

National propositions for post-accidental management in case of nuclear releases in the marine environment.

O. Radakovitch¹, C. Duffa¹, J-M. Bertho¹, F. Gabillaud-Poillion¹, L. Legrand¹, C. Reuter¹.

*¹ASNR. French Nuclear Safety and Radiation Protection Authority
92120 Montrouge, France
Olivier.radakovitch@asnr.fr*

The French Steering Committee for Post-Accidental management (CODIRPA) was established in 2005 to advise the government on post-accident management following a nuclear accident. These reflections led in 2012 then 2022 to the publication of post-accident management recommendations, which propose that public protection actions be based on a geographic zoning strategy for contaminated areas. In 2022, a "Marine Environment Management" working group was created with the mission of examining the relevance of these recommendations in the event of accidental contamination of the marine environment. The WG included more than 50 stakeholders issued from governmental institutions, nuclear operators and civil society. Obviously, the discussions considered feedback from the management of the consequences of the Fukushima accident in 2011. This conference will present the main issues and proposal arising from this work.

The dispersion of radionuclides at sea and their transfer to biological organisms is subject to environmental specificities. Dispersion kinetics differ from those in the atmospheric environment, with ocean currents being the vectors for transporting contamination. Dispersion and dilution at sea can take weeks, during which contaminated areas fluctuate. Establishing a fixed map of environmental contamination (as proposed in the terrestrial recommendations) from which to draw zoning would prove impossible. Sediments also play a major role through their ability to accumulate certain radionuclides which can be remobilized, especially on coastal areas, or constitute a secondary source of contamination for benthic organisms in a medium to long-term post-accident phase.

The primary issue in case of marine release is obviously related to fishing, but several other issues have been highlighted: shellfish farming, maritime traffic, tourism, ecological heritage... They were discussed to characterize them and identify the key points to be considered in the recommendations.

The risks of exposure to the population were studied based on a fictitious accident scenario with a major direct liquid release into the sea. Calculations of marine dispersion and transfers to seafood were carried out using ASNR numerical models. Dose calculations were done for different exposure scenarios (fisherman, tourist and local resident) and considering the various external and internal exposures pathways. The results show a very low risk of exceeding the effective dose limit of 20 mSv during the first-year post-emergency by external exposure, corresponding to the criterion to define the terrestrial exclusion zone. The main concerns would then relate to the measures and controls necessary to define and manage areas prohibiting or restricting the consumption of marine products before their sale, as well as those restricting access to beaches and associated activities.

The recommendations of the WG are thus focused on these topics, with an emphasis on the treatment of fishing and shellfish farming. It appears that the main principles of post-accident management defined in France for an accident involving contamination of the terrestrial environment could be applied to the marine environment. However, the mobility of radionuclides in this environment makes it difficult to define post-accident zoning a priori. This operational difficulty could be overcome by a strategy based on the results of environmental radioactivity monitoring, including citizen measurements, which should be carried out over a long period of time and over potentially large areas.