



ANNUAL REPORT

2024

MALAYSIAN NUCLEAR AGENCY

MALAYSIAN NUCLEAR AGENCY

2024

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AGENCY PROFILE

1.0

1.0 AGENCY PROFILE

VISION

Leading research, development, commercialization and innovation (R&D&C&I) in nuclear science and technology for sustainable national development.

MISSION

Creating wealth, generating new knowledge and driving economic growth and social well-being through nuclear science and technology towards shared prosperity.

OBJECTIVES

- Generate new products and technologies through research and innovation based on the national development agenda;
- Enhance organizational excellence through quality planning and management;
- Empower Nuklear Malaysia as the National Technical Support Organization in the field of nuclear and related technologies; and
- Strengthen relationships and collaboration with international organizations.

FUNCTION

- To carry out R&D&C&I in the field of nuclear science and technology;
- To provide technical support and training services in the field of nuclear and related technologies;
- To coordinate and manage national and international nuclear affairs, as a liaison agency of the International Atomic Energy Agency (IAEA) and the National Authority for the implementation of the Comprehensive Nuclear-Test-Ban Treaty (CTBT); and
- To be the National Centre for Radiation Metrology and Radioactive Waste Management.

SOURCE OF AUTHORITY

The source of Nuklear Malaysia's authority is stated in the Supply Bill (RUU) B.30 of the Ministry of Science, Technology and Innovation.

OVERALL VALUE

Novelty
Ubiquitous
Commited
Leadership
Empathy
Attitude
Respect

ORGANIZATIONAL CHART



TOP MANAGEMENT



DIRECTOR GENERAL

DR. ROSLI DARMAWAN



DEPUTY DIRECTOR GENERAL

Research & Technology
Development Programme

DR. MUHAMMAD RAWI
MOHAMED ZIN



DEPUTY DIRECTOR GENERAL

Technology Services
Programme

DR. ISHAK MANSOR

DIVISION DIRECTORS



**TS. DR. MOHD RODZI
ALI**

DIRECTOR
Medical Technology
Division (BTP)



DR. HASNI HASAN

DIRECTOR
Radiation Processing
Technology Division
(BTS)



DR. RAHMAN YACCUP

DIRECTOR
Waste Technology &
Environment Division
(BAS)



HABIBAH ADNAN

DIRECTOR
Information
Technology Division
(BPM)



**DR. NOR PA'IZA
MOHAMAD HASAN**

DIRECTOR
Industrial Technology
Division
(BTI)



DR. ZAITON AHMAD

DIRECTOR
Agrotechnology and
Bioscience Division
(BAB)



**IR. TS. HAJI ROSLI
AWANG**

DIRECTOR
Engineering Division
(BKJ)

**TS. DR. HUSAINI SALLEH**

DIRECTOR

Radiation Health &
Safety Division(BKS)**DR. FAIRUZ SUZANA
MOHD CHACHULI**

DIRECTOR

Planning & International
Relations Division (BPA)**AZRUL WAHAB**

DIRECTOR

Management Services
Division (BKP)**DR. SHUKRI MOHD**

DIRECTOR

Bahagian Sokongan
Teknikal (BST)**DR. RASIF MOHD ZAIN**DIRECTOR
Technology
Commercialization
Division (BKT)**YM. RAJA JAMAL ABDUL
NASSER RAJA HEDAR**

DIRECTOR

Human Resources
Development Division.
(BSM)





2.0

EXECUTIVE NOTES

2.0 EXECUTIVE NOTES



Based on the principles of People Centric, R & D, Enculturate, Capacity Building, Investment and Start-ups Ecosystem (PRECISE), the economic core under the Malaysia MADANI framework, the Malaysian Nuclear Agency (Nuklear Malaysia) continues to take steps to develop nuclear technology for national development. Nuklear Malaysia plays a critical and diverse role in realizing the PRECISE principles such as promoting innovation in the safe use of nuclear technology, engaging with society, developing human capital, attracting investment and realizing the benefits of technology through commercialization. This is in line with the spirit of MADANI, which drives the country's transformation towards a developed, inclusive and competitive nation.

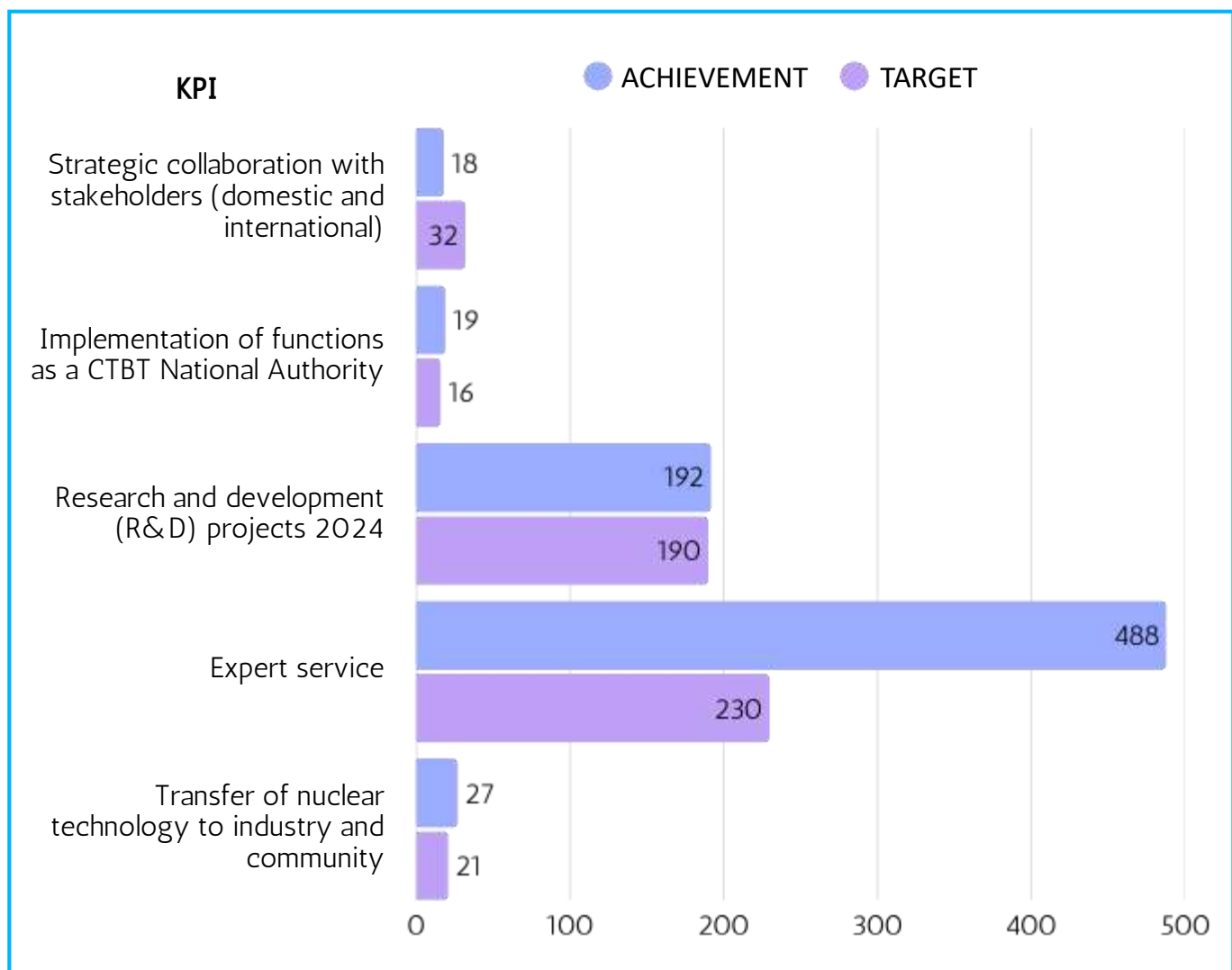
The agency is constantly striving to explore projects that can be translated to society by involving various stakeholders from industry, academia and the public. This is also in line with MOSTI's desire for all levels of society to experience the importance of science, technology and innovation (STI) in their daily lives. In carrying out the stated role, Nuklear Malaysia's activities are outlined based on the Nuklear Malaysia Vision 2030, which aims to strengthen the capabilities and capabilities of Nuklear Malaysia

as a pioneer in nuclear science and technology in Malaysia. In addition, the core activities of this agency are also driven by the National Nuclear Technology Policy (NTP). NTP creates a conducive national nuclear technology ecosystem which will in turn propel the country's socio-economic sector towards a developed and high-tech nation and improve the well-being of the people. The successful implementation of NTP will strengthen the local nuclear ecosystem and industry which will directly help the country achieve its aspirations as a developed and high-tech nation by 2030.

Nuklear Malaysia's Commitment in the MOSTI Outcome-Based Budgeting (OBB) Performance Framework 2024

Nuklear Malaysia's commitment to carrying out research activities and applications of nuclear technology that contribute to the country's sustainable development is demonstrated through its excellent performance every year. The achievement of Outcome Based Budget (OBB) targets at the ministry level is measured by Nuklear Malaysia based on the set outcomes and outputs.

Achievements Based on Outcome: Research and Application of Nuclear Technology that Contributes to Sustainable Development

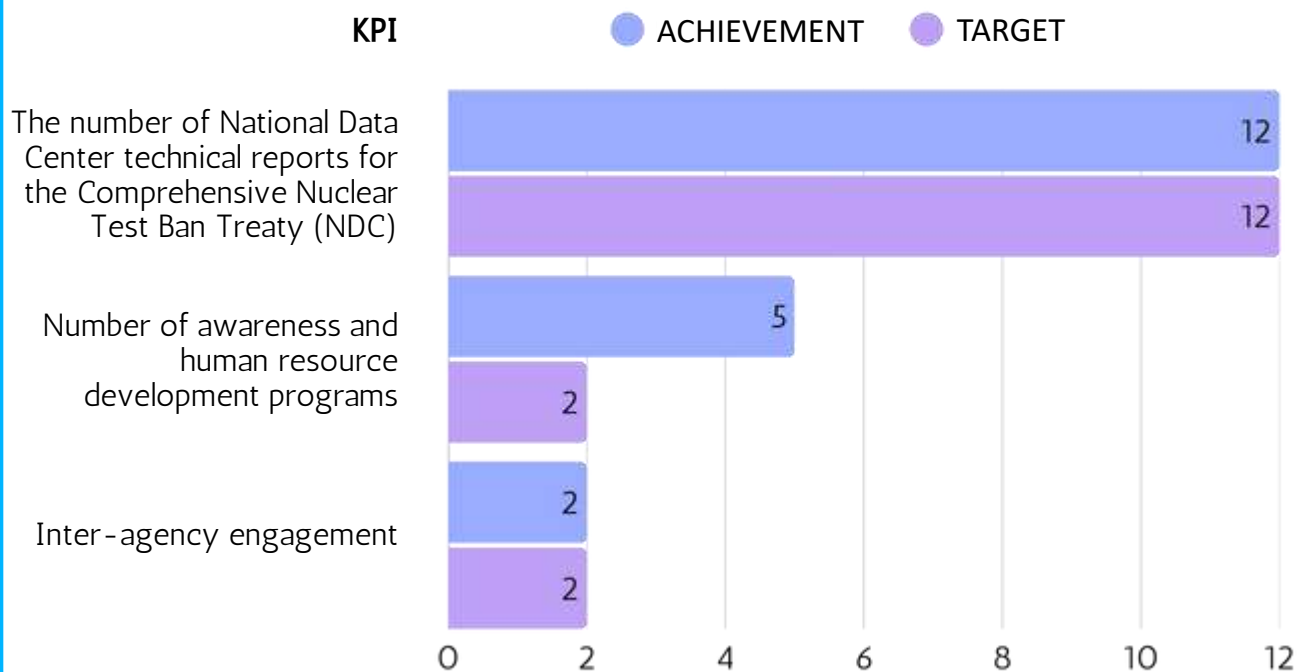


Achievement Based on Output

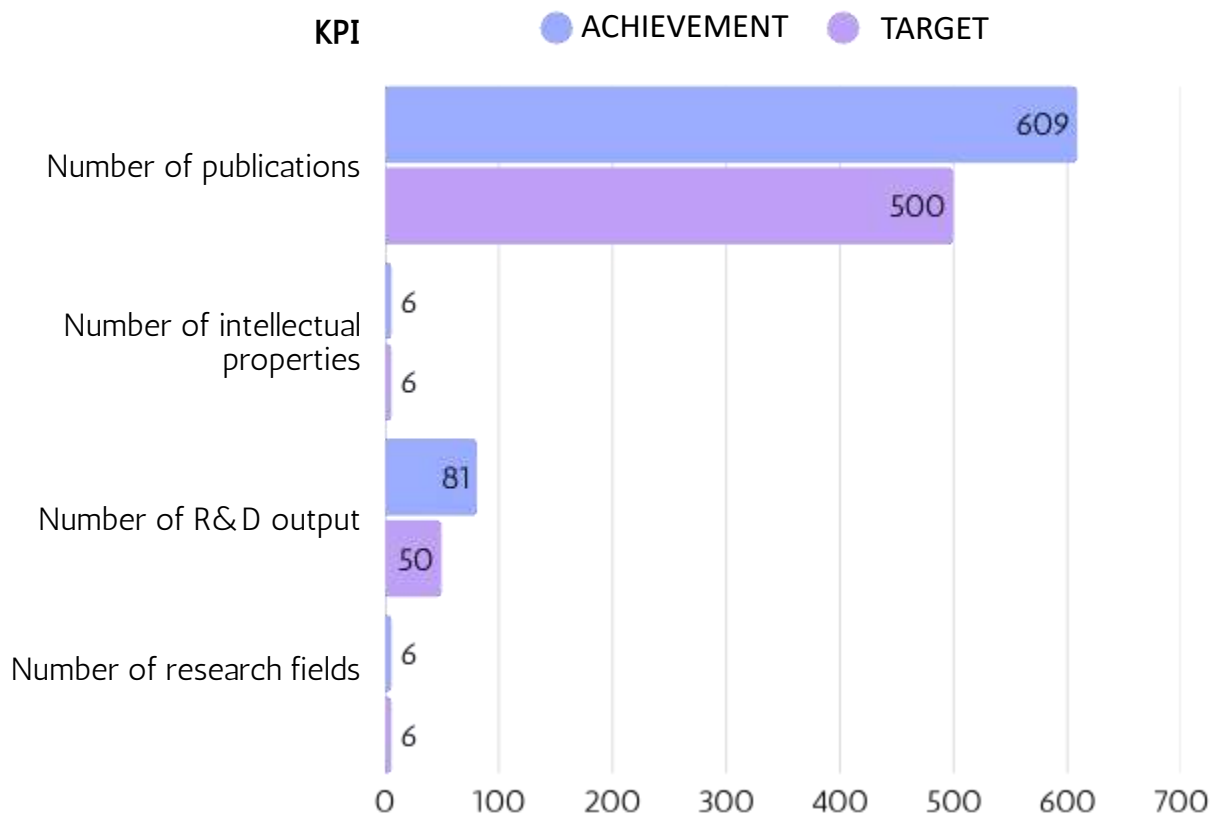
Output 1 : Strategic Collaboration with Stakeholders (Domestic & International)

KPI	ACHIEVEMENT	TARGET
Number of R&D collaboration projects with stakeholders		

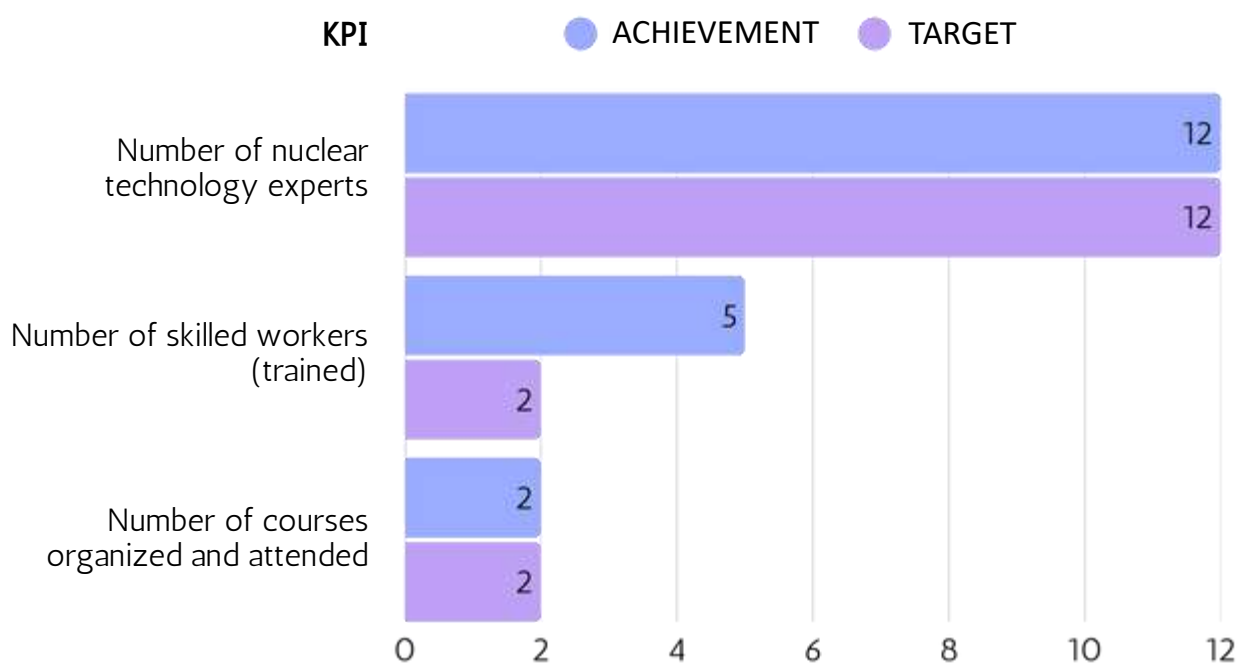
Output 2 : CTBT National Authority



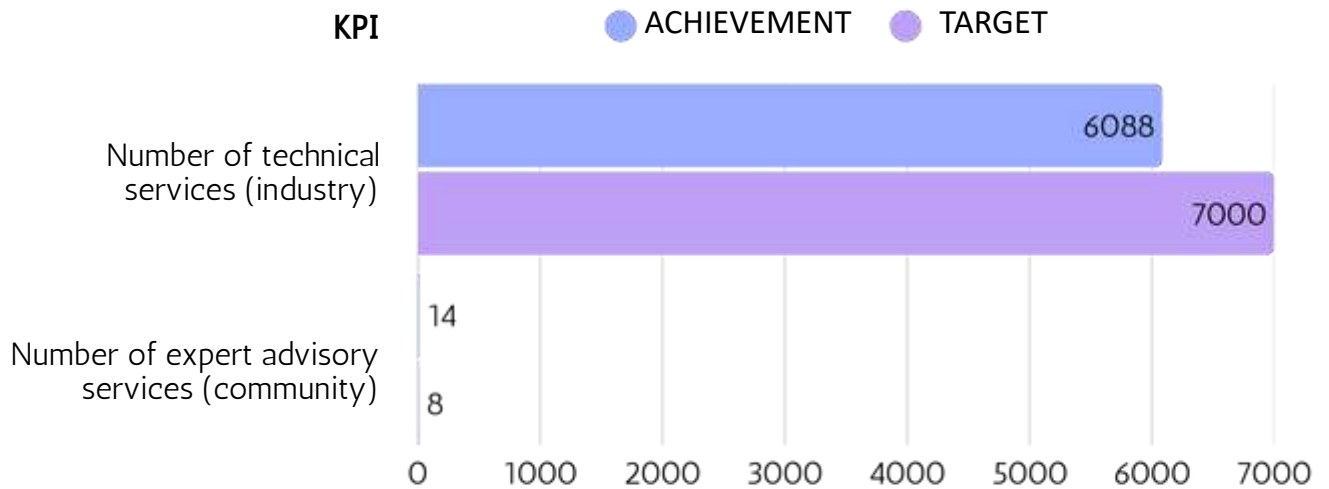
Output 3 : Research and Development Results in the Field of Nuclear Technology



Output 4 : Expertise in the Field of Nuclear Technology



Output 5 : Commercialized Nuclear Technology



Advancing Technology, Generating the Future

This year, Nuklear Malaysia has produced 21 products, 27 processes, 33 procedures, 32 databases, and four software through various R&D activities, which are one of the main core activities of this institution. Overall, the total research funds received in 2024 recorded an increase of 21% compared to 2023, which amounted to RM19,151,710.00. RM17,914,250.31.

The R&D activities were funded through research funds, totalling RM22,655,363.81. Apart from that, six intellectual properties for the research results have been Development (R&D) funds made up the successfully obtained, namely: highest amount, which was

6

INTELLECTUAL PROPERTY

1. Hybrid Ultraviolet-Peroxide Pre vulcanisation of Natural Rubber Latex
2. System for Real-Time Monitoring and Detecting Pipeline Leakage and Methods Thereof
3. Deltozide
4. Method to Produce High Purity of TiO₂ and Fe₂O₃ from Ilmenite
5. Cultural Heritage Research and Conservation Unit (Heritage): Blending Nuclear Science and Technology in Cultural Characterization and Preservation
6. MyFlexiTomoScanner. Flexible Tomography Scanner

Nuklear Malaysia always ensures that research conducted in the laboratory is in line with market needs and demands. To this end, the Research-Industry Scientific Exchange (RISE) platform which enables

researchers placed in industry, are fully utilized. In 2024, a total of five active RISE projects are being implemented by Nuklear Malaysia researchers. The five projects are:

1. Novel Methods and Applications of Electrolysed Oxidising Water Anolyte as Disinfecting Agent Effective Against Phytopathogens in Chilli (*Capsicum Annum* L.)
2. Development of Inspection Procedure for Detection of in-Service Flange Face Corrosion (FFC) using Advanced Ultrasonic Testing
3. Development of Protocol for Large Scale Commercial Micropropagation of Banana Var. Tanduk (Pisang Tanduk)
4. Pembangunan Produk Makanan Berasaskan Cendawan Menggunakan Aplikasi Nuklear
5. Characterization of Effective Microorganisms in Water Quality for Fish

In 2024, five of Nuklear Malaysia's entries won awards in various innovation competitions at home and abroad. In total, in a period of three years (2022-2024), Nuklear Malaysia has successfully obtained 24 innovation awards in various national and international competitions.

In the field of research, publications are one of the main outputs. Scientific publications, especially books, journals, presentations of papers at local and international conferences, as well as technical reports, are important assets in the development of national science and technology. This year, Nuklear Malaysia has successfully produced 609 publications, with 8 of them published in high-impact international journals.

R&D activities carried out in 2024 have produced various output that has the potential to be commercialized. In addition, Nuklear Malaysia has also successfully commercialized various services based on nuclear technology.

Through technology commercialization activities this year, Nuklear Malaysia has generated income of RM11,183,578.68. Nuklear Malaysia is always proactive in carrying out technology transfer to the industry and stakeholders to ensure that the output produced can be applied practically. This activity is implemented through five cooperation agreements (NDAs), three Memorandums of Agreement (MOA), three Memorandums of Understanding (MOU), and one Supplementary Agreement.

Nuklear Malaysia's expertise is also utilized by the industry through various expert services provided by research officers. A total of 1,015 expert services in nuclear technology were provided, involving 169 research officers who acted as consultants, radiation consultants, panels/assessors, external auditors/inspectors, and provided other expert services.

The development of nuclear science and technology cannot be separated from international cooperation, whether at the regional or global level. This cooperation is implemented bilaterally and includes technical cooperation in R&D, research grants, and human capital development for enhancing expertise in this field. The cooperation is carried out through

platforms under the International Atomic Energy Agency (IAEA), the Forum for Nuclear Cooperation in Asia (FNCA), the Regional Cooperation Agreement (RCA), and others.

In 2024, technical cooperation between the IAEA and Malaysia involves five national projects, 17 projects under the Regional Cooperation Agreement (RCA), 20 non-agreement regional projects, eight regional projects, and 16 Coordinated Research Network (CRP) projects.

Meanwhile, under the framework of the Forum for Nuclear Cooperation in Asia (FNCA), a total of eight active projects are being implemented, namely:

1. Mutation Breeding Project
2. Radiation Processing and Polymer Modification for Agricultural, Environmental and Medical Applications Project
3. Combating Food Fraud using Nuclear Technology
4. Radiation Oncology Project
5. Climate Change (Evaluating the Carbon Emission from Forest Soils) Project
6. Research Reactor Utilization Project
7. Radiation Safety and Radioactive Waste Management Project
8. Nuclear Security and Safeguards Project

Nuclear Malaysia has successfully maintained 10 International Standard (ISO) certifications and accreditations across nine of its major facilities. This reflects Nuclear Malaysia's continued commitment to providing high quality services to all its customers and stakeholders.

In addition, Nuklear Malaysia is committed to ensuring that the agency's financial performance is at an optimal level. Coordination of financial activities is carried out regularly to ensure efficient financial management and accounting. This year, the Agency's Financial Performance reached 99.96 percent.

Nuklear Malaysia also plays an important role in developing competent and competitive human capital in the field of nuclear science and technology. This responsibility is outlined in Strategic Thrust 5: Conducive Environment for Cultivating Talent and Research & Development (R&D) Capacity in Nuclear Science and Technology. The implementation of this responsibility is carried out through the Development of a Human Capital Development Roadmap and the Development of Nuclear Science and Technology Expertise through formal education.

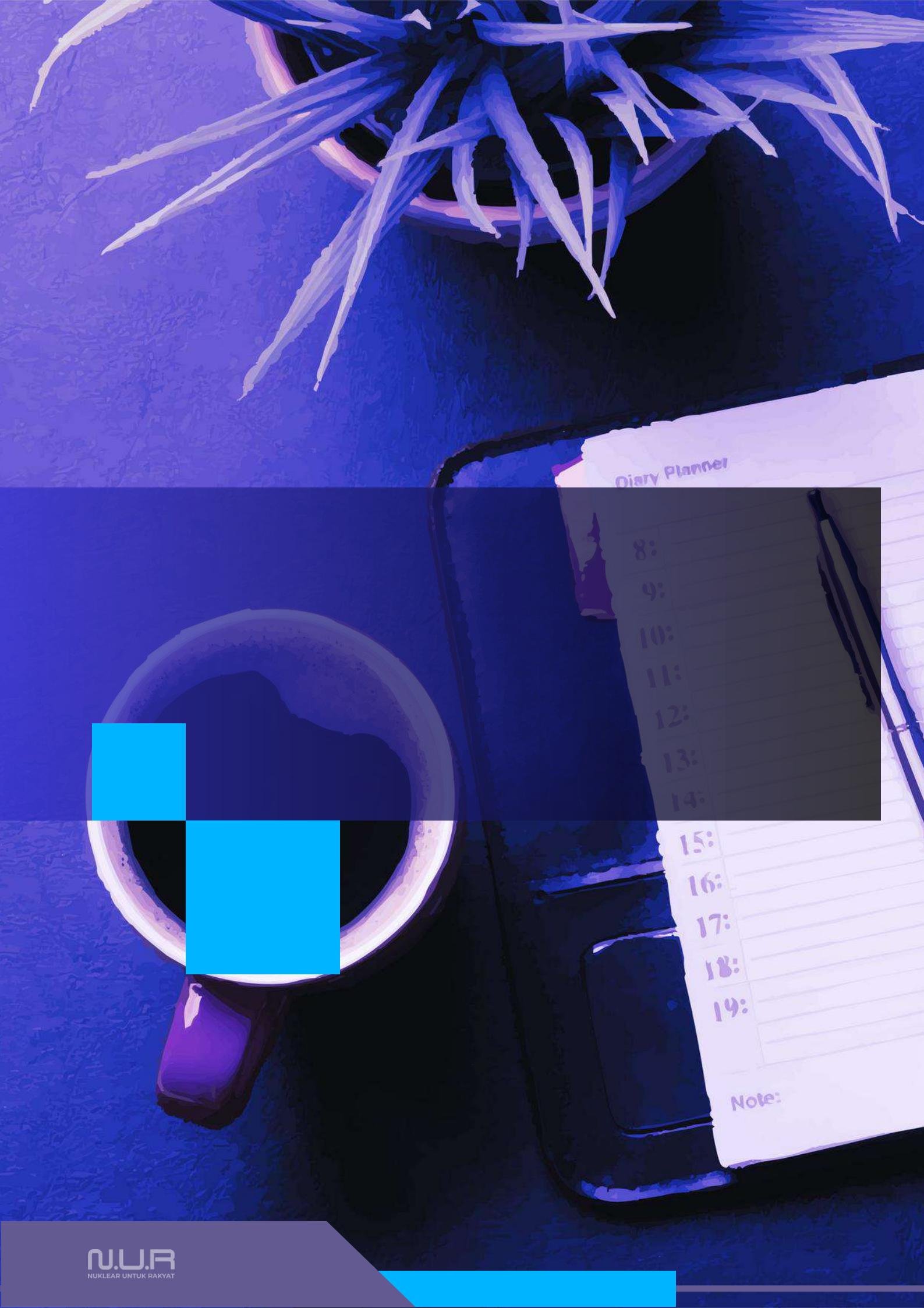
As part of its ongoing commitment, NuKlear Malaysia has also intensified its efforts to disseminate knowledge about nuclear technology to all levels of society in Malaysia. Promotional Programme

and dissemination of this information aims to provide deeper exposure to nuclear science and technology, thereby building public trust and acceptance of this technology. Several outreach activities have been successfully implemented both face-to-face and virtually, including the Communication Programme with the Local Community through the *Santuni Madani* Programme, National Science Week (MSN), various talk and exhibition programmes, the Nuclear Education Kit loan programme, the distribution of printed information, participation in various exhibitions, as well as visits by the public and strategic partners to Nuklear Malaysia's laboratories, plants and facilities. In addition, Nuklear Malaysia has also received publicity through various media platforms.



Nuklear Malaysia has successfully maintained 10 International Standard (ISO) certifications and accreditations across nine of its major facilities. This reflects Nuklear Malaysia's continued commitment to providing high quality services to all its customers and stakeholders.





3.0

CORPORATE DIARY

3.0 CORPORATE DIARY



16 JANUARY 2024

Memorandum of Understanding Exchange Ceremony between the Malaysian Nuclear Agency (Nuklear Malaysia) and Alam Flora Environment Solutions Sdn Bhd (AFES), Nuclear Malaysia.



17 JANUARY 2024

Working visit of YB Deputy Minister of the Ministry of Science, Technology and Innovation (MOSTI), Dato' Hj Mohammad Yusof bin Afdal to Nuklear Malaysia.



22 JANUARY 2024

Courtesy visit of the Comptroller of the Royal Household of the Johor Sultanate, YB. Dato' Haji Mustaffa Kamal bin Haji Shamsudin to Nuklear Malaysia.



31 JANUARY 2024

Signing Ceremony of the Cooperation Agreement (MoA) Document between Nuklear Malaysia and Minda Wangsa Agro Company, Nuklear Malaysia.





5-6 FEBRUARY 2024

Main Work Target Achievement Analysis Workshop (SKU)/My-Performance 2023 & 2024, Nuklear Malaysia.



5-9 FEBRUARI 2024

11th National Training Course 2024 (NTC 2024) on Environmental Radioactivity Monitoring (ERM), Nuklear Malaysia.



7 FEBRUARY 2024

Courtesy visit of Complex Luch Ltd (Russia) to Nuklear Malaysia.



8 FEBRUARY 2024

Courtesy visit from the Johor State Biotechnology & Biodiversity Corporation (J-Biotech) to Nuklear Malaysia.



15 FEBRUARY 2024

Working Visit of the Secretary-General, Ministry of Science and Technology (MOSTI), YBhg Dato' Ts. Dr. Hj. Aminuddin Hassim to the Nuclear Rice Project Site (NMRI52), Sekinchan, Selangor Darul Ehsan.



16 FEBRUARY 2024

Courtesy visit of YB Tn. Hj. Dzowahir Hj. Ab. Ghani, Member of the Kedah State Government Council, to Nuklear Malaysia.



19 FEBRUARY 2024

11th National Training Course 2024 on Nuclear and Radiological Emergency Preparedness (NREP), Nuklear Malaysia.



19-23 FEBRUARY 2024

Malaysia Cyber Security Incident Response: Tool and Technique (INSPIRE) Workshop (International Nuclear Security (INS), USDOE), Hotel Bangi Resort, Bangi, Selangor Darul Ehsan.





19-23 FEBRUARY 2024

Expert Mission on Decommissioning Plan and Ageing Management for Reactor Triga Puspatti (RTP), Nuklear Malaysia.



23 FEBRUARY 2024

Management Level Technical Exchange Meeting on a Variety of Cyber Security (International Nuclear Security (INS), USDOE), Hotel Bangi Resort, Bangi, Selangor Darul Ehsan.



25 FEBRUARY 2025

Working visit of the Minister of the Ministry of Science, Technology and Innovation (MOSTI), Mr. Chang Lih Kang to the Malaysian Nuclear Rice Distributor Project Site (NMRI52), Sekinchan, Selangor Darul Ehsan.



27 FEBRUARY 2024

Program Technology Preview and Showcase (TPS Johor), Bayview Waterfront Hotel, Johor Bahru, Johor Darul Takzim.





1 MARCH 202

Public Talk Nuclear Transmutation Technology oleh Dr. Harada Hideo (JAEA), Nuklear Malaysia.



4 MARCH 2024

Field visit of the Secretary-General, Ministry of Science, Technology and Innovation (MOSTI), YB Dato' Ts. Dr. Hj. Aminuddin bin Hassim to the Malaysian Nuclear Agency Project.



5 MARCH 2024

Visit of the Malaysian Cooperative Institute (IKMA) to Nuklear Malaysia.



5 MARCH 2024

Professional Development Seminar Transitioning from Research Methodology and Securing RnD Funding to Commercialization oleh Prof. Ts. Dr. Uda Hashim, Universiti Malaysia Pahang (UMP), Nuklear Malaysia.





6 MARCH 2024

Ministry of Science, Technology and Innovation (MOSTI)
Appreciation Ceremony, Sri Siantan Hall, Federal Territory of Putrajaya.



13 MARCH 2024

Dialogue Session between the Atom Malaysia's and Nuklear Malaysia's Management, Nuklear Malaysia.



14 MARCH 2024

Ministry of Science, Technology and Innovation (MOSTI) Townhall Session with Nuklear Malaysia's Contract Staff, Nuklear Malaysia.



14 MARCH 2024

Visit by Dr. Geoffrey Shaw, Director General of Australian Safeguards and Non-Proliferation Office (ASNO), Nuklear Malaysia.





27 MARCH 2024

Opening Ceremony of the PUSPANITA Annual General Meeting of the Ministry of Science, Technology and Innovation (MOSTI), Malaysian Nuclear Agency.



4 APRIL 2024

Strategic Core Working Committee Meeting (JKTS 2) National Nuclear Technology Policy (DTNN) 2030, Nuklear Malaysia.



15-26 APRIL 2024

Regional Training Course (RTC) on Climate Smart Agriculture to Improve Soil Fertility, Combat Salinity, Enhance Nutrients and Water, The Everly Hotel, Putrajaya.



22-24 APRIL 2024

Environmental Data Analysis Techniques Course Using Python Software Series I, Atom Malaysia.





22-26 APRIL 2024

National Workshop on Conducting Nuclear Security Culture Self-Assessments-Session II, The Everly Hotel, Putrajaya.



6 MAY 2024

Orientation & General Briefing Council 16th Postgraduation Educational Course (PGEC-18), Malaysian Nuclear Agency.



9 MAY 2024

Courtesy Visit and Discussion with Sultan Azlan Shah University (USAS), Malaysian Nuclear Agency.



12-14 MAY 2024

Validation Workshop on Nuclear Technology Roadmapping & Foresight with Stakeholders, Malaysian Nuclear Agency





14 MAY 2024

Validation Workshop on Nuclear Technology Roadmapping & Foresight with Stakeholders, Malaysian Nuclear Agency.



20-21 MAY 2024

Workshop on Strengthening Magazine Article Writing Techniques, Malaysian Nuclear Agency.



24 MAY 2024

Courtesy visit by the Ministry of National Education to the Director of the National Science Centre to strengthen cooperation, the National Science Centre, Federal Territory of Kuala Lumpur.



29 MAY 2024

UiTM Digital Campaign (Nuclear) - Nuklear Malaysia, Malaysian Nuclear Agency.





29-31 MAY 2024

Technology Transfer Course, Malaysian Nuclear Agency.



4-5 JUNE 2024

Leadership Course Series 1/2024 for Implementation Group, Nuklear Malaysia.



5-6 JUNE 2024

Mineral Processing Pilot Plant Operation and Maintenance Course, Nuklear Malaysia.



5-7 JUNE 2024

Mobile Photography Course for Nuclear Science and Technology Research Fieldwork, Port Dickson, Negeri Sembilan Darul Khusus.





6 JUNE 2024

Courtesy Visit of H.E. Manuel Balaguer Salas, Ambassador of the Republic of Argentina to Nuklear Malaysia.



13-14 JUNE 2024

Technology Preview Showcase (TPS Kedah) Program and Launch of the Nuclear Paddy Gallery by His Royal Highness Tengku Sarafudin Badlishah Ibni Al Aminul Karim Sultan Sallehuddin, Tuanku Raja Muda Kedah Alor Setar, Kedah Darul Aman.



19 JUNE 2024

Canva ePoster and Infographic Course
by Sifoo.com, Nuklear Malaysia.



21-23 JUNE 2024

Generic Competency Enhancement
Course for Radiation Technology
Processing Division (BTS) Staff, Janda
Baik, Pahang Darul Makmur.





24 JUNE 2024

Workshop on Physical Protection System (PPS) Evaluation and Assessment Methodologies Using Modeling and Simulation, Hotel Bangi Resort, Selangor Darul Ehsan.



26 JUNE 2024

ICT Together Day (HBICT2024), Nuklear Malaysia.



2-3 JULY 2024

National Nuclear Technology Policy Initiative Implementation Workshop (DTNN 2030), Malaysian Nuclear Agency.



15 JULY 2024

Courtesy visit by the Programme Management Officer (PMO), IAEA, Mr. Syahril Syahril, to the Director General of Nuklear Malaysia.





15-19 JULY 2024

RAS7040 IAEA Regional Training Course on Ground Water Flow and Solute Transport Modelling, Mid Valley City, Kuala Lumpur.



15-19 JULY 2024

Toward Fusion Technology-Fundamental Course, Nuklear Malaysia.



16 JULY 2024

Workshop on Designing IAEA Tech Cooperation Project Using the Logical Framework Approach, Nuklear Malaysia.



7 JULY 2024

Train The Trainer (TOT) Workshop For Nuclear Communicator, Hotel Malacca International Trade Center (MITC), Melaka.





22 JULY 2024

Instrumentation and Nuclear Engineering Module Workshop, Nuklear Malaysia.



23 JULY 2024

Empowering Minds Course - Strategies for Dealing with Stress and Anxiety, Nuklear Malaysia.



29 JULY - 2 AUGUST 2024

RAS 5097 Regional Training Course (RTC) on Fruit Fly Surveillance and Species Identification, Universiti Putra Malaysia (UPM), Selangor Darul Ehsan.



29 JULY 2024

Courtesy visit by the Nuklear Malaysia Delegation to the Director General of the Language and Literature Council (DBP), DBP Tower, Federal Territory of Kuala Lumpur.





30 JULY 2024

Awareness Workshop, Roles and Responsibilities of Area Supervisors, Nuklear Malaysia.



31 JULY - 2 AUGUST 2024

Tedi-Ted2-AIF Program Proposal Refinement Workshop, Lexis Hotel, Negeri Sembilan Darul Khusus.



5-7 AUGUST 2024

FY2024 Steering Committee Meeting (SCM) between Malaysian Nuclear Agency and Japan Atomic Energy Agency (JAEA), Nuklear Malaysia.



6-7 AUGUST 2024

Scientific Writing & Publishing Seminar and Workshop, Hotel Pacific Regency Beach Resort, Port Dickson, Negeri Sembilan Darul Khusus





16 AUGUST 2024

Integrity Relaxation Program Series 2 - Facing the Conflict of Interest by the Malaysian Anti-Corruption Commission (MACC), Nuklear Malaysia.



21 AUGUST 2024

Working Visit of YB Datuk Hj. Ahmad Amzad bin Mohamed @ Hashim, Chairman of the Special Select Committee on Environment, Science and Plantations (JKPK), Nuklear Malaysia.



23-24 AUGUST 2024

Launching Ceremony of the Social Adoption Village (MOSTi) Program, Kampung Tekam, Segamat, Johor Darul Takzim.



26-29 AUGUST 2024

RAS 1028 IAEA Expert Mission; Course on Uncertainty Measurement for Dosimetry Systems for Gamma and EB Plants, Nuklear Malaysia.





26-30 AUGUST 2024

IAEA Regional Workshop on Workplace Monitoring, Hotel Everly, Putrajaya.



27-29 AUGUST 2024

Nuklear Malaysia Innovation Day and R&D Seminar 2024, Nuklear Malaysia.





2-6 SEPTEMBER 2024

Underground Leak Detection Project Using Radioactive Tracer Technology by the Plant Assessment Technology Group (PAT), Department of Chemistry Malaysia, Kuala Terengganu, Terengganu Darul Naim.



4-5 SEPTEMBER 2024

Introductory Course: Occupational Safety & Health Act and Regulations, Nuklear Malaysia.





9 SEPTEMBER 2024

Visit of YB Tn. Hj. Akmal Nasrullah bin Mohd Nasir, Deputy Minister of the Ministry of Energy Transition and Water Transformation (PETRA) to Nuklear Malaysia



10-12 SEPTEMBER 2024

Forum for Nuclear Cooperation in Asia (FNCA) Workshop on Research Reactor Utilization, Bangi Avenue Convention Centre, Bangi, Selangor Darul Ehsan.

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KEMENTERIAN
KESIHATAN MALAYSIA

24 SEPTEMBER 2024

A photograph of three individuals seated on a stage for a panel discussion. On the left, a woman in a bright pink traditional Chinese qipao is speaking into a microphone. In the center, a man in a dark suit and tie sits behind a table adorned with a large bouquet of pink and white flowers. On the right, another man in a dark suit and tie is seated, looking towards the center. The background is a simple, light-colored wall.



24 SEPTEMBER 2024

Food Safety Seminar 2024, Grand Paragon Hotel, Johor Bahru, Johor Darul Takzim.



1-2 OCTOBER 2024

ISO-IEC 27001:2022 ISMS Certification Auditing and Transition Course, Nuklear Malaysia.



3 OCTOBER 2024

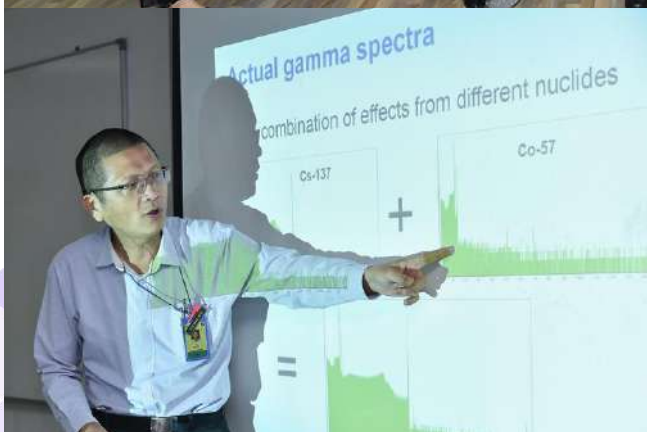
Meeting and Visit to Nuklear Malaysia's Facilities with MATRADE, MOGEC, MOGSC and MPRC, Nuklear Malaysia.



7-11 OCTOBER 2024

IAEA RTC RAS5098 Mutation Breeding for Abiotic Tolerance, Nuklear Malaysia.





8 OCTOBER 2024

Closed Colloquium on CTBT Radionuclide Data Analysis, Nuklear Malaysia.



9 OCTOBER 2024

Working Visit of Mr. Mikhail Chudakov, Deputy Director General, International Atomic Energy Agency (IAEA), Nuklear Malaysia.



10 OCTOBER 2024

Briefing on the Public Service Remuneration System (SSPA), Nuklear Malaysia.



17 OCTOBER 2024

Visit of the Delegation of the Ministry of Foreign Affairs (KLN), Mr. Tan Li Lung, Secretary of the Multilateral Security Division, Nuklear Malaysia.





22 OCTOBER 2024

Visit of Members of the National Nuclear Technology Steering Committee, Nuklear Malaysia.



28-29 OCTOBER 2024

9TH National Seminar on Material and Structural Integrity, Hotel Grand Darul Makmur, Kuantan, Pahang Darul Makmur.



29 OCTOBER 2024

Radiation Safety Awareness Seminar for
OBTL, Cititel Mid Valley Hotel, Federal
Territory of Kuala Lumpur.



4-6 NOVEMBER 2024

Safety Workshop and Incident Response Plan
(Radiation Contamination and Fire), Glory Beach
Resort Hotel, Port Dickson, Negeri Sembilan.





5-6 NOVEMBER 2024

Visit of Members of the National Nuclear Technology Steering Committee, Nuklear Malaysia.



5-6 NOVEMBER 2024

Seminar on Radiation Protection and the Safety of Radiation Sources IAEA (PGEC18), Nuklear Malaysia.



7 NOVEMBER 2024

Technical Visit to the Implementation of the Civilian Adoption Village Programme (KPWKM) Jetty Project, Nuklear Malaysia.



8 NOVEMBER 2024

Graduation Dinner 18TH IAEA Postgraduate Educational Course (PGEC-18), Bora Ombak, Wilayah Persekutuan Putrajaya.





11-15 NOVEMBER 2024

Interregional Training Course (INT9187) on the Use of the IAEA Mobile Tool Kit (MTKF) for Handling Category 3 to 5 Disused Sealed Radioactive Sources (DSRS), Nuklear Malaysia.



12 NOVEMBER 2024

Meeting and Visit to Nuklear Malaysia's Facilities with Petronas Project Delivery & Technology (PD&T), Nuklear Malaysia.



14 NOVEMBER 2024

Community Joint Program for Jetty Installation for the Biocomposite Floating Jetty Project - Kampung Angkat Madani MOSTI, Kampung Tekam, Segamat, Johor Darul Takzim.



25 NOVEMBER 2024

Visit and Discussion on Rare Earth Mining Research and Development Project with MIMOS Berhad, Nuklear Malaysia.





29 NOVEMBER 2024

Visit from YB Tan Sri Dato' (Dr.) Johari bin Abdul, Speaker of the Dewan Rakyat to Nuklear Malaysia.



1 DISEMBER 2024

Sungai Buah Village Civic Sanctity Programme, Public Field, Sungai Buah Village, Dengkil, Selangor Darul Ehsan.



2 DECEMBER 2024

IAEA First Coordination Meeting RAS1033 Strengthening Regional Capabilities and Infrastructure to Support Research Reactor Safe Operation, Utilization and Scientific Research for Prosperous Development, Hotel Cititel Mid Valley, Wilayah Persekutuan Kuala Lumpur.



12 DECEMBER 2024

AKRAB Benchmarking Visit, Department of Chemistry Malaysia, Nuklear Malaysia.





17 DECEMBER 2024

Thorium Talk Series (TTS), Hotel Grand Pulse, Putrajaya.



18 DECEMBER 2024

Inter-Departmental Meeting on the Implementation of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), Nuklear Malaysia.



19 DECEMBER 2024

Knowledge Tour to the National Library of Malaysia (PNM), National Library of Malaysia, Federal Territory of Kuala Lumpur.







4.0

RESEARCH & TECHNOLOGY DEVELOPMENT

4.0 RESEARCH & TECHNOLOGY DEVELOPMENT PROGRAMME

Nuklear Malaysia's research and development (R&D) activities are carried out based on Strategic Thrust 1 (Nuclear Science and Technology to Enhance Industrial Competitiveness) and Strategic Thrust 2 (Nuclear Science and Technology for the Well-being of the People and the Environment), Nuklear Vision Malaysia 2030 (WNM2030). Generally, Nuklear Malaysia has successfully implemented the activities planned for the medium-term implementation period of WNM2030 activities. However, there are also activities that have been re-evaluated due to budget constraints and other factors that require activities to be re-arranged.

These R&D activities are carried out to strengthen research capacity and subsequently produce outputs that are beneficial to the industry and stakeholders for the advancement of science and technology that has a positive impact on society and the country.

4.1 RESEARCH AND TECHNOLOGY DEVELOPMENT OUTPUTS

In 2024, a total of 21 products, 27 processes, 33 procedures, 32 databases, and four software have been successfully produced through various innovations and research by Nuklear Malaysia.

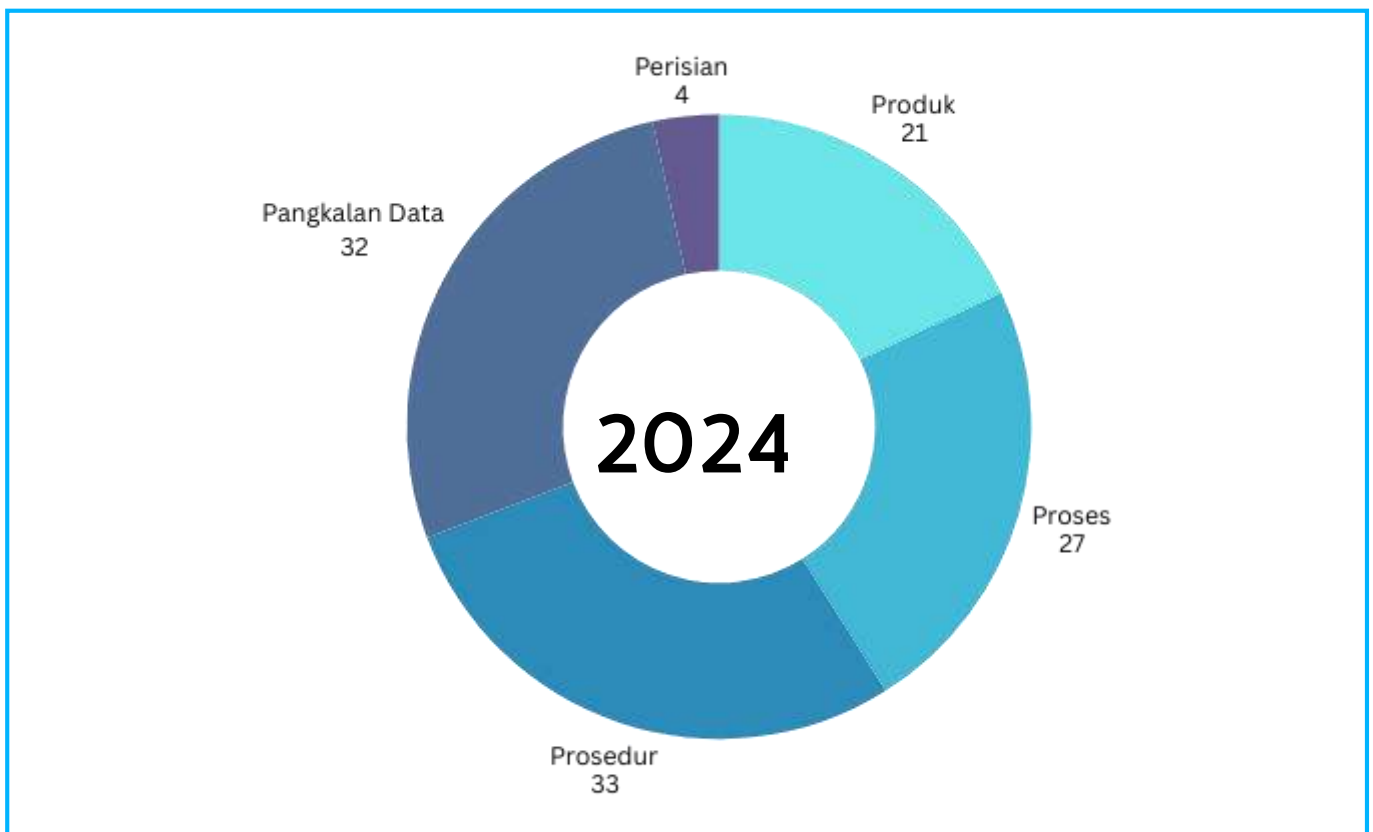


Figure 4.1: Research and Technology Development Output in 2024

Overall, the output production performance from Nuklear Malaysia's R&D activities for 2022 - 2024 shows various achievements, as detailed in Table 4.1.

**Table 4.1 : Comparison of Research and Technology Development Output
Year 2022 - 2024**

	Category	2022	2023	2024
1	Product	25	22	21
2	Process	5	1	27
3	Procedure	31	36	33
4	Database	5	23	32
5	Software	1	4	4

The production of products and procedures showed a slight decrease compared to 2023. This is due to funding constraints for research. Software did not show any improvement in two years. However, Nuklear Malaysia managed to produce processes and databases that recorded significant improvements.

The information and details of each research output for 2024 are as follows:

Table 4.2 : Product List

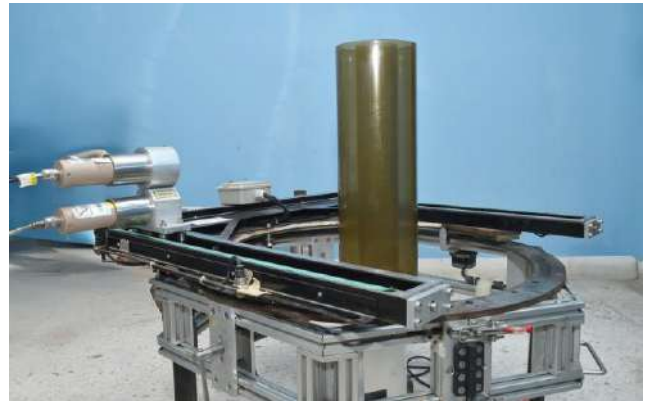
	Product	Technology Readiness Level (TRL)	Project Leader
1	Construction of Borehole Facilities for the Purpose of Disposing of Radioactive Waste of the Type of Sealed Used Radioactive Source (DSRS)	8	Dr. Mohd Zaidi bin Ibrahim
2	Performance Upgrading and Improvement of Plasma Pilot Plant Research Capabilities at the Malaysian Nuclear Agency	8	Rohyiza binti Ba'an

	Product	Technology Readiness Level (TRL)	Project Leader
3	Biocomposite Floating Pier (JTB) • MADANI Adoption Village Program (MOSTI), Kg Tekam, Pagoh 3, Segamat, Johor	8	Dr. Siti Salwa binti Mohammad Shirajuddin
4	Biocomposite Floating Pier (JTB) • MADANI Village Adoption Program (KPWKM), Kg Pasir Pekan Tengah, Tumpat, Kelantan	8	Mohd Shahrulnizam bin Ahmad
5	FLOODCOM: Floating Flood Disaster Command Center	8	Khairil Nor kamal bin Umar
6	RePlast Kenaf Poles	8	Muhammad Hazim bin Muhammad Sayuti
7	Irradiation for Disinfection of Cellulose Artifacts (Rare Books): New Products for Services That Can Be Performed by the SINAGAMA Irradiation Center	6	Nadira binti Kamarudin
8	Radiation Crosslinked Cable (Radiation Processing - Development of Radiation Cross-Linked Low-Smoke Halogen-Free Flame-Retardant Cables for Automotive and Construction Industry)	6	Wonderful Ebeam Cable Sdn Bhd (K), Dr. Nor Azwin binti Shukri
9	Hybrid Ultraviolet	5	Dr. Sofian bin Ibrahim
10	Commercialization of Microbe Beads R&D Products	4	Chong Saw Peng
11	Pre-Commercial G2 Tag Radig Meter	4	Dr. Nor Arymaswati binti Abdullah
12	RTP Multi-purpose Experimental Test-Rig (RTP-METRIG)	4	Tonny anak Lanyau
13	UVGI box: LembayUVng-IV (Eradication of Fomite Transmission Multidrug-Resistant Organisms (MDROs) via Deployment of Rapid UVGI Disinfection Chamber in Malaysian Hospitals)	4	Dr. Naurah binti Mat Isa

	Product	Technology Readiness Level (TRL)	Project Leader
14	Two-Layer Industrial Tomographic Imaging System Based on GammaSpider	4	Hanafi bin Ithnin
15	Production and Quality Assessment of Ho-166 Labelled Trastuzumab Humanized Monoclonal Antibody	3	Siti Selina binti Abdul Hamid
16	Feasibility Study on Mobile Robot Deployment for Autonomous Radiation Mapping in Malaysian Nuclear Agency	3	Dr. Nur Aira binti Abdul Rahman
17	Anti-Radon Coating & Anti-Microbial Coating (Upcycling of Microplastics in Electron Beam Functionalized Carbon Nano-Material Production for Antimicrobial and Norm Barrier Construction Coating)	3	Ts. Dr. Mohd Hamzah bin Harun
18	Carbon-Based POBUA Rust Protection Coating (Development of Carbon Composite Coating for Rust Protection Using POBUA Palm Oil Resin via UV Irradiation Technique)	3	Mohd Sofian bin Alias
19	Radiation-Grafted Filter Cartridge (Preparation of Radiation-grafted Polyethylene Filter Cartridge for Heavy Metal Removal and Industrial Application)	3	Norliza binti Ishak
20	Micro Powder (Recycling of Polymer Waste for Structural and Non-Structural Materials by Using Ionizing Radiation (F23036): PTFE Recycling)	3	Dr. Ting Teo Ming
21	Development of Smart RT-Nemo Capsule for Leak Detection in Underground Pipeline Application	3	Dr. Noraishah binti Othman



Cellulose Artifact Disinfection (Rare Book)



GammaSpider



UVGI box LembayUVng-IV



Hybrid Ultraviolet



Micro Powder



Ho-166 Labelled Trastuzumab



Johor Biocomposite Floating Jetty (JTB)



Radiation Crosslinked Cable



RePlast Kenaf Poles



Smart RT-Nemo



Kelantan Biocomposite Floating Jetty (JTB)



Radiation-Grafted Filter Cartridge

Photo 4.1: Among the Products of R&D

Table 4.3 : List of Processes

	Process	Technology Readiness Level (TRL)	Project Leader
1	Irradiation Process for Cellulose Artifact Disinfection (Rare Book)	6	Nadira binti Kamarudin
2	Hybrid Ultraviolet-Peroxide Pre-vulcanization of Natural Rubber Latex	5	Dr. Sofian bin Ibrahim
3	Preliminary Trial Test of Trisodium Phosphate Produced from Malaysian Monazite Alkali Digestion	3	Abdul Rahman bin Norazumin
4	Formulation of Fabrication Hybrid Composite Kenaf / Kevlar sample	3	Dr Siti Madiha binti Mohd Amir
5	Synthetic and Natural Polymer-Based Nanofiber Composites	3	Dr. Mohd Reusmaazran bin Yusof
6	Improve Thermal Insulation Characteristic of Solvent-Based Paint by Adding Aerogel	3	Ahmad Hambali bin Ismail
7	A Conceptual Framework for Big Data Analytics Nuclear Security	3	Dr. Maizura binti Ibrahim
8	Insider Threat Predictive Model using Personnel Trustworthiness Evaluation and Sentiment Analysis of Social Media (Algorithm)	3	Dr. Maizura binti Ibrahim
9	Electron Beam Irradiation Induce Degradation of Antidiabetic Drug and Antidepressant Drug in Sewage Treatment Plant Effluent	3	Khomsaton binti Abu Bakar
10	Biocompatible Photopolymer Resin	3	Dr. Marina binti Talib
11	Radiation Induced Graft Polymerization	2	Dr. Siti Fatahiyah binti Mohamed
12	Process for Producing Liquid Organic Fertilizer from Shrimp Shells	2	Dr. Sarada binti Idris

	Process	Technology Readiness Level (TRL)	Project Leader
13	Surface Modification of Ground Tire Rubber Waste (Electron Beam Ionization of Ground Tire Rubber as a Filler for the Development of Recycled Polyolefin TPE)	1	Norshafarina binti Ismail
14	Synthesis of Poly (Ethylene Furanoate) (PEF) Bioplastic from Bamboo Biowaste (Poly (Ethylene Furanoate) (PEF) Bioplastic Synthesised from Biowaste for Packaging Application)	2	Dr. Nor Azwin binti Shukri
15	Assessing Microplastics Contamination in Paddy Soil: Detection and Identification (Detection, Assessment and Impact of Microplastics Contamination on Agriculture Soil)	1	Sarala Selambakkannu
16	Recycling of Heat Shrinkable Tubing Waste as Additives for Polymeric Materials	1	Sivanesan Appadu
17	Production and Quality Control of Chromium-51 (Cr-51) to Form Cr-51 EDTA for Determination of Glomerular Filtration Rate	1	Muhammad Hanaffi bin Mohamad Mokhtar
18	Wafer Cutting Process Using Wafer Cutting Machine	1	Muhammad Haziq bin Sayuti
19	Oxidation Process Using Tube Furnace (Thermal Oxidation of Silicon Wafer)	1	Dr. Umi Zulaika binti Mohd Azmi
20	Fabrication of Transistor-Based Dosimeter	1	Dr. Umi Zulaika binti Mohd Azmi
21	Semiconductor Nuclear Detector Proof of Concept (POC) Development Project - Diode Detection Development	1	Muhammad Haziq bin Sayuti

	Process	Technology Readiness Level (TRL)	Project Leader
22	Design and Implementation of a Coastal Erosion Prevention System and Energy Generation Utilizing Nuclear-Enhanced Biocomposite Materials – BioGuardWave	1	Khairol Nizam bin Mohamed
23	Utilization of Organic Semiconductor Material for Dosimetry Application	1	Dr Umi Zulaika bin Mohd Azmi
24	Utilization of Organic Semiconductor Material for Dosimetry Application Online Particle Monitoring for Nuclear Semiconductor Detector Fabrication Cleanrooms	1	Muhammad Haziq bin Sayuti
25	Readout Electronic for Semiconductor Detector	1	Muhammad Haziq bin Sayuti
26	Preliminary Study on Synthesis of Tin Oxide Nanoparticle using Gamma Radiation- Induced Method	1	Dr. Umi Zulaika binti Mohd Azmi
27	Development of Upscaling Procedure for the Production of Silver Nanoparticles Using Gamma Radiation Induced Method for Aquaculture Applications (Radiolytic Synthesis and Characterization of Silver Nanocomposites for Aquaculture Applications)	1	Ts. Dr. Mohd Yusof bin Hamzah

Table 4.4 : List of Procedures

	Procedure	Technology Readiness Level (TRL)	Project Leader
1	Laboratory Test Method: Procedure for Rapid Screening of Ra-226 in Water Sample using Liquid Scintillation Counter	6	Yii Mei Wo
2	Procedures for Irradiation of Cellulose Artifacts (Rare Book)	6	Nadira binti Kamarudin
3	Standard Operating Procedure - Mutagenesis of Napier Grass Using Acute and Chronic Gamma Irradiation	5	Shakinah binti Salleh
4	Standard Operating Procedure for Direct Sampling and Measurement of Nitrous Oxide (N ₂ O) Using the LSE Analyser	5	Ahmad Nazrul bin Abd Wahid
5	Standard Operating Procedures for Tidal Irrigation (AWD) on Rice Crops	5	Ahmad Nazrul bin Abd Wahid
6	Procedure for Detection of Radiation Damage for Glass-Type Radiation Shielding Materials Used in the Medical Field (Fluoroscopy)	5	Nor Hayati binti Alias
7	Ultrasonic Thickness Gauge Measurement on Resin Tank System (Mb18tO-X) of Reactor PUSPATI TRIGA Mark II	4	Suhairi bin Sani
8	Asphalt Layer Determination using Ground Penetrating Radar	4	Amer Hazreq bin Haron
9	Procedure Training Instruction for Industrial Radiographic Technique for X-Ray Yxlon	4	YM Tengku Sarah binti Tengku Amran
10	Improvement Process for Phosphate Removal from Malaysian Xenotime using Alkaline Fusion Digestion Method	3	Ts. Dr. Roshasnorlyza binti Hazan

	Procedure	Technology Readiness Level (TRL)	Project Leader
11	Feasibility Study on Mobile Robot Deployment for Autonomous Radiation Mapping in Malaysian Nuclear Agency	3	Dr. Nur Aira binti Abdul Rahman
12	Investigation of Mutagenesis of Phosphate Solubilizing Microbe for Biofertilizer using Gamma Irradiation	3	Chong Saw Peng
13	Standard Operating Procedures - Screening of Morphological and Agronomic Traits of Cassava Mutants in the Field	3	Shakinah binti Salleh
14	CMSS 10L and 30L Production SOP	3	Norzita binti Yacob
15	Procedure using Semi-Automated Gamma-Ray Attenuation Technique System	2	Dr. Soleha binti Mohamat Yusuff
16	Separation of Cerium from Mixed Light Rare Earth Elements Recovery from Malaysian Monazite Processing	2	Jacqueline Kones
17	Development of Mobile Station Prototype for Nuclear Detection Instrumentation Maintenance	2	Syirrazie bin Che Soh @ Shaari
18	Developing Standard Guidelines for Gram Positive and Negative Bacteria Mutagenesis by using the Gamma Irradiation Technique	2	Dr. Phua Choo Kwai Hoe
19	Optimization and Characterization of Irradiation and Chemically Crosslinked Plasticized Gelatin Biopolymer Films	2	Mohd Shahrulnizam bin Ahmad
20	Preparation of Irradiated Biochar from Agricultural Biomass	2	Ahmad Zuhdi bin Mohd On
21	SOP Extraction of Pharmaceutical Residues (5000ng/L) in STP Effluent	2	Khomsaton binti Abu Bakar
22	Radiation Curable Palm Oil-Based Polyurethane Acrylate Waterborne Dispersion	2	Khairul Azhar bin Abdul Halim

	Procedure	Technology Readiness Level (TRL)	Project Leader
23	SOP Development of Biodegradable Film from PVA and Sago Starch	2	Farah Fadzehah binti Hilmi
24	Determination of Iodine Value for Jatropha Oil (Encapsulation of Jatropha Oil-Based Resin for Self-Healing Coating Application)	2	Dr. Nurul Huda binti Mudri
25	Verification Method for Simultaneous Determination of Elements in Water Samples using American Public Health Association (APHA) 3125 Method	1	Dr. Munirah binti Abdul Zali
26	Development of Method for Characterization of Source Capsule and Container of Nuclear Gauges for Nuclear Forensic Purposes	1	Dr Zalina binti Laili
27	Radiometric and Geospatial Techniques for Surface Weathering of Soils for Environmental Radiology and Geomorphology Applications in Sarawak	1	Hairul Nizam bin Idris
28	Standard Operating Procedures for Optimization of Double Shoot Induction Medium	1	Dr. Muniroh binti Md Saad
29	Proposal DSRS Reuse/Recycle from Sinagama to Raymintex	1	Anwar bin Abdul Rahman
30	Recommissioning of ELV - 4	1	Dr. Leo Kwee Wah

	Procedure	Technology Readiness Level (TRL)	Project Leader
31	Distribution of Neutron Flux within the Biological Shielding Concrete of RTP (To Determine Radionuclide Inventory)	1	Dr. Mohamad Hairie bin Rabir
32	Prediction of RTP Fuel Source Term and Decay Heat	1	Dr. Mohamad Hairie bin Rabir
33	Isolation and Molecular Characterization of Pantoea Ananatis, a Pathogen Associated with Bacterial Leaf Blight Symptoms in Rice	1	Mohammad Malek bin Faizal Azizi

Table 4.5 : List of Databases

	Databases	Technology Readiness Level (TRL)	Project Leader
1	Fusion Datasets for Ultrasonic Weld Defect Classification with Transfer Learning in Neural Networks	4	Suhairy bin Sani
2	Image Optimization by Using Predetermine Voltage and Filter On 1172 Micro Computed Tomography (MicroCT) System	2	Roslan bin Yahya
3	Data on The Effect of Varies Current and Focal Point using X-Ray Yxlon Machine for Welded Plate Component	3	YM Tengku Sarah binti Tengku Amran
4	Verification Data of Exposure Chart for X-Ray Yxlon Y.XMB 225 X-Ray System	3	Amer Hazreq bin Haron
5	Data on Radionuclides (Cs-134, Cs-137, Ra-226, Ra-228, Th-232, U-238, K-40) in Malaysian Foods	2	Yii Mei-Wo

	Databases	Technology Readiness Level (TRL)	Project Leader
6	Development of Marine Radioactivity Database in Peninsular Malaysia, Sabah, and Sarawak Seas	1	Dr. Noor Fadzilah binti Yusof
7	The Wetland and Land Use Management for Kuala Selangor Nature Park (KSNP) and its Surroundings using Nuclear and Related Techniques Study	3	Jalal bin Sharib@Sarip
8	Assessment of Environmental Radioactivity near Kuala Selangor Nature Park (KSNP) and Chukai Industrial Area: A Comprehensive Study on NORM and Anthrpogenic Radionuclides and Radiation Hazard Indexs	3	Mohd Izwan bin Abdul Adziz
9	Integration of Isotope Techniques and Geochemistry for Water Resources Management in The Dengkil Ex-Mining Area	1	Mohd Muzamil bin Mohd Hashim
10	Global Network of Isotope in Precipitation	1	Mohamad Syahiran bin Mustaffa
11	Establishment Tritium Database in Malaysia's Marine Environment due to Fukushima Daiichi Nuclear Power Plant (FDNPP) Radioactive Water Release	1	Mohamad Syahiran bin Mustaffa
12	Improving Water Resources Management Practices by Enhancing the Regional Collaboration in Environmental Isotope Analysis and Applications	1	Dr. Lakam Mejus
13	Assessing and Mitigating Agro-Contaminants to Improve Water Quality and Soil Productivity in Catchments using Integrated Isotopic Approaches	1	Roslanzairi bin Mostapa (Alternate)
14	Using Stable and Radioactive Isotopes to Assess Hydrological Connectivity on Freshwater Wetland Lakes, River Systems and Shallow Groundwater Source	1	Mohd Muzamil bin Mohd Hashim

	Databases	Technology Readiness Level (TRL)	Project Leader
15	Development of Hydrodynamic Model and Hydrological Characteristic of Constructed Wetland Using Stable and Radio Isotope	1	Dr. Nurul Fairuz Diyana binti Bahrudin
16	Assessment of Radioactive Fallout Along the Coastal and Marine of East Coast Malaysia, Sabah and Sarawak after the DPRK Nuclear Test and the 2011 Fukushima Nuclear Disaster	1	Hairul Nizam bin Idris (Ahli)
17	Measurement and Mapping of Radiofrequency Electromagnetic Fields (RF- EMF) Radiation Exposure in the Environment Around Malaysia	1	Hairul Nizam bin Idris (Ahli)
18	Evaluating the Efficacy of Artificial Recharge to Groundwater in Water Scarce Regions using Isotope Techniques	1	Jeremy Andy anak Dominic Daung
19	Land Ionizing Radiation Isodos Study in Peninsular Malaysia-Phase 2 (ISODOS Peninsular Malaysia 2.0)	1	Hairul Nizam bin Idris (Ahli)
20	Monitoring the Marine Environment for Enhanced Understanding of the Abundance and Impact of Marine Plastic Pollution	1	Dr. Md Suhaimi bin Elias
21	Development of Black Sand as Natural Tracer for Sediment Transport Assessment in Coastal, Estuary and River Banks Areas	1	Shakirah binti Abd Shukor
22	Assessment of Microplastic Pollution in the Marine Environment of Peninsular Malaysia	1	Dr. Md Suhaimi bin Elias
23	Determination of Pollution Sources of Heavy, Trace and Rare Earth Elements (REEs) in Soil from Industrial Area	1	Dr. Md Suhaimi bin Elias

	Databases	Technology Readiness Level (TRL)	Project Leader
24	Classification Model of Indigenous Rice Variety from Kota Belud, Sabah by Organic Elemental and Isotopic Profiling	1	Nazaratul Ashifa binti Abdullah Salim
25	Approach of Ga68-Nota-Rituximab mAb, a Radioimmunotherapy (RIT) in Cancer	2	Siti Aminah binti Muhamad
26	Functionalization of Gold Nanoparticles with Irradiated Chitosan (AuNP) for Tumor Imaging	2	Wan Hamirul Bahrin bin Wan Kamal
27	Strengthening Nuclear Instrumentation Capacity in the Area of Nuclear Sciences and Application	-	Dr. Lojius Lombigit
28	Monte Carlo Profiling of Neutron Characteristics at RTP In-Core and Beamport Irradiation Facilities	1	Dr. Mohamad Hairie bin Rabir
29	Analysis of Cycle Length for High-Fissile-Density Fuel in Selected SMR and MMR	1	Dr. Mohamad Hairie bin Rabir
30	Simulation and Comparative Analysis of Irradiation Capabilities for Radioisotope Production in Selected Multi-Purpose Research Reactors	1	Dr. Mohamad Hairie bin Rabir
31	Neutronics of Compact Fusion neutron Source - Utilization in Advanced Fission Reactor and Tritium Production	1	Dr. Mohamad Hairie bin Rabir
32	Pantoea Ananatis Isolated from Bacterial Leaf Blight Disease in Rice	1	Mohammad Malek bin Faizal Azizi

Table 4.6: Software List

	Software	Technology Readiness Level (TRL)	Project Leader
1	Feasibility Study on Mobile Robot Deployment for Autonomous Radiation Mapping in Malaysian Nuclear Agency	3	Dr. Nur Aira binti Abdul Rahman
2	MBioTest System	-	Dr. Mohamad Safuan bin Sulaiman
3	Prototaip Integrated & Intelligent Nuclear Security System (I2NS) versi 1.0	3	Dr. Maizura binti Ibrahim
4	Development of IoT Plaform for Nuklear Malaysia	-	Ts. Mohd Dzul Aiman bin Aslan

4.2 RESEARCH FUND

The success of Nuklear Malaysia in obtaining various research funds both nationally and internationally has enabled R&D activities to be carried out vigorously. The total funds received amounted to RM22,655,363.81. A detailed breakdown of the funds is as shown in the table below.

Table 4.7 : R&D Fund

	Funds	Total Funds(RM)
1	FRGS Projects	0.00
2	Smart Fund Projects	0.00
3	MSI Projects	0.00
4	RMK Development (R&D)	19,151,710.00
5	IAEA CRP (Nuklear Malaysia)	244,262.63
6	TED1	300,593.20
7	TED2	332,491.67
8	MOSTI R&D Fund Projects	0.00
9	Collaborative Projects	205,500.00
10	SRF-APP	2,287,329.59
11	MySI Projects	133,476.72
	TOTAL	22,655,363.81

Table 4.8 : Comparison of T&C Allocations 2022 – 2024

	Funds	Total Funds(RM)		
		2022	2023	2024
1	FRGS Projects	20,000.00		0.00
2	Smart Fund Projects	416,225.40	84,426.00	0.00
3	MSI Projects	54,100.00		0.00
4	RMK Development (R&D)	12,720,000.00	15,302,900.00	19,151,710.00
5	IAEA CRP (Nuklear Malaysia)	322,560.00	302,400.00	244,262.63
6	TED1	40,080.00	432,194.00	300,593.20
7	TED2			332,491.67
8	MOSTI R&D Fund Projects			0.00
9	Collaborative Projects		85,000.00	205,500.00
10	SRF- APP		450,400.00	2,287,329.59
11	MySI Projects		683,479.11	133,476.72
	TOTAL	13,970,772.60	17,914,250.31	22,655,363.81

4.3 INTELLECTUAL PROPERTY

Nuklear Malaysia always emphasizes the protection of intellectual property of R&D output produced by its researchers. Intellectual property registration will also be able to add value to the products produced, especially for commercialization purposes. To ensure that copyright and intellectual property are protected, intellectual property registration is implemented strategically and promptly.

A total of six intellectual properties for the research results of the agency have been obtained. All six of these researches have been commercialized. The table below shows the list of intellectual properties in 2024.

Table 4.9: List of Intellectual Property 2024

	Title	Inventor	Granted/ Filed
1	Hybrid Ultraviolet - Peroxide Prevulcanisation of Natural Rubber Latex	1. Dr. Sofian Ibrahim 2. Dr. Chai Chee Keong 3. Mohd Noorwadi bin Mat Lazim 4. Hasan bin Sham 5. Dr. Noor Hasni M Ali	Paten
2	System for Real-Time Monitoring and Detecting Pipeline Leakage and Methods Thereof	1. Dr. Noraishah binti Othman 2. Ahmad Zubair bin Johan 3. Muhammad Anas bin Mat Marzuki	Paten
3	Deltozide	1. Dr. Zainah binti Adam 2. Daryl bin Jesus Arapoc	Trademark
4	Method to Produce High Purity of TiO ₂ and Fe ₂ O ₃ from Ilmenite	1. Dr. Roshasnorlyza binti Hazan 2. Wilfred Paulus 3. Nur Aqilah binti Sapiee 4. Khaironie binti Mohamed Takip	Copyright
5	Cultural Heritage Research and Conservation Unit (Heritage): Blending Nuclear Science and Technology in Cultural Characterization and Preservation.	1. Ir. Dr. Mahdi Ezwan bin Mahmoud 2. Dr. Hishamuddin bin Husain 3. Azlan Shah bin Nerwan Shah @ Nintin 4. Suhaila binti Hani Ilias 5. Izura binti Izzudin	Copyright
6	MyFlexiTomoScanner. Flexible Tomography Scanner	1. Khairiah Yazid@Khalid 2. Azraf bin Azman 3. Hasif bin Mohammad 4. Dr. Julie Andrianny binti Murshidi 5. Rafhayudi bin Jamro	Industrial Design



Hybrid Ultraviolet



Pipeline Leakage



Deltocide

Photo 4.2 : Among the Products That Have Registered Intellectual Property and Have Been Commercialized

4.4 RESEARCHER-INDUSTRY SCIENTIFIC EXCHANGE PROGRAM (RISE)

Nuklear Malaysia always ensures that the research conducted in the laboratory is based on the needs and demands of the market. For this purpose, the Researcher-Industry Scientific Exchange Program (RISE) platform which places its researchers in the industry is fully utilized. The placement of researchers in the industry allows for specific research to be conducted to solve problems faced by the industry. This sharing of expertise aims to increase innovation and productivity as well as capacity building for both parties through research, consultation, technology transfer or training. In 2024, a total of five RISE projects are still active and are being implemented by Nuklear Malaysia's researchers.

Table 4.10 : List of RISE Projects

	Project
1	Novel Methods and Applications of Electrolysed Oxidising Water Anolyte as Disinfecting Agent Effective Against Phytopatogens in Chilli (Capsicum Annum L.)
2	Development of Inspection Procedure for Detection of in-Service Flange Face Corrosion (FFC) using Advanced Ultrasonic Testing
3	Development of Protocol for Large Scale Commercial Micropropagation of Banana Var. Tanduk (Pisang Tanduk)
4	Development of Mushroom-Based Food Products Using Nuclear Applications
5	Characterization of Effective Microorganisms in Water Quality for Fish

Overall, over a three-year period (2022-2024), Nuklear Malaysia has successfully implemented 16 RISE projects with the industry. The implementation of these projects has helped solve various problems faced by the industry and transferred technology and expertise from the laboratory to the field.

Table 4.11 : Total RISE Projects 2022 – 2024

2022	2023	2024	TOTAL
8	3	5	16

4.5 RESEARCH ACHIEVEMENTS AND RECOGNITION

To ensure the effectiveness and marketability of the research and innovation outputs produced, Nuklear Malaysia ensures that researchers participate in various innovation competitions both domestically and internationally. This participation not only opens up room for improvement through expert feedback, but also helps expand collaboration networks, increase recognition of research, and contribute to the institution's ranking at the national and international levels.

In 2024, five Nuklear Malaysia entries won awards in various innovation competitions both domestically and internationally. The list of awards received is as follows:

Table 4.12 : List of Innovation Competition Awards 2024

	Competition	Innovation Title	Name of Project Leader	Award
1	National Bioeconomy Showcase 2024 World Trade Centre (WTC) Kuala Lumpur 17-18 July 2024	-	Pharmaceutical Laboratory, Medical Technology Division	Bionexus Partner Laboratories (BNP) Award (Laboratory Recognition Certificate)
2	36 th International Invention Innovation Technology Competition & Exhibition (ITEX) KL Convention Centre, Malaysia 16-17 May 2024	Ionizing Irradiated Hybgc Composite Film Patch for Soft Tissue Regeneration and Wpund Healing	Ruzalina binti Baharin	Gold Medal
3	36 th International Invention Innovation Technology Competition & Exhibition (ITEX) KL Convention Centre, Malaysia 16-17 May 2024	AMORA: Autonomous Mobile Robot for Accurate Radiation Detection and Mapping	Nur Aira binti Abd Rahman	Gold Medal

	Competition	Innovation Title	Name of Project Leader	Award
4	International Development Research & Innovation Virtual Exhibition Universiti Tun Hussein Onn Malaysia 15 July 2024	Subsurface Utility Evaluation and Verification Runway (Steer)	YM Tengku Sarah binti Tengku Amran	Gold Medal
5	2024 Seoul International Invention Fair (SIIF 2024) Seoul, South Korea 30 November 2024	WINDR 53 Smart Electronic Winding System for Industrial Radiography Safety Enhancement	Dr Mohd Noorul Ikhsan bin Mohamed	Grand Prize & Special Award of Merit Dost-Tapi Philippines

Overall, in a three-year period (2022-2024), Nuklear Malaysia has successfully won 24 innovation awards in various competitions at the national and international levels. This proves the excellence of Nuklear Malaysia's R&D activities.



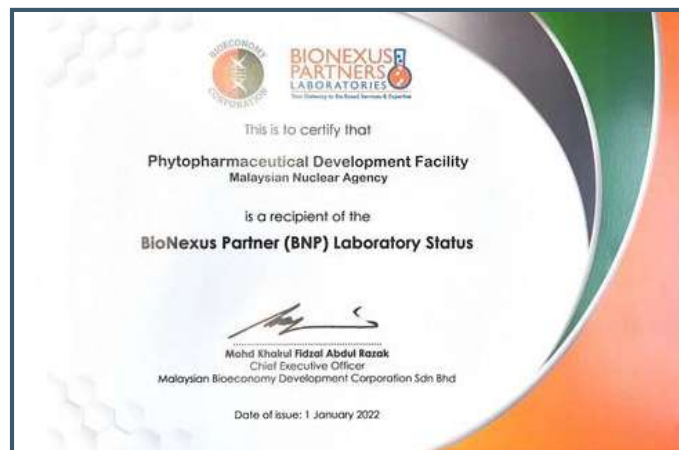


Photo 4.3 : Achievements and Recognition of Nuklear Malaysia's Research Results

Table 4.13 : Comparison of Total Achievements and Recognitions 2022 – 2024

2022	2023	2024	TOTAL
9	10	5	24

4.6 NUKLEAR MALAYSIA R&D SEMINAR AND INNOVATION DAY 2024

The Nuklear Malaysia R&D Seminar and Innovation Day 2024 was held from 27 to 29 August 2024. The theme for the R&D Seminar was “Nuclear Technology Driving National Industry” while “Recognizing Excellence in Nuclear Science & Technology Innovation” was the theme for the Nuklear Malaysia Innovation Day 2024.

This program serves as a platform for researchers, inventors, professionals and industry to share knowledge on R&D products and results, innovative discoveries and the latest solutions through nuclear technology in various sectors. In addition, this program serves as a catalyst for local expertise and R&D collaboration across various fields and applications of nuclear science and technology.

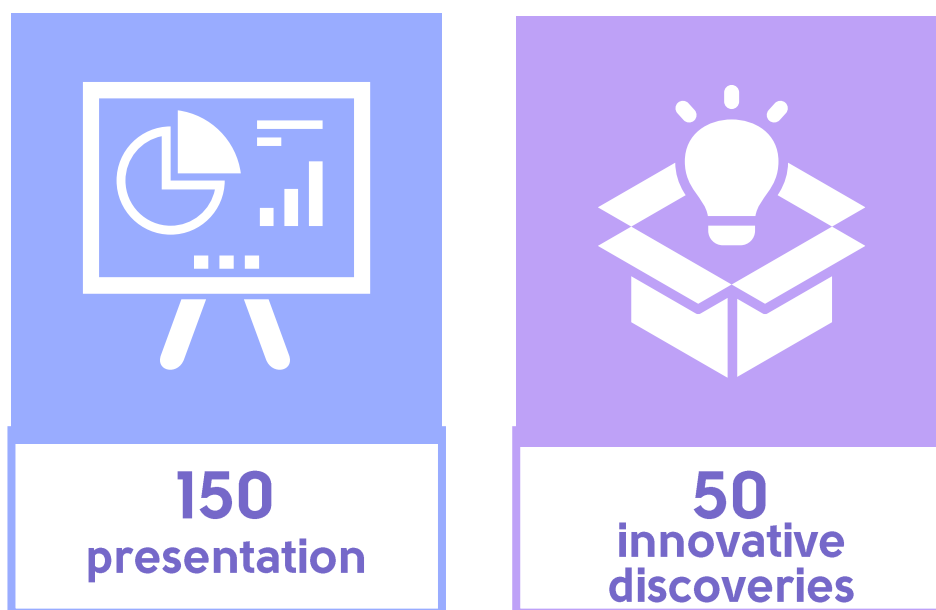


Figure 4.2 : Output of the Nuklear Malaysia R&D Seminar and Innovation Day 2024

Apart from the paper presentation, participants were also able to attend a technical visit to the facilities of Nuklear Malaysia as well as a town hall session with stakeholders on the National Nuclear Technology Policy (NTP) 2030 conducted by YBhg. Datuk Ts. Dr. Mohd. Nor Azman bin Hassan, Deputy Secretary-General (Technology Development) of MOSTI together with YBrs. Dr. Rosli bin Darmawan, Director-General of Nuklear Malaysia.

4.7 PUBLICATION LIST

Publication is one of the important outputs in Nuklear Malaysia's research. In the field of research, publications are one of the main mediums for disseminating discoveries, transferring knowledge and expertise, ideas and innovations to the research and academic community as well as relevant stakeholders and the public. In addition, high-impact publications can enhance the reputation of researchers and their research institutions. In turn, these publications serve as benchmarks for research success and catalysts for innovation and knowledge advancement.

In 2024, Nuklear Malaysia has successfully produced 609 publications. Of the total publications produced, eight international journal articles are categorized as high-impact publications. The list of publications is as follows:

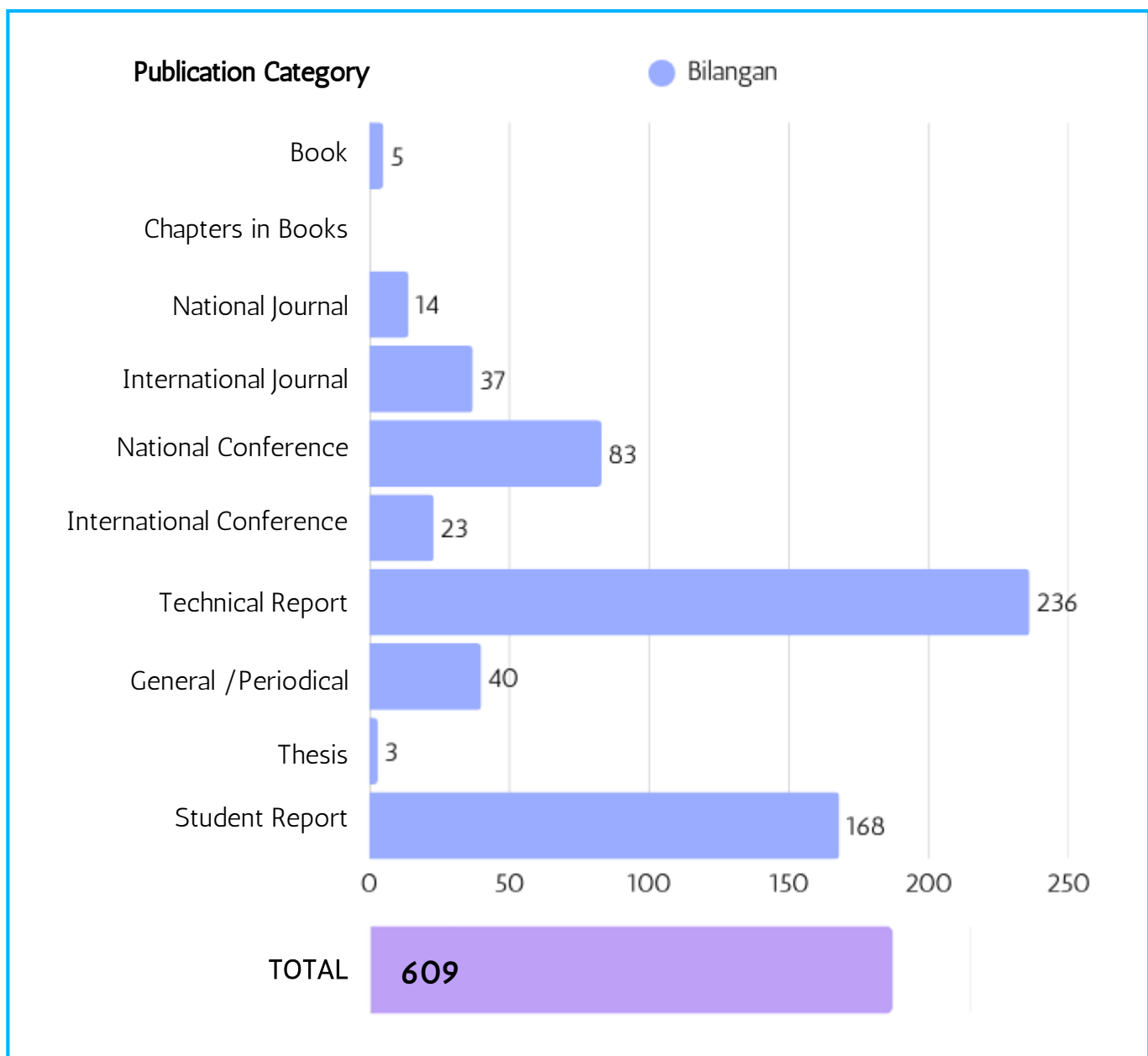


Figure 4.3 : Publication Achievements by Category in 2024

Table 4.14 : Comparison of Publication Achievements by Category 2022-2024

	Publication Category	2022	2023	2024
1	Book	1	3	5
2	Chapters in Books	9	1	-
3	National Journal	13 ** 6 high-impact journals	25 ** 3 high-impact journals	14
4	International Journal	51 ** 36 high-impact journals	45 ** 25 high-impact journals	37 ** 8 high-impact journals
5	National Conference	52	133	83
6	International Conference	33	16	23
7	Technical Report	138	212	236
8	General /Periodical	44	41	40
9	Thesis	3	4	3
10	Student Report	172	165	168
	TOTAL	516	645	609



Workshop on Strengthening Magazine Article Writing Techniques.
20-21.05.2024, Malaysian Nuclear Agency.



Courtesy visit by the Nuklear Malaysia Delegation to the Director General of the Language and Literature Council (DBP), 29.07.2024, DBP Tower, Federal Territory of Kuala Lumpur.

Photo 4.4 : Among the Activities of Nuklear Malaysia's Publication 2024





TECHNOLOGY COMMERCIALIZATION

5.0

5.0 TECHNOLOGY COMMERCIALIZATION

Research and development (R&D) activities in the nuclear field in Malaysia are carried out in line with Strategic Thrust 1 of WNM2030, which is to leverage nuclear science and technology to strengthen the competitiveness of the industry. Overall, Nuklear Malaysia has achieved success in implementing the initiatives planned for the medium-term implementation phase of WNM2030.

Throughout 2024, technology commercialization activities have recorded very encouraging developments. Previous R&D activities have yielded positive results, with various innovative products and services successfully commercialized and marketed. In addition, collaboration with industry and stakeholders has been strengthened to expand the reach and enhance the impact of the technology produced.

Overall, technology commercialization activities this year have successfully generated income of RM 11,183,578.68.

The main technology commercialization activities that contributed to this achievement are as follows:



This achievement reflects our continued commitment to driving innovation and technology commercialization to enhance the nation's competitiveness. Efforts to strengthen the innovation ecosystem and expand strategic collaborations will continue to be a focus in the years to come.

Table 5.1 : Income from Technology Commercialization

Clause	Resource Type	Total (RM)
15.1	IAEA Donation	1,035,354.87
15.3	Payment of "Research" service fee	2,793,369.35
15.4	Payment of "Training" service fee	5,052,680.33
15.5	Payment of "Service" fee	617,798.33
15.6	Receipts from Sales of Magazines, Reports, Journals & Publications of Nuklear Malaysia's Products	741.80
15.7	Acceptance of Cooperation Agreement	1,519,738.11
15.8	Fixed Deposit Investment Dividends	163,895.89
TOTAL		11,183,578.68

The income comparison from 2022 to 2024 is as follows:

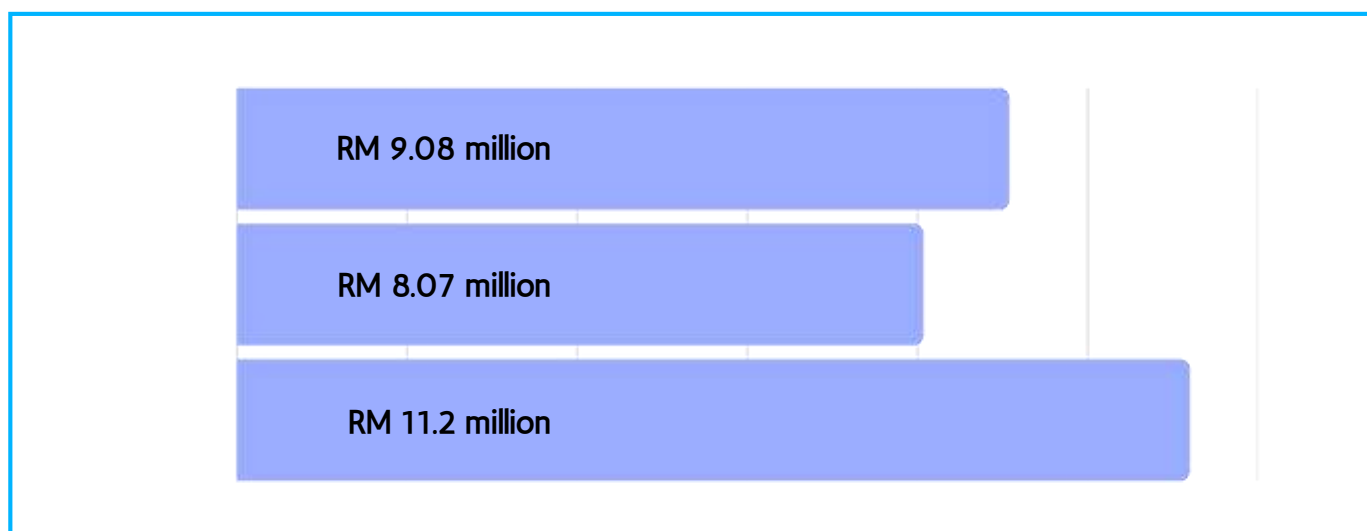


Figure 5.1 : Income Comparison from 2022 to 2024

5.1 PRODUCT COMMERCIALIZATION 2024

In 2024, Nuklear Malaysia has continued its efforts to strengthen the commercialization of R&D products, by focusing more strategically on market needs and industry requirements. This approach is in line with the agency's desire to ensure that each research output has a significant impact on the country's socio-economic development.

Throughout the year, several R&D products have been successfully commercialized by Nuklear Malaysia, involving various important sectors of the country. This success reflects the effectiveness of the strategy implemented and the high potential of nuclear technology in contributing to the overall development of the country.

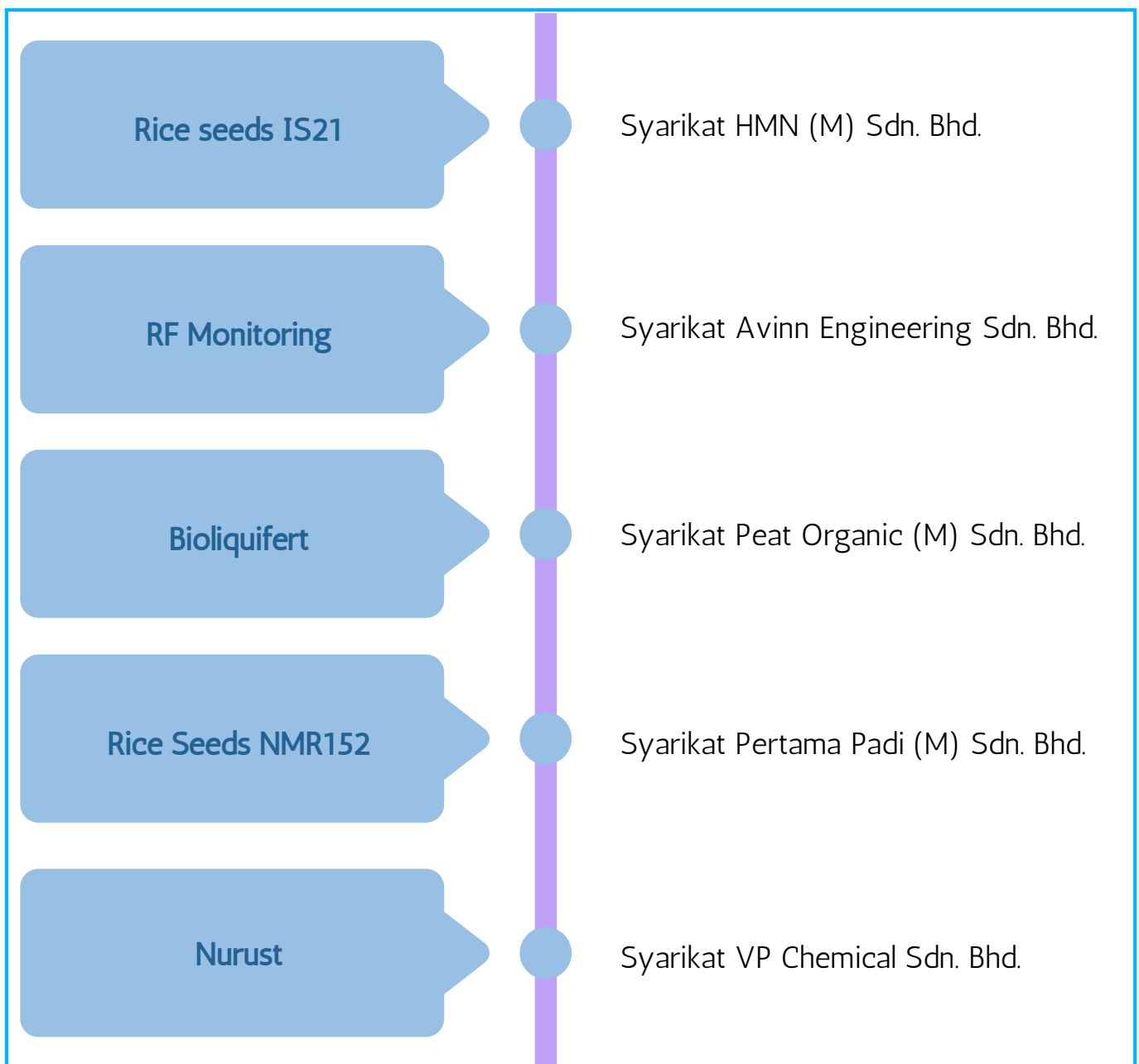


Figure 5.2 : List of Commercialized Nuklear Malaysia's R&D Products

5.2 TECHNOLOGY TRANSFER

Technology Transfer and Industrial Collaboration

To ensure that R&D results have a tangible impact on end users, efforts for technology transfer are constantly being enhanced. Nuklear Malaysia believes that an innovation can only provide optimal value when it can be widely utilized by the industry and stakeholders.

In this regard, various strategic initiatives have been proactively mobilized to transfer the technology produced to stakeholders. The success in signing a number of collaboration agreements with private entities is strong evidence of the effectiveness of this approach, in addition to reflecting the high level of trust from the industry sector in the feasibility and marketability of the technology developed by Nuklear Malaysia.

The established collaborations not only accelerate the technology commercialization process, but also stimulate the development of new products and services based on innovation. This effort indirectly strengthens the country's technology ecosystem, in line with the aspiration to make Malaysia a high-impact technology hub.

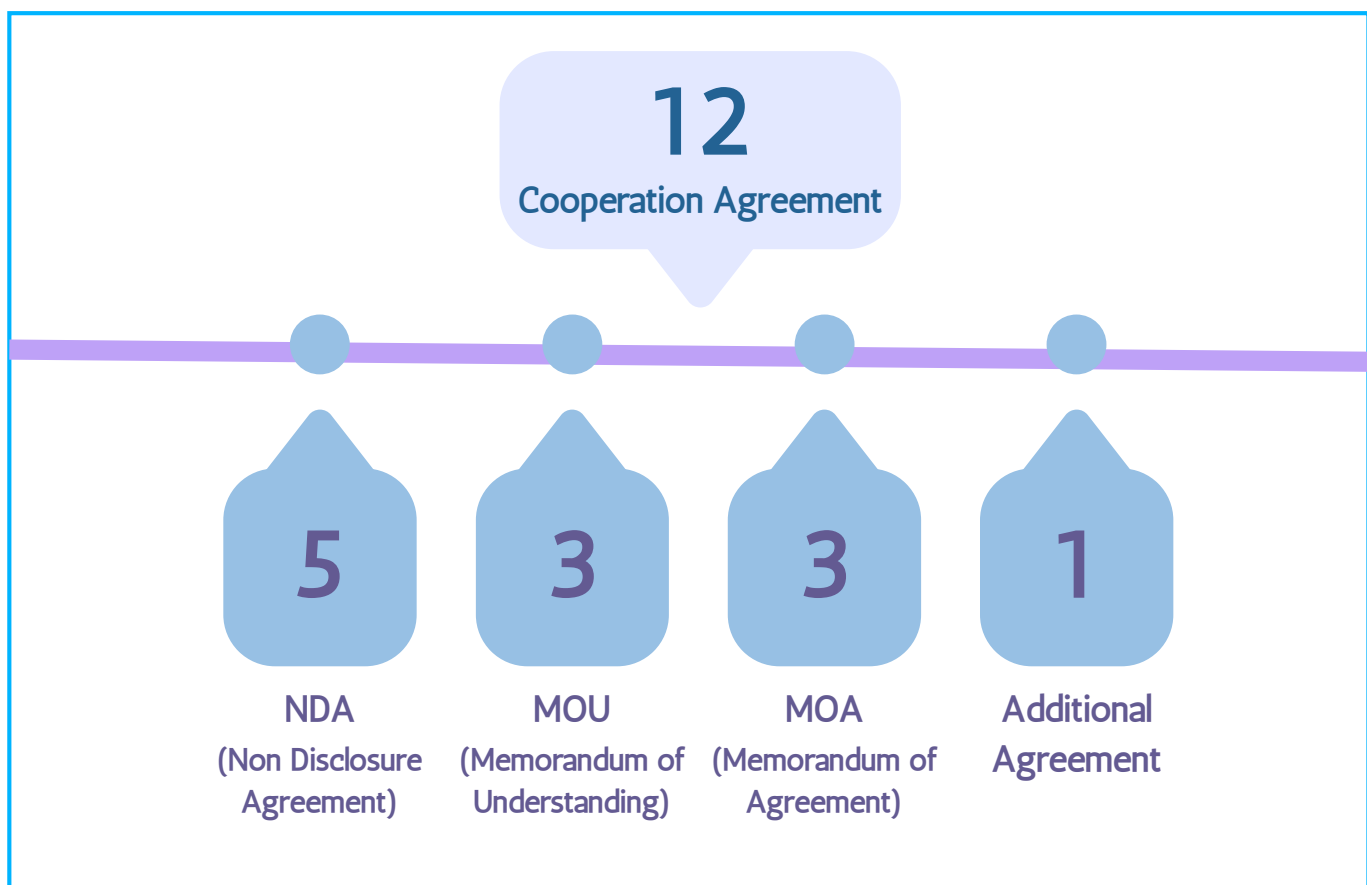


Figure 5.3 : Nuklear Malaysia's Cooperation Agreement 2024

Table 5.2 : List of Cooperation Agreements

	Project Name & Type of Agreement (MOA/MOU/NDA)	Company Name	Project Leader	Agreement Date/Agreement Year
1	Collaboration to Commercialize Radiation Detection Device Products (NDA)	Billion Prima Sdn Bhd	Dr. Nor Arymaswati binti Abdullah	26 December 2023
2	Certification of Competency for RF-EMF Compliance Assessor (DOA)	Malaysia Communications and Multimedia Commission (SKMM)	Roha Tukimin	1 January 2024
3	Cooperation for Radio Frequency (RF) Radiation Monitoring Project For All Types Of Transmitters Telecommunications in Sabah (NDA)	Sunwise Crystal Sdn Bhd	Roha Tukimin	1 February 2024
4	Collaboration Conducting Field Studies and Riverprotec Product Recognition (NDA)	CRT Rebar Marketing Sdn Bhd	Dr. Siti Salwa binti Mohammad Shirajuddin	14 February 2024
5	Commercialization Rice Seed Variety NMR152 and other new varieties from Nuklear Malaysia (MOA)	Pertama Padi (Malaysia) Sdn Bhd	Dr. Sobri bin Hussein	8 May 2024
6	Collaboration for the Commercialization of AP1 Biofertilizer and M99 Biofertilizer (NDA)	Adez Resources	Dr. Phua Choo Kwai Hoe	23 July 2024
7	Cooperation in Organizing the Annual Event of the Malaysian Nuclear Agency (Supplementary Agreement)	MARPA	Nor Hadzalina binti Sukarseh	11 September 2024

	Project Name & Type of Agreement (MOA/MOU/NDA)	Company Name	Project Leader	Agreement Date/Agreement Year
8	Collaboration Commercialization of Micro Bead R&D Products (NDA)	Buroq Resources	Chong Saw Peng	9 October 2024
9	Commercialization Collaboration NURUST Products (MOA)	VP Chemical Sdn Bhd	Dr. Siti Radiah binti Mohd Kamarudin	21 October 2024
10	Strategic Cooperation Concerning Services and Training in the Field of Non-Destructive Testing (NDT) (MOU)	Sirim Academy Sdn Bhd	Nor Hadzalina binti Sukarseh	1 December 2024
11	Technology Development and Facility Management Cooperation Project For Dosimeter Services (MOA)	APM Nuclear Technology Sdn Bhd	Mohd Khalid bin Matori	27 December 2024
12	Strategic Cooperation Concerning Research, Development and Training in the Field of Non-Destructive Testing (NDT) (MOU)	Kolej MCS	Nor Hadzalina binti Sukarseh	30 December 2024

5.3 COMMERCIAL EXPERT SERVICES

Nuklear Malaysia leverages nuclear technology developed through R&D activities to provide and market expert services to the industry. These advisory and expert services are offered to various industry parties and stakeholders interested in strengthening the commercial application of the technology.

Throughout 2024, Nuklear Malaysia has successfully provided expert services to a total of 6,088 customers, representing 2,039 companies across various strategic industry sectors. This achievement reflects the high level of trust and recognition of the technical expertise possessed by Nuklear Malaysia.

In addition, through a network of 21 service centers operating nationwide, Nuklear Malaysia has provided technical services, consulting and training to more than 3,340 customers, both domestically and internationally, since 2018. These services have benefited organizations in sectors such as manufacturing, manufacturing, semiconductors, oil and gas, medical, agriculture, telecommunications, higher education institutions and government agencies.

The provision of these expert services not only contributes to revenue generation, but also strengthens Nuklear Malaysia's position as a center of excellence in the field of nuclear technology, stimulates industrial development, and expands the impact of technology on the country's socio-economic development.



This achievement reflects the high level of trust and recognition of the technical expertise possessed by Nuklear Malaysia.



Table 5.3 : Service Center Commercial Expertise Service Income for the Year 2024

	Service Center	Services	Income (RM)
1	Radioisotope Supply Service Center (BRI)	The Analytical Chemistry Applications Laboratory (ACA) is equipped with analytical instrumentation facilities and capable of providing elemental analysis services for various types of samples (environmental, products, food, etc.) to the public and private sectors.	RM19,910.00
2	Medical Physics Laboratory (MPL)	Providing services for consulting purposes for testing and validation activities (quality control testing) of medical irradiation apparatus and related facilities, testing and validation of lead thickness determination for medical X-ray room shielding and related rooms as well as testing of facilities related to nuclear medicine dose calibration throughout Malaysia Also offering lead equivalence thickness testing services for radiation protection shield samples, PPE integrity testing, radiation scattering testing, thyroid counter calibration.	RM733,157.05
3	Analytical Chemistry Application Laboratory (ACA)	Providing elemental analysis services for various types of samples (environmental, products, food etc.) to the public and private sectors. Also providing training facilities and guidance to university students in operating analytical equipment. ACA Laboratory applies good quality control and quality assurance practices to provide high quality output and it meets international standards.	RM191,880.00
4	Radiochemistry and Environment Laboratory (RAS)	Providing radioanalysis services for the needs of government and private agencies. A national laboratory approved and recognized by the Ministry of Health Malaysia (KKM) to conduct radioactivity measurement analysis in food samples for export purposes and mineral water and packaged drinking water as part of the KKM licensing requirements.	RM1,189,128.00

	Service Center	Services	Income (RM)
5	Materials Technology Group (MTEG)	Conducting R&D&I&C activities in the fields of ceramics, metallurgy, corrosion protection, nanomaterials, biomaterials, radiation shielding, radiation damage, electronic materials, minerals, sensors, heritage preservation, mineral processing and nuclear instrumentation as well as modeling and simulation. MTEG has gained good trust and innovative approaches in performing various characterizations and tests on mechanical, microstructural, morphological, thermal, physical and chemical properties of materials under various conditions.	RM103,000.00
6	Radiation Technology Laboratory (MTS)	Offering reliable analytical methods for material and rubber characterization to academic and industrial users. The MTS laboratory is equipped with state-of-the-art equipment for material characterization work including studies of thermal properties, chemical properties, physical properties and mechanical properties. Also offers consulting services for the preparation of research samples based on polymer blends, synthesis of new products, preparation of nanomaterials and demonstration of methods for the use of radiation for the purpose of material modification.	RM30,444.00
7	Material Structural Integrity Group (MSI-NDT)	MSI-Offers services and consultancy related to structural integrity using Non-Destructive Testing (NDT) techniques for metallic and non-metallic materials, specifically for the civil engineering, shipping and oil/gas industries. Testing usually consists of sampling or testing carried out in-situ in the field. LENDT-Offers expertise, technical support and Advanced Non-Destructive Testing (NDT) facilities to the industry to assess the integrity and quality of materials, components or structures. Among the technologies used are Radiographic Testing - Digital (RT-D), Phased Array Ultrasonic Testing (PAUT) and Infrared Thermography Testing (IRT) Also offers safety assessments, advisory services, courses, training and services in Advanced Non-Destructive Testing.	RM15,164.90

	Service Center	Services	Income (RM)
8	Plant Assessment Technology Group (PAT)	Providing field services including scanning plants and pipes using gamma rays, determining levels between materials using neutrons and using industrial inspection techniques for petrochemical plants, industrial facilities, water treatment plants and other facilities. PAT also has an X-ray and Gamma Computed Tomography laboratory which offers sample scanning services using X-rays.	RM61,392.80
9	Environmental Tracer Application Group (E-TAG)	The use of surveying techniques and stable isotope techniques in environmental studies assists in the management and characterization of groundwater and surface water resources. The use of these techniques has also helped improve water resource management in many countries around the world. Surveying techniques and conventional techniques such as geophysics are used together in research studies such as site exploration, hydrology, fingerprinting studies, measurement of groundwater flow and direction, sedimentology, groundwater contamination and so on.	RM42,780.00
10	Health Physics Group (KFK)	Providing expert monitoring and analysis services in the field of radiation and nuclear safety. Expertise includes the fields of radiological safety and environmental safety. KFK's mission is to ensure a safe and healthy workplace for employees, the public and the environment.	RM417,916.48
11	Waste Technology Development Center (WasTeC)	The National Radioactive Waste Management Centre which has been entrusted by the Government with the management of radioactive waste in Malaysia. WasTeC carries out collection, removal, conditioning, storage and disposal services for radioactive waste obtained from manufacturing industries, hospitals, schools, educational institutions and research laboratories. WasTeC also offers services in the field of municipal solid waste (MSW) management.	RM217,006.49

	Service Center	Services	Income (RM)
12	Standard Secondary Dosimeter Laboratory (SSDL)	Responsible for preparing, maintaining and developing standards for ionizing radiation in Malaysia for the requirements of the Atomic Energy Licensing Act 1984 (Act 304), Radiation Protection (Basic Safety Standards) Regulations 1988 (amended 2010) which covers industry, radiation protection and safety, medicine (radiotherapy and brachytherapy), education and research.	RM1,807,333.08
13	Biological Testing Laboratory (BIOTEST/BIODOS)	The Microbiology Quality Control Laboratory (BIOTEST) offers testing services to meet the quality assurance requirements for products for medical use such as radiopharmaceutical products and medical devices. The Biodosimetry Laboratory (BIODOS) offers chromosomal aberration testing services to analyze the exposure dose of radiation workers in Malaysia.	RM175,356.00
14	MINTec-Sinagama Plant	The MINTec-Sinagama plant uses ionizing energy in the form of gamma rays from a Cobalt-60 source. The irradiation plant operates using the JS10000 (IR-219) which is capable of irradiating a variety of products requiring different doses simultaneously. MINTec-Sinagama operates on a commercial scale for the sterilization or decontamination of medical devices, food, spices, herbs and fruits. MINTec-Sinagama also offers tissue and bone sterilization services via gamma irradiation for tissue banking purposes to relevant authorities such as hospitals and the National Tissue Bank and insect control services in agricultural commodities, including for quarantine purposes	RM374,646.00
15	ALURTRON Plant	Electron beam irradiation (EB) services on products for crosslinking, polymer modification, surface treatment, water treatment, lithography, electron doping and other purposes to support the growth of the industrial sector and research and development (R&D) activities. ALURTRON also provides laboratory testing services and is certified with ISO 9001 Quality Management System (QMS) certification.	RM122,856.16

	Service Center	Services	Income (RM)
16	Plant Development and Prototype Center/Instrumentation and Automation Center (PDC/PIA)	Conducting engineering research and development related to nuclear technology and related technologies including instrumentation, automation and providing engineering consultancy and technical support services. Offering design and manufacturing services in developing the use of nuclear technology. In addition, PDC/PIA offers prototype and automation system development services as well as nuclear instrumentation maintenance training. Radiation pre-vulcanized natural rubber latex (RVNRL) preparation services through the use of gamma rays. This RVNRL can effectively meet the needs of the latex dyeing product manufacturing sector and related industries while promoting the promotion and transfer of RVNRL technology.	RM1,640.00
17	RAYMINTEX Plant	Radiation pre-vulcanized natural rubber latex (RVNRL) preparation services through the use of gamma radiation. This RVNRL can effectively meet the needs of the latex dyeing product manufacturing sector and related industries while promoting the promotion and transfer of RVNRL technology.	RM3,698.34
18	Agro and Bioscience Technology Laboratory (TAB)	Offering a variety of services in the fields of agrotechnology and bioscience. With the expertise and facilities available at TAB, customers can directly apply for the services provided or attend a discussion beforehand to obtain views and advice from experts in the field.	RM223,039.84
19	Non-Ionizing Radiation Group (NIR)	Providing technical support services and expertise related to Non-Ionizing Radiation (NIR) to the industry sector, government agencies and the public. The NIR Group also offers safety assessments, advisory services, courses, training and services in Non-Ionizing Radiation (NIR) from the ELF to UV range.	RM42,290.00

	Service Center	Services	Income (RM)
20	Technology Commercialization Division (BKT)	Coordinate the services of Radiation Protection Officer (RPO) Consultants.	RM149,125.00
21	Center of Nuclear Excellence (CoNE)	Implement training programs in the field of nuclear technology and related technologies for professional groups, public-private industry members, youth and the community. The training programs offered include seven (7) Training Sectors, namely Radiation Safety and Health, Medical Radiation, Non-Destructive Testing, Environmental Safety and Health, Nuclear Science and Engineering, Technology Management and International Training.	RM2,794,111.15
	TOTAL		RM8,715,875.29

5.4 EXPERT SERVICES

A total of 21 expert services were provided, leveraging the expertise of a number of research officers. The services offered encompass various forms of technical support, including:

Table 5.4 : Nuklear Malaysia's Expert Activities and Number of Officers Involved

	Expert Activities	Number of Officers/Experts
1	Consultant/Expert	96
2	Referee/External Examiner	23
3	Evaluation Panel	40
4	Project Leader (funded)	38
5	Supervisor/Co-Supervisor of Students/PhD Projects	10
6	Technical Speaker	52
	TOTAL	152

Nuklear Malaysia is also actively implementing Corporate Social Responsibility (CSR) activities as part of its commitment to community development. Through the implementation of various projects funded under the Malaysia Social Innovation (MySI) Fund by MOSTI, this initiative aims to contribute to improving the socio-economic status of communities in need.

Table 5.5 : Nuklear Malaysia's CSR Project 2024

	Service	Department/ Organization
1	Conducting Radiotracer Technology Tests to Detect Underground Pipe Leaks at the Chemistry Department, Ipoh	Chemistry Department, Ipoh
2	Radiotracer Technology Test to Detect Underground Pipe Leaks at Chemistry Department, Kedah	Chemistry Department, Kedah
3	Radiotracer Technology Test to Detect Underground Pipe Leaks at Chemistry Department, Terengganu	Chemistry Department, Terengganu
4	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Sri Kota, Taiping, Perak
5	Radioactive Waste Transport and Disposal Services by WasTeC	MRSM Taiping, Perak
6	Radioactive Waste Transport and Disposal Services by WasTeC	MRSM Pendang, Kedah
7	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Abdul Jalil, Selangor
8	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Bandar Kota Tinggi

	Service	Department/ Organization
9	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Tun Habab, Kota Tinggi, Johor
10	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Laksamana, Kota Tinggi, Johor
11	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Bandar Easter, Kota Tinggi, Johor
12	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Air Tawar, Kota Tinggi, Johor
13	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Semenchu, Kota Tinggi, Johor
14	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Adela, Kota Tinggi, Johor
15	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Munshi Abdullah, Melaka
16	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Tinggi Kluang, Johor
17	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Canossion Convent, Kluang, Johor
18	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Tinggi Muar
19	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Tengku Aris Bendahara, Johor
20	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Sultan Abdul Jalil, Johor

	Service	Department/ Organization
21	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Kahang, Johor
22	Radioactive Waste Transport and Disposal Services by WasTeC	Kolej Tun Datu Tuanku Haji Bujang, Sarawak
23	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Sungai Paoh, Sarikei, Sarawak
24	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Simanggang, Sarawak
25	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Tung Hua, Sibu, Sarawak
26	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Melugu, Sarawak
27	Radioactive Waste Transport and Disposal Services by WasTeC	SMK Rosli Dhoby, Sarawak
28	Mission to search for victims of landslide at Masjid India using Ground Penetrating Radar (GPR) equipment	Fire and Rescue Department

5.5 NATIONAL AND INTERNATIONAL TRAINING PROGRAMS

The Center of Nuclear Excellence (CoNE) continues to play a key role in driving the transfer of expertise from Nuklear Malaysia to industry and stakeholders. Through the implementation of various strategically designed and structured training programmes, CoNE has successfully enhanced capacity and technical skills in the field of nuclear technology.

This effort not only supports the local talent and skills development agenda, but also strengthens Nuklear Malaysia's position as a trusted training provider and leader in the field of international-class nuclear training.

Table 5.6 : List of Commercial Trainings in 2024 by Sector

Sector	Scheduled Courses	Agency Basis	Annual Event	NTW HRDC	Others (PGEC, Fellowship)
RSH	58	5	2	-	-
MXR	22	-	-	1	-
NDT	18	6	1	2	-
ESH	7	9	1	2	-
NSE	1	2	1	1	-
MGT	5	-	1	1	-
International Training	-	-	-	-	9
TOTAL	111	22	6	7	9
TOTAL	155				



Photo 5.1 : International Basic and Training Course Organized by CoNE



6.0

TECHNICAL SERVICES

6.0 TECHNICAL SERVICES PROGRAMME

Nuclear research and development (R&D) activities in Malaysia are carried out in accordance with the direction of Strategic Thrust 3 of the Nuklear Malaysia Vision 2030 (WNM2030), which emphasizes the provision of efficient and effective technical support services to support the implementation of R&D and service delivery. From an overall perspective, the various initiatives planned under WNM2030 have been successfully implemented by Nuklear Malaysia over the medium term.

Technical services are one of the core activities of Nuklear Malaysia that are important to ensure that R&D activities can be carried out excellently. Planning related to technical services is outlined in Strategic Thrust 3 of the Nuklear Vision Malaysia 2030, the delivery of effective and efficient technical support services.

6.1 TECHNICAL SUPPORT SERVICE ACHIEVEMENTS

In 2024, several strategic initiatives under this thrust have shown significant progress:

Strategy 1: Strengthening Cybersecurity Control Management through Smart System Development

Table 6.1 : Cyber Security Control Strengthening Activities

Initiative	Activities	Status	Leader
Cyber Security Control Strengthening Activities	Development of data integration design from various related log and recording systems (CCTV, CACS, internet browsing)	Has been implemented	Technical Support Division (BST)
	A pilot integration system (CCTV and Alert System - LCOSMOS and NAFAS)	Has been implemented	
	An IoT platform development study covering IoT technology requirements in Nuclear Malaysia, IoT technology hardware and software	Has been implemented	
	An IoT platform has been developed at the Agency's Data Center, with a series of tests	Has been implemented	

Strategy 2 : Provide Accelerator Technology Development Infrastructure to Contribute to National Socio-Economic Growth

Table 6.2: Status of Accelerated Technology Development Infrastructure

	Initiative	Activities	Status	Leader
1	Development of a Multipurpose Commercial 30 MeV Cyclotron Facility	Feasibility study report on the development of a 30 MeV cyclotron facility for medical use in Malaysia	Has been provided	Technical Support Division (BST) Medical Technology Division (BTP)
2	Sustaining Electron Beam Irradiation Services	Two SRF funding applications	Has been developed	Technical Support Division (BST)
		A draft of the feasibility of smart sharing	Has been developed	
		Draft SWOT analysis of smart partnerships with the private sector	Has been developed	
		Increasing the capacity of the Irradiation Plant Dosimetry Laboratory	Two staff members were trained	

Strategy 3 : Increase and Develop R&D Activities to Produce Current Source Generators (Ions and Electrons)

i,	IEC Device Development: The Towards to Fusion Technology: Fundamental Course was held in July 2024.
ii.	Increasing Applications of 200 keV Low Energy Electron Accelerators: Two new applications have been explored: Micropowder production from PTFE waste using radiation, and radiation-assisted pyrolysis of polyolefin waste.

Strategy 4 : Leading R&D in Nuclear Reactor Technology and its Applications

i.	Development of Multipurpose Research Reactor (MPR): Preparations to apply for and receive the IAEA expert mission (INIR-RR) have been made, by signing a consultant service contract, preparing an inception report, and organizing a management engagement workshop. An interim report from the consultant was received on 25 October 2024. Meanwhile, the strategic plan report for the MPR program development is being harmonized.
ii.	Ensuring the Safe Operation of RTP and Improving Its Utilization: Funding for the development of a new research facility at RTP's beamport no. 2 has been successfully secured. RTP is also looking into the feasibility of sourcing new fuel to increase its use. However, the procurement of new nuclear fuel has not proceeded due to difficulties in sourcing suppliers and funding constraints..
iii.	Developing the RTP Aging Management Program (AMP): A technical discussion workshop to strengthen the RTP aging program was held in April 2024. The RTP aging program document was also strengthened with IAEA experts in June 2024. A workshop to review the draft RTP decommissioning plan document with the IAEA was also completed in February 2024..
iv.	Developing Human Capital in Innovative and Advanced Reactor Technology Systems: The Reactor Technology training module that was developed was used in the "Essential Knowledge on Nuclear Reactor Technology" training for TNB Integrated Learning Solution - ILSAS in February 2024.

Strategy 5 : Localization of Nuclear and Radiation Technology Development**i. Development of Design Capabilities for Components, Processes, Plants, Equipment and Nuclear Facilities:****Table 6.3 : Status of Technology Development**

	Developed Technology	Status	Unit
1	Design, fabrication and testing (cold test) of radioactive storage capsules	Completed	Center for the Development of Plant and Prototype (PDC)
2	Automated Welding Machine Project	Completed physical fabrication	
3	Feasibility study proposal for the reuse of Spent Radioactive Sources from Sinagama to Raymintex	Completed	
4	Programming the essentials of Automated Welding Machine control	Completed	
5	Development of a survey meter prototype: • G2 Tag Radig Meter (for esseney) • Low - Cost Survey Meter for Education	Has been produced	Instrumentation and Automation Center (PIA)
6	Industrial Design (ID) for G2 Tag Radig Meter	Has been obtained	
7	A technical report on the feasibility study of the Low - Cost Survey Meter for Education	Has been produced	
8	A prototype Radiation Mapping Mobile Robot (AmoRA)	Has been developed	
9	A technical report on the usability study of AmoRA	Has been produced	

	Developed Technology	Status	Unit
10	Procurement activities for research tools and fabrication of Proof of Concept (POC) components	Has been implemented	Non-Destructive Testing (NDT)
11	Circuit testing for a semiconductor nuclear detector development project using Schottky Diodes	Has been implemented	
12	Development of process and methodology for fabrication of tools for nuclear detection essence and detection effectiveness testing (CCE)	Has been carried out	

i.	Strengthening and Consolidating the Handling of Radioactive Materials (PDC): The Mobile Hot Cell (MHC) licensing has been approved by the Atom Malaysia (JTA) under a class G license. The MHC Workshop with the International Atomic Energy Agency (IAEA) for operational preparation was completed in May 2024.
ii.	Strengthening Nuclear Equipment Development and Maintenance Capabilities (PIA): Estimated expenditure for the required equipment/hardware has been identified and included in the 13th RMK application proposal. High voltage and linearity testing procedures have been developed.

Strategy 6 : Developing New P&P Applications and Gamma Irradiation Services

i.	Strengthening Capabilities and Ensuring Safety and Security Compliance for Irradiation Services: A Safety Analysis Report (SAR) has been developed.
ii.	Development of New Applications of Gamma Irradiation: A <i>rambutan</i> irradiation procedure was developed and an irradiation of historical artifacts was carried out in the first quarter.

iii. Development of Latex Vulcanization Process Based on Irradiation Technology:

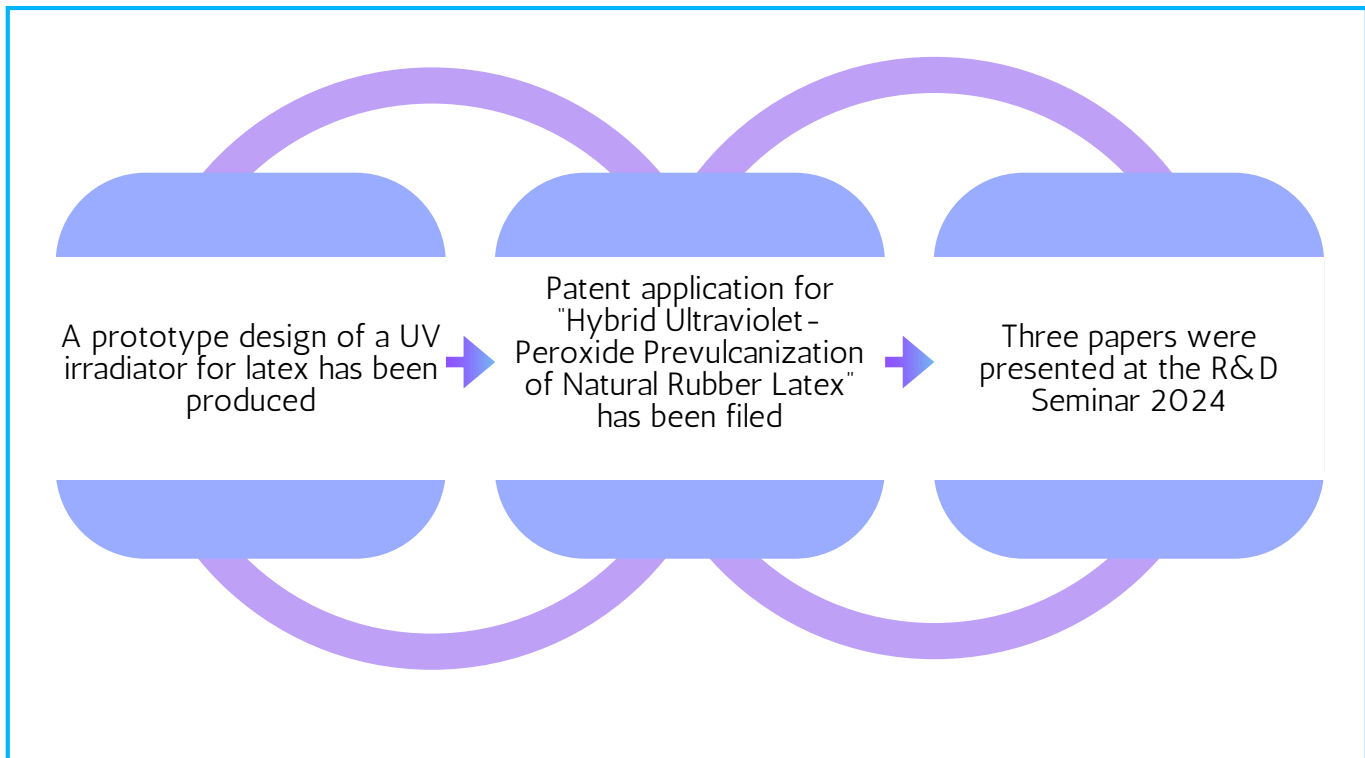


Figure 6.1 : Development of Latex Vulcanization Process Based on Irradiation Technology

6.2 TRIGA PUSPATI REACTOR (RTP)

The TRIGA PUSPATI Reactor (RTP), the only nuclear research reactor in Malaysia, stands as a testament to the country's achievements in nuclear science and technology. Since its commissioning on 28 June 1982, RTP has been a key player in advancing the country's nuclear agenda. For over four decades, the reactor has not only been a catalyst for cutting-edge research and development (R&D), but also an important hub for technical training and seminars, nurturing a new generation of nuclear scientists and engineers. Under the management of Nuklear Malaysia, RTP has contributed significantly to various sectors, including medicine, industry, agriculture and the environment. Among its major achievements are :

- **Radioisotope Production:** Providing essential radioisotopes for medical purposes, such as cancer diagnosis and treatment, as well as for industrial applications such as non-destructive testing (NDT).
- **Neutron Activation Analysis (NAA):** Provides accurate analytical services for a variety of samples, assisting in environmental, geological, and archaeological research.
- **Advanced Research:** Becoming a platform for research in the fields of reactor physics, materials science, and radiation technology, placing Malaysia on the global nuclear research map.

Despite being over 40 years old, RTP continues to operate with an excellent safety record, without any incidents affecting public safety or the environment. This is a result of a rigorous maintenance programme, continuous system modernization, and strict adherence to international safety standards regulated by Atom Malaysia.

a) Empowering Research Through Irradiation Services

Throughout 2024, the TRIGA PUSPATI Reactor has once again proven its role as a strategic national research infrastructure. With 367 hours of operation, the RTP has actively supported the research and industrial community, attracting a total of 146 users from various institutions and backgrounds. 2024 saw irradiation activities with a total of 2,382 samples successfully processed. Researchers have used various irradiation facilities such as the Pneumatic Transfer System (PTS) and Rotary Rack (RR) for neutron activation analysis, as well as utilizing specialized instruments including the Neutron Diffractometer (ND) and Small Angle Neutron Scattering (SANS) for detailed material structure studies.

The variety of samples analyzed this year reflects the wide range of RTP's contributions to science and technology, including:

- **Life Sciences and Agriculture:** Samples of flora, fauna, animal organs, rice, and cancer cells for biological and medical research.
- **Geology and Environment:** Analysis of soil, sediment, sludge, and gypsum for the purpose of environmental monitoring and geological exploration.
- **Advanced Materials and Industry:** In-depth study of industrial minerals such as tin slag, ilmenite, and zircon; rare earth materials; building materials such as concrete blocks; and modern technology components including batteries, electronic materials, ceramics, and polymers.
- **Physics and Dosimetry:** Irradiation of dosimeters and pure elements such as holmium, samarium, and gold for calibration and fundamental physics research.

b) Integrity and Reliability: The Main Focus of RTP Maintenance

For a nuclear facility such as the TRIGA PUSPATI Reactor, operational safety and reliability are absolute priorities. The foundation for both of these principles is a comprehensive and meticulously implemented maintenance program.

Reactor maintenance is not just about repairing faults. It is a proactive approach to ensuring that every component, system, and structure is functioning at an optimal and safe level. This activity is divided into two main categories :

- **Preventive Maintenance:** This is work that is planned and scheduled on a regular basis, like an annual health check-up for humans. The purpose is to inspect, test, and service equipment to detect and prevent any potential problems before they occur. It involves activities such as calibrating instruments, checking component integrity, and replacing parts according to their intended lifespan.
- **Corrective Maintenance:** This is the action taken to repair unexpected equipment damage or failure. The main goal of a good preventive maintenance program is to minimize or completely eliminate the need for corrective maintenance..

Table 6.4 shows the breakdown of time spent to ensure RTP continues to operate safely and efficiently throughout 2024. A total of 1,256 hours were recorded for scheduled maintenance activities and improvement works.

A particularly impressive performance indicator for 2024 was the zero hours recorded for unscheduled maintenance. This means that there were no unexpected breakdowns or incidents that required the reactor to be shut down for repairs, thus proving the effectiveness of the preventive maintenance program implemented..

The following is a further description of the data in the table. :

i.	Annual & Semi-Annual Maintenance (Total: 296 hours): This refers to comprehensive preventive maintenance activities. The main session is conducted at the beginning of the year (January-February) and another mid-year session is held in July. This activity involves a comprehensive inspection of the reactor's mechanical, electrical, and instrumentation & control systems..
ii.	Improvement Works (Total: 960 hours): In addition to routine maintenance, a large portion of the reactor downtime this year (from March to August) was dedicated to a significant upgrade project. This project is the "Upgrade of the Emission Stack Monitoring System

Radionuclide Effluent." This is work to modernize and improve the capabilities of the safety monitoring system on the reactor air discharge stack. This system functions as an automatic safety guard that constantly monitors and measures any release of radioactive materials into the air to ensure that it is always at very low and safe levels, in line with the limits set by the authorities. The investment in this upgrade demonstrates a continued commitment to adopting the latest technology to ensure the safety of the environment and the public.

Table 6.4 : RTP Maintenance Data for the Year 2024

Month	Scheduled Maintenance (Hours)					Uncontrolled Reactor Information
	Yearly	Semi Annual	Improvements	Unscheduled (Hours)	Amount (Hours)	
January	192	0	0	0	192	• RTP annual maintenance activities 2024 (January to February 2024) • RTP 2024 semi-annual maintenance activities (July 2024) • Works to upgrade the RTP Radionuclide Effluent Emission Stack Monitoring System (March to August 2024)
February	0	0	0	0	8	
March	0	0	160	0	160	
April	0	0	176	0	176	
May	0	0	184	0	184	
June	0	0	160	0	160	
July	0	96	160	0	256	
August	0	0	120	0	120	
September	0	0	0	0	0	
October	0	0	0	0	0	
November	0	0	0	0	0	
December	0	0	0	0	0	



Photo 6.1 : Inspection of Reactor Control Rod System



Photo 6.2: Installation of Nuclear Fuel Integrity Inspection Equipment



Photo 6.3 : RTP Control Rod Drive Maintenance



Photo 6.4 : Visual Inspection of the Nuclear Reactor Core

c) Strategic Planning and Future Development of Reactors

i. **Interim Report Assessment Meeting for the Feasibility Study Project for the Replacement Plan for the TRIGA PUSPATI Reactor**

As a key milestone in planning for the sustainability of the country's nuclear technology, a strategic meeting was held to assess the Interim Report of the Feasibility Study Project for the TRIGA PUSPATI Reactor Replacement Plan.

Held from 14 to 16 August 2024 at the Avillion Hotel, the assessment session saw extensive engagement from 45 participants representing a wide spectrum of stakeholders. The presence of various agencies and institutions underscored the national importance of this project, including:

- Policy Makers and Regulatory Bodies: Ministry of Science, Technology and Innovation (MOSTI) and Department of Atomic Energy.
- Security and Strategy: Office of the Chief Government Security Officer (KPKK) of Selangor State and Institute of Strategic and International Studies (ISIS) Malaysia.
- End Users and Industry: National Cancer Institute, Tenaga Nasional Berhad (TNB), and Malaysian Industry-Government Group for High Technology (MIGHT).
- Academic and Research Institutions: Universiti Tenaga Nasional (UNITEN) and Universiti Tun Hussain Onn Malaysia (UTHM), with the Malaysian Nuclear Agency as the lead.

The main focus of the meeting was to review and provide critical feedback on the interim report prepared by the accredited consultant. The report specifically analyzed the need and justification for the development of a Multipurpose Reactor (MPR) as a strategic successor to the RTP, which is now approaching the end of its operational life.

ii. **New Research Reactor Strategic Plan Workshop**

Moving to the next phase in realizing the country's new research reactor agenda, the Reactor Technology Centre (PTR) has taken a proactive initiative by organizing the New Research Reactor Strategic Plan Workshop.

The workshop, which took place from 18 to 20 September 2024 at the Lexis Hotel, Port Dickson, successfully brought together 42 participants. The brainstorming session involved synergy between in-house experts from the Malaysian Nuclear Agency with representatives from ministries, key industry players, as well as academics from public and private higher education institutions.

The main objective of the workshop was to develop an initial draft of a holistic strategic plan. The discussions focused on several key pillars that will form the basis for the success of this project, including:

- **Governance and Management:** Covers project and operational management strategies, as well as comprehensive stakeholder mapping.
- **Operational and Technical Framework:** Detailing aspects of facility operations and developing a robust long-term maintenance program.
- **Financial Framework and Licensing:** Reviewing the projected financial allocations required and outlining the licensing application process with the authorities.

The outcome of this workshop is a draft strategic plan that will serve as a basic reference document to guide the next phases of development. It is an important step in ensuring that this new research reactor project is implemented with careful, transparent, and comprehensive planning..



Photo 6.5 : Participants in the New Research Reactor Strategic Plan Workshop

iii. **RTP Structural, System and Component Aging Management Program Development Workshop**

As part of the ongoing commitment to long-term safety and reliability, a Workshop on the Development of the Ageing Management Program for Structures, Systems and Components (SSC) was organized. This initiative is a proactive step to ensure that the TRIGA PUSPATI Reactor continues to be managed in line with international best practices for nuclear facilities.

This intensive workshop was held from 24 to 26 April 2024 at AVI Pangkor Beach Resort, Perak. It involved the participation of 31 core personnel directly responsible for the operation and maintenance of the RTP.

The session aimed to collectively develop and strengthen the RTP aging management plan, with discussions focusing on the following critical elements:

- **Strategy and System Development:** Formulate a comprehensive aging management strategy and develop a cross-referencing system to enable more systematic, planned and organized implementation.
- **Long-Term Financial Planning:** Planning sustainable financial allocations to cover operation and maintenance needs related to the effects of aging materials and components.
- **Sharing Experiences and Solving Challenges:** Holding open discussions on issues, challenges, and problems faced to identify the best solutions together.

The output from this workshop became an important foundation in formalizing the RTP aging management plan, ensuring that each critical asset is carefully monitored and managed..



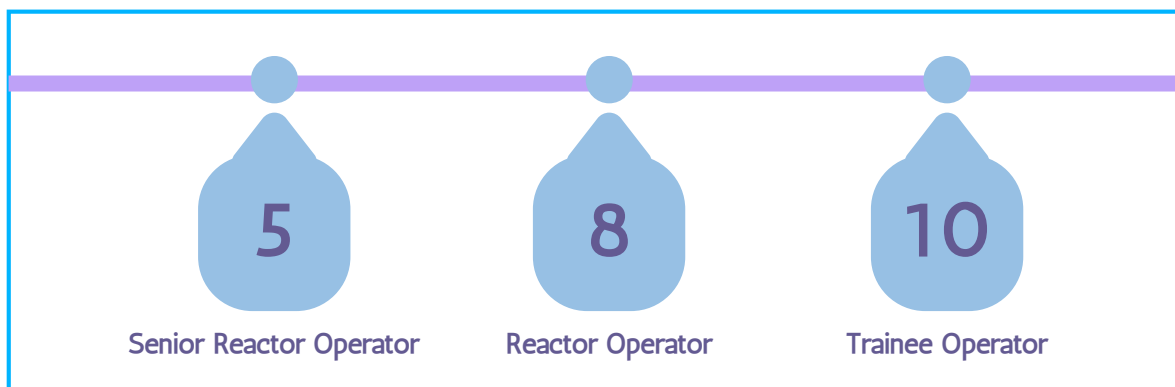
Photo 6.6: Discussion Session in the Structure, System and Aging Program Development Workshop RTP components

d) Nuclear Competence Development and Safety

i. Review Course for Recertification of Reactor Operators and Senior Reactor Operators

In line with its commitment to maintaining the highest operational and safety standards, the Reactor Technology Centre has organized a Refresher Course for the Recertification of Reactor Operators and Senior Reactor Operators. This programme is a critical component in ensuring that all operational personnel have up-to-date knowledge and recognized competencies.

This preparatory course was attended by 23 PTR staff, covering the entire spectrum of the operational team:



As a highlight of the programme, a total of 13 licensed operators sat for the recertification examination which was conducted between July and September 2024. It was reported that all candidates successfully passed. This outstanding success not only confirms the high level of expertise and preparedness of the RTP operations team, but also provides ongoing assurance of safe reactor operation and full compliance with the requirements set by the regulatory body.



Photo 6.7 : Course to Strengthen Understanding of System Operation and Reactor Control

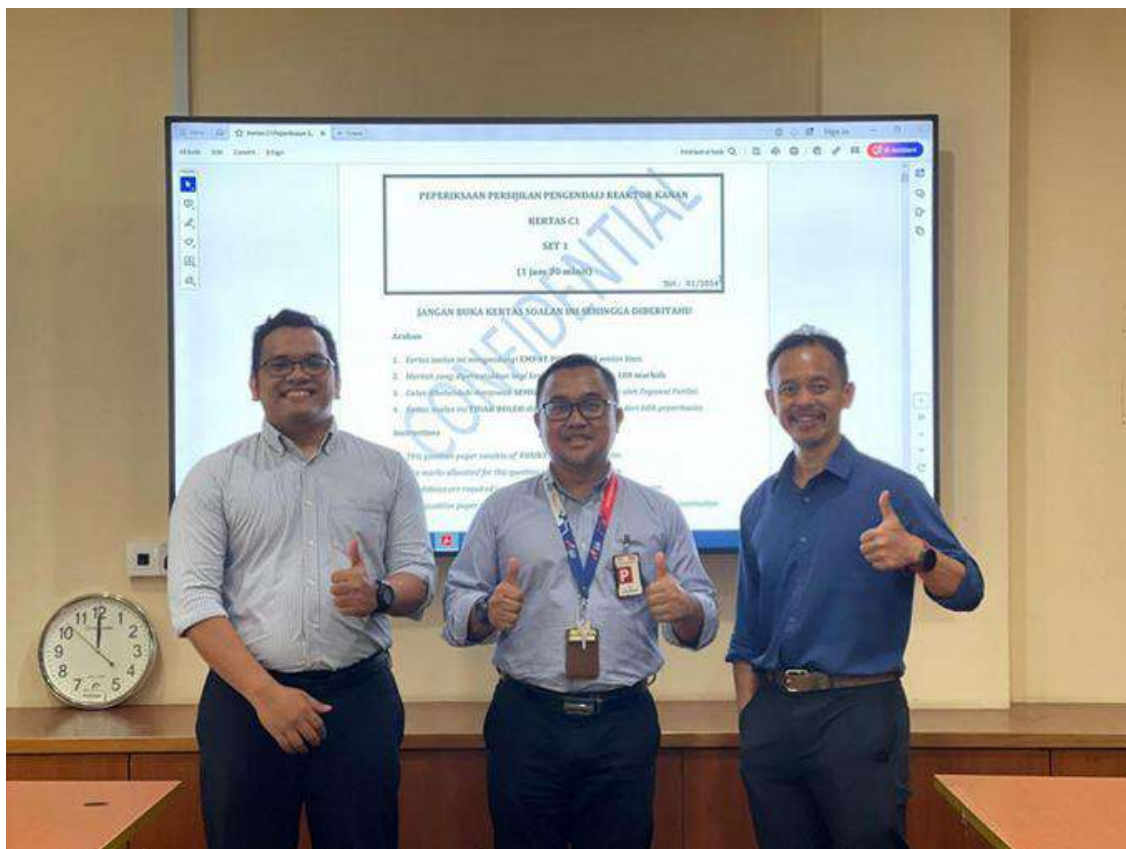


Photo 6.8 : Reactor Operating Officer Completed Oral Test Conducted by the Department of Atomic Energy



Photo 6.9 : Reactor Operator Explains Operation and Safety Evaluation Steps



Photo 6.10 : New Reactor Operator Completes Practical Exam

ii. **Safety, Security and Regulatory (3S) Colloquium of the TRIGA PUSPATI Reactor Facility**

In an ongoing effort to strengthen a safe and secure work culture, the Safety, Security and Regulatory (3S) Colloquium was successfully organized on 8 August 2024 at the Malaysian Nuclear Agency. This initiative is a strategic platform to strengthen technical understanding and update knowledge among employees of the TRIGA PUSPATI Reactor (RTP). The colloquium, which brought together 30 participants, focused on the three critical aspects (3S) that are the backbone of the operation of a nuclear reactor. This knowledge sharing session featured four important topics presented by RTP's own internal experts. The organization of this colloquium played an important role in improving procedures related to the 3S system. More importantly, the resulting input and discussions will be channeled directly to further strengthen the quality assurance program, especially in strengthening training modules for Reactor Operators in the future.

Table 6.5 : RTP 3S Colloquium

Date	Sharing Title	Presenter
8/8/2024	Safeguards and Nuclear Material Accounting (NMAC)	Ts. Mohd Fairus bin Abdul Farid
	Nuclear Safety and Security Culture	Mrs. Nurfarhana Ayuni binti Joha
	Radiation Protection Safety	Tn. Syed Asraf Fahlawi Wafa bin Syed Mohd Gazi
	Computer Security Challenges	Mr. Mohd. Khairulezwan bin Abdul Manan

iii. **Professional and Industrial Training**

The TRIGA PUSPATI Reactor places human capital development as one of its strategic cores, with a two-pronged approach: empowering internal staff competencies and actively contributing to the development of the country's nuclear talent ecosystem.

This commitment is reflected in the planning and implementation of ongoing training programmes. They are specifically designed to ensure that every staff member, from technicians to research officers, is always equipped with the latest skills and in-depth knowledge in line with international best practices. This is essential to ensure the highest level of professionalism and efficiency in every aspect of operations and research at RTP.

In addition to its internal focus, RTP also plays an important role as a training and knowledge sharing center. RTP actively opens its doors to engagement in various platforms to foster and disseminate technical knowledge. Among the initiatives undertaken are:

- International Cooperation: Engage in training programs at the global level to share and gain the latest expertise.
- Joint Training with the Centre of Nuclear Excellence (CoE): Working closely with the Centre of Nuclear Excellence (CoNE) in organizing a series of specialized trainings.
- Attachment Training: Placing and accepting staff for attachment programs at various relevant institutions locally and abroad for the purpose of technology and knowledge transfer.
- Industrial Training: Providing a platform for guidance and practical exposure to students of higher learning institutions, to foster the next generation in the field of nuclear technology.

Through these initiatives, RTP not only ensures its own operational excellence, but also strengthens its position as a strategic national asset in the development of highly skilled human resources.



Photo 6.11 : RTP Research Reactor Aging Management Program Empowerment Expert Mission



Photo 6.12 : PUSPATI TRIGA Reactor Decommissioning and Ageing Management Plan Expert Mission



Photo 6.13 : LabVIEW Instrumentation and Control Course



Photo 6.14 : Participants of the 3rd Fellowship Program on the Inspection and Enforcement of Radiation Facilities, NRRC Saudi Arabia



Photo 6.15 : Participants of the 11th National Training Course on Reactor Engineering

e) Public Outreach and Stakeholder Engagement

i. Visit Program to TRIGA PUSPATI Reactor and Simulator

The TRIGA PUSPATI Reactor (RTP) continues to play its role as a hub for education and public outreach in the country's nuclear science and technology. Throughout 2024, we were pleased to open our doors to over 60 tour groups, involving a total of 1,442 visitors.

The diverse profile of visitors who attended reflected the importance of RTP to various levels of society and sectors. These visits were not only intended to provide technical exposure, but also to build confidence and foster collaboration. Among the major delegations received were:

- Policymakers and National Governance: Members of Parliament, top-level delegations from the Ministry of Energy Transition and Water Transformation (PETRA), as well as MyPower Corporation.
- National Security and Defense: Senior officers from the Royal Malaysian Air Force (RMAF) and the Office of the Chief Government Security Officer (CGSO) of Selangor.
- International Network: Experts from the International Atomic Energy Agency (IAEA) and academic delegation from China-ASEAN College of Marine Sciences, Xiamen University.
- Education and Talent Development: The finalists of the Malaysia Nuclear Science Olympiad, as well as a group of students from various schools and maahad *tahfiz* institutions from across the country.
- Industry and Media: Representatives from leading solid waste management companies such as *Alam Flora* and media outlets such as *Siakap Keli*.

Through this tour program, RTP is not only showcasing its technological capabilities, but more importantly, it is building a bridge of understanding between the nuclear community and the public.



Photo 6.16 : Ergonomic Factors and Mental Workload Awareness Program for Reactor Operators by UNITEN



Photo 6.17 : Visit of YB Tuan Haji Akmal Nasrullah bin Mohd Nasir, Deputy Minister Ministry of Energy Transition and Water Transformation (PETRA)



Photo 6.18 : Visitors from the Royal Malaysian Customs Department



Photo 6.19 : Visit of Siakap Keli Media Representatives to RTP



Photo 6.20 : Student Visit from Maahad Tahfiz Ismail to the RTP Simulator



Photo 6.21 : Visit of Participants of the 11th National Training Course 2024 on Nuclear and Radiological Emergency Preparedness (NREP)

i. **Reactor Get Together Program (RG2G)**

To instill a dynamic culture of knowledge sharing and foster teamwork, the Reactor Get Together (RG2G) Program continued throughout 2024. The program serves as a relaxed yet impactful internal platform where Reactor Technology Center members can share knowledge, experiences, and best practices on a peer-to-peer basis.

Throughout the year, four RG2G series were held, focusing on several key themes that support RTP's operational excellence:

- **Modernization and Digital Transformation**

- The main focus of this year's sessions was towards digital transformation in daily operations. This initiative is essential to increase efficiency and reduce reliance on manual processes. Topics presented included a demonstration of the Digital Operational Checklist System using an iPad, training on adapting to Network Attached Storage Systems (NAS), and improvements to data entry procedures..

- **Knowledge Sharing and Experience Transfer**

- RG2G has become an important medium for knowledge transfer. A valuable session was held where a retiring officer shared his experience and knowledge, ensuring that veteran knowledge and expertise can be passed on to the next generation. In addition, staff who attend international workshops and courses, such as those organized by the International Atomic Energy Agency (IAEA), also share global inputs and perspectives with colleagues.

- **Wellbeing and Human Factors in Operations**

- Recognizing the importance of human capital in ensuring safety, a special session was organized in collaboration with experts from Universiti Tenaga Nasional (UNITEN). This session discussed "Ergonomic Factors and Mental Workload Awareness", which aimed to raise awareness about the management of mental and physical workload for reactor operators. This is a critical aspect in maintaining the highest level of focus and performance.

Overall, the RG2G program has succeeded in creating a positive and open learning environment. It not only speeds up the process of adapting to new technologies, but also strengthens the professional bonds and camaraderie among the RTP team, which is the foundation for excellent and safe operations.

Table 6.6 : Reactor Get Together Program (RG2G)

Date	Sharing Title	Presenter
Session I 1/2/2024	Demonstration Session "Operation Checklist using Digital Forms in iPad System"	Mr. Amirudin bin Mohamad Rosli
	Network Attached Storage System (NAS) Adaptation Training at RTP	Mr. Mohd. Khairulezwan bin Abdul Manan
Session 2 29/5/2024	Sharing of experience and knowledge by retiring officers	Mr. Roslan bin Md Dan
	International Workshop on Management of the Response to a Nuclear Security Event at Nuclear Facilities	Mr. Mohd. Khairulezwan bin Abdul Manan
	IAEA International School on Nuclear and Radiological Leadership for Safety	Mr. Muh Kasim bin Abdul
	OptOur Data Entry	Mr. Amirudin bin Mohamad Rosli

Date	Sharing Title	Presenter
Session 3 4/10/2024	Changes to the Initial and Final Operation Checklist for RTP Motor Drives	Ts. Dr. Mohd Sabri bin Minhat
	ICT Incident Management	Mr. Mohd. Khairulezwan bin Abdul Manan
Session 4 6/11/2024	Ergonomic Factors and Mental Workload Awareness for Reactor Operator at Reaktor TRIGA PUSPATI	Ms. Nurainaa binti Kabilmiharbi (UNITEN)





7.0

INTERNATIONAL RELATIONS

7.0 INTERNATIONAL RELATIONS

The development of nuclear science and technology is strengthened through strategic cooperation and ongoing international relations, both at the regional and global levels. This effort plays an important role in supporting the implementation of various technical programs that include research and development (R&D) and human capital development, to strengthen the country's capabilities and expertise. Its implementation involves multilateral cooperation platforms such as the International Atomic Energy Agency (IAEA), Regional Cooperation Agreements (RCA), Forum for Nuclear Cooperation in Asia (FNCA), Comprehensive Nuclear-Test-Ban Treaty (CTBT), in addition to bilateral relations that continue to be strengthened with strategic partner countries.

In addition, technical services in this field are also strengthened through compliance with International Standards Certification (ISO), particularly to ensure quality, transparency and efficiency of delivery, in line with global best practices.

7.1 IAEA – MALAYSIA TECHNICAL COOPERATION PROGRAMME

The technical cooperation programme is the IAEA's main mechanism for transferring and building expertise in nuclear technology to member states. Through this cooperation, the IAEA helps Malaysia build, strengthen, and maintain human and institutional capacity for the safe, secure and secure use of nuclear technology to assist the development of national science and technology. This cooperation involves various priority areas of national development such as health and nutrition, food and agriculture, water and environment, industrial applications, safety and security, energy and nuclear power planning, and nuclear knowledge development and management. Overall, a total of 82 IAEA technical cooperation projects are being utilized for the development of national nuclear technology.

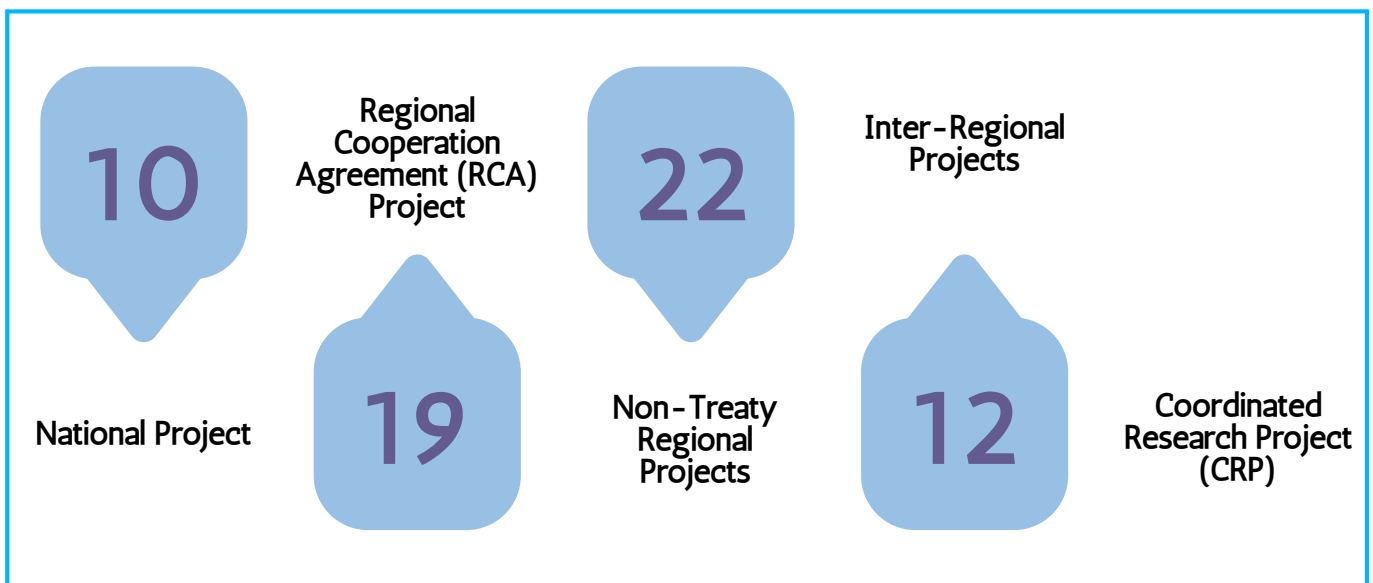


Figure 7.1 : List of Projects under the IAEA Technical Cooperation Programme 2024

Table 7.1 : Number of IAEA Technical Cooperation Projects for the Years 2021 – 2024

Project	2022	2023	2024
National Projects	5	5	10
Regional Cooperation Agreement Project (RCA)	19	17	19
Non-Treaty Regional Projects	20	20	22
Inter-Regional Project	8	8	12
Coordinated Research Projects (CRP)	16	16	19

a) IAEA General Conference

The IAEA General Conference is one of the two main policy-making bodies of the IAEA, in addition to the Board of Governors. It is responsible for discussing policy issues, direction and the implementation of the agency's main mandate. As a member state of the IAEA, Malaysia has participated in the IAEA General Conference every year as a commitment to international cooperation in the peaceful use of nuclear technology. In 2024, the Malaysian delegation led by the Director General of the Malaysian Nuclear Agency attended the 68th IAEA General Conference which took place from 16 to 20 September 2024 in Vienna, Austria. The delegation was also joined by several officials from the Malaysian Embassy and Permanent Mission to Austria as well as representatives from the Department of Atomic Energy. Throughout the conference, the Malaysian delegation participated in several bilateral meetings with the IAEA and strategic partner countries to strengthen technical and policy cooperation. The delegation also attended the IAEA Scientific Forum themed Atoms4Food – Better Agriculture for Better Life which emphasized the role of nuclear technology in supporting the agricultural sector and global food security.



Photo 7.1 : Bilateral Meeting with the IAEA Technical Cooperation Department 20 September 2024



Photo 7.2 : Technical Sharing by Dr. Zaiton Ahmad during the IAEA Scientific Forum

b) IAEA Ministerial Conference on Nuclear Science, Technology and Applications and the Technical Cooperation Programme

Malaysia participated in the IAEA Ministerial Conference on Nuclear Science, Technology and Applications and the Technical Cooperation Programme, which took place from 26 to 28 November 2024 in Vienna, Austria. The conference brought together ministers, senior officials and policymakers from over 120 IAEA member states to discuss the role of nuclear technology in addressing global challenges such as food security, climate change, health and water resource management.

The Malaysian delegation was led by YBrs. Dr. Rosli bin Darmawan, Director General of the Malaysian Nuclear Agency, who delivered the country's statement during the conference session. In his speech, he expressed Malaysia's commitment to the peaceful use of nuclear technology, in line with the implementation of the National Nuclear Technology Policy 2030. He also highlighted Malaysia's active participation in various key IAEA initiatives such as Atoms4Food, NUTEC Plastics, Rays of Hope and ZODIAC, which support efforts to empower nuclear applications for sustainable development.

In addition, Malaysia was also given the opportunity to hold an exhibition themed Highlighting the Advancement of Nuclear Technology in Malaysia, which showcased the country's progress and achievements in the field of nuclear technology. The Malaysian delegation also participated in several side events related to the IAEA NUTEC Plastics initiative, which demonstrated the country's commitment and active involvement in the global agenda of plastic waste management through the application of nuclear technology.



Photo 7.3 : Pictures Around the Program of the IAEA Ministerial Conference On Nuclear Science, Technology and Applications and the Technical Cooperation

c) IAEA Top Management Visit

In 2024, Malaysia received several important visits from senior IAEA management as part of efforts to strengthen bilateral cooperation and support the development of the country's nuclear technology.

Nuklear Malaysia received an official visit from Mr. Mikhail Chudakov, Deputy Director General of the IAEA and Head of the Department of Nuclear Energy on 9 October 2024. As part of the technical visit, Mr. Mikhail Chudakov also visited several key facilities including the Research Reactor Simulator Centre and the National Radioactive Waste Management Centre, which showcased Nuklear Malaysia's capabilities in research, waste management and technical training related to nuclear technology.



Photo 7.4 : Receiving an Official Visit from Mr. Mikhail Chudakov, Deputy Director General of the IAEA and Head of the Nuclear Energy Department.

In addition, Nuklear Malaysia also received a working visit from the IAEA Programme Management Officer (PMO), Mr. Syahril bin Syahril from the IAEA Technical Cooperation Department from 15 to 18 July 2024. This visit focused on assessing technical project implementation, impact reporting as well as discussions on IAEA support requirements for current and planned projects under future project cycles.



Photo 7.5 : Receiving a Working Visit from IAEA Programme Management Officer (PMO), Mr. Syahril from the IAEA Technical Cooperation Department.

7.2 REGIONAL COOPERATION AGREEMENT (RCA)

The Regional Cooperation Agreement (RCA) is a multilateral cooperation framework for 22 countries in Asia and the Pacific in the field of research, development and training related to nuclear science and technology. This agreement was established in 1972 under the auspices of the IAEA and functions as a platform for regional technical cooperation between governments (intergovernmental agreement).

Planning and coordination of activities under the RCA is carried out through the RCA National Representatives Meeting (RCA NRM) and the RCA General Conference Meeting (RCA GCM) which are held annually. In 2024, YBrs. Dr. Rosli bin Darmawan, as the RCA National Representative, attended the 46th RCA NRM from 14 to 17 May 2024 held in Beijing, China, and the 53rd RCA GCM from 13 September 2024 in Vienna, Austria.



Photo 7.6 : RCA General Conference Meeting (RCA GCM)

a) List of Cooperation Projects under the Regional Cooperation Agreement (RCA) 2024

Table 7.2 : Cooperation Projects under the Regional Cooperation Agreement (RCA) 2024

	Project Number	Project Title	Period	Field	Collaborative Partner
1	RAS6110	Improving the radiotherapy capacity of newcomer government parties	2024-2027	26	Dr. Vickee Rajeswaran Oncology Clinic Hospital Sultan Ismail
2	RAS7043	Evaluating the Efficacy of Artificial Recharge to Groundwater in Water Scarce Regions using Isotope Techniques	2024-2027	15	Jeremy Dominic Daung Waste and Environment Technology Division Malaysian Nuclear Agency
3	RAS6109	Improving the Quality and Safety of Diagnostic and Interventional Radiology Services to Benefit Health Care by Enhancing the Status, Knowledge, and Skills of Medical Physicists	2024-2027	29	Siti Normasitah binti Masduki Head of Medical Physicist (Radiology) Hospital Sultan Idris Shah

	Project Number	Project Title	Period	Field	Collaborative Partner
4	RAS6108	Strengthening Cancer Care by Training Radiation Oncology Health Professionals in Consistent and Accurate Data Collection through Oncology Information Systems	2024-2025	26	Dr. Suhana binti Yusak Clinical Oncologist and Head of Department National Cancer Institute
5	RAS6105	Improving Cancer Management through Theranostics by Using Radioisotope Based Diagnostic and Therapeutic Techniques	2024-2027	27	Dr. Siti Zarina Amir binti Hassan Head of Nuclear Medicine Services, Head of Department of Nuclear Medicine Kuala Lumpur Hospital
6	RAS5101	Using Mutational Biofortification for Improving the Nutritional Quality of Food Crops	2024-2027	20	Shakinah binti Salleh Agrotechnology & Biosciences Division Malaysian Nuclear Agency
7	RAS0092	Enhancing the Strategic Management of the Programme under the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific	2024-2027	1	Dr. Hazmimi binti Kasim Planning & International Relations Division Malaysian Nuclear Agency
2022-2023					

	Project Number	Project Title	Period	Field	Collaborative Partner
8	RAS1028	Improving the Quality Management Practices in Radiation Processing Facilities for Better Performance and Applications (RCA)	2022-2025	18	Ruzalina binti Baharin Research Officer Technical Support Division Malaysian Nuclear Agency
9	RAS1029	Enhancing Regional Capabilities in Advanced Non-Destructive Testing Techniques for Improved Safety and Inspection Performance in Industries (RCA)	2022-2025	18	Dr. Ilham Mukriz bin Zainal Abidin Research Officer Industrial Technology Division Malaysian Nuclear Agency
10	RAS5091	Assessing and Mitigating Agro-Contaminants to Improve Water Quality and Soil Productivity in Catchments Using Integrated Isotopic Approaches (RCA)	2022-2025	21	Shyful Azizi Abdul Rahman Research Officer Agrotechnology & Bioscience Division Malaysian Nuclear Agency
11	RAS6098	Standardizing Radiotherapy in Palliative Care (RCA)	2022-2025	26	Dr. Muthukkumaran Thiagarajan Clinical Oncologist Hospital Kuala Lumpur
12	RAS6100	Strengthening Clinical Application of Hypofractionated Radiotherapy (RCA)	2022-2025	26	Dr. Suhana binti Yusak Clinical Oncologist National Cancer Institute (IKN)

	Project Number	Project Title	Period	Field	Collaborative Partner
13	RAS6101	Improving the Quality and Safety of Radiation Medicine through Medical Physicist Education and Training (RCA)	2022-2025	29	Dr. Mohd Ariff binti Mohamed Hanifa Physicist, Department of Radiotherapy & Oncology Kuala Lumpur Hospital
14	RAS7040	Improving Water Resources Management Practices by Enhancing the Regional Collaboration in Environmental Isotope Analysis and Applications (RCA)	2022-2025	15	Dr. Lakam Mejus Research Officer Malaysian Nuclear Agency
15	RAS5092	Increasing Crop Productivity under Drought Conditions by Using Isotope Techniques to Optimize Water Usage (RCA)	2022-2025		Ahmad Nazrul bin Abd Wahid Research Officer Malaysian Nuclear Agency
16	RCARO (RCARPO2)	RCA Research Project on Air Quality and Environmental Impact Assessment of Industrial Activities in Asian Region (RCARPO2)	2021-2023		Dr. Suhaimi bin Elias Waste Technology and Environment Division Malaysian Nuclear Agency
17	RCARO (RCARPO3)	RCA Research Project on Closing the Gap in Radiotherapy Access in RCA Government Parties (RCARPO3)	2022-2024		Dr. Suhana binti Yusak Clinical Oncologist and Head of Department National Cancer Institute

	Project Number	Project Title	Period	Field	Collaborative Partner
18	RCARO	Supporting the Adoption of Electron Beam Technology and its Applications in Areas of Food and Agriculture, Industry, Human Health and Environment Treatment	2024-2028		Dr. Shukri bin Mohd Technical Support Division Malaysian Nuclear Agency
19	RCARO/ ASEANTOM	Enhancing Emergency Preparedness and Response Capabilities in the ASEAN Region through Building Technical Capacity in Radiation Monitoring and Dose Assessment Phase 2 (2022-2024)	2022-2024		Nik Mohd Faiz bin Khairuddin Atom Malaysia

7.3 FORUM FOR NUCLEAR COOPERATION IN ASIA (FNCA)

The Forum for Nuclear Cooperation in Asia (FNCA) is a regional cooperation platform led by the Government of Japan, and was established in 2000 with full funding from the Cabinet Office of Japan. The Forum is comprised of 12 countries, namely Australia, Bangladesh, Philippines, Indonesia, Japan, Kazakhstan, Malaysia, Mongolia, Republic of Korea, People's Republic of China (PRC), Thailand and Vietnam. The main purpose of the establishment of FNCA is to establish cooperation and exchange of information among member countries to support the development and peaceful use of nuclear technology, particularly for socio-economic development and community well-being in the Asian region.

Malaysia has played an active role in various major activities of FNCA which include the Annual Ministerial Forum (FNCA MLM), National Coordination Meeting (FNCA CDM) and Study Panel, as well as technical workshops related to eight (8) FNCA projects, namely:

i.	<i>Mutation Breeding Project</i>
ii.	<i>Radiation Processing and Polymer Modification for Agricultural, Environmental and Medical Applications Project</i>
iii.	<i>Combating Food Fraud using Nuclear Technology</i>

- iv. *Radiation Oncology Project*
- v. *Climate Change (Evaluating the Carbon Emission from Forest Soils) Project*
- vi. *Research Reactor Utilization Project*
- vii. *Radiation Safety and Radioactive Waste Management Project*
- viii. *Nuclear Security and Safeguards Project*

In 2024, YBrs. Dr. Muhammad Rawi Mohd Zin, as the National Coordinator of FNCA, represented Malaysia in the 24th FNCA Coordinating Meeting (FNCA CDM) from 12 to 13 March 2024, and the 25th FNCA Ministerial Meeting (FNCA MLM) which took place in Tokyo, Japan.

In conjunction with the 25th anniversary of the establishment of FNCA in 2024, Mr Faiz Ahmad received international recognition through the “2024 FNCA Young Researcher Encouraging Award” in recognition of his active involvement in the FNCA Mutation Breeding project. The award was announced during the 25th FNCA MLM in Tokyo, Japan.





Date: 30 September 2024

Mr. Faiz Ahmad
Malaysia

Forum for Nuclear Cooperation in Asia (FNCA)
2024 Young Researcher Encouraging Award

Dear Mr. Faiz Ahmad,

I am honored to inform you that you are selected as 2024 FNCA Young Researcher Encouraging Award, which is the prize created especially for the year of 2024 commemorating the 25th anniversary of FNCA. I would like to express my sincere congratulations to you.

The achievement of your activities will be introduced to the attendants of the 25th FNCA Ministerial Level Meeting which is going to be held in Tokyo, Japan, on 18-19 December 2024. For this purpose, the FNCA Secretariat will soon contact you to ask for your assistance in preparing the presentation material.

Also, in recognition of the achievement, a commemorative item will be sent to you from the Secretariat.

We would like you to devote yourself to further achievement in your area of expertise.

Yours sincerely,

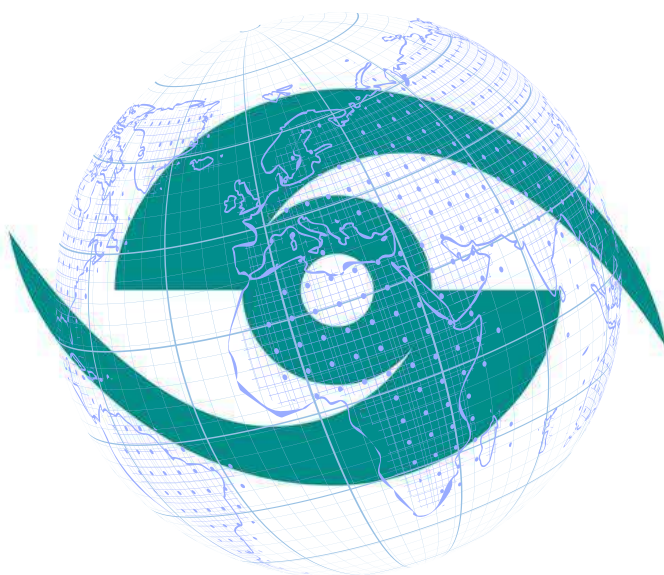
TOKUMASU Shinji
Deputy Director General for Science,
Technology and Innovation Policy,
Cabinet Office, Japan

7.4 COMPREHENSIVE NUCLEAR TEST-BANCY TREATY (CTBT)

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) aims to ban all forms of nuclear explosion testing worldwide and was opened for signature on 24 September 1996. Malaysia signed the treaty on 23 July 1998 and ratified it on 17 January 2008, with the Malaysian Nuclear Agency being given responsibility as the National Body for its implementation. In line with this commitment, Malaysia has established a radionuclide monitoring station (RN42) in Cameron Highlands and the Malaysian National Data Centre (My-NDC) operated by the Malaysian Nuclear Agency together with the Malaysian Meteorological Department. This initiative strengthens Malaysia's role internationally in opposing nuclear weapons testing and demonstrates support for the peaceful, safe and controlled use of nuclear technology.

Malaysia's membership in the CTBT also brings various benefits, including the use of treaty data not only for the purpose of monitoring nuclear explosion tests, but also contributing to the monitoring of volcanic activity, tsunami early warning systems, earthquakes, climate change studies and research and development (R&D). As the CTBT is not yet fully in force at the international level, the focus of implementation in Malaysia is on disseminating information to stakeholders and developing local capabilities in handling CTBT technology and data analysis.

This effort is being implemented through training and technical assistance provided by the CTBTO Commission as well as bilateral and multilateral cooperation with experienced member states. Other benefits include the opportunity to voice the country's position on nuclear disarmament and non-proliferation in international forums, the development of local expertise in verification technologies such as radionuclide, seismic, hydroacoustic and infrasound, and the use of monitoring data in national disaster management systems and scientific research.



CTBT Activities in 2024

- i. Outreach Program at the Northeast Monsoon National Climate Forum 2024 organized by the METMalaysia Department in Putrajaya on 3 October 2024.



- ii. Meeting of the 63rd Session of Working Group B of the CTBTO from 26 August to 6 September 2024 in Vienna, Austria.



- iii. Inter-Departmental Meeting on the Implementation of the Comprehensive Nuclear-Test-Ban Treaty CTBT on 18 December 2024.



- iv. i. Closed Colloquium on CTBT Data Analysis – Radionuclides on 8 October 2024 at Nuklear Malaysia.



- v. Visit of the Director General of the Australian Safeguards and Non-Proliferation Office (ASNO) Dr. Geoffrey Shaw to Nuklear Malaysia on 14 March 2024.



- vi. Ministry of Foreign Affairs visit to Nuklear Malaysia on 17 October 2024 in the Conference Room (*Bilik Persidangan*).



- vii. Visit of Nuklear Malaysia's Management and MET Malaysia to Station RN42 on 12 January 2024.



- viii. *Pocket Talk during National Science Week with the title Get to Know the Global Nuclear Weapons Test Monitoring Network on 25 June 2024.*



- ix. *Practical Arrangement Between the Government of Malaysia and the Government of Australia on Cooperation in the Areas of Science and Technology and Their Applications for the Implementation of the Comprehensive Nuclear-Test-Ban Treaty on March 4, 2024 in Melbourne, Australia.*



7.5 CERTIFICATION AND ACCREDITATION

Nuklear Malaysia has successfully maintained 10 International Standard (ISO) certifications and accreditations for nine facilities, as shown in Table 7.2. This achievement reflects Nuklear Malaysia's continued commitment to providing the highest quality and best service to its customers and stakeholders..

Table 7.2 : List of International Standards (ISO) Certification and Accreditation

	ISO CERTIFICATION/ACCREDITATION	FACILITIES
1	ISO 9001:2015	SINAGAMA
2	ISO 13485:2016	
3	ISO 9001:2015	ALURTRON
4	ISO 9001:2015	RAYMINTEX
5	ISO 9001:2015	Waste Technology Development Center(WasTeC)
6	ISO 9001:2015	Center of Nuclear Excellence (CoEN)
7	ISO/IEC 17025:2017	Radiation Metrology Group(KMS)
8	ISO/IEC 17025:2017	Radiochemistry and Environment Laboratory(RAS)
9	ISO/IEC 17020:2012	Non-Ionizing (NIR) Group
10	ISO/IEC 27001:2022	Information Technology & Applications Center (PTM) & Standard Secondary Dosimeter Laboratory (SSDL)

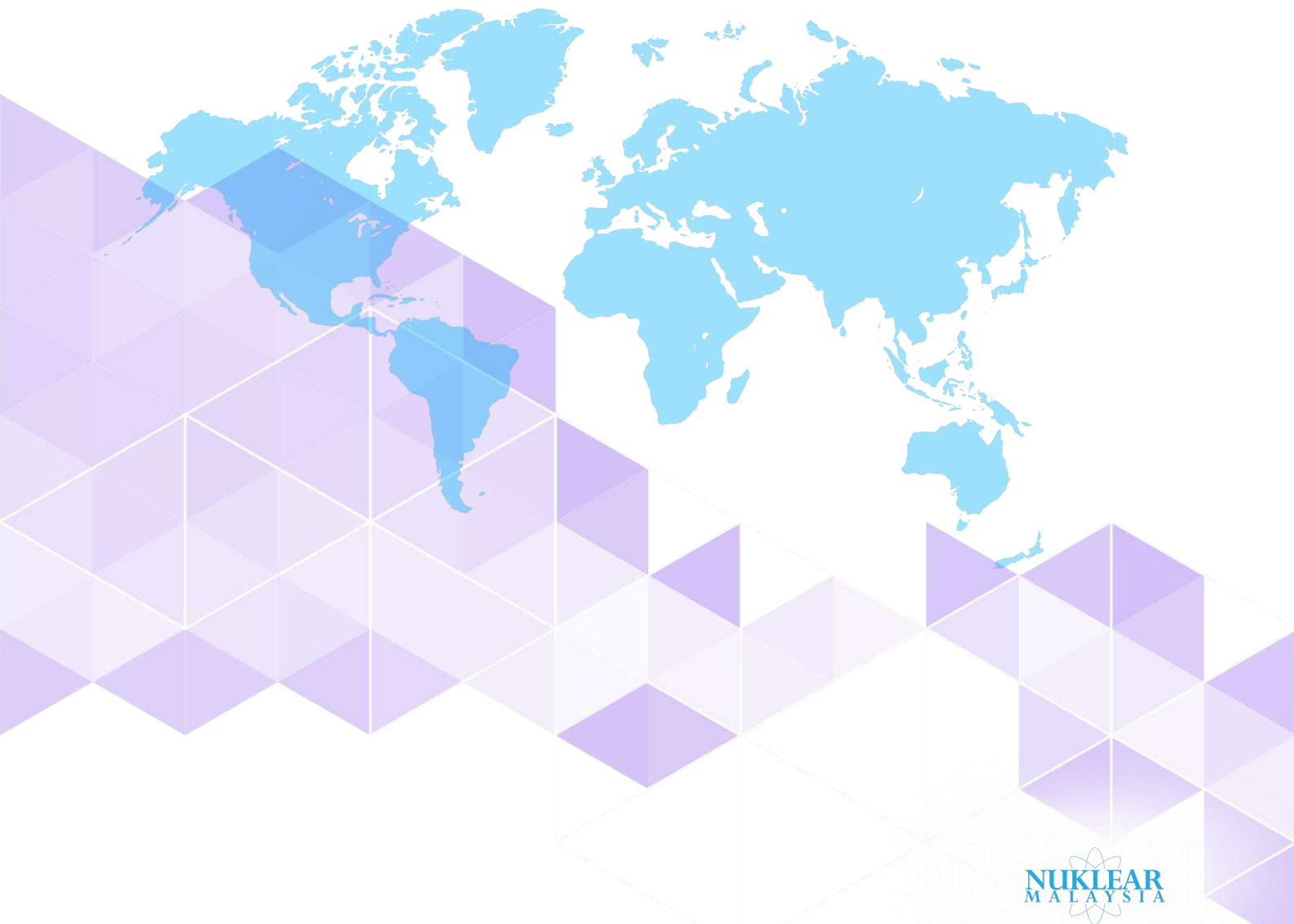
The Planning and International Relations Division has organized two quality-related courses, namely Refresher Course on ISO 9001:2015, ISO/IEC 17020:2012 & PKP BCMS ISO 22301:2019 Internal Auditing and ISO 27001:2022 ISMS Certification Auditing and Transition Course. Both courses were held on 21 May and 1 to 2 October 2024 at the Lecture Hall (*Bilik Kuliah*), Nuklear Malaysia. The course was officiated by YBrs. Dr. Nor Pa'iza Mohamad Hasan, Senior Director of the Technology Commercialization & Planning Program, Nuklear Malaysia. More than 20 participants attended this course, consisting of Internal Auditors and facility staff who are directly involved in ISO certification and accreditation. The organization of this course aims to increase understanding of the ISO standard system and strengthen the competence of Internal Auditors in implementing the internal audit process effectively.



Participants of the Refresher Course on ISO 9001:2015, ISO/IEC 17020:2012 & PKP BCMS ISO 22301:2019 Internal Auditing



ISO 27001:2022 ISMS Certification Auditing and Transition Course Participants







8.0

MANAGEMENT & **ADMINISTRATION**

8.0 MANAGEMENT & ADMINISTRATION PROGRAMME

The efficiency of the agency's management and administration has been a catalyst for the progress of Nuklear Malaysia's R&D and commercialization activities. The agency has been able to carry out its main functions with excellence due to the strategic management of government allocations, research funds, human capital and expert personnel, as well as its information management.

8.1 PERSONNEL

Overall, Nuklear Malaysia has 777 permanent employees and 73 contract employees in various employment schemes. This number represents 83.9% of the employment warrant of 926.

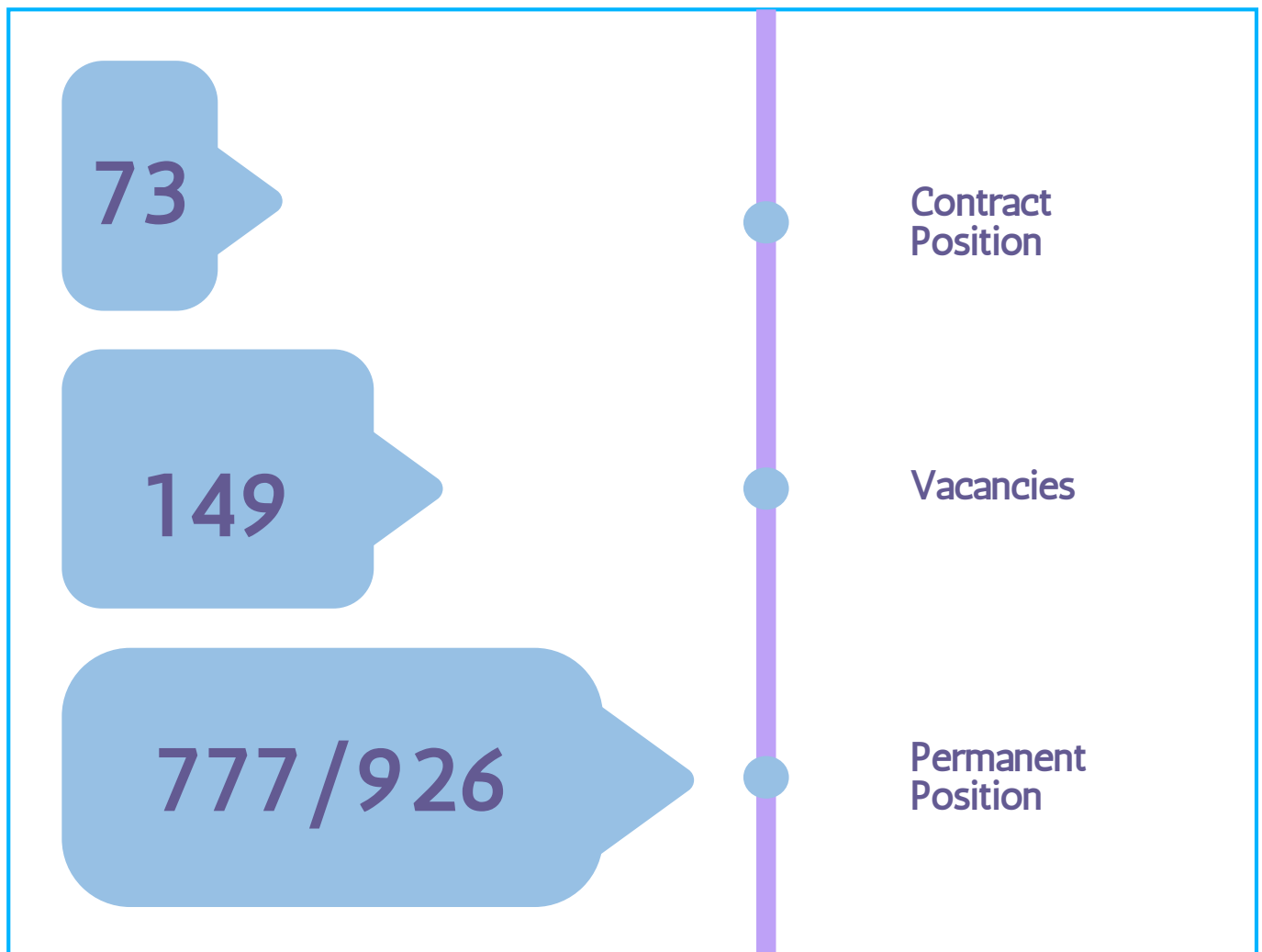


Figure 8.1 : Nuklear Malaysia's Staffing Breakdown

Overall, the number of employees at Nuklear Malaysia has not changed significantly since 2022. The table below shows a comparison of staffing for the years 2022-2024.

Table 8.1 : Staffing Comparison for the years 2022-2024

Staff Breakdown	2022	2023	2024
Contract Position	77	77	73
Vacancies	146	152	149
Permanent Position	780/926	774/926	777/926

8.2 FINANCIAL PERFORMANCE

Efficient and strategic financial management is very important to ensure that the allocation received can be spent optimally to achieve the agency's objectives. In 2024, the total allocation received by Nuklear Malaysia was RM117,782,472.00 million. This allocation includes an operating allocation of RM98,630,762.00 million and a development allocation of RM19,151,710.00 million. Of this allocation received, RM98,589,360.85 of the operating allocation was spent. While the expenditure for the development allocation was RM19,151,706.84 million. Overall, Nuklear Malaysia's financial performance is excellent. The figure below shows the performance of Nuclear Malaysia's allocation expenditure.

Table 8.2 : Financial Performance 2024

Source	Allocation (RM)	Expenditure (RM)	Expenditure Percentage (%)
Management			
a) Current Policy	98,630,762.00	98,589,360.85	99.96
b) New Policy	-	-	-
c) One - off	-	-	-
Development	19,151,710.00	19,151,706.84	99.99
Total	117,782,472.00	117,741,067.69	99.96

Table 8.3 : Comparison of Management Allocation Performance 2023-2024

	2023	2024
Management Provision	RM92,686,310.00	RM98,630,762.00
Expenditure	RM92,133,715.68	RM98,589,360.85
Expenditure Percentage	99.40%	99.96%

Table 8.4 : Comparison of Development Allocation Performance 2023-2024

	2023	2024
Management Provision	RM13,970,600.00	19,151,710.00
Expenditure	RM13,375,577.91	19,151,706.84
Expenditure Percentage	95.74%	99.99%

8.3 HUMAN CAPITAL DEVELOPMENT

Nuklear Malaysia is responsible for developing competent and competitive human capital in the field of nuclear science and technology. This is outlined in Strategic Thrust 5: Conducive Environment for Cultivating Talent and R&D Capacity in Nuclear Science and Technology.

a) Human Capital Development Roadmap Nuclear Sciences and Technology (NST)

As stated in the Nuklear Malaysia Vision 2030, Nuklear Malaysia is responsible for developing competent and competitive human capital in the field of nuclear science and technology to the international level. This is outlined in Strategic Thrust 5: Conducive Environment for Cultivating Talent and R&D Capacity in Nuclear Science and Technology. One of the initiatives implemented is the development of a roadmap for the Development of Human Capital in Nuclear Sciences and Technology (NST). In 2024, one of the outputs under this initiative is the Nuklear Malaysia Competency Dictionary (KKF) to the MyPerformance module in the HRMIS system.

b) Development of Expertise in Nuclear Science and Technology through Formal Education

Nuklear Malaysia always supports and encourages its employees in various schemes and job grades to improve their education level. For research officers, the implementation of long-term in-service training (formal education) at the doctoral level continues. Table 8.2 shows the number of master's and doctoral degree holders among researchers in 2024. While Table 8.6 and Table 8.7 show the implementation of formal training for the R&D group and the implementation group respectively.

Table 8.5 : Number of Masters and Doctoral Degree Holders Among Researchers Year 2024

Grade	Total Researchers	BSC	MSC	PHD
Grade 9 Q41 / Q44M	43	18	13	12
Grade 10 Q44 / Q48M	51	9	35	7
Grade 12 Q48 / Q52M	73	9	48	16
Grade 13 Q52 / Q54M	118	19	58	41
Grade 14 Q54 / <i>Memangku</i> VU7	37	4	7	26
JUSA	3	0	0	3
Total	325	59	161	105
Percentage		18.15%	49.54%	32.31%

Table 8.6 : Implementation of Formal Training for the R&D Group in 2024

Position	Grade	Study Leave	Part Time	Study Leave Preparations
Publication Officer	N44/N9	2	-	-
Research Officer	Gred 9 Q41/Q44M	-	2	-
Research Officer	Gred 10 Q44/Q48M	6	3	-
Research Officer	Gred 12 Q48/Q52M	6	1	5
Research Officer	Gred 13 Q52/Q54M	1	-	1
Total		15	6	6

Table 8.7 : Implementation of Formal Training for the Implementation Group in 2024

Position	Grade	Study Leave	Part Time
Assistant Information Technology Officer	FA29/FA5	1	-
Assistant Science Officer	C29/C5	-	3
Assistant Accountant	W29/W5	-	1
Assistant Engineer	JA29/JA5	-	1
Assistant Administrative Officer	N29/N5	-	1
Administrative Assistant	N19/N1	-	1
Laboratory Assistant	C19/C1	-	1
Total		1	8

c) University and Professional Student Involvement Study Programs and Training Industry

Nuklear Malaysia continues to carry out its responsibilities as a research institution with expertise in nuclear science and technology to train students from local higher education institutions. This role is carried out through research study programmes, industrial attachment and training. Nuklear Malaysia has received a total of 231 students from various public and private educational institutions for industrial training this year.

Table 8.8 : Number of IPT Student Placements for Industrial Training in STI 2022-2024

Achievement 2022	Achievement 2023	Achievement 2024
255	224	231

d) Competency Enhancement

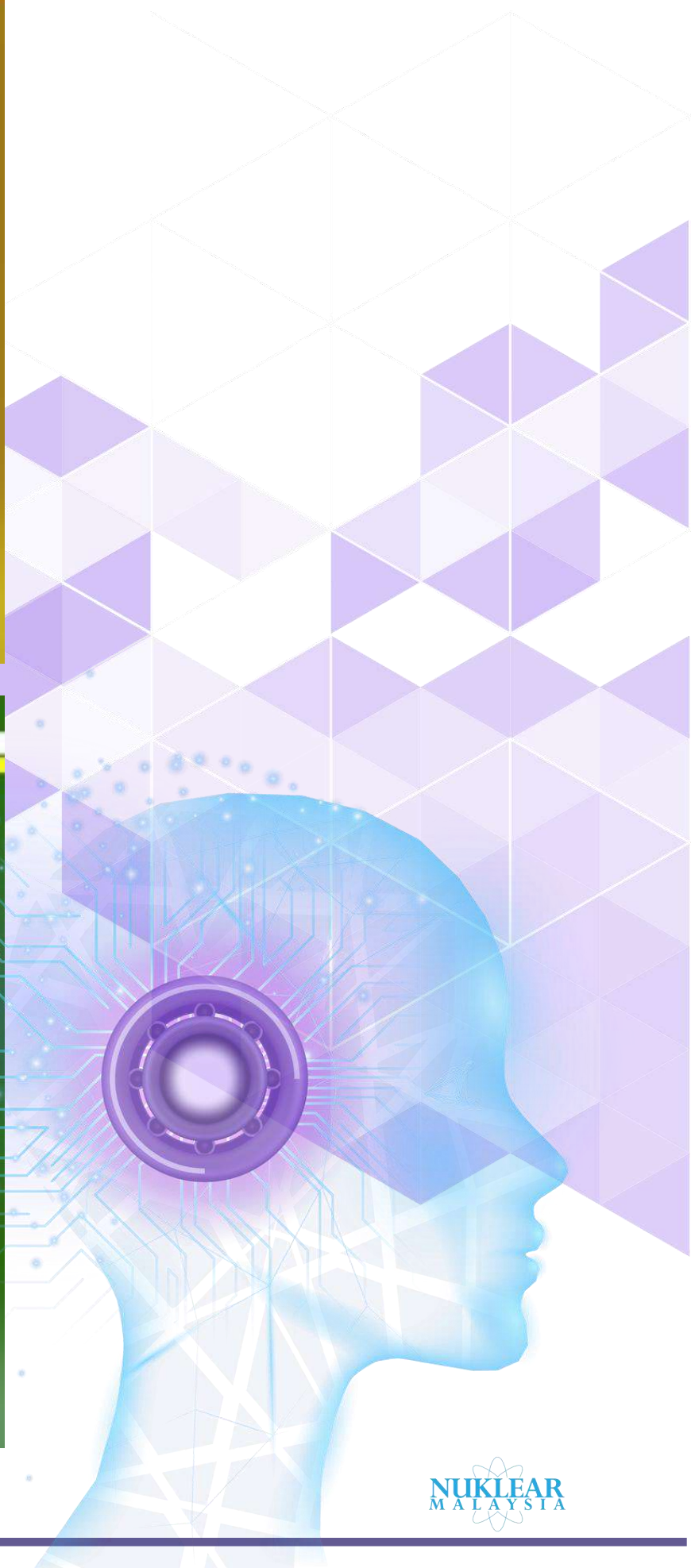
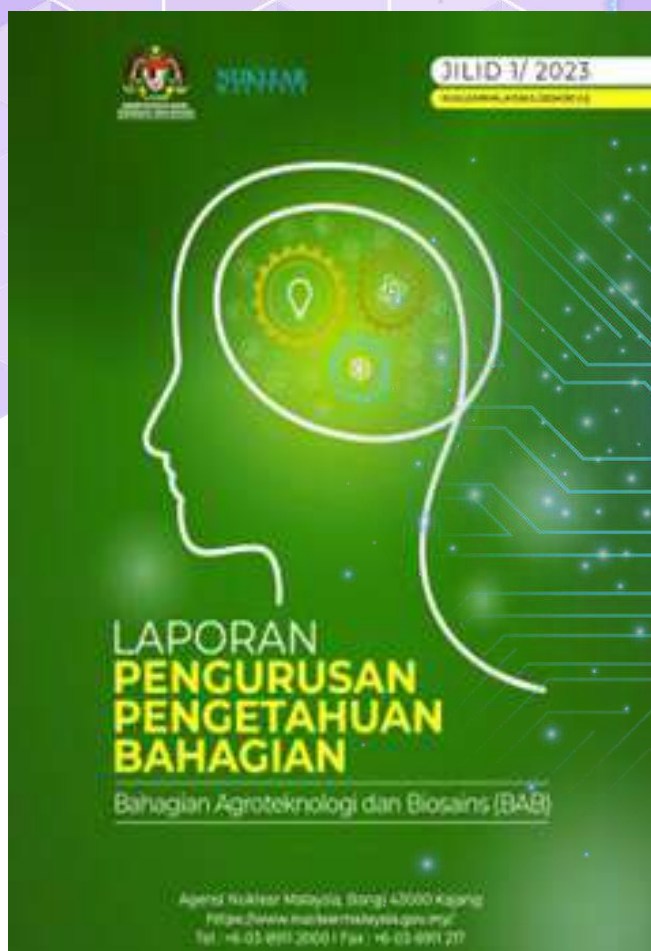
Nuklear Malaysia always prioritizes enhancing the competency of its staff. The Seven (7) Days Training Policy for the Civil Service is consistently adhered to. To increase expertise in nuclear technology, Nuklear Malaysia staff are also trained abroad.

8.4 NUCLEAR KNOWLEDGE MANAGEMENT STRENGTHENING PROGRAM (NKM)

As a research institution that uses nuclear technology and has a research reactor, the need to store critical information such as laboratory design, radioactive material management and waste, is one of the important requirements. To manage this information, Nuklear Malaysia ensures that Nuclear Knowledge Management (NKM) is an ongoing practice and initiative of the agency. Apart from safety purposes, NKM is important to ensure that existing knowledge and expertise are managed and stored properly. The knowledge developed needs to be well documented not only for record purposes, but also as a reference for problems that may arise in the future.

Various activities related to NKM have been organized this year such as:

- i. The Knowledge Management Report Writing Workshop was held on 25-27 June 2025 at The Straits Hotel, Melaka. This workshop successfully published 13 knowledge management report books for the divisions including the Industrial Technology Division (BTI) and the Agrotechnology and Bioscience Division (BAB).



- ii. Knowledge Visit to the National Library of Malaysia (PNM) on 19 December 2024. A total of 25 participants from Nuklear Malaysia were brought to share best practices in knowledge management at PNM and serve as a benchmark for Nuklear Malaysia.



8.5 INTERNATIONAL NUCLEAR INFORMATION SYSTEM (INIS)

The International Nuclear Information System (INIS) was first developed in 1966 by the International Atomic Energy Agency (IAEA) in collaboration with 132 Member States. The main purpose of developing this system is to promote the sharing of information related to research activities between member states and the development of nuclear technology between member states. Malaysia as a country under the IAEA joined INIS in 1978 and the first input to INIS was sent in 1984. In Malaysia, INIS is managed by the Malaysian Nuclear Agency under the coordination of the Information Management Division (BPM). To date, the achievements of INIS Malaysia are at a proud level with a total of 8,650 inputs. Nuklear Malaysia continues its excellence in 2024 by successfully providing 300 inputs.





9.0

NUCLEAR FOR **THE MASSES**

9.0 NUCLEAR FOR THE MASSES

In line with the aspirations of the National Nuclear Technology Policy (NTP) 2030 which emphasizes the development and application of nuclear technology in a safe, responsible and beneficial manner for the people, the implementation of the Communication, Education and Public Awareness (CEPA) initiative is an important element in achieving this goal. Through a strategic communication approach, continuous education and community engagement, CEPA plays a role in ensuring that nuclear technology is comprehensively understood and accepted as a national asset that contributes to the well-being of the people and the progress of the country. This approach strengthens public support and increases the level of nuclear literacy among the community, thus supporting the implementation of programmes such as the Nuclear Education Outreach Programme (NEO) in a more effective and inclusive manner.

9.1 NUCLEAR EDUCATION OUTREACH PROGRAMME (NEO)

The Nuclear Education Outreach (NEO) Programme organised by Nuklear Malaysia is a strategic initiative in line with the Nuklear Malaysia's Vision, particularly in supporting Strategic Thrust 4: Nuclear Governance at the National and International Levels. Various programmes and initiatives have been implemented to ensure that public understanding, awareness and support for nuclear technology continues to be strengthened.

a) National Science Week (MSN)

Themed "Popularizing Science, Humanizing Technology", the National Science Week (MSN) will be held again in 2024. This program organized by MOSTI has selected seven main focus areas as shown in the diagram below:

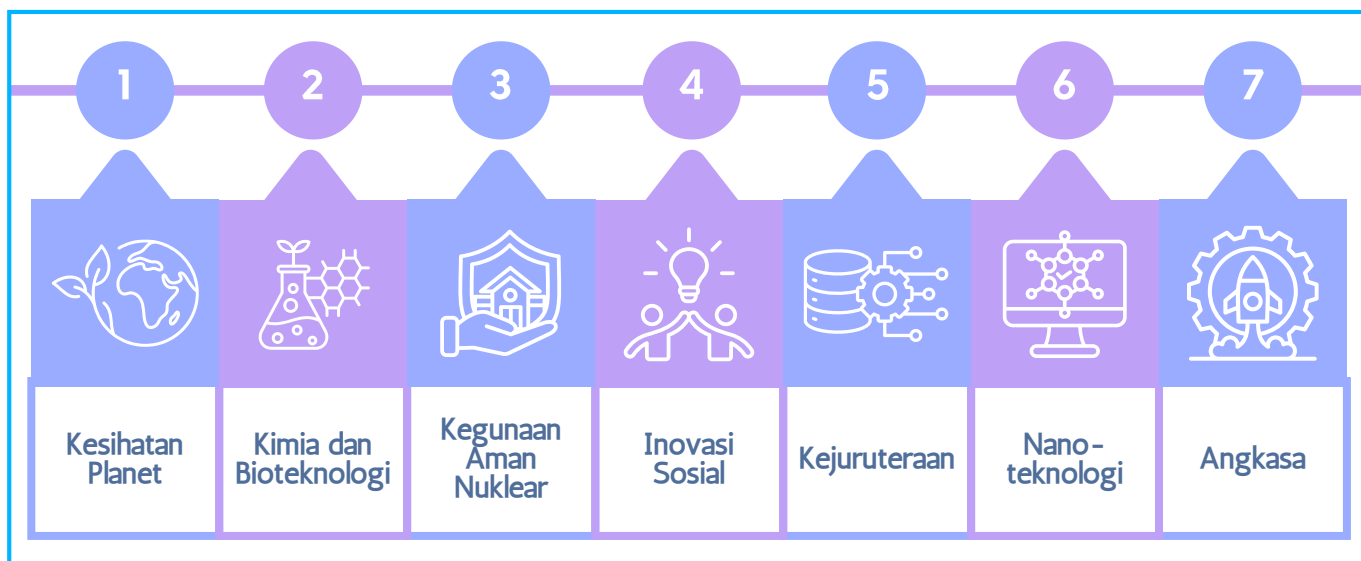


Figure 9.1 : Key Focus Areas of MSN 2024

Peaceful use of nuclear technology

Nuklear Malaysia, which leads the Safe Uses of Nuclear thrust, was assisted by implementing partners, the Atomic Energy Department (JTA) and the National Science Centre (PSN), and organized various face-to-face and online programs for various target groups such as the public, educational institutions, industry and the private sector, as well as other stakeholders.



Photo 9.1 : Various MSN 2024 Programs

b) Lecture, Workshop and Exhibition Program

Increasing public awareness of nuclear technology requires face-to-face programs to provide the public and stakeholders with an opportunity to take a closer look at the products and services produced. This program organized by Nuklear Malaysia also provides an opportunity for the target group to ask various questions and share their views on nuclear technology.

The diagram below shows the various NEO programs in 2024.

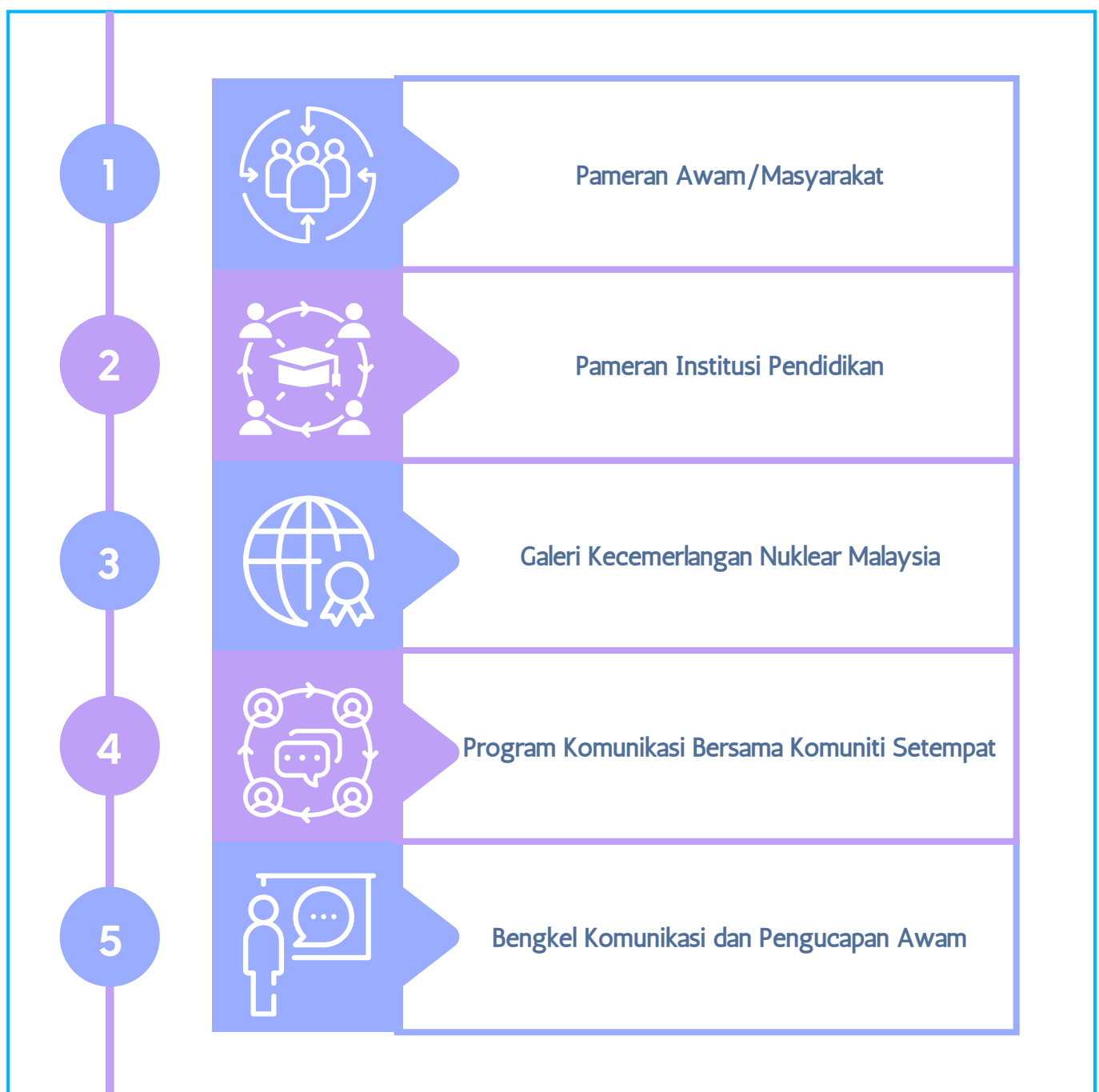


Figure 9.2 : Outreach Education (NEO) Programme 2024

i. Public/Community Exhibition

In 2024, a total of 14 exhibitions for the public and stakeholders were organized as listed below:

Table 9.1 : Public/Community Exhibitions

	Exhibition Name	Date	Venue
1	Program Madani Rakyat Zon Tengah	23-25 February 2024	Kuala Selangor Sport Complex, Selangor
2	Technology Preview Showcase (TPS) Southern Zone	27 February 2024	Hotel Berjaya Waterfront, Johor
3	PUSPANITA MOSTI Annual Meeting 2024	27 March 2024	Malaysian Nuclear Agency, Selangor
4	Security Visit from the RMAF	2 May 2024	Malaysian Nuclear Agency, Selangor
5	STEM Showcase Pulau Pinang 2024	3-4 May 2024	UOW Batu Kawan, Pulau Pinang
6	EMF Radiation Course from Telco Towers: Are We Safe?	29 May 2024	Double Tree Hilton Hotel, Batu Ferringhi, Pulau Pinang
7	Technology Preview and Showcase (TPS) Northern Zone	13-14 June 2024	Kedah Paddy Museum, Kedah
8	Special Science Day Program 2024	25-26 June 2024	National Science Center, Kuala Lumpur
9	Program Semarak@Perak Museum	13-14 July 2024	Perak Museum, Perak
10	Malaysia Commercialization Year Summit (MCY) 2024	12-13 August 2024	Kuala Lumpur Convention Center
11	Chemistry to the Villages 2024	28 September 2024	Industrial Training Institute (ILP) Selandar, Melaka
12	Sarawak Research & Development Symposium 2024	5-7 November 2024	Kuching Imperial Hotel, Sarawak

	Exhibition Name	Date	Venue
13	National Science Week Carnival Finals and National Techlympics 2024	17-18 November 2024	Putrajaya International Convention Centre (PICC), Putrajaya
14	Santuni MADANI 2024 Program together with Selangor Penyayang 2024 Program	1 December 2024	Kampung Sungai Buah, Selangor

ii. **Exhibition of Educational Institutions**

Nuklear Malaysia also focuses on educational institutions as a key component of its outreach efforts. This approach aims to increase awareness and understanding among students and educators on the positive and safe application of nuclear technology. The table below shows all 27 exhibitions that have been held at various educational institutions nationwide.

Table 9.2 : Educational Institution Exhibition

	Exhibition Name	Date	Venue
1	SciTech4U-STEM Camp Pilot Series 1	26 February 2024	SJK(C) Chen Moh, Selangor
2	Jaafarian Carnival	7 May 2024	SMK Taman Tuanku Jaafar, Negeri Sembilan
3	Jom Sains carnival	14-15 May 2024	Universiti Putra Malaysia (UPM), Selangor
4	STEM Carnival	15 May 2024	SMK Sungai Ramal, Selangor
5	Career Day	6 June 2024	SMKA Tun Rahah, Selangor
6	Stemfinity in Me	9 June 2024	MRSM Johor Bahru, Johor
7	Radiation Workshop and Talk	20 June 2024	SMK Datuk Menteri, Johor
8	Biofiesta: Programme Exploring Life's Wonders	22 June 2024	Universiti Teknologi MARA (UiTM) Kampus Kuala Pilah, Negeri Sembilan

	Exhibition Name	Date	Venue
9	Scifest USIM	26 June 2024	Universiti Sains Islam Malaysia (USIM), Negeri Sembilan
10	Curriculum and STEM Carnival 2024	27 July 2024	SMK Telok Ayer Tawar, Pulau Pinang
11	STEM Carnival 2024	1 August 2024	SMK Senaling, Negeri Sembilan
12	Malaysia Techlympics 2024 program (MT 2024)	7-8 August 2024	Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA), Pahang
13	Visit to the Polytechnic Sultan Salahuddin Abdul Aziz Shah	21 August 2024	Malaysian Nuclear Agency, Selangor
14	Batang Padang and Muallim District Girl Guide Carnival 2024	4 September 2024	SMK Sungai Kruit, Perak
15	Career Day SK Bandar Seri Putra	8 September 2024	SK Bandar Seri Putra, Selangor
16	SMK Bandar Baru Seri Petaling Visit	11 September 2024	Malaysian Nuclear Agency, Selangor
17	<i>STEM and Young STEMIST Expo Carnival</i>	11 September 2024	SMK Putrajaya Presint 5(1), Putrajaya
18	<i>Young STEMIST Expo Exhibition</i>	2 October 2024	SK Desa Putra, Selangor
19	Radiation Workshop, SMKA Maahad Hamidiah Kajang	3 October 2024	SMKA Maahad Hamidiah, Selangor
20	STEM Carnival 2024	9 October 2024	SMK Khir Johari, Beranang, Selangor
21	Maahad Tahfiz Ismail Puncak Alam Visit	16 October 2024	Malaysian Nuclear Agency, Selangor
22	Green Future Open Day UiTM Cawangan Johor Kampus Pasir Gudang Exhibition	28 October 2024	UiTM Pasir Gudang, Johor

	Exhibition Name	Date	Venue
23	National Science Week Exhibition, Melaka State Level 2024	28 - 29 October 2024	UiTM Alor Gajah, Melaka
24	Science and Maker Fair 2024	5 November 2024	Sri KDU Secondary School Damansara, Selangor
25	SKPJ SS 19 Young Engineer Program	23 November 2024	SK Perdana Jaya SS19, Selangor
26	Sirih Pulang ke Gangang Program	23 November 2024	MRSM Jasin, Melaka
27	Technical and Vocational Education and Training (TVET) Week 2024 School Levelh	18 December 2024	SMK Nilai Impian, Negeri Sembilan

iii. **Nuklear Malaysia’s Excellence Gallery**

Themed exhibitions held quarterly at the Nuklear Malaysia’s Excellence Gallery showcase the latest innovations, research successes and potential of nuclear technology. The exhibition aims to provide exposure to visitors, especially teachers, students, stakeholders, industry and general visitors, on the role and contribution of Nuklear Malaysia in national development.

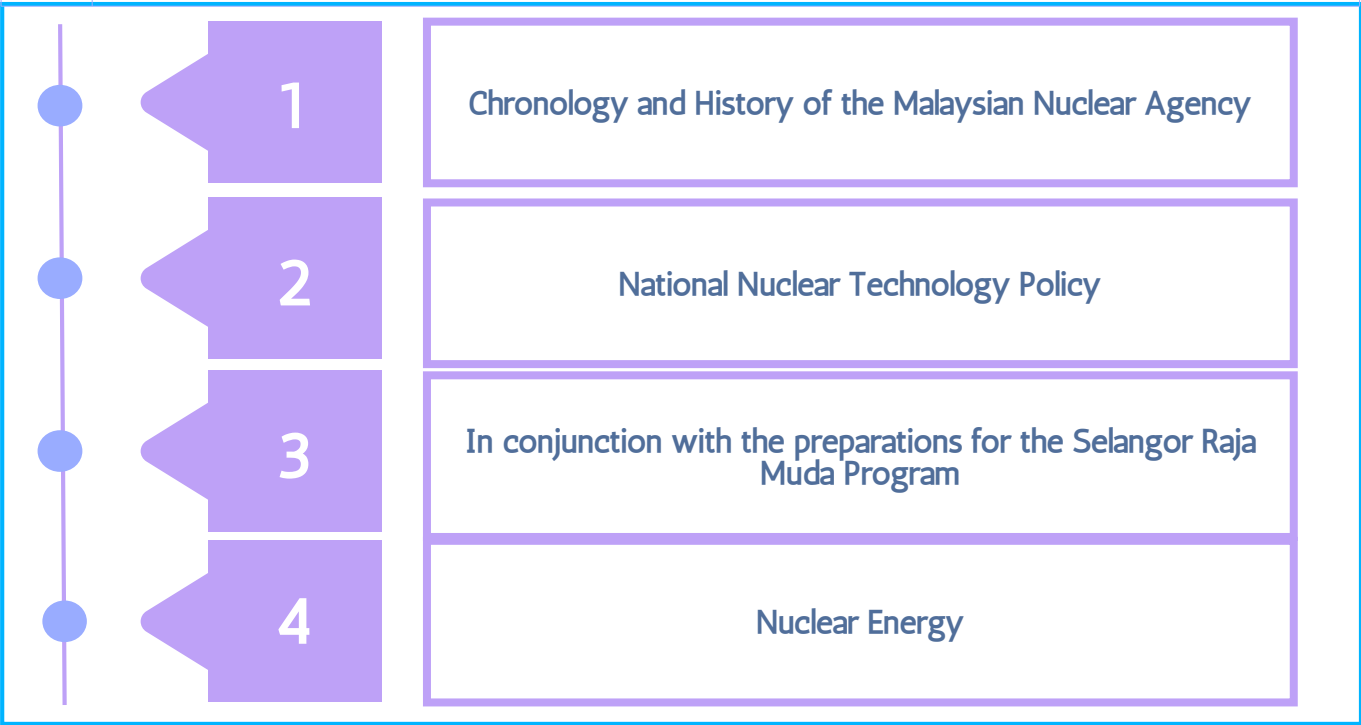


Figure 9.3: Themed Exhibitions at the Nuklear Malaysia's Excellence Gallery

iv. Communication Program with Local Communities

The Communication Program with the Local Community was held to bring the community closer to information and developments in nuclear technology in a more open and interactive manner. This year, two programs with the local community have been successfully implemented.



Photo 9.2 : Santuni Madani Programme in Kampung Sungai Buah, Dengkil: Adopted Village of the Director General of Nuklear Malaysia, 01 December 2024



Photo 9.3 : The Social Adoption Village (MOSTI) Programme in Kampung Sungai Tekam, Segamat, Johor, 23 - 24 August 2024

v. Communication and Public Speaking Workshop

The Communication and Public Speaking Workshop is organized as an important component of the Training of Trainers for Nuclear Communicators. This program aims to train participants to be able to convey information related to nuclear technology clearly, effectively and convincingly to various levels of society. Through practical and interactive training, participants are empowered with the communication skills needed to be authoritative nuclear spokespersons. For 2024, a workshop involving the participation of participants from among Nuklear Malaysia and Information Department of Malaysia officers has been successfully implemented.



Photo 9.4 : Training of Trainer (ToT) Workshop for Nuclear Communicator, July 17 - 19, 2024, Malacca International Trade Center (MITC), Malacca

c) Nuclear Education Kit Loan Program

Since 2021, Nuklear Malaysia has introduced a new approach through the Nuclear Education Kit Loan program. This program aims to provide practical exposure to students while supporting teaching and learning activities in nuclear science subjects in schools.



Photo 9.5 : Poster Advertising the Nuclear Education Kit Loan Program

d) Printed Information Distribution

Information related to nuclear science and technology will be more easily understood by the public through reading public publications, whether printed or electronic. In 2024, a total of 7,161 Nuklear Malaysia publications such as magazines and brochures were distributed to the public.

9.2 NUKLEAR MALAYSIA VISITORS

In 2024, the number of visitors to Nuklear Malaysia was 2,249.

Through scientific visits, Nuklear Malaysia's initiative to disseminate information on nuclear science and technology to the public can be implemented continuously. Visitors' visits to Nuklear Malaysia not only open up space and opportunities for them to interact directly with research officers, but also to see the facilities and innovative products of nuclear technology up close.

Overall, the number of visitors to Nuklear Malaysia showed an increasing trend in the three-year period from 2022 to 2024. This reflects the growing interest in the nuclear field as well as the effectiveness of the promotional and public engagement efforts implemented.

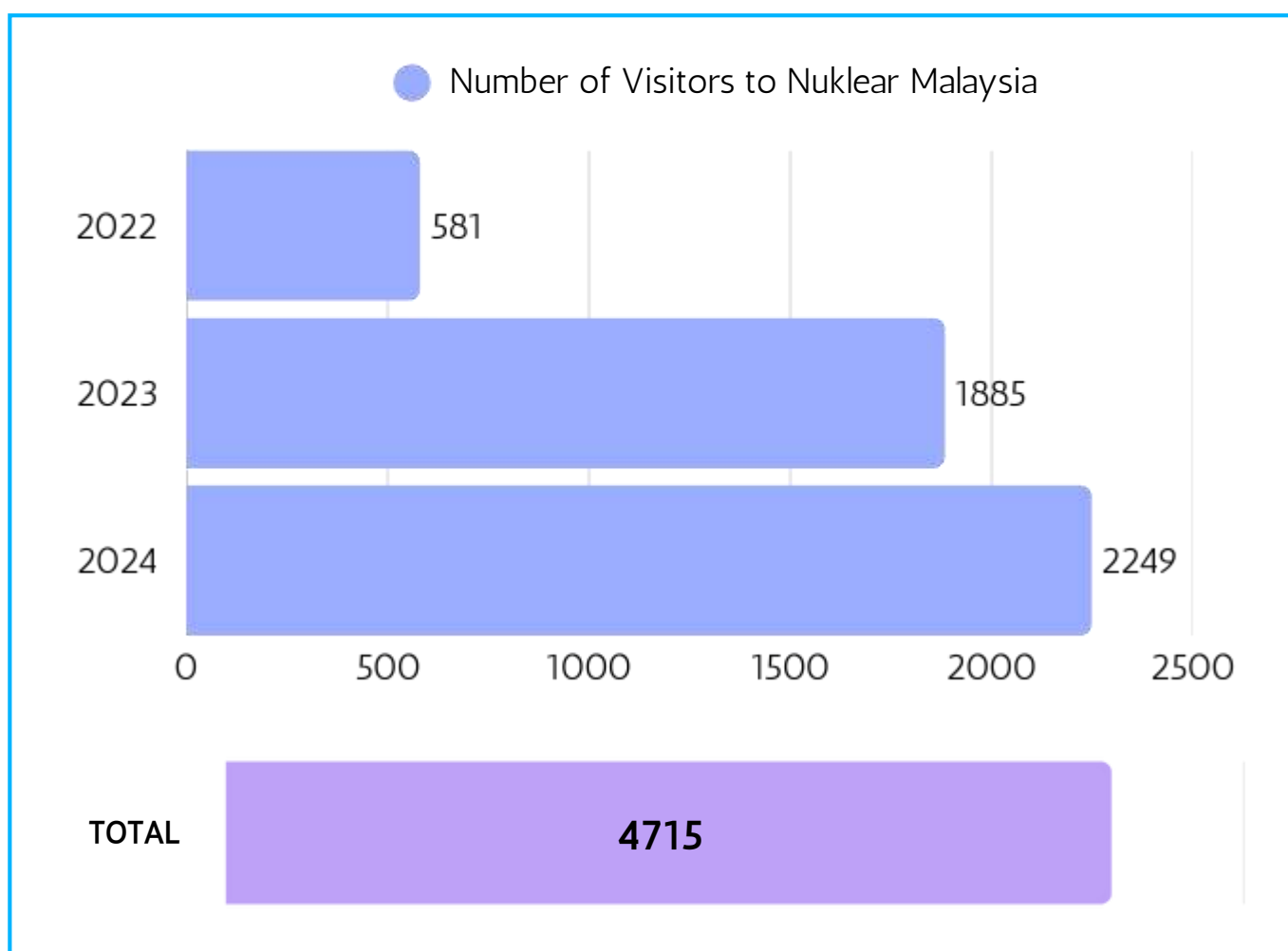


Figure 9.4 : Total Number of Visitors to Nuklear Malaysia 2022 – 2024

9.3 NUKLEAR MALAYSIA AND MEDIA

Media publicity is an important platform for enhancing the corporate image of Nuklear Malaysia. Nuklear Malaysia always involves the media in organizing its official activities to ensure that information can be disseminated to the public more effectively. In 2024, various activities with the media, whether print media, electronic media and social media, will be held.

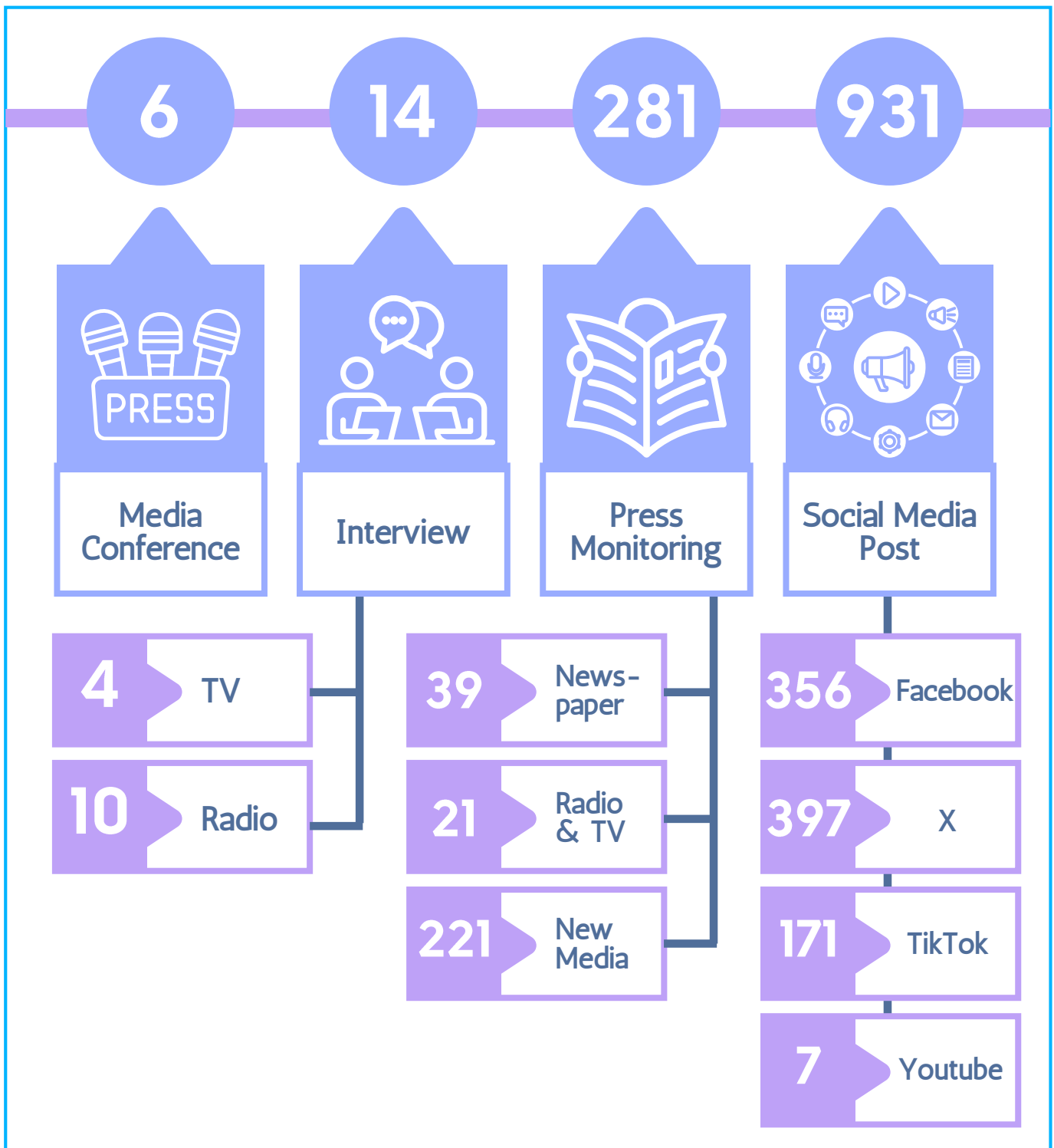


Figure 9.5 : Nuklear Malaysia's Activities for Print and Electronic Media

Tenaga nuklear diperlukan untuk capai aspirasi karbon sifar bersih

KUALA LUMPUR - Agensi Nuklear Malaysia (Nuklear Malaysia) tidak menolak kemungkinan bahawa penggunaan tenaga nuklear mungkin diperlukan bagi proses penjanaan tenaga dalam usaha merealisasikan aspirasi karbon sifar bersih menjelang 2050.

Ketua Pengarah Nuklear Malaysia, Dr Rosli Darmawan berkata, meskipun penggunaan tenaga nuklear tidak disebut secara khusus dalam Dasar Teknologi Nuklear Negara (DTNN) 2030, namun pihaknya sentiasa bersedia untuk meneroka penjanaan tenaga menggunakan tenaga nuklear.

"Walaupun dalam Pelan Hala Tuju Peralihan Tenaga Negara (NETR) tidak disebut perkara itu tetapi sudah ada beberapa kenyataan daripada Kementerian Sumber Asli, Alam Sekitar

dan Perubahan Iklim dan Menteri Ekonomi, Rafizi Ramli sebelum ini yang pernah menyebut ia dalam pertimbangan menjelang tahun 2050.

"Sebab buat masa ini, kita tiada pilihan kerana kalau ingin capai karbon sifar menggunakan teknologi tenaga boleh baharu (RE) sahaja memang tidak akan berjaya kerana ini adalah senario di peringkat global. Malah, banyak pihak sudah akui bahawa mahu atau tidak kita perlu masukkan keperluan tenaga kita menggunakan nuklear," katanya.

Beliau berkata demikian pada sidang akhbar selepas majlis menandatangani memorandum persefahaman (MoU) antara Nuklear Malaysia bersama Alam Flora



DR ROSLI

Environmental Solutions Sdn Bhd (AFES) di Dewan Tun Dr Ismail, Kompleks Agensi Nuklear Malaysia, Bangi di sini pada Selasa.

Jelas beliau, kebanyakan industri di luar juga sudah mempertimbangkan penggunaan tenaga nuklear secara serius berikutan bahan api fosil dan arang adalah penyumbang terbesar pelepasan karbon

"Ia akan dilaksanakan atau tidak bergantung kepada pertimbangan Kementerian Tenaga (Kementerian Peralihan Tenaga dan Daya Guna Awam).

"Kita lihat dasar bagi kementerian ini dalam dua hingga tiga tahun akan datang," katanya - *Bernama*

Media : Sinar Harian

Coverage : Nuclear Energy Needed to Achieve Net Zero Carbon Aspirations

Date : 17 January 2024



Event: Live Interview at Slot Lensa Ipt with the Title "The Future of Nuclear Technology in IPT" with YBr. Dr. Muhammad Rawi bin Mohamed Zin,

Deputy Director General, Research & Technology Development

Date: 8 March 2024

Location: Wisma Berita, Angkasapuri

NASIONAL

Nuklear Malaysia alu-alukan kerjasama strategik bersama negara anggota IAEA

🕒 25 Mei 2024, 2:05pm

21
Shares



Share



Tweet



Share



Email



KUALA LUMPUR: Nuklear Malaysia mengalu-alukan jaringan kerjasama strategik dilakukan bersama negara anggota Agensi Tenaga Atom Antarabangsa (IAEA) bagi mengurusperdanakan penggunaan teknologi nuklear secara aman di rantau Asia Pasifik.

Nuklear Malaysia dalam satu kenyataan berkata, kerjasama itu perlu kerana teknologi nuklear mempunyai kepentingannya dalam sektor sosio ekonomi negara.

"Malah pada 27 September 2022, Malaysia sudah menandatangani Practical Arrangement (PA) di Vienna, Austria bersama IAEA dalam bidang pendidikan dan latihan bagi bidang radiasi, pengangkutan dan keselamatan sisa radioaktif.

"Menerusi perjanjian itu, Nuklear Malaysia sendiri berperanan sebagai pusat latihan serantau bagi rantau Asia Pasifik.

"Pusat latihan ini bertanggungjawab dalam penganjuran kursus, pembangunan makmal dan bahan latihan serta membangunkan kepakaran dalam bidang keselamatan sinaran," menurut agensi itu dalam satu kenyataan media, hari ini.

Agensi itu berkata, bagi memahami lebih lanjut teknologi berkenaan, ia turut menghimpun profesional, penyelidik dan penggubal dasar dari rantau Asia Pasifik untuk meningkatkan keupayaan mengenai penggunaan sumber sinaran yang selamat terhadap masyarakat dan alam sekitar.

Media : TV3 Bulletin Portal

Date : 25 May 2024

Coverage : Nuklear Malaysia Welcomes Strategic Cooperation with IAEA Member States

BERITA SEMASA

Nuklear Malaysia anjur kursus antarabangsa dalam bidang keselamatan sinaran



Azrul Naimi X • May 26, 2024

236 1 minute read

BANGI – Agensi Nuklear Malaysia (Nuklear Malaysia) baru-baru ini menganjurkan kursus antarabangsa Pendidikan PascaSiswazah Ke-18 Mengenai Perlindungan Sinaran & Keselamatan Sumber Sinaran, di sini.

Kursus yang dianjurkan secara bersama dengan Agensi Tenaga Atom Antarabangsa (IAEA) ini merupakan satu inisiatif bagi memahami kepentingan teknologi nuklear dalam perkembangan sektor sosioekonomi negara.



Dirasmikan oleh Ketua Setiausaha, Kementerian Sains, Teknologi dan Inovasi (MOSTI) Datuk Ts. Dr. Aminuddin Hassim (gambar), seramai 25 peserta dari 17 negara telah menyertai kursus peningkatan keupayaan ini.

"Melalui kursus ini, para peserta dapat memahami dan memperkukuhkan pelaksanaan piawaian keselamatan antarabangsa melalui pembangunan modal insan dalam bidang keselamatan sinaran.

Media : Portal Malaysia Tribune

Date : 25 May 2024

Coverage : Nuklear Malaysia Organizes International Course in Radiation Safety



Lubang Benam: Agensi nuklear guna radar kesan pergerakan

Hafidzul Hilmi Mohd Noor
hafidzul@hmetro.com.my

KUALA LUMPUR: Agensi Nuklear Malaysia dan pasukan teknikal Dewan Bandaraya Kuala Lumpur (DBKL) dilihat berada di lokasi insiden tanah jerlus di Jalan Masjid India.

Pasukan berkenaan membawa alat pengesan radar dipercayai bagi mengesan sebarang pergerakan di bawah tanah.

Alat sama pernah digunakan dalam insiden tanah runtuh di Batang Kali pada 2022.

Sebelum ini, Indah Water Konsortium (IWK) memulakan aktiviti 'jetting' iaitu penyemburan air bertekanan tinggi di lokasi kejadian tanah jerlus berhampiran Wisma Yakin di Masjid India di sini, malam ini.

Media : Berita Harian Malaysia Portal

Date : 27 August 2024

Coverage : Sinkhole: Nuklear Malaysia Uses Motion Detection Radar



Program: Live Interview on Bernama TV Through Apa Khabar Malaysia Slot with YBrs. Dr. Rosli bin Darmawan, Director General of the Malaysian Nuclear Agency

Date : 15 October 2024

Topic : Nuclear For The Masses

BELANJAWAN 2025 > BERITA

Malaysia Berkongsi Kepakaran Nuklear Sempena Kepengerusian ASEAN 2025

21/12/2024 10:41 AM



Ketua Pengarah Agensi Nuklear Malaysia (Nuklear Malaysia) Dr Rosli Darmawan (kanan) berkongsi mengenai Dasar Teknologi Nuklear Negara 2030 (DTNN 2030) ketika ditemu bual Bernama di pejabatnya baru-baru ini.

Newspaper : Bernama Malaysia Portal

Date : 21 December 2024

Coverage : Malaysia Shares Nuclear Expertise in Conjunction with ASEAN Chairmanship 2025

Photo 9.6 : Some of the Media Coverage Published for the Year 2024



A photograph of three hikers from behind, standing on a rocky mountain peak. They are wearing backpacks and using trekking poles. The background shows a sunset or sunrise over a valley. A semi-transparent blue rectangle is overlaid on the right side of the image, containing the text '10.0'.

10.0

WELFARE & SOCIAL

10.0 WELFARE & SOCIAL

Nuklear Malaysia is always concerned about the social, mental and physical well-being of its employees. Various welfare and social activities are held through PUSPANITA, Nuklear Malaysia Sports and Welfare Club, AKRAB, and First Aider. The Joint Department Council (MBJ) also plays an important role in safeguarding the welfare of its employees.

10.1 JOINT DEPARTMENTAL COUNCIL (MBJ)

The Departmental Joint Meeting (MBJ) is a very important platform in fostering closer relationships between management and staff at Nuklear Malaysia. Activities organized by the DBM not only provide space for more open communication, but also have a positive impact on harmony, work effectiveness, and the development of a more inclusive organizational culture.

The MBJ Nuklear Malaysia highlights various issues for the welfare and well-being of the people of Nuklear Malaysia. Among the issues are:

- i. Ensure information or guidelines in the form of infographics are provided so that Nuklear Malaysia personnel understand the procedures for using the Spot-Me application.
- ii. Urging improvements to the multi-storey parking area in Block 11 to prevent recurrence of accidents.
- iii. Urges MOSTI to brief contract officers on the status of Contract of Service at Nuklear Malaysia.
- iv. Propose the extension of the contracts of Nuklear Malaysia contract staff using Trust Account Fund funds, and also obtain radiation leave, claims, and insurance facilities.
- v. Urge that applications for grade change warrants and related support staff posting grades be sent to MOSTI.
- vi. Supporting the need to repair damaged building doors that use risky access card systems and moldy building walls.
- vii. Identify the readiness status of Nuklear Malaysia's Daycare centers in terms of safety and caregivers.

10.2 CLUBS AND ASSOCIATIONS

PUSPANITA Sub-Branch of the Malaysian Nuclear Agency

Throughout 2024, PUSPANITA Nuklear Malaysia Branch has successfully implemented various programs and activities of a scientific, spiritual, health, social and recreational nature. These programs were organized with the aim of strengthening friendships among members, supporting the development of women's character, and supporting the national health and well-being agenda.

The list of activities organized in 2024 is as follows:

i.	1-3 March 2024 : Sleeper Train – Backpackers 3.0 to Dabong, Kelantan
ii.	1 March 2024: Study tour to Nasyrul Quran Complex, Putrajaya.
iii.	12 March to 3 April 2024: Ihya Ramadan Programme - Tadarus Al-Quran, Iftar Banquet, Ramadan Lecture, Qiamullail, and Khatam Ceremony as well as Ramadan Contribution Presentation.
iv.	4 July 2024: Healthy Malaysia National Agenda Programme, Nuklear Malaysia.
v.	16 July 2024: Mini Health Carnival - Collaboration between the Human Resource Development Division, PUSPANITA, Sports & Welfare Club, First Aider Squad and AKRAB Nuklear Malaysia.
vi.	22 August 2024 : Nuklear Merdeka Walk
vii.	19 September 2024 : Little Scientist Day - Collaboration with the Information Management Division (BPM).
viii.	11 to 15 December 2024 : Backpackers 4.0 to Padang & Bukit Tinggi, Indonesia.
ix.	19 December 2024: Fruit composition competition, blood donation and product sales.

Overall, the programs throughout 2024 successfully achieved the objectives set with the active involvement of PUSPANITA members. The activities implemented not only empowered the role of women in various aspects, but also provided a positive impact from a spiritual, health, intellectual and social perspective.

Photos of PUSPANITA activities throughout 2024

















10.3 SPORTS AND CHARITY CLUB, NUKLEAR MALAYSIA

The Nuklear Malaysia Sports and Welfare Club plays a very important role in supporting the goals of the organization and the well-being of its employees. The activities carried out by this club are not only aimed at improving the physical and mental health of employees, but also have a positive impact on productivity, cooperation, and work culture among agency employees.

Among the activities organized in 2024 are as follows :

- i. 17 February 2024 : Nuklear Malaysia Indoor Bowling Championship, Nilai.
- ii. February 28, 2024: Israk Mikraj Lecture, Nuklear Malaysia
- iii. 13 July 2024 : Nuklear Malaysia Indoor Futsal Competition Director General's Cup 2024, Nilai.
- iv. 31 July 2024 : Fruit Eating Festival, Nuklear Malaysia Recreation Forest.
- v. 25 October 2024: 39th Annual General Meeting, Nuklear Malaysia.
- vi. 16 November 2024 : Nuklear Malaysia Indoor Badminton Competition, Nilai.

Photos of Sports and Welfare Club activities throughout 2024













10.4 AKRAB

AKRAB Nuklear Malaysia is always active in implementing various programs aimed at fostering noble values, strengthening integrity, and improving the quality of public services through a more humane and ethical approach.

- i. 13 – 14 May 2024: AKRAB Workshop: TAJMA Personality Profile
- ii. AKRAB Nuklear Malaysia Exhibition and Leisure Activities Pavilion
 - 27 March 2024: AGM PUSPANITA MOSTI
 - 16 July 2024: Mini Health Carnival
 - 19 September 2024: Little Scientist Day
- iii. 11 September 2024: Pure Values & Psychology Program 2024 Series 2: Ethical Robots or Ethics for Robots in collaboration with the Human Resources Division
- iv. 16 August 2024: Opening Ceremony, Yasin Recitation and Goodbye Prayer for the AKRAB Room of Nuklear Malaysia
- v. 2 December 2024: Malaysian Department of Chemistry AKRAB Benchmarking Visit to AKRAB Nuklear Malaysia

Photos of AKRAB activities throughout 2024





PROGRAM NILAI MURNI PSIKOLOGI 2024: Siri 2 Ceramah

"ROBOT BERETIKA ATAU ETIKA UNTUK ROBOT?"

11 September 2024 (Rabu) | Dewan Tun Dr. Ismail, Agensi Nuklear Malaysia

Agenda Program

MASA	PROGRAM
9.00 pagi – 9.30 pagi	Pendaftaran
9.30 pagi – 9.40 pagi	Bacaan Doa / Ucapan Auklan
9.40 pagi – 11.40 pagi	Ceramah "Robot Beretika ATAU Etika untuk Robot?" • Penceramah: Prof. Ts. Dr. Norita binti Md Norwani, USM
11.40 pagi – 12.00 tengah hari	Sesi Soal – Jawab
12.00 tengah hari	Penutup

ANJARAN:
Bahagian Pembangunan Sumber Manusia (BSM)
Peraturan Surai dan Anggota Wanita
Perkhidmatan Awam Malaysia (PUSAPITA)

NUKLEAR MALAYSIA
KEMENTERIAN SAINS, TEKNOLOGI DAN INOVASI

10.5 FIRST AIDER NUKLEAR MALAYSIA

The Nuklear Malaysia First Aider Squad is a support team under the supervision of the Emergency Sub-Committee (JKK) which plays an important role in ensuring that the level of emergency preparedness in this agency is always at an optimal level. This squad was established to train and provide personnel who are skilled in providing initial emergency assistance (first aid) to incident victims before the arrival of paramedics or further treatment at a medical center. The membership of this squad consists of agency personnel who have undergone basic first aid training and are able to respond quickly and effectively in emergency situations.

Among the activities implemented are the following:

- i. 4 to 5 March 2024: *Basic Occupational First Aid (BOFA)*
- ii. Blood Donation and Health Screening Program with the National Blood Center (PDN)
 - 16 July 2024 - Blood Donation Program as well as Health Checkup, HPV, and Breast Self-Exam Screening
 - 19 December 2024 - Blood Donation Program

Photos of Nuklear Malaysia's First Aider activities throughout 2024





