that concern them with regard to different sources of environmental radiation and its assessment. The focus is presenting and discussing both positive and negative aspects of the current system, highlighting any misconceptions or frustrations, and proposing solutions for the future.

To be announced

1500 – 1515

Break

1515 - 1600

Course wrap-up discussion

1600

Close of Course