



## International Commission on Radiological Protection

### 2014 Annual Report

**S T R O N G E R**

EUROPEAN ALARA NETWORK • EUROPEAN COMMISSION • EUROPEAN NUCLEAR INSTALLATIONS SAFETY STANDARDS INITIATIVE • EUROPEAN PLATFORM ON PREPAREDNESS FOR NUCLEAR AND RADIOLOGICAL EMERGENCY RESPONSE AND RECOVERY • HEADS OF THE EUROPEAN RADIOLOGICAL PROTECTION COMPETENT AUTHORITIES • IBERO AMERICAN FORUM OF RADIOLOGICAL AND NUCLEAR REGULATORY ORGANISATIONS • INFORMATION SYSTEM ON OCCUPATIONAL EXPOSURE • INTERNATIONAL ATOMIC ENERGY AGENCY • INTERNATIONAL COMMISSION ON RADIATION UNITS AND MEASUREMENTS • **INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION** • INTERNATIONAL LABOUR ORGANISATION • INTERNATIONAL RADIATION PROTECTION ASSOCIATION • MULTIDISCIPLINARY EUROPEAN LOW DOSE INITIATIVE • NUCLEAR ENERGY AGENCY • UNITED NATIONS SCIENTIFIC COMMITTEE ON THE EFFECTS OF ATOMIC RADIATION • WORLD HEALTH ORGANISATION • WORLD NUCLEAR ASSOCIATION

**T O G E T H E R**

[www.icrp.org](http://www.icrp.org)

On the cover:

The names of organisations in formal relations with ICRP (and ICRP itself) as of December 31, 2014, signifying the importance of engagement and collaboration

ICRP 2014 Annual Report

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# CHAIR'S FOREWORD

In November 2012, near the end of its previous four-year term, ICRP launched new and improved formal arrangements for collaboration with other organisations. The previous, informal, system relied almost exclusively on observers attending ICRP Committee meetings. Unfortunately, this put a practical limit on the number of organisations that could be accommodated, and did not allow for good interactions at a more strategic level.



At the end of 2014, ICRP was in formal relations with sixteen organisations, listed on the cover of this Annual Report and again in a special section on 'Formal Relations', with plans to expand the number and types of organisations. Two annual meetings (in 2013 and 2014) have been held between the Main Commission and senior representatives of these organisations, focusing on radiological protection questions of strategic importance, and some of these organisations have representatives working directly with some of our Committees and Task Groups.

This is just the tip of the iceberg; ICRP continues to engage with many organisations and individuals across the globe and in all sectors through our own biennial symposia and workshops on specific topics (such as the ethical basis of the system of radiological protection); participation in congresses, conferences, and a wide variety of meetings; and through open consultations and various on-line mechanisms.

Maintaining independence is crucial to ensuring our recommendations remain free from undue influence. However, independence does not mean isolation; engaging with other organisations is central to achieving ICRP's aims. This engagement ensures that we continue to address the current and future needs of radiological protection, and receive the best possible advice as we develop our recommendations.

As always, in undertaking this and other initiatives to modernise the way ICRP operates, we never forget the reason why ICRP was established and why it still exists today. Our sole object, clearly stated in the second line of ICRP's constitution immediately after the name, is to advance radiological protection for the public benefit.

A handwritten signature in black ink that reads "Claire Cousins".

Dr Claire Cousins, ICRP Chair

# THE INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION

Since 1928, the International Commission on Radiological Protection (ICRP) has successfully developed the System of Radiological Protection as the basis for radiological protection standards, legislation, guidance, programmes and practice worldwide.

ICRP is a charity, registered in the UK, established to advance for the public benefit the science of Radiological Protection, in particular by providing recommendations and guidance on all aspects of radiation protection.

In preparing its recommendations, ICRP considers advances in scientific knowledge, evolving social values, and practical experience. Formulating standards, regulations, and codes of practice is the responsibility of other national and international organisations.

***The objective of the work of ICRP is to contribute to an appropriate level of protection against the detrimental effects of ionising radiation exposure without unduly limiting the benefits associated with the use of radiation.***

ICRP provides recommendations and guidance on protection against risks associated with exposure to ionising radiation from artificial sources widely used in medicine, general industry and nuclear enterprises, and from naturally occurring sources. These recommendations are published on behalf of the ICRP in the Annals of the ICRP. Each issue provides in-depth coverage of a specific subject area.

## Structure

ICRP consists of the Main Commission, the Scientific Secretariat; five standing Committees on: Radiation Effects, Doses from Radiation Exposures, Protection in Medicine, Application of the Commission's Recommendations, and Protection of the Environment; and Task Groups established as needed to undertake specific work.



*The structure of ICRP*

This structure supports a rigorous quality management system of peer review. The work of Task Groups is reviewed by the relevant Committee(s), and then by the Main Commission. Before most reports are approved for publication, they are circulated to a number of bodies and individual experts, and posted for public consultation through the ICRP website.

## Membership

Members come from over 30 countries and from all disciplines relevant to radiological protection. Following an open nomination process, members are selected on the basis of competence and experience, and are invited to join ICRP as independent experts on a voluntary basis.

## The System of Radiological Protection

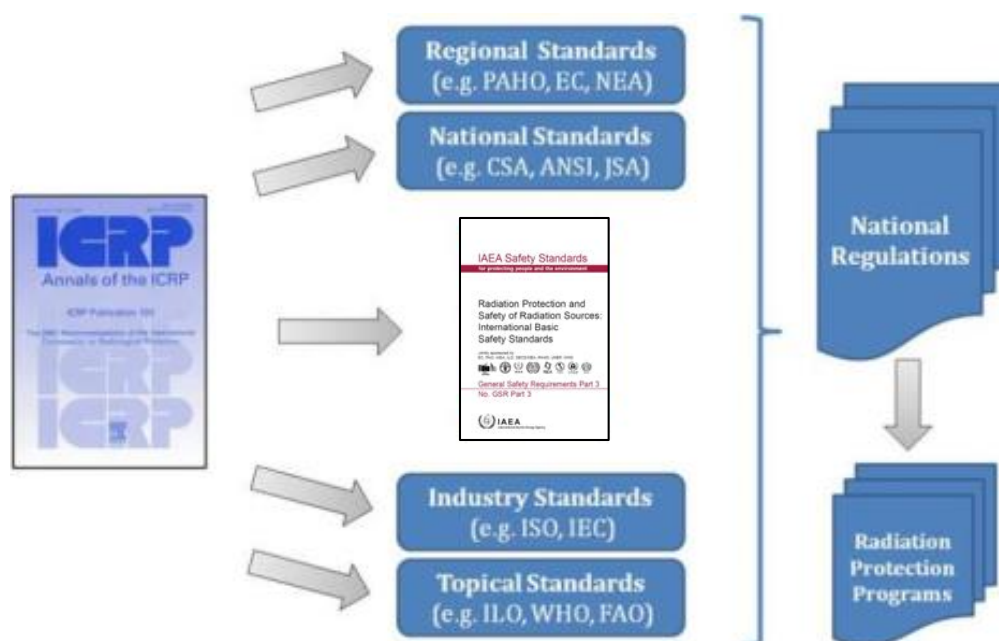
ICRP has produced well over one hundred publications on all aspects of protection against ionising radiation. A few describe the overall **System of Radiological Protection**, most recently ICRP *Publication 103*, The 2007 Recommendations of the International Commission on Radiological Protection. The rest provide more detailed guidance in a particular area, supporting technical information needed to implement the system, or examine the radiological protection implications of the latest science.



*The ICRP System of Radiological Protection is based on the latest science, social and ethical values, and nearly a century of experience*

ICRP recommendations are used world-wide by intergovernmental and non-governmental advisory and standard setting agencies; government health and other regulatory authorities; educational, scientific, and healthcare institutes; operators, individual professionals; and others with an interest in radiological protection.

The International Atomic Energy Agency International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources is based heavily on ICRP recommendations, as are the similar European Basic Safety Standards. The International Labour Organisation Convention 115, Radiation Protection Convention, General Observation 1992, refers specifically to the recommendations of ICRP.



*The ICRP System of Radiological Protection forms the basis of radiological protection standards, regulations, programmes and practice world-wide*

## Independence and Collaboration

An important strength of ICRP is its ability to provide independent recommendations and guidance. In particular, this independence relates to determining the programme of work and selecting members. However, independence does not mean isolation; engaging with other organisations benefits ICRP's aim to advance radiological protection for the public benefit.

ICRP interacts with many organisations with an interest in radiological protection, and (as of December 31, 2014) maintains formal relations with sixteen organisations, listed in the section on 'Formal Relations'. Senior representatives of these organisations participated in a two-day strategic discussion in London, UK, in November 2014.

### ***ICRP IN NUMBERS***

*232 Members*

*126 Numbered Publications*

*20 Active Task Groups*

*16 organisations in formal relations*

*13 Fundamental Recommendations*

*5 Standing Committees*

*1 System of Radiological Protection*



## Main Commission

*The Main Commission consists of the Chair and up to twelve other members. The Main Commission is the governing body, setting the policy and programme of work, and approving all official publications.*



*Main Commission in Moscow, April 2014 – From left to right: Ohtsura Niwa, Jai-Ki Lee, John Boice, Christopher Clement (Scientific Secretary<sup>1</sup>), John Harrison, Claire Cousins (Chair), Carl-Magnus Larsson, Jacques Lochard (Vice-Chair), Sergey Romanov, Eliseo Vañó, Hans-Georg Menzel, Donald Cool. Inset: Hua Liu, William Morgan.*

Formally, the ‘Main Commission’ is ICRP, providing overall direction and oversight to the larger organisation. The members are also the trustees of ICRP as a registered charity.

The Main Commission sets the programme of work, and approves all publications. The Chairs of all the five standing Committees are members of the Main Commission.

The Main Commission met once in 2014 in Moscow, and took the opportunity to meet with the directors and staff of the Burnasyan Federal Medical Biophysical Centre.

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<sup>1</sup> Although not formally a member, the Scientific Secretary is an integral part of the Main Commission, organising and participating in all Main Commission meetings, and often acting as the representative of ICRP.





## Scientific Secretariat

*The Scientific Secretariat manages the daily business of ICRP, and the Scientific Secretary often represents ICRP at international meetings.*



*Scientific Secretariat in Kyoto, December 2014 – From left to right: Andrea Bauer (Intern), Nobuyuki Hamada (Assistant Scientific Secretary from March 2014), Christopher Clement (Scientific Secretary), Toshihiro Higuchi (Historian). Inset: Lynn Lemaire (Executive Assistant), Michiya Sasaki (Assistant Scientific Secretary to March 2014).*

ICRP operates its Scientific Secretariat in Ottawa, Canada, in an office provided as an in-kind contribution from the Canadian Nuclear Safety Commission.

The Scientific Secretariat includes two full-time paid employees, the Scientific Secretary and Executive Assistant, and three others. The full-time position of Assistant Scientific Secretary is filled through a multi-year cost-free staff loan, currently provided by the Central Research Institute of Electric Power Industry of Japan (CRIEPI). The full-time position of Intern is filled on a four-month rotating basis through the Canadian Nuclear Safety Commission co-op student programme. The ICRP Historian is a part-time position filled on a voluntary basis.



## Committee 1 (Radiation Effects)

*Committee 1 assesses scientific knowledge on radiation risk, examining possible implications on the System of Radiological Protection.*



*Committee 1 in Beijing, September 2014 – From left to right back: Dominique Laurier, Nobuhiko Ban, Alice Sigurdson (Vice-Chair), (From left to right middle) Quanfu Sun, William Morgan (Chair), Michael Hauptmann, Dan Stram, Simon Bouffler, Wolfgang Dörr, Sisko Salomaa, Anna Denisova (interpreter for Tamara Azizova). From left to right front: Nobuyuki Hamada (Assistant Scientific Secretary), Ranajit Chakraborty, Margot Tirmarche, Richard Wakeford, Preetha Rajaraman, Tamara Azizova, Werner Rühm (Secretary).*

The Main Commission approved the Task Group 75 draft report Stem Cell Biology with Respect to Carcinogenesis Aspects of Radiological Protection for public consultation. Ohtsura Niwa and Jolyon Hendry revised the report according to the public comments.

Task Group 64 produced *Publication 115* “Lung Cancer Risk from Radon and Progeny and Statement on Radon” in 2010 and is now extending this to consider cancer risks from other alpha emitters including plutonium, uranium, thorostrast and radium. They will use the recently published risk coefficients of lung cancer for a life-long risk calculation, in order to compare risk from these alpha emitters with that from radon and also from external exposure(s). Selection of the appropriate model systems, accounting for differences between males and females, as well as smokers and non-smokers is being undertaken.

Task Group 91 is reviewing the available information on the estimation of risk coefficients and recommend whether it is desirable to continue to estimate risk at low doses by assessing the slope of the dose response at high doses and then applying a *Dose and Dose-Rate Effectiveness Factor* (DDREF) reduction factor, and whether such coefficients are applicable to acute, protracted and prolonged exposure or need a particular correction.



The goal of Task Group 92 is to review the "Terminology and Definitions" used by ICRP in the past, check them for accuracy and where there are conflicts resolve them. The Task Group will progress in two phases: First, it will review a list of terms and definitions where there are no apparent inconsistencies and evaluate their appropriateness. Second, a list of terms and definitions where there are inconsistencies has been compiled. The first phase is nearing completion and the second phase is expected to begin mid 2015.

## Outlook

Further areas where work may be initiated and topics that will be kept under surveillance:

- Individual human sensitivity to ionising radiation (with Committee 3)
- Radiation detriment (with Committee 2)
- Shape of the dose response for cancer
- Uncertainties in dosimetry
- Late effects from particle therapy
- RBE for low energy vs. high-energy gammas
- Radiation weighting factors for tritium
- Radiation risk in relation to chemical risk
- Tissue banking, archival tissues, use and value of these resources
- Trans-generational effects



## Committee 2 (Doses from Radiation Exposures)

*Committee 2 develops reference models and data, including dose coefficients, for the assessment of exposure to radiation.*



*Committee 2 in Abu Dhabi, October 2013 –From left to right back: Chan Hyeong Kim, Jizeng Ma, John Harrison (Chair), Dietmar Nosske, Wesley Bolch (Secretary), Frank Wissman, Douglas Chambers, John Hunt. From left to right front: Michael Bailey, Francois Paquet (Vice-Chair), Marina Degteva, Isabelle Thierry-Chef (WHO/IARC representative), Akira Endo, Nina Petoussi-Henss. Inset: Vladimir Berkovski, Luiz Bertelli, Rich Leggett.*

Committee 2 has 15 members and five task groups chaired by members of the committee. The new groups are the Computational Phantoms and Radiation Transport (CPRT) Task Group and the Internal Dose Coefficients (IDC) Tasks Group, replacing task groups on Dose Calculations (DOCAL) and Internal Dosimetry (INDOS). The CPRT Task Group is responsible for the development of reference phantoms and associated radiation transport calculation. The IDC Task Group will produce reports with revised dose coefficients for inhaled and ingested radionuclides, one series for intakes by workers and another for intakes by members of the public.

Two further Task Groups are engaged in the calculation of dose coefficients, one group considering environmental exposures of members of the public to external sources of radiation, as for example following accidental releases of radioactivity from a nuclear installation. The second group, jointly chaired by a member of Committee 2 and an

Emeritus member of Committee 3, considers doses from administration of radiopharmaceuticals. The Committee is also leading a cross-committee group tasked with the provision of advice on the use of effective dose and its relation to risk.



## Outlook

Following a successful September 2014 meeting of the committee in Nashville, Tennessee, and associated task group meetings, the committee is making good progress in work on phantom development and the provision of *Publication 103* based dose coefficients. Work is progressing on a set of reference phantoms – those for adults are complete, those for children are nearing completion, and models for the pregnant woman are also in development. Improved biokinetic models will be used to calculate dose coefficients and also to provide data for the interpretation of bioassay measurements.

Calculation of dose coefficients for external environmental exposures after accidental releases requires the evaluation of the environmental fields. Work is in progress to calculate fields for contaminated soil, water and air, considering different radiation types. Organ and effective doses will be calculated using the reference phantoms provided by the CPRT Task Group. The same phantoms will also be used in new calculations of *Publication 103* based dose coefficients for radiopharmaceutical administration.

The Effective Dose Task Group did not meet in 2014 but will renew efforts on this important topic in 2015. While effective dose is a risk-adjusted quantity that allows the summation of doses from very different sources of external and internal exposure, its use as a measure of individual risk, as commonly done, for example, in medical practice is problematical. As well as defining limits on the use of effective dose, it is envisaged that the report will make proposals for the control of exposures and risk management in situations for which effective dose was not intended.

## Committee 3 (Protection in Medicine)

*Committee 3 develops recommendations and guidance on the protection of patients, staff, and the public against radiation exposure in medicine.*



*Committee 3 in Paris, September 2014, along with representatives of IAEA and WHO – From left to right back: Pierre Scalliet, Donald Miller (Vice-Chair), Reinhard Loose, Sandor Demeter, Ola Holberg (IAEA), Colin Martin, Yoshiharu Yonekura. From left to right front: Baorong Yue, Michel Bourguignon, Eliseo Vañó (Chair), Katrine Åhlström Riklund (slightly behind), Madan Rehani (Secretary), Kimberly Applegate (slightly behind), Maria Del Rosario Perez (WHO), Pek-Lan Khong, Pedro Ortiz-López, Lawrence Dauer. Inset: Keon Kang.*

In deciding its actions, Committee 3 took into account activities of organisations (e.g., IAEA, WHO, EC, ICRU, UNSCEAR) to avoid duplication, reduce or avoid overlap and develop synergy. Topics such as justification are being pursued by all organisations.

In 2014, the Main Commission approved Committee 3's report "Radiological protection in ion beam therapy" after considering comments received through public consultation. Also during 2014, Committee 3's report "Radiological protection in cone beam computed tomography (CBCT)" was made available for public consultation after approval of the draft by the Main Commission.

## Outlook

With regard to diagnostic use of radiation, work on diagnostic reference levels for diagnostic and interventional imaging is at advanced stage. A



Working Party is developing a framework for justification in medical use of ionising radiation. A 2001 web publication “Radiation and Your Patient - a Guide for Medical Practitioners” is being updated.

In radiotherapy, ongoing work includes occupational radiological protection in brachytherapy.



In nuclear medicine, radiological protection in therapy with radiopharmaceuticals is being reviewed. In a separate effort, Committee 3 continues to work with Committee 2 on dose to patients from radiopharmaceuticals.

Occupational protection is covered in all Committee 3 documents, but a Working Party is paying specific attention to occupational protection issues in fluoroscopy- and CT-guided interventional procedures. The importance of this topic is due in part to the impact in medicine of the newly recommended occupational dose limit for the lens of the eye.

Committee 3 is working with Committee 1 on individual human sensitivity to ionising radiation and is also participating in Committee 2 Task Group on Effective Dose and the Main Commission Task Group on Terminology and Definitions.

Committee 3 prepares educational slides for each of its publications and makes them available on the ICRP website for free download. The draft slides for *Publications 113, 117, 120 and 121* are being reviewed.

Areas for future work and topics to be kept under surveillance include:

- a. Framework for optimisation in medical imaging for individual patients.
- b. Proposal for standardisation of dose metrics (quantities and units) for medical imaging equipment, displays and radiation dose analysis software in cooperation with other involved international organisations.
- c. Protection of the lens of the eye, cardiovascular and cerebrovascular systems: Implications for medicine of *Publication 118*.

## Committee 4 (Application of the Commission's Recommendations)

*Committee 4 develops principles and recommendations on radiological protection of people in all exposure situations.*



*Committee 4 in Illinois, July 2014 – From left to right back: Senlin Liu, John Takala, Edward Lazo (NEA), Sergey Shinkarev, Berned LeGuen (IRPA), François Bochud, Mark Doruff. From left to right middle: Thiagan Pather, Jacques Lochard (former C4), Miroslav Pinak (IAEA), Michael Boyd, Eduardo Gallego, Analía Canoba. From left to right front: Donald Cool (Chair), Toshimitsu Homma, Jean-François Lecomte (Secretary), Kun-Woo Cho, Anne Nisbet, Michiaki Kai. Inset: Deborah Oughton, Ann McGarry.*

The Committee meeting was hosted by GE Healthcare in Arlington Heights, Illinois, USA in July, 2014.

The Committee 4 programme of work encompasses several broad areas, including a series of reports covering various aspects of existing exposure situations, leading the ICRP effort to update and elaborate recommendations in light of the accident at Fukushima Daiichi for emergencies and living in contaminated areas, elaborating the underpinnings of the system of protection, and developing focused reports on specific topic areas in consultation with ICRP's special liaison organizations (SLOs).

The report of Task Group 71 on Security Screening was published as *Publication 125* in 2014. The report provides recommendations for the specific topical area, and is the first of the new series of topical reports to be completed.

The report of Task Group 81 on Radon was published as *Publication 126* in 2014, and provides practical recommendations for developing a graded approach to radon protection in both occupational and public

settings. This report is part of the series covering aspects of existing exposure situations.

## Outlook

Task Group 76 is developing a report that examines the issues of applying the system of protection to Naturally Occurring Radioactive Materials (NORM). NORM industries are particularly difficult to consider because of the wide range of possible situations and the lack of radiological protection cultures in many long established industries.



The report of Task Group 83 on Cosmic Radiation in Aviation was approved by the Committee. This report elaborates on another topic in existing exposure situations where it is not possible to control the source, and where a graded approach based upon information and personal actions is useful.

Task Group 93 is contributing to ICRP's review of lessons from the Fukushima Daiichi accident, and will update *Publications 109* and *111*. This work is being done in consultation with the ICRP Fukushima Dialogue initiative.

Task Group 94 on Ethics of Radiological Protection is developing a report that elaborated on the underpinnings of the system of protection, and is intended to improve our understanding and use of the system, and assist in developing decision approaches and communications. The Task Group has benefited from a series of workshops organised in cooperation with the International Radiation Protection Association (IRPA) in 2014, and continuing in 2015.

Two new Task Groups were approved in 2014. Task Group 97 will examine issues in surface and near surface disposal, as a companion to *Publication 122*. This work was suggested by one of the SLOs. Task Group 98 will address application of the Commission's recommendations to exposures resulting from contaminated sites. This report will complement the Task Group 93 work on living in contaminated areas, and complete the initial suite of reports on existing exposure situations.

As a result of a solicitation of topics from the SLOs, the Committee has considered several possible topics for future focused reports. The Committee agreed that a draft terms of reference should be developed with interested organisations on mobile high activity sources for consideration in 2015.

## Committee 5 (Protection of the Environment)

*Committee 5 develops reference models and data, and guidance on radiological protection of the environment.*



*Committee 5 in Abu Dhabi, October 2013 – From left to right: Kathryn Higley (Vice-Chair), Jordi Vives i Batlle, Carl-Magnus Larsson (Chair), David Copplestone, Per Strand, Kazuo Sakai, Almudena Real (Secretary). Inset: Jacqueline Garnier-Laplace, Alexander Ulanovsky, Li Jianguo.*

*Publication 124* was published in 2014, and outlines how the principles of radiation protection can be applied to protection of the environment (or more specifically of non-human biota) under different exposure situations. It goes on to describe how reference values for environmental protection can be based on dose-rate bands (Derived Consideration Reference Levels) for specific Reference Animals and Plants (RAPs). *Publication 124* completes a suite of ‘foundation publications’ for the ICRP system for radiological protection of the environment.

Committee 5 is currently finalising the work of two task groups that will provide further depth to the system outlined above, namely on improved dosimetry and dosimetric tools for biota; and on relative biological effectiveness including its significance in relation to environmental protection.

The ICRP methodology for radiation protection of the environment has gained increased application worldwide and has been drawn upon in recent international studies. These include the UNSCEAR assessment of the impact of the 2011 nuclear accident in Japan (published 2014 as Scientific Annex A to the UNSCEAR 2013 Report to the UN General



Assembly), the IAEA report on radiological assessment procedures under the terms of the London Convention 1972 (IAEA-TECDOC-1759), and the methodology for environmental assessments under the terms of the OSPAR Convention 1992 for the Protection of the Marine Environment of the North-East Atlantic.

## Outlook

The Committee met in Barcelona, Spain, in September 2014 to discuss current and future work. The future work will focus on the scientific foundation for our understanding of the primary components of an ecological risk assessment, namely transfer and dosimetry to biota, radiation effects on biota, and implications at higher levels of ecological organisations (populations, communities, ecosystems) when characterising the radiological risk. Additionally, Committee 5 will further develop the methodology when applying the system to ‘real’ exposure situations, either planned, existing or resulting from radiation emergencies.

The Committee will collate data for the base set of 12 RAPs, in the form of ‘monographs’ organised on a taxonomic basis. It is expected that a Task Group may be launched in the first half of 2015. Committee 5 will also take the step to ‘representative’ organisms in the environment, based on the concepts and databases already developed for the RAPs. This will facilitate the application in the field, including the identification of representative organisms in different scenarios and generation of suitable data for protective approaches on the basis of the RAPs data sets. It is anticipated that such work could start in the second half of 2015.



## Task Groups

Active as of December 31, 2014:

C2/3 TG36: **Radiopharmaceuticals**, Chaired by *D. Noßke*

C1 TG64: **Cancer Risk from Alpha Emitters**, Chaired by *Margot Tirmarche*

C5 TG72: **RBE and Reference Animals and Plants**, Chaired by *Kathryn Higley*

C5 TG74: **More Realistic Dosimetry for Non-human Species**, Chaired by *Alexander Ulanovsky*

C1 TG75: **Stem Cell Radiobiology**, Chaired by *Ohtsura Niwa*

C4 TG76: **Application of the Commission's Recommendations to NORM (Naturally Occurring Radioactive Material)**, Chaired by *Jean-François Lecomte*

C2 TG79: **Effective Dose**, Chaired by *John Harrison*

C4 TG83: **Protection of Aircraft Crew against Cosmic Radiation Exposure**, Chaired by *Jacques Lochard*

C3 TG87: **Radiological Protection in Ion Beam Radiotherapy**, Chaired by *Yoshiharu Yonekura*

C3 TG88: **Radiological Protection in Cone Beam CT**, Chaired by *Madan Rehani*

C3 TG89: **Occupational Radiological Protection in Brachytherapy**, Chaired by *Lawrence Dauer*

C2 TG90: **Age-dependent Dose Conversion Coefficients for External Exposures to Environmental Sources**, Chaired by *Nina Petoussi-Henß*

C1 TG91: **Radiation Risk Inference at Low-dose and Low-dose Rate Exposure for Radiological Protection Purposes**, Chaired by *Werner Rühm*



MC TG92: **Terminology and Definitions**, Chaired by *Wolfgang Dörr*

C4 TG93: **Update of ICRP Publications 109 and 111**, Chaired by *Michiaki Kai*

C4 TG94: **Ethics of Radiological Protection**, Chaired by *Deborah Oughton*

C2 TG95: **Internal Dose Coefficients**, Chaired by *Francois Paquet*

C2 TG96: **Computational Phantoms and Radiation Transport**, Chaired by *Wesley Bolch*

C4 TG97: **Application of the Commission's Recommendations for Surface and Near Surface Disposal of Solid Radioactive Waste**, Chaired by *Francois Besnus*

C4 TG98: **Application of the Commission's Recommendations to Exposures Resulting from Contaminated Sites from Past Industrial, Military and Nuclear Activities**, Chaired by *Michael Boyd*

## FORMAL RELATIONS

The need to remain independent from undue influence is essential, but so is maintaining good relationships with organisations interested in radiological protection. ICRP works with many organisations world-wide, and maintains formal relations with a growing number of key international organisations (and potentially national organisations where there is no international organisation to represent their views). A major milestone in 2014 was a highly successful strategic discussion with senior representatives of these organisations. Two questions were explored: the role of ICRP in interactions with the public, and stability and evolution of the System of Radiological Protection.

<b>EAN</b> European ALARA Network	<b>HERCA</b> Heads of the European Radiological Protection Competent Authorities	<b>ICRU</b> International Commission on Radiation Units and Measurements	<b>NEA</b> OECD Nuclear Energy Agency
<b>EC</b> European Commission	<b>FORO</b> Ibero American Forum of Radiological and Nuclear Regulatory Organisations	<b>ILO</b> International Labour Organisation	<b>UNSCEAR</b> United Nations Scientific Committee on the Effects of Atomic Radiation
<b>ENISS</b> European Nuclear Installations Safety Standards Initiative	<b>ISOE</b> Information System on Occupational Exposure	<b>IRPA</b> International Radiation Protection Association	<b>WHO</b> World Health Organisation
<b>NERIS</b> European Platform on Preparedness for Nuclear and Radiological Emergency Response and Recovery	<b>IAEA</b> International Atomic Energy Agency	<b>MELODI</b> Multidisciplinary European Low Dose Initiative	<b>WNA</b> World Nuclear Association

*Organisations in Formal Relations with ICRP as of December 31, 2014*

## ICRP PUBLICATIONS

Three reports were published in the Annals of the ICRP in 2014. Their abstracts are on the following pages. In addition, a Spanish translation of *Publication 93*, a Chinese translation of *Publication 118*, and Japanese translations of *Publications 60, 103, 109 and 111* became available for free download.

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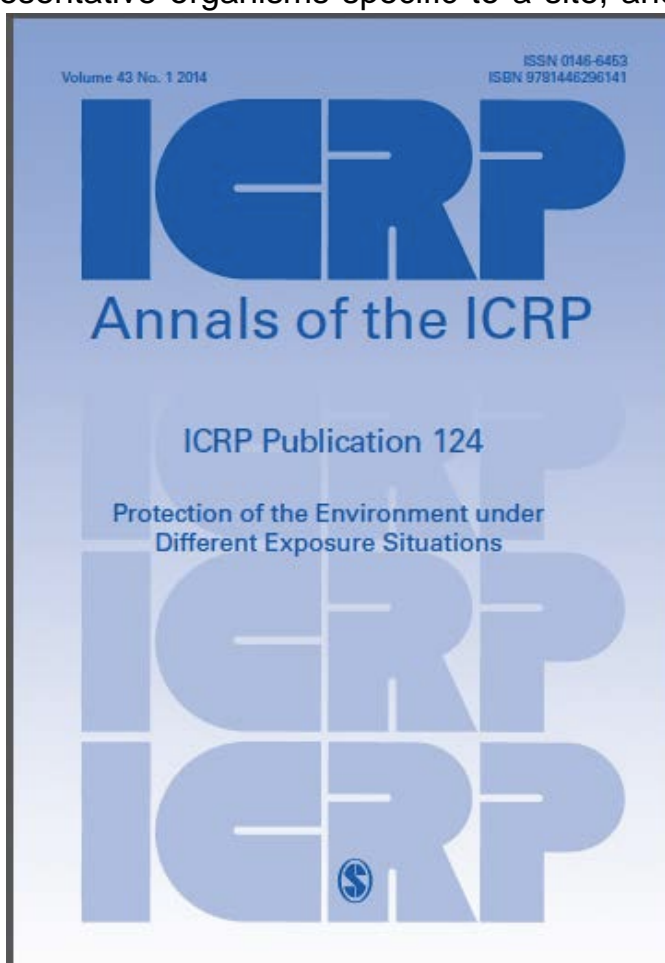
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## **Publication 124: Protection of the Environment under Different Exposure Situations**

**R.J. Pentreath, J. Lochard, C-M. Larsson, D.A. Cool, P. Strand, J. Simmonds, D. Copplestone, D. Oughton, E. Lazo**

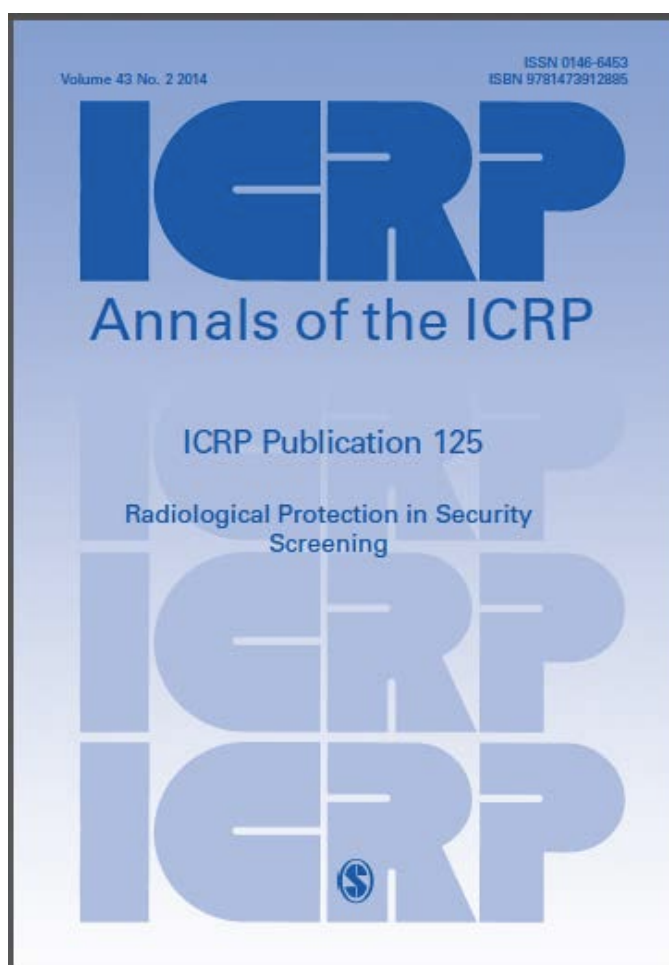
In this report, the Commission describes its framework for protection of the environment and how it should be applied within the Commission's system of protection. The report expands upon its objectives in relation to protection of the environment, in so far as it relates to the protection of animals and plants (biota) in their natural environment, and how these can be met by the use of Reference Animals and Plants (RAPs); their Derived Consideration Reference Levels (DCRLs), which relate radiation effects to doses over and above their normal local background natural radiation levels; and different potential pathways of exposure. The report explains the different types of exposure situations to which its recommendations apply; the key principles that are relevant to protection of the environment; and hence how reference values based on the use of DCRLs can be used to inform on the appropriate level of effort relevant to different exposure situations. Further recommendations are made with regard to how the Commission's recommendations can be implemented to satisfy different forms of environmental protection objectives, which may require the use of representative organisms specific to a site, and how these may be compared with the reference values. Additional information is also given with regard to, in particular, communication with other interested parties and stakeholders. Issues that may arise in relation to compliance are also discussed, and the final chapter discusses the overall implications of the Commission's work in this area to date. Appendices A and B provide some numerical information relating to the RAPs. Annex C considers various existing types of environmental protection legislation currently in place in relation to large industrial sites and practices, and the various ways in which wildlife are protected from various threats arising from such sites.



## **Publication 125: Radiological Protection in Security Screening**

**D.A. Cool , E. Lazo , P. Tattersall, G. Simeonov, S. Niu**

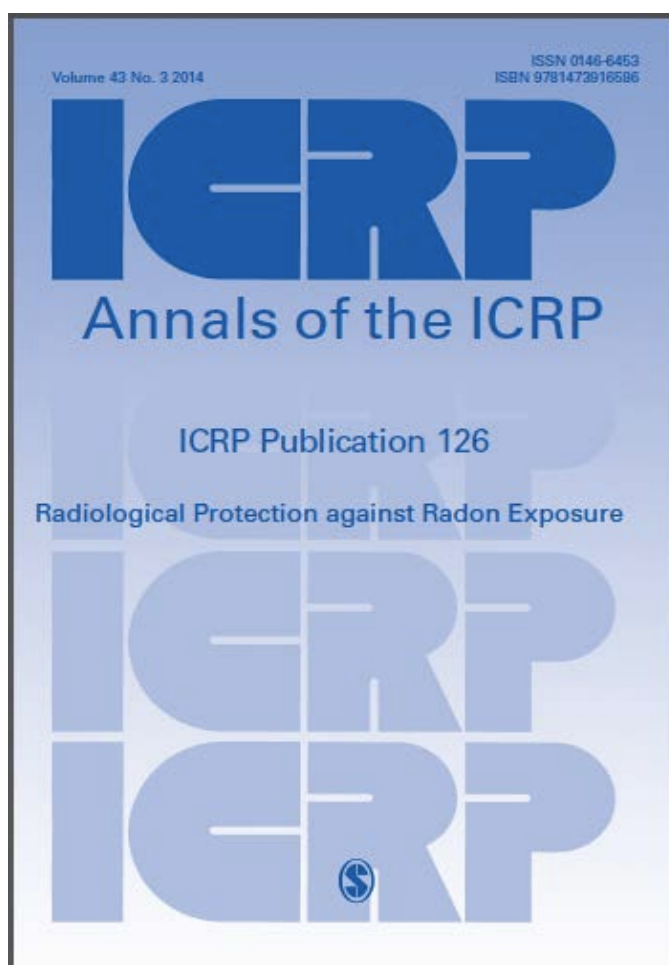
The use of technologies to provide security screening for individuals and objects has been increasing rapidly, in keeping with the significant increase in security concerns worldwide. Within the spectrum of technologies, the use of ionising radiation to provide backscatter and transmission screening capabilities has also increased. The Commission has previously made a number of statements related to the general topic of deliberate exposures of individuals in non-medical settings. This report provides advice on how the radiological protection principles recommended by the Commission should be applied within the context of security screening. More specifically, the principles of justification, optimisation of protection, and dose limitation for planned exposure situations are directly applicable to the use of ionising radiation in security screening. In addition, several specific topics are considered in this report, including the situation in which individuals may be exposed because they are concealed ('stowaways') in a cargo container or conveyance that may be subject to screening. The Commission continues to recommend that careful justification of screening should be considered before decisions are made to employ the technology. If a decision is made that its use is justified, the framework for protection as a planned exposure situation should be employed, including optimisation of protection with the use of dose constraints and the appropriate provisions for authorisation and inspection.



## **Publication 126: Radiological Protection against Radon Exposure**

**J-F. Lecomte, S. Solomon, J. Takala, T. Jung, P. Strand, C. Murith, S. Kiselev, W. Zhuo, F. Shannoun, A. Janssens**

In this report, the Commission provides updated guidance on radiological protection against radon exposure. The report has been developed considering the latest ICRP recommendations for the system of radiological protection, all available scientific knowledge about the risks of radon, and the experience gained by many organisations and countries in the control of radon exposure. The report describes the characteristics of radon exposure, covering sources and transfer mechanisms, the health risks associated with radon, and the challenges of managing radon exposure. The Commission recommends an integrated approach for controlling radon exposure, relying as far as possible on the management of buildings or locations in which radon exposure occurs, whatever the use of the building. This approach is based on the optimisation principle, and is graded reflecting the responsibilities of key stakeholders, notably in workplaces, and the intent of the national authorities to control radon exposure. The report also provides recommendations on managing radon exposure when workers' exposures are considered as occupational, and the appropriate requirements of the Commission should be applied.





# MEMBERSHIP

ICRP membership totals nearly 250 experts from more than 30 countries. The membership of the Main Commission, Scientific Secretariat, and Committees as of December 31, 2014 is shown below. The membership of Task Groups can be found at [www.icrp.org](http://www.icrp.org).

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Jacqueline Garnier-Laplace  
Jianguo Li  
Kazuo Sakai  
Per Strand  
Alexander Ulanovsky

# FINANCES

ITEM	2014	2013	2012	2011	2010
Incoming Resources					
Contributions Received	529 949	482 334	533 025	650,955	617 168
Royalties *	126 527	103 772	199 059	70,071	107 551
Interest and Other Income	8	30	1 331	78	0
<b>Total Incoming Resources</b>	<b>656 484</b>	<b>586 146</b>	<b>733 414</b>	<b>721 104</b>	<b>724 719</b>
Resources Expended					
Promotion of Radiological Protection	240 069	303 917	401 855	627 326	552 953
Governance Costs †	392 753	380 943	269 846	288 646	169 027
Other Resources Expended	36 642	23 037	13 034	21 873	2 752
<b>Total Resources Expended</b>	<b>669 464</b>	<b>707 897</b>	<b>684 735</b>	<b>937 845</b>	<b>724 732</b>
<b>Net Movement in Resources</b>	<b>(12 980)</b>	<b>(121 750)</b>	<b>48 679</b>	<b>(216 741)</b>	<b>(13)</b>
<b>Total Funds Carried Forward</b>	<b>87 348</b>	<b>100 328</b>	<b>222 078</b>	<b>173 399</b>	<b>390 140</b>
Tangible Fixed Assets	0	0	1 032	2 680	4 329
Current Assets	22 574	95 683	107 572	236 567	391 445
Debtors (falling due within one year)	149 186	194 986	242 167	38 498	168 413
Creditors (falling due within the year)	(84 412)	(190 341)	(128 693)	(104 346)	(174 047)
<b>Net Assets</b>	<b>87 348</b>	<b>100 328</b>	<b>222 078</b>	<b>173 399</b>	<b>390 140</b>

This is a summary of ICRP annual financial statements as audited by Tudor John Chartered Accountants, Epsom, UK. All amounts are expressed in US dollars.

\* In 2012 ICRP reverted to accrual accounting for royalties. Historically royalties had been accounted for on a cash basis (royalties earned in a year being received and recognised as income in the following year). Due to this change royalties for 2012 include royalties received in 2012 (earned in 2011) and royalties earned in 2012 (received in 2013).

† The increase in governance costs in 2011 relates to an adjustment to more appropriately allocate Scientific Secretariat costs. The increase in governance costs beginning in 2013 relates to the "Advancing Together" fundraising campaign.

The majority of ICRP support is received in kind. For example, members' institutions make members' time available without charge and, in many cases, cover their costs of attending ICRP meetings.

ICRP is financed primarily through voluntary contributions from organisations with an interest in radiological protection. All voluntary contributions are accepted with the understanding that they do not influence the ICRP membership or programme of work. Those providing financial contributions to ICRP in 2014 were:

- Australian Radiation Protection and Nuclear Safety Agency
- Canadian Nuclear Safety Commission
- Chinese Society of Radiation Protection (中国辐射防护学会)
- Danish National Board of Health (Statens Institut for Strålehygiejne, SIS)
- Finnish Radiation and Nuclear Safety Authority (Säteilyturvakeskus, STUK)
- French Institute of Radiation Protection and Nuclear Safety (Institut de radioprotection et de sûreté nucléaire, IRSN)
- French National Radioactive Waste Management Agency (Agence nationale pour la gestion des déchets radioactifs, ANDRA)
- German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, BMUB)
- Health Canada
- Icelandic Radiation Safety Authority (Geislavarnir ríkisins)
- International Atomic Energy Agency
- International Radiation Protection Association
- International Society of Radiology
- Japan NUS Co Ltd. (日本エヌ・ユー・エス株式会社, JANUS)
- Korea Radiation Safety Foundation (한국방사선안전재단, KORSAFe)
- Norwegian Radiation Protection Authority (Statens strålevern)
- Nuclear Energy Agency, Organisation for Economic Co-operation and Development
- Nuclear Energy Institute, USA
- Spanish Nuclear Safety Council (Consejo de Seguridad Nuclear, CSN)
- Swedish Ministry of the Environment (Miljödepartementet)
- US Environmental Protection Agency
- US Nuclear Regulatory Commission

## CONTACT

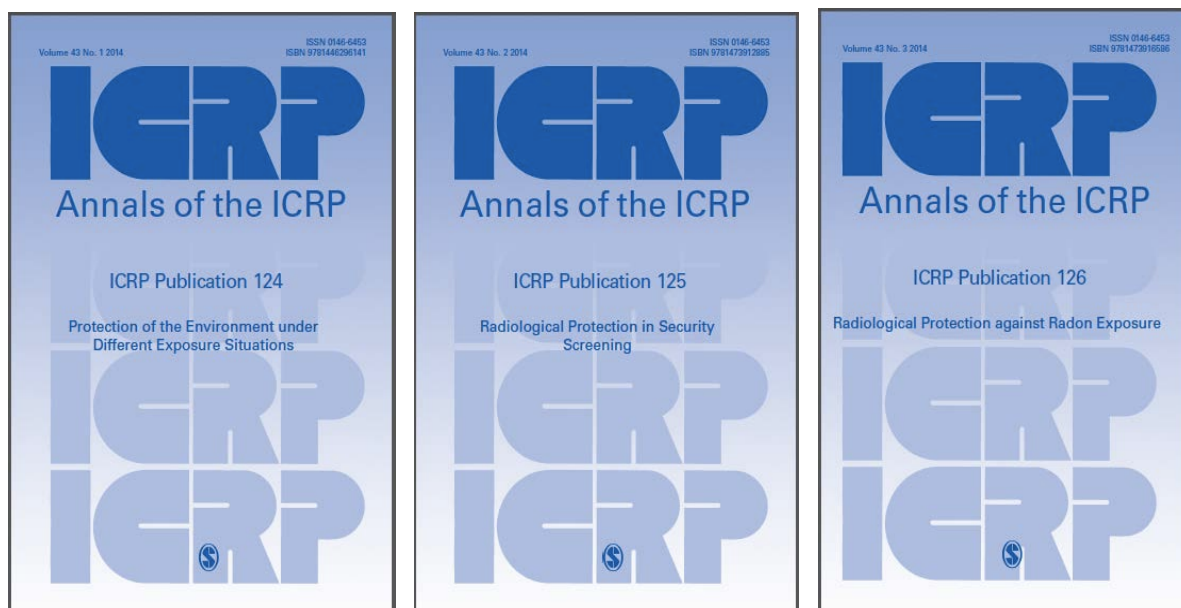
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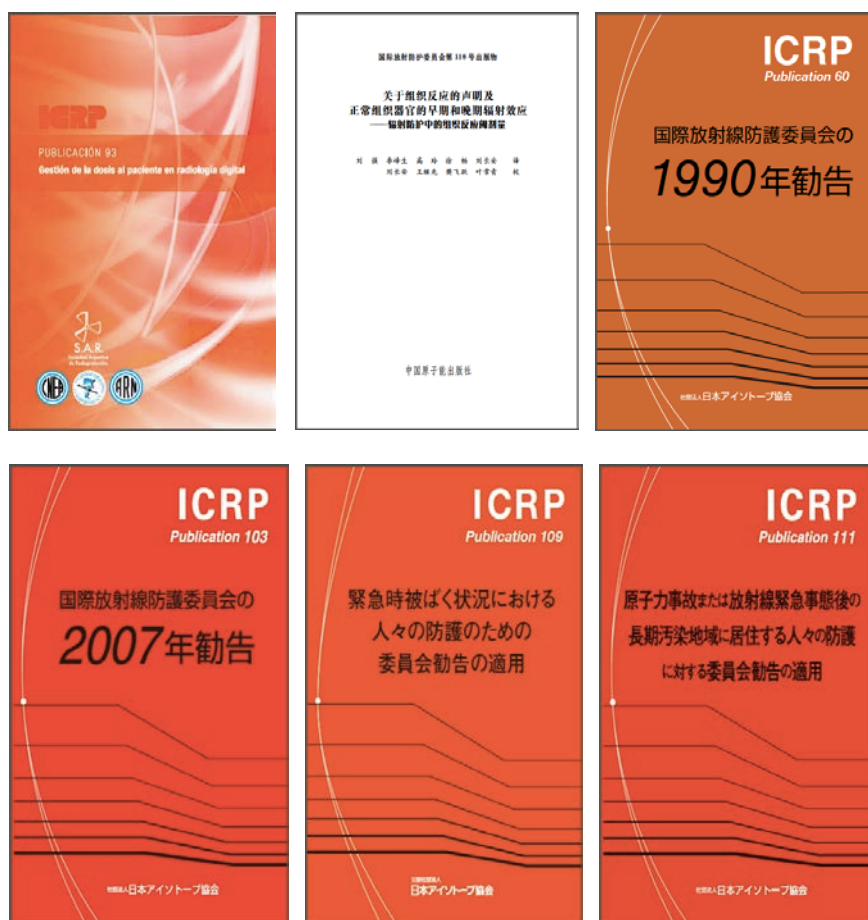
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## Released in 2014



*Publications 124, 125, and 126*



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