

## **NCRP Report No. 109, *Effects of Ionizing Radiation on Aquatic Systems***

In 1991, the National Council on Radiation Protection and Measurements (NCRP) published Report No. 109, *Effects of Ionizing Radiation on Aquatic Systems*, to achieve the following objectives:

- review the available literature on the effects of ionizing radiation on aquatic organisms;
- provide guidance for the establishment of a dose rate below which deleterious effects to aquatic populations are acceptably low; and
- provide a series of simple dosimetric models that can be employed to demonstrate compliance with such guidance.

While NCRP Report No. 109 focuses on the discharge of the low-level radioactive effluents into the aquatic environment, parts of the Report apply to the current situation at the Fukushima nuclear facility.

The fate of individual organisms is, generally, not the major concern but rather the response and maintenance of native populations. Experimental studies to date have shown that fertility of the organisms and embryonic development are probably the most sensitive components of the radiation response, and it is precisely these attributes which are of importance in determining the fate of the population.

From the information reviewed in Report No. 109, it appears that a chronic dose rate of less than  $0.4 \text{ mGy h}^{-1}$  ( $1 \text{ rad d}^{-1}$ ) to the maximally-exposed individual in a population of aquatic organisms would ensure protection for the population. It must, however, be recognized that increased radiation exposure is but one of the many stresses imposed upon aquatic populations by human activities. Determination of the mode of interaction of radiation, whether it be antagonistic, additive or synergistic, with other environmental contaminants or stressors, is extremely difficult to assess under conditions of chronic exposure.

As of today, the emergency conditions at the Fukushima nuclear facility result in the immediate need to:

- continue monitoring releases of radioactive water from the facility to the ocean; and
- limit short-term exposures to aquatic organisms near the plant while maintaining doses to emergency workers to as low as reasonably achievable.

The Report is available from the NCRP website, <http://NCRPpublications.org>, in soft- and hard-copy formats. For additional information contact David A. Schauer, ScD, CHP at [schauer@NCRPonline.org](mailto:schauer@NCRPonline.org), 301.657.2652 (x20) or 301.907.8768 (fax).