Monitoring and Dose Assessment of Occupational Exposure in Nepal

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Abstract

The use of ionizing radiation is ubiquitous in the field of medicine, industry, agriculture etc, however the hazardous aspects of those radiations should be addressed during their use. In Nepal, the use of ionizing radiation is mainly focused on medical sectors and the equipment in use include X-Ray machine, Computerized Tomography (CT), Cobalt-60 therapy, linear accelerator (LINAC), fluoroscopy, mammography, nuclear medicine facilities, high dose rate brachytherapy sources, etc. However, the status of individual monitoring for the implementation of radiation protection has not been satisfactory here. With the radiation related law in place in the country recently in 2020, the radiation protection related issue can be expected to intensify in near future. An initiation on the radiation protection of individuals has been carried out at Nepal Academy of Science and Technology (NAST) with the establishment of Individual Monitoring Service (IMS) laboratory at Physical Science Unit of NAST. This laboratory has been established in Dec. 2015 in collaboration with Ministry of Education, Science and Technology, Government of Nepal and IAEA under the technical cooperation project NEP9001 "Developing and Establishing National Infrastructures for Radiation Safety". The IMS laboratory currently hosts a 6600 plus Harshaw TLD reader along with 1050 TLD-100 cards. The reader is calibrated annually by exposing calibration cards to known dose at SSDL, Nuclear Malaysia/ IAEA. The individual monitoring service is being provided to almost 800 radiation professionals from more than 100 health institutions of the country. The monitoring period is of three months. The year wise expansion of dosimetry service of NAST since its establishment. The dosimetry service has gained serious attention from the stake-holders with numerous request received for personal dosimetry. The laboratory however currently is not able to address all the received request due to limited resources. The laboratory plans to expand dosimetry network all over Nepal in near future.

Keywords: IMS, TLD, Occupational exposure, Ionizing radiation, IAEA,

External Dosimetry System at NAST

Thermoluminescent Dosimetry -TLD

Established - IAEA TC Project
NEP 9001 (2012)
Strengthened – IAEA TC Project
NEP 9005

DOSIMETRY STARTED November 2015

Calibration of Reader is done each year by using gold cards exposed at SSDL Nuclear Malaysia and the IAEA

TLD-100: LiF

Thermo Luminescent Dosimetry (TLD) Service:

Service Oriented radiation dose measurement service has been provided to different radiation professionals throughout the country.

Dosimetry Laboratory Setup

Expansion of TLD Service over the Years

NEPAL ACADEMY OF SCIENCE & TECHNOLOGY
CENTRAL OFFICE
NAST

Date: 23 August, 2019
Name of Hospital:
Lot No: 4
Address:

DOSE ASSESSMENT REPORT FROM 10 MARCH 2019 TO 20 AUG. 2019

S.No.	TLD Card Number	User Name	Dose (mSv) Deep Dose Hp(10)	Dose (mSv) Shallow Dose Hp(0.07)
1	1000028		1.02	1.01
2	1000052		0.98	0.92
3	1000081		0.32	0.33
4	1000085		0.73	0.88
5	1000122		0.58	0.37
6	1000129		0.35	0.38
7	1000244		0.74	1.16
8	1000338		0.31	0.35
9	1000496		0.32	0.34
10	1001009		0.38	0.40
11	1001131		0.45	0.47
12	1001275		1.12	1.31
13	1001274		0.43	0.44
14	1001277		0.44	0.38
15	1001359		0.51	0.39
16	1001474		0.36	0.41

1. Whole body dose limit for radiation workers is 20 millisievert (mSv) per annual calender year, IAEA GSR Part-3 (2014), ICRP 103 (2007).
2. Minimum recording level is 0.1 mSv above background. Dose below that limit is recorded as 0mSv.
3. 1.0mSv = 100mrem = 1.0mJ/kg of tissue
4. Hp(10) is personal dose equivalent under 10mm depth of tissue
5. Hp(0.07) is personal dose equivalent under 0.07mm depth of tissue or skin dose equivalent.
6. The investigation level for three month monitoring period is 5 mSv.

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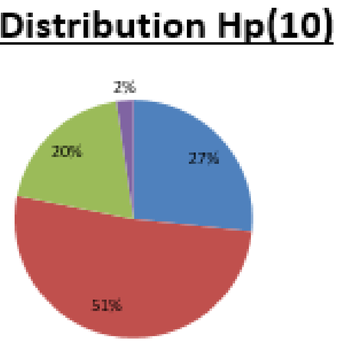
Dose Distribution of radiation professionals for last cycle of assessment

Dose Distribution Hp(10)

Dose Limit : 20 mSv per annum

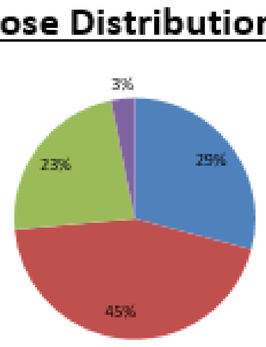


Total : 605

0 mSv | Between 0 & 1 mSv | Between 1 & 5 mSv | More Than 5 mSv

Dose Distribution Hp(0.07)

Dose Limit : 500 mSv per annum



Total : 605

0 mSv | Between 0 & 1 mSv | Between 1 & 5 mSv | More Than 5 mSv

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UNCERTAINTY EVALUATION IN MEASUREMENT OF THE PERSONAL DOSE EQUIVALENT AT NINE INDIVIDUAL MONITORING SERVICES IN ASIA AND THE PACIFIC REGION

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Work are on progress to establish a dose registry system for systematic and sequential arrangement of radiation dose absorbed by radiation professionals.

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