BULETIN

NUKLEAR MALAYSIA

Think Nuclear Think Positive Act Proactive .. $E=mc^2$

NUCLEAR BULLETIN OF MALAYSIA

FREE

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EDITORIAL

Eid Mubarak to all our readers and contributors. As we celebrate this season of renewal and reflection, we find ourselves at a critical stage in our nation's journey toward a sustainable and resilient future.

After hard work by the editorial members, BNM 2026 Vol. 24, No. 1 is finally published. The editors would like to express their sincere thanks to all contributors and readers for their patience and loyal support to BNM. Congratulations MNS for its 37th anniversary. This effort is very much appreciated, and we hope this spirit will continue for all MNS activities and BNM, in particular. We know that the issuance of BNM needs very strong support and commitment from all members of MNS and readers in general. The editorial is very optimistic, with the good support and enough articles from the contributors the biannual issue of this bulletin will be published on schedule. We also observed that over the past few years there has been encouraging responses from contributors from a wide range of organizations and agencies. This can probably be improved in the future, as sharing and disseminating knowledge and information is one of the agendas of Malaysian Nuclear Society (MNS).

Authors could deliver the same message but probably from a different approach. The editorial would also like to welcome contribution from students at various levels of education and MNS has agreed to provide some token as an incentive for your efforts. The editor welcomes articles and news from any related science, technology, engineering regulatory and economy issues. However, the articles should reflect the title of this bulletin on news and information on nuclear. With the current scenario and trends on world energy demand, food and water security, environmental concerned, it is hoped that the contributed articles and news could be “hot” topic of discussions on nuclear.

The editorial would like to highlight that the peaceful use of nuclear technology for socio-economic development should be utilized to the maximum in order to put Malaysia on a par with developed countries by 2030. This is especially in the area of industrial, health, food and agriculture, water management and environmental protection.

To support this holistic infrastructure development, the editorial believed that capacity and nuclear-related human capital expertise needs to be strengthened. Experience, knowledge and expertise in the field of nuclear technology obtained during training programs, forums or visits will be able to be applied to Malaysia nuclear energy programs if it will be implemented in the future. The editorial has gone through exciting experiences in highlighting many activities related to nuclear science and nuclear technology among the members throughout the country.

In relation to that, the public acceptance program of nuclear technology as well need to be implemented effectively and continuously in order to spread the benefits of using nuclear technology peacefully in Malaysia. Hopefully through this Buletin Nuklear Malaysia that related to nuclear science, technology, engineering, regulatory and economy issues can help our efforts in improving the effectiveness of the Communication, Education and Public Awareness Program (CEPA) of nuclear technology throughout the country.

Chief Editor Buletin Nuklear Malaysia, April 2026.

LETTER FROM CHIEF EDITOR

Navigating a New Energy Era

The world's energy supply is under a lot of pressure right now. What started as a local fight in the Middle East has turned into a major problem for the whole world's economy. Recent attacks on shipping routes and oil facilities in the Gulf have caused the biggest drop in oil and gas supplies ever recorded.

In response to these challenges, we are witnessing a global "nuclear renaissance." Neighbours like Vietnam and the Philippines are reintroducing nuclear energy into their national plans to power growing economies and AI-driven data centres. The rise of Small Modular Reactors (SMRs) has changed conversation, offering scalable, safer, and more flexible baseload power compared to traditional large-scale plants. As of the Nuclear Energy Summit 2026 in Paris, 38 countries have now endorsed the declaration to triple nuclear energy capacity by 2050, recognizing it as a vital pillar of energy security and net-zero goals.

For a country like Malaysia, these global problems are a wake-up call. We can no longer ignore the risk of relying too much on fuel from other countries. Under the 13th Malaysia Plan (RMK13), the government has officially identified nuclear energy as a potential long-term, low-carbon baseload source. MyPOWER Corporation has been tasked as the Nuclear Energy Programme Implementing Organisation (NEPIO) to conduct comprehensive feasibility studies, ensuring that any future steps align with the highest international safety standards and the nation vision of sustainability.

As the world moves toward a more fragmented and uncertain energy future, the role of nuclear science and technology becomes more relevant than ever.

"CLEAN, GREEN, SUSTAIN"

Natural landscapes of Andalusia, Spain, including El Tajo Gorge in Ronda and the Zahara–El Gastor Reservoir.

REGIONAL WORKSHOP ON RADIOLOGICAL CRIME SCENE MANAGEMENT

Dr. Zalina Laili[1], Suzilawati Muhd Sarowi[1] and Sofia Aida Ngah[2]

[1]Malaysian Nuclear Agency (Nuklear Malaysia)
[2]Department of Atomic Energy (ATOM Malaysia)

Effective management of radiological crime scenes is a critical component of nuclear security, particularly in incidents involving the suspected presence of radioactive materials. To strengthen regional capabilities in radiological crime scene management, the Regional Workshop on Radiological Crime Scene Management was conducted from 16 to 20 June 2025 in Manila, Philippines. The workshop was hosted by the Philippine Nuclear Research Institute (PNRI) with technical support from the International Atomic Energy Agency (IAEA). Participants comprised representatives from several Southeast Asian countries, including Cambodia, Indonesia, Laos, Malaysia, and Vietnam, as well as participants from the host country, the Philippines.

Group Photo of Participants at the Regional Workshop on Radiological Crime Scene Management.

The programme focused on strengthening national and regional preparedness for radiological crime scene management in accordance with IAEA Nuclear Security Series No. 22-G: Radiological Crime Scene Management. The primary objective of the workshop was to build national capacity for safe, effective, and efficient operations at crime scenes where nuclear or other radioactive materials are known or suspected to be present. Sessions were delivered through a combination of lectures, case studies, and table-top exercises. Topics covered responder safety, control of contaminated areas, protection of evidence, and coordination between technical personnel and law enforcement agencies. Practical exercises exposed participants to realistic scenarios and encouraged the application of concepts introduced during the lectures. A key benefit of the workshop was the sharing of national practices and experiences, highlighting both common challenges and different national approaches.



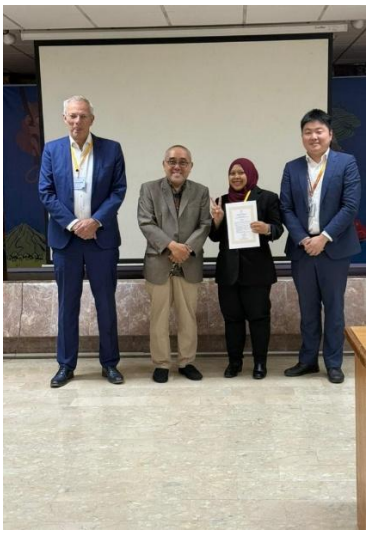
IAEA experts delivered lectures, complemented by hands-on experience with radiation detection instruments.

The workshop further strengthened national capabilities through the exchange of strategies and implementation approaches aligned with international guidance. The programme commenced with introductory sessions on crime scene management principles, threat awareness, radiation fundamentals, and basic radiation protection. Participants were given hands-on exposure to radiation detection instruments, including personal radiation detectors, radionuclide identification devices, survey meters, and high-purity germanium (HPGe) systems. Subsequent sessions addressed roles and responsibilities at radiological crime scenes, crime scene management procedures, and an introduction to nuclear forensics. Practical activities included the use of personal protective equipment, radiation surveys to locate and identify radioactive materials, and the collection and handling of evidence contaminated with radionuclides. Command and control concepts were introduced through structured table-top exercises and a live play exercise. These activities simulated realistic scenarios involving initial scene assessment, operational and safety planning, and evidence retrieval, followed by structured debriefing sessions. Throughout the workshop, participants presented their national plans, procedures, and existing capabilities related to radiological crime scene management. These exchanges highlighted common challenges such as limited technical capacity, legal and jurisdictional considerations, interagency coordination, and access to sustainable resources and funding.



Participants engaged in a table-top exercise simulating radiological crime scene management scenarios.

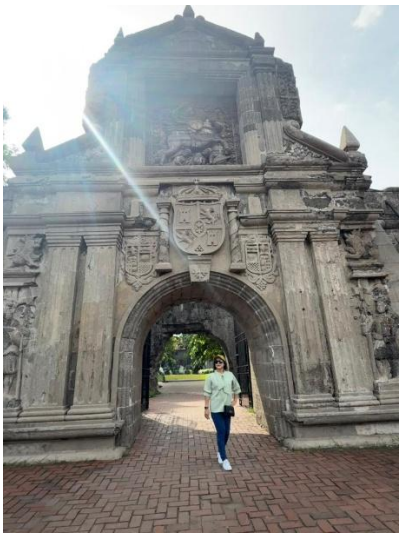
From a Malaysian perspective, the workshop clarified the role of radiological crime scene management within the broader nuclear security and emergency response framework. Discussions emphasised the importance of clear procedures, well-defined roles, and effective communication between agencies during an incident. The workshop underscored that radiological crime scene management extends beyond technical tasks and requires close collaboration between radiation protection specialists, forensic experts, and law enforcement officers to ensure safety without compromising the integrity of the investigation.


Dr. Zalina Laili (left) and Ms. Suzilawati Muhd Sarowi (center) from Nuklear Malaysia, with Ms. Sofia Aida Ngah (right) from ATOM Malaysia, Malaysia representatives at the certification ceremony.

The Regional Workshop on Radiological Crime Scene Management enhanced regional capabilities in responding to incidents involving radioactive materials. Participants gained practical knowledge and hands-on experience in radiation detection, evidence handling, and crime scene management while sharing national practices and approaches. The workshop highlighted the need for strong collaboration between technical personnel and law enforcement agencies, supported by clear procedures and effective communication. For Malaysia, the workshop reinforced the importance of integrating radiological crime scene management within the broader nuclear security and emergency response framework, strengthening national preparedness and contributing to regional nuclear security.





A glimpse of Manila alongside the Regional Workshop on Radiological Crime Scene Management.

EVT2404163: IAEA-KINS BASIC TRAINING COURSE ON RADIATION SAFETY

Puteri Nuraliah Husna Mohd Tajuddin

Malaysian Nuclear Agency

The IAEA-KINS Basic Training course on Radiation Safety was held from 1st until 12th September 2025 at Korea Institute of Nuclear Safety (KINS), Daejeon, Republic of Korea. The event aims to provide the participants with fundamental knowledge on radiation safety principles, including the relevant legal and regulatory frameworks. It is primarily designed for junior professionals involved in radiation activities.

The training was attended by 18 participants representing eleven countries, which were Bangladesh, Brunei Darussalam, Indonesia, Lao P.D.R, Malaysia, Mongolia, Myanmar, the Philippines, Singapore, Sri Lanka, and Thailand. All representatives must deliver a country presentation regarding the safety culture that includes the regulatory framework, regulatory activities, and challenges.

The training covered critical regulatory aspects such as the control of radiation sources, transport of radioactive material, NORM regulation, and source security. Special attention was given to the practical implementation of the ALARA principle, as well as the management of planned, emergency, and existing exposure situations. Sessions on radioactive waste management, including predisposal, disposal, and management of disused sealed radioactive sources (DSRS), further enhanced participants' understanding of the radiation safety lifecycle.

In addition to the technical programme, participants also took part in a cultural event, which included a visit to the Gapsa Temple. This cultural visit provided an opportunity to experience Korea's rich heritage, foster cross-cultural understanding, and strengthen networking and increase bonding among participants through informal interaction and shared experiences.

The Malaysian representative delivered a country presentation.

Lecture for radiation safety on IAEA regulations.

Program Highlights:

- **Comprehensive radiation safety foundation** covering IAEA Safety Standards, ICRP recommendations, and GSR Part 3 requirements.
- **Focus on regulatory frameworks**, including control of radiation sources, transport regulations, NORM regulation, and source security.

- **Occupational radiation protection and dosimetry**, including external and internal dose assessment, bioassay methods, and exposure assessment.
- **Application-oriented sessions** on industrial and medical uses of radiation, radiation monitoring, and laboratory practices.
- **ALARA implementation and exposure situations**, covering planned, emergency, and existing exposure scenarios.
- **Hands-on learning through group exercises**, focusing on PPE selection and dose estimation.
- **Technical visit to KAERI Advanced Radiation Technology Institute**, providing real-world exposure to advanced radiation technologies.
- **Radioactive waste management modules**, covering predisposal, disposal, and DSRS management
- **Assessment and certification**, with written tests for both weeks and a Certificate of Completion awarded at the closing session.

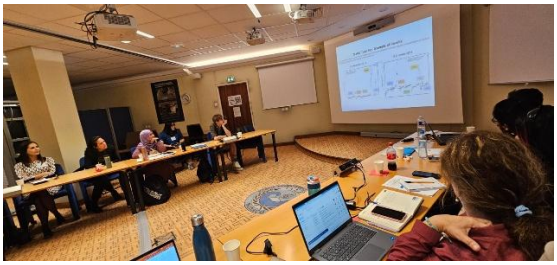
Technical Visit to KAERI Advanced Radiation Technology Institute.

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

ChM Dr Munirah Abdul Zali

Nuklear Malaysia, Bangi

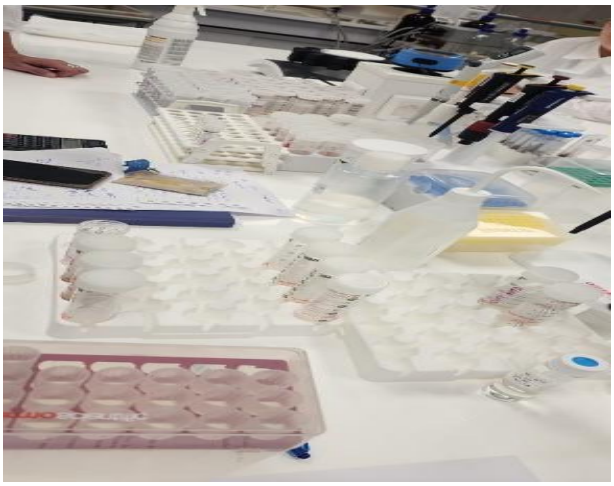
The Training Course on Protocols, Quality Assurance, and Quality Control for Monitoring Mercury and Mercury Compounds in Marine Ecosystems was held from 6th to 10th October 2025 at the International Atomic Energy Agency (IAEA) Environment Laboratories, Monaco. The training was hosted by the Government 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.

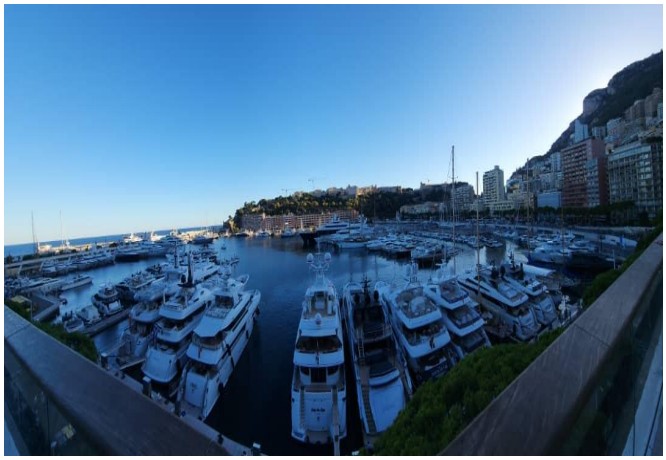
The learning agenda for this workshop includes protocols for the collection, preservation, and preparation of marine samples for mercury analysis. The participants also learned about sampling design, analysis of mercury by different analytical techniques (solid analyser, cold vapour), quality

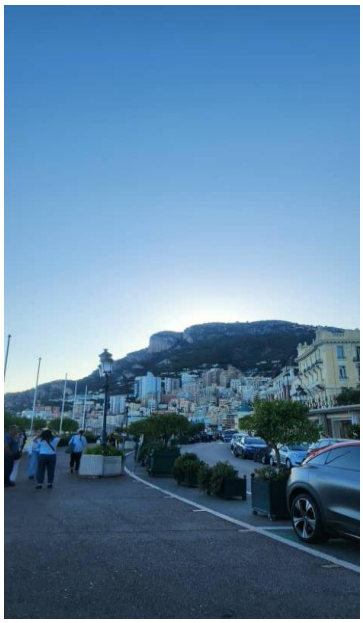
assurance and quality control, including method validation and uncertainty estimation, and the use of proficiency tests for method validation and corrective action. The participants were also exposed to the method for the reporting of mercury and mercury compound results in the marine environment.

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.

IAEA FELLOWSHIP TRAINING IN WATER RESOURCES MANAGEMENT

(EVT2403251 – MAL7008)

Dr. Nurrul Assyikeen Md. Jaffary

Malaysian Nuclear Agency, Bangi

Introduction

The IAEA Fellowship Training in the field of Water Resources Management under the Technical Cooperation Project MAL7008 was conducted from 12 February to 18 April 2025 at the Universidad de Sevilla, Department of Applied Physics II (Departamento de Física Aplicada II), Spain. The fellowship was organized by the International Atomic Energy Agency (IAEA) as part of its capacity-building initiatives to strengthen Member States' technical competencies in environmental radioactivity monitoring and radiochemical analysis.

The fellowship combined theoretical understanding through literature review with extensive hands-on laboratory work and instrumental analysis, under the supervision of Prof. Rafael Garcia-Tenorio, an expert in environmental radioactivity and radioanalytical techniques.

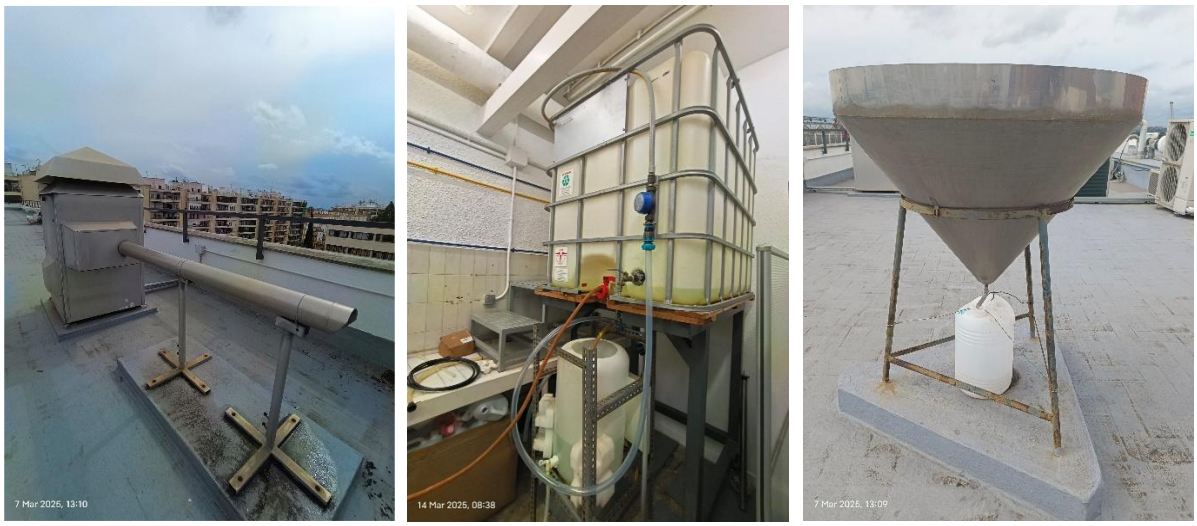
Training Scope and Technical Activities

A key component of the fellowship involved practical laboratory training on sample pretreatment and radiochemical separation techniques. Microwave-assisted digestion was applied to soil, sediment, and organic matrices using tailored acid mixtures to ensure effective dissolution and minimal analyte loss. Participants gained experience in iron (Fe^{3+}) co-precipitation, solvent extraction using the tributyl phosphate (TBP) method, and ion-exchange chromatography employing AG 1×4 and UTEVA resins for actinide purification.

The fellowship also provided extensive exposure to alpha spectrometry, including source preparation through electrodeposition for uranium and plutonium, as well as autodeposition techniques for polonium. Measurements were carried out using silicon surface barrier detectors, enabling high-resolution alpha spectra and reliable activity determination. Complementary analytical techniques included liquid scintillation counting (LSC) for radium and tritium analysis, as well as gamma spectrometry for environmental monitoring samples.

Environmental Radioactivity Monitoring Practices

In addition to laboratory-based training, the programme emphasized environmental radioactivity monitoring practices implemented by the host institution. This included airborne monitoring using high-volume air samplers for radionuclides such as Pb-210, Be-7, and Cs-137, as well as low-flow charcoal-based sampling for iodine-131. Water monitoring activities covered rainwater and tap water analysis, including cesium determination using ammonium phosphomolybdate (AMP) precipitation and total alpha and beta measurements by LSC with pulse shape analysis.



Environmental radioactivity monitoring facilities, including high-flow air samplers with 4 ft × 4 ft filters, large-volume water tanks for routine surveillance of gamma-emitting radionuclides in drinking water, and rainwater samplers.

Laboratory facilities used for radiochemical analysis during the IAEA Fellowship Training at Universidad de Sevilla.

Group photo with academic supervisors and research colleagues at the Department of Applied Physics II, Universidad de Sevilla, Spain, during the IAEA Fellowship Training.

Technical Visit to Centro Nacional de Aceleradores (CNA)

An important highlight of the fellowship was a technical visit to the Centro Nacional de Aceleradores (CNA), where the MiCaDaS accelerator mass spectrometry (AMS) system is operated for radiocarbon (^{14}C) dating. The visit provided valuable insight into sample preparation, graphitization, and isotopic measurement using AMS, broadening understanding of isotope applications in environmental and climate studies.

The MiCaDaS accelerator mass spectrometry (AMS) system at the Centro Nacional de Aceleradores (CNA), Seville, is used for radiocarbon (^{14}C) analysis.

Laboratory staff from the Centro Nacional de Aceleradores (CNA), Seville, providing technical guidance on AMS sample preparation and system operation during the IAEA Fellowship Training.

Outcomes and Relevance to Malaysia

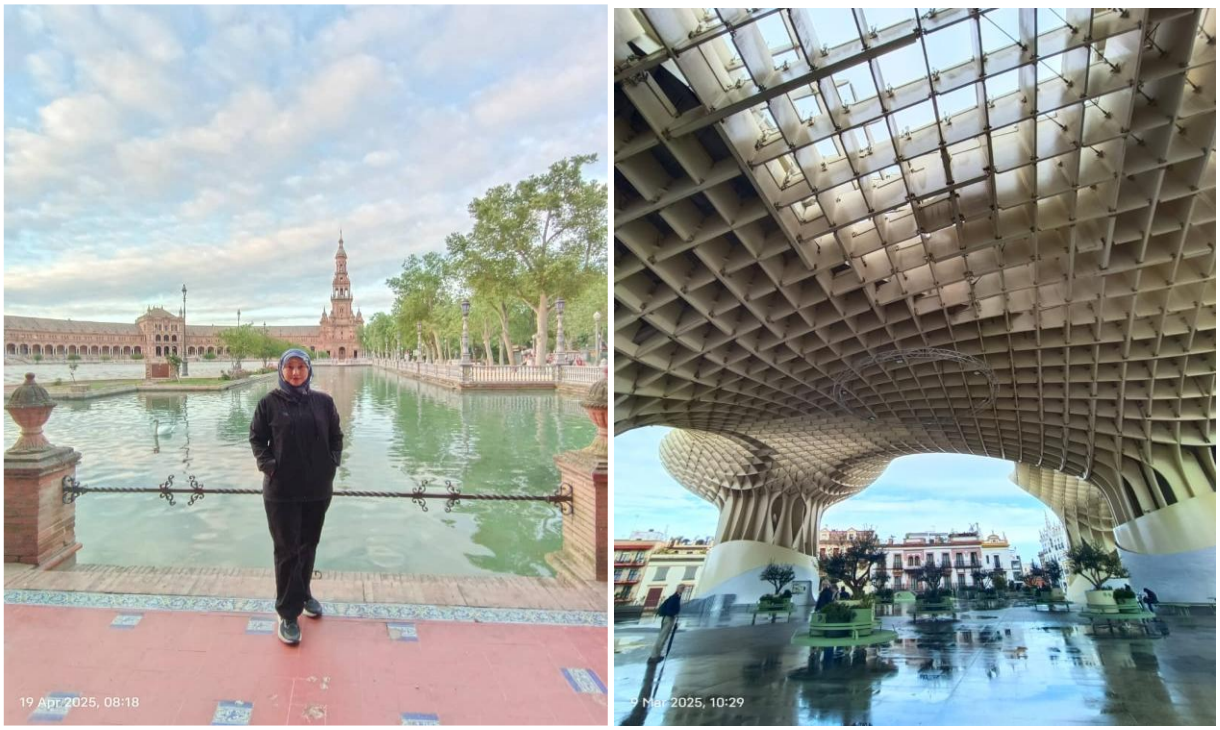
The IAEA Fellowship Training provided tangible outcomes that are directly relevant to strengthening national capabilities in environmental radioactivity monitoring and water resources management. The advanced radiochemical techniques, analytical methodologies, and quality assurance practices acquired during the fellowship can be adapted and applied to routine laboratory operations at the Malaysian Nuclear Agency, particularly in the analysis of low-level radionuclides in environmental and drinking water samples.

The exposure to established laboratory workflows, method optimisation strategies, and laboratory management practices supports ongoing efforts to enhance analytical reliability, method validation, and technical competence within national laboratories. Furthermore, the fellowship strengthened professional networks with international experts and research institutions, creating opportunities for future technical collaboration, knowledge exchange, and capacity-building initiatives under IAEA programmes. Overall, the outcomes of this fellowship contribute to Malaysia's long-term objectives in safeguarding environmental and public health through robust and sustainable radiological monitoring frameworks.

Cultural Exposure and Personal Reflection

In addition, exposure to the historical and cultural landscape of Seville and the surrounding regions offered a meaningful complement to the technical training. The architectural heritage and layered history of places that were previously unfamiliar left a lasting impression, fostering a deeper appreciation of the region's civilisation and environment and enriching the fellowship experience beyond the scientific and laboratory context.

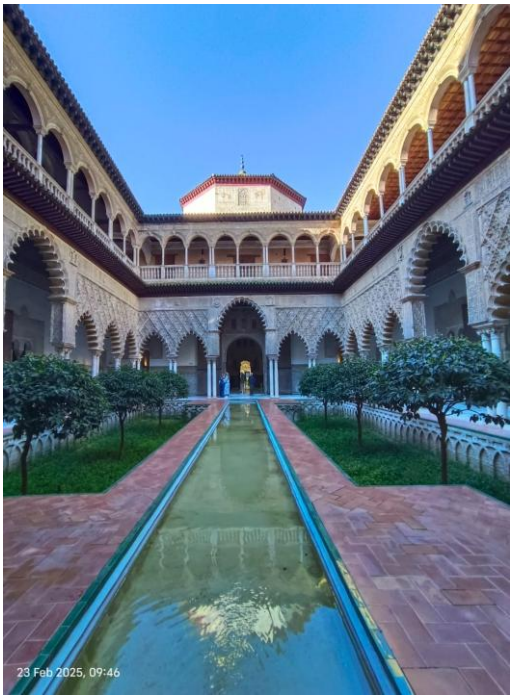
Members of the Muslim community gathering for Eid al-Fitr prayer at Alamillo Park, Seville, Spain.



Historic and contemporary landmarks in Seville, Spain, including Plaza de España and the Metropol Parasol.

Natural landscapes of Andalusia, Spain, including El Tajo Gorge in Ronda and the Zahara–El Gastor Reservoir.

Roman heritage sites in Andalusia, Spain, including Italica and the Roman Bridge of Cordoba.



Architectural landmarks of Andalusia, Spain, featuring the Mezquita-Catedral of Cordoba, the Courtyard of the Maidens at the Real Alcazar of Seville, and the Alhambra, reflecting the region's layered Islamic and historical architectural heritage.

22ND COORDINATION MEETING OF THE IAEA'S NETWORK OF ANALYTICAL LABORATORIES FOR THE MEASUREMENT OF ENVIRONMENTAL RADIOACTIVITY (ALMERA)

Dr. Noor Fadzilah Yusof

Malaysian Nuclear Agency

The 22nd Coordination Meeting of the Network of Analytical Laboratories for the Measurement of Environmental Radioactivity (ALMERA) was held from 20th to 23rd October 2025 in Munich, Germany. Hosted by the Federal Office for Radiation Protection (Bundesamt für Strahlenschutz, BfS), the event brought together representatives from member laboratories worldwide to discuss technical advancements, quality assurance, and future strategies for environmental monitoring. The meeting was organised by the International Atomic Energy Agency (IAEA) and conducted in a hybrid format, enabling participation by ALMERA member laboratories worldwide.

The coordination meeting served as a platform to review ALMERA activities, achievements, and future priorities, with particular emphasis on proficiency tests (PTs), interlaboratory comparisons (ILCs), reference materials, and capacity building. A key highlight of the plenary sessions was the review of the 2025 ALMERA rapid gamma-ray spectrum analysis exercise organised in conjunction with the ConvEx-3 emergency response exercise. This exercise is vital for ensuring that member laboratories can deliver rapid and accurate results during radiological emergencies.

Figure 1: Opening remarks by the Director of the IAEA Nuclear Application Laboratories, followed by a welcome address from the President of BfS (left) and group photo after opening ceremony (right).

Updates were also provided on IAEA proficiency test organisation, seawater PTs, and ongoing interlaboratory comparisons. These discussions highlighted common analytical challenges faced by laboratories, including low-level radionuclide measurements, matrix interferences, and the need for improved documentation and sample characterisation. The introduction of new ALMERA member laboratories further strengthened the global network and enhanced regional representation.

A significant component of the meeting was the regional group discussions, covering Africa, Asia Pacific, Europe, the Middle East, and North and Latin America. These sessions allowed members to identify region-specific priorities related to environmental radioactivity monitoring, training needs, method development, and emergency preparedness. Malaysia, as an active member of the Asia

Pacific region, participated in sessions led by the regional coordinator. The group focused on finalizing regional reports and addressing key analytical challenges identified in previous meetings, such as the analysis of Naturally Occurring Radioactive Materials (NORM) in industrial residues and the monitoring of marine samples.

The meeting also featured several technical presentations, including advancements in gamma spectrometry, drone-based radiation mapping, liquid scintillation counting, and innovative approaches to enhance laboratory performance. A technical visit to BfS laboratories provided participants with valuable insights into advanced technologies, quality management practices, and applied research in environmental radioactivity monitoring.

Figure 2: Group photo of the technical visit to Bundesamt für Strahlenschutz laboratories.

The coordination meeting concluded with a plenary session summarising regional priorities and the ALMERA work plan for 2025-2026, reinforcing the network's commitment to maintaining high analytical quality, harmonisation of methods, and readiness to support environmental monitoring and emergency response worldwide. Participation in the 22nd ALMERA Coordination Meeting strengthened international collaboration, enhanced technical knowledge, and supported Malaysia's continued involvement in global initiatives related to environmental radioactivity measurement and radiation protection.

Figure 3: Enjoying the autumn landscape at the Hofgarten (Court Garden) in Munich.

Figure 4: The Famous Marienplatz (Mary's Square) in the Heart of Munich City Centre (left) and The Historic Karlstor Gate, one of the remaining medieval city gates in Munich (right).