Radioprotection of the Environment

IRSN’s current views and work plan

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Institute For Radioprotection & Nuclear Safety, France
National body, 1500 specialists, Nuclear Safety & Radiological Protection
Activities in the field of Radioprotection of the Environment

- IRSN conducts research programmes and studies on health and environmental radiological risks. These are the foundation to ensure a high quality of the technical support provided to the French nuclear authority in the fields of radioprotection and chronic risks.

- Currently, the institute promotes the development of a wide research programme devoted to radiological chronic risks for human health and environment (ENVIRHOM). This is combined with operational issues such as conception/improvement of risk assessment methods, models and associated parameters.

- Its research teams devoted to experimental research on biological responses of living organisms (including humans) chronically exposed to radionuclides is probably unique in the world (ca. 50 specialists and technical plate-form).
Main reasons to promote R&D in RP of the Environment

- The lack of internationally agreed methods for Ecological Risk Assessment & Management devoted to radioactive substances is difficult to justify face to the European legislation, and due to the international tendency for environmental protection in general.

- There is no compelling argument for radioactive substances to be considered in a different way than that used for chemicals. For the latter, the Technical Guidance Document (2003) is proposed by the EC to support regulations of releases into the environment and to demonstrate the provision of an appropriate level of protection for ecosystems.

- The French situation is specific with a recent change in the constitution ("charte pour l’environnement", March 2005), a very high contribution of nuclear energy (EPRs, radioactive wastes)

- France has signed the OSPAR convention and agreed on the declaration of Sintra (1998). Both designate explicitly radioactive substances as potential stressors for the concerned marine ecosystems (North-East Atlantic).

Within the Water Framework Directive, European member states are engaged to reach "good ecological and chemical status" for waters by 2015 (fixed emission limit values & Environ. Quality Standards). Radioactive substances are not explicitly cited.
The present knowledge on effects can be used to conceive and apply a robust methodology for ERA & RNs. As for chemicals, the ERA methods are preferred to make a defensible risk estimate rather than only using expert judgement.

However it still remains gaps of knowledge on fate within ecosystems and effects of radionuclides on non-human species (e.g., chronic - internal – α & β emitters).

Two R&D axis are promoted:
- since biological effects (radio- and chemo-toxicity) at any organisational level remain fairly unknown, rule of extrapolations are needed.
  Acute to chronic; external to internal; individual to population and to higher level of organisation; one stressor to mixtures
- in parallel, missing knowledge on fate and effects specific to the domain of chronic low-level RNs exposure of living organisms needs to be acquired.
IRSN strategy and work plan (1/2)

- IRSN is conceiving and developing its own methodology to assess the ecological risk due to the occurrence or releases of radioactive substances in the environment (End of 2006).

  The targeted object of protection is the structure and function of ecosystems under chronic or accidental exposure conditions. This implies a need for solid scientific understanding, to minimise the use of unsupported safety factors.

- IRSN follows the approach adopted by ICRP: Consistency with the existing human radioprotection system needs to be ensured.

- IRSN follows the approach developed for chemicals at the European level, and is adapting it to the various activities using RNs.

- One major adaptation is to use Dose(rate) – Gy.time\(^{-1}\) – both to express the exposure level of the ecological objects (from individual to ecosystems) and to analyse effects. Another specific point is that there is no standardised ecotoxicity tests.
Balance between the contribution of the development of a regulatory framework and research work aimed at improving knowledge.

**Research work**
- Priority given to (1) the design and development of chronic ecotoxicity tests over the whole life cycle, for one or more generations, (2) the establishment of dose-effect relationships - foundation to derive protection criteria, (3) the implementation of population dynamics modelling (ENVIRHOM - Since 2001)

**Operationnal issues**
- Implementation of testing the method on pilot sites to validate the operational feasibility of the method developed by IRSN (2007)
- Examination of the suitability of the current environmental monitoring to check for the compliance with protection criteria (from 2007).
IRSN and international collaboration

- IRSN still goes on being strongly involved in this field at the international level:
  in the ERICA project, especially in the field of risk characterisation both on a theoretical and experimental aspects, in the EMRAS IAEA programme, in the ICRP and UNSCEAR.

- IRSN greatly wishes to take active part in this new action plan.

- IRSN will deliver the most recent results obtained on the behavior of RNs and their biological effects on living organisms in ecosystems chronically exposed.
  Possible reorientation of the current programmes in light of the conclusions/recommendations from those WG.
IRSN is convinced that a robust ERA method is necessary as radioactive substances are used in a variety of industries, hospitals or research laboratories, and very widely in terms of geographical distribution.

On the basis of this first work, it is possible to start working on comparative risk methodology to apply to different categories of stressors. This is a major challenge for industries such as e.g. nuclear power plants for which routine or accidental releases are mixtures of conventional chemicals and radionuclides.

To read in details the IRSN orientation on the radioprotection of the environment, please consult www.irsn.org