



## **Statement on Clean-up Criteria following a Radiological Incident**

**February 2007**

### ***Purpose***

The object of this statement is to inform high-level decision-makers of the radiation protection considerations regarded by the Radiation Health Committee as being relevant to the remediation and recovery from an incident involving widespread radioactive contamination.

### ***Radiation Protection for a Radiation Emergency***

By its nature, a Radiological Dispersal Device (RDD) would spread radioactive contamination over an extended area. Experimental data and modelling of the dispersion of radioactive material from an explosive RDD have shown that affected areas may need to be decontaminated or remediated to reduce the risk of health effects to members of the public.

The basic principles established in the internationally accepted system of radiological protection relevant to a radiation emergency situation are:

1. *Prevention of deterministic effects.* Intervention to prevent serious immediate (deterministic) effects should be carried out as a first priority;
2. *Justification of Intervention.* Protective actions to avoid longer-term (stochastic) health effects should be initiated when they will be justified – that is, when they will produce more good than harm in the affected population; and
3. *Optimisation of Intervention.* The levels at which these actions are introduced and withdrawn should be optimised, that is, they should produce a maximum net benefit to the population.

Australia has adopted guidelines consistent with the current international safety standards (Reference 1) that apply to preventing immediate (deterministic) health effects in workers and the public and limiting the occurrence of longer-term (stochastic) health effects in the population.

In an emergency involving the dispersion of radioactive material into a community, protective measures such as evacuation, sheltering in place, resettlement or restrictions on foodstuffs may be carried out to minimize the risk to the public. In Australia, the decision on the implementation of these protective measures should be based on the national guidelines (Reference 2) that have used this process of justification and optimisation to derive a generic set of intervention and action levels.

### ***Setting Cleanup Criteria***

There is no existing Australian guidance on criteria for the implementation of clean-up or remediation of an area affected by radiological or nuclear emergencies.

There is developing international guidance for dealing with clean-up and remediation following an event involving the malicious use of radioactive material, with reference levels based on projected annual doses. The International Commission on Radiological Protection (Reference 3) recommends that if a situation arising from a radiological attack is likely to result in an annual dose to people exposed as a result of using the affected area approaching 100 mSv this will almost certainly justify protective or remedial measures; whereas an annual dose of about 10 mSv may be used as a generic reference level below which protective or remedial measures are not likely to be justifiable for some prolonged exposure situations. The reference levels would apply to a representative person in the affected area, with consideration to a range of exposure pathways (external, inhalation, ingestion and others) (Reference 4).

The nature of potential impacts from radiological incidents such as a RDD is very broad, from light contamination of a street or building, to widespread destruction of a major metropolitan area. Remediation of RDD contamination would require a site-specific optimisation process that takes account of the scope of contamination, the societal objectives for expected land uses, the level of effort and resources required for the cleanup, the storage requirements for the contaminated waste material, the potential severity of economic impact, technical feasibility, and resource constraints, as well as operational radiation protection and other considerations. This optimisation process should result in the selection of the most appropriate solution that is sensitive to the range of involved stakeholders. The end point for the remediation and recovery should be determined by the optimisation process, but there is likely to be little value to public health in reducing annual doses from the residual contamination to less than 1 mSv.

### *Recommendations*

**In an incident involving the dispersion of radioactive material into a community, the decision on cleanup and recovery of the affected area should take account of the following considerations:**

- **in circumstances where a representative person in the affected area is likely to receive above an annual dose of about 10 mSv, remediation or decontamination of the affected area may be necessary and should be justified on a case-by-case basis**
- **situations for which the annual dose (equivalent) dose thresholds for deterministic effects in relevant organs could be exceeded, or the annual effective dose may approach 100 mSv will almost always justify remediation**
- **the end point for the remediation and recovery should be provided by the optimisation process, but there is likely to be little value in cleanup to less than 1 mSv per year from residual material.**

**Following a radiological incident, a Technical Working Group should be formed to provide multi-disciplinary advice on the optimisation and implementation of the remediation measures.**

### *References*

- (1) International Atomic Energy Agency (IAEA), *Preparedness and Response for a Nuclear or Radiological Emergency*, Safety Standards Series No. GS-R-2, IAEA, Vienna (2002).
- (2) Australian Radiation Protection and Nuclear Safety Agency, Protection Series No 7, *Intervention in Emergency Situations Involving Radiation Exposure*, ARPANSA, Melbourne, (2004).
- (3) International Commission on Radiological Protection (ICRP), *Protecting People against Radiation Exposure in the Event of a Radiological Attack*, Publication 96. Pergamon Press, Oxford, (2005).
- (4) International Commission on Radiological Protection (ICRP), *Assessing Dose of the Representative Person for the Purposes of Radiation Protection of the Public and the Optimisation of Radiological Protection: Broadening the Process*, Publication 101. Elsevier, (2006).