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GT – CIPR
4 décembre 2007

Travaux engagés par la CIPR pour la mise en œuvre de ses nouvelles recommandations

Annie Sugier

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Réunion de la CIPR à Berlin: 21-28 octobre 2007
Eléments d'actualité

- Publication fin 2007 des Recommandations
- Articulation avec les travaux des agences internationales
- Fortes attentes par rapport à deux Task Group du Comité 4
  - Emergency (W. Weiss)
  - Rehabilitation (J. Lochard)
- Sujets nécessitant des éclaircissements
  - Le radon (risques de cancer du poumon)
  - Le facteur (DDREF) d'atténuation du risque
  - Le risque de cataracte radioinduit

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Eléments d'actualité sur le Radon

- **Programme OMS (IRP - International Radon Project)**

  2005: programme radon dans les habitations, 30 pays de tous les continents

  Motivation: nouveaux résultats épidémiologiques

  2008: production d'un guide

- **Rappel des nouvelles études épidémiologiques**

  Etude cas/contrôles récentes (2004-2006):
  Europe: *13 études*, Amérique du Nord: *7 études*, Chine: *2 études*

  Risque relatif: + 16% par 100 Bq/m^3

  Synergie avec le risque tabac (risque vie x 25)

  Contribution des doses faibles (jusqu'à 200 Bq/m^3)

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Eléments d'actualité sur le Radon (suite)

- **Conséquences sur la politique de gestion du radon**
  - Tenir compte de la synergie radon/tabac
  - Prévention dans les futures constructions
  - Révision des BSS
  - Abaisser les niveaux de référence: 100-400 Bq/m3 (population)
    300-1000 Bq/m3 (travailleurs)

- **Facteurs de conversion**
  - CIPR: 60 Bq/m3 pour 1 mSv (population)
    50 Bq/m3 pour 1 mSv (travailleurs)
  - 50% plus élevés que ceux de l'UNSCEAR: 40 Bq/m3 pour 1 mSv (population)

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Committee 1 - Biological Effects

- **Tissue reactions, non-cancer effects**
  - Two rather different areas!
  - Main report expected 2009/2010
  - Advance report on eye lens, 2008
- **Alpha particle cancer risk**
  - Summary of state of science expected 2009
  - If indicated by the results, amended risk estimates 2010/2011
  - Advance statement on radon and lung cancer, 2007:
    Risk per Bq m^{-3}
    Conversion factor Sv / Bq m^{-3}
    How to apply reference levels
- **New: Stem cell radiobiology and radiation risk**
  - Report in 2-3 years

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Working Party on Stem Cell Radiobiology

WP Chair: **Ohtsura Niwa**, Chiba, Japan 2nd Report of WP that was established in 2006 to review current state of knowledge of stem cell biology and radiobiology and potential impacts on cancer risk. There has been an enormous increase in knowledge of stem cell biology in the past 3-5 years although not nearly as much new information on radiation effects on stem cells. It is appropriate to consider establishing a TG (Stem cell radiobiology in relation to carcinogenic radiation risk) to review the topic and to produce a report in 2-3 years. This effort would involve input from C2 and C4.

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Committee 2 - Doses

- **Revised radionuclide data**
  - Report in 2008
- **Voxel-based reference adult phantoms (with ICRU)**
  - Report in 2008
  - Children, 2010/2011, pregnant woman-fetus, 2011/2012
- **New dose coefficients + interpretation of bioassay data**
  - 'OIR Part 1' replacing ICRP P30 – P54 – P78 2009
- **Aircrew exposure (with ICRU)**
  - Report in 2009
- **Dosimetry and exposures in space**
  - Report in 2010

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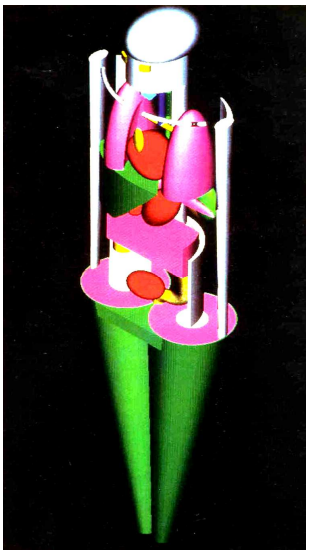
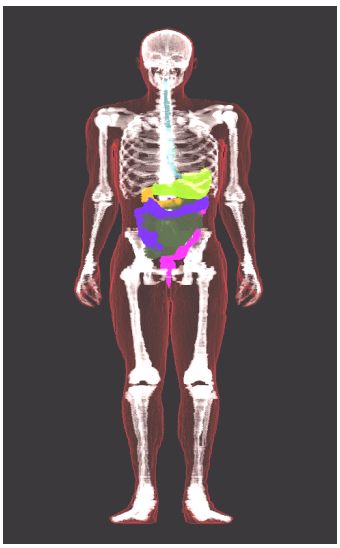
MIRD and Voxel Phantom





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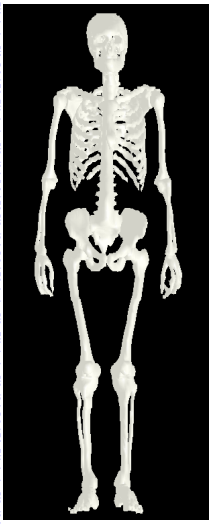
Main characteristics of the ICRP reference voxel phantoms



RMCP (Reference Male Computational Phantom)
176 cm, 73 kg
1.9 million voxels
Voxel size: 36.5 mm^3
Slice thickness: 8 mm
In-plane resolution: 2.137 mm

140 Organ identification numbers

RFCP (Reference Female Computational Phantom)
163 cm, 60 kg
3.9 million voxels
Voxel size: 15.2 mm^3
Slice thickness: 4.84 mm
In-plane resolution: 1.775 mm

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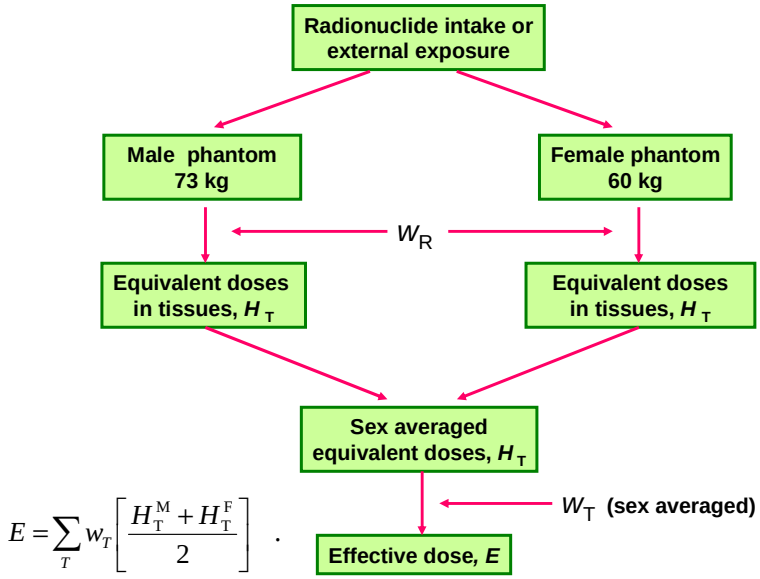
Sex-averaging in calculation of *E*



$$E = \sum_T w_T \left[\frac{H_T^M + H_T^F}{2} \right] .$$

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Future publications: DOCAL / INDOS

- Occupational intakes reports, replacing Publication 30, giving dose coefficients and bioassay data
- Dose conversion coefficients for external radiation
- Phantoms for children
- Phantoms for the pregnant woman / fetus
- Dose coefficients for the public
- Guidance documents on internal SAFs

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Committee 3- Medicine

- New building block
  - Radiation protection in medicine
- Interventional cardiology
- New radiotherapy methods and second cancers **(w. ICRU)**
- New: Avoiding unintended exposure with new radiotherapy
- Further radiopharmaceuticals data **(standing)**

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Per capita radiation dose from medicine

1980	2006
0.54 mSv	3.2mSv

600% increase

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Collective annual population dose from medicine

1980	2006
124 000 person Sv	930 000 person Sv

750% increase

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Collective population doses: comparison

- ~600,000 person-Sv worldwide over all time from entire Chernobyl release*
- ~930,000 person-Sv annually from radiology and nuclear medicine in U.S.
- ~900,000 person-Sv annually from natural background radiation (assuming old NCRP 100 calculations)

* UNSCEAR

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Working party / Task Group

- Radiation protection training for diagnostic and interventional procedures
- Chair: *E. Vano*
- Members: *M. Rosenstein*
  J. Liniecki
  M. Rehani
- Basic information on the situation of training in RP in their respective countries is requested from all the members of C3.

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Committee 5 - Environment

- **Reference Animals and Plants biology; dosimetry**
  - Report 2008
- **Radiation weighting factors, non-human species**
  - Report 2010?
- **Comparison radiation – other environmental protection**
  - Report 2010?

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Four Year Plan: Principal Documents

- **Reference Animals and Plants**
  - Radiation dosimetry
  - Radiation effects
  - Supporting databases
- **Radiation weighting factors and related issues**
- **Commonality of RAPs approach to other environmental protection efforts**

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ICRP Reference Animals and Plants (RAPs)

- Deer
- Rat
- Bee
- Worm
- Pine tree
- Grass

- Duck
- Frog
- Trout

- Flatfish
- Crab
- Brown seaweed

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RAP report

- Rationale of RAP selection
- Biological introduction to RAPs
- Pathways of exposure
- Dosimetry
- Radiation effects
- Derived Consideration Levels
- Applications and Extrapolations

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Dosimetry Task Group (G. Pröel)

- **Summarize current modeling approaches**
  - significant differences
  - limitations
- **Select and justify preferred approach**
- **Calculate dose per unit concentration factors (DPUCF) for RAPs at different life-cycle stages**
  - external
  - internal
- **Identify issues for consideration, as appropriate**

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Relevant radiation effects on biota

- Early mortality
- Morbidity
- Reduced reproductive success
- Chromosomal aberrations etc

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The Missions of Committee 4

- To assist the Commission in developing guidance on the application of the recommended system of protection
- To act as the major point of contact with other international organisations and professional societies concerned with protection against ionising radiation

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Framework for Dose Constraints and Reference Levels

BANDS OF PROJECTED DOSE	CHARACTERISTICS AND REQUIREMENTS
20 - 100 mSv	Exceptional situations. Benefit on a case-by-case basis. Information, training and individual monitoring of workers, assessment of public doses.
1 - 20 mSv	Individual direct or indirect benefit. Information, training and either individual monitoring or assessment.
<1 mSv	Societal benefit (not individual). No information, training or individual monitoring. Assessment of doses for compliance.

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Moving to an exposure situation based approach in the New Recommendations

- **Planned exposure:** situations involving the deliberate introduction and operation of sources. Planned exposure situations may give rise both to exposures that are anticipated to occur (normal exposures) and to exposures that are not anticipated to occur (potential).
- **Emergency exposure:** unexpected situations that occur during the operation of a practice requiring urgent action.
- **Existing exposure:** situations that already exist when a decision on control has to be taken, including natural background radiation and residues from past practices.

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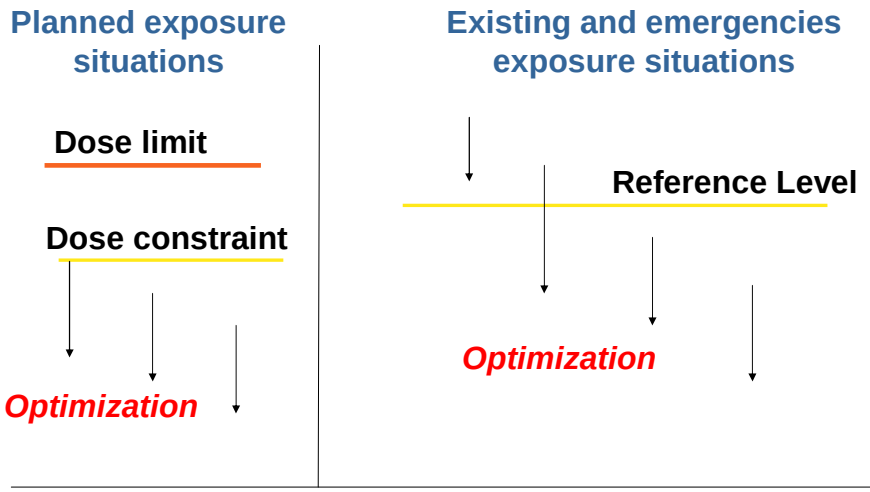
A similar approach whatever the Exposure Situation: Optimisation + Source Related Restrictions



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Areas Discussed

- **Ongoing Activities**
  - TG Report on Emergency Situations
  - TG Report on Rehabilitation following a Nuclear Accident or Radiological Event
  - WP Study of NORM
  - WP on Occupational Exposure from Cosmic Radiation
  - WP on Deliberate Non-medical Exposures
  - Liaison with other Committees
  - Discussion with Observer Organisations

- **New Areas**
  - WP on Radon
  - Joint WP (C4, C3, C2) on Effective Dose
  - WP on the Application of the Commissions Recommendations to Releases of Radioactive Material in the Environment
  - WP on International Outreach

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Ongoing Activities of C4

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Emergencies issues to further develop

- Refine the scope of the report
- Better describe the role of justification (2 steps) and optimisation in planning and in response
- Better describe the role of dose distributions in the affected populations during planning and in response
- Better describe the RP of emergency workers (ICRP 96)
- Identify cases where the relevant unit is equivalent dose (organ dose)
- Clearly establish the principles used to set reference levels
- Better describe the differences and the link to rationale and values of ICRP 63
- Better structure the report (Planning; Response; Transition to rehabilitation)
- Terminology must be clear: e.g. planning and preparations; late phase versus existing phase

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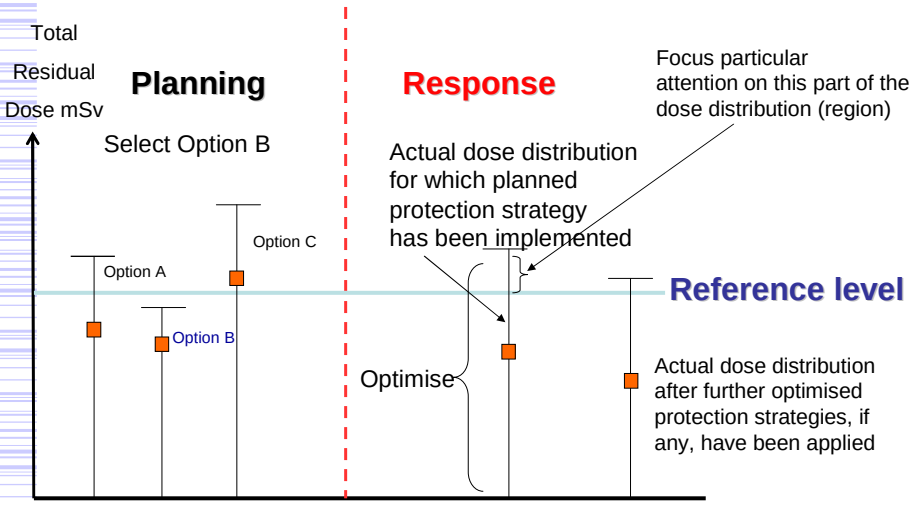
Application of Dose Reference Level



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Framework for setting Dose Reference Levels

BANDS OF PROJECTED DOSE	CHARACTERISTICS AND REQUIREMENTS
20 - 100 mSv	Exceptional situations. Benefit on a case-by-case basis. Information, training and individual monitoring of workers, assessment of public doses.
1 - 20 mSv	Individual direct or indirect benefit. Information, training and either individual monitoring or assessment.
<1 mSv	Societal benefit (not individual). No information, training or individual monitoring. Assessment of doses for compliance.

Organ dose!

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Task Group on Emergencies

- **The Next Steps for the TG**
  - Redrafting of the report by the TG (Jan 2008)
  - WEB Consultation: February to April 2008
  - Redrafting TG report May 2008
  - Submission to C4 and MC for final approval

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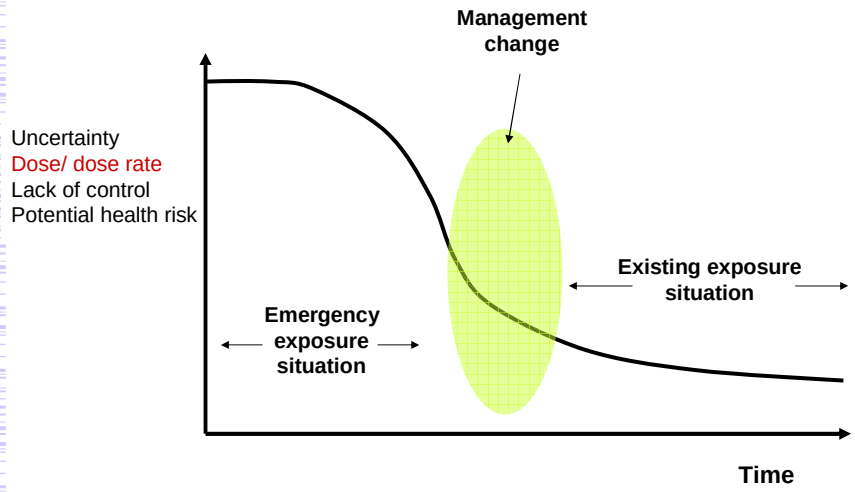
Task Group on Emergencies



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Task Group on Existing Exposure Situations

Characteristics

- Time is a key parameter
- Affecting places of living
- Difficult to control (mainly controllable through pathways)
- De facto large distribution of individual exposures
- The level of exposure is driven by individual behaviour and particularly the diet

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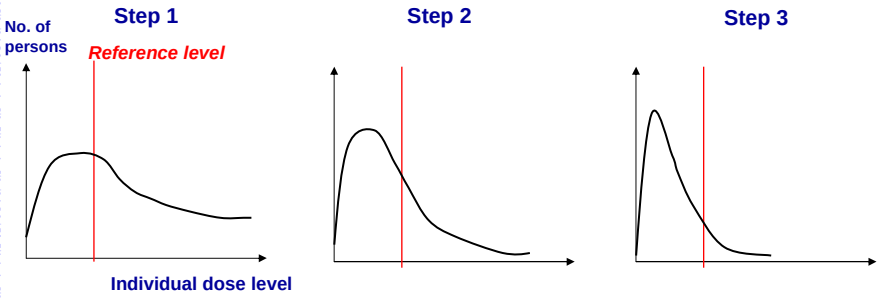
Existing Exposure Situations

- **Optimisation recommended to *and below* Reference Levels**
  - The old intervention system implied optimisation TO intervention levels
- **Optimisation, an iterative process**
  - This does NOT mean that one chases a moving target – the Reference Level stays



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Framework for selecting reference levels

BANDS OF PROJECTED DOSE	CHARACTERISTICS AND REQUIREMENTS
20 - 100 mSv	Exceptional situations. Benefit on a case-by-case basis. Information, training and individual monitoring of workers. Monitoring or assessment of public doses.
1 - 20 mSv	Individual and/or societal benefit. Individual monitoring or assessment. Information, education and training.
<1 mSv	Societal benefit (not individual). No information, training or individual monitoring. Assessment of doses for compliance.

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Issues to further develop in TG report

- Be clear on the scope, focus on the context of NPP accidents, but also more broadly applicable
- Indicate that RLs should “typically” be set in the range of 1 to 20 mSv in a year, and towards the lower end of the range, but may also be below
- Examples should be kept as illustrations of tools
- Do not address the issue of compensation
- Note that CODEX values for foods MAY be applicable to some local consumption situations, rather than ONLY to international trade

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Working Party on NORM

- **Description of the variety of activities concerned (4 types)**
- **Existing guidance**
  - Scope document, reference to IAEA and EU values
  - “Unwarranted control as opposed to trivality of risk”
  - RP07: Planned or Existing Exposure Situations (in the band from 1 to 20 mSv/a)
- **Guidance is rather scattered, lack of consistency**

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Working Party on NORM (suite)

C4 suggests that a TG on NORM be formed to:

- Review RP07 and the new Scope document, and to summarise their recommendations as to how the system relates to NORM
- Develop a conceptual framework that provides the link between RP07 and the detailed guidance required by international organisations and national authorities needed to manage the risks posed by NORM

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Occupational Exposure: 1st phase Revision of Pub. 75?

- **Items Considered**
  - Attributable risk
  - Radon at work
  - Comparison with other risks
  - Women at work
  - Itinerant workers
  - Air Crew

Conclusion: No need to revise Pub 75

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New Activities of C4

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Task Group on Radon

C4 will participate in the C1 TG to investigate:

- Nominal radon risk factors per unit integral activity concentration (C1)
- Implementation of the ICRP system (C4)

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Working Party Application of the Commissions Recommendations to Releases of Radioactive Material in the Environment

- Initially, investigate the tools developed by Committee 5 for protection of environment in the context of the ICRP system of protection for man.
- Look at exposure scenarios where man is protected, and see what the predicted impact is on flora and fauna.

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Working Party on Occupational Exposure

A WP has been proposed to:

- review the current status of occupational exposure to identify particular occupational exposure situations which would benefit from further guidance from ICRP
- **Chairman**: *Ann McGarry, Ireland*
- **Other Members:** *Wolfgang Weiss, Germany*
  Jacques Lochard, France
  Renate Czarwinski, IAEA
  Gustavo Massera, Argentina
  Alain Rannou, ISO
  Stefan Mundigl, EU
  Ted Lazo, NEA
  Schengli Niu, ILO
  Committee 2 member
  Committee 3 member

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Working Party on International Outreach

A WP has been proposed to:

- Improve the C4 web-site
- Develop a Network of ICRP Focal Points, mostly in developing countries
- Develop a roster of “Experts Familiar with ICRP” for purposes of fostering info. exchange
- Develop a “database” of standard presentations and lectures on ICRP recommendations and positions

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Working Party on Deliberate Non-medical Exposures

Issues raised by the WP (Chair: Don COOL)

- Any exposure required\referred by a physician is a medical exposure and will not addressed in this work
- Types of exposures addressed include self-referral CT scans, security screening, insurance-related screening, exposure related to legal proceedings, etc.
- In the context of the Commission’s new recommendations, there is a need to develop guidance for these types of exposures.
- C4 recommends that this WP be transformed into a TG

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Joint Working Party on Effective Dose (C4, C3, C2)

- To provide guidance on the use of “effective dose”
- To provide guidance on the use of dose coefficients

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Summary

- **Ongoing Activities**

- TG on Emergency
- TG on Rehabilitation
- TG on Space (Lead by C2)
- WP on NORM == Future TG
- WP on Deliberate non-medical exposure == Future TG

- **New Activities**

- TG on Radon (with C1 and C2)
- WP on Occupational Exposure, 2nd step to consider specific areas, comparison data (with input from C2 and C3)
- WP on Application of the Commissions Recommendations to Releases of Radioactive Material in the Environment (with input from C5)
- WP on International Outreach (post RP07 PR)
- WP on Effective Dose (with C2 and C3)

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Merci pour votre attention.