

ICRP

**1998 Annual Report
of the
International Commission
on Radiological Protection**

ICRP
ICRP

ICRP Annual Report on 1998
1999-05-03
ICRP Reg. No. 52/192/99

Our Mission Statement

**The International Commission on Radiological Protection, ICRP,
is an independent Registered Charity,
established to advance for the public benefit
the science of radiological protection,
in particular by providing recommendations and guidance
on all aspects of protection against ionising radiation.**

Progress in 1998 in a Nutshell

The present report begins with a brief description of ICRP and its procedures, serving as a platform providing a logical structure for the report.

Two reports were printed in the *Annals of the ICRP* in 1998: Publication 77 on 'Radiological Protection Policy for the Disposal of Radioactive Waste'; and Publication 78 on 'Individual Monitoring for Intakes of Radionuclides by Workers'.

A report in CD ROM format on 'The ICRP Database of Dose Coefficients: Workers and Members of the Public' was produced and is being distributed through the same channels as the *Annals of the ICRP*. It extends the collection of dose coefficients given in ICRP Publications 68 and 72.

Another report, Publication 79 on 'Genetic Susceptibility to Cancer', and a booklet on the 'History, Policy, Procedures' of ICRP, were prepared for printing. Preparation for printing in the *Annals of the ICRP* was started on a further report, on 'Radiation Doses to Patients from Radiopharmaceuticals' (constituting Addendum 2 to ICRP Publication 53).

The Main Commission adopted two reports for publication, one on Multifactorial diseases and one (pending completion of the Quality Assurance process) on Intake dose coefficients for embryo/foetus.

The Commission also reviewed two draft reports from Task Groups, on Prolonged ('chronic') radiation exposures and on Disposal of long-lived solid radioactive waste. Drafting continued on numerous further reports, some of them intended to be produced partly or entirely in CD ROM format.

Meetings were held in 1998 with the Main Commission (twice), with each one of the four Committees, and with each one of 13 Task Groups; and the Secretariat undertook various actions to support these activities.

The International Commission on Radiological Protection

ICRP consists of the Main Commission, Committee 1 (Radiation Effects), Committee 2 (Doses from Radiation Exposure), Committee 3 (Protection in Medicine), Committee 4 (Application of ICRP Recommendations), *ad hoc* Task Groups and Working Parties, and the Scientific Secretariat.

The Main Commission consists of twelve members and a Chairman, while the Committees contain between 15 and 20 members each. The Commission and its Committees run for four-year periods, from 1 July. On each occasion of a new period, at least three, and not more than five, members of the Commission must be changed. A similar rate of renewal is sought for the Committees. Such a new period began 1 July 1997.

The Commission meets once or twice a year. Each Committee meets once a year. Twice in each four-year period, the annual meeting of the Committees is conducted jointly and together with the Commission. These meetings are funded as necessary from monies available to ICRP.

The Commission uses Task Groups and Working Parties to deal with specific areas. Task Groups are formally appointed by the Commission to perform a defined task, usually the preparation of a draft report. A Task Group usually contains a majority of specialists from outside the Commission's structure. It is funded as necessary from monies available to ICRP.

Working Parties are set up by Committees to develop ideas, sometimes leading to the establishment of a Task Group. The membership of a Working Party is usually limited to Committee members. Working Parties receive no funding of their own, *i.e.* they operate primarily by correspondence and by meetings in direct conjunction with meetings of the Committee concerned.

These activities are co-ordinated with a minimum of bureaucracy by a Scientific Secretary, ensuring that ICRP recommendations are promulgated.

Thus, ICRP is an independent international network of specialists in various fields of radiological protection. At any one time, about one hundred eminent scientists are actively involved in the work of ICRP. The four-tier structure described provides a rigorous Quality Management system of peer review for the production of ICRP Publications.

In preparing its recommendations, the Commission considers the fundamental principles and quantitative bases on which appropriate radiation protection measures can be established, while leaving to the various national protection bodies the responsibility of formulating the specific advice, codes of practice, or regulations that are best suited to the needs of their individual countries. The aim of the recommendations of ICRP is to

- *provide an appropriate standard of protection for mankind from sources of ionising radiation, without unduly limiting beneficial practices that give rise to exposure to radiation.*

The Main Commission:

Radioactive Waste; Genetic Susceptibility to Cancer; Radiopharmaceuticals; Multifactorial Diseases; Embryo/Foetus Doses; CD ROM Database

The Commission is an independent Registered Charity, established to advance for the public benefit the science of radiological protection, in particular by providing recommendations and guidance on all aspects of protection against ionising radiation.

In 1998, ICRP *Publication 77*, **Radiological Protection Policy for the Disposal of Radioactive Waste** was published. This report had been prepared by a Task Group of the Main Commission itself. The report reaffirms the Commission's current policy of radiological protection, in particular its policy on public exposure, and aims to clarify the practical application of that policy to the disposal of radioactive waste.

Two Reports which had been adopted in principle in 1997 were prepared for final publication in 1998 and are now in press. The first of these, *Publication 79*, is the report from Committee 1 on **Genetic Susceptibility to Cancer**. It was adopted with a concluding section on implications for radiological protection drafted by the Main Commission. The report reviews mechanisms of radiation oncogenesis with respect to gene mutations in man and animals; the spontaneous frequencies of relevant germline mutations in human populations; and the role of genetic factors in radiation-induced cancer. The text adopted contains reviews and judgements on mechanisms of DNA damage and repair; on gene involvement in the development of cancers, leukaemia and lymphomas; and the modelling of genetically imposed cancer risk. In respect of the implications for radiological protection, the report concludes that the prevalence of familial cancers in the population is too low to distort current estimates of population risk. Radiation-induced cancer risks at low doses in genetically susceptible individuals are considered small when compared with background rates; but that these individual risks will become important following high dose exposure such as would occur after radiotherapy.

The second report, *Publication 80*, is from a Task Group of members of Committees 2 and 3 on **Radiation Doses to Patients from Radiopharmaceuticals (Addendum 2 to ICRP Publication 53)**. This will contain biokinetic models and effective doses, using ICRP 60 dosimetry for C-11 methylthymidine and 2-thymidine C-14 urea including CO₂ and bicarbonate, O-15 water, Tc-99m HIG, Pertechnegas, Technegas, Tetrofosmin In-111 HIG and Octreotide. Dose data for the 19 most frequently used radiopharmaceuticals from *Publication 53* have been recalculated using ICRP 60 dosimetry and include, F-18 FDG, Cr-51 EDTA, Ga-67 citrate, Se-75 SeHCAT, Tc-99m DMSA, DTPA, RBC, IDA derivatives, large colloids, WBC, MAA, non-absorbable markers, pertechnetate, and phosphates/phosphonates, I-123 Hippuran, I-131 Hippuran, I-123 MIBG, I-131 NP 59, Tl-201 thallos ion and some printing corrections to *Publication 53*. Finally dose data are reproduced unchanged from *Addendum 1*,

i.e., H-3 neutral fat and free fatty acids, C-14 neutral fat and free fatty acids, Ga-68 EDTA, and Tc-99m HMPAO, MAG3, and MIBI.

Furthermore, a booklet on the History, policies, and procedures of ICRP which had been adopted in 1997 was also issued.

The Main Commission met twice in 1998: In Cape Town, South Africa, in May, and in Stockholm, Sweden, in October. In Cape Town, considerable effort was spent on a thorough review of a mid-term draft report on the Protection of the Public in Situations of Prolonged Exposure to Radiation ('chronic' exposures). This includes such topics as when to suspend intervention countermeasures, advice on decontamination and reclamation of land after contamination from past practices or accidents, and unexpected exposure to high doses from natural sources. After this review, the Task Group drafting the report has elaborated the manuscript further. It is currently (spring 1999) being circulated to experts outside ICRP for information and consultation.

In addition to this review, the Commission reviewed current progress and plans in each of its four Committees. The Commission also made its annual formal survey of its financial and administrative matters.

In Stockholm, three different ICRP documents were adopted, two of them for printing as ICRP Reports and one for distribution as a CD ROM.

One of these reports is **Risk Estimation for Multifactorial Diseases**, which is likely to become *Publication 81*. The main conclusion is that the risk of hereditary radiation-induced disease is less than had been previously estimated. The report will give details of computer simulation studies to estimate the risk of those multifactorial diseases that commonly occur and where both mutation and environmental factors are known to be involved. It will indicate the limitations of the model and the impact of mutational changes on gene interactions in non-equilibrium populations. The preliminary conclusion is that radiation-induced mutations at low doses are not likely to significantly influence the incidence of the commonly-occurring multifactorial diseases.

Another report, on **Age-dependent Doses to Members of the Public from Intakes of Radionuclides, Part 6. Embryo and Fetus** is likely to become *Publication 82*. This covers intakes by the mother before and during pregnancy for selected radioisotopes of the 31 elements for which age-dependent biokinetic models have been given in recent publications. The report was adopted in principle, pending full quality assurance of the dose coefficients which is scheduled to be completed early in 1999.

New electronic media pose special challenges. In Stockholm, the Commission also adopted a CD ROM, **The ICRP Database of Dose Coefficients: Workers and Members of the Public**. The CD ROM essentially expands the lookup tables of *ICRP Publications 68 and 72* by adding organ doses including Remainder Tissues to the effective doses given in the printed

versions. It also provides more detail in some further respects. This CD ROM is now (spring 1999) being distributed through the Commission's publisher, Elsevier Science Ltd.

Furthermore, the Commission reviewed a mid-term draft report on Radiological Protection Recommendations as Applied to Disposal of Long-lived Solid Radioactive Waste. This report will supplement ICRP *Publication 46* on the same topic, particularly on potential exposures from long-lived wastes, protection objectives in the long-term, the weight to be given to future doses, and the application of optimisation of protection. After this review, the Task Group drafting the report has elaborated the manuscript further. It is currently (spring 1999) being circulated to experts outside ICRP for information and consultation.

The Stockholm meeting also marked the 70th anniversary of the formation of ICRP in that same town, and an informal gathering was arranged at the very restaurant where the founder members had met in 1928.

The most recent fundamental recommendations of ICRP, *Publication 60*, date from 1990 (published in 1991). Initial work to Consolidate/Recapitulate these ICRP recommendations, aiming at publishing an updated set of recommendations around the year 2005, was also undertaken.

Committee 1 (Radiation Effects):

*Multifactorial Disease; Low Dose Risks; Effects on Embryo/Foetus;
Radiation Quality Effects*

Committee 1 considers the risk of induction of cancer and heritable disease (stochastic effects) together with the underlying mechanisms of radiation action; also, the risks, severity, and mechanism of induction of tissue/organ damage and developmental defects (deterministic effects).

Committee 1 of the International Commission on Radiological Protection met in Boston, MA, USA, in September 1998.

A major task for Committee 1 at that meeting was to review the final draft of the report on multifactorial hereditary diseases which was then adopted by the Main Commission in October.

Furthermore, the Committee reviewed progress of its three Task Groups. The first one of these addresses 'Estimates of radiation-induced cancer risks at low doses'. There are two main objectives of this Task Group: First, to review the information in ICRP *Publication 60* regarding stochastic effects. Second, to examine what has been learnt subsequently with respect to: the value of low dose studies for risk estimation; the possibility of a dose threshold; linearity at low doses including the implication of genomic instability; the standard general dose-response model; the Dose-Dose Rate Effectiveness Factor; and variations in radiation-induced risk by age at exposure and time since exposure.

A second Task Group deals with 'Radiation effects on the embryo/foetus'. The Task Group's aims are to address the pre-implantation period (including whether malformations can be induced in this period), teratogenesis (including brain development), and stochastic effects.

The third Task Group is working on 'Radiation quality effects in radiological protection'. The Task Group will collate and evaluate data from alpha particles, neutrons, and protons, considering deterministic and stochastic effects and effects after both acute and prolonged exposure. The methods of handling difference and uncertainties in radiation quality effects for radiological protection purposes will be examined.

In addition, Working Parties will continue:

- to review published epidemiological studies,
- to survey developments in cell/molecular biology and biophysics relevant to the effects of ionising radiation,
- to identify cells at risk,
- to provide evidence of dose and dose-rate effects from animal studies,
- to consider genetic risks in relation to both mendelian and multifactorial disorders, and
- to survey the evidence of interaction between the effects of ionising radiations and chemical carcinogens and to consider the differences in systems of protection.

Committee 2 (Doses from Radiation Exposures):

Intake Monitoring; Embryo/Foetus Doses; CD ROM Database; Reliability and Application of Dose Coefficients; Basic Anatomy/Physiology

Committee 2 is concerned with the development of dose coefficients for the assessment of internal and external radiation exposure, development of reference biokinetic and dosimetric models, and reference data for workers and members of the public.

In 1998, ICRP *Publication 78, Individual Monitoring for Internal Exposure of Workers (Replacement of ICRP Publication 54)* was published. This report had been prepared by a Working Party of Committee 2. It updates an earlier publication on the same topic by taking more recent biokinetic models and data into account.

ICRP Committee 2 met in Kiev, Ukraine, in September 1998. At the meeting, a detailed review was performed on a final draft of the report on dose coefficients for the embryo and foetus after intakes of radionuclides by the mother, which was then adopted by the Main Commission at its October meeting. Similarly, the CD ROM data base of dose coefficients was also discussed prior to its adoption in October by the Main Commission.

The Committee also reviewed the progress of its Task Groups. One of these, the standing 'INDOS' group (for INternal DOSimetry), is working on draft reports on the Reliability of dose coefficients for intake of radionuclides, on Application of the ICRP human respiratory tract model (a supporting technical document), and on a longer term, revision of ICRP *Publication 30* on Limits for intakes of radionuclides by workers.

Another Task Group, 'HAT', addresses the Human Alimentary Tract. It aims to produce a dosimetric model to replace the current 1966 gastro-intestinal tract model.

A Task Group on REference Man, 'REM', is working on the revision of information relevant for dosimetry in ICRP *Publication 23* which is a catalogue of data on man. ICRP *Publication 70* constituted a first part dealing with the skeleton. A new report on Anatomical and physiological data is due next.

The 'DOCAL' (DOse CALculations) standing Task Group is working on the development of realistic human phantoms for dose calculation, based on medical imaging. This Task Group is also generally involved in Quality Assurance for dose coefficient tabulations.

There is also a Task Group, 'EXDOS', that is concerned with dose coefficients for EXternal DOSimetry.

A standing Task Group on 'Radiation doses to patients from radiopharmaceuticals' is operated jointly with Committee 3 and will be discussed under that heading below.

Committee 3 (Protection in Medicine):

Radiopharmaceuticals; Pregnancy and Medical Radiation, Accident Prevention in Radiotherapy; Radiation Injuries in Interventional Procedures

Committee 3 is concerned with protection of persons and unborn children when ionising radiation is used for medical diagnosis, therapy, or for biomedical research.

As indicated in the section on the Main Commission, ICRP *Publication 80* on radiation doses to patients from radiopharmaceuticals is currently being printed. This report was drafted by the joint Committee 2 – Committee 3 Task Group on ‘Radiation doses to patients from radiopharmaceuticals’.

ICRP Committee 3 met in Lima, Peru, in July 1998. During this meeting, the progress of the Task Groups of the Committee were reviewed.

One of these Task Groups addresses ‘Pregnancy and medical radiation’. It takes account of both medical exposures of pregnant patients, and occupational exposures of pregnant medical staff.

Another Task Group deals with ‘Accident prevention and safety in radiotherapy’. The task includes a discussion of what constitutes an accident in radiotherapy, as well as material intended to provide learning from experience.

A third Task Group is working on ‘Radiation injuries in interventional procedures’. Again, the document is intended to cover both medical exposures of patients and occupational exposures of medical staff.

A common feature of the reports being drafted by these three Task Groups is that they are aimed very much at the practising physician and nurses and other medical staff concerned, in addition to health physicists and managers. Thus, the primary target group is somewhat different than the traditional readership of the Commission’s journal, *Annals of the ICRP*. Special efforts are being planned to ensure adequate distribution of these reports when they are ready.

The standing joint Committee 2-Committee 3 Task Group on radiopharmaceuticals had produced dose tables for several new drugs, and the Committee also reviewed this information.

In addition, Working Parties of Committee 3 will consider:

- radiation protection in paediatrics,
- aspects of medical radioactive waste disposal,
- the principles of radiological protection for general practitioners and medical students,
- radiation safety in nuclear medicine,
- radiation protection in computed tomography: recommendations for dose reduction,
- implications of genetic susceptibility for radiation exposure in medical practice.

Committee 4 (Application of the Commission's Recommendations):
Prolonged Exposure Situations; Solid Radioactive Waste; New Tasks

Committee 4 is concerned with providing advice on the application of the recommended system of protection in all its facets for occupational and public exposure. It also acts as the major point of contact with other international organisations and professional societies concerned with protection against ionising radiation.

ICRP Committee 4 met in Madrid in June 1998. A main item on the agenda was to review in detail a draft report from the Task Group on 'Protection of the public in situations of prolonged exposure to radiation' ('chronic' exposure). As indicated above, the draft had also been reviewed in broad terms by the Main Commission at its May meeting. It is expected that a final draft will become available for Main Commission review in 1999.

Similarly, a draft report on 'Radiation protection principles for the disposal of long-lived solid radioactive waste' was also scrutinised in detail. Again, the draft was then also reviewed by the Main Commission, in this case during its October meeting, and again a final draft is expected in 1999.

Committee 4 also has several Working Parties in operation. These are addressing the following questions:

- consideration of the concept of controllable dose and its implications;
- consideration of the formulation of the Commission's statement on protection of the environment;
- consideration of the need for further guidance on optimisation of protection;
- consideration of cosmic ray exposures in aircraft and space flight; and
- assessment of doses to man from radionuclide releases into the environment.

The Scientific Secretariat

The Scientific Secretariat is currently situated in Stockholm, Sweden. The seat of ICRP remains in the United Kingdom where ICRP is a Registered Independent Charity.

Tasks of the Secretariat include preparations for and organisation of meetings, final editing of reports for publication in the *Annals of the ICRP*, maintenance of contacts with all collaborating organisations, and administrative issues.

In 1998, 271 different new matters were filed for action in the Commission's computerised document filing system. Of these, 17 concerned the Main Commission, 60 concerned the four Committees and their Task Groups, and the remaining 194 concerned the Scientific Secretariat. Of the latter, 46 were to do with ICRP Publications (mostly, requests for permission to publish ICRP material). 109 were general enquiries to ICRP and draft reports for consultation, and 39 concerned economical matters. 263 of these 271 actions were completed in 1998.

The Secretariat also devoted part of its efforts to arranging an Internet Web Site. This Home Page is now (spring 1999) operative.

Contacts, Meetings, etc.

Numerous different contacts were maintained, formally and informally, during the year. The Chairman, Professor Clarke, gave presentations in Dublin on ICRP philosophy and background to the Commission's recommendations at a meeting to introduce the Basic Safety Standards in the Euratom Directive and he also participated in a PAHO workshop in Curaçao on the inter-agency Basic Safety Standards. He gave an overview of the need to take action on exposures to aircrew at the NCRP annual meeting and debated the low dose risk issue at the US Health Physics Society Annual meeting in Minneapolis. The Chairman participated in an International Medical Physics Conference in Dehli and in a symposium on exposure to indoor radon in Munich. He held discussions with USNRC, EPA, DOE and FEMA and with officials of the European Commission on current ICRP developments.

In addition, the Vice-Chairman, Professor Meinhold, the Scientific Secretary, Dr Valentin, and members of the Commission represented ICRP in meetings of various kinds with IAEA, the International Radiation Protection Association (IRPA), the Nuclear Energy Agency of the Organization for Economic Co-operation and Development (OECD/NEA), the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the US National Council on Radiation Protection and Measurements (NCRP), and WHO, as well as meetings of professional societies in different countries. On a

number of occasions when formal representation was not called for, ICRP arranged to obtain observers' reports so as to keep abreast with developments.

There was also a brisk demand for informal enlightenment and information via telephone, e-mail, and regular mail to the Secretariat.

ICRP Publications, etc., 1998

ICRP (1998). Radiological protection policy for the disposal of radioactive waste. ICRP Publication 77. *Annals of the ICRP* 27(Supplement), Pergamon Press, Oxford, UK.

ICRP (1998). Individual monitoring for intakes of radionuclides by workers. Replacement of ICRP Publication 54. ICRP Publication 78. *Annals of the ICRP* 27(3-4), Pergamon Press, Oxford, UK.

ICRP (1998). The ICRP database of dose coefficients: Workers and members of the public. CD ROM (distributed by Elsevier Science).

Contact Information

The address of the Commission's Scientific Secretary, Dr J Valentin, is

International Commission on Radiological Protection
ICRP
SE-171 16 Stockholm
Sweden

Telephone: +46 8 729 727 5
Telefax: +46 8 729 729 8
E-mail: jack.valentin@ssi.se
Web site: www.icrp.org

ICRP Publications are available from reputable booksellers or directly from the Commission's publishers, Elsevier Science Ltd:

For customers in the Americas, the Regional Sales Office in New York,

Telefax: +1 212 633 36 80
E-mail: usinfo-f@elsevier.com

For customers outside the Americas, the Regional Sales Office in Amsterdam,

Telefax: +31 20 485 34 32
E-mail: nlinfo-f@elsevier.nl

Composition of the International Commission on Radiological Protection and Committees, 1997 - 2001

MAIN COMMISSION

Chairman:

Professor R H Clarke

Vice-Chairman:

Professor C B Meinhold

Members:

Dr D Beninson
Dr J D Boice Jr.
Dr R Cox
Dr L-E Holm
Professor L A Ilyin
Professor Dr A Kaul
Dr Matsudaira H
Professor F Mettler
Dr J-C Nenot
Dr Pan Z
Mr B C Winkler

Emeritus Members: (as of January 1998)

Mr H J Dunster
Professor B Lindell
Professor K Z Morgan
Dr W K Sinclair
Dr L S Taylor

Scientific Secretary

Dr J Valentin

COMMITTEE 1

Chairman:

Dr R Cox

Members:

Dr A V Akleyev
Dr R J M Fry
Dr J H Hendry
Professor Dr A M Kellerer
Dr C E Land
Professor J B Little
Dr Mabuchi K
Dr R Masse
Dr C R Muirhead
Dr R J Preston
Professor K Sankaranarayanan
Professor R E Shore
Professor Dr C Streffer
Professor W Ullrich (*from Oct. 1998*)
Professor Wei K
Dr H R Withers

COMMITTEE 2

Chairman:

Professor Dr A Kaul

Members

Dr B B Boecker
Dr A Bouville
Professor Dr Chen X
Professor Dr G Dietze
Dr K F Eckerman
Miss F A Fry
Dr Inaba J
Professor Dr I A Likhtarev
Professor J L Lipsztein
Dr H Métivier
Dr H Paretzke
Dr A R Reddy
Dr M Roy
Dr J W Stather
Professor D M Taylor
Professor T Wøhni (*ret. Oct. 1998*)

COMMITTEE 3

Chairman:

Professor F Mettler

Members:

Professor J M Cosset
Dr M J Guiberteau
Dr L K Harding
Professor Dr J Liniecki
Professor S Mattsson
Professor Nakamura H
Dr P Ortiz
Dr L V Pinillos-Ashton
Professor M M Rehani
Professor H Ringertz
Dr M Rosenstein
Dr Sasaki Y
Dr C Sharp
Professor Yin W
Professor W Y Ussov

COMMITTEE 4

Chairman:

Mr B C Winkler

Members:

Dr R M Alexakhin
Dr E D'Amato
Dr D Cancio
Mr T Godås
Dr A J González
Dr K R Kase
Dr Kosako T
Professor Dr W Kraus
Mr J Lochard
Dr A C McEwan
Dr R V Osborne
Dr K C Pillai
Dr A Sugier
Dr J E Till
Dr A D Wrixon
Dr Xia Y
Dr C Zuur