

Status of National Arrangements on Dose Registry

“Regulatory provisions on NDR & its’ implementation”

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Legal Basis- Regulatory provisions

Requirements and provisions for the NDR:

Applicatory Decree 15512 of the law 105/83

Article 5:

The Lebanese Atomic Energy Commission shall:

A- ...

B- Ensure the mandatory and regular monitoring of workers directly or indirectly exposed to ionizing radiations within hospitals, medical, industrial, agricultural, educational, and research facilities.

Legal Basis- Regulatory provisions

Requirements and provisions for the NDR:

General Regulations for Radiation Safety and Protection from Ionizing Radiation
Sources 1/11 2020

Article 61: The National Register of Occupational Doses

- a. IMS providers **licensed** or **approved** by the Commission must send the results of those measurements to the licensee and to the Commission to be registered in the **national occupational dose registry** according to the mechanism approved by Commission (RB).
- b. A record of occupational exposure shall be kept for each worker throughout his or her professional life and beyond until the age of seventy-five or until the expiration of thirty years after cessation of work involving occupational exposure whichever is longer.

Legal Basis- Regulatory provisions

Requirements and provisions for the NDR:

General Regulations for Radiation Safety and Protection from Ionizing Radiation Sources 1/11 2020

Article 62: Occupational exposure records

- a. The licensee shall keep records of occupational exposure to workers that Article (53) requires “Assessment occupational exposure” and in accordance with the instructions issued by the Commission.
- b. The licensee shall make available information about workers exposures, while preserving the privacy of this information, to:
 - 1. The workers themselves.
 - 2. The Commission.
 - 3. Any other entity that needs it in accordance with the laws and regulations in force, including health authorities, insurance and pension institutions and other employers.

IMS Providers Status in Lebanon

- One IMS provider in Lebanon, within the Lebanese Atomic Commission.
- An internal approval process for the IMS Lab is performed by the department of Authorization, Inspection and Regulations of the LAEC, and an internal Co-ordination is in place between The IMS and DAIR department.
- According to Article 53 B of the Lebanese regulations:
The Licensee shall enrol the workers in the controlled areas in an Individual Monitoring Program from a provider approved and licensed by the Commission. In case of services provided from out of the republic, the provider should be approved by the Commission and holding a license from the Regulatory Body of his country.

Legal Basis- Regulatory provisions

Regulatory requirements for Authorization or Approval of TSPs-I

For the approval and authorization of TSP service (individual monitoring and calibration Laboratories, consultancy and Radiation safety services, ..), LAEC requires:

- Appropriate documentation about the service. This documentation should contain information about:
 - Safe handling and use of radiation sources within their laboratories,
 - Staff qualifications and training,
 - Types of monitoring system that will be in use,
 - Tests and verification procedures that show credibility of LAB results, Quality control and procedures,
 - Dosimetry procedures and reading intervals,
 - calibration traceability,
 - Management system, organizational structure
- A proper QMS certification or accreditation according to EN ISO/IEC 17025

Legal Basis- Regulatory provisions

Regulatory requirements for Authorization or Approval of TSPs-II

As part of the approval process, the regulatory body requires the TSPs to provide:

- Traceability of the measurements to national/international standards,
- Participation in international intercomparisons,
- Inspection of the laboratory: LAEC conduct a yearly inspection to TSP Labs in order to ensure the safe use of radiation sources and to evaluate areas as staff (including training), equipment, facilities, calibration and dosimetry procedures.
- Approval performance license is valid out at regular intervals (every year).

IMS Providers Status in Lebanon

- **Types of dosimetry services available:**
Whole Body and **Extremity** Monitoring
- **Radiation types for which dosimetry services can be provided:**
For Hp(10) (Whole body): **Photon** radiation
For Hp(0.07) (Extremities): **Photon** and **Beta** radiation
- **Types of personal dosimeters provided:**
 - 1- Thermoluminescent dosimeter type TLD-100 (LiF: Mg, Ti) for whole body monitoring.
 - 2- EXTRAD chips TLD-100 (LiF: Mg, Ti) for extremity and eye lens monitoring.

Operational Technical Service Providers (TSPs) in the country

Consultancy and maintenance services, including:

- (i) Radiation safety consultancy;
- (ii) Shielding calculations;
- (iii) Maintenance services covering both in-house operations and services contracted with an outside organization.

Calibration and testing and assay services, including:

- (i) **Monitoring services, including individual monitoring (accreditation), workplace monitoring and environmental monitoring (accreditation),**
- (ii) Calibration and calibration verification services for monitoring devices and radiation sources.

Dosimetry service characteristics

- Monitoring periods used for external dosimetry:
One **month** and **3 months** according to practice type.
- Calibration procedures for external dosimetry:
 - Calibration of the TLD readers are performed in an accredited SSDL (Greece, Belgium, IAEA, ..) on a yearly basis using a PMMA phantom.
 - Calibration of the dosimeters are performed using an internal irradiator (Sr-90) on a bi-annual basis.
- Extremity dosimetry:
 - One **month** and **3 months** according to practice type.
 - Calibration of the TLD readers are performed in an accredited SSDL (Greece, Belgium, IAEA, ..) on a yearly basis using a rod or a pillar phantom.
 - Calibration of the dosimeters are performed using an internal irradiator (Sr-90) on a bi-annual basis.
- Internal dosimetry: **N.A.**
- Software for internal dosimetry analysis: **N.A.**

Dosimetry service characteristics

- Dose assessment methodologies for internal dosimetry:
Screening **urine analysis** for nuclear medicine staff was lunched.
- Calibration procedures for internal dosimetry:
N.A.
- Dose estimation of internal dose using the results of workplace monitoring:
N.A.
- Monitoring requirements for emergency exposure situations and recording arrangements:
Article 99: Protection of responders to Emergency Situations:

Dosimetry service characteristics

Article 99: Protection of responders to Emergency Situations

- a. The licensee shall ensure that its personnel involved in emergency response are **not exposed to a dose exceeding 50 mSv** except in the following cases:
 - 1. Carry out operations aimed at avoiding a large mass dose.
 - 2. Preventing the occurrence of disasters.
 - 3. Lifesaving or avoiding severe injuries.
- b. The licensee shall provide the workers with the **necessary information** about the emergency
- c. The licensee shall make the necessary efforts ... so that the dose of his workers participating in the response does not exceed **twice the limit** (100 mSv) and when the response is intended for lifesaving or avoiding severe injuries ... the dose must not exceed **ten times** the mentioned limit (500 millisieverts) in order to avoid deterministic radiation effects ...
- d. The licensee shall ensure that its workers participating do so **voluntarily** ...
- e. The licensee shall take all possible **measures to protect** his workers participating in the emergency ...
- f. After the response phase is terminated, the workers ... are subject to the **occupational exposure protection requirements** ..
- g. The receipt of doses during the response operations **does not necessarily cause the worker to abstain** from any work that may subsequently be associated with occupational exposures, however, **medical advice** is to be provided given by a qualified person to the worker prior to any other occupational exposure if the worker has received a dose of more than 200 mSv, or at the request of the worker.

Provision for Quality Management System for TSPs

- System:
Individual Monitoring System (IMS)
- Certification:
IMS is accredited according to **ISO 17025** since 2015 for both whole body and extremity monitoring.
- Accreditation and scope: **Slides 15 and 16.**
- Qualified staff: IMS is operated by a **senior physicist** (PhD in Medical physics, with more than 17 years of experience in the field of individual monitoring and occupational radiation protection) and **3 technologists + one consultant physicist** (PhD in Medical physics)

Provision for Quality Management System for TSPs

Training requirements

- Training for every **new staff** member includes the following areas:
 - IMS management system
 - Dosimetry methods
 - Safety/security
 - Radiation Protection
 - Equipment operation
 - Software
 - Specific job tasks
- The success of training is evaluated by supervisors.
- For all the staff: Initial training, regular follow up and re-training.
- Yearly periodic **performance review**.

Provision for Quality Management System for TSPs

Accreditation and scope I

IMS : Scope of Accreditation

- Technical equipment (Instruments):
 - Harshaw 6600 Lite Reader and TLD LiF: Mg,Ti in form of chips (1/8"x 1/8" x 0.035") and holders type 8814 for the measurement of photon radiation in term of Hp(10) and Hp(0.07) for whole body dosemeter.
 - Harshaw 4500 Reader and EXTRAD detector LiF: Mg,Ti in form of chips (1/8"x 1/8" x 0.015") and pouch with extremity finger straps for the measurement of photon and beta radiation in term of Hp(0.07).

Provision for Quality Management System for TSPs

Accreditation and scope II

- Dosimetry Performance Specifications of TLD's

The method used at the individual Monitoring Services Laboratory is a Standard Method:

- **For Hp(10) (whole body dosimeter):**

- Dose Range: $0.1 \text{ mSv} \leq \text{Hp}(10) \leq 1 \text{ Sv}$
- Photon energy and angle of incidence: 12 keV to 1.25 MeV, at 0°
- Photon energy and angle of incidence: 80 keV to 1.25 MeV, at 0° to $\pm 60^\circ$

- **For Hp(0.07) (whole body dosimeter):**

- Dose Range: $0.1 \text{ mSv} \leq \text{Hp}(0.07) \leq 1 \text{ Sv}$
- Photon energy and angle of incidence: 60 keV to 1,25 Mev, at 0° to $\pm 60^\circ$

- **For Hp(0.07) (extremities)**

- Dose Range: $0.1 \text{ mSv} \leq \text{Hp}(0.07) \leq 1 \text{ Sv}$
- Photon energy and angle of incidence: 60 keV to 1,25Mev, at 0° to $\pm 60^\circ$
- Beta radiation and angle of incidence: 0.8Mev,at 0° to $\pm 60^\circ$

General characteristics of the NDR

- Establishment date:

The Dosimetry Laboratory and the IMS at LAEC started in 1996

- Responsible body/organization:

The Lebanese Atomic Energy Commission

- Role of the NDR:

According to Article 61 of the Lebanese Regulation:

- Register of occupational exposure records.
- Dose certificate for workers.
- Dose monitoring and over exposure notifications.

General characteristics of the NDR

- Occupational categories included in the NDR:

| Medical | Industrial | Miscellaneous |
|--|--|---|
| <ul style="list-style-type: none">❖ Nuclear Medicine❖ Diagnostic Radiology❖ Radiotherapy | <ul style="list-style-type: none">❖ Industrial Radiography❖ Radioisotope production❖ Industrial gauges | <ul style="list-style-type: none">❖ Educational establishments❖ Waste and spent sources storage❖ Transport of radiation sources |

- Responsible organisation (individual) for submitting the required information to the NDR:

IMS providers according to [Article 61-A of the Lebanese Regulation](#):

Licensee shall sent **information** related to their workers to the RB to be enrolled in the NDR and the monitoring service.

Licensee shall sent **report of Dose assessment** for workers who do not have individual monitoring program.

General characteristics of the NDR

- Information is required by the NDR:
 - ✓ Name and Code of the institution
 - ✓ Name and Code of the workers per activity
 - ✓ Whole body and extremity doses (Eye lens) cumulated for 5 years
- Types of doses are recorded in the NDR:
 - ✓ $H_p(10)$ or effective dose
 - ✓ $H_p(0.07)$
 - ✓ $H_p(3)$ when applicable
- Procedure applicable for overexposure and/or in an emergency situation:
 - ✓ Notification letter sent to the RPO with a CC to the administration and DAIR department at the LAEC
 - ✓ Investigation and Corrective/Preventive action report from the Licensee

General characteristics of the NDR

- Time period for submitting data to the NDR: **Yearly** Basis
- Retainment period of the NDR data:
Article 61-B of the Lebanese Regulation 1/11 mention that “A record of occupational exposure shall be kept for each worker throughout his or her professional life and beyond until the age of **seventy-five** or until the expiration of **thirty years** after cessation of work involving occupational exposure whichever is longer”.
- Number of currently registered occupationally exposed workers:
Around **5000** workers.

General characteristics of the NDR

- Type of database to establish a NDR and maintenance arrangements (e.g., in-house developments, off the shelf, etc.) : **Electronic data** and **hard Copies** of reports.
- Difficulties when establishing the NDR:
 - Collection of exposure data specially from users having IMS program out of the republic.
 - Resources (IT assistance, ..).
- Reporting mechanism to occupationally exposed workers or organisations:

Dose record reports from TPS are sent to the Licensee represented by the **RPO**, who is responsible to provide workers with their dose records for the monitoring period.
- Management system of the NDR (collection of exposure data):

Licensees are responsible to submit their workers dosimeters every two months for reading at the IMS of LAEC. **Hard copies** as well as **electronic data** of the reports are kept at the IMS of LAEC.

Introduction of 2022 Annual Report / Newsletter

The **information** are divided in **2 types**: the **mandatory** information required from the standard, and the **optional** information which are mainly related to IMSL activities

The mandatory information are:

- The logo and the name of the institute (Lebanese Atomic Energy Commission)
- The name of the lab (Individual Monitoring Services Laboratory)
- The logo of the accreditation body with the certificate number (ESYD, Certificate number: FB1/1-788)
- The report title (Report of Individual Monitoring Exposure)
- A report reference number
- Number of reading per year and the issuing date of the report
- Name of the monitored institute and its code
- The Monitoring period (from ...To ...) and the exact number of days between the dates of delivering/receiving the dosimeters by the laboratory.
- The reading date of the dosimeters
- The List of names of monitored employee, distributed by department as Radiology, Radiotherapy, Nuclear Medicine, Operating room, cardiology etc.
- Dosimeter ID,
- Personal dose equivalent values measured during the mentioned period
- The annual accumulated personal dose equivalent
- Causes for no dose evaluation (WBD/ED not return, damage etc...)

Introduction of 2022 Annual Report / Newsletter

- General **technical** notes:

At the end of each report some technical notes are listed. Those notes include:

- Radiation monitoring **type**,
- The natural radiation **background** dose for the reporting period which is subtracted from the readings of the dosimeter,
- The maximum **permissible dose** limit per Year for the effective dose and equivalent dose to the extremity,
- The **investigation level** for the monitoring period and the related combined standard uncertainty,
- The **detection limit** value for the monitoring period,
- The **method** used.

- An official **cover letter** contains:

- An **Interpretation** of the result by comparison to the yearly maximum permissible dose, taking into consideration the measured dose, the accumulated dose within a year to the date of last reading.
- A **warning message** in case of **high dose** with the name of the employee.
- A **warning message** for **exceeding the monitoring period** if the due date is exceeded by 15 days.



Thank You

