

## EXECUTIVE SUMMARY

At the request of the Government of Sri Lanka through the Sri Lanka Atomic Energy Board (SLAEB) addressed to the International Atomic Energy Agency (IAEA) to conduct an Occupational Radiation Protection Appraisal Services (ORPAS) mission dated as 14 March 2019, the Agency organised the ORPAS review mission in Sri Lanka from 24 November to 2 December 2019 with a team of eight international experts that includes a Team Leader and an Agency Coordinator. The Sri Lanka Atomic Energy Board (SLAEB) acted as the national contact point for the mission.

The purpose of this mission was to appraise the regulatory and practical implementation of the occupational radiation protection arrangements in Sri Lanka. Prior to this mission, a preparatory meeting was conducted from 16 to 18 July 2019 in Colombo to determine the participating organizations (National Counterparts), to introduce and agree on self-assessment by those organizations using the ORPAS questionnaires prepared by the Agency, and to agree upon the scope and dates of the mission. Accordingly, the National Counterparts that participated in the ORPAS mission were the following;

### REGULATORY BODY

- Sri Lanka Atomic Energy Regulatory Council

### TECHNICAL SERVICE PROVIDERS

- Sri Lanka Atomic Energy Board
  - Personal Monitoring Services Laboratory
  - Secondary Standards Dosimetry Laboratory
  - Radiation Protection and Technical Services Division

### OPERATORS

- Lanka Hospitals (Pvt) Ltd.
- Ceylinco Healthcare Services Ltd.
- National Hospital of Sri Lanka - Colombo
- National Centre for Non-Destructive Testing and the National Certification Body for Non-Destructive Testing
- Sri Lanka Gamma Centre
- Ceylon Petroleum Corporation
- Sri Lanka Atomic Energy Board, Central Disused Radioactive Source Storage Facility
- Lanka Mineral Sands Ltd. and Pulmudai Mineral Sand Factory

### RESEARCH AND EDUCATION INSTITUTION

- Department of Nuclear Science, University of Colombo

The ORPAS mission compared Sri Lanka's arrangements for occupational radiation protection against the IAEA Safety standards as the international benchmark for protection and safety of workers. The mission was also used to exchange information and experience between the team members and official national counterparts. The SLAEB provided the review team with advance materials that are relevant to the mission including the self-assessment carried out by the participating organizations.

This report provides the main findings, recommendations, suggestions, and good practices identified during the mission conducted from 24 November to 2 December 2019. Detailed findings for individual organisations are provided in the Appendices.

In general, the occupational exposure control regime is covered in the regulatory framework of Sri Lanka. The framework is embodied in law and subsequent regulations, orders and rules. The Sri Lanka Atomic Energy Act, No. 40 of 2014 clearly identifies the independent regulator and the technical service provider and details their objectives, duties and powers. Furthermore, the Act includes all the necessary provisions for licensing, control and radiation protection of workers which is far more detail than is usually incorporated in such Acts.

The ORPAS team notes that the Sri Lanka Atomic Energy Regulatory Council (SLAERC) intends to replace the current regulations, which are based on the previous version of GSR Part 3 (BSS 115, 1996), with modern regulations based on the current requirements on occupational exposure control of GSR Part 3 for planned exposure situations. The draft Regulations should be published as soon as possible and cover all exposure situations (planned exposure situation, existing exposure situations and emergency situations) with provisions for a radiation protection programme (RPP) including radiation protection of itinerant workers. However, the ORPAS team is impressed with the request of the Government of Sri Lanka for ORPAS such a short time after the establishment of the SLAERC.

The ORPAS team also notes that the Act empowers the SLAERC and SLAEB to perform some of the same functions, which may lead to duplication and inefficiency in coordination, cooperation and consultation.

The ORPAS Team notes that SLAERC has limited resources and recommends that it limits its activities to regulatory functions and allocate its resources in accordance with a graded approach. It should also be noted proper implementation of regulations and guidance can only be achieved by qualified and competent staff.

In general, regulations should be supported by regulatory guidance materials and authorized facilities would benefit from guidance from SLAERC to properly implement the regulations, e.g. guidance on the establishment and maintenance of the RPP by the employers, registrants and licensees, harmonization of health surveillance program of workers, and establishment of dose constraints.

It is observed that SLAERC concentrates on the regulation of artificial sources and authorization of individuals. However, the overall arrangement for the control of occupational exposure requires oversight of occupational doses from all exposure situations, which can only be provided through a national dose registry. SLAERC should consider the necessary arrangements for the establishment and maintenance of a national dose registry.

Stakeholder involvement is paramount for any regulatory activity and SLAERC should establish mechanisms for the necessary consultation, cooperation and coordination with relevant entities.

The ORPAS team notes that Sri Lanka has limited resources available for training for radiation protection and suggests that SLAERC and the SLAEB should consider cooperating to ensure that limited resources are used effectively and efficiently to ensure employers have sufficient access to radiation protection training services.

The Sri Lanka Atomic Energy Act, No. 40 of 2014, specifically empowers the SLAEB to provide radiation protection services, dosimetry services and calibration services. Therefore, SLAERC should authorize SLAEB as a technical service provider for calibration, workplace

monitoring and individual monitoring to ensure that SLAEB has complied with the requirements stated in the Act and the Regulations.

The SLAEB is accredited according to IEC/ISO 17025:2005 to provide dosimetry services and calibration services and is well equipped to provide such services. SLAEB is also capable of providing workplace monitoring and radiation protection training services.

The ORPAS team recommends that the SLAEB pursues recognition as the national laboratory for ionising radiation metrology and that it retains personal dose records for the period recommended in GSR Part-3.

The SLAERC should recommend the calibration period for all workplace monitoring instruments.

In order to improve its services, SLAEB is encouraged to change its monitor (dosimeters) distribution paperwork to ensure that the Radiation Protection Officer (RPO) accepts responsibility for correctly distributing the monitors to the workers. In addition, the SLAEB should consider changing its charging policy to remove the financial disincentive for government hospitals to monitor workers. Treating all users equally would also enable more efficient use of the limited stock of TLD cards available. The SLAEB should consider reporting the Hp (0.07) dose recorded on each monitor. The SLAEB should consider implementing extremity monitoring and internal dose monitoring for workers.

As a general principle, the employers, registrants and licensees and SLAERC should ensure that a safety assessment is conducted as the basis for the establishment of the RPP in the respective facilities. The RPP should include the necessary arrangements for the control, monitoring and recording of occupational exposures.

The license holders should make arrangement to define the boundaries of classified areas, taking into account the magnitude of the exposures expected in normal operation, the likelihood and magnitude of exposures in anticipated operational occurrences and in accident conditions, and the type and extent of the procedures required for protection and safety.

It is observed that all hospitals are licensed to use radiation sources by SLAERC. The license holders should provide internal dosimetry, double dosimeter and extremity monitoring to the relevant workers depending on the exposure pathway.

The employers, registrants and licensees should provide appropriate training in protection and safety, including emergency response arrangement with a primary focus on emergency worker protection, as well as periodic retraining as required to ensure the necessary level of competence.

Furthermore, to improve their practice, nuclear medicine departments should consider using portable protective shields that would protect staff from radiation exposure following application of radiopharmaceuticals to patients.

In Sri Lanka, non-destructive testing (NDT) training and certification is based on international standards, which include training on radiation protection.

To improve worker protection, NDT license holders should:

- review the design of the shielded enclosure;
- include rehearsal of emergency plans and refresher training in their training programme;
- provide direct reading dosimeters (active / alarm personal dosimeters) to all radiographers and assistants;
- implement an inspection and maintenance programme.

The ORPAS team acknowledges a significant achievement has been made by the establishment of independent regulatory authority in Sri Lanka, empowered single technical service provider for dosimetry services and calibrations, but recognizes there remains considerable work ahead to develop the national occupational radiation protection programme.

A press release was issued after completion of the mission.