

Radiological protection of the environment from an NGO perspective

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Abstract. Non-governmental environmental organisations (environmental NGOs) may consider the issue of radiological protection of the environment differently to other interested parties such as regulators or industry. While environmental NGOs are broadly positive towards the current emphasis and engagement on radiological protection of the environment *per se*, there remain concerns about the precise meaning of the term, the scope of the system being developed and the ultimate objectives of the current initiatives. Ongoing work on developing a “reference organism” approach to radiological protection may contribute to a better understanding of the possible impacts of inputs of radioactivity into the environment. However this approach may lead to narrowly-defined regulatory compliance criteria that do not ensure effective environmental protection. A more comprehensive approach is needed in order to provide a sufficient basis for developing an effective system for protection of the environment. At the core of such a system would be an ecosystem-based and precautionary approach, drawing on developments and experience in environmental protection across a range of disciplines, industrial sectors and human activities. To be considered sustainable, any future nuclear developments would need to be undertaken fully within the framework of such an integrated, holistic system of environmental protection.

1. INTRODUCTION

Non-governmental environmental organisations (environmental NGOs) may consider the issue of radiological protection of the environment differently to other interested parties such as regulators or industry. While environmental NGOs are broadly positive towards the current emphasis and engagement on radiological protection of the environment *per se*, there remain concerns about the precise meaning of the term, the scope of the system being developed and the ultimate objectives of the current initiatives to develop approaches for radiological protection of the environment.

2. RADIOLOGICAL PROTECTION OF THE ENVIRONMENT

There is as yet no clear common understanding of what is meant by “radiological protection of the environment”. This matters, because what is understood by the term will have a profound influence on the type of system considered necessary and appropriate and the tools needed to implement it.

In 1977 the International Commission on Radiological Protection (ICRP) asserted that “*if man is adequately protected then other living things are also likely to be sufficiently protected*” [1]. Despite evidence from other fields indicating that protecting man does not automatically imply protection of the environment, there are those involved who consider the assertion remains valid in radiological protection matters [2].

Even if the ICRP statement might be considered generally applicable where “environment” is confined to the human habitat, the assertion would seem not to hold true under all circumstances, for example where human populations are non-existent or far-removed. Moreover there is growing recognition that the current system of radiological protection fails to demonstrate that the environment is not harmed. Management of radioactive wastes and releases to the environment are increasingly being addressed in contexts requiring protection of the environment and “environmentally acceptable

solutions” [3], implying considerations which extend beyond narrowly construed radiological criteria. With these considerations in mind, there is a growing awareness that the ICRP’s 1977 anthropocentric assertion should be questioned and is no longer sufficient [4].

One strategy being suggested for the protection of the environment from ionising radiation is to follow an approach coherent to that applied to radiological protection of humans [5–7]. This approach would consist in defining endpoints and establishing dose-effect relationships for selected “reference” organisms, with the specification of either thresholds or limits at values that lead to effects deemed acceptable or negligible. While such an approach has its merits, there is also a risk arising from this necessarily focused approach in that it may lead to narrowly-defined regulatory compliance criteria that do not ensure effective environmental protection. In particular, the approach may simply shift the monitoring of the environment from man to selected organisms designated by man on the basis of criteria that are difficult to establish and scientifically defend [8].

3. THE DISPOSAL OF RADIOACTIVE WASTE AT SEA: A CASE STUDY

The general assumption about levels of radiation protection considered adequate to protect human individuals being generally sufficient to protect the environment, or more specifically populations of non-human species, came under scrutiny directly and relatively early on in the debate concerning the disposal of radioactive wastes at sea. The evolution of the debate concerning disposal of radioactive waste at sea usefully illustrates the transition from a narrow anthropocentric system of control to a more holistic ecosystem-based management approach considered necessary to protect the marine environment.

Pursuant to the provisions of the Convention on the Prevention of Marine Pollution by the Dumping of Wastes and other Matter, 1972 (the “London Convention”), the International Atomic Energy Agency (IAEA) has responsibility for the definition and recommendations relating to the marine disposal of radioactive wastes. In the 1970s the focus in implementing the London Convention was on defining acceptable levels of dumping at sea based on assessments of the “assimilative capacity” of the oceans. For disposal of radioactive materials at sea, the core of the definition and recommendations were drawn up in light of considerations of constraints based on calculations of radiological exposure to humans.

At about the same time as the 1977 ICRP statement, an IAEA advisory group made recommendations concerning the oceanographic and radiological basis for dumping of radioactive wastes at sea. With respect to radiation exposure of marine organisms, the advisory group concluded that “*the radiation doses to marine organisms arising as a result of releases within these limits would not lead to significant adverse effects to populations as a whole*” [9]. The extent of impact considered “tolerable” impact seems rather high, certainly by today’s standards, as the experts also stated that:

Even if dose rates, say in the dumping area... were high enough to kill all deep ocean organisms in that area, the fraction of the total population affected would be small and it is probable that any effect would be indistinguishable from natural mortality in the total population [9].

A decade later, a new assessment showed that dumping of radioactive materials according to the IAEA’s definition and recommendations for the London Convention could give rise to significant exposures to species of marine organisms and that future revisions of the definition and recommendations would have to consider impacts on the marine ecosystem in setting limits for such dumping [10].

A moratorium on the dumping at sea of all radioactive wastes was put in place in 1983 pending the completion of scientific and technical studies as well as studies on the wider political, legal, economic and social aspects of the issue [11]. Following completion of these studies, the Parties agreed in 1993 to amend the Annexes I and II to the London Convention to ban the dumping of all radioactive

wastes.¹ Work on revising the London Convention continued and resulted in the adoption of the 1996 Protocol to the London Convention.² As a result, the option of dumping of radioactive wastes and other hazardous (non-radioactive) substances at sea no longer exists. The transformation of the London Convention has resulted in a system of control centred on protecting the environment by preventing the inputs by dumping of any material which, by its nature and properties, could give rise to harm to the marine environment. Management centred on a specific assessment based on the radiological consequences (largely to humans) has been replaced by a system of protection for the ecosystem as a whole.

A parallel trend has emerged also with respect to the strategy for radioactive discharges developed under the OSPAR Convention for Protection of the Marine Environment of the Northeast Atlantic [12]. The objective of preventing pollution of the maritime area from ionising radiation is to be realised through progressive and substantial reductions of discharges, emissions and losses of radioactive substances so that additional concentrations in the marine environment are close to zero.

4. TOWARDS AN EFFECTIVE SYSTEM OF PROTECTION

The ongoing work on developing a “reference organism” approach to radiological protection may contribute to a better understanding of the possible impacts on organisms of inputs of radioactivity into the environment. This is to be welcomed particularly in the context of assessing the impacts of past or ongoing releases to the environment. However there is concern that this approach may be too narrow and focused to be able to provide a framework for effective environmental protection.

One concern is that a reference organism approach may prove inadequate to cover the full range of biodiversity at scales ranging from the genetic to that of the ecosystem. A further and related concern is that the implied extrapolations across multiple levels of biological organisation are misleading and that protection of ecosystems cannot be realised through a selective organism-based reference system. Put simply, “radiological protection of selected biota” may not be synonymous to “radiological protection of the environment”. The use of the term “radiological protection of the environment” should be avoided where a much narrower scope is intended.

In order to be effective, approaches to radiological protection of the environment need to be compatible with the broader principles and conceptual approaches in other areas of environmental protection [13]. They must be integral, addressing all aspects of pollution. Thus radiological protection of the environment also implies consideration of the abiotic environment and whether it is appropriate to continue to plan the systematic release of radionuclides into the environment as a result of human activities. The approach would need to be able to address inputs of radioactivity in a multi-pollution context, with multiple stressors on organisms and ecosystems. There is increasing recognition that an ecosystem-based (or “ecocentric”) approach, based on the preservation of ecosystems, appears best suited to protecting the environment as a whole [14]. More generally, environmental protection should be seen in the context of sustainable development, whereby it constitutes an integral part of the development process and cannot be considered in isolation from it [15].

A reference organism approach may help with assessments and may also have a role to play as part of a system of radiological protection of the environment. However it does not constitute such a system on its own. A comprehensive approach is needed in order to provide a sufficient basis for developing an effective system for protection of the environment and a framework for decision-making concerning future nuclear activities. At the core of such a system would be an ecosystem-based and precautionary approach, drawing on developments and experience in environmental protection across a range of disciplines, industrial sectors and human activities. A reference organism approach could form a complementary part of such a system.

¹ This legally binding prohibition entered into force on 20 February 1994.

² The 1996 Protocol entered into force on 24 March 2006.

5. THE PRINCIPAL OBJECT OF PROTECTION

There remains some concern about what might be the ultimate objective of the current initiatives in radiological protection of the environment. This concern arises in part by the adoption of objectives and principles by the international nuclear community that appear to subordinate protection of the environment (and people) to the goal of ensuring ongoing development of nuclear power. For example, it is emphasised that:

This fundamental safety objective of protecting ... the environment has to be achieved without unduly limiting the operation of facilities or the conduct of activities that give rise to radiation risks [3].

To environmental NGOs this statement appears “back-to-front” because it could constrain environmental protection within a framework determined by the operational requirements of nuclear facilities. A more appropriate perspective is that, in order to be sustainable, development needs to be undertaken fully within the framework of an integrated, holistic system of environmental protection, centred on an ecosystem-based and precautionary approach. If they cannot meet the required standards, then it is the nuclear programmes that should be curtailed, not the protection of the environment.

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