Summaries of articles in this issue

2010 J. Radiol. Prot. 30

(http://iopscience.iop.org/0952-4746/30/2/E01)

J. Radiol. Prot. **30** (2010) doi:10.1088/0952-4746/30/2/E01

GENERAL SUMMARIES

Summaries of articles in this issue

REGULAR PAPERS

Incomplete data on the Canadian cohort may have affected the results of the study by the International Agency for Research on Cancer on the radiogenic cancer risk among nuclear industry workers in 15 countries

J Patrick Ashmore, Norman E Gentner and Richard V Osborne (121–129)

A prominent finding of the 2005 IARC study on the health of nuclear industry workers was a statistically significant excess relative risk per sievert (ERR Sv^{-1}) for 'all cancers excluding leukaemia'. The risk ascribed to the Canadian cohort was significantly higher than the risk estimate for the total study cohort. An examination of the records from the Canadian National Dose Registry has revealed that the records for the cohort of workers from Atomic Energy of Canada Limited were incomplete for the years before 1971 and this anomaly may have contributed to the high value of estimated risk.

An estimation of the annual effective dose to the Canadian population from medical CT examinations

Jing Chen and Deborah Moir (131–137)

This study was carried out to assess the annual per capita effective dose from medical diagnostic procedures using computed tomography (CT) in Canada. Relevant data concerning the nature and the frequency of various diagnostic CT examinations were obtained from the reports on Medical Imaging in Canada and Diagnostic Services in Ontario. Doses associated with examinations of different types were based primarily on typical effective doses used in the National Council on Radiation Protection and Measurements Report 160 with considerations of limited dose information surveyed in Canada. The results show that the per capita annual effective dose from diagnostic CT exams was 0.74 mSv in 2006, up from 0.19 mSv in 1991. This significant increase in population radiation dose from CT scans is due mainly to a more than doubling in the examination rate and to a higher radiation dose per procedure from the newer generation of multi-detector CTs.

The *in vivo* relationship between cross-sectional area and CT dose index in abdominal multidetector CT with automatic exposure control

S Meeson, C M Alvey and S J Golding (139–147)

This paper explores the relationship between patient cross-sectional area and volume CT dose index (CTDI) for abdominal CT using a multidetector row scanner with automatic exposure control. Cross-sectional areas were estimated using customised ellipses at the level of the middle of vertebra L3. From a survey of 94 patients the CTDI increased with the increase in cross-sectional area and gave a measure of patient size based on the region of the body to be exposed. The greater radiation exposure of larger patients was partly a consequence of their size. We believe cross-sectional area should be added to future dose surveys.

Development of a framework of quality assurance practices for a radon passive dosemeter service

M D'Alessandro, F Leonardi, S Tonnarini, R Trevisi and M Veschetti (149–159)

Etched track detectors are widely used for the detection of radon and its decay products. The reliability of radon measurement performed with such devices requires that laboratories producing analytical data are able to provide results of the required quality. The need for uniform results from laboratories at an international level therefore requires the implementation of a quality assurance programme, the harmonization of criteria, sampling procedures, calculations and the reporting of results, agreed on the basis of fundamental principles and international standards. The quality assurance programme described here is the first step on the way to ISO/IEC 17025 certification for the RI-RN (ISPESL) laboratory.

Impacts on non-human biota from a generic geological disposal facility for radioactive waste: some key assessment issues

C A Robinson, K L Smith and S Norris (161–173)

This paper provides an overview of key issues associated with the application of currently available biota dose assessment methods to consideration of potential environmental impacts from geological disposal facilities. It explores philosophical, methodological and practical assessment issues and reviews the implications of test assessment results in the context of recent and on-going challenges and debates.

NOTE

The UK's Surplus Source Disposal Programme: successful management of a national radioactive legacy

Clive Williams, Philip Burns, Malcolm Wakerley, Isabelle Watson, Marianne Cook and Barry Moloney (175–180)

Between 2004 and 2009, the Surplus Source Disposal Programme (SSDP) arranged and subsidised the safe disposal or recycling of more than 11 000 unwanted radioactive items from some 500 sites—principally universities, schools and colleges, museums and hospitals—located throughout the United Kingdom. SSDP was managed by the Environment Agency, in liaison with other UK regulatory bodies and government departments. It had very positive benefits for radioactive waste management, the environment, business and the UK public purse. This note outlines the programme and how it was successfully managed.

MEMORANDUM

Additional guidance on protecting on-site personnel from the excessive risks of a radiation accident

Samantha Watson and Neil Higgins (181–190)

Advice was published in 2005 (NRPB 2005 *Doc. NRPB* **16** 1–29) to provide a framework for the protection of on-site personnel not involved in mitigating actions in the event of a radiation accident. The HPA has subsequently developed additional guidance which discusses protection of the unborn child, measures to protect against serious deterministic injury and high individual risk of stochastic effects, implications of off-site and public exposure considerations, and development of on-site neighbouring areas. In each case particular thought is required to ensure that protective measures are efficient and do not lead to any discontinuities in the level of protection offered.

SPECIAL SECTION PAPERS: PROTECTION OF THE ENVIRONMENT FROM IONISING RADIATION IN A REGULATORY CONTEXT (PROTECT)

Protection of the environment from ionizing radiation in a regulatory context—an overview of the PROTECT coordinated action project

B J Howard, N A Beresford, P Andersson, J E Brown, D Copplestone, K Beaugelin-Seiller, J Garnier-Laplace, P D Howe, D Oughton and P Whitehouse (195–214)

The outcome of the PROTECT project is summarised, focusing on the protection goal and derivation of dose rates which may detrimentally affect wildlife populations. To carry out an impact assessment for radioactive substances, the estimated dose rates produced by assessment tools need to be compared with some form of criteria to judge the level of risk. To do this, appropriate protection goals need to be defined and associated predefined dose rate values, or benchmarks, derived and agreed upon. Previous approaches used to estimate dose rates at which there may be observable changes in populations or individuals are described and discussed, as are more recent derivations of screening benchmarks for use in regulatory frameworks. PROTECT has derived a benchmark screening dose rate of 10 μGy h^{-1} which can be used to identify situations which are below regulatory concern with a high degree of confidence.

A multi-criteria weight of evidence approach for deriving ecological benchmarks for radioactive substances

J Garnier-Laplace, C Della-Vedova, P Andersson, D Copplestone, C Cailes, N A Beresford, B J Howard, P Howe and P Whitehouse (215–233)

In order to screen out benign exposure scenarios in radiological ecological risk assessment, screening benchmarks, namely the Predicted No-Effect Dose Rates (PNEDR), have been derived by applying, as far as possible, the European guidance developed for chemicals. Several different statistical data treatments were considered which all gave reasonably similar results. Finally, a generic screening value of 10 μGy h^{-1} (incremental dose rate) was derived using a transparent multi-criteria weight of evidence approach. Consideration was also given to deriving screening benchmark values for organism groups but was not thought to be currently appropriate due to the few relevant data currently available.

Background dose-rates to reference animals and plants arising from exposure to naturally occurring radionuclides in aquatic environments

A Hosseini, N A Beresford, J E Brown, D G Jones, M Phaneuf, H Thørring and T Yankovich (235–264)

In order to put dose-rates derived in environmental impact assessments into context, the ICRP has recommended the structuring of effects data according to background exposure levels. The ICRP has also recommended a suite of reference animals and plants (RAPs) for use within their developing framework. The objective of this work was to collate information on activity concentrations of naturally occurring primordial radionuclides for marine and freshwater ecosystems and apply appropriate dosimetry models to derive absorbed dose-rates. The dominating radionuclides contributing to exposure in the RAPs are ^{40}K, ^{210}Po and ^{226}Ra. The mean unweighted and weighted dose-rates for aquatic RAPs are in the ranges 0.07–0.39 μGy h^{-1} and 0.37–1.9 μGy h^{-1} respectively.

Assessment of risk to wildlife from ionising radiation: can initial screening tiers be used with a high level of confidence?
N A Beresford, A Hosseini, J E Brown, C Cailes, K Beaugelin-Seiller, C L Barnett and D Copplestone (265–281)
Models available for application in radiological assessments of wildlife often use a tiered structure. The initial tiers of such models are designed to provide highly conservative screening assessments. Screening assessments should identify sites which can be removed from the need for more detailed consideration with a high degree of confidence. The initial screening tiers outputs of three freely available models have been compared. There was considerable difference in the model outputs due to the assumptions and parameters used in the models. The variation in screening tier outputs needs to be better understood so that assessors can justify their results.

Considerations for the integration of human and wildlife radiological assessments
D Copplestone, J E Brown and N A Beresford (283–297)
Recently, several approaches and tools have been developed for demonstrating whether the environment is protected from the impact of ionising radiation. Eventually it would be beneficial if wildlife assessments could be conducted alongside those for humans. Within this paper, we investigate some issues that arise when these two categories of radiological assessment are conducted together. A particular issue was the lack of comparable (numeric) criteria for determining the significance of the dose rates calculated for humans and wildlife. The paper also considers how the developing ICRP framework on radiological protection of the environment may inform the assessment process.

An international model validation exercise on radionuclide transfer and doses to freshwater biota
T L Yankovich, J Vives i Batlle, S Vives-Lynch, N A Beresford, C L Barnett, K Beaugelin-Seiller, J E Brown, J-J Cheng, D Copplestone, R Heling, A Hosseini, B J Howard, S Kamboj, A I Kryshev, T Nedveckaite, J T Smith and M D Wood (299–340)
Under the IAEA's EMRAS programme, activity concentrations of ^{60}Co, ^{90}Sr, ^{137}Cs and ^{3}H in Perch Lake at Atomic Energy of Canada Limited's Chalk River Laboratories site were predicted, in freshwater primary producers, invertebrates, fishes, herpetofauna and mammals using eleven modelling approaches. Comparison of predicted radionuclide concentrations with measured values highlighted a number of areas where additional work and understanding is required to improve the predictions of radionuclide transfer. For some species, the differences could be explained by ecological factors. Model predictions were relatively poor for mammalian species and herpetofauna compared with measured values, partly due to a lack of relevant data. In addition, concentration ratios are sometimes under-predicted when derived from experiments performed under controlled laboratory conditions representative of conditions in other water bodies.

Predicting the radiation exposure of terrestrial wildlife in the Chernobyl exclusion zone: an international comparison of approaches
N A Beresford, C L Barnett, J E Brown, J-J Cheng, D Copplestone, S Gaschak, A Hosseini, B J Howard, S Kamboj, T Nedveckaite, G Olyslaegers, J T Smith, J Vives i Batlle, S Vives-Lynch and C Yu (341–373)
Seven of the different approaches available for application in radiological assessments of wildlife have been used to predict whole-body radionuclide activity concentrations and

absorbed dose rates for terrestrial species within the Chernobyl exclusion zone. Predictions were compared to available measurement data, including some estimates of external dose rate. In many instances, the majority of predictions were within an order of magnitude of the measured data. However, some predictions did not show this degree of agreement and there was considerable variation between the participating models. The potential reasons for poor predictions and differences between the models are explored.