27 November 2006

"Radioecological sensitivity: an operational tool in federating radioecological knowledge"

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Observations in the field of the radiological consequences from radioactive releases, especially feedback from the Chernobyl accident, show that not only do the amount and type of radioactive pollution dictate the effect on humans and the environment, but also the territory polluted and the human and environmental context at the time of pollution. This is also true for all industrial pollution. These consequences, be they expressed in economic terms or in terms of toxicity or health risk, will be more or less penalising depending on the characteristics of the environment affected (environmental parameters) and the use that man makes of it (anthropogenic parameters). The various environments – urban, agricultural, forest, river, lake, marine or altitude – vary in sensitivity towards pollution and, even within these major components that are environmental compartments, a variety of natural or anthropogenic factors specific to the ecosystem in question determine the environment's response to pollution in a given period. For example, in an agricultural context, the crop type, the date the pollution affected the vegetative cycle and how the consumer uses this product are major sensitivity factors. Corn and milk produced on land subjected to the identical pollution will have very different respective contamination levels. The persistence of this contamination in successive crops will also depend largely on the soil properties. And overall, all the intrinsic characteristics of an ecosystem with an influence on pollutant transfers confer a specific sensitivity with respect to pollution on a territory. The same applies to anthropogenic factors (e.g. agricultural practices – use of fertilisers, irrigation, sowing periods) or those involving animal husbandry (feeding animals, outside presence). All these factors are known collectively as sensitivity factors (implying radioecological sensitivity) and a two-prong definition of territories' radioecological sensitivity is reached – environmental and anthropogenic, whose relative importance can change over time.

Whereas the sensitivity of a territory to a specific pollution is well known, comparing the overall sensitivity of various territories is far from easy. For example, is it more serious to have a major stock of pollutants in a natural space with little human influence or to have a low concentration of these same pollutants in a water course used widely for irrigation purposes? Radioecological sensitivity is a concept used to represent the intensity of a territory's reaction to pollution at a given moment in the year. For this purpose, a scale of radioecological sensitivity of territories would be useful in standardising representation of the radiological state of the environment following accidental pollution.

IRSN has been exploring the possibilities of using the radioecological sensitivity concept under the SENSIB project supported jointly by IRSN and ADEME. The applications investigated in SENSIB illustrate interesting possibilities in developing methods of characterising environment states at various stages in the life of a nuclear facility (chronic releases, accident context, decommissioning). IRSN (France) and the Università Cattolica del Sacro Cuore (Italy) are proposing that an international working group be set up to expand this dimension of thought under the theme "Radioecological sensitivity: an operational tool in federating radioecological knowledge". The intention would be to exchange experience at international level on territory classification methods, identify the potential pooling of needs of regional data acquisition methods, as well as a results publication format common to the territory's stakeholders, and, ultimately, propose the development of shared tools and/or a research programme.

The main areas suggested for the work of this working group revolve around the following issues:

How can we simplify representing the effects of radioactive contamination on a territory and create a management tool shared by stakeholders who in principle speak "different" languages. Can composite indicators be a useful tool for defining radioecological vulnerability? What are the most significant radioecological criteria for people living in the territory and how are they weighted between them and also with respect to other types of criteria (economic, political, sociological and so on)? Which criteria may be used as a basis for decisions?

How can spatial data be acquired in real time on the state of the main components of environments vulnerable to pollution (crop recognition, development stage, location of breeding activities)? How can these data be compared with and combined according to the criteria envisaged above for use by the various stakeholders?

These various avenues of research should be expanded in line with the involvement of international partners potentially interested in joining the working group.