Thermo Luminescent Dosimetry (TLD Lab)

Personnel Radiation Monitoring service was introduced in 1991. It was established under IAEA assisted project. Training and appropriate equipments were provided by IAEA satisfactorily. In early 1997 a basic radiation protection course was conducted by MAEC (Myanmar Atomic Energy Committee) for hospital radiation workers in Mandalay. Then TLD service was spread to nation wide. MAEC was also requested for assistance by a foreign radiography firm working for oil and gas industry and was willingly provided. The Government of the Union of Myanmar enacted the Atomic Energy Law (The State Peace and Development Council Law No 8/98) on 8th June 1998. This Law encompasses all aspects of radiation and waste safety in Myanmar. Radiation Protection Regulations was finished technically and waiting for the approval. To upgrade the role of Radiation Protection aspects. “Radioactive Materials and Radiation Licensing Procedure Explanatory Century” was held on 7th May, 2003, led by the Prime Minister of the Ministry of Science and Technology. Consequently, the announcement for Personnel Radiation Monitoring Service has been established to the private sector related to ionizing radiation.

Personnel Radiation Monitoring Service is concerned to control radiation hazards by keeping a check on radiation exposure of individual worker engaged in used of ionizing radiations and isotopes in the field of medicine, research, industrial, agriculture, etc. Individual Monitoring is achieved by using equipment carried on the person or worker. Thermoluminescent Detectors (TLD) are being used for the personnel radiation monitoring. Lithium Fluoride and Calcium Fluoride are currently in use. The latter is very sensitive but a poor energy response. Lithium Fluoride is less sensitive but its energy response is excellent. TL material is in the form of thin disc. Thermoluminescent Detectors are used by persons workers who exposed directly or indirectly to radiation in the work places. Normally the monitoring period for one service takes two months but sometimes it needs a little shorter or longer for special case. The absorbed dose is evaluated on TLD reader which is linked to computerized dose recording system. As the atomic number of
LiF is equivalent to human tissue, it gives reliable results of skin & whole body dose.

**Purpose**

The purpose of personnel radiation monitoring service is to ensure that the workers who exposed directly or indirectly to ionizing radiation are kept within the dose limits recommended by the International Commission on Radiological Protection and to ensure that nobody is exposed to maximum permissible dose.

**Facilities**

The Harshaw model 4500 manual TLD workshop is state of the art instrument used for Thermoluminescent dosimetry (TLD) measurement. The complete workstation includes a personal computer with the Harshaw Radiation Evaluation and Management system (TLD REMS) software. The workstation computer is an IBM personal computer with the following minimum equipments.

- 386 SX 3 20 processor or better.
- Math Coprocessor
- 200 megabyte hard disk drive
- 2 MB RAM
- One diskette drive
- Dot matrix printer IBM pro printer compatible
- Optional laser printer HP laser Jet II compatible

TLD-REMS software is used exclusively for Harshaw reader. This software also provides a common interface from reader to a central computer system. Two photomultiplier tubes are incorporated in a sliding housing for rapid manual reading of while body environmental TLD cards.
The TLD Irradiator Model 2210 is consisting in this system for calibration process. Annealing of TLD cards, Generating the calibration cards, Calibrating the TLD readers, Card calibrations are done before distribution to the users.

In very soon, we will use Landauer “Inlight Automatic Reader” to upgrade our personnel monitoring system. It can be made automatic processing of 50 dosimeters per standard magazine at one time.

**Optically Stimulated Luminescence Dosimetry (OSLD)**

At present, DAE substitute Landauer ‘InLight Automatic Reader’ in Harshaw TLD Reader to upgrade our personnel radiation monitoring system. It can be made automatic processing of 280 dosimeters per hour with results in 0 to 13 seconds at one time with multiple read.

**InLight Systems**

InLight Systems are automated dosimetry systems using Landauer’s optically stimulated luminescence (OSL) technology. InLight System includes a reader, an external PC, containing the InLight software that provides control over data recording, analysis and the step up and management of the database and custom software. OSL dosimeter system consists of a four-chip OSL dosimeter, with Al₂O₃ detector. InLight Automatic Reader provides readout for InLight System dosimeters.

Dosimeter measures radiation exposure with carbon-doped aluminum oxide detector (Al₂O₃:C) read out by OSL technology. The read out process uses a light emitting diode (LED) array to stimulate the detectors, and the light emitted by the OSL material is detected and measured by a photomultiplier tube (PMT) using a
high sensitivity photon counting system. The amount of light released during optical stimulation is directly proportional to the absorbed radiation dose and the intensity of stimulation light. The OSL read out process of Al$_2$O$_3$: C allows for dose verification through reanalysis (approximately less than 0.5% of the signal is removed for each reading). OSL has found a widespread application in a variety of radiation dosimetry fields, including personal monitoring, environmental monitoring, retrospective dosimetry used in the dating of archaeological and geological material, reconstruction of radiation doses following a nuclear accident, and space dosimetry.

Recommended dose equivalent limits are as follow;

Occupational = 20 mSv/year  
(Average over 5 years but not exceed 50 mSv in a single year)

Public = 1 mSv in a year

Skin (extremity) = 500 mSv/year  
(eg. Wrist, ankle, feet etc.)

Lens of eye = 150 mSv/year
သိပ္ပံနှင့်နည်းပညာဝန်ကြီးဌာနအဏီစွမ်းအင်ဦးစီးဌာနလေပ်သားတစ်ဦးချင်းအတွက်ဓါတ်ရာင်ခည်သင့်မပမာဏကို IC RP (International Commission of Radiation Protection) က သတ်မှတ်ထားသာခွင့်ပုနိုင်သည်စန်းန်းထက်ကျာ်လွန်မပြီရှိစရန်စာင့်ကည့်တိုင်းတာမပုခင်းဖင့်လူကိုအန္တရာယ်ဖစ်နိုင်သည်ကြောင်းဓါတ်ရာင်ခည်ကိုအရာင်ပါင်ကိရိယာဖင့်တိုင်းတာ၍အဖထတ်ယူခင်ဖစ်ပါသည်။

အခြားသောစနစ်

အခြားသောစနစ် အလင်းဆိုင်ရာလခ်စားခင်ဖင့်အရာင်ပါင်ထားပါသည်။အခြားသောစနစ် Optically Stimulated Luminescence Dosimetry System (OSLD)ကိုအတွက်နောက်ထိးကိရိယာ၌မည်သည့်အတွက်ကာင့်အတွက်ပါကည့်တိုင်းတာသည်ကြောင်း

အခြားသောစနစ်ကိုသောစနစ်နှင့်သက်မှတ်ထားသာသည်ကြောင်းသည်ကို

tissue equivalent performance အတွက် Al₂O₃:C ဖျင်သော့င်ပျို့သောစနစ်ထဲဆောင်ရွက်သောစားသည်အကြောင်းမှတ်နေထိုက်သည်မှာ (Skin Dose) နှင့်ပျမ်းမံခန္တာယ့် (Whole Body Dose) တွင်စားသည်ကို

သောစနစ်

သောစနစ်နှင့်သက်မှတ်ထားသာသည်ကြောင်းသည်ကို
စာသီလေ့လာခြင်း၊ အစိတ်အပိုင်းတန်ဖိုးဖြစ်ရာအလိုအလျောက်နာဝန်ထမ်းဆောင်ခွင်း အစိတ်အပိုင်းတစ်ခုလှုပ်ရာတွင် အစိတ်အပိုင်းတစ်ခုအရ ရှိသည် ပြသနေသည်။

စာသီလေ့လာခြင်း:

စာသီလေ့လာခြင်းအရ အစိတ်အပိုင်းတစ်ခုလှုပ်ရာတွင် ရှိသည် ပြသနေသည်။ OS LD dosimeter ရှစ်ဆောင်/အစိတ်အပိုင်းတစ်ခုရှိသည် ရှိသည်။ (စာသီလေ့လာခြင်း) အစိတ်အပိုင်းတစ်ခုရှိသည်။

စာသီလေ့လာခြင်းအရ အစိတ်အပိုင်းတစ်ခု သို့မဟုတ် TLD Lab, DAE (စာသီလေ့လာခြင်း)

Figure(1) Automatic Reader 200-Unit  Figure(2) Dosimeter Designation