Environment

Objective

To identify environmental problems caused by radioactive and non-radioactive pollutants and climate change, using nuclear, isotopic and related techniques, and to propose mitigation/adaptation strategies and tools. To enhance the capability of Member States to develop strategies for the sustainable management of terrestrial, marine and atmospheric environments and their natural resources in order to address effectively and efficiently their environment related development priorities.

Strengthened Analytical Capacity for Rapid Response

The Agency continued to work with Member States to enhance their capacity to rapidly and reliably analyse samples during a nuclear or radiological emergency. In 2017, a new global strategic plan was developed and implemented, involving the development and validation of a method of analysis; training activities; the production and supply of tailored reference materials; and the use of specially designed proficiency tests.

FIG. 1. Laboratory testing of water samples containing radionuclides typically found in the environment after a nuclear accident during the ConvEx-3 in June.

In 2017, the Agency for the first time tested the performance of Member State analytical laboratories during a Convention Exercise (ConvEx-3), held in Hungary in June. The test was organized in collaboration with the Radioanalytical Reference Laboratory of Hungary's National Food Chain Safety Office, an IAEA Collaborating Centre.

During the exercise, water samples with known activities of radionuclides that are typically found in the environment after an event such as a nuclear accident and that can pose analytical challenges were distributed to participating Member State laboratories to evaluate the timeliness and accuracy of their analyses and the standardization of their reporting methods (Fig. 1). Almost 90 laboratories from 37 Member States participated in the measurement and reporting exercise, including a large majority of ALMERA network laboratories. Ninety per cent of the laboratories reported within the time frame of the exercise, and the results showed excellent analytical performance.

Proficiency Tests

In 2017, the Agency developed a novel proficiency test for short-lived radionuclides representing a hypothetical release from a nuclear accident. Such samples had not previously been developed owing to logistical challenges in creating samples containing such radionuclides. The proficiency test drew substantial interest from Member State laboratories, and the results are being used to develop guidance for future tests, methodological guidelines and training materials.

The Agency expanded the range of proficiency tests to include sample materials for testing contamination of food, feed and different surface materials and matrices. It also developed an innovative approach to calibrate, test and train for in situ measurements using 'mosaic samples', samples that simulate a larger, integrated contaminated surface. The Agency conducted a series of training sessions focused on rapid contamination assessment using a comprehensive suite of in situ measurements, rapid analytical methods and dose assessment. The training courses were developed and implemented in close partnership with, inter alia, three IAEA Collaborating Centres: the Spiez Laboratory in Switzerland, the Radioanalytical Reference Laboratory of Hungary's National Food Chain Safety Office and the Korea Institute of Nuclear Safety. The Institute of Radiation Safety and Ecology in Kazakhstan and Argonne National Laboratory in the United States of America also contributed to this effort.

Movement of Contaminants in the Marine Environment

The Agency developed new analytical methods and conducted environmental research to advance understanding of the movement and impact of toxic contaminants on coastal and marine ecosystems. These contaminants, such as mercury and lead, persistent organic pollutants (POPs), biotoxins from harmful algae, and natural and artificial radionuclides, can have serious negative impacts on commercially important marine organisms that are consumed around the world. In 2017, the Agency assisted Member States in building capacity to rapidly identify the presence of such contaminants and to track their biogeochemical incorporation into and transfer up the food chain. In this regard, it provided Member States with a range of new tools — including fine-tuned radiolabelled tracers, nuclear and isotopic techniques, and other analytical methods — to precisely track the movement of these contaminants and biotoxins through marine food webs and ecosystems.

Through a Peaceful Uses Initiative project entitled 'Marine Plastics: Tackling the Challenge Using Nuclear Applications', the Agency designed multi-stressor experiments using controlled aquariums to examine the effects of realistic concentrations of organic contaminants adsorbed onto plastic particles under varying environmental conditions, such as a subtle change in the dissolved oxygen concentration, in the pH or in the salinity (Fig. 2). Other experiments used radio- and POP-labelled microplastic pellets as tracers to evaluate the uptake and loss mechanisms in commercially important fish and bivalve species. The research is delivering quantitative data that will enable all seafood-producing Member States to strengthen their seafood safety programmes.

FIG. 2. The Agency began a new project to study the effects of plastic particles in the marine environment and how contaminants can be transferred to marine animals.