

## Challenges in Strengthening Radiation Safety and Security Programme in Malaysia

**Norih M.A.**

Quality Management Centre  
Malaysian Nuclear Agency (Nuclear Malaysia)  
Bangi, 43000 KAJANG  
Selangor  
MALAYSIA

### **Abstract**

This paper illustrates the Malaysian experience in implementing steps in strengthening radiation safety and security through certification of radiation safety personnel, which is dedicated to meet the current and future needs in sustainability of radiation safety and security systems. Commitment from the workforce to treat safety as a priority and the ability to turn a requirement into a practical language is also important in implementing the radiation safety policy efficiently. Through this effort, we are able to create a basis for adequate protection of workers, the public and the environment and encourage licensees to manage radiation safety and security based on performance, and not on compliance culture, with the final objective of professing a safety culture through self regulation. This will certainly benefit an organisation with ultimate goals are to continuously strive for a healthy, accident free and environmentally sound workplace and community, while providing the technical support needed to meet the national mission. This will strengthen the radiation safety and security programme and could be used to assist in manpower development once Malaysia makes the decision to embark on a nuclear power programme.

### **1. Introduction**

The increasing use of radiation in various economic sectors requires proper safety practices and standards. In line with the need to ensure efficient use of the technology, a proactive approach has been taken in formulating radiation safety strategies, whereby due consideration is given to the application of nuclear technology in various economic sectors without compromising on radiation safety standard. The introduction of the Atomic Energy Licensing Act (Act 304), followed by the establishment of the Atomic Energy Licensing Board (AELB) in 1984, are serious initiatives taken by the Malaysian Government to regulate, safeguard and monitor the ionising radiation activities in Malaysia. It licenses all activities related to nuclear technology applications in all sectors by enforcing Act 304. In addition, AELB is to complement the functions of Malaysian Nuclear Agency in promoting the peaceful uses of nuclear technology. The applications of nuclear technology by private companies and public agencies in various sectors have increased out of confidence that local expertise and technical support facilities are available at hand. Pilot scale demonstration facilities for selected processes designed and constructed at Nuclear Malaysia have also contributed to the growing level of acceptance of the technology. Demonstration plants reduce the anxiety of industrialists as the technical and economic risks associated with using new, nuclear technology as the basis of doing business can be understood better.

Currently, in Malaysia, radiation industries are only small-sized organisations or teams of workers using radiation sources with about 20,000 radiation workers monitored monthly. The percentage of radiation workers exceeding 50 mSv, which is less than 1%, is maintained for over a 25-year period, indicating proper planning and implementation of radiation safety programme to achieve ALARA

doses in the country. It also demonstrates great efforts of the regulating body, AELB and Nuclear Malaysia to promote radiation safety awareness among radiation workers through a good radiation protection programme at the workplace. Anyhow, the lower in average doses may not be sustainable in the face of changes in work requirements. The widening of the scope of application, including intention of Nuclear Power Programme may require the initiation of several programmes for strengthening the foundation. This includes promoting safety and security programme in the use of radiation sources, designing and implementing measures to compound these constraints. This paper will discuss on establishment of the radiation safety personnel competency through appropriate certification scheme which could pave the way to nuclear safety when Malaysia embarks on its Nuclear Power Programme.

## 2. Competency in Radiation Protection

The most important factor for radiation safety and security is the technical or scientific capabilities to performed assigned task. In Malaysia, the need for maintaining competency in radiation protection is emerging, focusing on the qualification of Radiation Protection Officers (RPO). Regulation 23 of Malaysian Radiation Protection (Basic Safety Standards) Regulations 1988 requires the applicant to employ an RPO, with the necessary knowledge, skill and training, enabling effective protection of individuals and minimising danger to life, property and the environment for all activities sought to be licensed. An RPO is a technically competent person, designated by the registrant or licensee to supervise radiation safety within a facility and to ensure that work is carried out safely and in accordance with the relevant national requirements. They should:

- (a) provide the links between the workplace, the registrant or licensee, the qualified expert and the regulatory body, and should ensure that operations involving radiation are in compliance with established regulations;
- (b) be fully familiar with operations performed in a facility, its organisational infrastructure and working procedures, and should have an understanding of the relevant regulatory requirements; and
- (c) have sufficient authority to be able to perform these functions effectively.

A radiation protection officer should be the central point of reference within a company for radiation protection matters, and may carry out or directly supervise contingency plans in the event of an accident or incident (Table 1). They may also be assigned responsibilities concerning implementation of the emergency response plan.

Table 1. Task and Responsibilities of Radiation Protection Officer in different sectors i.e. industrial gauging, non-destructive testing, medical facility, research laboratory and nuclear installation

Sector	Task and Responsibilities
Industrial gauging	<ul style="list-style-type: none"> <li>• Supervise radiation protection measures relating to the gauge operation, maintenance, leak testing, and exchange and storage of sources.</li> </ul>
Non-destructive testing	<ul style="list-style-type: none"> <li>• Safe operation in fixed industrial radiography or with mobile devices on site.</li> </ul>
Medical facility	<ul style="list-style-type: none"> <li>• Protection of workers and patients and ensuring the appropriate condition of the equipment used.</li> </ul>
Research Laboratory	<ul style="list-style-type: none"> <li>• Safe handling of sealed and unsealed radiation sources and radiation generating equipment.</li> </ul>
Nuclear Installation	<ul style="list-style-type: none"> <li>• Ranging from controlling occupational exposures satisfactory compliance with license conditions, including the safe management radioactive waste in the facility</li> </ul>

An RPO must demonstrate the knowledge required, by attending RPO courses organised by an accredited agency and pass the RPO certification examination. The major goal of training is to provide essential knowledge and skills and to foster correct attitudes on radiation protection, secure and safe use of radiation sources. They need to be appointed by their employer before being certified as RPO by the regulatory authority, AELB.

Maintaining a high level of competency is crucial for future development of safe applications of ionising radiation. The major goal of training is to provide essential knowledge and skills and to foster correct attitudes on radiation protection and safe use of radiation sources. Assessment of the competency is through theoretical and practical examination. A standard criterion on the performance of the individuals evaluated has been established and only those who meet this criterion can be accepted as certified RPO. The National Committee for the Certification of Radiation Protection Officer (NCCRPO), comprising experts in various fields, is responsible to review and update requirements on competency of a certified RPO. NCCRPO will endorse the examination results and approved by the AELB.

### 3. Strategy for Enhancement of Competency

With increasing number of candidates (i.e. 701 in 2008) and the international requirement for radioactive source security, it is incumbent upon the NCCRPO to improve the syllabus of the certification scheme. It has been grouped into 3 categories and applied both for industrial and medical application examination (Table 2) and the examination format was altered accordingly (Figure 1 and 2). This is aimed for further enhance of the RPO competency based on their categorisation.

Table 2. Examination Categorisation for RPO Certification

Examination Categorization	Industrial application	Medical application
1	<ul style="list-style-type: none"> <li>• Irradiation cell</li> <li>• Blood irradiator</li> <li>• Generator thermoelectric radioisotope (RTG)</li> <li>• Accelerator</li> <li>• Cyclotron</li> <li>• Reactor nuclear</li> </ul>	<ul style="list-style-type: none"> <li>• Teletherapy source</li> <li>• Multibeam teletherapy</li> <li>• Linear accelerator</li> </ul>
2	<ul style="list-style-type: none"> <li>• Radiography gamma industry</li> </ul>	<ul style="list-style-type: none"> <li>• Medium/high dose rate brachytherapy source</li> </ul>
3	<ul style="list-style-type: none"> <li>• Fixed industrial gauge with high activity</li> <li>• Well-logging</li> <li>• Industrial gauge with low/medium activities</li> <li>• NORM/TENORM</li> </ul>	<ul style="list-style-type: none"> <li>• Nuclear medicine source</li> <li>• Low dose rate brachytherapy source</li> <li>• Positron Emission Tomography (PET)</li> </ul>

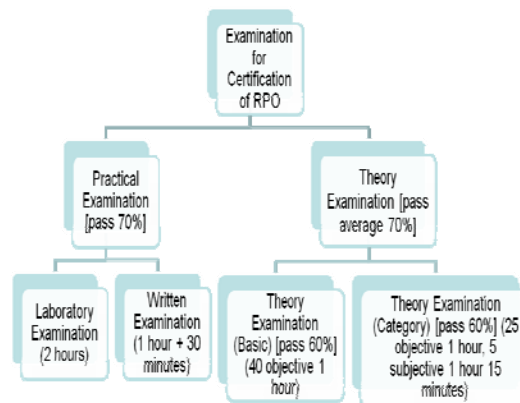


Fig.1 Examination structure for Category 3

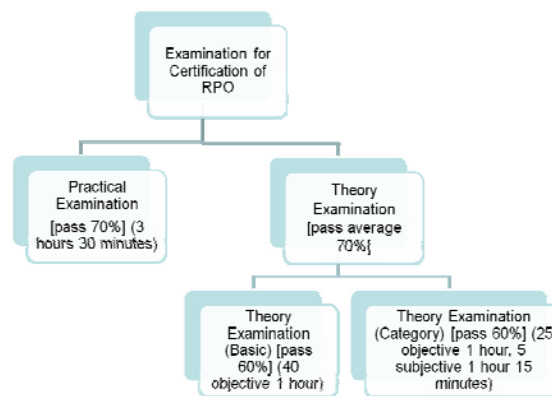


Fig.2 Examination structure for Categories 1 and 2.

#### 4. Building Competency in Safety and Security

A training programme is designed or tailored to respond to the needs arising from the legislative requirements, in line with the enforcement of the Act 304. In this regards, Nuclear Malaysia has provided all these opportunities to cater for the changing needs of customers. With suitable training approaches, dedicated trainers, state of the art training facilities, the training has attracted numerous customers from various industries and institutions of higher learning both local and abroad. To improve safety performance in an organisation, those involved in radiation activities are required to undergo continuous professional education (CPE) to refresh and enhance their knowledge, and improve skills in radiation related areas.

In realising this need, Nuclear Malaysia has initiated a new course which is Radiation Safety Management Audit, which is aimed to manage a variety of hazards on environmental, safety and health and by promoting safe behaviour at all levels of workers. The course is aimed to:

- (a) provide detailed knowledge and understanding on requirement of radiation safety audit;
- (b) motivate radiation practitioners to conduct own radiation safety audit (self regulation); and
- (c) help promote performance based radiation safety culture between employers and employees.

The syllabus was structured not only to cover basic theory but stress on the practice and case studies on protection and safety, as appropriate. The course recognition is been made formally, conferred through a process of accreditation of personnel employed to perform radiation safety audit in radiation industries by the Department of Standards, Malaysia (Standards Malaysia). The requirements for accreditation of training centres and courses have been defined according to the requirement of ISO/IEC 17024 (Conformity Assessment- General Requirements for Bodies Operating Certifications of Persons). Efforts towards the certification of ISO/IEC 17024 have been initiated since 2008 by Nuclear Malaysia. The scheme will provide international recognition for Radiation Safety Auditor Certification Body (RSACB), which establishes a system for the certification of personnel in accordance with Malaysia's own Atomic Energy Act (Act 304) and International Standards. The certified Radiation Safety Auditor may be employed within the radiation facility organisation as part of the quality assurance, or by third party inspectorates, inspection bodies, purchasers or consultants.

This scheme specifies the qualification and certification of personnel involved in radiation safety auditing in radiation industries in accordance to national and international standards. The certification would be able to:

- (a) Establish and confirm by examination the auditing competency, knowledge and skill of radiation safety auditor to verify the conformity of radiation safety in the industries audited according to the national and international standards;
- (b) Provide documented evidence of the radiation safety auditor proficiency in the form of a certificate;
- (c) Provide radiation safety auditor a certification that will be recognised and respected by certification bodies, industry, inspection bodies and authorities in Malaysia and internationally.
- (d) Provide a certification system for radiation safety auditor that is transparent, uniform and equitable.

The certification system, which shall be controlled and administered by a certification body (with the assistance, where necessary, of authorised qualifying bodies), includes all procedures necessary to demonstrate the qualification of an individual to carry out tasks in a specific radiation safety audit method in various industrial sector, leading to certification of competence. The certification is engaged in a continuous review and improvement of auditor competency. By harmonising the certification process, the standard will provide a basis to promote a self-check/self-audit culture among radiation practitioners. This will result in a better working situation and confidence in a radiation protection community.

## 5. Conclusion

In Malaysia, the implementation of radiation safety and security training is to enhance the safety performance in an organisation that leads to the development of a safety culture, in line with the spirit of national atomic regulation. The effectiveness of regulatory system in Malaysia can be improved further through the upgrading of the RPO examination and implementation of Radiation Safety Management Audit Course that is seen as a competitive product to meet the current and future needs for the sustainability of radiation safety. Opportunities for improvement raised during the self audit shall be considered carefully and used to improve the implementation of the existing systems in each and every radiation facility in Malaysia whenever appropriate. As a result, safety culture, which has been a vital element on safety can be improved and utilised to promote changes from good safety performance leading to excellence. This will assist in manpower development once Malaysia makes the decision to embark on its nuclear power programme.

## References

1. Noriah Mod Ali, Evolution of Radiation Protection Trends – the Malaysian Perspective, 5<sup>th</sup> International Symposium on Radiation Detection and Safety, Kitakyushu, Japan, 15-17 July 2009.
2. Noraishah Pungut, Noriah Mod Ali, Noraini Razali, Radiation Protection Officer Scheme: Malaysian Experience, 5<sup>th</sup> International Symposium on Radiation Detection and Safety, Kitakyushu, Japan, 15-17 July 2009.
3. Management Systems for Technical Services in Radiation Safety, IAEA Safety Standards, Safety Guide DS315, 2005.
4. Noriah Mod Ali, Trends of Occupational Exposure in Malaysia, 11<sup>th</sup> International Congress on Radiation Protection, Spain, 23-28 May 2004
5. IAEA Safety Standards Series, Building Competence in Radiation Protection and Safe Use of Radiation Sources, Safety Guide, RS-G-1.4, 2001
6. Key Practical Issue in Strengthening Safety Culture, INSAG-15, IAEA, 2002.