5th Asian Regional Conference on the Evolution of the System Of Radiological Protection

P A Burns
Acting CEO of ARPANSA
Australia
Overview – Regulatory Systems

- Australia is a federation comprising:
  - 6 States;
  - 2 Territories; and
  - The Commonwealth

- Responsibility for radiation regulation rests with each jurisdiction

- There is no one set of common laws with common requirements
National Directory for Radiation Protection

- All jurisdictions have agreed to develop a National Directory for Radiation Protection and to use it to change their existing legislative frameworks

- The Directory is developed by the Radiation Health Committee, which comprises regulators from each jurisdiction
National Directory for Radiation Protection

• The National Directory consists of:

  – agreed general principles for regulatory frameworks
  – uniform regulatory elements such as exclusions, exemptions and authorisations
  – national adoption of Recommendations, Standards and Codes of Practice
Radiation Health Committee

• The role of the Radiation Health Committee is to:
  – advise the CEO of ARPANSA on matters relating to radiation protection
  – formulate draft Recommendations, Standards and Codes of Practice for consideration by the Commonwealth, the States and the Territories
Radiation Health and Safety Advisory Council

• The role of the Radiation Health and Safety Advisory Council is to:
  – identify emerging issues relating to radiation protection and nuclear safety and advise the CEO on them
  – advise the CEO on the adoption of Recommendations, Standards and Codes of Practice in relation to radiation protection and nuclear safety
• ARPANSA publishes Recommendations, Standards, Codes of Practice and Safety Guides under its Radiation Protection Series
Recommendations (red) provide guidance on fundamental principles for radiation protection – they are written in an explanatory and non-regulatory style and describe the basic concepts and objectives of best international practice.

Standards (grey) set fundamental requirements for safety – they are regulatory in style and may be referenced by regulatory instruments in State, Territory or Commonwealth jurisdictions.

Codes of Practice (blue) are also regulatory in style and may be referenced by regulations or conditions of licence – they contain practice-specific requirements that must be satisfied to ensure an acceptable level of safety in dealings involving exposure to radiation.

Safety Guides (green) provide practice-specific guidance on achieving the requirements set out in Standards and Codes of Practice – they are non-regulatory in style, but may recommend good practices.
ICRP60 – 1990 Recommendations

• Process-based system identifying two types of human activities that may result in a change in radiation exposure:
  
  • *Practices*
    – Human activities that may increase the overall exposure
  
  • *Interventions*
    – Other human activities that can decrease overall exposure
ICRP103 – 2007 Recommendations

• Situation-based system identifying three exposure situations that address all conceivable exposure circumstances:
  • **Planned exposure situations**
    – situations involving the deliberate introduction and operation of sources
  • **Emergency exposure situations**
    – situations that may occur during the operation of a planned situation, or from a malicious act
  • **Existing exposure situations**
    – situations that already exist when a decision on control has to be taken
ICRP103 – 2007 Recommendations

- Three categories of exposure are retained from ICRP60:
  - Occupational exposure
  - Public exposure
  - Medical exposure of patients
ICRP103 – 2007 Recommendations

- Emphasises optimisation is the primary tool for radiation protection
- Dose constraints, risk constraints and reference levels are introduced as benchmarks for the optimisation process
- Defines three bands of Constraints and Reference Levels:
  - 20-100 mSv unusual and extreme situations
  - 1-20 mSv individuals receive direct benefit
  - < 1 mSv individuals receive no direct benefit
## Application of Dose Constraints and Reference Levels under ICRP103

<table>
<thead>
<tr>
<th>Category</th>
<th>Situation</th>
<th>Occupational</th>
<th>Public</th>
<th>Medical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planned</td>
<td>Dose limit;</td>
<td>Dose limit;</td>
<td>Diagnostic reference level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dose constraint</td>
<td>Dose constraint</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emergency</td>
<td>Reference level</td>
<td>Reference level</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td>Existing</td>
<td>Reference level</td>
<td>Reference level</td>
<td>N.A.</td>
</tr>
</tbody>
</table>
What is Australia doing to support international best practice in radiation protection?
Recommendations and National Standard

• Recommendations and National Standard for Limiting Exposure to Ionizing Radiation

• The Recommendations underpin many of ARPANSA’s Standards and Codes of Practice

• Based on ICRP60 system of practices and interventions

• Revision is pending release of new Basic Safety Standards
Changes required to Recommendations

• Revision of scope to cover exposure situations and bands of constraints and reference levels and their application for public and occupational exposures

• Include detail on application of optimisation to existing exposure situations particularly for natural materials, including radon

• More detail on optimisation below 1 mSv for members of the public in planned exposure situations
Occupational Exposure

National Dose Register

- ARPANSA is developing a National Dose Register to manage the radiation dose records of workers engaged in the uranium mining and processing industry in Australia

- There is currently no national system for recording dose to workers in this industry and no practical means of tracking doses across jurisdictions

- The National Dose Register will provide assurance that dose records will be checked and maintained, and allow the production of annual statistics showing industry sector trends and comparisons

- A new Safety Guide is also being developed to promote a nationally consistent approach to monitoring, assessing and recording occupational exposures in mining and mineral processing
Occupational Exposure

Planned Situations

• ARPANSA operates Australia’s longest running personal radiation monitoring service

• The service operates an AS17025 quality system and is accredited by the National Association of Testing Authorities (NATA)

• Occupational exposure levels for different industries are published in ARPANSA technical reports and provide a useful tool in the optimisation of worker doses
Occupational Exposure

Existing Situations

- Safety Guide for the Management of Naturally Occurring Radioactive Material (NORM)

- Guidance on situations where an assessment of the need for radiation protection measures or regulation is an important consideration

- Annexes address the application of the guidance to three industries in which NORM is considered a potential issue:
  - Oil & Gas Production
  - Bauxite/Aluminium
  - Phosphate
Medical Exposure

Planned Situations

- The Medical Code requires the implementation of diagnostic reference levels (DRLs) as a practical, quantitative guidance tool to aid in dose optimisation
Medical Exposure

Planned Situations

- Safety Guides recommend that DRLs should be determined by the relevant professional bodies, for example by choosing a percentile point in a substantive survey of the observed distribution of doses to patients, with the target to reduce doses to a level which maximises the difference between the benefit and risk without compromising the clinical purpose of the examination.
## Application of Dose Constraints and Reference Levels under ICRP103

<table>
<thead>
<tr>
<th>Category</th>
<th>Occupational</th>
<th>Public</th>
<th>Medical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Situation</td>
<td>Dose limit; Dose constraint</td>
<td>Dose limit; Dose constraint</td>
<td>Diagnostic reference level</td>
</tr>
<tr>
<td>Planned</td>
<td>Reference level</td>
<td>Reference level</td>
<td>N.A.</td>
</tr>
<tr>
<td>Emergency</td>
<td>Reference level</td>
<td>Reference level</td>
<td>N.A.</td>
</tr>
<tr>
<td>Existing</td>
<td>Reference level</td>
<td>Reference level</td>
<td>N.A.</td>
</tr>
</tbody>
</table>
### Application of Dose Constraints and Reference Levels under ICRP103

<table>
<thead>
<tr>
<th>Category</th>
<th>Occupational</th>
<th>Public</th>
<th>Medical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned</td>
<td>Dose limit; Dose constraint</td>
<td>Dose limit; Dose constraint</td>
<td>Diagnostic reference level</td>
</tr>
<tr>
<td></td>
<td>Data available to set constraints</td>
<td>Difficult to set constraints at lower end of dose band</td>
<td>Need to do surveys of diagnostic doses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>~10 microSv</td>
<td></td>
</tr>
</tbody>
</table>
## Application of Dose Constraints and Reference Levels under ICRP103

<table>
<thead>
<tr>
<th>Category</th>
<th>Occupational</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Situation</td>
<td>Reference level</td>
<td>Reference level</td>
</tr>
<tr>
<td>Emergency</td>
<td>Need to implement optimisation at the planning stage</td>
<td></td>
</tr>
</tbody>
</table>
Application of Dose Constraints and Reference Levels under ICRP103

<table>
<thead>
<tr>
<th>Category</th>
<th>Occupational</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Situation</td>
<td>Reference level</td>
<td>Reference level</td>
</tr>
<tr>
<td>Existing</td>
<td>Variable situations</td>
<td>Need to develop guidance</td>
</tr>
</tbody>
</table>
Thank you