

TRAINING COURSE ON PROTOCOLS, QUALITY ASSURANCE, AND QUALITY CONTROL FOR MONITORING MERCURY AND MERCURY COMPOUNDS IN MARINE ECOSYSTEMS

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The Training Course on Protocols, Quality Assurance, and Quality Control for Monitoring Mercury and Mercury Compounds in Marine Ecosystems was held from 6th to 10th October 2025 at the International Atomic Energy Agency (IAEA) Environment Laboratories, Monaco. The training was hosted by the Government of Monaco with the support of the IAEA. This training was attended by sixteen participants from Argentina, Belize, Cuba, Ecuador, Jamaica, Latvia, Lithuania, Malaysia, Mauritius, Mexico, Montenegro, Namibia, South Africa, Thailand, Türkiye, and Uruguay. The participant for this training was trained by Ms. Sabine Azemard and Mr. Marc Metian, the Reference Material Specialist at the IAEA Monaco. The participants were also lucky to have a lecture by Ms. Milena Horvat, an expert researcher in mercury studies in the environment. She was also a part of the national expert team for the Mercury Minamata Convention.

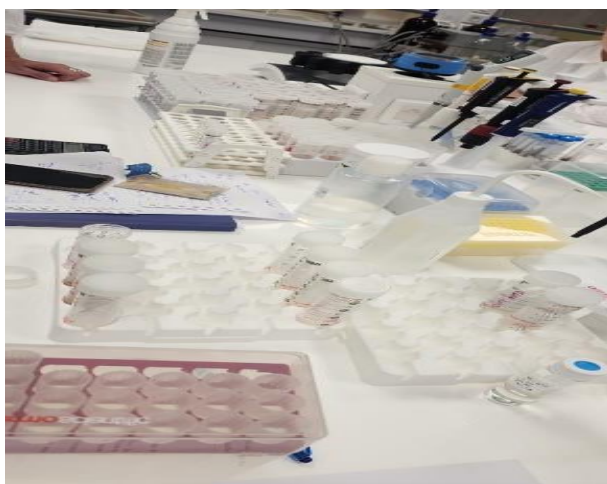


Lecture Session



Group photos with experts and participants.

The purpose of the training is to strengthen the technical capacities of participating Member States in the application of standardized protocols and quality assurance/quality control (QA/QC) practices for the monitoring of mercury and mercury compounds in marine ecosystems, with the aim of improving data quality and comparability at national, regional, and global levels. The training supports efforts to assess environmental risks, manage pollution effectively, and contribute to international commitments such as the Minamata Convention on Mercury. As we knew, the determination of mercury compounds in the marine ecosystem for samples like sediment and biota is very critical and tedious. Therefore, the use of simple, highly reproducible, and precise extraction methods is very crucial to determine the mercury and mercury compounds in various marine environment samples. The application of the Mercury Analyzer shows strong potential for providing reliable and high-quality data to support mercury monitoring programs and regulatory enforcement in marine environments.



Extraction of mercury and mercury compound procedure.



Mercury Analyzer.

The learning agenda for this workshop includes protocols for the collection, preservation, and preparation of marine samples for mercury analysis. The participants also learned about sampling design, analysis of mercury by different analytical techniques (solid analyser, cold vapour), quality

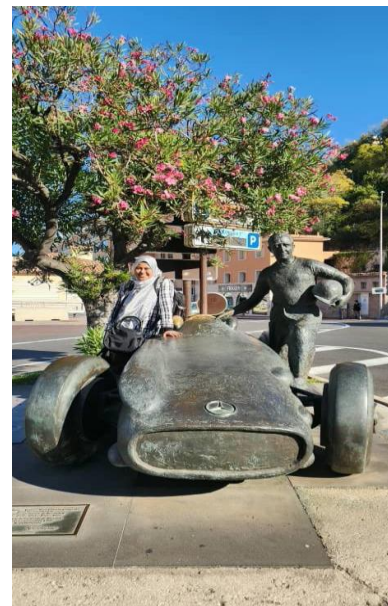
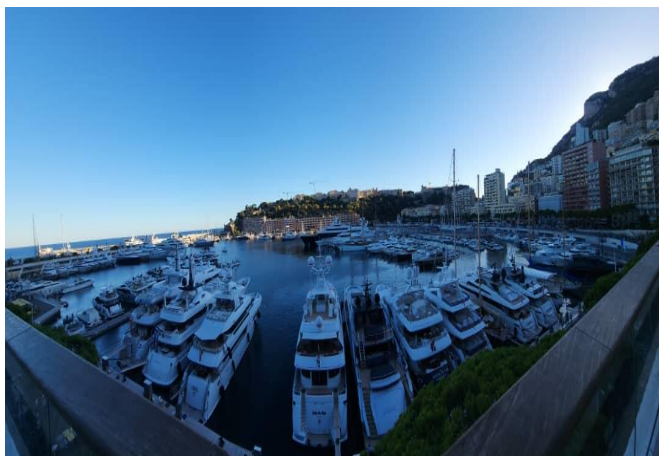
assurance and quality control, including method validation and uncertainty estimation, and the use of proficiency tests for method validation and corrective action. The participants were also exposed to the method for the reporting of mercury and mercury compound results in the marine environment.

The IAEA aims to strengthen ocean health for sustainable development. With over 70 percent of the Earth’s surface covered by oceans, they are vital for maintaining livelihoods by providing food, regulating global climate, and preserving biodiversity. However, threats such as pollution from radioactive and non-radioactive contaminants such as mercury, climate change, ocean acidification, and deoxygenation are affecting marine life, food security, and human health; the attainment of sustainable development goals (SDGs) relating to ocean health remains in question.

This training event discussed good analytical techniques for mercury and mercury compound determinations in line with International Organization of Standardization (ISO) 17025: 2017. This is vital to ensure the data produced are reliable and able to mitigate the mercury pollution in the marine environment. With the help of experts and the discussion among the participants, the method learned for this project will help researchers worldwide in conducting the monitoring of these pollutants in marine ecosystems. The excursion to the Oceanographic Museum of Monaco offers substantial value for research scientists working in marine pollution, as it provides direct exposure to the historical and contemporary intersections of oceanography, marine ecology, and environmental protection. The museum’s extensive exhibits on various types of marine biodiversity in the worldwide ocean, with a focus on the Mediterranean Sea, ocean circulation, and anthropogenic stressors, particularly pollutants such as plastics, heavy metals, and emerging contaminants. The most interesting part of this museum is an immersive combination of historic oceanographic collections and state-of-the-art aquariums that vividly connect marine science, biodiversity, and ocean conservation in one experience.



Excursion to the Oceanographic Museum of Monaco.



Monte-Carlo, The Principality of Monaco.

For the author, this training course provides priceless experiences in terms of capacity building for global capacity in monitoring mercury within marine ecosystem improvement. Through the exposure to the high-end analytical techniques and nurturing collaborative exchanges, this training supports the member states of the IAEA towards the Minamata Convention commitments. As human health really depends on the health of our ocean, safeguarding marine biodiversity and advancing environmental protection and management are vital in the marine environment.