

## WASTE MONITORING IN THE MARINE ENVIRONMENT

The IAEA's Marine Environment Laboratory in Monaco has been carrying out several projects connected with waste management issues. They include studies of authorized releases of radioactive wastes from reprocessing plants into the marine environment and investigations of possible leakages from radioactive waste dumping sites on the sea bottom.

An innovation in the monitoring of marine radioactivity using stationary gamma monitors with satellite data transmission has been conceived at IAEA-MEL's Radiometrics Laboratory. The new monitoring system was deployed from April 1999 to February 2000 in Monaco Bay to test the performance of data transmission via satellite and to evaluate the results. The sensors were deployed a few meters below the sea surface on a structure attached to a floating buoy. They generated long-term continuous records of gamma-activity in seawater, salinity, temperature and current speed and direction. The monitoring system performed well over the testing period and reached the projected sensitivity of 4 Bq per cubic meter for caesium-137 concentration in water. It will be deployed in the summer of 2000 in the Irish Sea to investigate long-term transport of caesium in seawater released from the Sellafield reprocessing plant.

Further work recently completed in the Irish Sea is *in situ* gamma-mapping of seabed sediments from the Sellafield discharging point to about 15 kilometers from the coast. The total sea area covered was about 400 square kilometers. A high resolution map of the distribution of caesium-137 in the sediment was obtained. This would have required hundreds of sampling points and thousands of analyses of sediments if the data for the map had been obtained by laboratory work.

Work on the investigation of possible releases of radionuclides from radioactive waste dumping sites in the North West Pacific Ocean has

been completed. The obtained results have shown that at the sites visited, no leakages

which could be attributed to radioactive waste dumping were observed. Modelling and radiological assessment work covering impacts from both liquid radioactive wastes dumped on the sea surface, as well as solid wastes dumped on the sea bottom have shown that only negligible

radiation doses could be delivered to local populations.

During the first meeting of the coordinated research project on "Worldwide Marine Radioactivity Studies", a geographical system for the assessment of marine radioactivity in the world oceans and seas was developed. Tritium, carbon-14, strontium-90, iodine-129, caesium-137, plutonium, and americium isotopes were chosen as representative of anthropogenic radionuclides in the marine environment and their main distribution patterns were established. The evaluation of sources of anthropogenic marine radioactivity has shown that global fallout is still the dominant source in the oceans, although in some areas releases from reprocessing plants (e.g. in the Irish and North Seas) and the Chernobyl accident (the Baltic and Black Seas) have exceeded the contributions from global fallout.

The Global Marine Radioactivity Database (GLOMARD) is under development, and will store all available data on the concentrations and distribution of radionuclides in the marine environment.



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*Photo: In August 2000, the Radiological Protection Institute of Ireland, in cooperation with the Environment and Heritage Service of Northern Ireland and the IAEA, deployed an experimental buoy in the Irish Sea, equipped with a radiation detector capable of continuously measuring radioactive contamination in seawater. (Credit: IAEA-MEL)*