



ICRP

2019 Annual Report

Established in Stockholm 27 July 1928



ICRP 2019 Annual Report

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Contact

Christopher Clement, ICRP Scientific Secretary and Editor-in-Chief of Annals of the ICRP

International Commission on Radiological Protection, PO Box 1046, Station B

280 Slater Street Ottawa, Ontario K1P 5S9 CANADA

(tel) +1 (613) 947-9750

(fax) +1 (613) 944-1920

sci.sec@icrp.org www.icrp.org

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Chair's Foreword

Last year was significant for ICRP as the success of our Free the Annals initiative, means ICRP has never been so accessible for you, your organisation, and everyone around the world.

All publications from 1928 to 2017 are now free-to-access through our website. This is a monumental shift in our ability to engage with international stakeholders regarding the protection of patients, people, and the environment from ionising radiation.

The 5th ICRP International Symposium was held from 17-21 November 2019, in Adelaide, South Australia. This was hosted with the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the Australasian Radiation Protection Society (ARPS) and we welcomed over 400 radiological protection professionals from around the world. Highlighting three main themes, "Mines, Medicine, and Mars", attendees experienced another world-class programme and more information is available later in this report.

2019 also marked the commencement of a crucial decade for the International Commission on Radiological Protection (ICRP) as in the next 10 years, we will be carrying out an extensive review of the System of Radiological Protection, leading to the publication of the next fundamental recommendations. This will be a challenge that entails unprecedented levels of engagement, communication, and resources.

This review work will require a necessary increase in resources to ensure we capture new science, new priorities, and new domains of radiological protection. In an increasingly expensive global market, we will continue to seek relevant support from governments, industry, and individuals. Our priority is our work, and our work requires funding, as for all charities committed to the betterment of people and the environment while maintaining our independence.

Our Main Commission, Committees, Task Groups, Working Parties, and Scientific Secretariat continue to be the engine that drives our work forward. Without them, our supporters and partner organisations, the concept of developing a new set of fundamental recommendations would be daunting. Instead, we are poised for our most significant decade to date. Thank you to everyone who has, continues to, and will play a role in our mission.

Finally, as I write this in 2020, the world is facing a global crisis, not encountered for many decades, due to the Covid-19 pandemic. It is a time of isolation, anxiety, worry and hardship. For all those working on the frontline to treat the sick and keep us safe, a heartfelt thanks from everyone at ICRP.

Claire Cousins
ICRP Chair

A handwritten signature in black ink that reads "Claire Cousins". The signature is written in a cursive style with a small flourish at the end.

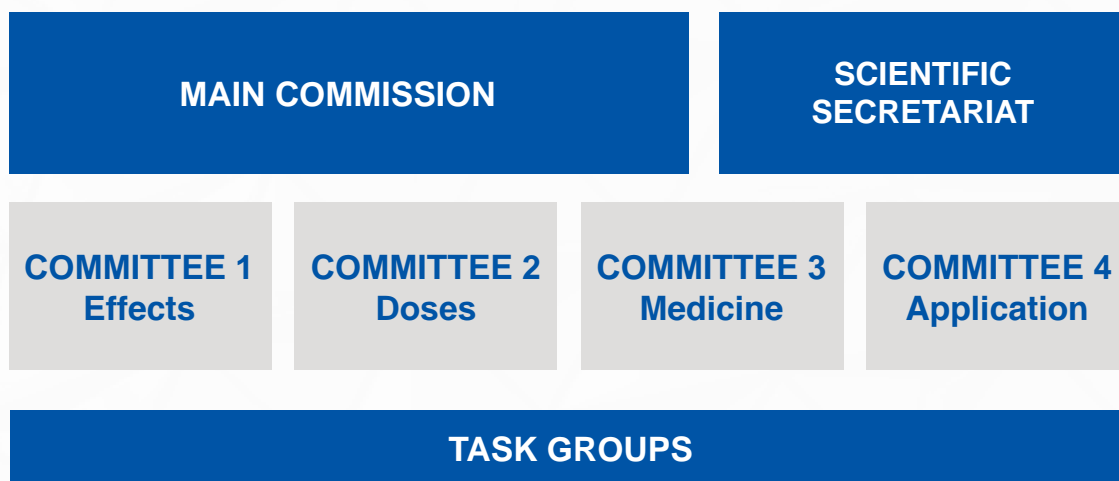
The International Commission on Radiological Protection

ICRP develops the System of Radiological Protection for the public benefit. The System takes account of the latest scientific knowledge, ethical values, and practical experience. It is the basis of standards, legislation, guidance, programmes, and practice worldwide.

The objective of the System is to contribute to an appropriate level of protection for people and the environment against the harmful effects of ionising radiation exposure without unduly limiting the individual or societal benefits of activities involving radiation.

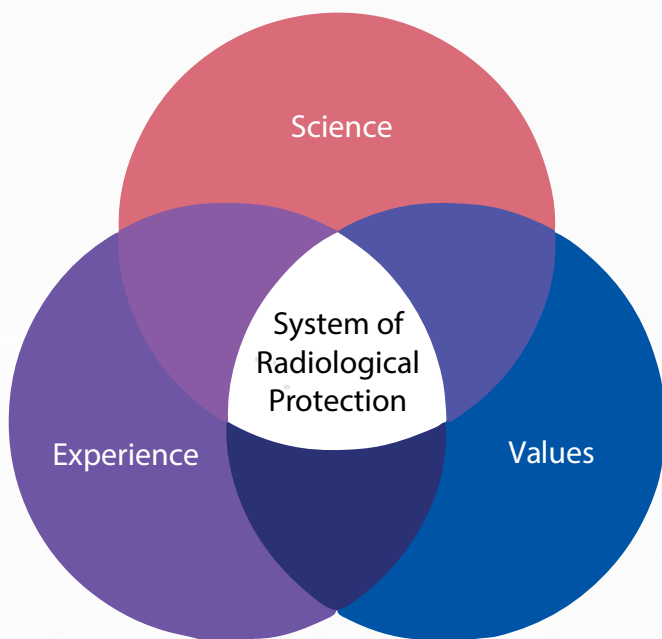
Originally established at the Second International Congress of Radiology in 1928 as the International X-ray and Radium Protection Committee, today ICRP is an independent international charity registered in the UK, relying on financial contributions and support from governments, industry, agencies, and foundations from around the world.

ICRP consists of the Main Commission, the Scientific Secretariat, four standing Committees, and Task Groups established as needed to undertake specific work. Members come from over 30 countries and all disciplines relevant to radiological protection. They are invited to join ICRP as independent experts on a volunteer basis for four-year terms. Representatives of organisations in formal relations with ICRP are regularly invited to both advise the Main Commission and to participate in meetings of the Committees. Individuals from these organisations may be invited to be members of Task Groups or to review drafts of work in progress where their expertise is particularly relevant.



This structure supports a rigorous system of peer review. The work of Task Groups is reviewed by the relevant Committee(s), and then reviewed and approved by the Main Commission. During development, most reports are circulated to several organisations and individual experts for critical review and all are posted for public consultation through the ICRP website.

The System of Radiological Protection



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

The System of Radiological Protection is based on the latest science, social and ethical values, with over a century of experience since the discovery of ionising radiation.

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

The IAEA International Basic Safety Standards for Protection against Ionising 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 Organization Convention 115, Radiation Protection Convention, General Observation 2015, refers specifically to the recommendations of ICRP.

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.



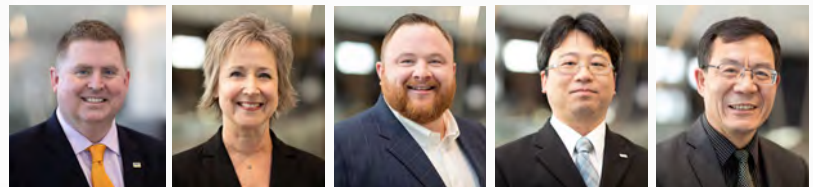
Back Row (L-R): Michiaki Kai (Japan), Werner Ruhm (Germany), Dominique Laurier (France), John Harrison (United Kingdom), Carl-Magnus Larsson (Australia), Sergey Romanov (Russian Federation), Simon Bouffler (United Kingdom)

Front Row (L-R): Kimberly Applegate (United States), Donald Cool (United States), Jacques Lochard (Vice-Chair, France), Claire Cousins (Chair, United Kingdom), Christopher Clement (Scientific Secretary*, Canada), Kunwoo Cho (South Korea), Senlin Liu (China)

*The Scientific Secretary has not been a Main Commission member since 1988, but continues to be integral to the work of the Main Commission, often serving 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.



From L-R
Christopher Clement, Scientific Secretary,
Lynn Lemaire, Executive Administrator,
Kelsey Cloutier, Development and Communications Manager,
Hiroki Fujita, Assistant Scientific Secretary,
Chunsheng Li, Assistant Scientific Secretary

Not Pictured:
Toshihiro Higuchi, Historian

ICRP in Numbers:



Committee 1

Effects

Committee 1 considers the effects of radiation action from the subcellular to population and ecosystem levels, including the induction of cancer, heritable and other diseases, impairment of tissue/organ function and developmental defects, and assesses implications for protection of people and the environment.

Committee 1's annual meeting began with a moment of silence for members **Ranajit Chakraborty** and **Wolfgang Dörr**, who both tragically passed away since the 2018 meeting.

> [2019 Meeting Summary](#)



Adelaide, November 2019

Back Row (L-R): Quanfu Sun (China), Mikhail Sokolnikov (Russian Federation), Michael Hauptmann (Netherlands), Andrzej Wojcik (Vice Chair, Sweden), Richard Wakeford (United Kingdom)

Front Row (L-R): Kazuo Sakai (Japan), Kotaro Ozasa (Japan), Gayle Woloschak (United States), Werner Ruhm (Chair, Germany), Tamara Azizova (Russian Federation), Jacqueline Garnier-Lapace (Secretary, France), Sisko Salomaa (Finland),

NOT PICTURED: Dan Stram (United States), Preetha Rajaraman (India)



Committee 2

Dose

Committee 2 develops dosimetric methodology for the assessment of internal and external radiation exposures, including reference biokinetic and dosimetric models and reference data and dose coefficients, for use in the protection of people and the environment.

> [2019 Meeting Summary](#)



Adelaide, November 2019

Back Row(L-R): Jizeng Ma (Invitee from IAEA), Derek Jokisch (United States), Augusto Giussani (Germany), Alexander Ulanowski (Austria), Nina Petoussi-Henss (Germany), Wesley Bolch (Secretary, United States), Eric Blanchardon (France)

Front Row(L-R): Francois Paquet (Vice Chair, France), John Harrison (Chair, United Kingdom), Maria Antonia Lopez (Spain), Tracy Smith (United Kingdom), Tatsuhiro Sato (Japan), Volodymyr Berkovskyy (Ukraine), Chan Hyeong Kim (South Korea) **NOT PICTURED:** Rich Leggett (United States), Junli Li (China)

Committee 3 Medicine

Committee 3 addresses protection of persons and unborn children when ionising radiation is used in medical diagnosis, therapy, and biomedical research, as well as protection in veterinary medicine.

> 2019 Meeting Summary



Adelaide, November 2019

Back Row (L-R): Keon Kang (South Korea), Sandor Demeter (Canada), David Sutton (United Kingdom), Reinhard Loose (Germany), Lodewijk van Bladel (Belgium), Yantao Niu (China)

Front Row (L-R): William Small (United States), Colin Martin (Vice Chair, United Kingdom), Kimberly Applegate (Chair, United States), Madan Rehani (Secretary, United States), Josep Marti-Climent (Spain), Makato Hosono (Japan)

NOT PICTURED: Marie-Claire Cantone (Italy), Michel Bourguignon (France), Jamila Alsuwaidi (UAE), Claudia Rube (Germany)



Committee 4 Application

Committee 4 provides advice on the application of the Commission's recommendations for the protection of people and the environment in an integrated manner for all exposure situations.

> 2019 Meeting Summary



Adelaide, November 2019

Back Row (L-R): Thierry Schneider (France), Miroslav Pinak (Invitee from IAEA), Catrin Koch (Sweden), Mike Boyd (United States), John Takala (Canada), Francois Bochud (Switzerland), Sergey Shinkarev (Russian Federation), David Coplestone (United Kingdom)

Front Row (L-R): Gillian Hirth (Australia), Eduardo Gallego (Spain), Toshimitsu Homma (Japan), Donald Cool (Chair, United States), Kathryn Highley (Vice-Chair, United States), Jean-Francois Lecomte (Secretary, France), Anne Nisbet (United Kingdom), Analia Canoba (Argentina), Yahong Mao (China), Nicole Martinez (United States)

NOT PICTURED: Nobuhiko Ban (Japan)

2019 Highlights

The Main Commission met with representatives of NASA, the European Space Agency, the Canadian Space Agency, and the Russian Federal Space Agency to explore **collaboration on radiological protection** in space in Houston, Texas.

ICRP Mentorship Program established

Six **new Task Groups** were established:

- TG 112 Emergency Dosimetry
- TG 113 Reference Organ and Effective Dose Coefficients for Common Diagnostic X-Ray Imaging Examinations
- TG 114 Reasonableness and Tolerability in the System of Radiological Protection
- TG 115 Risk and Dose Assessment for Radiological Protection of Astronauts
- TG 116 Radiological Protection Aspects of Imaging in Radiotherapy
- TG 117 Radiological Protection in PET and PET/CT

Seven **reports were approved for publication**:

- Radiation Weighting for Reference Animals and Plants
- The Use of Dose Quantities in Radiological Protection
- Dose Coefficients for External Exposures to Environmental Sources
- Paediatric Reference Computational Phantoms
- Adult Mesh-type Reference Computational Phantoms
- Radiological Protection in Therapy with Radiopharmaceuticals
- Radiological Protection from Naturally Occurring Radioactive Material (NORM) in Industrial Processes

Public consultation on the draft report **Radiological Protection of People and the Environment in the Event of a Large Nuclear Accident** launched, and subsequently extended due to record-breaking interest.

The ICRU/ICRP report **Operational Quantities for External Exposures** was approved for publication. This joint report will be published by ICRU.

Hosted over 400 delegates at **ICRP 2019** in Adelaide, South Australia along with the Australasian Radiation Protection Society (ARPS) and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

Announced that **ICRP 2021** will be hosted by the Canadian Radiation Protection Association (CRPA) and the Canadian Nuclear Safety Commission (CNSC), in Vancouver, British Columbia.

Discussed the decade-long plan to **review and refine the System of Radiological Protection**.

Announced the **International Conference on Recovery After Nuclear Accidents**, to be held 29 November – 4 December 2020 in Iwaki City, Fukushima Prefecture, Japan.

Announced the success of the **Free the Annals** Initiative announced, making all issues of Annals of the ICRP free two years after initial publication.

Dr **Elizabeth Ainsbury** awarded the **2019 Bo Lindell Medal** for Promotion of Radiological Protection.

The 5th International Symposium on the System of Radiological Protection

Adelaide, Australia 17-21 November 2019

With special thanks to the [Australian Radiation Protection and Nuclear Safety Agency](#) (ARPANSA) and the [Australasian Radiation Protection Society](#) (ARPS), over 400 delegates converged in Adelaide, South Australia for the 5th International Symposium on Radiological Protection.

While “Mines, Medicine, and Mars” were highlighted sessions, delegates were once again provided a world-class programme covering a broad range of topics in radiological protection.

In case you missed this event, abstracts, presentation videos, posters, and eventually papers can be found on the [ICRP website](#).

As is tradition during the closing ceremonies of the ICRP biennial symposia series, Dr Claire Cousins announced that the 6th International Symposium on the System of Radiological Protection will be in Vancouver, British Columbia, Canada, 1-4 November 2021. Subscribe [here](#) for updates on all things ICRP 2021.



Bo Lindell Medal

Dr Elizabeth Ainsbury (right) receiving the 2019 Bo Lindell Medal for her significant contribution to the field of radiological protection from ICRP Chair Claire Cousins (left).



“One of the most important challenges in radiological protection right now is to find innovative ways to work in a genuinely interdisciplinary manner across both scientific and geographical borders. In common with almost all fields of scientific research these days, radiological protection questions are international questions and the only way that we will see progress is to address them as such.”

-Dr Elizabeth Ainsbury

On 18 November 2019, the first official day of ICRP 2019, Dr Elizabeth “Liz” Ainsbury was awarded the 2nd Bo Lindell Medal for significant contributions to the promotion of radiological protection by an early-to-mid career professional.

Liz is a Principal Radiation Protection Scientist and Cytogenetics Group Leader at Public Health England’s (PHE) Centre for Radiation, Chemical and Environmental Hazards. A physicist by training, Liz has worked in the field of radiation biology and radiological protection for 12 years since completing her PhD, and during that time has focused on a wide range of different projects encompassing statistical analysis for cytogenetic bio-dosimetry, development of biological and physical dosimetry techniques and related guidance, radiation emergency response preparedness and the mechanisms, and radiological protection implications of recent findings on radiation cataract genesis. In addition, she has contributed to over 80 peer reviewed publications and presented at a number of international symposia.

Together We Freed the Annals!

On 15 May 2019, we announced the success of the **Free the Annals initiative**. This marked a permanent change to the way the world can access Annals of the ICRP. All issues of *Annals of the ICRP* are now free to download two years after their initial publication. This took effect at the end of 2019, when all of issues up to 2017 (up to *ICRP Publication 137*) became free-to-access. Thank you to everyone who contributed to this monumental success!



Free the Annals Supporting Organisations



中国辐射防护学会
China Society of Radiation Protection



الهيئة الاتحادية للرقابة النووية
Federal Authority for Nuclear Regulation



中国辐射防护研究院
CHINA INSTITUTE FOR RADIATION PROTECTION



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety



Health
Canada

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire



Italian National Inspectorate for Nuclear Safety and Radiation Protection (ISIN)



Dutch Society for
Radiation Protection



Australian Government
Australian Radiation Protection
and Nuclear Safety Agency

CEPN

FANC
federal agency for nuclear control



EURAMED
European Alliance for Medical
Radiation Protection Research



NSFS
Norsk Society for Radiation Protection

nks
Nordic nuclear safety research



REACTOR INSTITUTE DELFT



SOCIEDAD ESPAÑOLA DE
PROTECCIÓN RADIOLÓGICA



Sociedad Española
de Física Médica



IPEM Institute of Physics and
Engineering in Medicine



GEISLAVARNIR RÍKISINS
Icelandic Radiation Protection Authority



Free the Annals Individual Supporters

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Penelope Allisy
Meshary Alnuaimi
Kimberly Applegate
Nobuhiko Ban
Catrin Bauréus Koch
Alistair Bell
Theocharis Berris
Eric Blanchardon
Wesley Bolch
Simon Bouffler
Marie-Claire Cantone
Nicol Caplin
Kunwoo Cho
Roger Clarke
Christopher Clement
Kelsey Cloutier
Donald Cool
Claire Cousins
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Keith Eckerman
Akira Endo
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Hiroki Fujita
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Julian Ginniver
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UAE Dubai Team
Phillip Thomas
Alexander Ulanowski
Jack Valentin
Eliseo Vano
Erik Wåhlin
Wong Pai Wai
Hanne Waltenburg
Gisbert Weigl
Robert Wilson
Andrew Yule

Regular Supporters

The contributions from these organisations allow ICRP to further our programme of work, paving the way for the advancement of the system of radiological protection globally. Want to join this growing list of organisations at the forefront of radiological protection? [Contact us](#).



Organisations in Formal Relations

ICRP maintains formal relations with other organisations with an interest in radiological protection through specific agreements, or by granting Special Liaison status to organisations whose work is relevant to ICRP's mandate. Organisations currently in formal relations with ICRP are shown below.



IEC Electrical Equipment in Medical Practice (IEC/TC62)



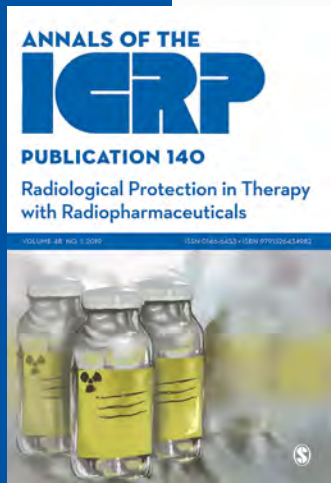
IEC Nuclear Instrumentation (IEC/TC45)



Task Groups

Active as of 31 December 2019

- C2/3 TG36:** Radiation Dose to Patients in Diagnostic Nuclear Medicine, chaired by Augusto Giussani
- C1 TG64:** Cancer Risk from Alpha Emitters, chaired by Eric Blanchardon and Richard Wakeford
- MC TG72:** RBE and Reference Animals and Plants, chaired by Kathryn Higley
- C2 TG79:** The Use of Effective Dose as a Risk Related Radiological Protection Quantity, chaired by John Harrison
- C3 TG89:** Occupational Radiological Protection in Brachytherapy, chaired by William Small
- 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
- C4 TG93:** Update of ICRP Publication 109 and 11, chaired by Michiaki Kai
- C2 TG95:** Internal Dose Coefficients, chaired by Francois Paquet
- C2 TG96:** Computational Phantoms and Radiation Transport, chaired by Wesley Bolch
- C4 TG97:** Surface and Near Surface Disposal of Solid Radioactive Waste, chaired by John Takala
- C4 TG98:** Exposures Resulting from Contaminated Sites from Past Industrial, Military and Nuclear Activities, chaired by Michael Boyd
- C1/4 TG99:** Reference Animals and Plants (RAPs) Monographs, chaired by Jacqueline Garnier-Laplace
- C1 TG102:** Detriment Calculation Methodology, chaired by Nobuhiko Ban
- C2 TG103:** Mesh-type Reference Computational Phantoms, chaired by Chan Hyeong Kim
- C4/5 TG105:** Considering the Environment when Applying the System of Radiological Protection, chaired by David Copplestone
- C4 TG106:** Application of the Commission's Recommendations to Activities involving Mobile High Activity Sources, chaired by Donald Cool
- C3 TG108:** Optimisation of Radiological Protection in Digital Radiography, Fluoroscopy, and CT in Medical Imaging, chaired by Colin Martin
- C3/4 TG109:** Ethics in Radiological Protection for Medical Diagnosis and Treatment, chaired by Francois Bochud and Marie-Claire Cantone
- C3/4 TG110:** Radiological Protection for Occupational and Public Exposure in Veterinary Practice, chaired by Nicole Martinez and Lodewijk Van Bladel
- C1/3 TG111:** Factors Governing the Individual Response of Humans to Ionising Radiation, chaired by Simon Bouffler
- NEW C2 TG112:** Emergency Dosimetry, chaired by Volodymyr Berkovskyy
- NEW C2/C3 TG113:** Reference Organ and Effective Dose Coefficients for Common Diagnostic X-ray Imaging Examinations, co-chaired by Nina Petoussi-Henß and David Sutton
- NEW C4 TG114:** Reasonableness and Tolerability in the System of Radiological Protection, chaired by Thierry Schneider
- NEW C1 TG115:** Risk and Dose Assessment for Radiological Protection of Astronauts, chaired by Werner Rühm
- NEW C3 TG116:** Radiological Protection Aspects of Imaging in Radiotherapy, chaired by Colin Martin
- NEW C3 TG117:** Radiological Protection in PET and PET/CT, chaired by Josep M Martí-Climent



Publication 140

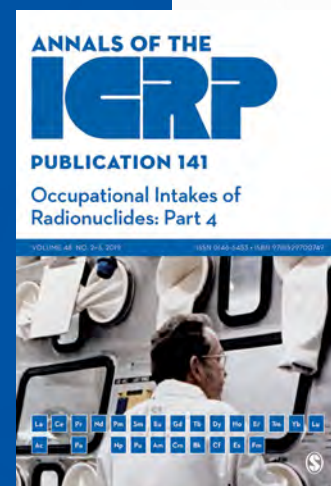
Radiological Protection in Therapy with Radiopharmaceuticals

Recommended citation

ICRP, 2019. Radiological protection in therapy with radiopharmaceuticals. ICRP Publication 140. Ann. ICRP 48(1).

Authors on behalf of ICRP

Y. Yonekura, S. Mattsson, G. Flux, W.E. Bolch, L.T. Dauer, D.R. Fisher, M. Lassmann, S. Palm, M. Hosono, M. Doruff, C. Divgi, P. Zanzonico



Publication 141

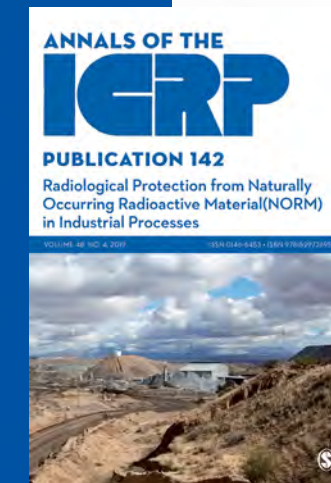
Occupational Intakes of Radionuclides: Part 4

Recommended citation

ICRP, 2019. Occupational intakes of radionuclides: Part 4. ICRP Publication 141. Ann. ICRP 48(2/3).

Authors on behalf of ICRP

F. Paquet, M.R. Bailey, R.W. Leggett, G. Etherington, E. Blanchardon, T. Smith, G. Ratia, D. Melo, T.P. Fell, V. Berkovski, J.D. Harrison



Publication 142

Radiological Protection from Naturally Occurring Radioactive Material (NORM) in Industrial Processes

Recommended citation

ICRP, 2019. Radiological protection from naturally occurring radioactive material (NORM) in industrial processes. ICRP Publication 142. Ann. ICRP 48(4).

Authors on behalf of ICRP

J-F. Lecomte, P. Shaw, A. Liland, M. Markkanen, P. Egidi, S. Andresz, J. Mrdakovic-Popic, F. Liu, D. da Costa Lauria, H.B. Okyar, P.P. Haridasan, S. Mundigl

Finances

	2016	2017	2018	2019
INCOMING RESOURCES				
Contributions Received	998 002	1 012 503	1 111 734	1 017 495
Royalties	142 255	184 722	229 585	124 153
Total Incoming Resources	1 140 257	1 197 225	1 341 319	1 141 648
RESOURCES EXPENDED				
Promotion of Radiological Protection	622 915	929 988	430 422	781 865
Governance Costs	387 504	477 652	509 784	494 158
Other Resources Expended	29 264	16 418	(6 832)	34 531
Total Resources Expended	1 039 684	1 424 058	933 374	1 310 554
NET MOVEMENT IN RESOURCES	100 573	(226 833)	407 945	(168 906)
TOTAL FUNDS CARRIED FORWARD	478 201	251 368	659 313	490 407

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

ICRP2021

1-4 NOV  VANCOUVER

**Come for the waves,
Stay for the mountains.
See you at ICRP2021.**



6th International Symposium on the
System of Radiological Protection

Brought to you by:



**International Commission on
Radiological Protection**



Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

**Canadian Nuclear
Safety Commission**



**Canadian Radiation
Protection Association**