



Environment Agency Stakeholder Interests

The Environment Agency (EA) regulates the disposal and discharge of radioactive waste from the nuclear and non-nuclear industries. The EA ensures that the radiation exposure of people, plants and animals resulting from the disposal of radioactive waste is as low as it can be and well below the statutory limits and guidance levels. The EA also has roles in the regulation of the remediation of radioactive contaminated land and in the multi-agency radiation incident response arrangements, particularly in the recovery and clean-up phase.

The EA's assessments of environmental safety cases and environmental impacts, and its permitting and other regulatory decisions and advice, must be supported by the best available evidence and R&D.

Key drivers:

1. Since around 2000 the EA has routinely included the assessment of impact on non-human species in its regulatory decisions. However there is a growing emphasis on the radiological protection of animals and plants and of the environment generally and on the need to improve the assessment frameworks. For example:

- The ICRP recommendations in 2007 have outlined the need to consider the protection of the environment and have outlined a framework based on Reference Animals and Plants (RAPs) for evaluating the exposure – dose – response relationships for different wildlife species.
- The IAEA interim international basic safety standards include provision for the protection of the environment. Principle 7 states that “people and the environment, present and future, must be protected against radiation risks”.

2. Future permitting decisions regarding the Geological Disposal Facility (GDF) for higher active waste, the low-level waste repository and other facilities for the disposal of radioactive waste. The EA is the regulator for permitting borehole investigations and the disposal of radioactive waste at the GDF, which will depend on whether a strong Environmental Safety Case can be made for the facility.

3. Future permitting decisions regarding new nuclear power stations and decommissioning projects.

4. Regulatory decisions and advice related to environmental remediation and emergency and existing exposure situations, for example contaminated land and groundwater

5. The ongoing need for realistic and fit for purpose radiological assessment models and sound radiological monitoring programmes related to all of the above drivers, which can withstand public scrutiny and which can be used as effective aids to communicating regulatory decisions. Given the location of many of the UK's nuclear sites, the marine



environment will continue to be a particular focus. Innovation in modelling, monitoring and in how risk/impact assessment results are presented and communicated is particularly important.

Current priority research interests include:

1. Filling gaps in the Reference Animal and Plant (RAP) framework

Research is needed to fill data gaps related to the ICRP RAPs in order to be able to maximise the use of the ICRP derived consideration reference levels (DCRLs) as fit for purpose benchmarks for decision making.

2. Radiation effects on animals and plants

Radiation effects studies may be carried out in laboratories or in contaminated areas (e.g. Chernobyl or Fukushima) if suitable conditions can be found (e.g. involving chronic exposure, a suitable range of radionuclides, access to contaminated areas and suitable species being present etc.).

There is a short window of opportunity to consider research that may be relevant to the acute phase of an accident by studying the short term effects of high radiation exposure on wildlife living around Fukushima. This will be particularly relevant to improving our understanding of the impact of releases of radionuclides on marine ecosystems.

A key aspect missing from our knowledge on radiation effects on wildlife is our understanding of long term trans-generational effects. Consideration should therefore be given to the possibility of long term epidemiological studies which could help us to better understand the effects on populations and also the underlying mechanisms that could be applied to a wider range of species by establishing a theoretical framework for wildlife from molecular to tissue to individual/population level effects.

The potential synergistic effects of radiation with other environmental stressors is an important research area.

Understanding how the impact of radiation (or any other stressor) on an individual might ultimately affect a population is an area which has not been researched thoroughly. It is often assumed that if the individuals in a population are adequately protected then so is the population - this assumption should be tested.

There are no models/approaches in place for assessing the likely impact of heterogeneous exposure of the kind that may result from high activity concentration particles. Such exposures to radioactive particles are likely to impact only the individual exposed, establishing the dosimetry of particle exposure and the resulting effects to that individual have not yet been investigated.

3. Integrated radiological assessment models



IAEA and ICRP are working on documents to describe the process of conducting radiological assessments in an integrated manner (i.e. including both human and wildlife within the same assessment).

There is a need to consider the many uncertainties associated with lack of knowledge and variability in the available parameter data sets and to establish whether the models can be combined and whether the models are, or remain, fit for purpose within the context of nuclear new build, decommissioning activities, development of the repository and other regulatory requirements. The majority of nuclear sites in the UK are located on the coast and therefore the marine environment will continue to be a priority.

Current wildlife dose assessment tools are not designed to deal adequately with the acute phase of emergency exposure situations. It should be possible to use, with appropriate caveats, the current equilibrium based models to give advice on the likely long term consequences following an emergency situation that may be of use in emergency preparedness planning for incidents. Another aspect of emergency exposure situations is the potential external exposure of wildlife species from atmospheric plumes of radioactive substances.

4. Environmental monitoring

The need for monitoring for the radiological assessment for humans and for wildlife species is a well-established regulatory principle. Data from such monitoring programmes are also useful in verifying and validating the development of models. Many of the species of interest in the UK are protected species; research may therefore be needed to confirm that any chosen surrogate species are appropriate and representative of the species of interest.

There is a need to ensure that baseline environmental monitoring of the marine and terrestrial environments around new build sites is fit for purpose.

5. Geological disposal

Research is needed to ensure that predictive models are fit for purpose, describe radionuclide behaviour adequately and can withstand ever greater public scrutiny. For example, there is scope for work on radionuclide behaviour in response to: temperature, ionic strength, microorganisms, and organic complexation.

There is also a need to improve understanding of radionuclide speciation in different redox environments, the production and migration of gases, and long-term geosphere stability.

The EA's stakeholder contribution to the RATE programme



We are augmenting NERC's and NDA's funding by £1M over the funding period. EA will contribute to the programme through the following ways:

- Link our contribution to outputs and outcomes that support our objectives and business needs;
- Help focus the bids for specific research projects on work which will be of clear value to end-users (ourselves as regulator, and applicants for permits etc.);
- Provide access to information, data and expert guidance where required and appropriate; and
- Assist with turning research findings into policy and management advice and will contribute where possible and subject to resource availability, in science and end user workshops.