



MALAYSIAN NUCLEAR AGENCY  
***ANNUAL REPORT***  
***2022***

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**1.0**

## ***AGENCY PROFILE***





## 1.0 AGENCY PROFILE

### VISION

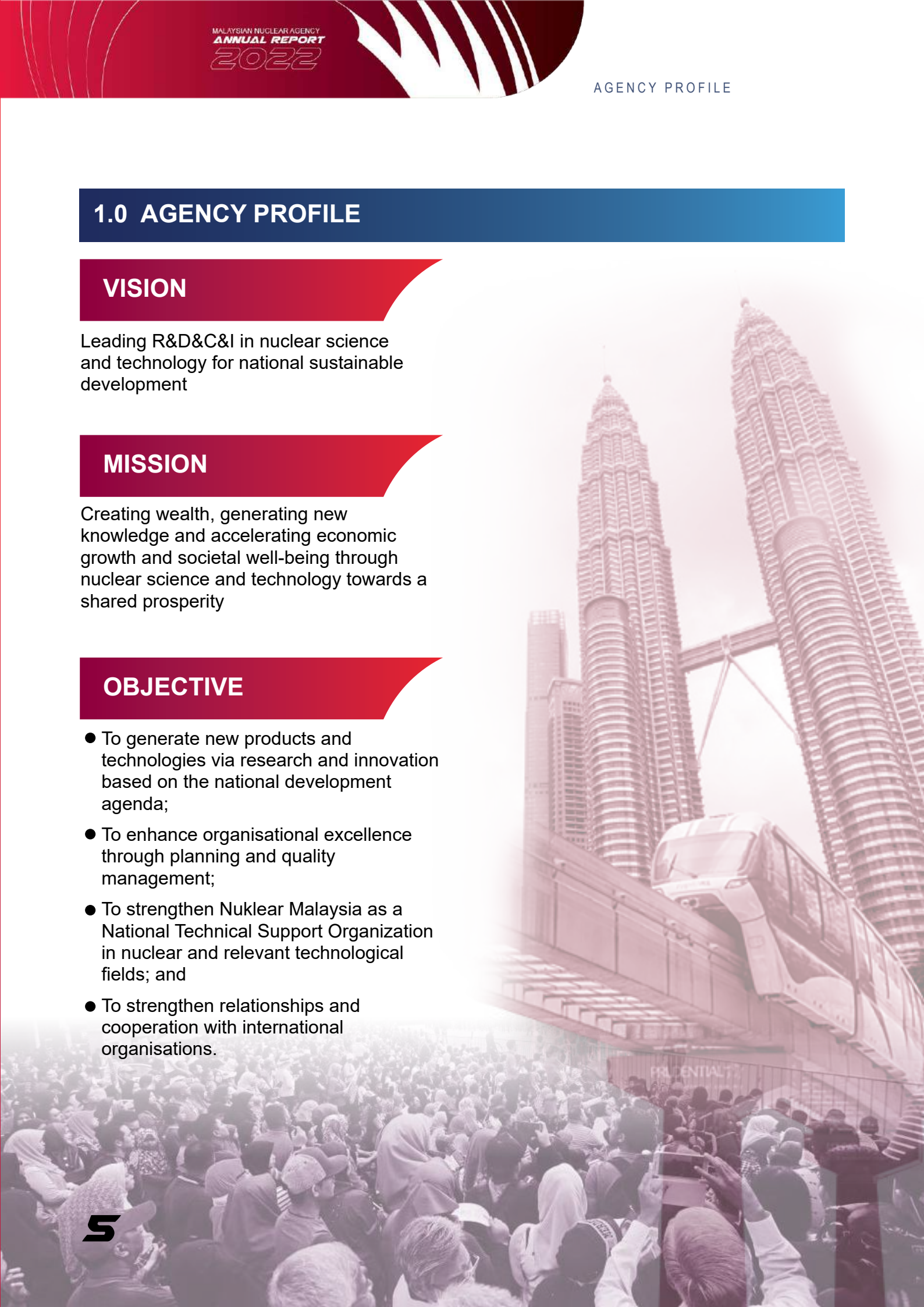
Leading R&D&C&I in nuclear science and technology for national sustainable development

### MISSION

Creating wealth, generating new knowledge and accelerating economic growth and societal well-being through nuclear science and technology towards a shared prosperity

### OBJECTIVE

- To generate new products and technologies via research and innovation based on the national development agenda;
- To enhance organisational excellence through planning and quality management;
- To strengthen Nuklear Malaysia as a National Technical Support Organization in nuclear and relevant technological fields; and
- To strengthen relationships and cooperation with international organisations.

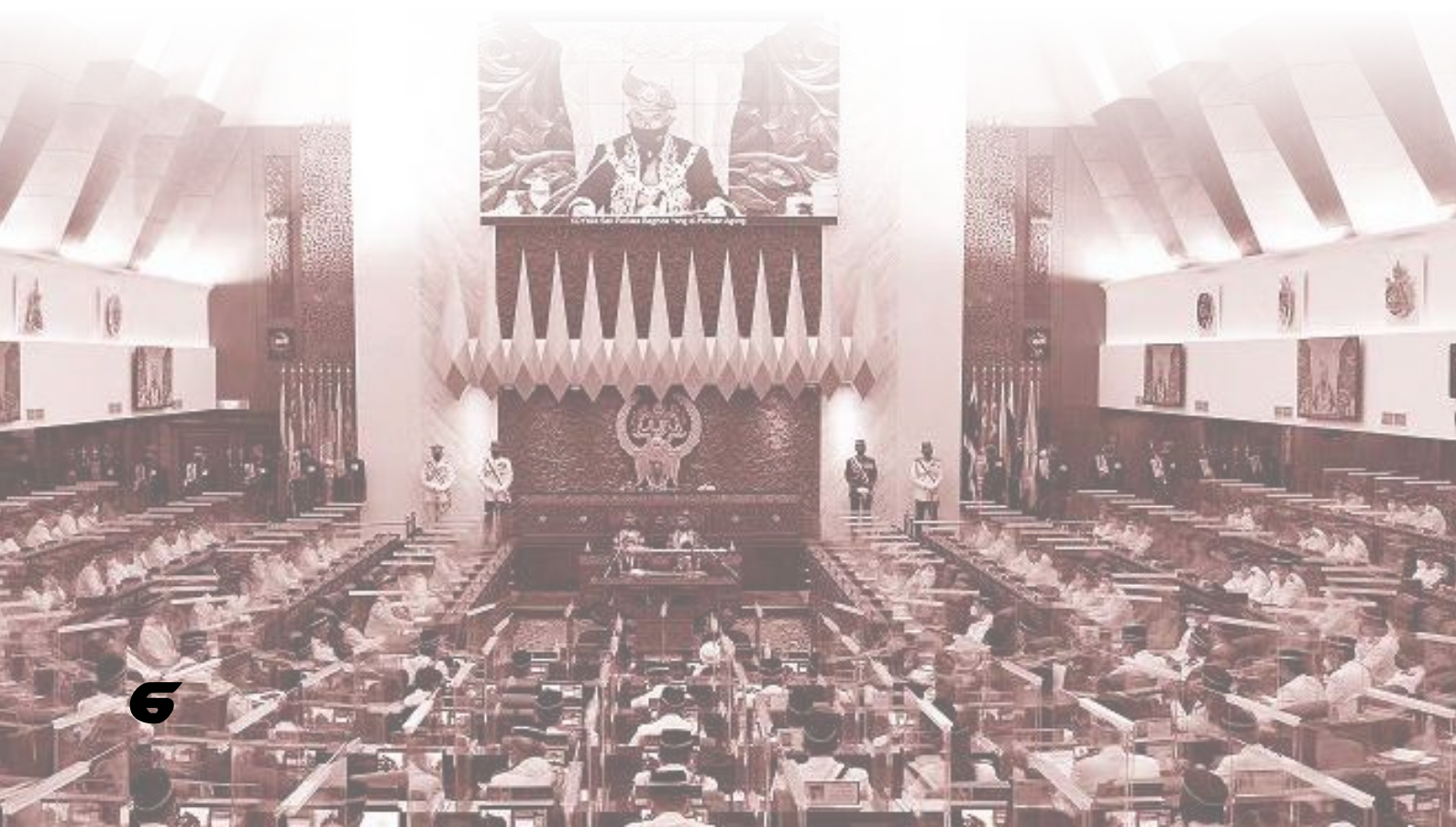


## FUNCTION

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

## SOURCE OF AUTHORITY

The source of authority for Nuklear Malaysia is stipulated in the RUU Perbekalan B.30, Ministry of Science, Technology and Innovation





## SHARED VALUE

**N**

NOVELTY

**U**

UBIQUITOUS

**C**

COMMITTED

**L**

LEADERSHIP

**E**

EMPHATY

**A**

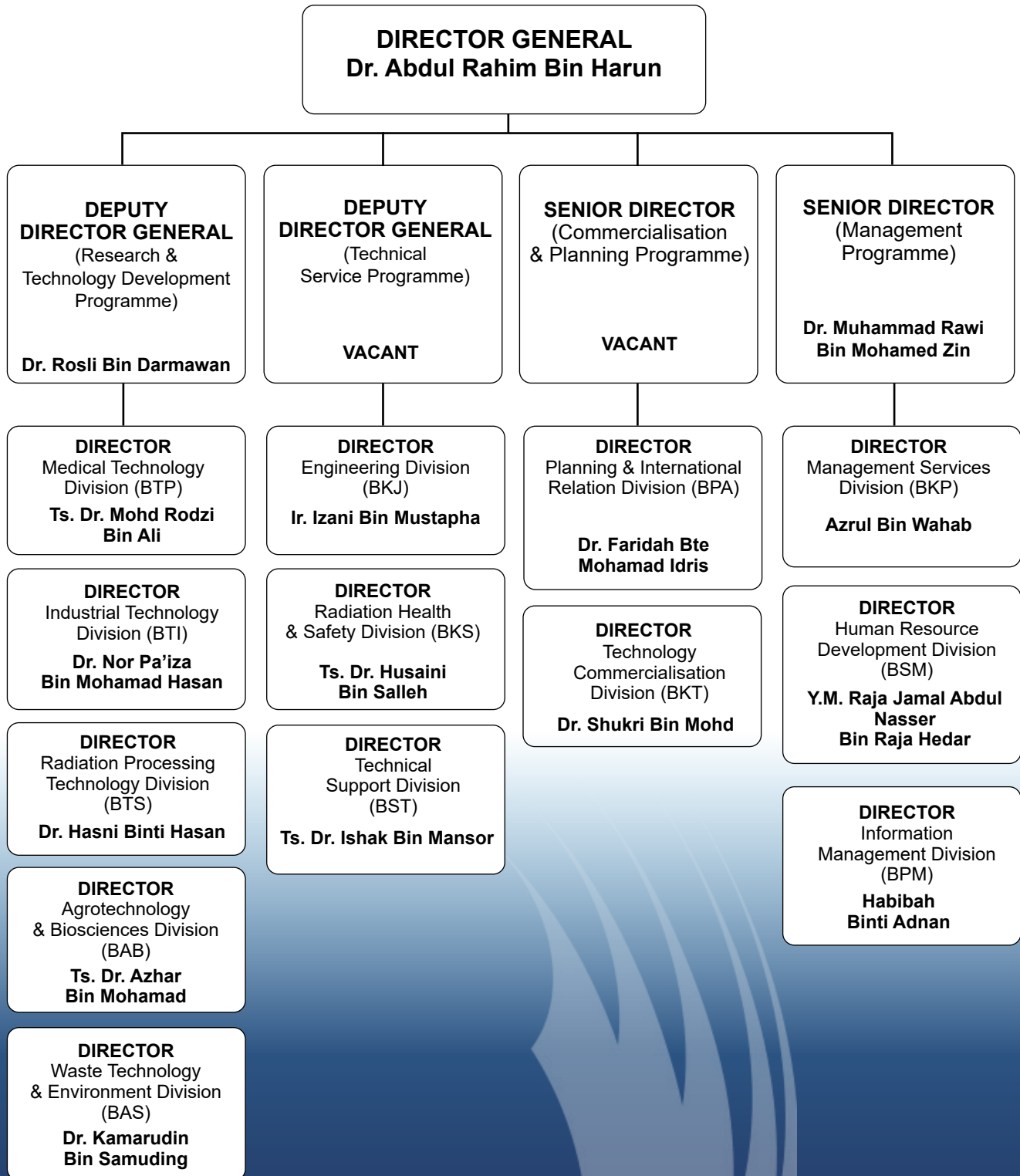
ATTITUDE

**R**

RESPECT



## ORGANISATIONAL CHART



## TOP MANAGEMENT



**DEPUTY  
DIRECTOR GENERAL**  
(Research &  
Technology Development  
Programme)  
**Dr. Rosli Bin Darmawan**

**DIRECTOR GENERAL**  
**Dr. Abdul Rahim Bin Harun**

**SENIOR DIRECTOR**  
(Management Programme)  
**Dr. Muhammad Rawi  
Bin Mohamed Zin**

## DIVISION DIRECTOR

Waste Technology  
& Environment  
Division (BAS)

**Dr. Kamarudin  
Bin Samuding**

Agrotechnology  
& Biosciences  
Division (BAB)

**Ts. Dr. Azhar  
Bin Mohamad**

Radiation Processing  
Technology Division  
(BTS)

**Dr. Hasni  
Binti Hasan**

Industrial Technology  
Division (BTI)

**Dr. Nor Pai'za  
Bin Mohamad Hasan**

Medical  
Technology Division  
(BTP)

**Ts. Dr. Mohd Rodzi  
Bin Ali**

Engineering  
Division (BKJ)

**Ir. Izani  
Bin Mustapha**





Technical  
Support Division  
(BST)

**Ts. Dr. Ishak  
Bin Mansor**

Technology  
Commercialisation  
Division (BKT)

**Dr. Shukri  
Bin Mohd**

Human Resource  
Development Division  
(BSM)

**Y.M. Raja Jamal  
Abdul Nasser  
Bin Raja Hedar**

Radiation Health  
& Safety Division  
(BKS)

**Ts. Dr. Husaini  
Bin Salleh**

Planning &  
International  
Relation Division  
(BPA)

**Dr. Faridah  
Bte Mohamad Idris**

Management  
Services  
Division (BKP)

**Azrul Bin Wahab**

Information  
Management  
Division (BPM)

**Habibah  
Binti Adnan**



## ***EXECUTIVE NOTE***

**2.0**

...gave your life to, or  
...em up with worn-out too  
...ke one heap of all your winnings  
...on one turn of pit

## 2.0 EXECUTIVE NOTE

### *Maturity at the age of 50*

*Themed “Nuclear Advances, Prosperous People”, 2022 is another crucial year in developing the country’s nuclear science and technology. The Malaysian Nuclear Agency (Nuklear Malaysia) is now 50, established on 19 September 1972. This golden jubilee is marked by various activities. The climax of the celebration on 19 September 2022 has seen the reunion of the pioneer generation of this agency and the country’s nuclear technology experts, whether retired or still active in the country and abroad.*

*The theme of this golden jubilee celebration has a deeper meaning. The development of nuclear technology throughout the 50 years undertaken by Nuclear Malaysia has had a significant impact on the development of the country’s socioeconomic levels. Starting in the early 80s, nuclear technology has been used by researchers in higher education institutions (IPT).*





Researchers in the agro and nuclear biotechnology field in Malaysia have collaborated with researchers from Universiti Pertanian Malaysia, now known as Universiti Putra Malaysia (UPM), on the fertilisation of oil palm plants. This research involved the usage of phosphorus-32 radioisotope has successfully mapped the active roots of mature oil palm, which helps to decrease the cost of fertilisation of the oil palm industry. Isotope technology can also help preserve the sustainability of food crops by detecting ecosystem function, organic matter dynamics, and water uptake and use by plants. Furthermore, nuclear technology in plant breeding has succeeded in producing new varieties of plants that can give high yields and resist diseases, such as the NMR152 rice seeds.

Gamma and neutron radioactive sources in non-destructive testing technology have been developed in Malaysia by Nuklear Malaysia's experts since 1982 to augment local industries, especially the oil and gas industry, in identifying leaks, defects, or deposits in oil and gas pipelines. Non-destructive testing (NDT) technology can also detect cracks in building structures and welding defects in components and structures of various heavy industries such as oil and gas, power generation, transportation, and aerospace. Nuklear Malaysia has also developed expertise, facilities, NDT certification systems, and new NDT techniques and promoted the technology to local industries. The first NDT training was held in 1986 with the assistance of the IAEA in collaboration with the Skills Development Department (DSD), SIRIM, and the Atomic Energy Licensing Board (AELB). Since then, Nuklear Malaysia has produced a qualified and certified workforce to carry out NDT tests for local industries. This effort also resulted in new economic activities, where many of the trained crews offered NDT expertise services to local and foreign companies, contributing to the competitiveness and sustainability of Malaysia's economic growth. The appointment as an IAEA Collaborating Centre for NDT in 2015 marked the outstanding achievements of Nuklear Malaysia in this field. There are currently over 60 local NDT companies with over 500 trained workforces.

In 1989, MINTec-Sinagama began providing gamma irradiation services for the treatment of rubber gloves from the local industry and successfully augmented the development of the country's rubber glove industry. The impact of this business model based on nuclear technology has contributed much income to the national economy. Since then, the plant's activities have grown, and its services have expanded to include various medical equipment and products and the industrial irradiation of food and spices.

The TRIGA PUSPATI reactor, which reached its critical stage on 28 June 1982, produces neutron sources for medical use, such as the production of several types of isotopes, including technetium-99m, iodine-131 generators, and radiopharmaceutical kits. Nuklear Malaysia's latest contribution in this field is the production of samarium-153 EDTMP for the palliative care of cancer patients.

## Excellence in 2022

The world remains in post-Covid-19 recovery in 2022, and research and technology development is no exception. Nuklear Malaysia's persistent efforts have produced 25 products, five processes, 31 procedures, five databases, and one software via its research and development (R&D) activities. These activities are implemented using research funds, amounting to RM13,970,772.60 obtained in 2022. Via research activities, Nuklear Malaysia patented seven intellectual properties, and commercialised four.

Nuklear Malaysia's researchers actively participate in various innovation competitions inside and outside the country. The Rt-Nemo Project: Leak Detection in Underground Pipelines, led by Dr Noraishah Othman, was awarded the Gold Award and Special Award from the Japan Intellectual Property Association (JIPA)



at the Malaysia Technology Expo 2022 (MTE 2022). Nuklear Malaysia also won the Research Entrepreneur and Overall Award at the Malaysian Commercialization Year Summit (MCY) for the NMR-152 rice seed production project. At the 7th Asian PGPR International Conference for Sustainable Agriculture, Dr Phua Choo Kwai Hoe received the Outstanding Female Researcher Award. Nuklear Malaysia's commitments, which involves cooperation in 141 RCA projects, resulted in the organisation of more than 68 RCA activities, benefitting more than 1,200 personnel in the region and provided 41 technical experts to RCA, has been recognised with the RCA Regional Cooperation Award for the institutional category at the General Conference 66th IAEA. At this conference, the expertise and dedication of Dr Ilham Mukhriz bin Zainal Abidin in empowering NDT technology in Malaysia was recognised with him receiving the Regional Cooperative Agreement (RCA) Project Award.

Publication is one of the outputs of research and development. Nuclear Malaysia has successfully published 516 articles. Out of these publications, six national and 36 international journals are regarded as high-impact publications.

Malaysia continues to actively cooperate at the international level to strengthen the development of the country's nuclear technology. Cooperation with the IAEA (International Atomic Energy Agency) has helped Malaysia build, strengthen, and maintain human and institutional capacity for the safe, peaceful, and secure use of nuclear technology. A total of 68 active collaborations on various international platforms are utilised for the development of the country's nuclear technology.

Nuklear Malaysia's ongoing commitment to ensuring its quality and service to stakeholders and customers is demonstrated by its ten main facilities' retention of 11 international standard certifications (ISO).

Efficient agency management and administration also catalyses Nuklear Malaysia's excellence. For example, in 2022, Nuklear Malaysia received

100% payment within 14 days from January to December 2022. This achievement was recognised and lauded by MOSTI.

Information dissemination activities to increase public awareness of nuclear science and technology continue to be among the main commitments of Nuclear Malaysia. For example, the IAEA/Regional Meeting on Advancing Nuclear Science Education for Sustainable Development involving a total of 48 top education officials from various Asia Pacific countries has increased the knowledge of high school science teachers about nuclear science and technology, especially on the best teaching and learning techniques for the curriculum high school science. Nuklear Malaysia is also committed to various public awareness programs organised by the Ministry of Science, Technology and Innovation (MOSTI), such as the National Science Week (MSN), in addition to carrying out various other activities for the public, such as Scientist Talks, Nuklear Malaysia Roadshow and also programs with the media.

#### **DR. ABDUL RAHIM BIN HARUN**

Director General

Malaysian Nuclear Agency (Nuklear Malaysia)



**3.0**

***CORPORATE DIARY***





**3.0**

## **NUCLEAR MALAYSIA** *Corporate Diary 2022*

**12 January 2022**

Honourable Visit of the Strategic  
Technology and Application Division  
(TSA) of MOSTI



**12 January 2022**

Industrial Visit of Postgraduate Students of the  
Public Health Program (Radiation Disaster and  
Public Health), Universiti Putra Malaysia



**22 January 2022**

Malaysian Nuclear Agency Director  
General Cup Indoor Futsal Competition



**10 February 2022**

Technology and Data Colloquium  
on the Comprehensive Nuclear Test  
Ban Treaty (CTBT)



## ***16-17 February 2022***

Workshop on the Determination of Main Work Targets (SKU)/KPI MyPerformance and Analysis of Achievement of SKT/KPI 2021 of Malaysian Nuclear Agency



## ***21-25 February 2022***

Radiological Emergency Preparedness (ERM)



## ***21 February - 4 March 2022***

9<sup>th</sup> Follow-up Training Course (FTC) on Nuclear and Radiological Emergency Preparedness (NREP)



## ***21-25 February 2022***

9<sup>th</sup> Follow-up Training Course (FTC) on Reactor Engineering (RE)





## 09 March 2022

YAB Prime Minister, Dato' Sri Ismail Sabri bin Yaakob, handed over 500 IS21 rice seed combs (20 kg) at the IS21 Rice Seed Handover Ceremony to rice farmers and farmers in Endau, Johor

## 10-11 March 2022

Malaysia's New Variety Rice Seed Product IS21 won first place for the Research Entrepreneur Category and Overall Winner (Supreme Award) at the MCY Summit 2021



## 18 March 2022

Courtesy Visit of Lieutenant General Dato' Indera Hj Yazid bin Hj Arshad (Air), Commander of the Joint Forces Headquarters to Nuklear Malaysia to discuss the direction of the Biocomposite Floating Jetty Project





**29 March 2022**

Data Collection Workshop for the Technical Study of the TRIGA PUSPATI Reactor Replacement Plan Series 1/2022

**11 April 2022**

Appointment of YBrs. Dr Abdul Rahim bin Harun as the Director General of Nuklear Malaysia and YBrs. Dr. Rosli bin Darmawan as the Deputy Director General (Research and Development Program) effective 11 April 2022



**21 April 2022**

Visit of YB Dato' Sri Dr Adham Baba, Minister of MOSTI, to the Medical Technology Division, Nuklear Malaysia



**22 April 2022**

Signing Ceremony of the “Supply Agreement with Renewable Energy (SARE)” between KETSA, Nuklear Malaysia, Tenaga Nasional Berhad (TNB), and GSPRAX Sdn. Bhd.



**26 April 2022**

Courtesy visit by YBrs. Dr Abdul Rahim bin Harun, Director General of Nuklear Malaysia to YBhg. Datu Sr Zaidi bin Haji Mahdi, the Permanent Secretary, Ministry of Natural Resources and Urban Development of Sarawak

**17 May 2022**

Briefing YB Datuk Haji Ahmad Amzad Hashim, Deputy Minister of the Ministry of Science, Technology, and Innovation (MOSTI), regarding the IS21 Rice Seed Development Planning Plan by the Director General of Nuklear Malaysia



**23 May 2022**

Courtesy visit of the Nuklear Malaysia delegation to YB Datuk Seri Panglima Dr Jeffrey Kitingan, Sabah Agriculture and Fisheries Minister at the Sabah Ministry of Agriculture and Food Industry Office, Wisma Pertanian, Kota Kinabalu, Sabah



### ***03 June 2022***

Delivery of new IS21 rice seeds to farmers of the Kuala Terengganu Area Farmers' Organisation in Kampung Kubang Tangga, Kuala Terengganu, by YB Datuk Haji Ahmad Amzad bin Hashim, the Deputy Minister of MOSTI



### ***12 June 2022***

Official work visit of YBhg. Datuk Zainal Abidin bin Abu Hassan, Secretary General of MOSTI to the Biocomposite Floating Jetty Development Project for the Operation and Logistics Use of the Malaysian Armed Forces at the Tun Sharifah Rodziah Sea Base, Semporna, Sabah.



### ***23 June 2022***

Visit of YB Dato' Sri Dr Adham Baba, Minister of Science, Technology and Innovation (MOSTI) to the Gamma Greenhouse (GGH), Nuklear Malaysia



### ***24 June 2022***

Visit of YB Dr Muhamad Akmal bin Saleh, State Assembly Member, Merlimau



**28 June 2022**

Scientific Writing & Publishing  
Seminar and Workshop 2022



**28-29 June 2022**

Launching the book '100 Facts About RTP'  
at the Opening Ceremony of the TRIGA  
PUSPATI Reactor Symposium in conjunction  
with the 40th anniversary of the establishment  
of the TRIGA PUSPATI Reactor (RTP)

**22-23 June 2022**

Indesign Graphic Workshop



**16-18 June 2022**

Strategic Direction Development  
Workshop & Action Plan for  
Nuklear Malaysia's Digitisation  
2021-2025



**19-21 July 2022**

Advance First Aid, CPR & AED  
Training



**01 August 2022**

Courtesy visit of the Nuklear  
Malaysia delegation to YB Dato'  
Ahmad Suaidi bin Abdul Rahim,  
State Secretary of the Perak  
State Government

**05-07 July 2022**

Research Methodology and Ethics Course  
for Research Officers Q54



**02 August 2022**

MS ISO/IEC 17025:2017  
Radiochemical and Environmental  
Laboratory (RAS) Quality  
Management System  
Documentation Review Workshop  
Series 1/2022

### ***03-04 August 2022***

Workshop on Writing and Refining  
Cosmic Hall Special Edition 50 Years  
of Nuklear Malaysia



### ***09 August 2022***

Briefing regarding the IS21 rice seed  
planting using new technology - Mukim  
Sungai Balang, Muar by the Director  
General of Nuklear Malaysia to DYMM  
Sultan Ibrahim Ibni Almarhum Sultan  
Iskandar, Sultan of Johor

### ***12 August 2022***

MyPerformance HRMIS  
SKU Administrator Briefing  
(Section)



### ***17 - 18 August 2022***

METSIM Simulation  
Application Course for Rare  
Earth Extraction



## 08 September 2022

MADA delegation visit led by YBr. Tuan Haji Kamarudin Bin Dahuli, General Manager of MADA



## 13 September 2022

Inauguration of Nuclear Malaysia Innovation and Creativity Day 2022 (HIKNM2022) by YBhg. Datuk Ts. Dr Mohd Nor Azman bin Hassan, Deputy Secretary General (Technology Development), MOSTI

## 14 September 2022

NASIONALfm Radio Interview - YBr. Dr Faridah Mohamad Idris, Director of Planning and International Relations Division



## 15 September 2022

Good Morning Malaysia Interview (TV1) - YBr. Dr Abdul Rahim bin Harun, Director General of Nuklear Malaysia, in conjunction with the Celebration of 50 Years of Nuklear Malaysia

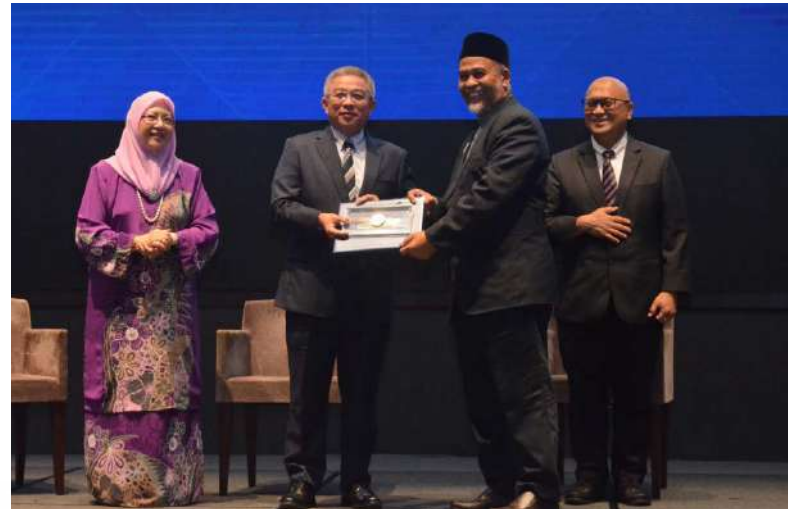
## ***15 September 2022***

BERNAMA Radio Interview - YBrs. Dr Muhammad Rawi bin Mohamed Zin, Director (Management Programme)



## ***19 September 2022***

YB Dato' Sri Dr Adham bin Baba, Minister of MOSTI, officiated the Inauguration Ceremony of Nuklear Malaysia's Golden Jubilee at Dewan Tun Dr Ismail



## ***21 September 2022***

Recognition of YBrs. Dr Abdul Rahim bin Harun, Director General of Nuklear Malaysia as Malaysia's Top Research Scientist at the Malaysian Academy of Sciences Fellow Award Ceremony



## ***21-22 September 2022***

YBrs. Dr Abdul Rahim bin Harun, Director General of the Malaysian Nuclear Agency officiated the International Conference on Non-Ionising Radiation (NIR) at Sri Mas Ballroom, Bayview Hotel, Pulau Pinang





## *26 September 2022*

YB Dato' Sri Dr Adham Baba, Minister of MOSTI, together with a delegation from Nuklear Malaysia and the Department of Atomic Energy (JTA), attended the 66th IAEA General Conference Opening Plenary at the International Atomic Energy Agency (IAEA) Headquarters in Vienna, Austria

## *26 September 2022*

Malaysia won the RCA Regional Cooperation Award for the institutional category and the RCA Project Award for the individual category in conjunction with the 50th anniversary of the Regional Cooperation Agreement (RCA), Vienna, Austria



## *28 September 2022*

Malaysia and the IAEA signed a Practical Arrangement (PA) to increase cooperation in education and training in the field of radiation, transport, and safety of radioactive waste





## 28 September 2022

Malaysian delegation attended a Bilateral meeting with the Director General of the IAEA, His Excellency Rafael Mariano Grossi

## 29 September 2022

YBrs. Dr Abdul Rahim Harun and Mr Hua Liu, IAEA Deputy Director General and Head of the Technical Cooperation Department, signed Malaysia's Country Program Framework (CPF) for 2022 - 2027 during the 66th IAEA General Conference



## 29 September 2022

Courtesy visit of the Nuklear Malaysia delegation led by YBrs. Dr Abdul Rahim bin Harun on Ms Najat Mokhtar, Deputy Director General and Head of the Department of Nuclear Science and Applications, IAEA

**04-06 October 2022**

Nuklear Malaysia R&D  
Seminar 2022



**05 October 2022**

YBhg Datuk Dr Aminuddin Hassim,  
KSU MOSTI's official work visit

**31 October -  
04 November 2022**

RAS0091 IAEA Regional Meeting on  
Advancing Nuclear Science Education for  
Sustainable Development, Hotel Everly,  
Putrajaya



**14-16 October 2022**

Training course: Strengthening  
Preparedness for Radiological and  
Nuclear Emergency





***18-19 October 2022***

Course: Development of  
expertise in Nuclear Technology  
Foresight

***06-07 October 2022***

National Stakeholders Meeting  
on Nuclear Technology for  
Controlling Plastic Pollution  
(NuTeC Plastics)



***18-19 October 2022***

NDT Seminar in Civil Engineering  
(18 - 19 October 2022)

***18-20 October 2022***

Book Completion Workshop 2022



***27 October 2022***

Courtesy visit from Universiti  
Teknologi Malaysia (UTM)

## ***08 November 2022***

Premier Lecture, "Appeal to the Greatness of Silam Technology, Facing Upcoming Challenges" by YBhg. Prof. Dato' Ir. Dr Wan Ramli bin Wan Daud, Principal Investigator Fellow, Universiti Malaya (UM)



## ***09-10 November 2022***

Steering Committee Meeting between Malaysian Nuclear Agency & Japan Atomic Energy Agency (JAEA)



## ***14-18 November 2022***

IAEA - Pilot National Workshop on the Use of Decision Support Tools in Research Reactor Spent Fuel Management, Melaka



## ***23 November 2022***

Technical visit of the Knowledge Administration Committee (JKKM) led by Dr Muhammad Rawi bin Mohamed Zin (Director, Management Programme) to the Malaysian Cooperative Institute (IKMa) (23 November 2022)



**28 November -  
02 December 2022**

Regional Training Course on Guidelines  
and Standards of Quality Management  
for Radiation Processing Facilities



**05 December 2022**

Nuklear Malaysia's reciprocal visit to the  
Young Agricultural Development Board  
(MADA), Alor Setar, Kedah, led by the  
Deputy Director General of Research and  
Development, YBrs. Dr. Rosli Darmawan

**08 December 2022**

Workshop KM Back to Basic-What  
is Knowledge Management



**19 December 2022**

The use of Ground Penetrating  
Radar (GPR) technology to help  
rescue the landslide incident in  
Batang Kali, Selangor





**4.0**

***GOLDEN JUBILEE  
CELEBRATION OF  
50 YEARS OF THE  
ESTABLISHMENT OF  
NUKLEAR MALAYSIA***





4.0

## **GOLDEN JUBILEE CELEBRATION OF 50 YEARS OF THE ESTABLISHMENT OF NUKLEAR MALAYSIA**

Nuklear Malaysia became 50 years old in 2022, culminating in a celebration: the Golden Jubilee of 50 Years of the Establishment of Nuklear Malaysia. The celebration began in early September 2022 and will go on until September 2023. “Nuclear Advances, Prosperous People”, which was chosen as the celebration’s theme, reflects the importance of nuclear technology’s progress to the nation’s development and well-being. Various programs impacting the public were organised in conjunction with this celebration.



Figure 4.1 Nuclear Malaysia's 50<sup>th</sup>-Year Celebration Logo



Nuklear Malaysia designer Mrs Norhidayah binti Jait designed the 50<sup>th</sup>-anniversary logo, comprising of the typeface ‘50’, orbits, and atoms. Orbits and atoms symbolise the continuous research of nuclear science and technology towards excellence. The colour gold represents the success of Nuklear Malaysia as a leader in research, development, commercialisation and innovation (R&D&C&I) in nuclear science and technology for the well-being of the people over the past 50 years and into the future.

### **4.1 INAUGURAL CELEBRATION OF THE GOLDEN JUBILEE OF 50 YEARS OF THE ESTABLISHMENT OF NUKLEAR MALAYSIA**

The Opening Ceremony of the Golden Jubilee Celebration of 50 Years of the Establishment of Nuklear Malaysia, the highlight of this celebration, was held on 19 September 2023 at Tun Dr Ismail Hall. The ceremony, officiated by YB Dato’ Sri’ Dr Adham bin Baba, Minister of MOSTI, was also attended by the Top Management of MOSTI, including YBrs. Ts. Dr. Nagulendran a/l Kangayatkarasu, Deputy Secretary General (TKSU) MOSTI.





This historical event was attended by ~50 important figures for Nuklear Malaysia, those former employees of the pioneering generation that developed the agency. They consist of former Directors General and Nuklear Malaysia Top Management, retired nuclear experts and Nuklear Malaysia retirees. Among those present is YBhg. Tan Sri Tajuddin bin Ali, Dato' Baharuddin bin Yatim, YM Raja Dato' Dr. Abdul Aziz bin Raja Adnan, Dato' Dr. Abdul Ghaffar bin Ramli, Datuk Dr. Ashar bin Hj Khalid, and Dr. Muhd Noor bin Muhd Yunus.

Among the events held on the day was the launch gimmick of the 50th anniversary of Nuklear Malaysia, the handover ceremony of the Dewan Kosmik magazine Special Edition of the Golden Jubilee 50 Years of Nuklear Malaysia and the launch of the Coffee Table book: 50 Years of Glory with Nuklear Malaysia. Also, at this event, a ceremony was held for the exchange of the R&D NDA/MoU document and the Commercialisation NDA/MoA document between Nuklear Malaysia and various companies and organisations, such as MPOB and UKM, while a Commercialisation MoA was signed with HG Solution, Austral Techsmith Sdn Bhd, and JustClick Vision Sdn Bhd.



*Figure 4.2 The Opening Ceremony of the Golden Jubilee Celebration of 50 Years of the Establishment of Nuclear Malaysia officiated by the Minister of MOSTI, YBhg. Dato' Sri Adham Baba*





**Table 4.1 List of Companies Involved in the Memorandum of Agreement (MoA)**

Bil.	Company Name	Collaborative Titles
1.	HG Solution Sdn Bhd	Course Training Cooperation - Malaysian Nuclear Agency Course
2.	Austral Techsmith Sdn Bhd	Radio Frequency (RF) Monitoring Collaboration for Telecommunications Transmitting Structures in Sarawak
3.	JustClick Vision Sdn Bhd	Collaboration on Non-Ionizing Radiation (NIR) Monitoring of Telecommunication Transmitter Structures

An exhibition of Nuclear Malaysia's R&D products and activities was also held at this event. Among the projects exhibited in the gallery are:

**Table 4.2: List of Exhibitions in conjunction with the 50<sup>th</sup> Anniversary of Nuklear Malaysia's Establishment**

Bil	Project	Division
1.	MUDSkipper Scan: Innovative On-site Radiometric Mapping System for Efficient Coastal Erosion Monitoring	BTI
2.	Internet of Things (IoT) based Reaktor TRIGA PUSPATI (RTP) Simulator for Research and Training (IoT-RTPSim)	BST
3.	Gamma-Spider	BTI
4.	Development of Procedures on Performing LASER Pointer Safety Evaluation and Hazard Analysis	BKS
5.	Borehole	BAS
6.	Padi	BAB
7.	Biobaja M-99	BAB
8.	Integrated Interceptor Collector System for River Waste Management	BST
9.	Rare Earth	BTI
10.	G <sup>2</sup> Tag Survey Meter	BST
11.	Gamma Radiation-Synthesized Fuel Cell Electrocatalyst	BTI
12.	MyFlexiDet	BTI

## 4.2 PRODUCT AND SERVICES (NUKLEAR MALAYSIA) EXHIBITION

The month-long Nuklear Malaysia Products and Services Exhibition took place on 5 September to 5 October 2022. The exhibition, officiated by the Honourable Datuk Seri Adham bin Baba, Minister of MOSTI, on 19 September 2022, was opened to the public.



Visitors can visit three exhibition areas based on clusters and five facilities in Nuklear Malaysia. This program synergises nine divisions in Nuklear Malaysia, namely the Technology Commercialization Division (BKT), Medical Technology Division (BTP), Radiation Safety and Health Division (BKS), Environmental Division (BAS), Technical Support Division (BST), Industrial Technology Division (BTI), Agrosience and Biotechnology Division (BAB), and Information Management Division (BPM).

### Nuklear Malaysia Products and Services Exhibition Visit Cluster:

Block	Cluster
37	Medical Cluster, Radiation Metrology, Radiation Safety, Environment and Nuclear Engineering
34	Industrial Cluster
44	Agriculture, Food and Radiation Processing Cluster







Products and Services  
(Nuklear Malaysia) Exhibition  
Facility Visit:

SINAGAMA

ALURTRON

TRIGA PUSPATI Reactor  
(RTP)

Reactor Simulator

Gamma Green House







“ A total of 7,083 visitors participated in this programme. These visitors comprise various sectors and social groups, including school and university students, NGOs, industry, government, and private sector partners’



Figure 4.3 Exhibition of Products and Services at the facilities available at Nuklear Malaysia





## 4.2 PUBLICATION OF THE SPECIAL EDITION OF DEWAN KOSMIK IN CONJUNCTION WITH THE GOLDEN JUBILEE CELEBRATION OF 50 YEARS OF NUKLEAR MALAYSIA AND THE COFFEE TABLE BOOK: 50 GLORIOUS YEARS WITH NUKLEAR MALAYSIA

In conjunction with this golden jubilee, Nuklear Malaysia has collaborated with Dewan Bahasa dan Pustaka (DBP) to publish a special edition of Dewan Kosmik with the 50th Golden Jubilee Celebration of Nuklear Malaysia. A total of 20 articles on research and technology development in Nuklear Malaysia were prepared by Nuklear Malaysia personnel. In addition, 10,000 copies of this special issue, printed by DBP, were distributed to the public.

Nuklear Malaysia also published the Coffee Table book: 50 Glorious Years Together with Nuklear Malaysia, which showcases the history of the establishment, leading figures and achievements throughout the 50 years of its establishment.



Figure 4.4 The launch of the Coffee Table Book: 50 Glorious Years with Nuklear Malaysia and the launch of the Special Edition of Dewan Kosmik: Celebration of the Golden Jubilee of 50 Years of Nuklear Malaysia





## 4.4 PREMIER SPEECH



*Figure 4.5 The Premier Speech delivered by YBhg. Prof. Dato' Ir. Dr Wan Ramli bin Wan Daud, Principal Research Fellow, University of Malaya (UM)*

YBhg. Prof. Dato' Ir. Dr Wan Ramli bin Wan Daud, Principal Research Fellow, Universiti Malaya (UM), was invited to give a lecture entitled "Recalling the Greatness of Past Technology, Facing Upcoming Challenges" on 8 November 2022 at the Seminar Room, Block 11. A total of 145 Nuklear Malaysia personnel partook in this experience-sharing session.

## 4.5 PEOPLE'S SPORTS DAY







In conjunction with the celebration of Nuklear Malaysia's Golden Jubilee, the People's Sports Day was organised to symbolise the closeness of relationship and spirit of cooperation between the personnel of Nuklear Malaysia throughout its 50 years of establishment. The People's Sports Day comprised of various exciting events, such as parade competitions, sports, and banquets on 8 November 2022.

*Figure 4.6 The People's Sports Day, attended by Nuklear Malaysia's personnel, held at Nuclear Malaysia's Recreation Park*

## 4.6 INTERVIEW WITH THE MEDIA

1. Live Interview YBr. Dr Faridah binti Mohamad Idris, Director of Planning and International Relations (BPA) by BERNAMA RADIO for the Think Window Slot in conjunction with Nuklear Malaysia Innovation & Creativity Day 2022 - 7 July 2022
2. Interview of YBr. Dr Rosli bin Darmawan, Deputy Director General (Research and Technology Development) by Akhbar Wilayahku titled "Malaysian Nuclear Agency 50 Years of Striving" - 9 September 2022- 15 September 2022
3. Interview of YBr. Dr Faridah binti Mohamad Idris by Radio Nasional FM entitled "Malaysian Nuclear Agency: 50 Years of Making Steps" - 14 September 2022
4. Interview of YBr. Dr Abdul Rahim bin Harun, Director General of Nuklear Malaysia by Selamat Pagi Malaysia titled "Malaysian Nuclear Agency: 50 Years of Making Steps" – 15 September 2022
5. Interview of YBr. Dr Muhammad Rawi bin Mohamed Zin, Director of the Management Programme by Bernama Radio entitled "Malaysian Nuclear Agency: 50 Years of Making Steps" - 15 September 2022



*Figure 4.7 Interview with the Director General of Nuklear Malaysia by Selamat Pagi Malaysia (SPM)*

**5.0**

***RESEARCH AND  
TECHNOLOGY  
DEVELOPMENT***





**5.0****RESEARCH AND  
TECHNOLOGY  
DEVELOPMENT**

Research and technology development (R&D) activities continued throughout 2022, and our success in this is evidenced by various outputs and internal and external recognitions bestowed upon Nuklear Malaysia.

**5.1 RESEARCH AND TECHNOLOGY DEVELOPMENT  
OUTPUTS**

Nuklear Malaysia actively conducts R&D in various fields such as reactor technology, industry, medicine, waste and environment, agrotechnology and bioscience, radiation safety and health, accelerators, nuclear technology support facilities and radiation processing.

A total of 25 products, 5 processes, 31 procedures, 5 databases, and 1 software have been successfully produced.

**PRODUCTS****25****PROCESSES****5****PROCEDURES****31****DATABASES****5****SOFTWARE****1**

Information and details of each research result are as follows:

Jadual 5.1 : **RESEARCH AND TECHNOLOGY  
DEVELOPMENT OUTPUTS**

No.	Product	Project Leader
1	Alunode	Dr. Siti Radiah Mohd Kamarudin
2	NuRust	Dr. Siti Radiah Mohd Kamarudin
3	Development of Disinfectants Using Irradiation Technology (UVGI) along with Irradiated PPE Product Resistance Study	Ts. Dr. Naurah Mat Isa
4	Development of Biocomposite Floating Jetty for Logistic and Operation of Malaysian Armed Forces	Mohd. Faizal Abdul Rahman
5	Tri-Maran Bagang floating HDPE Biocomposite for Capturing Anchovies.	Meor Yahaya Razali
6	Floatable Anchovies Drying System.	Mohd. Faizal Abdul Rahman
7	Bioliquifert M100 Product - Bioliquifert M100 Commercialisation Project with Peat Organic Sdn Bhd. (2021 -2022)	Dr. Phua Choo Kwai Hoe
8	GoGrow BioNPK Biofertilizer Products - Commercialisation Project Acinetobacter sp. AP1 with Syarikat Enviro Clean Energy (ECE) Sdn Bhd. (2021- 2023)	Dr. Phua Choo Kwai Hoe
9	"Geotagging Survey Meter" Prototype Development	Nor Arymaswati Abdullah
10	Development of Sm-153 using TRIGA PUSPATI Reactor	Dr. Azahari Kasbollah
11	Development of Pyrogen Free EDTMP	Wan Hamirul Bahrin
12	Sterile and Pyrogen Free DTPA kit: Preparation for Kidney Imaging	Wan Hamirul Baharin
13	Radiopharmaceutical Kits; Tetrofosmin Radiolabeled with Tc-99m for Coronary Artery Disease	Siti Selina Abdul Hamid
14	WINDR-53	Dr. Mohd Noorul Ikhsan Mohamed
15	Binturong: Extendable Telescopic Gamma Ray Scanning Tool for Horizontal Vessel Inspection.	Ts. Dr. Mohd Amirul Syafiq Mohd Yunos



16	I-SPECT – PAT	Ts. Dr. Nazrul Hizam Yusoff & Hanafi Ithnin
17	Development of Portable Gamma CT System for On-site Large Object Scanning	Dr. Susan Maria Sipaun
18	I-SPECT Software	Hanafi Ithnin & Dr. Nazrul Hizam Yusoff
19	Wireless Nuclear Detector GM	Ismail Mustapha
20	Elevated Temperature Core Flood Rig	Dr. Noraishah Othman
21	RT-NEMO	Dr. Noraishah Othman
22	DURAShield: A Novel Radiation Shielding Material which Successfully Integrates Between Compression Strength, Durability and Homogeneity	Noor Azreen Masenwat
23	GPR RoadScan: Portable Mounting System	Tengku Sarah Tengku Amran
24	Development of Hygiene Paper Using Electron Beam Irradiation for Medical Laboratory and Clean Room Application	Dr. Siti Fatahiyah Mohamed
25	Inactivation of Microorganism in Domestic Sewage Sludge by Hygienization Process with Electron Beam Accelerators	Sarala Selambakkannu

Figure 5.1: R&D products



Table 5.2 : **List of Processes**

No.	Process	Project Leader
1.	SWA & Oligo (Chitosan & Carrageenan) Synergy Studies on Vegetable Crops	Norhashidah Talip
2.	Preservation of Cultural Heritage Arts Using Photoactive Coatings Materials Form Palm Oil	Dr. Rida Tajau
3.	Gamma-Irradiated Chitosan as an Enhancer to The Growth of Freshwater Plants and Fish in an Aquaponic System	Dr. Sarada Idris
4.	Studies on The Mechanism of Radiation-induced Degradation of PTFE and Characterization of PTFE-Elastomer Blends	Sivanesan Appadu
5.	Radioactive Waste Inventory System and Data Analysis for Malaysia	Ahmad Hasnulhadi Che Kamaruddin

Table 5.3 : **List of Procedures**

No.	Procedure	Project Leader
1	SOP - In-Vitro Mutagenesis of Cassava Using Acute Gamma Irradiation	Norazlina Noordin
2	Protocol : Investigation of Mutagenesis of Phosphate Solubilizing Microbe for Biofertilizer Using Gamma Irradiation	Chong Saw Peng
3	SOP in Preparation and Irradiation of Shelf Stable Ready to Eat Products	Dr. Seri Chempaka Mohd. Yusof
4	I-SPECT – PAT	Dr. Nazrul Hizam Yusoff
5	Wireless Nuclear Detector GM	Ismail Mustapha
6	Development of New Formulation for Sprayable Ultrahigh Performance Concrete (UHPC) for Civil Structure Rehabilitation.	Noor Azreen Masenwat
7	Development of NDT Method for Monitoring Acrylic Polymer on Slope Using Nuclear Density Gauge (NDG)	Mohamad Ridzuan Ahmad



8	Development of New NDT Method for Assessing Internal Condition of Road Side Tree Using X-ray Imaging System	Mohamad Syafiq Mohd Amin
9	Development of New Data Correlation Procedure for Monitoring Soil Condition Using Ground Penetrating Radar (GPR) and Nuclear Density Gauge (NDG)	Tengku Sarah Tengku Amran
10	MOA Projek Acoustic Emission with Kencana Jaya Mas	Mohamad Ridzuan Ahmad
11	Production of Cellulose Microfibrils from Biopolymer Sago Crumbs as a Packaging Coating Material	Dr. Norzita Yacob
12	Development of 3-Dimensional Tissue Scaffolds for Tissue Engineering Application via Microstereolithography Technique	Dr. Marina Talib
13	Gamma-Irradiated Chitosan as an Enhancer to the Growth of Freshwater Plants and Fish in an Aquaponic System	Dr. Sarada Idris
14	SWA dan Oligo (Chitosan and Carrageenan) Synergy Studies on Vegetable Crops	Norhashidah Talip
15	The Development of Gamma Degraded Seaweed as Plant Growth Promoter	Maznah Mahmud
16	Determining the Effect of Gamma Irradiation Dose on LCST Value of Thermo Sensitive Nano Gels	Ts. Dr. Mohd Yusof Hamzah
17	Development of Disinfectants Using Irradiation Technology (UVGI) Along with Irradiated PPE Product Resistance Study	Ts. Dr. Naurah Mat Isa
18	Radiopharmaceutical Kits; Tetrofosmin Radiolabeled with Tc-99m for Coronary Artery Disease	Siti Selina / Rahimah Abdul Rahim
19	Development of Multimodal Medical Radioisotope Ho-166 as a Liver Cancer Targeted Therapy	Dr Azahari Kasbollah
20	Chromosome Aberration in Interventional Radiology Staff Occupationally Exposed to Low Dose Ionising Radiation	Rahimah Abdul Rahim/ Noraisyah Mohd Yusof
21	Radioactive Waste Inventory System and Data Analysis for Malaysia	Ahmad Hasnulhadi Che Kamaruddin
22	Effect of Gamma Irradiation Towards Cellulose in Different Dose for Disinfection and Preservation of Cultural Heritage Artifact	Nadira Kamarudin
23	Synthesis and Characterization of Irradiated Metal Functionalized Graphene for Hydrogen Storage	Suhaila Hani Ilias

24	Synergistic Solvent Extraction of Cerium from Monazite Mineral	Dr. Nurliana Roslan
25	Feasibility Studies of BaBrX:Eu <sup>2+</sup> (X=Cl, F, I) Synthesis Process as Phosphor Material for Imaging Plate/Detector Application	Dr. Izura Izzuddin
26	Procedure to Reduce Size of Xenotime Particles Using Fritsch Pulverisette 6 Classic Line for Xenotime Digestion Process	Dr. Roshasnorlyza Hazan
27	Separation of TiO <sub>2</sub> and Fe <sub>2</sub> O <sub>3</sub> from Local Ilmenite	Dr. Roshasnorlyza Hazan
28	A Method for Preparation of Titania Fibers	Dr. Cik Rohaida Che Hak
29	Standard Operating Procedure for Field Emission Scanning Electron Microscope (FESEM) Version Ii	Dr. Cik Rohaida Che Hak
30	SOP for Production of Fine Particles Monazite for Rare Earth Extraction Using MVLab Industrial Grade Grinder	Dr. Nurliana Roslan / Dr. Cik Rohaida Che Hak
31	A Combined Method to Probe The Localisation of Fillers in the Polymeric Nanocomposite	Ir. Dr. Hafizal Yazid

Table 5.4 : **List of Databases**

No.	Database	Project Leader
1.	Radiotracer Database	Ts. Dr. Nazrul Hizam Yusoff
2.	National Forensic Library	Dr. Hishamuddin Husain
3.	Stable Isotope Technique for Honey Authenticity	Mohd Noor Hidayat Adenan
4.	Stable Isotope Database of Raw Uncleaned (RUC) Malaysian Edible Bird Nest (EBN)	Mohd Noor Hidayat Adenan
5.	Reducing Greenhouse Gas Emissions from Agriculture and Land Use Changes Through Climate Smart Agricultural Practice	Ahmad Nazrul Abd Wahid

Table 5.5 : **List of Software**

No.	Software	Project Leader
1.	Welding Defect Classification from Radiographic Images using Convolutional Neural Networks (CNN)	Suhairy Sani



## 5.2 RESEARCH GRANTS

Nuclear Malaysia received various research funds at the national and or international levels. The total amount of funds received amounted to RM13,970,772.60. The detailed breakdown of funds is in the table below.

Table 5.6 : **Research and Development Fund Allocations**

No.	Fund	Total Fund (RM)
1.	FRGS Project	20,000.00
2.	Smart Fund Project	416,225.40
3.	MSI Project	54,100.00
4.	Development RMK (R&D)	12,720,000.00
5.	IAEA TC (Nuklear Malaysia)	397,807.00
6.	IAEA CRP (Nuklear Malaysia)	322,560.00
7.	TED1	40,080.00
<b>TOTAL (OVERALL)</b>		<b>13,970,772.60</b>








## 5.3 INTELLECTUAL PROPERTY

The output from research activities is one of the nation's critical assets and should be registered as intellectual property. This intellectual property registration aims to protect it through legislation from plagiarism and brand misuse. Intellectual property registration will also be able to add value to products produced, mainly for commercialisation purposes.

**7 SUCCESSFULLY  
OBTAINED**

**4 HAVE BEEN  
COMMERCIALISED**

Table 5.7 : **List of Intellectual Properties**

No.	Title	Researcher(s)	Commercialisation Status	Intellectual Property
1.	A Sterilization Apparatus	Dr Naurah Mat Isa Dr Mohd Yusof Hamzah (BTS)		Paten
2.	Method for Polymer Modification by Radiation Grafting and Incorporation of Functional Groups	Dr. Ting Teo Ming (BTS)		Paten
3.	An Inspection Device for Leak Detection in Pipelines- RT- Nemo	Dr Noraishah Othman (BTI)		Paten
4.	TM-IS21	Dr Sobri Husein (BAB)		Trade mark
5.	Manual of Method of M99 Biofertilizer Production Laboratory Scale	Nur Humaira Lau Abdullah et.al (BAB)		Copyright
6.	Procedures for Preparation of Nuklear Malaysia Radiation-Degraded Chitosan (NM-Oligochitosan) as Plant Growth Promoter	Maznah Mahmud et.al (BTS)		Copyright
7.	Malaysian Nuclear Rice Seed NMR152 Standard Operating Procedure (SOP) Development	Dr Sobri Husein et.al (BAB)		Copyright



## 5.4 RESEARCHER-INDUSTRY SCIENTIFIC EXCHANGE PROGRAMME (RISE)

All research carried out in research institutions must be relevant to society or industries. One of the platforms used to realise this is the Researcher-Industry Scientific Exchange Programme (RISE). The placement of researchers in industries allows specific research to be conducted to solve industrial problems. This expertise-sharing aims to increase innovation, productivity, and capacity building for both parties via research, consultancy, technology transfer, or training. In 2022, a total of eight RISE projects will remain active.

Table 5.8 : **List of RISE Projects**

No.	Project
1.	Technology Transfer of Volvariella Mushroom Seed Production
2.	Upscaling CMSS-Graphene Oxide as a Nano Fluid
3.	Automation System for the Production of Commercially Seeded Mushroom Blocks
4.	Cultivation of Mushrooms for Commercialisation
5.	Enhancement of Radiation Safety and Security within the Supply Base Area
6.	Organising International Conference on R&D&C&I Management
7.	Novel Methods and Applications of Electrolysed Oxidising Water Anolyte as Disinfecting Agent Effective Against Phytopathogens in Chili
8.	Establishment of Micropropagation Procedure for Ornamental Banana var. Variegated Hawaiian and Blue Java



*Volvariella Mushroom*

## 5.5 RESEARCH ACHIEVEMENTS AND RECOGNITION

Nuklear Malaysia's researchers actively participate in innovation programs and competitions at home and abroad. Nuclear Malaysia's teams cinched a total of 7 awards in 2022, per the table below:

Table 5.9 : **List of Innovation Achievements**

No.	Competition	Innovation title	Group leader	Awards
1.	Malaysia Technology Expo 2022 (MTE 2022) 21-25 Mac 2022	Rt-Nemo: Leak Detection in Underground Pipelines	Dr Noraishah Othman	Gold Award
2.		Rt-Nemo: Leak Detection in Underground Pipelines	Dr Noraishah Othman	Special Award by Japan Intellectual Property Association (JIPA)
3.		MyNUTEC Luthor: Lutetium-177 Targeted Radionuclide Therapy High Yield of RTP	Dr Azahari Kasbollah	Silver Award
4.		MyNUTEC Lutanoc: Lutetium-177 Labelled with Dotanoc for Cancer Theranostic	Dr Azahari Kasbollah	Bronze Award
5.	Malaysian Invention & Innovation Expo 2022 (Senior Inventor) 1 November 2021-29 April 2022	Smart Non-Destructive Vessel Scanner with Gamma-Ray Sensor Technology	Ts Dr Mohd Amirul Syafiq Mohd Yunos	-
6.	Selangor Research & Development and Innovation (SRIE) 2022 6-9 October 2022	Development of Rapid UV Germicidal Irradiation Chamber with PPE Degradation Study for Healthcare Usage	Ts. Dr. Naurah Mat Isa	Second Place
7.	National Innovation & Invention Competition 2022 (NIICe 2022) 22 August 2022	Polysaccharides from Mushroom by Submerged Culture Fermentation for Skin Lightening Application	Dr. Shaiful Azuar Mohamad	Silver Award
8.	Malaysia Commercialisation Year (MCY) NMR 152		Malaysia Nuclear Agency	Research Entrepreneur Award and Overall Award
9.	7 <sup>th</sup> Asian PGPR International Conference for Sustainable Agriculture		Dr Phua Choo Kwai Hoe	Outstanding Female Researcher Award



“ Various parties recognised Nuklear Malaysia’s research efforts and endeavours”

Table 5.10 : **List of Research and Innovation Achievements**

No.	Research		Achievements
1.	Malaysia Commercialisation Year (MCY) NMR 152		Research Entrepreneur Award and Overall Award
2.	Malaysia Technology Expo 2022 (MTE 2022)	* T-Nemo: Leak Detection in Underground Pipelines  * Rt-Nemo: Leak Detection in Underground Pipelines  * MynutecLuthor: Lutetium-177 Targeted Radionuclide Therapy High Yield of RTP  * MynutecLutanoc: Lutetium-177 Labelled with Dotanoc for Cancer Theranostic	Gold Award  Special Award by Japan Intellectual Property Association (JIPA)  Silver Award  Bronze Award
3.	National Innovation & Invention Competition 2022 (NIICe2022)	Polysaccharides from Mushroom by Submerged Culture Fermentation for Skin Lightening Application Project	Silver Award
4.	Effect of Acute Gamma Radiation on Soghum BTS		Best Poster Award
5.	57 <sup>th</sup> Asian PGPR International Conference for Sustainable Agriculture		Outstanding Female Researcher Award

## 5.6 NUKLEAR MALAYSIA INNOVATION AND CREATIVITY DAY



The HIKNM program is an annual program organised to celebrate and award researchers and inventors who are active and excel in research and development of science, technology and innovation in Nuklear Malaysia. The program provides an interactive platform for participants to showcase their innovation and creativity to the public, encompassing other researchers, scientists and academics, students, and local industry players.

The program was held on 13 - 14 September 2022 and inaugurated by YBhg. Dato' Ts. Dr Mohd Nor Azman bin Hassan, the Deputy Secretary General of MOSTI (Technology Development). The program, which was attended by a total of 100 participants, involved two competition categories, namely the Research Innovation Competition and the Service Creativity Competition. The Research Innovation Competition consists of the R&D innovation results of researchers, especially those that support the development of nuclear science and technology in Malaysia. The Service Competition category involves Nuklear Malaysia's efforts and creativity in producing creative and

Figure 5.2 The inauguration of Nuklear Malaysia Innovation and Creativity Day (HIKNM 2022), officiated by YBhd. Datuk Ts. Dr Mohd Nor Azman bin Hassan, TKSU (Technology Development) MOSTI



innovative ideas to support efforts to increase the productivity, efficiency, and effectiveness of the department's service delivery. These creative and innovative ideas include creating improvements to systems, procedures, work methods, and equipment.



Table 5.11 : **HIKNM Competition List 2022**

No.	Category	Total projects	Participation
1.	Research Innovation Competition	24	13 Nuklear Malaysia's Researchers
			11 IPT Researchers dan Nuklear Malaysia's collaborators
2.	Service Creativity Competition	10	10 Nuklear Malaysia Participants

Table 5.12 : **List of Service Creativity Competition Winners**

No.	Services	Medal
1.	Radiation Workers Management: Manual to Digital	Gold
2.	Nuclear Forensic Library Management System (MyNFL)	Gold
3.	Lab Safety Audit Program by Self and Inspection	Silver
4.	Nuclear Malaysia's Expertise Service Data Management Innovation Online Using KM Technology Platform	Silver
5.	DiR3X: Digital Repository of Reactor Experience, Expertise and Explicit Knowledge	Silver
6.	Mechanical Puncher for Sample Preparation	Bronze
7.	An Alert Monitoring System for the Malaysian Radionuclide Monitoring Station (RN42)	Bronze
8.	Development of Procedures on Performing LASER Pointer Safety Evaluation and Hazard Analysis	Bronze
9.	Monitoring Purchase Contract Periodic Implementation of the Mechanical System of the Malaysian Nuclear Agency Building Interactively Using the Pivot Table and Pivot Chart Functions of Microsoft Excel	Bronze
10.	Database Management System (DBMS) E-Tag Group Research & Development Project, BAS	Bronze

Table 5.13 : **List of Research Innovation Competition Winners**

No.	Services	Medal
1.	Enhancement of the Valuable Potential of Blood Waste from Slaughterhouses by Irradiation for Various Industrial Applications	Gold
2.	FIBRICK (Home Fire Door)	Gold
3.	G <sup>2</sup> Tag Survey Meter	Gold
4.	MUDSkipper Scan: Innovative On-site Radiometric Mapping System for Efficient Coastal Erosion Monitoring	Gold
5.	Theranostic Microparticles For Radio-chemoembolization of Liver Cancer	Silver
6.	Azman Kamal Rat (AZK): The First Malaysia Hairless New Breed For Biomedical Study	Silver
7.	GPR RoadScan: Portable Mounting System	Silver
8.	Mandrel-less Orbital Friction Stir Welding for Pipe Joining	Silver
9.	Gamma Radiation-Synthesized Fuel Cell Electrocatalyst	Silver
10.	EASY NEEDLE	Silver
11.	MyFlex iDet	Silver
12.	Centralization Fire Alarm System	Bronze
13.	AedesTech Apps: Aedes Eggs Auto-Counting Mobile Apps	Bronze
14.	Irradiated Sewage Sludge as Green Fertilizer for Sustainable Agriculture	Bronze
15.	Microwave Welding of Thermoplastic using Silicon Carbide Nanomaterial as Novel Susceptor	Bronze
16.	Internet of Things (IoT) based Reaktor TRIGA PUSPATI (RTP) Simulator for Research and Training (IoT-RTPSim)	Bronze
17.	Integrated Interceptor Collector System for River Waste Management	Bronze
18.	CHALCONE Innovative Theranostic Agent for Future Colon Cancer Treatment	Bronze
19.	PUTRA UAV: Bio-Degradable Natural Fibre Composite Material	Bronze
20.	Augmented and Visual Learning: Hunting with E-Language	Bronze
21.	paniMmagnetic Film	Bronze
22.	Green Concrete	Bronze
23.	Bismuth Oxide Nanoparticles (BiONPs): A Safe Radiobiological Enhancer for Breast Cancer Radiotherapy	Bronze
24.	Radioprotective Features of Schiff Bases-Functionalized Iron Nanoparticles	Bronze





Figure 5.3  
Nuklear Malaysia Innovation and  
Creativity Day (HIKNM) activities





Apart from these two competition categories, HIKNM 2022 also involves several other programs



## 1. Nuclear Science and Technology short video competition

This competition was open to high school students throughout Malaysia and received a total of 102 entries that showcase students' various creativity and knowledge about nuclear science and technology through the production of creative and informative short videos. This activity can indirectly increase the students' attention and interest in science and technology, especially nuclear technology, as the next generation drives the country's progress.

List of National Level Nuclear Science and Technology Short Video Competition Winners :

### FIRST PLACE

Nur Shabreena binti Mohd Shahizal and Siti Nur Shifaa binti Mohamad Hisham together with their Guidance Teacher, Mohd Mutalabisin bin Maryaman from SMK (A) Tun Rahah, Sungai Besar, Selangor. Received cash prize worth RM1000, trophy, and a certificate.

### SECOND PLACE

Heesharrane a/p Ravi and Adriana Hurin binti Rosli from SM (Sains) Seri Puteri, Kuala Lumpur. Received cash prize worth RM800 along with a trophy and a certificate.

### THIRD PLACE

Mohamad Fares bin Mohamad Shahril from SMK Seri Kota Paloh, Klang, Johor. Received cash prize worth RM600 along with a trophy and a certificate.



Figure 5.4  
First to Third Place Winners of  
the National Nuclear Science  
and Technology Short Video  
Competition





#### FOURTH PLACE

Maryam binti Ahmad Ikram and Muhammad Zarif Faishal bin Zuhilmi and the Guidance Teacher, SMK Abdul Rahman Talib, Kuantan, Pahang. Received RM300 cash prize and a certificate.

#### FIFTH PLACE

Nur Sabrina binti Wira and Guidance Teacher Juliana Yew Ik Hoon from SMK (Teknik) Sejingkat, Kuching, Sarawak. Receive a cash prize worth RM 300, along with a certificate.



## 2. Visit to facilities and product and services exhibition of Nuklear Malaysia

HIKNM 2022 received ~ 5000 visitors from students and teachers of schools and higher education institutions. Each visitor was taken on a tour of several facilities, service centres and R&D laboratories, and several product and service exhibition galleries. Throughout this tour and exhibition program, visitors had the opportunity to get to know various Nuklear Malaysia R&D products and

obtain direct information about Nuklear Malaysia services and expertise readily available to the public and industries. These activities can simultaneously encourage and attract students' interest in nuclear science and technology.





### 3. Intellectual Property Program

This program involves the organisation of seminars and Intellectual Property Clinics that aim to provide exposure and educate Nuclear Malaysia's researchers to intellectual property management, including its importance and implementation methods.

### 4. International Forums and Pocket Talks

An international forum, Advancing Nuclear Innovation for the Nation's Prosperity, was also held in conjunction with HIKNM 2022. This forum was made possible through the involvement of three expert panels from Universiti Teknologi Malaysia (UTM), the International Atomic Energy Agency (IAEA), and Nuklear Malaysia, and saw 150 participants. Experts presented their works on various related fields at national and international levels. Next, through the pocket talks activity, two experts from the Malaysian Innovation Foundation (YIM) and the Malaysian Industry-Government Group for High Technology (MIGHT) were invited to share knowledge and information through seminars titled Nuclear Technology & Social Innovation Initiative and Foresight & Innovation.

### 5. Science Corner, Nuclear Education Outreach for school students

An interactive science activity, Nuclear Education Outreach (NEO), was prepared for students visiting HIKNM 2022. This activity focuses on hands-on aspects, experiments, and games related to topics of nuclear and radiation science and technology. Through this activity, students can increase their knowledge and interest in science and technology, especially nuclear technology-related ones.

Figure 5.5  
Among the Activities  
participated by School  
Students in the NEO corner





## 5.7 LIST OF PUBLICATIONS

Publications is one of the essential outputs of research and development. Scientific publications, especially books, journals, presentations of papers in national and international conferences, and technical reports, are assets to the development of national science and technology. Also, publishing is part of the activities in knowledge management, which is vital for conserving and disseminating knowledge. Nuklear Malaysia published a total of 516 articles. The list of publications is as follows:

Table 5.12 : **Publication Achievements**

No.	Publication Category	Number
1	Book	1
2	Chapter in Book	9
3	National Journal	13
4	International Journal	51
5	National Conference	52
6	International Conference	33
7	Technical Report	138
8	General/Serial	44
9	Thesis	3
10	Student Report	172
<b>TOTAL (OVERALL)</b>		<b>516</b>

“ Out of all the publications produced, a total of six national journals and 36 international journals are categorised as high-impact publications”

**6.0**

## **COMMERCIALISATION OF NUCLEAR TECHNOLOGY**





**6.0****COMMERCIALISATION  
OF NUCLEAR TECHNOLOGY**

Nuklear Malaysia commercialised much of its R&D output, generating RM9,079,766.41 in 2022 alone. Technical expert services are the highest contributors, followed by product supply and training services. The complete sources of income are as follows:

**2022**  
**GENERATING OUTPUT****RM9,079,766.41**

No.	Type of Source	Total (RM)
1.	Product Supply	1,941,783.36
2.	Training	3,151,111.98
3.	Technical Services	3,986,871.07
<b>TOTAL (OVERALL)</b>		<b>9,079,766.41</b>

**6.1 PRODUCT COMMERCIALISATION**

Nuklear Malaysia commercialised the Bioliquifert M100 product. This product is the result of collaboration with Peat Organic Sdn. Bhd. Bioliquifert M100 Probiotic Biofertilizer is a multifunctional third-generation biofertiliser. Microbes used in this fertiliser have various functions, such as atmospheric nitrogen binders (N<sub>2</sub>), soil phosphate (P) decomposers, and soil potassium (K) decomposers.

This product also has probiotic properties that can increase plant immunity to disease and decrease dependence on chemical-based disease control products.

This biofertiliser is suitable for acidic soil (pH 4.0-6.0). Bioliquifert M100 also enriches the biodiversity of the rhizosphere and increases soil fertility, yield, and plant quality, in addition to being suitable for all systems and types of plant production. It has been used in several paddy-growing areas, such as the Pekan Integrated Agricultural Development Project (IADA), Sungai Burung Plant Industry Development Division (BPIT), Kemasin Semarak IADA, Kemubu Agricultural Development Board (KADA), and Muda Agricultural Development Board (MADA). Other areas of paddy cultivation under the supervision of the Department of Agriculture (Jabatan Pertanian Malaysia) also use this product.

The GoGrow BioNPK Biobaja product was successfully commercialised in collaboration with Syarikat Enviro Clean Energy (ECE) Sdn Bhd. GoGrow BioNPK products are from a type of microbial AP1 (*Acinetobacter baumannii*) with multiple functions, such as N binders and P and K decomposers, which increase plant growth and yield. It is also effective against wilt disease (bacterial). Nuklear Malaysia subsequently established a partnership with Enviro Clean Energy Sdn. Bhd. For commercialising the GoGrow BioNPK biofertiliser products.



Figure 6.1 Bioliquifert M100 Product



Figure 6.2 GoGrow BioNPK Bio-baja products



## 6.2 COMMERCIALISATION INCOME

Nuklear Malaysia generated income from its commercialised products in 2022 per the breakdown below:

**BIOLIQUIFERT**  
**RM4664**

**GOGROW BIONPK**  
**RM500**

**NMR152**  
**RM51,018,40**



## 6.3 TECHNOLOGY TRANSFER

R&D output can only be shared with the industry and society via technology transfer. Therefore, Nuklear Malaysia actively transferred many technologies to industries and stakeholders, evidenced by various cooperation agreements signed this year.

**MOA**

**6**

**MOU**

**1**

**NDA**

**4**

Table 6.1: **2022 Commercialisation Cooperation Agreements**

No.	Project Title	Type of Agreement	Company Name	Project Leader
1.	The commercialisation of Paddy Seeds IS21 (NMR152)	MOA	Haji Md. Nor Bin Haji Abd. Rahman (M) Sdn Bhd	Dr. Abdul Rahim Harun
2.	Commercialisation of Riverprotec	NDA	CRT Rebar Marketing Sdn. Bhd.	Mohd Faizal Abdul Rahman
3.	Collaborative training project for courses offered by Malaysia Nuclear Agency	MOA	HG Solution Sdn. Bhd.	Nor Hadzalina Sukarseh
4.	Radio Frequency (RF) Radiation Monitoring Cooperation Project for Telecommunication Transmitter Structures in Sarawak	MOA	Austral Techsmith Sdn. Bhd.	Roha Tukimin
5.	Collaborative Project on Non-Ionizing Radiation (NIR) Monitoring of Telecommunication Transmitter Structures	MOA	JustClick Vision Sdn. Bhd.	Roha Tukimin
6.	Cooperation in Organizing Training in Non-Destructive Testing (NDT)	NDA	Winner Inspection Sdn. Bhd.	Nor Hadzalina Sukarseh
7.	Non-Ionising Radiation Level Monitoring Collaborative Project (NIR)	MOA	CISSPR Sdn Bhd	Roha Tukimin
8.	Collaboration on the Commercialization of Biocomposite Support Poles for Black Pepper Cultivation Systems	NDA	Marquis Holdings Sdn Bhd	Mohd Faizal Abd Rahman
9.	Plant Tissue Culture Seedling Production Consultancy Service at the Plant Tissue Culture Incubator Laboratory at Block 61, Malaysia Nuclear Agency	NDA	Procure Toyib Sdn Bhd	Norazlina Noordin
10.	Training Cooperation Project for Non-Destructive Testing (NDT) Levels 2 and 3	MOA	Madani NDT Training Centre (M) Sdn. Bhd.	Nor Hadzalina Sukarseh
11.	Strategic Cooperation Regarding Electromagnetic Field Radio Frequency (Radio Frequency Electromagnetic Field - (RF-EMF))	MOU	Suruhanjaya Komunikasi dan Multimedia Malaysia (SKMM)	Roha Tukimin



**Table 6.2: List of Agreements 2022  
(Industry and Community)**

No.	Project Title
1.	Cooperation Agreement for the Development of School Furniture Based on Advanced Biocomposite Materials
2.	Sabah Royal Malaysian Navy Veteran Community Economic Resources with Bilis Capture and Processing Technology Package using HDPE Biocomposite Floating Bagang Tri-Maran Structure and Advanced Processing Techniques
3.	Re-Plast Kenaf Poles: Holistic B40 Economic Development MySI-21-04
4.	SEAPlast: Sustainable Eco-Remediation via Aquatic Plastic Waste Recovery
5.	Technology Transfer of Volvariella Fungus Seed Production
6.	Upscaling CMSS-Graphene Oxide as a Nano Fluid Loss Additive in Drilling Fluid Application
7.	Automation System for the Production of Commercially Seeded Mushroom Blocks
8.	Mushroom Cultivation for Commercialisation
9.	Enhancement of Radiation Safety and Security within the Supply Base Area
10.	Organising International Conference on R&D&C&I Management
11.	Novel Methods and Applications of Electrolysed Oxidising Water Anolyte as Disinfecting Agent Effective Against Phytopathogens in Chilli (Capsicum Annum L.)
12.	Establishment of Micropropagation Procedure for Ornamental Banana var. Variegated Hawaiian and Blue Java

## 6.4 TECHNICAL SERVICES

Nuklear Malaysia also provides technical services to industry and stakeholders using technology from its R&D activities. In 2022, Nuklear Malaysia had 6,693 customers from 1,969 companies in various sectors. Technical expert services, consultancy, and training to companies in the manufacturing,

manufacturing, semiconductor, oil and gas, medical, agriculture, and telecommunications industries, universities and government agencies were provided through 21 Nuklear Malaysia service centres, encompassing more than 6,000 local and international customers.

Table 6.3 : **Total Service Centre Income for the Year 2022**

No.	Service Centre	Target (RM)	Total Collected Invoice (RM)
1.	Medical Technology - BRI	50,000.00	27,600.00
2.	Medical Technology - MPL	400,000.00	591,400.39
3.	Environmental Analysis & Assessment - ACA	150,000.00	279,640.00
4.	Environmental Analysis & Assessment - RAS	2,000,000.00	1,082,980.00
5.	Environmental Analysis & Assessment - MTEC	50,000.00	72,780.00
6.	Environmental Analysis & Assessment - MTS	50,000.00	28,859.00
7.	Industry Exams and Assessments - NDT	30,000.00	17,034.00
8.	Industry Exams and Assessments - PAT	100,000.00	42,000.00
9.	Industry Exams and Assessments - e-TAG	50,000.00	73,090.00
10.	Waste and Pollution Control - KFK	250,000.00	245,878.00
11.	Waste and Pollution Control - WasTeC	100,000.00	139,892.68
12.	Industrial Safety and Quality Assurance - SSDL	2,000,000.00	1,900,965.38
13.	Industrial Safety and Quality Assurance - BIODOS/BIOTEST	200,000.00	260,783.00
14.	Radiation Services - SINAGAMA	300,000.00	641,631.50
15.	Radiation Services - ALUTRON	150,000.00	41,022.80
16.	Engineering Design and Repair - PIA/PDC	10,000.00	9,848.00
17.	Loji - RAYMINTEX	10,000.00	13,217.98
18.	TAB/STERIFEED	50,000.00	113,997.64
19.	NIR	50,000.00	44,030.00
20.	BKT	300,000.00	302,004.06
21.	Centre of Nuclear Excellence (CoNE)	1,700,000.00	2,938,177.42
<b>TOTAL (OVERALL)</b>		<b>8,000,000.00</b>	<b>8,866,831.85</b>



## 6.5 PROFESSIONAL SERVICES

A total of 1,015 professional specialist services related to nuclear technology involving 166 research officers were provided as radiation consultants/consultants, panels/assessors, and referees/external inspections.

## 6.6 NATIONAL AND INTERNATIONAL TRAINING PROGRAMS

The many internationally recognised experts in Nuklear Malaysia enable it to share its expertise in nuclear technology with local industry trainees via the Nuklear Malaysia Centre of Excellence (CoNE). CoNE offers 44 training modules through 148 courses organised at the national and international levels, such as associate programs/bestari alliances, training field experts, training local and international participants and IAEA-sponsored Pre-Graduate Education Courses (PGEC) in radiation safety. A total of 1962 local and international participants were trained in 2022.

**TOTAL TRAINING  
PRODUCTS  
OFFERED**

**44**

**TOTAL TRAINING**

**148**

**TOTAL ONLINE  
TRAINING**

**37**

**TOTAL PRODUCT  
COURSES  
IMPLEMENTED**

**119**

**TOTAL PARTICIPANTS**

**1962**

**Table 6.4: List of Courses Organised by CoNE in 2022**

NO.	COURSE	FREQUENCY	
		INFORMAL COURSE	FORMAL COURSE
1	Radiation Protection for Officers (RSH 300)		10
2	Radiation Safety & Emergency Procedures (RSH 301)		9
3	Level 1 Industrial Radiography (NRT 111)		8
4	Level 2 Industrial Radiography (Mid-level) (NRT 211)		5
5	Level 2 Industrial Radiography (Direct Admission) (NRT 212)		7
6	Radiographic Test - Digital Level 2 (NRT 213)		2
7	Eddy Current Level 1 (NET 110)		1
8	Eddy Current Level 2 (NET 210)		1
9	Awareness of Non-Destructive Testing (NDT 102)	1	
10	Radiological Safety Awareness in Medical X-Rays (MXR200)	7	
11	X-Ray Training for General Medical Practitioners (MXR 201)	8	
12	Quality Control in X-Ray Equipment Maintenance (MXR 205)	1	
13	Best Practices in Medical X-Rays (MXR 301)	1	
14	Best Operating Practices in Medical X-Rays (MXR 100)	1	
15	Introductory Course of Ultrasonography in Medicine (MXR 300)	1	
16	Radiographic Image Interpretation Course: Chest (MXR 303)	2	
17	Radiograph Image Interpretation: Extremitis (MXR 304)	1	
18	Radiation Safety Awareness (RSH 101)	7	
19	Radiation Safety and Health (RSH 100)	7	
20	Radiation Safety Best Practices Workshop (RSH 102)	2	
21	Work Practices in Industrial Radiation Gauges (RSH 103)	4	
22	Radiation Safety Awareness Seminar for OBTL (RSH 104)	2	
23	Radiation Safety in NORM/TENORM (RSH 105)	1	
24	Sealed Source Leakage Test (RSH 201)	1	
25	Safe Work Procedures and Practices Involving X-Ray Equipment (RSH202)	1	
26	Extension Course for Radiation Protection Officer (RSH 302)	5	
27	Radiation Protection for Workers (RSH 200)	2	
28	Radioactive Waste Management (RSH 203)	1	
29	Safe Transport of Radioactive Materials (RSH 204)	1	
30	Radiation Monitoring and Measurement (RSH 106)	1	
31	Radiological Emergency Plan Program (RSH 107)	1	
32	Practical Radiological Emergency Preparedness and Response (RSH 109)	1	
33	Radiation Safety Management Audit (MGT 311)	2	
34	Risk Management for Radiation Safety (MGT 315)	2	



35	Radiation Safety Management Integration System (MGT 315)	1	
36	Workshop to Train the Trainers of Radiation Protection Officers (MGT 310)	1	
37	Radiation Safety Program: Audit and Inspection (MGT 316)	1	
38	Scientific Writing & Publishing Seminars and Workshops (MGT 320)	1	
39	Laser Safety for Officers (ESH 300)	2	
40	Laser Safety Awareness (ESH 126)	2	
41	Radiofrequency Radiation (RF) Monitoring for Telecommunication Structures (ESH 112)	1	
42	International Conference on Non-Ionizing Radiation (ICNIR) (ESH 400)	1	
43	Management & Maintenance of Survey Meter (NIE 101)	1	
44	Introductory Course of Radiation Detectors and Measurements (NIE 103)	1	
<b>TOTAL</b>		<b>76</b>	<b>43</b>
<b>TOTAL (OVERALL)</b>		<b>119</b>	

Table 6.5 : **List of International Agency/  
Training Basic Courses**

NO.	TYPE OF COURSE/TRAINING	NUMBER OF COURSES
1.	International sector - PGEC-17	1
2.	International sector – Basic Agency Course for Brunei	1
3.	Radiation Safety & Health (RSH) Sector	20
4.	Non Destructive Testing (NDT) Sector	2
5.	Environmental Safety & Health (ESH) Sector	3
6.	Medical Radiation (MXR) Sector	1
7.	Nuclear Science & Engineering (NSE) Sector	1
<b>TOTAL (OVERALL)</b>		<b>29</b>

**7.0**

***TECHNICAL  
SERVICES***





## 7.0

TECHNICAL  
SERVICES

Technical services is critical towards supporting Nuklear Malaysia's research and development endeavours. The effectiveness of Nuklear Malaysia's technical service results from efficient practices in technical support and reactor technology, radiation safety, and engineering and maintenance services.

## 7.1 KEY FACILITY SAFETY CULTURE PRACTICES

Table 7.1 : **Safety Cultivation Activities at Nuklear Malaysia's Major Facilities**

Unit	Activities	Achievements
ALURTRON	Compliance License LPTA/A/724	No major non-compliance
SINAGAMA	Compliance with the premise license for food irradiation facility from the Ministry of Health	No major non-compliance
	Compliance License LPTA 724	1-License 724 compliance inspection by LPTA, no major non-compliance 2-Security training for staff 3-Safety training for staff & individuals (radiation workers)
	Registration as a fresh fruit irradiation centre with the Department of Agriculture	Registration with the Department of Agriculture



Reactor Technology Centre	License LPTA/A/1026	Remains
	Appointment of a new Senior Reactor Operator (SRO).	At least 3 people
	Practical for Emergency First Aid for the reactor facility	1 Practical
	RTP Security Evaluation and RTP Controls	1 JKA Evaluation
		1 Scheduled Evaluation by AELB
		1 Regulatory Inspection by the IAEA
	RTP Operation Safety Report	1 Annual Report
		1 Safety Performance Indicator Report
		1 Mid-year Report
		1 Maintenance Report



## 7.2 ASSETS MAINTENANCE AND OPERATION ACTIVITIES

**Asset maintenance and operation activities aim to improve personnel comfort, reduce costs and security, and ensure organisational efficiency, guaranteeing a conducive work environment.**

The activities that have been implemented are:

### 1. Administration

- Maintenance of computers, printers, scanners, laptops
- Hardware, software, and system maintenance
- The central systems of Nuklear Malaysia (e.g., ePC, eClient, Bioweb, Official Website, intranet and others)
- Maintenance of Scientific Equipment
- Support system maintenance

### 2. Implementation of Security Management Systems

- ICT Security Policy
- Penetration Test System
- License LPTA/A/724
- Food Irradiation Premises License (KKM)
- Appoint an SRO
- RTP Emergency Charity Train
- Operational Safety Report RTP



Table 7.2 **List of Technical Services**

Unit	Activities	Outputs
INFORMATION TECHNOLOGY CENTRE	PTM technical help desk service (IT Helpdesk)	468 services
	System Security Penetration Testing Services (Pen Test)	1 Pen Test was conducted in October 2022
	ICT system and infrastructure development consultancy services	7 System development 16 ICT infrastructure (server and network)
	Preventive maintenance and repair services for main ICT facilities	2 Corrective Maintenance 2 Preventive Maintenance
	ICT equipment disposal service	121 units of CPU
	WIFI network system preparation service for online events and events	19 services
	Consultation/general services at Nuklear Malaysia and other agencies	1 Cybersecurity at AELB (Online)
	Consultancy services - ICT Steering Committee (JPICT) & ICT Technical Committee (JTICT) MOSTI	2 JPICT MOSTI 2 JTICT MOSTI

**Services provided  
by the Centre for  
Instrumentation and  
Automation (PIA) for  
Nuklear Malaysia and  
external customers**

1. Inspection and verification of X-ray machines with NDT/ BTI for external customers
2. Maintenance of nuclear/radiation equipment outside the premises
3. Preventive maintenance and overhaul of equipment
4. Internal equipment calibration
5. Technical testing of new tools and verification of new tools
6. Disposal of tools
7. Preparation of audio-visual system
8. Consultation services/general

### Services provided by the Plant and Prototype Development Centre (PDC)

1. Decommissioning and disposal of X-ray machines of the National Institute of Occupational Safety and Health (NIOSH)
2. Engineering design and fabrication, as well as other technical services
3. Design development and engineering innovation
4. Technical services for Conditioning Disused Sealed Radioactive Sources (DSRS) Cat 3 - 5 (Borehole Project)
5. Lead door of building 59 and DSRS

The Accelerator Development Centre (ADC) has been used for Nuklear Malaysia's R&D activities, such as irradiation services with focused plasma devices and irradiation with low-energy electron accelerators. ADC was also used for the Site Acceptance Test (SAT) and Factory Acceptance Test (FAT) for cargo scanning and tracking systems on behalf of the Royal Malaysian Customs Department (JKDM).

## 7.3 FACILITY OPERATION AND MAINTENANCE



Figure 7.1 Total Expenditure on Periodic Contracts and Upgrade Works

The operation and maintenance of Nuklear Malaysia's assets were carried out by the Engineering Division (BKJ), aiming to improve the civil, electrical, and mechanical infrastructure in Nuklear Malaysia. This maintenance operation was carried out internally by BKJ staff or appointed contractors. In 2022, RM4.13 million was used for periodic maintenance via 29 maintenance contracts, while RM4.06 million was spent on facility upgrading work.





Figure 7.2 Breakdown of Periodic Maintenance Expenses by Category



Figure 7.1 Among the Maintenance Activities implemented in 2022



## 7.4 COMPREHENSIVE NUCLEAR TEST BAN TREATY (CTBT)

Nuklear Malaysia continually operated two of CTBT's main facilities, namely the Radionuclide Monitoring Station (RN42) in Cameron Highlands, Pahang and the CTBT National Data Centre (MY-NDC) in Nuklear Malaysia, Bangi, Selangor throughout 2022.

Nuclear Malaysia continues to emphasise the implementation of CTBT-related awareness, outreach, and capacity development programs. This program succeeded in widely disseminating information about CTBT and strengthening CTBT data analysis capabilities to monitor nuclear weapons tests. This facility can also be used for scientific and public studies. Three activities were successfully implemented in 2022 under this program, including the organisation of colloquiums and training courses and participation in the 17<sup>th</sup> GEOSEA 2022 conference in Langkawi, Kedah.

**“ This program succeeded in widely disseminating information about CTBT and strengthening CTBT data analysis capabilities to monitor nuclear weapons tests”**

*Figure 7.2: Linux Essential Hands-on Tutorial for CTBTO User Course, 24 - 26 May 2022.*







Figure 7.3: Technology and Data Hybrid Colloquium of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), 10 February 2022



Figure 7.4: Nuklear Malaysia's Participation at the 17<sup>th</sup> GEOSEA 2022, 17 - 21 October 2022



Figure 7.5: 59<sup>th</sup> Session of Working Group B, 22 August - 2 September 2022

Nuklear Malaysia's researchers also participated in several capacity-building programs organised by the CTBTO Preparatory Commission, held online or physically, such as:

1. Online Training Course on NDC Capacity Building for Advanced Web-Grape Users, 28 - 29 Mar 2022
2. Online Training Course on NDC Capacity Building: Advanced Training Course on Radionuclide Particulates Data Analysis, 13 - 24 Jun 2022
3. Online NDC Advanced Training Course on Radionuclide Noble Gas Data Analysis, 14 - 25 November 2022
4. 59<sup>th</sup> Session of Working Group B, 22 Ogos - 2 September 2022

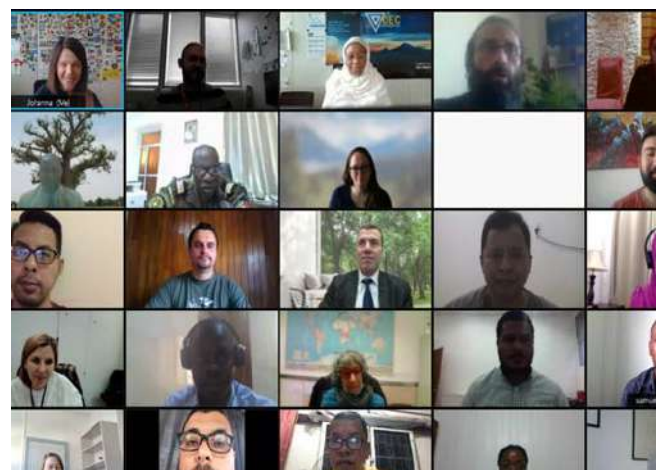


Figure 7.6: Online Training Course on NDC Capacity Building for Advanced Web-Grape Users, 28 - 29 March 2022

Nuklear Malaysia's researchers are currently implementing a total of four R&D projects using CTBT data:

1. Predicting Seasonal Weathers and Monsoons in Malaysia using The International Monitoring System (IMS) Radionuclide Data of The Preparatory Commission of The Comprehensive Nuclear Test Ban Treaty Organization (CTBTO)
2. Seismic Hazard Assessment (SHA) in Sabah using The International Monitoring System (IMS) Data of The Preparatory Commission of The Comprehensive Nuclear Test Ban Treaty Organization (CTBTO)
3. Assessment of Radioactive Fallout Along The Coastal and Marine of East Coast Malaysia, Sabah and Sarawak After the Democratic People's Republic of Korea (DPRK) Nuclear Test and 2011 Fukushima Nuclear Disaster
4. Cosmogenic Radionuclide Analysis Using Multi Time-series Forecasting Model and Machine Learning for North East Monsoon Forecasting.

An inter-departmental meeting on CTBT was held online in 2022 to ensure the smooth implementation of CTBT in Malaysia, seeing the participation of relevant ministries and departments.



Figure 7.7: Inter-Departmental Meeting on CTBT, 29 June 2022





## 7.5 TRIGA PUSPATI REACTOR (RTP)

The RTP will be 40 years old in 2022, marked by its critical moment on 28 June 1982. The RTP has been in operation with zero accidents as of now. RTP is one of the pillars of R&D activities in advancing nuclear technology in Malaysia. Various R&D activities at Nuklear Malaysia are related to irradiation and RTP activities.

## 1. Operation and Radiation

The RTP operated for 208 hours, and 1705 samples were irradiated using the various irradiation facilities available at RTP in 2022.

Among the types of samples irradiated at the Pneumatic Transfer System (PTS), Rotary Rack (RR), Dry Tube (DT) and Central Thimble (CT) irradiation facilities include bird nests, gypsum, oil sludge, soil, wood, rocks, sand, and samarium oxide, while cancer cells, concrete, flowers and rice are irradiated at the neutron diffractometer (ND), Small Angle Neutron Scattering (SANS), Thermal Column (TC), and Neutron Radiography (NuR) radiation facility.

## 2. Maintenance

To ensure that the RTP operates safely and complies with its pre-set safety rules, it undergoes scheduled maintenance (twice annually). These scheduled maintenances in 2022 took place in March and September.



Figure 7.8 RTP Maintenance Activities



### 3. RTP 40-year symposium



A symposium themed, “Our Nuclear Future: From Policy to Reality” was organised in conjunction with the RTP’s 40<sup>th</sup> anniversary. It was held with the National Science Week Program (MSN), organised by MOSTI, on 28 - 29 June 2022. In addition, the book titled ‘100 Facts about the TRIGA PUSPATI Reactor’, which lists 100 facts encompassing the history, structure, systems and components, management, facilities, applications, success stories and community contributions of the RTP, was launched in conjunction with the RTP’s 40<sup>th</sup>-anniversary celebration.



Figure 7.9 Inauguration Gimmick and Montage Launching the Book ‘100 Facts of the TRIGA PUSPATI Reactor’.

Government, private sector representatives, NGOs, and Nuklear Malaysia personnel attended the symposium. Among those present were representatives from the Malaysian Armed Forces, Environment Technologies, Ian Scott International, National Cancer Institute, Petronas, Malaysian Society for NDT, Sustainable Energy Development Authority (SEDA) Malaysia, TNB Fuel Services Sdn. Bhd., and the Department of Atomic Energy (JTA). The RTP symposium also attracted the interest of local universities, which include Universiti Kebangsaan Malaysia, Universiti Teknologi Malaysia, Universiti Putra Malaysia, Universiti Malaysia Pahang, Universiti Tenaga Nasional, Universiti Tun Hussein Onn, and schools such as Al Amin Tropicana Secondary School Sg. Buloh, SMI Al Amin Gombak, Sri Ayesha Islamic School, and SMK Banggol, Kemaman, Terengganu.

Two forums were conducted, highlighting issues related to future energy prospects using fission and fusion energy through the Small Medium Reactor (SMR) and Microreactor (MR) technology and 3S (Safety, Security & Safeguard), which are the primary safety component in the RTP's operation.

The forum's panel consists of experts and retirees with extensive backgrounds and experience in nuclear technology.

**A symposium themed, “Our Nuclear Future: From Policy to Reality” was organised**







Foto 7.11 Forum Safety, Security and Safeguards

The Symposium also included the Nuclear Youth Talk slot, a platform for students who had undergone industrial training at Nuklear Malaysia and the winners of the “IAEA Nuclear Science & Technology - Education Competition for Secondary Level Students and Teachers”. They shared their experiences and success stories during their stint at Nuklear Malaysia. During this program, an experimental demonstration involving nuclear science and technology was held to increase public awareness about nuclear science and technology for the members of the public present during the forum. This demonstration is available on the National Science Week online platform.

**SIMPOSIUM REAKTOR TRIGA PUSPATI**

RTP 40 Tahun

Mata Hadapan Nuklear Kita Dan Pelajar Reaktor

**28 Jun 2022 (Selasa) "Bicara Belia Nuklear"**

**Sesi I:** Pelajar Latihan Industri  
Masa: 10.00 pg - 11.00 pg  
Ayu Sofia Shaari, Nurhidayah Amrah Suhaimi

**Sesi II:** Pelajar Latihan Industri yang telah menjadi Kelengkapan Nuklear Malaysia  
Masa: 11.00 pg - 12.00pg  
MODERATOR: Huzuan Abdul Mutalib, Asyraf Arif Abu Bakar, Mohamad Amrudin Mohamad Rosli, Puteri Nuruliah Huzna Mohd Tajuddin

**Sesi III:** Pemenang Pertandingan IAEA Nuclear Science & Technology Education Competition for Secondary Level Students and Teachers  
Masa: 2.30 ptg - 3.30 ptg  
Pemenang Kategori Guru: SMK Sanzax, Sabah  
MODERATOR: Muhamad Amur Ali Ghani, Cikgu Kuri Vei Kut  
Pemenang Kategori Pelajar: SMK Kuala Besut, Terengganu  
Ainul Mardiah Mohd Azmi, Muhamad Zulfan Zaidi

**SIMPOSIUM REAKTOR TRIGA PUSPATI**

RTP 40 Tahun

Mata Hadapan Nuklear Kita Dan Pelajar Reaktor

**29 Jun 2022 (Rabu) "Demonstrasi Eksperimen S&T Nuklear"**

**Dr. Mark Dennis** Usang  
"OpenMC Monte Carlo Code - Menjejak Neutron"  
10.00 pg - 10.30 pg

**Dr. Mazleha** Maskin  
"Eksperimen Fizik Nuklear - ALARA Ooo La La"  
11.00 pg - 11.30 pg

**Pn. Khair'iah** Yazid@Khalid  
"Neutron Radiografi - Tulen atau Tiruan"  
2.00 ptg - 2.30 ptg

**Dr. Mohd Sabri** Minhat  
"Simulator RTP - Analog Masih Berbisu"  
3.00 ptg - 3.30 ptg

Figure 7.12 National Science Week Joint Program





Figure 7.13 Photography Session with Participants from Schools, Universities, and External Agencies



Figure 7.14 Nuclear Physics Experiment Demonstration: ALARA Ooo La La

Figure 7.15 Tour Session in the RTP Simulator



#### 4. RTP's Sustainability

The core configuration plays an essential role in the optimal RTP operation. Therefore, planning for converting the 15<sup>th</sup> RTP core configuration to the 16<sup>th</sup> core was actively underway at the end of 2022. The simulation and safety analysis have been reported to the LPTA for compliance with the RTP license conditions before the implementation of the core conversion works, scheduled for early 2023.

The Reactor Technology Centre (PTR) organised a Data Collection Workshop for the Technical Study of the TRIGA PUSPATI Reactor Replacement Plan, involving PTR employees and the top management of Nuclear Malaysia and RTP users. The workshop intended to obtain initial feedback to formulate a sustainable reactor replacement plan.

A series of workshops, colloquia, courses, and sharing sessions involving PTR staff, radiation protection officers, LPTA, and related parties were also held throughout 2022 to improve the skills and expertise of PTR staff in the management, operation, and application of RTP.

**“The workshop intended to obtain initial feedback to formulate a sustainable reactor replacement plan”**



Figure 7.16 Group Work Activities for RTP Technical Data Collection

**B.O**

***INTERNATIONAL  
RELATIONS***





**8.0****INTERNATIONAL  
RELATIONS**

The development of nuclear science and technology will inevitably always involve international cooperation and relations, regional or global. This bilateral relationship involves technical collaboration in R&D, research grants, and human capital development to increase expertise in this field. This cooperation is implemented through

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

**8.1 IAEA-MALAYSIA TECHNICAL  
COOPERATION PROGRAM**

The technical cooperation (TC) program is the IAEA's primary mechanism for sharing and building expertise in nuclear technology with member states. Through this collaboration, the IAEA helps Malaysia build, strengthen, and maintain human and institutional capacity for the safe, peaceful, and secure use of nuclear technology to assist the nation's science and technology development. This cooperation involves various areas of national development priorities, such as health and nutrition, food and agriculture, water and the environment, industrial applications, security and protection, energy planning and nuclear power, and nuclear knowledge development and management. A total of 68 active collaborations on various international platforms are utilised for the development of the country's nuclear technology.

**NATIONAL  
PROJECTS****5****REGIONAL  
COOPERATIVE  
AGREEMENT  
PROJECTS  
(RCA)****19****REGIONAL  
NON-  
AGREEMENT  
PROJECTS****20****INTERREGIONAL  
PROJECTS****8****COORDINATED  
RESEARCH  
PROJECTS (CRP)****16**

Figure 8.1: List  
of active projects  
implemented  
under the  
IAEA Technical  
Cooperation (TC)  
Programme



## 1. ACTIVITIES UNDER THE IAEA TECHNICAL COOPERATION PROGRAM



*Figure 8.1*  
Work Visit of Ms Jane Gerardo-Abaya, Director, Department of Technical Cooperation, Asia and Pacific Division, IAEA, on 2-4 November 2022



*Figure 8.2*  
IAEA Regional Meeting on Advancing Nuclear Science Education for Sustainable Development on 31 October - 4 November 2022, Putrajaya







*Figure 8.3  
IAEA Regional Training Course  
on Computational Fluid  
Dynamics (CFD) Simulation for  
Beginners on 3-6 October 2022,  
Putrajaya*



*Figure 8.4  
IAEA – Pilot National Workshop  
on the Use of Decision Support  
Tools in Research Reactor  
Spent Fuel Management on 14 -  
18 November 2022, Melaka*







*Figure 8.5*  
IAEA/RCA Regional Training  
Course on The Guidelines  
and Standards of Quality  
Management for Radiation  
Processing Facilities on 28  
November – 2 December 2022,  
Putrajaya



## 2. RCA MINISTERIAL LEVEL MEETING VIENNA, AUSTRIA



*Figure 8.6*  
The RCA Ministerial Level Meeting was held in Vienna, Austria, on 26 September 2022, attended by the Honourable Minister of MOSTI, Dato' Sri Adham Baba and YBrs. Director General of Nuklear Malaysia, Dr Abdul Rahim Harun

## 3. 66<sup>th</sup> IAEA GENERAL CONFERENCE (26-30 SEPTEMBER 2022)



*Figure 8.7*  
Presentation of the State Statement during the 66th Regular Session of the General Conference by the Honourable Minister of MOSTI, Dato' Adham Baba



*Figure 8.8*  
Courtesy Visit to Mr Rafael  
Mariano Grossi, IAEA Director  
General



*Figure 8.9*  
Courtesy Visit to Ms Najat  
Mokhtar, IAEA Deputy Director  
General and  
Head of Nuclear Sciences and  
Applications Department



*Figure 8.10*  
Courtesy Visit with Mr Hua Liu,  
IAEA Deputy Director General &  
Head of Technical Cooperation  
Department





*Figure 8.11*  
Courtesy visit with Ms Lydie  
Evrard, IAEA Deputy Director  
General and  
Head of Nuclear Safety and  
Security Department



*Figure 8.12*  
Technical Visit to IAEA's  
Seibersdorf Laboratory





### 3. FORUM FOR NUCLEAR COOPERATION IN ASIA (FNCA)



Figure 8.13  
23<sup>rd</sup> FNCA Ministerial Level  
Meeting Ulaanbaatar, Mongolia  
on 31 October 2022



Figure 8.14  
22<sup>nd</sup> FNCA Coordinators  
Meeting (online) on 28 June  
2022



## 8.2 INTERNATIONAL AWARDS AND ACHIEVEMENTS

The excellence of its global achievements evidences Nuklear Malaysia's commitment and expertise in the R&D of nuclear technology. As a result, various awards and recognitions were received in 2022.

### ▶ RCA REGIONAL COOPERATION AWARD

Nuklear Malaysia received the RCA Regional Cooperation Award for the institutional category. This award was accepted due to Nuklear Malaysia's commitment to collaboration in 141 RCA projects, organising more than 68 RCA activities that benefited ~1,200 personnel in the region and provided 41 technical experts to RCA. As the primary coordinator of several RCA projects since 2000, Nuklear Malaysia has contributed to advancing nuclear science and technology in the region by providing consultancy services and analysing materials and resources.



Figure 8.15: RCA Award Ceremony in Vienna, Austria, to Honourable Minister Dato' Adham Baba, Minister of MOSTI

### ▶ REGIONAL COOPERATIVE AGREEMENT (RCA) PROJECT AWARD

Dr Ilham Mukhriz Zainal Abidin, a senior research officer at Nuklear Malaysia, received the RCA Project Award due to his involvement, since 2012, with the RCA project in the field of non-destructive testing techniques (NDT) and contributed to the promotion of NDT applications for civil and industrial engineering structures. Furthermore, as the Lead Country Coordinator (LCC) of the NDT project since 2018, he solves problems identified by RCA member countries to strengthen NDT capabilities in the Asia and Pacific (APEC) region.



Figure 8.16: RCA Project Award Presentation Ceremony to Dr Ilham Mukhriz Zainal Abidin delivered by YBr. Director General of Nuklear Malaysia, Dr Abdul Rahim Harun.

## COUNTRY PROGRAMME FRAMEWORK 2022-2027

During the 66<sup>th</sup> IAEA General Conference, Malaysia signed the Country Program Framework (CPF) for 2022-2027. The CPF is a reference framework for medium-term planning of technical cooperation between member states and the IAEA. This collaboration is to identify priority areas for nuclear technology transfer and technical cooperation resources that will be channelled to support national development goals.

The five priority areas that have been identified are;

Nuclear Safety  
and  
Security

Radiation  
Technology  
and Industrial  
Applications

Human Health  
and  
Nutrition

Food  
and  
Agriculture

Water, Natural  
Resources and  
Environment

## PRACTICAL ARRANGEMENT (PA) ON COOPERATION IN THE AREA OF EDUCATION AND TRAINING IN RADIATION, TRANSPORT AND WASTE SAFETY

Nuklear Malaysia signed a Practical Arrangement (PA) on Cooperation in The Area of Education and Training in Radiation, Transport and Waste Safety with the IAEA. This PA establishes cooperation between the two organisations in education and training in radiation, transport, and safety of radioactive waste in the Asia Pacific region. This understanding also reaffirms the importance of cooperation and collaboration to promote an integrated approach to developing education and training, supporting more effective technical cooperation programs, and ensuring coordination and complementarity of activities.



Figure 8.17:  
Chairman of the Nuklear Malaysia Steering Committee signed a Practical Arrangement (PA) on Cooperation in The Area of Education and Training in Radiation, Transport and Waste Safety with the IAEA in Vienna, Austria



## 8.3 CERTIFICATION AND ACCREDITATION

Nuklear Malaysia has successfully maintained 11 international standards (ISO) certifications held by its ten main facilities. This effort shows Nuklear Malaysia's continued commitment to providing quality and best services to all customers and stakeholders..

*Table 8.1: List of Major Facility Centres that Have International Standards (ISO) Certification*

NO.	ISO CERTIFICATION	NUKLEAR MALAYSIA'S MAIN 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 Centre (WasTeC)
6.	ISO 9001:2015	Centre of Nuclear Excellence (CoNE)
7.	ISO/IEC 17025:2017	Makmal Radiokimia dan Alam Sekitar (RAS)
8.	ISO/IEC 17025:2017	Radiation Metrology Group (KMS)
9.	ISO/IEC 17020:2012	Non-Ionising Radiation Group (NIR)
10.	ISO/IEC 27001:2013	Information Technology Centre (IT)
11.	ISO 22301:2019	Service Continuity Management System (PKP-BCMS)



**9.0**

***MANAGEMENT AND  
ADMINISTRATION***





# 9.0

## MANAGEMENT AND ADMINISTRATION

Nuklear Malaysia's R&D and commercialisation activities owe its success to excellent management practices. Expert human capital, government allocations, research funds, and information management must be managed well to ensure Nuklear Malaysia's core activities seamlessness.

### 9.1 PERSONNEL

**PERMANENT  
POSITIONS**

**780/926  
(84.23%)**

**CONTRACT  
POSITIONS 77**

**SHORT-TERM  
EMPLOYMENT  
PROGRAMME 16**

**VACANCIES 146**



## 9.2 FINANCIAL PERFORMANCE

Nuklear Malaysia has received a management allocation of RM76.69 million. Nuklear Malaysia reported a 100% payment performance within 14 days from January to December 2022, which MOSTI recognised.

No.	Financial Source	Budget (RM)	Expenditure (RM)
1.	Management	76,699,667.00	86,799,397.16
2.	Development	8,790,350.00	6,657,833.45

Table 9.1: Total Allocation and Expenditure for the Year 2022



Figure 9.1: Presentation of Certificate of Appreciation for the 100% Payment Performance within 14 Days Achievement from MOSTI, presented by YBrs. Director General of Nuklear Malaysia, Dr Abdul Rahim Harun

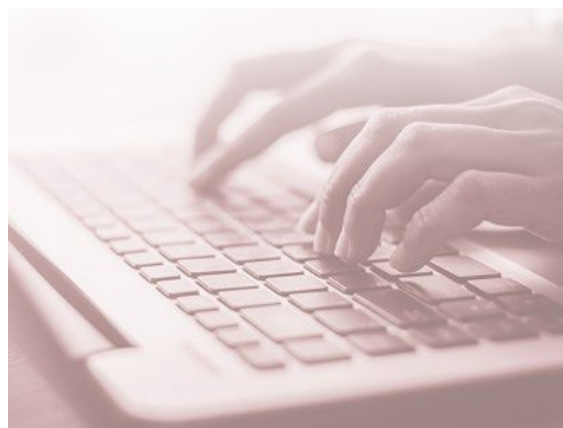


## 9.3 HUMAN CAPITAL DEVELOPMENT

Nuklear Malaysia is responsible for developing competent and competitive human capital. This is outlined in Strategic Thrust 5: Conducive Environment for Nurturing R&D Talent and Capacity in Nuclear Science and Technology.

### 1. Nuclear Science and Technology Human Capital Development Roadmap

The short-term strategy was to create a competence dictionary for Nuclear Malaysia to develop competent and competitive human capital. In 2022, Nuklear Malaysia successfully developed a Functional Competency Dictionary (KKF) under MyPerformance under the Q and C schemes. Ten new KKF's have been proposed to MOSTI. Apart from that, the Training Operation Plan (POL) for 2022 was also prepared



### 2. Development of Nuclear Science and Technology Expertise through Formal Education

Apart from continuing the implementation of long-term in-service training (formal education) at the doctorate level for research officers, Nuklear Malaysia also supports educating/training joint-use officers and support personnel.

Qualification	Study Leave	Part-time programme
Diploma		1
Bachelor's Degree		7
Master's Degree	4	4
Doctor of Philosophy	16	5
<b>Total</b>	<b>20</b>	<b>17</b>

Table 9.2 Number of officers undertaking formal education

### 3. Program to Support Human Resource Replacement Plan

Nuklear Malaysia continues implementing mentoring and leadership programs to support the human resource replacement plan. This program is essential to overcome the challenges of an ageing workforce and loss of expertise due to experts reaching retirement age. A mentoring program was implemented for the Assistant Science Officer and Laboratory Assistant Schemes. The pre-placement program was implemented for 31 newly appointed research officers.

#### 4. Improvement of the Competence of the Implementation Group through Examinations in Services and Departments

In 2022, four service examinations were conducted for the C scheme personnel, involving eight candidates for grade C19 and nine for grade C29.

#### 5. Knowledge Management Strengthening Program (KM)

The knowledge of nuclear science and technology among Nuklear Malaysia experts must be well managed to maintain the critical knowledge and expertise available and minimise the risk of knowledge loss. The knowledge management strengthening program continues to be implemented with the organisation of a KM forum by Members of the Nuklear Malaysia Knowledge Management Working Committee on 8 December 2022. This forum aims to increase understanding of the Nuklear Malaysia KM Community of Practice (CoP). Also, a knowledge visit to the Malaysian Cooperative Institute was organised on 23 November 2022 to share knowledge and experience related to culture and KM practices at the agency.



Figure 9.2:  
KM's visit to the Malaysian Cooperative Institute led by the Director of the Management Programme, Dr Muhammad Rawi bin Muhammad Zin



Figure 9.3:  
Organising the KM Forum on 8 December 2022



## 6. University and Professional Student Transfer Studies Program and Industrial Training

Nuklear Malaysia trains students from local higher education institutions in nuclear science and technology via research study programs and industrial training. For the latter, Nuklear Malaysia accepted students from 29 higher education institutions.

No.	Programme	Total number of students
1.	Bachelor's, Master's and Doctoral Research Studies	55
2.	Attachment programmes	4
3.	Industrial Training	255

Table 9.3:  
Number of Students Following  
University and Professional  
Student Exchange Programs and  
Industrial Training

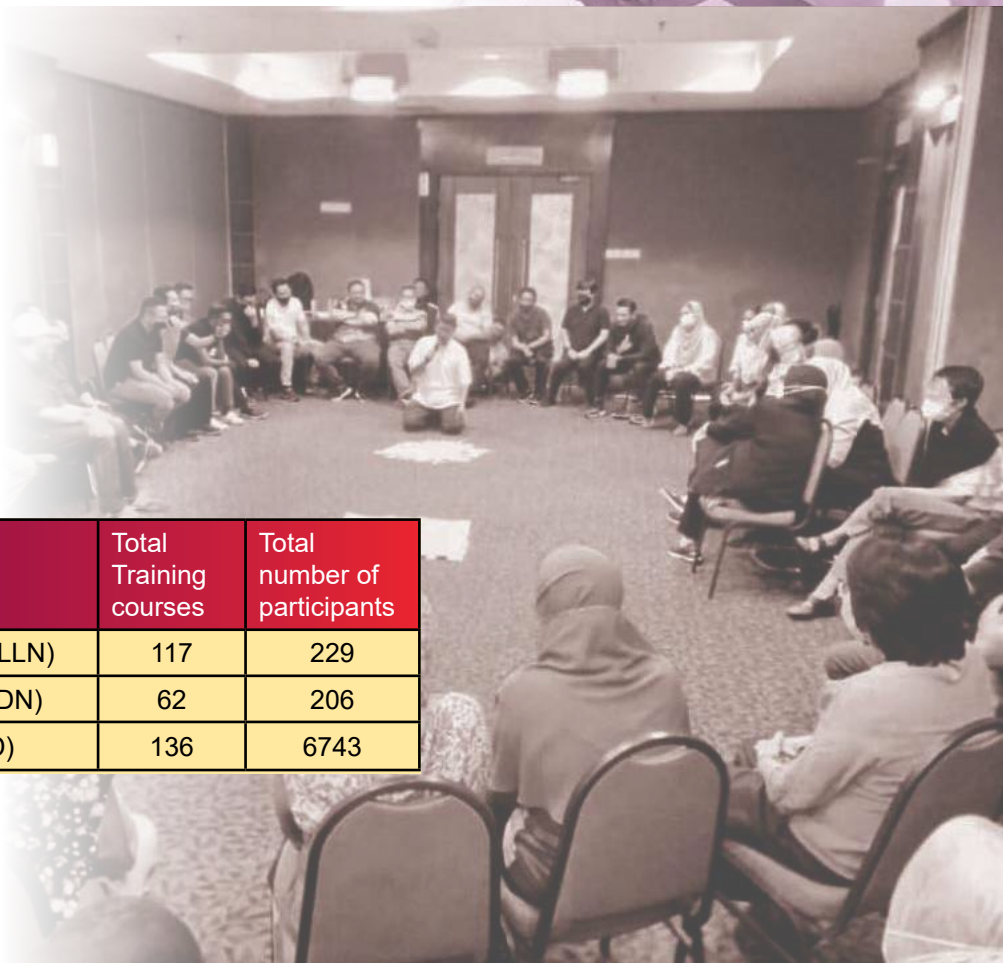


## 7. Competency Improvement

Nuklear Malaysia always emphasises improving the competence of its personnel. The policy where personnel must partake in at least 7 days of courses annually is implemented and followed in Nuklear Malaysia. Some of these training programmes also occur abroad with partner agencies and organisations.

No.	Type of Training	Total Training courses	Total number of participants
1.	Overseas Training Courses (LLN)	117	229
2.	National Training Courses (LDN)	62	206
3.	Internal Training Courses (LD)	136	6743

Table 9.4:  
Exercises and Participants  
Undergoing Training Programme





## 9.4. PROGRAM BEYOND NUCLEAR EDUCATION (NEO)

Nuklear Malaysia continues its commitment to disseminating knowledge about nuclear technology to Malaysian society. This promotion and information dissemination program was held to expose the public and make them more amenable to accepting nuclear science and technology. NEO activities were implemented in both face-to-face and virtual forms.

### 1. IAEA/ REGIONAL MEETING ON ADVANCING NUCLEAR SCIENCE EDUCATION FOR SUSTAINABLE DEVELOPMENT

The “IAEA/ Regional Meeting on Advancing Nuclear Science Education for Sustainable Development” was held on 31 October to 4 November 2022 (5 days) at the Everly Hotel, Putrajaya. 48 participants, comprising top-ranking officials of the Ministry of Education (MoE) from various Asia Pacific countries and the Malaysian Nuclear Agency, attended the meeting.

The meeting was organised in collaboration with the IAEA and was officiated by Mr Azman bin Adnan, the Director of the Co-Curriculum Development Division, Ministry of Education Malaysia (KPM). This meeting increased the knowledge of high school science teachers about nuclear science and technology, especially in terms of the best teaching and learning techniques for the high school science curriculum.





## 2. NATIONAL SCIENCE WEEK (MSN)

The Ministry of Science, Technology, and Innovation (MOSTI) organised the National Science Week in 2022 and branded it the Malaysian Family National Science Week (MSNKM). With the theme “Popularising Science, Humanising Technology”, MSNKM 2022 is based on seven main focus areas that change every month from April to October 2022. Focus areas such as Planetary Health, Chemistry and Biotechnology, Safe Use of Nuclear, Social Innovation, Engineering, Nanotechnology and Space were selected to celebrate important Science, Technology and Innovation (STI) days.

“  
**1,202,588**  
participants took  
part in MSNKM  
until June 2022.”



Throughout June, Nuklear Malaysia, the Department of Atomic Energy (JTA) and the National Science Centre (PSN), as implementing agencies, presented various interesting content, either face-to-face or online, per the focus area of “Nuclear Safe Use”. The activities included the National Level Science and Nuclear Technology Essay Writing Competition, National Level Science Poster Drawing Competition, Forum, “Pocket Talk” Series, Chemical Safety Workshop, Symposium, and Inter-Varsity Nuclear Debate Competition. 1,202,588 participants took part in MSNKM until June 2022.

Figure 9.5 MSN program 2022 held online



## 2. RELAXED SCIENTIST CHATS (3'S)

Nuklear Malaysia organised five webinar series of Scientist Relaxation Chats (3'S) with 637 participants, comprising the general public, teachers, and students throughout Malaysia. The 3'S program is one of the critical cores in the Nuclear Education Outreach Program (NEO) and was implemented using virtual learning methods. Five Nuklear Malaysia research officers were directly involved in this program, sharing their knowledge and expertise and

motivating students to venture into the S&T field. The 3'S program was regarded as successful in achieving the primary goal of its implementation, which is to foster interest in science and equip participants with accurate knowledge about nuclear technology.



Figure 9.6 Announcement Poster for Relaxed Scientist Chat (3'S)

## 3. NUCLEAR MALAYSIA TOUR PROGRAMME

Many NEO programs were conducted, such as School Exhibitions and Lectures, National Level Nuclear S&T Short Video Competition, and Science Corner in conjunction with Malaysia's Nuclear Innovation and Creativity Day (HIKNM) and Nuklear Malaysia's Golden Jubilee Carnival to disseminate information and public awareness related to nuclear science and technology.



Figure 9.7 Among the NEO Program Activities Provided for School Students



Figure 9.8 National Rating Nuclear Science and Technology Short Video Competition Poster



## 4. NUCLEAR EDUCATION KIT LOAN PROGRAMME

Nuklear Malaysia introduced a new approach to winning public confidence through the Nuclear Education Kit Loan Programme in 2021. In 2022, this programme demonstrated and allowed three schools to take advantage of an education kit consisting of survey meter tools in our endeavour to support learning activities of measuring radiation in schools.

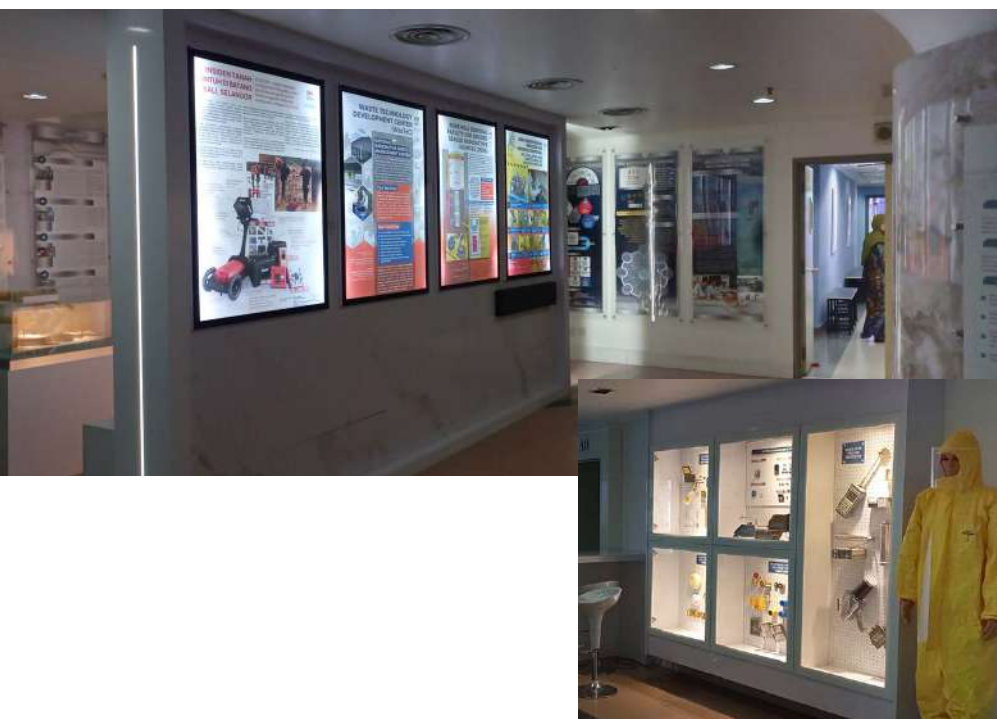
Figure 9.9 Poster Publicising the Nuclear Education Kit Loan Program to Schools via Social Media



## 9.5 DISTRIBUTION OF PRINTED INFORMATION AND THEMED EXHIBITIONS

The general public will readily understand information related to nuclear S&T through reading general publications, whether printed or electronic. In 2022, 11,739 Nuklear Malaysia publications, such as magazines and pamphlets, were distributed to the public.

Nuklear Malaysia holds a themed exhibition annually at the Nuklear Malaysia Gallery of Excellence. This exhibition aims to showcase the latest discoveries and excellence of Nuklear Malaysia's research.





## 9.6 VISITORS TO NUKLEAR MALAYSIA

The country began transitioning to post-pandemic COVID-19 settings in 2022, and all movement and activity restrictions were relaxed almost to pre-pandemic levels. This is evidenced by the number of visitors to Nuklear Malaysia, which increased to 581 in line with the 50th Golden Jubilee Celebration of Nuklear Malaysia. Through this scientific visit, Nuklear Malaysia's initiative in widely disseminating S&T information, especially on nuclear technology,



can be extended to the community. Visitors to Nuklear Malaysia are not only allowed to interact directly with research officers, but they can also see nuclear technology facilities and innovative products.





## 9.7 MEDIA RELATIONS

**MEDIA CONFERENCE**

**7**

**PRINT & ELECTRONIC  
MEDIA COVERAGE**

**72**

**PRINT & ELECTRONIC MEDIA  
SPECIAL INTERVIEW**

**10**

**SOCIAL MEDIA  
UPLOADS**

**866**

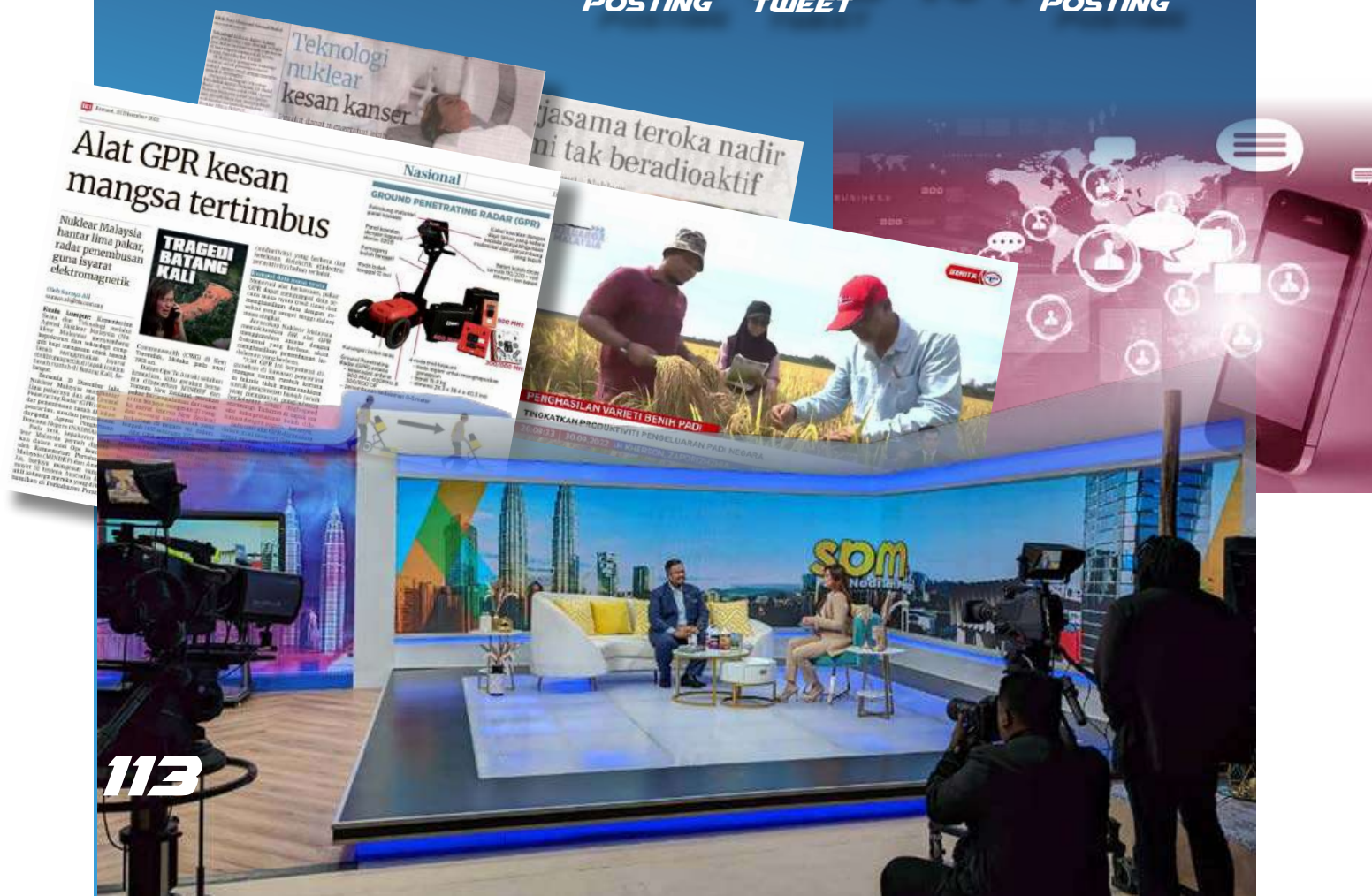


**313**  
POSTING

**368**  
TWEET

**164**

**21**  
POSTING



**10.0**

***WELFARE  
AND SOCIAL***





10.0

**WELFARE  
AND SOCIAL****10.1 AKRAB NUKLEAR MALAYSIA  
ACTIVITY REPORT****1. STRESS MANAGEMENT WORKSHOP:  
WFO & WFH**

The Stress Management Workshop: WFO & WFH was held on 22 March 2022 at the Tun Dr Ismail Hall (DTI). This workshop aimed to educate the participants on stress, emotional control, and management at work and home. This workshop can also help create a more positive atmosphere in the workplace and overcome stress in relationships with colleagues, superiors, and family members via skills and emotional intelligence and continuous positive self-creativity.



Figure 10.1  
Stress Management Activity: WFO & WFH

**2. PRESENTATION OF THE APPOINTMENT  
CERTIFICATE OF NUKLEAR MALAYSIA  
AKRAB COMMITTEE SESSION 2022/2024**

The AKRAB Committee Member Appointment Presentation Ceremony was held on 30 June 2022 at the DTI. The ceremony involved eight 2022/2024 AJK members and was officiated by YBrs. Dr Abdul Rahim bin Harun, the Director General of Nuklear Malaysia.



Figure 10.2 Presentation of the Certificate of Appointment of the Nuklear Malaysia AKRAB Committee Session 2022/2024

### 3. AKRAB Relaxation

In conjunction with the Nuklear Malaysia Blood Donation Program Series 1/2022 on 26 July 2022, members of AKRAB Nuklear Malaysia also donated food items to Nuklear Malaysia personnel who donated blood. 70 units of rice packets (1 kg) were distributed to the donors. AKRAB also promoted Art Drawing House Tree Person (ADHTP) and Colour Personality Inventory (IPW) classes to interested Nuklear Malaysia personnel.



Figure 10.3 Blood donation programme

### 4. Lecture On Women's Rights In Islamic Family Law And Enactment In Malaysia

AKRAB organised a talk entitled, 'Women's Rights in Islamic Family Law and Enactment in Malaysia' on 8 September 2022 at the Tun Dr Ismail Hall (DTI). The lecture was delivered by Yang Arif Haji Azmi Ibrahim, a judge of the Malacca Syariah High Court. 100 participant were informed about the rights of women and men in cases of polygamy and property disputes in court.



Figure 10.4  
Lecture on Women's Rights in  
Islamic Family Law





## 5. MOSTI'S AKRAB Empowerment PROGRAMME

AKRAB Nuklear Malaysia, in collaboration with AKRAB of the Department of Atomic Energy (JTA) and AKRAB of the Malaysian Space Agency (MySA), organised the AKRAB MOSTI Empowerment Program at the Great Hall, JTA, on 17 - 18 October 2022. This program exposed concepts, issues, objectives, and the goals of implementing the AKRAB initiative to its members. The lecture was delivered by Mrs Siti Hasiah Jusoh, Psychological Officer of the Public Service Department (JPA) and the AKRAB coordinator.



Figure 10.5 AKRAB MOSTI Empowerment Program held at the Department of Atomic Energy (JTA)



## 6. AKRAB'S Prime Minister's Department's Visit to The Malaysian Nuclear Agency on 30 September, 2022

On 30 September 2022, AKRAB of the Prime Minister's Department (JPM) held a benchmarking visit to Nuclear Malaysia. This delegation was welcomed by Dr Muhammad Rawi bin Mohamed Zain, Director of the Management Programme and a member of AKRAB Malaysia.



Figure 10.6 AKRAB Prime Minister's Department Visit to Nuklear Malaysia

## 7. Fun & Easy Activities With AKRAB Nuklear Malaysia During The Series 2 Blood Donation Program At Tun Dr. Ismail Hall On 15 December 2022

During the Series 2/2022 Blood Donation Program, AKRAB prepared exhibition booths that organised various exciting activities for Nuklear Malaysia personnel. The mind test using the Mind Tree Test poster was among the activities involved.





## 10.2 ACTIVITY REPORT OF NUKLEAR MALAYSIA SPORTS AND WELFARE CLUB NUKLEAR MALAYSIA



### 1. MAIN COMMITTEE OF CLUB NUKLEAR MALAYSIA



The Ramadan Infak Program 2022: Lambuk Porridge and Aidilfitri Donations took place on 13 April 2022 and April 27-29, 2022, respectively.



Al-Quran Infak Program to Madrasah Tahfiz Darul Iman, Bandar Tenggara, Johor, on 24 April 2022.



## INFAQ AL QURAN

di bawah Program INFAQ AHLULLAH

Syarikat Furqanworks Sdn Bhd melalui Kelab Sukan dan Kebajikan Agensi Nuklear Malaysia menghadiahkan 10 Al-Quran Tadabbur Multazam kepada Madrasah Tahfiz Darul Iman, Bandar Tenggara.





## 2. SPORTS SECTION



Malaysia Nuclear Agency Director-General Cup Indoor Futsal Competition at Galaxy Futsal, Section 15, Bangi, on 22 January 2022.



Nuklear Malaysia Indoor Badminton Competition at Airport Sports Complex, Nilai, Negeri Sembilan on 25 June 2022



Dessert stall in conjunction with the Hari Raya Aidilfitri and the Annual General Meeting (AGM) of Club Nuklear Malaysia 2022 at Tun Dr Ismail Hall, Nuclear Malaysia, Bangi on 17 May 2022



Participating in the National Sports Day at the Ministry of Science, Technology and Innovation (MOSTI) in Putrajaya on 8 October 2022



People's Games in conjunction with the Malaysian Nuclear Agency's 50th Golden Jubilee Celebration 2022 at the Malaysia Nuclear Agency's Recreation Forest, Bangi, on 8 November 2022





### 3. RECREATION AND CULTURE SECTION



Raft House Fishing Programme in Kampung Padang Rumbia, Pekan, Pahang, on 20-21 August 2022



Guide for Nuclear Creativity and Innovation Day Malaysia (HIKNM) on 13-14 September 2022





#### 4. WELFARE SECTION



Solat Hajat, Yasin Recitation, and Doa Selamat at Block 17 Surau, Nuklear Malaysia, Bangi on 10 June 2022



Lecture program titled Tadabbur Quran in conjunction with Ramadan at the Tun Dr Ismail Hall on 15 April 2022



Zakat Fitrah counter at Nuklear Malaysia, Bangi, on 25 April 2022



Nuklear Malaysia Aidiladha Sacrifice Programme at Surau Sri MINT, Malaysian Nuclear Agency on 13 July 2022.



## 10.3 ACTIVITY REPORT PUSPANITA MINOR BRANCH (CK), NUKLEAR MALAYSIA

### 1. Tadarus Al-Quran PROGRAMME

The Tadarus Al-Quran programme was held in a hybrid setting throughout Ramadan, 4 - 26 April 2022. Estimate 57 Muslim Nuklear Malaysia personnel completed the Tadarus Al-Quran programme in 2022.



### 2. Al-Quran Recitation Completion Ceremony ONLINE

The Al-Quran recitation completion ceremony online was held on 25 April 2022 to celebrate the success of the Al-Quran tadarus participants.







PUSPANITA invited Ustaz Mohd Fauzi bin Haris to officiate and lead the ceremony, which was held online.

### 3. Health Talk On The Importance Of *PAP Smear* And HPV Self-Screening Test

In conjunction with the Blood Donation Program, which took place on 26 July 2022, PUSPANITA organised a health talk entitled The Importance of Pap Smear Tests. The lecture was delivered by Dr Farahana binti Mohamad Pilus, Health Officer, District Health Office (PKD), Hulu Langat. HPV (Human Papilloma Virus) self-testing was also held and offered to Nuklear Malaysia's female personnel, managed by three health officers and three nurses from the PKD Hulu Langat and PUSPANITA.

## PAP SMEAR

**PAP SMEAR**  
Pap smear adalah kaedah penyaringan kanser pangkal rahim bagi membolehkan pengesanan awal kanser pangkal rahim atau serviks

**Kepentingan Pap Smear untuk wanita**  
Kanser pangkal rahim adalah kanser yang sering terjadi di kalangan wanita di seluruh dunia  
Dapat dicegah sekiranya dikesan dan diubati pada tahap awal (tahap prakanser)  
Pap Smear adalah satu kaedah yang mudah untuk mengesan perubahan sel-sel serviks

**CERAMAH KESIHATAN  
KEPENTINGAN UJIAN PAP  
SMEAR OLEH PEGAWAI  
KESIHATAN DARI PEJABAT  
KESIHATAN HULU LANGAT**

📅 26/7/2022  
🕒 9.00 – 10.00 Pagi  
📍 Bilik Seminar, Blok 11

**SARINGAN  
KENDIRI UJIAN  
HPV**

🕒 10.00 Pagi



The health officers also performed clinical breast examinations on female personnel to check their general well-being. 81 people participated in the lecture, which took place in the Seminar Room, Block 11, and ~34 HPV self-tests were performed that day.

#### 4. Infak Ramadan 2022

PUSPANITA, in collaboration with Club Nuklear Malaysia and PUSPATI Staff Cooperative Berhad (KKPB), organised the 2022 Ramadan Infak Programme. This programme is a platform for Nuklear Malaysia personnel to contribute to the 2022 Ramadan Infak Program fund. The donations were used for two activities: 'Bubur Lambuk' and 'Aidilfitri Contribution'.

Aidilfitri donations were distributed by Club Nuklear Malaysia in an online transaction directly to the recipient's account. The recipients are:

1. Support personnel with a base salary of RM2000 and below.
2. Personnel with a husband/wife/child suffering from chronic illnesses.

**Program Infak Ramadan 2022**

**Bubur Lambuk**  
Agihan pada: **13 April 2022**  
kepada warga Nuklear Malaysia dan komuniti setempat

**Sumbangan Aidilfitri**  
Agihan pada: **27-29 April 2022**  
kepada warga Nuklear Malaysia yang memerlukan

Sumbangan dibuka dari: **5-26 April 2022**  
"Rakan Komuniti Anda"

Salurkan sumbangan seikhlas hati anda melalui:  
**1100715660**  
Kelab Sukan & Kebajikan Agensi Nuklear Malaysia  
Rujukan: Infak Ramadan

Sila hantar slip sumbangan kepada:  
Pn. Norzehan Ngadiron (019-3985464) atau  
En. Shaifullizan Mohamad (017-5051302)

Anjuran:   
Kerjasama:

f Nuklear Malaysia | g Nuklear Malaysia | i Nuklear Malaysia | @NuklearM | www.nuklearmalaysia.gov.my | @nuklearmalaysiaofficial

#### TARIKH PROGRAM

Sumbangan **5 April – 26 April 2022**

Serahan Sumbangan Aidilfitri **27-29 April 2022**  
(secara dalam talian)

Agihan Bubur Lambuk **13 April 2022**



## 5. PUSPANITA CK Nuklear Malaysia Activities as a Sports Bureau

The Chief Secretary of the Government Bowling Competition Cup, organised by Puspanita Kebangsaan, was held on 12 June 2022. The competition starts at 9:00 am at Wangsa Bowl IOI City Mall, Putrajaya. Also present was Datin Ts. Dr Siti Hanom binti Marjuni, Chairman of the Puspanita branch of the headquarters of the Ministry of Science, Technology and Innovation (MOSTI), as well as representatives from various Departments and Agencies under MOSTI.



