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CONTENTS

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EDITORIAL

After hard work by the editorial members, BNM 2025 Vol. 23 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 36th 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, 2025

EXPLORING SMALL MODULAR REACTORS FOR SUSTAINABLE PROSPERITY AT iNUSTEC2024

Puteri Nuraliah Husna Mohd Tajuddin

Nuklear Malaysia, Bangi

The Malaysian Nuclear Society (MNS) and the Institute of Nuclear Engineers (INE-MNS), in collaboration with China National Nuclear Corporation Overseas (CNNC), has organised a seminar event focusing on the future of nuclear energy in conjunction of International Nuclear Science, Technology and Engineering 2024 (iNuSTEC 2024).

The workshop that focuses on Small Modular Reactor (SMR) was held on October 17th, 2024, at the Danau Golf Club, Universiti Kebangsaan Malaysia (UKM), Selangor. This workshop has been attended by 38 people from various backgrounds to engage with cutting-edge developments in nuclear science and technology.

Participants of SMR Workshop.

A Deep Dive into SMRs

The workshop explored the transformative potential of SMRs under the theme **"Energy for Sustainable Prosperity."** The event features a series of insightful sessions, blending physical and online participation, and brings together experts, policymakers, and industry stakeholders.

The participants and experts were engaging with each other.

Program Highlights:

1. **Introduction to Small Modular Reactors (SMRs): Concept, Design, and Deployment**
   This session provided an overview of SMR technology, focusing on innovative design principles and deployment strategies.
2. **Regulatory and Licensing Framework for SMRs (China Case Study)**
   A comprehensive discussion on the regulatory challenges and licensing practices for SMRs, with a case study on China's experience.
3. **Safety and Risk Management in SMRs (China Case Study)**
   Safety remains paramount in nuclear technology. This segment explored into the robust risk management frameworks employed in SMR operations.
4. **Challenges and Opportunities in the Supply Chain for SMRs (China Case Study)**
   This session highlighted the logistical and economic dynamics of integrating SMRs into existing energy supply chains.

Presentation from CNNC.

EVT2304095: IAEA-FUKUI WORKSHOP ON THE INTEGRATED RISK INFORMED DECISION-MAKING FRAMEWORK AND CURRENT PRACTICES (IRIDM) FUKUI, JAPAN

Mazleha Maskin

Reactor Technology Division, Malaysian Nuclear Agency.

Introduction

The IAEA-Fukui Workshop on the Integrated Risk-Informed Decision-Making (IRIDM) Framework and Current Practices was held from 19th to 23rd February 2024 at the Wakasa Wan Energy Research Center (WERC) in Fukui, Japan.

The workshop was attended by 16 participants representing ten countries: Algeria, China, Egypt, Kenya, Indonesia, Jordan, Malaysia, Nigeria, Thailand, and Vietnam. The sessions were led by four experts:

- Mr. Shahen Poghosyan, Nuclear Safety Officer, IAEA (Vienna)
- Mr. Andrea Maioli, Westinghouse (USA)
- Mr. Fernando Ferrante, EPRI (USA)
- Mr. Olivier Nusbaumer, Leibstadt NPP-KKL (Switzerland)

The workshop featured a blend of lectures, knowledge-sharing sessions, exercises, and a site visit, providing participants with valuable insights and hands-on experience in the IRIDM framework and its applications.

Malaysia representative delivered a country presentation titled "*Malaysian Experiences in Developing Probabilistic Safety Assessment (PSA).*"

About IRIDM (pronounce as E-Ri-Dim)

Integrated Risk-Informed Decision-Making (IRIDM) is a systematic process designed to integrate key considerations influencing the safety of nuclear power plants. This process is also applicable to other types of nuclear installations. IRIDM enables decision-makers to make balanced and optimal decisions by adequately incorporating risk information derived from Probabilistic Safety Assessments (PSA) alongside a broad spectrum of other considerations, such as deterministic analyses, operating experience, human and organizational factors, and regulatory framework implications.

The development of PSA methodologies has led to more formalized approaches to the IRIDM process and the promotion of diverse PSA applications for nuclear power plants globally. Detailed guidance on these applications and the corresponding IRIDM process is provided in relevant IAEA publications, including:

- IAEA Safety Standards: SSG-3 and SSG-4 (development and application of PSA)
- IAEA TECDOC-1909: Considerations for performing IRIDM
- IAEA TECDOC-1983: Risk aggregation, risk communication, and decision-making

The event includes discussions on the experiences of various stakeholders—such as regulators, operators, and designers—regarding risk-informed applications. It also addresses recent developments, emerging trends, and challenges in this field.

Site Visit

On the third day of the workshop, participants visited the Fukui Prefectural Environmental Radiation Research and Monitoring Offsite Center in Tsuruga City, Fukui Prefecture, Japan. The center's primary purpose is to monitor environmental radiation and ensure that the public dose from a nuclear power plant remains below the public dose limit of 1 mSv/year.

Participants received a safety briefing and were introduced to the center's activities, functions, and emergency response protocols during the visit.

Participants experienced a unique practice by the center where they distributing near-expiry food items to schools or university students before restocking with a new batch of food supplies and essential amenities.

Outcomes

All participants successfully exchanged information on current national practices and experiences in PSA applications and the use of various inputs for IRIDM. Additionally, they gained new knowledge on practical approaches for applying risk insights to support various aspects of nuclear installations, including design, operation, licensing, and regulatory oversight. The discussions also addressed current challenges in utilizing PSA insights and IRIDM, with participants exploring potential solutions and identifying pathways for future improvements.

Closing ceremony and presentation of participant certificates.

GLOBAL FORUM TO PREVENT RADIOLOGICAL AND NUCLEAR TERRORISM (GLOBAL FTPRNT)

Zalina Laili

Waste And Environment Technology Division, Nuklear Malaysia, Bangi

The Global Forum to Prevent Radiological and Nuclear Terrorism (Global FTPRNT) was held in Bucharest, Romania, from 13 to 15 November 2024. It brought together over 200 participants from 63 countries and six international organisations, including Malaysia. Organised by Romania and the United States, the forum served as a platform to highlight the importance of international cooperation in addressing the growing threats of radiological and nuclear (R/N) terrorism.

The forum featured 15 plenary and breakout sessions, covering critical topics such as International Legal Frameworks, Prevention and Preparedness, Detection, Nuclear Forensics, Response and Mitigation, International Cooperation, New and Emerging Technologies, and Women and Youth Engagement in R/N Workforce Development. Participants engaged in detailed threat briefings, offering valuable perspectives on current and emerging R/N risks. A keynote address on "R/N Security During Armed Conflict," with a particular focus on Ukraine, set the tone for the discussions

Group Photo (left) and Dr. Ms. Zalina Laili as Malaysia representative (right) at the Global FTPRNT in Bucharest, Romania

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Throughout the forum, expert presentations, interactive panel sessions, and scenario-based discussions encouraged collaboration and knowledge-sharing. Issues raised included the commitment to enhancing international cooperation and adhering to international norms in addressing R/N terrorism. Notably, the forum recognised gaps in combating R/N terrorism, especially after the suspension of activities by the Global Initiative to Combat Nuclear Terrorism (GICNT) following Russia's invasion of Ukraine in 2022. This led to the creation of the Global FTPRNT to fill the gap and ensure

continuity.

The forum highlighted the risks associated with R/N materials falling into the wrong hands and stressed the need for international measures to prevent their malicious use. The security of emerging nuclear technologies, such as small modular reactors, was also emphasised.

Participants engaged in 15 plenary and breakout sessions on key topics like Nuclear Forensics, Legal Frameworks, and Emerging Technologies in R/N security

Participants discussed the importance of adhering to nuclear safety principles, including prevention, detection, and prosecution of R/N terrorism, as well as compliance with international frameworks like the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), the Convention on the Physical Protection of Nuclear Material (CPPNM), the Amendment to the Convention on the Physical Protection of Nuclear Material (A/CPPNM), and UN Security Council Resolutions 1373 and 1540. International cooperation was urged to prevent the illegal acquisition and use of R/N materials, safeguard R/N facilities, and respond effectively to related incidents. The need to strengthen global institutions and integrate collective capabilities was emphasized, with a focus on non-legally binding networks for information and expertise sharing. Additionally, there were appeals for global participation to address the threat of R/N terrorism and create a safer, more secure world through collective action.

The forum provided a space to foster vital dialogues on coordination, collaboration, and the investments needed to strengthen international capacities and capabilities in responding to R/N terrorism threats. A key outcome was the joint statement introduced by the United States and Romania, reaffirming their commitment to strengthening global R/N security through international cooperation, upholding international norms, and supporting the robust implementation of legal frameworks. Participating nations were invited to endorse this statement, symbolising unified dedication to addressing these global challenges.

Exploring Bucharest, Romania, during the Global FTPRNT.

Overall, the forum successfully raised global awareness of the threat of R/N terrorism and stressed the importance of international cooperation for prevention and response. Key discussions on international frameworks, nuclear forensics, and emergency response highlighted effective approaches for national implementation. The participation of various international agencies emphasized the need for multi-disciplinary collaboration in addressing R/N threats. The focus on emerging technologies, such as small modular reactors (SMRs) and Unmanned Aerial Systems (UAS), showcased the role of innovation in strengthening nuclear security. Additionally, the forum stressed the significance of nuclear forensics and the need for international cooperation, particularly with organizations like the International Atomic Energy Agency (IAEA), the International Technical Working Group (ITWG), and the United Nations Office of Counter-Terrorism (UNOCT), to enhance nuclear forensics capabilities and provide technical assistance.

A scenic view of Bucharest, where the city's architectural beauty is complemented by the rich colours of autumn

UKM NUCLEAR SCIENCE MOBILITY PROGRAM TO THAILAND

Mazleen Mokhtar & Mohd Idzat Idris

Nuclear Science Program, Universiti Kebangsaan Malaysia

The Nuclear Science Mobility Program to Thailand was held on 28 April - 2 May 2024, focusing on two main locations; Thailand Institute of Nuclear Technology (TINT) and Chulalongkorn University. This program was organized by the third-year students of the Nuclear Science Programme from Universiti Kebangsaan Malaysia (UKM) of the cohort 2021 / 2022. The aim of this program was to expose the students on the nuclear power technology and syllabus in Thailand. A total of 13 students accompanied by their lecturer, Dr. Idzat Mohd Idris have joined this program.

The first day of the program starts with a visit to one of the Thailand Institute of Nuclear Technology (TINT) branches which is located in Nakhon Nayok. Three different technical visits were conducted involving Calibration and Personal Dosimetry Laboratory, Nuclear Technology Service Center, Gemstone Irradiation Facility and Radioactive Waste Management Center. The students were given a brief explanation and were have the opportunity to take a closer look and to bring forth any questions towards the personnel. During their visit to the Radioactive Waste Management Center, the students were informed that they were the first group to have the opportunity to tour the Tool Kit Facility.

Upon arrival at TINT.

Briefing on the Gemstone Irradiation Process.

Visit to the Radioactive Waste Storage Building.

The second day mobility program continued by visiting Chulalongkorn University which was located around 30 minutes away from the accommodation and upon arrival, the participants were greeted warmly by one of the staff. Then, a brief introduction of the Department of Nuclear Engineering was given by the Head of department along with all of their lecturers. In return, Dr. Idzat and Mr. Aaaron Ewe Teik Soon gave a brief introduction on Nuclear Science Program and Kelab Sains Nuklear (KESAN) UKM respectively.

A brief introduction from both Chulalongkorn University and UKM representatives.

After that a few lab tours were conducted involving Measurement Lab, Crystal Growth Lab, Materials Lab, Alpha Spectroscopy Lab, NORM Lab, and Instrument Lab. One of

the highlights for the lab tour session was how the department grew their own NaI crystal as one of the components for their NaI (Tl) Sodium Iodide Scintillation Detectors and had their own facility. Throughout the whole lab tours, each session was handled by a lecturer respectively and the insightful day ended with a session of conclusion and closing. There was also a short session, meeting some of the Ph.D. students where they gave an explanation of their project which was related to the production of rare sugars using innovative plasma technology.

A snippet of the lab tours around the Nuclear Engineering Department of Chulalongkorn University.

A token of appreciation from of Chulalongkorn University.

The participants with the lecturers and students Nuclear Engineering Department.

For the next remaining days in Thailand, the participants went on a trip around Bangkok to enjoy what Bangkok has to offer. One of the visited tourist attractions was Wat Arun where the participants had the opportunity to wear the traditional Thai dress called Chut Thai and went on more sightseeing tours including the Science Centre for Education.


A day of touring around Wat Arun and several other places.

This mobility program was one of the most informative and memorable program that the students have ever joined whilst under the Nuclear Science Program especially on the exposure regarding the nuclear sector and how it is done or handled in a different country. Other than that, all members of the secretariat have successfully gained experience in organizing international mobility program. In conclusion, UKM Nuclear Science students are now able to convey the new knowledge to the community or fellow STEM students in a more effective way.

Program "National Training Course: Environmental Radioactivity Monitoring (NTC ERM)"

Muhammad Azfar Azman

Kumpulan Aplikasi Kimia Analisis , Bahagian Teknologi Sisa & Alam Sekitar, Agensi Nuklear Malaysia, Bangi

Keradioaktifan alam sekitar merupakan isu yang semakin relevan dengan pencemaran alam sekitar serta kesedaran terhadap kesihatan dan keselamatan masyarakat. Program yang dapat memberikan pengetahuan yang lebih mendalam dan kemahiran yang lebih berkesan dalam pemantauan keradioaktifan alam sekitar perlu diadakan bagi menangani isu ini. Sehubungan dengan itu, pada 5 hingga 9 Februari 2024, Agensi Nuklear Malaysia dengan kerjasama Agensi Tenaga Atom Jepun (JAEA) telah mengadakan program "National Training Course: Environmental Radioactivity Monitoring" (NTC ERM).

Program yang berlangsung di Agensi Nuklear Malaysia ini telah disertai oleh sepuluh orang peserta daripada pelbagai universiti tempatan serta agensi kerajaan negeri Kedah. Dua pakar utama dari JAEA iaitu Yoshihiro Togashi, dan Hiroki Fujita turut menghadiri program ini. Aktiviti program merangkumi teori, teknik, serta praktikal menggunakan teknologi nuklear.

Ucapan Perasmian oleh YM Raja Jamal Abdul Nasser Raja Hedar, Pengarah Bahagian Pengurusan Sumber Manusia, Agensi Nuklear Malaysia

Ucapan Aluan oleh Yoshihiro Togashi, koordinator JAEA

Topik ceramah yang dibincangkan termasuklah Asas Sinaran dan Perlindungan, Kesan Biologi Sinaran, serta Pemantauan Keradioaktifan Alam Sekitar. Selain itu, para peserta juga mempelajari asas penggunaan Spektrometer Alfa, Spektrometer Gama, Pembilang Sintilasi Cecair (LSC), serta teknik Analisis Pengaktifan Neutron (NAA) dalam mengenal pasti kandungan unsur dalam alam sekitar. Latihan praktikal pula melibatkan teknik persampelan air, flora, dan tanah diikuti analisis lanjutan ke atas sampel di makmal.


Peserta menjalankan persampelan flora dan tanah di kawasan pantai di Port Dickson, Negeri Sembilan


Penerangan kepada peserta berkaitan alat Spektrometer Alfa dan Teknik Analisis Pengaktifan Neutron (NAA).

Pada hari terakhir kursus, peserta diberi peluang untuk melawat Reaktor TRIGA PUSPATI MKII, Makmal Tritium, dan Makmal Dosimetri di Agensi Nuklear Malaysia. Dalam lawatan ini, para peserta berkesempatan melihat satu-satunya reaktor nuklear di Malaysia yang digunakan untuk penyelidikan. Selain itu, mereka turut diberi penerangan mengenai bagaimana Agensi Nuklear Malaysia mengendalikan analisis Tritium dan pengurusan dosimetri untuk mengukur serta mengawal pendedahan sinaran kepada pekerja di industri yang terdedah kepada sinaran.


Lawatan ke Makmal Tritium


Lawatan ke Makmal Dosimetri

Lawatan ke Reaktor TRIGA PUSPATI

Kemuncak program adalah ceramah yang telah disampaikan oleh Hiroki Fujita bertajuk "Outline of ALPS Treated Water Discharge and Related Environmental Monitoring". Ceramah ini memberikan penjelasan tentang pengurusan air terawat daripada loji tenaga nuklear Fukushima Daiichi menggunakan "Advanced Liquid Processing System" (ALPS) yang digunakan di Jepun. ALPS adalah teknologi canggih yang digunakan untuk mengurangkan kadar keradioaktifan dalam air yang dilepaskan ke alam sekitar. Isu pengurusan air buangan daripada loji tenaga nuklear ini semakin mendapat perhatian dunia, dan ceramah ini memberikan peserta pemahaman tentang bagaimana pemantauan dan kawalan dilakukan untuk memastikan tiada kesan buruk terhadap alam sekitar dan kesihatan manusia.

Penceramah JAEA, Hiroki Fujita menyampaikan ceramah menarik berkaitan "Outline of ALPS Treated Water Discharge and Related Environmental Monitoring"

Majlis penutup dan penyampaian sijil telah disempurnakan oleh Dr. Rahman Yaccup, Pengarah Bahagian Teknologi Sisa dan Alam Sekitar, Agensi Nuklear Malaysia. Dr. Rahman Yaccup mengucapkan tahniah kepada para peserta di atas kejayaan menamatkan kursus dan mengalu-alukan kolaborasi antara universiti, agensi kerajaan, dan Agensi Nuklear Malaysia dalam penyelidikan alam sekitar. Yoshihiro Togashi dari JAEA memberi ucapan penutup, mengucapkan terima kasih dan tahniah

kepada urusetia atas kejayaan menganjurkan program National Training Course 2024.

Majlis penutupan dan penyampaian sijil peserta

Secara keseluruhan, program NTC ERM telah berjaya memberikan peluang berharga kepada para peserta untuk meningkatkan pengetahuan dan kemahiran mereka dalam bidang pemantauan keradioaktifan alam sekitar dan seterusnya mengaplikasikan pengetahuan tersebut dalam situasi dunia nyata. Program ini juga memperkukuhkan hubungan antara institusi penyelidikan di Malaysia dan Jepun, yang diharapkan dapat memperluas kerjasama dalam bidang penyelidikan nuklear dan keselamatan sinaran pada masa hadapan.

Gambar urusetia dan penceramah program.

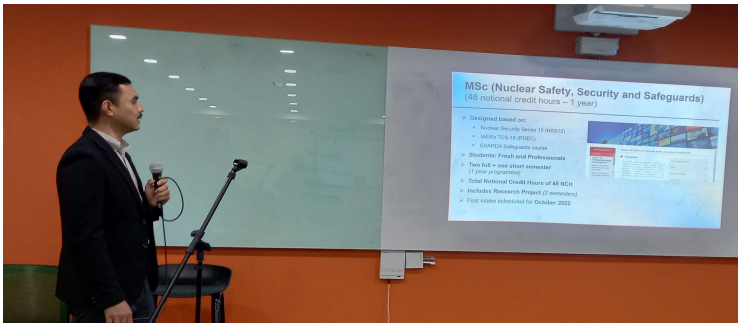
WORLD NUCLEAR ENERGY DAY 2024

Malaysian Nuclear Society (MNS)

World Nuclear Energy Day was celebrated on 2 December to commemorate the first anniversary of Fermi's self-sustaining chain reaction and the start-up of the first nuclear reactor named the Chicago Pile-1 on December 2, 1942, as well as the first commercial-sized power reactor in Shippingport, Pennsylvania December 2, 1957 15 year later. 82 years on, the reliable nuclear power generation contributed to a country's energy security in reducing dependence on fossil fuels. Operating nuclear plants requires a highly trained workforce with expertise in engineering, physics, and safety protocols, which can benefit other industries. The spillover from the nuclear power industry into technological advancements and skilled workforce development that can benefit other industries. Technological advancements such research and development in nuclear power have led to innovations in other fields like medicine, materials science, and radiation detection.

In conjunction of World Nuclear Energy Day 2024, Malaysian Nuclear Society (MNS) and Institute of Nuclear Energy, Universiti Tenaga Nasional (UNITEN) have taken the initiative to organised a public talk to commemorate this event on 2 December 2024 at UNITEN Putrajaya Campus. Invited to give the talks are 4 speakers, namely on "Sustainability of Nuclear Education and Training" by Dr Mohd Idzat Idris of UKM, "Basic Conceptual Design of Radioactive Waste Disposal" by Ts Razali Harun REM Consult, "Nuclear Energy for the Future - HTGR" by Mr Boran of China National Nuclear Corporation Overseas (CNNC) and "India's 3 Stage Nuclear Energy Program" by SM Mahajan of India.

Presenter giving talks at World Nuclear Energy Day 2025 in UNITEN (below).



Assoc Prof Dr Mohd Idzat of UKM

Ts Razali Harum of REM Consult

Among the participants of the public talk of World Nuclear Energy Day 2024 at UNITEN.

The public talk of World Nuclear Energy Day on 2 Dec 2024 at Admin Building UNITEN.