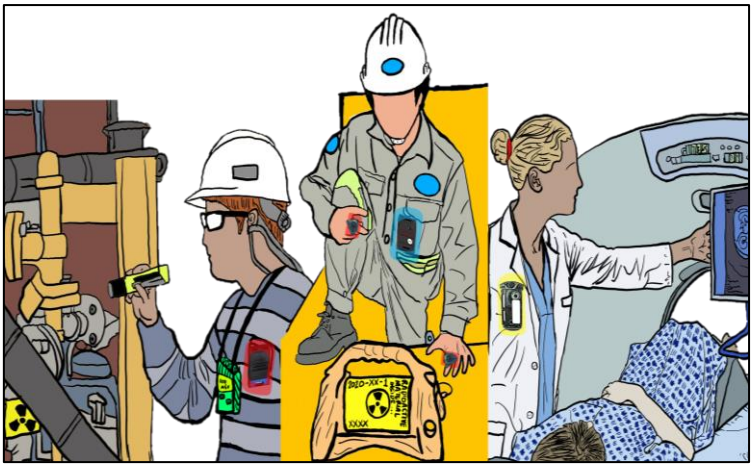
DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE NUCLEAR RESEARCH INSTITUTE

RADIATION PROTECTION SERVICES SECTION

PERSONNEL MONITORING SERVICE
Customer's Service Guide



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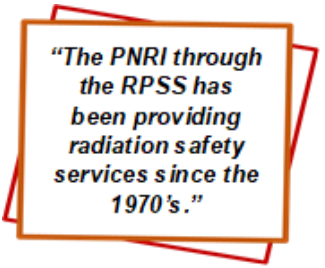
1. The Purpose of the Customer's Service Guide

The purpose of this booklet is to provide guidance to the customers on the Personnel Monitoring Services (PMS) of the Radiation Protection Services Section (RPSS). Discussed in this guide are the following:

a) Steps in availing of the service
b) PMS processes
c) Instructions on the proper usage and maintenance of dosimeters
d) Overview of the PMS dosimeter systems & personnel monitoring programs.

2. The Personnel Monitoring Service (PMS)

Personnel working with radioactive materials and other sources of ionizing radiation such as an X-ray equipment could be potentially exposed to and receive radiation doses due to the nature of their occupation. Considering that exposure to radiation could be a health hazard to humans, it is necessary that radiation levels in these facilities are measured, monitored and controlled to within safe limits.



The Philippine Nuclear Research Institute through the Radiation Proctection Services Section provides services to users of ionizing radiation to monitor, assess and help control radiation levels and personnel exposures. Since the 1970s, the RPSS has been providing the following radiation safety services:

a. calibration of radiation instruments to ensure accuracy of measurements;
b. personnel monitoring to measure the radiation exposures received by the staff from the workplace;
c. radioactivity measurements to determine presence of residual activity and contamination in sealed sources and surfaces;
d. dose audit to measure the output of radiation sources used for patient therapy and diagnosis.

The RPSS has been providing personnel monitoring services to occupationally exposed workers in the Philippines to enable workers to monitor the radiation exposures they received in the workplace. There are several types of PMS provided by the RPSS: a) the OSL Personnel Monitoring Service (OPMS); b) the TLD Personnel Monitoring Service (TPMS); c) the Extremity Monitoring Service; and d) Neutron Dose Monitoring.

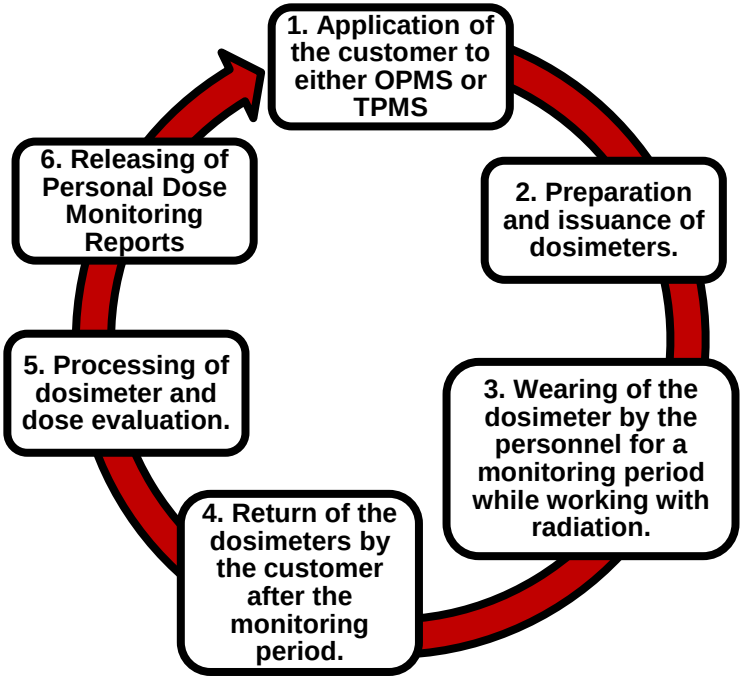


Figure 1. Personnel Monitoring Service Cycle

Figure 1 shows the overview of the PMS cycle. It illustrates the different processes in the service from application, issuance, evaluation and releasing of dose report. A detailed discussion of each process is found on Section 4.

3. The Personnel Dosimetry System

There are different types of dosimetry services being offered by the RPSS. Each one has a different approach in collecting raw data or information about the dose received by the personnel. The materials and equipment used in the analysis of dosimeters differ from one another as well. In this section, these types of dosimetry system are elaborated; the proper usage of dosimeter and record keeping practices are discussed.

3.1 Optically-Stimulated Luminescence Dosimetry (OSLD)

OSL DOSIMETER COMPONENTS:

One of the dosimeter types used by RPSS in measuring radiation doses for their PMS is a Landauer Inlight XA wholebody dosimeter system. This is specific in

determining the whole body effective dose (Hp 10) and the equivalent dose to the skin or extremities (Hp 0.07). The main components are shown in Figure 2.

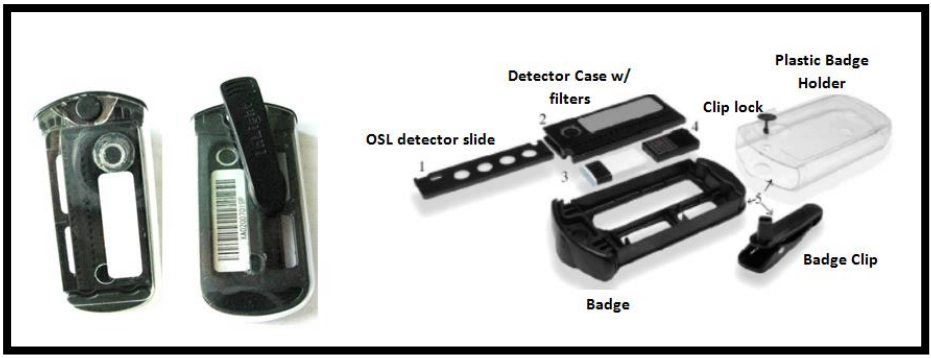


Figure 2. OSL Dosimeter Main Components

The dosimeter is composed of several components namely:

1. ***Detector slide*** – contains the four aluminum oxide (Al_2O_3) crystals which serve as detector elements.
2. ***Detector case with filters*** – case where the detector slide is inserted. It contains the four types of filtration system: a) open window, b) plastic filter, c) aluminum filter and d) copper filter. The case also contains the serial number of the dosimeter.
3. **Clip lock** – locks the badge, badge holder, badge clip, and other dosimeter components together.
4. **Plastic badge holder** – holds the badge.
5. **Badge clip** – used for attaching the badge to the user/personnel.

OSL DOSIMETER READER:

The OPMS utilizes the both the microStar manual OSL reader (Figure 3a) and the InLight Auto 200 Reader by Nagase Landauer Inc. (Figure 3b). The manual reader process dosimeters one at a time while the auto 200 reader is capable of processing 200 InLight wholebody dosimeter per load. Both readers have a readout of 12-13 seconds per dosimeter. When a dosimeter is processed in the readers, a light-emitting diode (LED) array stimulates each Al_2O_3 crystal. Each crystal then produces light of a different wavelength which is detected and measured by a photomultiplier tube (PMT). The produced light from the optical stimulation of the crystals gives information on the dose of the worker. The information is then run through the National Voluntary Laboratory Accreditation Program (NVLAP) algorithm to calculate the Hp(10) and Hp(0.07) doses of the

workers in mSv. The manual reader is used for processing extremity dosimeters and research purposes; while the automatic reader is used for wholebody dosimeter processing. The readers are traceable to the National Institute of Standards and Technology, USA.

Figure 3 (a). OSL Manual Reader

Figure 3 (b). OSL Automatic Reader

3.2 Thermoluminescence Dosimetry (TLD)

TL DOSIMETER COMPONENTS:

Another type of dosimeter used in measuring Hp(10) and Hp(0.07) is the Thermo Scientific Harshaw TLD Materials Multi-Elements Cards TLD-100, LiF:Mg,Ti. The main components are shown in Figure 4.

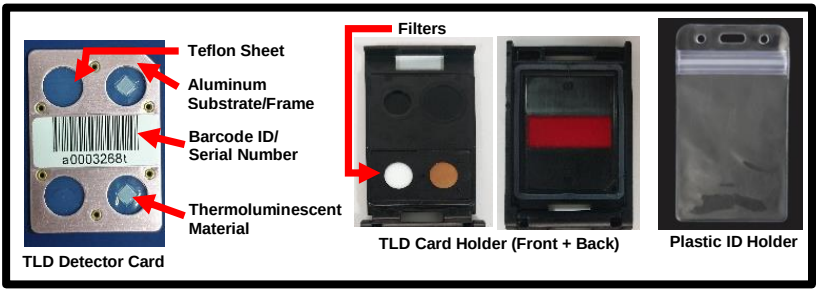


Figure 4. TL Dosimeter Main Components

The dosimeter is composed of two components namely:

1. ***TLD detector card*** – or the TLD card may consist of two or four TL chips mounted between two PTFE sheets or mounted on Kapton® on an aluminum substrate, identified by a barcode identification number appearing in both numeric and barcode formats.
2. ***The TLD card holder*** – a case that protects the card from environmental damage and retains the filtration media that attenuate the various radiation types to provide selective entrapment in the TL material. The front and back halves may be either hinged or hooked together. The card cavity contains an orientation notch so that a card cannot be inserted incorrectly. This is then inserted to a plastic ID holder to provide a means of attachment to the user.
3. ***Plastic ID Holder –*** where the dosimeter is contained.

TL DOSIMETER READER:

The main equipment being used in processing TL dosimeters is the Model 6600 LITE Automatic TLD Card Reader by Thermofisher Scientific (Figure 5). This is a medium capacity TLD card reader capable of producing readouts for 200 whole-body TL dosimeters per loading. The reader utilizes a photomultiplier tube (PMT) in detecting signals produced upon heating the TLD card for up to 300^{o}C. The reading cycles are accompanied by a nitrogen gas in order to accommodate the cooling of PMT after heating the cards. The reading of TLD cards can be performed with minimum operational requirements after setting up the reader.

Figure 5. Automatic TLD Card Reader

3.3 Extremity Dosimetry (EXT)

Extremity dosimeters are another type of radiation detector in which the equivalent dose to the skin or extremities (Hp 0.07) is detected on a more in-depth scale, since the user will be wearing this kind of dosimeter like a ring. There are 2 types of extremity dosimeters being offered by the RPSS PMS, one Aluminum Oxide (Al_2O_3) material and the other is made of Lithium Fluoride (LiF).

OSL EXTREMITY DOSIMETER COMPONENTS:

The OSL extremity dosimeter or OSL-EXT consists of one Al_2O_3 crystal without any filtration material to measure beta, x-ray, and gamma ray Hp(0.07) dose of workers. The dosimeter is shown on Figure 6, and how it is worn on the hand.

Figure 6. OSL Extremity Dosimeter Components

The dosimeter is composed of the following:

1. ***Nanodot with QR code*** – the OSL-EXT consists 1 Al_2O_3 chip mounted on a hard plastic case identified by a QR code identification number appearing in both numeric and barcode formats.
2. ***Ring Mount*** – this is a case that protects the card from environmental damage. This enables the ring-like usage of the OSL-EXT.

OSL EXTREMITY DOSIMETER READER:

The OSL manual reader is used when reading the OSL-EXT. However, a nanodot adapter is needed in order for the OSL manual reader to properly read the OSL-EXT. The adapter is shown in Figure 7.

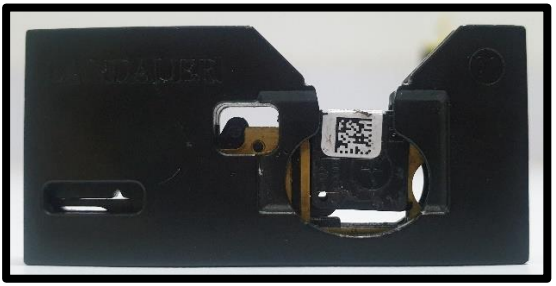


Figure 7. OSL-EXT Nanodot Adapter

TLD EXTREMITY DOSIMETER COMPONENTS:

The TLD extremity dosimeter or TLD-EXT is a TLD-100, the same material in the whole-body TL dosimeter. It consists of different components assembled in a single configuration. The main components of the TLD-EXT are shown in Figure 8.

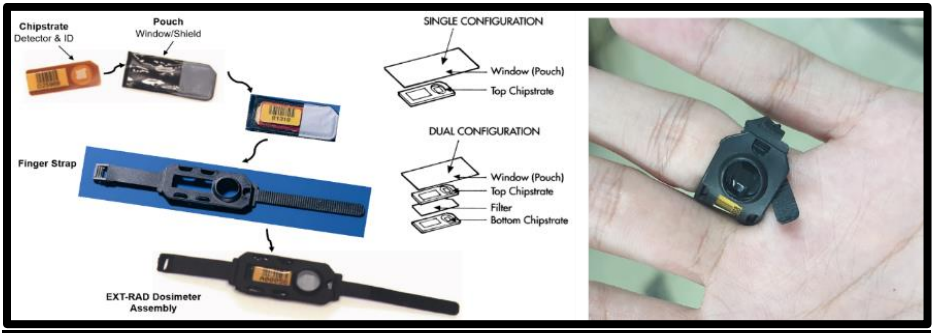


Figure 8. TLD Extremity Dosimeter Components

The dosimeter is composed of the following:

1. ***Chipstrate detector with barcode ID*** – the TLD-EXT consists 1 TL chip mounted on a PTFE sheet identified by a barcode identification number appearing in both numeric and barcode formats.
2. ***Pouch Window/Shield*** – this is a case that protects the card from environmental damage. The far end of the pouch is color coded in order to detemrine the location of the chipstrate detector.
3. ***Finger Strap*** – this is the outer case of the whole assembly which can be form as a ring in order for the user to wear the TLD-EXT.

TLD EXTREMITY DOSIMETER READER:

The same reader as the whole-body TL dosimeter is used when reading the TLD-EXT. However, a chipstrate mount is needed in order for the Automatic TLD Card reader to properly read the TLD-EXT. The mount is shown in Figure 9.

Figure 9. TLD-EXT Chipstrate Mount

3.4 Neutron Dosimetry (NEU)

DOSIMETER COMPONENTS:

This type of dosimeter is dedicated for detecting radiation dose of personnel working with neutron sources. This is based on TLD Materials as well, hence, the components are almost the same compared to the TL dosimeter in section 3.2. Figure 10 shows the Neutron TL dosimeter components.

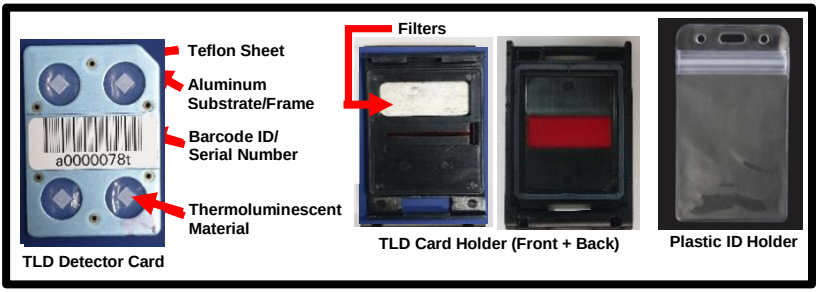


Figure 10. Neutron TL Dosimeter Main Components

DOSIMETER READER:

The same reader as the whole-body TL dosimeter is used when reading the Neutron TL dosimeter.

3.5 Dosimeter Package

3.5.1 The contents of the dosimeter package received by the customer include the following:

3.5.1.1 Dosimeters to be used by the personnel

3.5.1.2 At least one CONTROL BADGE

3.5.1.3 Identification Sheet (description in 3.5.2)

3.5.1.4 Personal Dose Monitoring Report (if available)

***** *Sample dosimeter packages are shown in Figure 11.*

3.5.2 The Identification Sheet is a document that contains the following information:

3.5.2.1 The list of dosimeters inside the package identified in terms of serial number and to whom the dosimeter is assigned to.

3.5.2.2 The Control Badge/Dosimeter and its serial number.

3.5.2.3 Customer information (name, address, customer code)

3.5.2.4 Classification of practice such as industrial radiography, conventional radiology, nuclear medicine, radiotherapy, etc.

3.5.2.5 The duration of dosimeter usage or the monitoring period.

**A sample Identification Sheet and the description of its contents is detailed in Appendix C.*

Figure 11. Dosimeter Packages (a.OSLD, b.TLD, c.Extremity, d. TLD [Neutron])

4. Subscribing to the Service

4.1 Subscription Options

To apply to the PMS, customers must first choose which type of service to avail: OPMS or TPMS. They can then choose between two options for the PMS. In Option 1, the PNRI owns and provides the dosimeters. In Option 2, customers buy their own dosimeters and send it to PNRI for initial processing & evaluation. **However, the Option 2 is only exclusive for the OPMS.**

Option 1: PNRI provides the dosimeters

In this option, the dosimeters issued to the customers are owned by PNRI. The dosimeters issued are to be used for an indicated monitoring period (MP). After each MP, the dosimeters have to be RETURNED to PNRI for processing & evaluation.

Note that before subscription, the customer shall sign a Letter of Agreement (LOA) with PNRI on the terms & conditions of the Service.

Option 2: The customer buys or rents their own dosimeter

In this option, the customer may RENT or PURCHASE their own OSL dosimeters from other authorized suppliers & use it for personnel monitoring. The dosimeters are therefore owned by the customer.

For this option the client has to send the dosimeters to PNRI BEFORE each MP for initial processing and AFTER each MP for dose evaluation of exposures received. The customers may bring the OSLDs to PNRI and have them re-issued for the next MP.

"Option 2 is exclusive for the OSL Dosimeter System only!"

4.2 Application for Subscription

The first step in the PMS, as illustrated in Figure 1, is the application for subscription to the service. The application process depends on the option chosen. Figure 12 describes these steps.

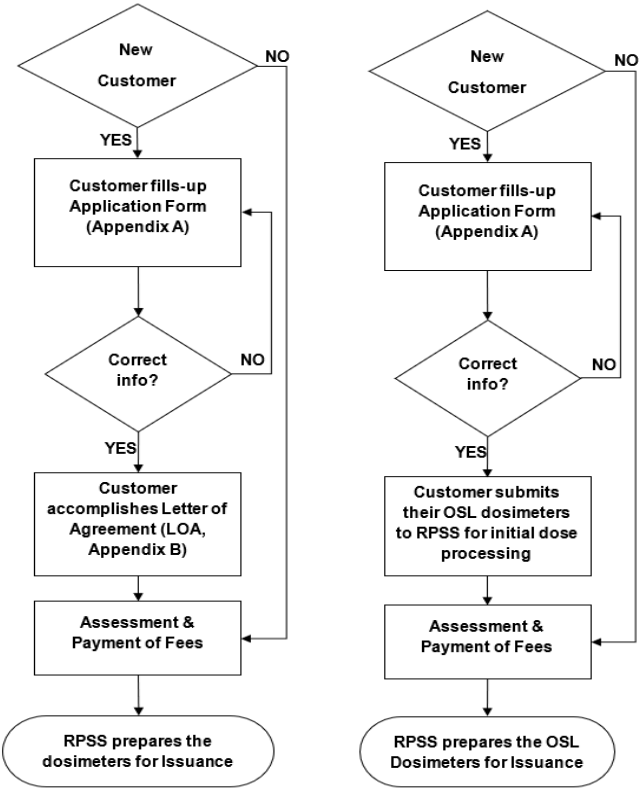


Figure 12. Application process for Option 1 (right) and Option 2 (left) of the PMS

4.3 Selection of Personnel to be Monitored

It is not necessary to measure the exposures received by all the workers in a radiation facility. Only those who are authorized in using and/or handling of radiation sources are to be monitored. In particular, the personnel to be monitored are:

a) Individuals working in Controlled Areas*****
b) Workers who are regularly employed in a Supervised Area or those who enter a Controlled Area occasionally

c) Declared pregnant workers who are likely to receive an equivalent dose from external sources to the embryo/fetus in excess of the public limit of 1 mSv in a year
d) Emergency workers responding to a radiological incident or emergency
e) Apprentices, students & trainees of age 16 years and above who are training for employment involving exposure to radiation and/or requried to use sources of ionizing radiation in the course of their training/activities.

During application for subscription to the PMS, supporting documents demonstrating that the person to be monitored is authorized and/or would be under supervision while using sources of ionizing radiation must be presented to the RPSS.

***For more details on classification of areas, see Reference 6.*

4.4 The Monitoring Period (MP)

Dosimeters used in the PMS are passive devices that measure cumulative radiation doses over a time period called Monitoring Period (MP). The MP is therefore the duration for which the dosimeters will be used. The frequency of this dosimeter exchange depends on the a) magnitude of the potential radiation doses that maybe received and b) possible fluctuations of exposure levels.

Typically, one MP is equivalent to two (2) months or 60 days. However for practices with high exposure risks such as in Industrial Radiography and Radiation Therapy, one MP maybe equivalent to one (1) month.

5. The PMS Processes

5.1 Application for the PMS

The application process to subscribe to the PMS was discussed in Section 4.

5.2 Preparation and Issuance of Dosimeters

After the application process is completed, RPSS starts the preparation of the dosimeters for issuance to the customers. Figure 13 shows the steps.

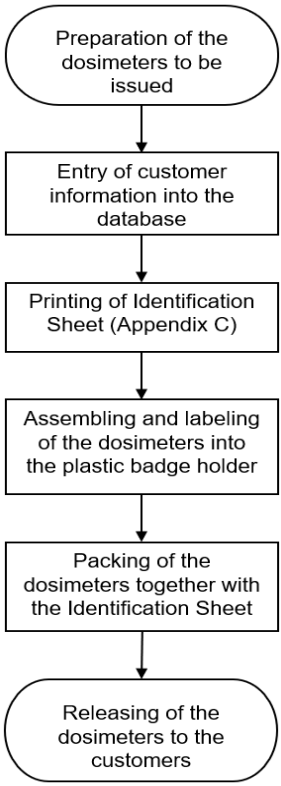


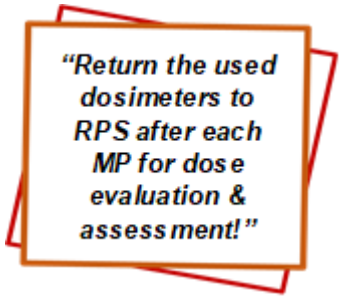
Figure 13. Steps in Preparation to Releasing of Dosimeters

5.3 Usage of Dosimeters

Upon receipt of the issued dosimeters, the customer gives the dosimeters to the assigned individuals for them to wear while working with ionizing radiation. Section 6 describes in detail the proper use of the dosimeters.

5.4 Returning of Dosimeters After the MP

The monitoring period (MP) for which the dosimeters are to be used is indicated in the Identification Sheet provided. The MP is also shown in the dosimeter labels. After each MP, the customers should then RETURN the used dosimeters together with the identification sheet for dose evaluation & assessment to RPSS.



Dosimeters not returned are noted and indicated in the dose evaluation report. Late return of the dosimeters shall have corresponding penalties as stipulated in the LOA.

Dosimeter Exchange or Issuance for the next MP

A new batch of dosimeters that will be used for the next MP is then sent to the customers. Typically, the replacement dosimeters are ready for pickup or mailed at least 1 week before the start of the MP.

5.5 Processing of Dosimeters and Dose Evaluation

Upon receipt, the used dosimeters are opened and removed from the badge holder. The dosimeters are then prepared for processing & evaluation. Figure 14 shows the steps during the processing and evaluation of the dosimeters. After the dosimeters have been processed, the total radiation doses received during the monitoring period are evaluated. The dose results are then reviewed, assessed and compared to the occupational dose limits. After which the Personal Dose Monitoring Report is prepared and printed.

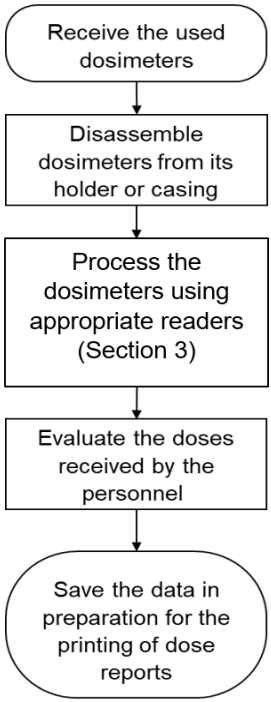
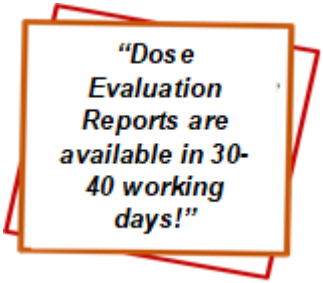


Figure 14. Processing & evaluation of dosimeters

5.6 Reporting of Dose Received by the Personnel

After the evaluation is completed and reviewed, a Personal Dose Monitoring Report is generated. A copy of this Report is given to the customer through their Radiation Safety Officer (RSO) for records keeping and assessment of the safety of the radiation facility.



Dose Reports will be available to the clients in 30-40 working days following receipt of the used dosimeters by the RPSS. High doses are notified to the customers immediately. One report is generated for each monitoring period. Each report includes among others the following information:

a) The custormer information or details

b) The monintoring period

c) The equivalent doses received by personnel for the specific MP

d) The methodology used in retrieving the data

e) The evaluation remarks

After the effective doses have been evaluated, the results are compared to the regulatory safety limits. Each report contains several evaluation remarks as means to guide the RSO on the meaning of the results. It is important that the RSO takes note of these remarks and makes necessary action.

Below are the types of evaluation remarks used and their description:

a) **Below MDL** means that the evaluated radiation dose is below the minimum detection limit (MDL) of the dosimeter. Any evaluated dose below this level is not recordable and not considered as occupational exposure. The MDL depends on the dosimeter used and for the PMS of the RPSS, the MDL = 0.1 mSv.

b) **Below or Above IL** means that the evaluated dose is below or above the Investigation Level (IL). Investigation levels are radiation dose levels that are equivalent to one third (1/3) of the prescribed dose limit. As per regulations, the annual dose limit for workers is 20 mSv. Hence, the monthly dose limit is 1.67 mSv and the equivalent IL is 0.5 mSv.

The evaluated dose levels **Below IL** are still within the prescribed safety limits. No immediate radiation controls & actions from the RSO are necessary.

If the evaluated dose level is **Above IL,** the RSO should initiate the review of the facility's radiation safety program and investigate why the personnel was exposed to such level. Additional radiation controls & safety measures may be introduced as necessary and as reasonably

achievable to minimize the received doses. This is to ensure that the dose received by the personnel will not reach the annual dose limit.

c) **Above AL** means that the evaluated dose has reached the Action Level (AL) and exceeded the dose limit for that monitoring period. Continued exposure to such levels may lead to overexposure of personnel**.** In this situation, the RSO should take necessary actions and radiation controls to avert the dose received by the personnel.

d) **Not Returned** means that a particular dosimeter was not received by the RPSS for evaluation.

e) **Late Return** means that a particular dosimeter was received for evaluation more than one month after the indicated monitoring period.

6. Proper Usage of Dosimeters

After the dosimeters have been received and given to the assigned personnel, the RSO should ensure that the personnel wears them properly while working with ionizing radiation.

Each time a worker enters a radiation (or suspected) area, he/she should wear the Dosimeter to monitor occupational doses he/she may receive. In particular, the personnel should:

6.1 Pin or clip the dosimeter to the body: For the OSL dosimeters, the name tag should face away the body; For the TL dosimeters, the name tag should face the body same.

6.2 Wear the dosimeters around the chest area to best measure the doses received by the upper torso. If however, one part of the body is most likely to be exposed than the other parts, such as the waist, neck, or back, the dosimeters are to be placed on any of those area. Also, the personnel should not allow clothing, buttons, pens or other artifacts to shield the front of the dosimeter.

6.3 Wear the dosimeter using the following guidelines, if protective clothing is used:

6.3.1 When dealing primarily with penetrating radiation such as X-rays or gamma-rays, place the dosimeter under the protective clothing

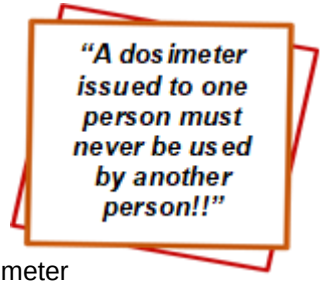
6.3.2 When a non-penetrating radiation type is expected (e.g. beta radiation, or photon radiation < 20 keV average) and the eyes or substantial areas of skin are unprotected (e.g., the face and neck), then the dosimeter should be placed on the outside of the protective

clothing to ensure proper measurement of shallow dose. However for areas with potential contamination, the dosimeter should be placed in a thin plastic bag to avoid cross contamination.

6.3.3 When a lead vest / apron is used, place the dosimeter underneath it in order to measure efficiency of the vest or apron in protecting the personnel.

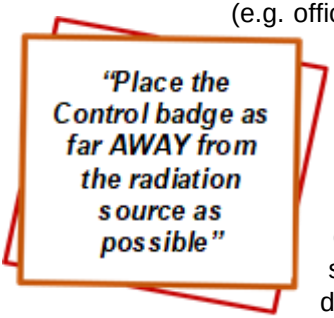
6.4 Remove the dosimeter and store it together with the Control dosimeter at the end of each work in the radiation facility.

**Note that the dosimeters are NOT interchangeable and should be used only by the personnel to which it was assigned to. The RPSS must be notified as soon as possible, should there be any changes in personnel and customer details.*



The Control Badge

A CONTROL BADGE is always sent with each dosimeter package in order to monitor the a) radiation received during transit and b) background radiation in the facility. It must not be used by any personnel or for any other purpose. Control badge/s should be placed in normal background area (e.g. office) and as far away from radiation facility/source as possible. It should never be placed near or on top of any radiation source.



Control badges are typically stored together with the other dosimeters when not used. It must be returned together with the used TLDs after each MP. The dose received by the Control badge will be substracted from doses received by each personnel during the dose evaluation.

7. Proper Storage of Dosimeters

7.1 The dosimeters provided to the customers are each locked inside a plastic badge holder. Each dosimeter must not be opened or removed from the holder in any way as it may damage the dosimeter or affect the accuracy of the dose evaluation.

7.2 When not in use, the dosimeters should be stored together with the Control badge in a radiation-free area, preferably in a designated location such as the office or locker room. This location should be

out of direct sunlight and away from excessive heat or radioactive sources. Also, it should not be taken home or used when undergoing a medical procedure.

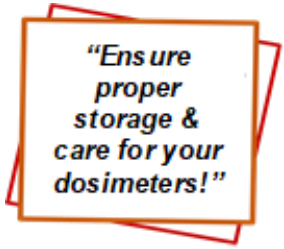
7.3 The dosimeters are not water tight. Extra case should be taken to prevent it from getting wet.

7.4 Necessary precautions must be taken to prevent contamination of the dosimeters as this may significantly affect the dose evaluation.

7.5 The dosimeters should NEVER be deliberately exposed.

8. Record Keeping

A Personal Dose Evaluation Report is provided to each customer for each MP after the used dosimeters are returned. A copy of this Report is given to the customer and should be properly kept and maintained.



Record keeping of the dose reports is very essential in:

a) Providing analysis for dose levels received by personnel
b) Evaluating exposure trends
c) Optimizing the monitoring procedures and programs, and
d) Providing data for epidemiological studies

The management through the RSO shall therefore maintain exposure records for each worker by keeping the dose evaluation reports.

Dose records should be kept up to date and procedures should be established to ensure that assessment of doses from any monitoring period reach the individual's dose record promptly.

The management through the RSO should:

1. Provide workers with access to information on their own exposure records.
2. Provide the regulatory authority, health surveillance agency and the relevant employer access to the exposure records.
3. Facilitate provision of copies of worker exposure records to new employers when workers change employment.

4. Give due care and attention to the maintenance of appropriate confidentiality of records.

Exposure records for each worker shall be preserved during the worker's working life and afterwards at least until the worker attains the age of 75 years and/or for not less than 30 years after the termination of the work involving occupational exposure.

REFERENCES

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[4] Landauer Inc., Inlight Systems Microstar User Manual, Version 4.3, 2012

[5] INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR OFFICE Assessment of Occupational Exposure Due to External Sources of Radiation, Safety Guide No. RS-G-1.3, IAEA, Vienna, 1999

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR OFFICE, Occupational Radiation Protection, Safety Standards Series No. RS-G-1.1,IAEA, Vienna (1999)

[7] Thermo Scientific Harshaw Model 6600 LITE TLD Reader Operator's Manual, Pub. No. 6600LT-W-0-0810-002, September 8, 2010.

CONTACT US

Our office is available from Monday to Friday, from 8:30 to 17:00 by:

Landline No:	(02) 8929-6011 to 6019 local 262 and 246
Phone No:	+639336079294 and +639270660751
Fax:	8920-1646
Email:	rps@pnri.dost.gov.ph
Post:	Radiation Protection Services Section Philippine Nuclear Research Institute Commonwealth Ave., Diliman Quezon City 1101 PHILIPPINES
P.O. Box:	213 at UP Quezon City 932 at Manila 1314 at Central, Quezon City

You may download our forms at https://www.pnri.dost.gov.ph/index.php/downloads/pnri-forms under the **Radiation Protection Services.**

Appendix A:

Sample Personnel Monitoring Service Application Form (Page 1)

Philippine Nuclear Research Institute
RADIATION PROTECTION SERVICES

PERSONNEL MONITORING SERVICE APPLICATION FORM

Please fill-up all necessary details on the following fields. Numbers 1-6 MUST be filled-up. Insert a ☑ on the box that corresponds to your facility. INCOMPLETE FORMS WILL NOT BE PROCESSED. PRINT/WRITE LEGIBLY.

I. CUSTOMER INFORMATION

1. Name of Institution:______________ ☐ Government ☐ Private

2. Complete Address:______________

3. PNRI/FDA License No.:______________ Date Issued: ______________

4. Radiation Safety Officer: ______________ Contact Number:______________ Email:______________

5. Dosimetry system: ☐ OSLD System ☐ TLD System Subscription type: ☐ MAIL ☐ PICK-UP

6. Type of Monitoring ☐ Whole body monitoring (Photon) ☐ Whole body monitoring (Neutron) ☐ Extremity monitoring

7. For Medical X-ray and Industrial X-ray machine: *(use additional sheets as necessary)*

Type/Brand:______________ Date acquired:______________ Maximum mA: ______________ No. of units:______________

8. For Nuclear Medicine/Radiotherapy/Industrial Radiography & Gauges/Research: *(use additional sheets as necessary)*

Number of Radioactive Sources:______________ Isotopes used:______________ Type of Source: ☐ Open ☐ Sealed

II. TYPE OF WORK
(please check as appropriate)

MEDICAL	INDUSTRIAL	NUCLEAR FUEL CYCLE	MISC.	OTHERS
☐ **Nuclear Medicine**	☐ **Industrial Xray** (Electronics, etc.)	☐ **Reactor operations**	☐ **Educational Establishment**	
☐ **Conventional Diagnostic Radiology** (Conventional Radiology, CT Scan, Special Exam Radiology, Urology, Endoscopy, Mammography, etc)	☐ **Radioisotope production/ distribution** (e.g. Production/ distribution of I-131, Tc-99m, etc)	☐ **Safety and safeguards inspections**	☐ **Transport of Radiation Sources**	
☐ **Interventional procedures** (e.g. Cardiovascular)	☐ **Industrial Radiography** (NDT, weld/pipe/concrete testing, etc)	☐ **Decommissioning**	☐ **Waste/Spent Sources**	
☐ **Radiotherapy** (e.g. Brachytherapy, Teletherapy)	☐ **Industrial Gauges** (Density/ thickness/level gauge, etc)	☐ **Research in nuclear fuel cycle**	☐ **Service Provider**	
☐ **Dental Practice**	☐ **Accelerator operation**			
☐ **Veterinary Medicine**				

Page 1 of 2

PNRI LAB PM 006 F3
Rev. 5, 3 February 2020

Sample Personnel Monitoring Service Application Form (Page 2)

Philippine Nuclear Research Institute
RADIATION PROTECTION SERVICES

PERSONNEL MONITORING SERVICE APPLICATION FORM

III. PERSONNEL INFORMATION

Name of Institution: _____ Customer Code *(for existing subscribers)*: _____

Fill out the table **COMPLETELY** and **LEGIBLY**. You may use additional sheets as necessary.

LAST NAME	FIRST NAME	MIDDLE NAME	NAME EXTENSION	DATE OF BIRTH	SEX	OCCUPATION**	PREVIOUS WORK WITH RADIATION***

** Position/Title (Dr., Engr., Nurse, Rad.Tech, etc.)
*** Please indicate by appropriate letter then add when is the last duty and where.
a) Office Work
b) Field Work (e.g. Nuclear Medicine Laboratory, Research Laboratory, RIA Laboratory, etc.)
Facility Radiation Area (e.g. Industrial Gauges, Radiography, Teletherapy, Brachytherapy)

IV. TERMS AND CONDITIONS

1. The Dose Evaluation Results shall be available 40 working days upon receipt of the used dosimeters. The results shall only be released to the person who applied for the service, or to any authorized representative.
2. The Institute is implementing a CASH PAYMENT POLICY. Payments accepted may be in CASH, POSTAL MONEY ORDER, COMPANY CHECK or MANAGER'S CHECK payable to the Philippine Nuclear Research Institute. The services being requested will be provided only upon presentation of the official receipt and completion of requirements.
3. In addition to the terms and conditions stipulated in this application form, the customer has read and agreed to the contents detailed in the Letter of Agreement (LOA) and to duly send 3 copies of notarized LOA; and other supplementary provisions regarding special conditions and/or agreements.

Signature over printed name of authorized representative	Date received	RPSS receiving personnel

PNRI LAB PM 006 F3
Rev. 5, 3 February 2020

Appendix B:

Sample OSLD/TLD Letter of Agreement (Page 1)

LETTER OF AGREEMENT

OSLD/TLD Personnel Monitoring Service

This letter of agreement (LOA) outlines the terms and conditions of the Optically Stimulated Luminescence Dosimeter (OSLD) and Thermoluminescence Dosimeter (TLD) Personnel Monitoring Services provided by the Philippine Nuclear Research Institute (PNRI) – Radiation Protection Services Section (RPSS)

This AGREEMENT, is made and entered between:

the PNRI represented by the Division Chief of the Nuclear Services Division,

– and –

_____, with address at
Name of Company

_____a government/private entity operating and doing business under Philippine law, and hereinafter referred to as the CUSTOMER.

The CUSTOMER recognizes that the PNRI is the owner of OSLD or TLD, each unit consisting of an OSLD/TLD card and card holder, which are available for use to monitor personnel who are occupationally exposed to radiation, the issuance of such units forming part of the personnel monitoring service rendered by PNRI for radiation protection purposes;

The CUSTOMER desires to avail of such personnel monitoring service and, hence, the use of the PNRI OSLD/TLD unit described above in connection with the CUSTOMER's duly licensed use and/or handling of radioactive materials and/or radiation sources;

In connection with the foregoing, the PNRI and the CUSTOMER agree to the following:

The PNRI shall allow the use of the OSLD/TLD by the CUSTOMER, and the CUSTOMER shall accept and take possession of the said Dosimeter subject to the following terms and conditions:

a. The CUSTOMER shall use the OSLD/TLD unit exclusively for the purpose indicated above within the paid for monitoring period.

b. The CUSTOMER shall pay the PNRI for the personnel monitoring service, including the use of the Dosimeter, in the amount of **Php 300.00/unit/monitoring period with an advance payment to be made equivalent to at least three monitoring period**s. The service cost is subject to increase, in accordance with the approved fees & charges of the Institute, without prior notice. The CUSTOMER shall be responsible for the delivery or collection of the Dosimeters; otherwise, a delivery fee shall be charged to them and the transport of the same Dosimeter unit shall be taken care of by the PNRI.

c. The CUSTOMER shall return to PNRI the dosimeters at the end of each stipulated monitoring period for evaluation of the dosimeter reading, without need of prior notice from the PNRI. Failure to return the dosimeter units one month after the monitoring period shall make the CUSTOMER liable to pay PNRI the amount **Php 250.00/unit/monitoring period** until its actual return. Dosimeters not returned after two monitoring periods from the prescribed period of use shall be considered as LOST.

d. The CUSTOMER shall be responsible for preserving intact and in good condition the dosimeters provided to them. In case of loss or damage of the OSLD while it is under the custody of the CUSTOMER, the CUSTOMER shall **REPLACE** the lost or damaged unit with another Dosimeter of the same quality & specifications. In case of loss or damage of the TLD while it is under the custody of the CUSTOMER, the CUSTOMER shall pay PNRI

Sample OSLD/TLD Letter of Agreement (Page 2)

the amount of **Php 6,500.00** per unit of **WHOLE BODY DOSIMETER** and **Php 3,000.00** per unit of **EXTREMITY DOSIMETER**.

e. The CUSTOMER with outstanding penalty charges from late return or LOST dosimeters may not be allowed to renew their subscription to the OSLD/TLD Personnel Monitoring Service until all penalty charges have been settled and all lost dosimeters have been replaced.

f. The CUSTOMER shall allow PNRI to report personnel dose values to the Philippine Dose Registry of Occupationally Exposed Workers (PhilDose) managed by the PNRI-RPSS. Worker personal information shall be kept strictly confidential; and protected under the R.A. 10173 – Data Privacy Act of 2012.

This agreement is effective for TWO YEARS and shall supersede and revoke any prior contract governing the OSLD/TLD Personnel Monitoring Services which PNRI has executed with the CUSTOMER. Further, this agreement may be amended, modified, or earlier terminated at the option of the PNRI.

Signed and sealed this _____ day of _____, 20___.

PHILIPPINE NUCLEAR RESEARCH INSTITUTE
by

Chief, Nuclear Services Division

CUSTOMER
by

Signature over printed name of Head of Office/Department

Designation: _____

WITNESS

_____
PNRI Representative

_____
Signature over printed name

ACKNOWLEDGEMENT

Republic of the Philippines)
Quezon City) ss.

BEFORE ME, a Notary Public of _____ personally appeared **PRECIOSA CORAZON B. PABROA** with Passport No. **S0004626A** issued at **DFA Manila** on **07 August 2017**.

and

_____ with Passport/LTO/PRC/Voter/Postal ID No. _____

issued at _____ on _____, 20__ known to me to be the same persons who have executed the above Memorandum of Agreement and who acknowledge that the same is their voluntary act and deed. I further certify that this document consists of (2) pages, including this page upon which this acknowledgement is written, and that the parties together with their instrumental witnesses have signed their names on the left-hand margin of each page of this document.
WITNESS my hand and seal this _____ day of _____ 201__ at the_____, Philippines.

NOTARY PUBLIC
Until December 31, 20__
PTR No. _____

Doc. No. _____
Page No._____
Book No._____
Series of 200_____

PNRI LAB PM RPSS 001 F1
Rev. 6, 31 July 2020
Page 2 of 2

Appendix C:

C.1 Sample OSL Service Identification Sheet

MAIL
PNRI-RPSS-OSL-C
Rev 0, 23 Sep 2019

Page 1 of 1

Republic of the Philippines
PHILIPPINE NUCLEAR RESEARCH INSTITUTE
Radiation Protection Services Section Laboratory
OSL Personnel Monitoring Services

OSL SERVICE IDENTIFICATION SHEET

Customer Name: [redacted] *Reference Date:* 02/06/2020 10:08:29 AM

Address: [redacted] *Monitoring Period (MP):* 2 FEB-MAR 2020

Phone Number: [redacted] *Class:* DENTAL PRACTICE

Customer Code: [redacted]

	Dosimeter No.	Name of User	REMARK
2	XA02783683Z	CONTROL BADGE 1	
2	XA02624781D	[redacted]	

Total Number of Dosimeters: **2**

IMPORTANT: ***1. Return OSL Badges after the indicated monitoring period together with the corresponding ID sheet.***

2. If there is a change name or additional user/s kindly download and fill-up the SUBSCRIPTION AMENDMENT FORM that can be downloaded from PNRI website and submit it to RPSS. Additional and changed names written in ID sheet will not be accepted

[redacted]

Received By: _____
Date: _____
Signature: _____

OR Date: [redacted]
OR Number: [redacted]
Period Covered FEB-JAN 2020
Pickup/Mail MAIL
Ref. Number: [redacted]

C.2 Sample TLD Service Identification Sheet

MAIL
Customer's Copy
PNRI-RPSS-TLD-C

Page 1 of 1

Republic of the Philippines
PHILIPPINE NUCLEAR RESEARCH INSTITUTE
Radiation Protection Services Section Laboratory
TLD Personnel Monitoring Services

TLD SERVICE IDENTIFICATION SHEET

Customer Name: [redacted] *Reference Date:* 01/21/2020 4:55:12 PM

Address: [redacted] *Monitoring Period (MP):* 2 FEB-MAR 2020

Phone Number: *Class:* DENTAL PRACTICE

Customer Code: [redacted]

	Dosimeter No.	Name of User	REMARK
2	A0003092A	CONTROL BADGE	
2	A0003010A	[redacted]	

Total Number of Dosimeters: **2**

Process Date: 01/21/2020
Released By: _____
Received By: _____
Date: _____
Signature: _____

OR Date: **11/27/2019**
OR Number: [redacted]
Period Covered **FEB-JAN 2020**
Pickup/Mail **MAIL**
Ref. Number: [redacted]

NOTE: RETURN TLD BADGES AFTER THE INDICATED MONITORING PERIOD TOGETHER WITH THE CORRESPONDING ID SHEET.

[redacted]

C.3 Sample Personnel Monitoring Service Identification Sheet – Extremity

PICKUP
Customer's Copy
PNRI-RPSS-EXT-C

Page 1 of 1

Republic of the Philippines
PHILIPPINE NUCLEAR RESEARCH INSTITUTE
Radiation Protection Services Section Laboratory
Personnel Monitoring Services

EXTREMITY SERVICE IDENTIFICATION SHEET

Customer Name [redacted] *Reference Date:* 07/17/2020 9:19:02 AM

Address: [redacted] *Monitoring Period (MP):* 8 AUG-SEP 2020

Phone Number: *Class:* NUCLEAR MEDICINE

Customer Code [redacted]

	Dosimeter No.	Name of User	REMARK
8	A00605	CONTROL BADGE [L]	
8	A00048	[redacted]	
8	A00589		
8	A00042		
8	A00054		
8	A00101		
8	A00174		
8	A00099		
8	A00118		

Total Number of Dosimeters: **9**

Process Date: 07/17/2020
Released By: _____
Received By: _____
Date: _____
Signature: _____

OR Date: 07/15/2020
OR Number: [redacted]
Period Covered AUG-JAN 2020
Pickup/Mail PICKUP
Ref. Number: [redacted]

NOTE: RETURN RING BADGES AFTER THE INDICATED MONITORING PERIOD TOGETHER WITH THE CORRESPONDING ID SHEET.

[redacted]

C.4 Sample Neutron Dose Monitoring Service Identification Sheet

Subscriber's Copy

Republic of the Philippines

PHILIPPINE NUCLEAR RESEARCH INSTITUTE
Commonwealth Avenue Diliman Quezon City
NUCLEAR SERVICES DIVISION
RADIATION PROTECTION SERVICES

NSTD/RP-002-C
Rev-3 (2013)
Page 1 of 1

NEUTRON DOSE MONITORING
SERVICE IDENTIFICATION SHEET

Client Name [redacted]

Reference Date: 21/07/2020 4:18:00 PM

Address: [redacted]

Monitoring Period (MP): 1 JAN-FEB 2020

Classification: SERVICE FACILITIES

Client Code: [redacted]

TLD No.	Name of User	Radiation Type Used X-Ray	Gamma	Neutron	REMARKS
1	A0000034A CONTROL BADGE				
1	A0000120A [redacted]				
1	A0000115A [redacted]				
1	A0000042A [redacted]				
1	A0000041A [redacted]				
1	A0000107A [redacted]				
1	A0000070A [redacted]				
1	A0000097A [redacted]				
1	A0000059A [redacted]				

COMPLETE BEFORE RETURNING TLD BADGES FOR PROCESSING:

1. No. of Unused TLDs received for distribution for the next monitoring period

No. of TLD _____
Date _____
Signature _____

2. No. of TLDs mailed/submitted to PNRI for Processing.

*Signature*_____
*Date:*_____

Processed by: [redacted]

NOTE: PLEASE RETURN USED TLD'S AFTER THE INDICATED MONITORING PERIOD TOGETHER WITH THE CORRESPONDING ID SHEET.

Appendix D:

D.1 Sample OSL Personal Dose Monitoring Report (Page 1)

Republic of the Philippines
Department of Science and Technology
PHILIPPINE NUCLEAR RESEARCH INSTITUTE

Radiation Protection Services Section Laboratory
PERSONAL DOSE MONITORING REPORT

OSL PERSONNEL MONITORING SERVICE

1. Customer Name:	
Customer Code:	
2. Address:	
3. Reference Date:	February 17, 2020
4. Monitoring Period (MP):	MAR-JUN 2020
5. Classification:	CONVENTIONAL RADIOLOGY
6. Date Returned:	June 26, 2020
7. Date Processed:	July 06, 2020
8. Date Evaluated:	July 21, 2020
9. Subscription Type:	PICKUP

METHOD USED:

Purpose:	Assessment of occupational exposure due to external sources of radiation.
Dosimeter System:	InLight XA Whole Body Optically-Stimulated Luminescence Dosimeter (OSLD)
Algorithm:	InLight LDR Model 2-NVLAP* Algorithm
Quantity and Unit:	Doses are reported in terms of: Personal Dose Equivalent Hp(10) and Hp(0.07) in units of milli-Sievert (mSv)
Traceability:	Results are traceable to the National Institute of Standards Technology

REMARKS:

Below MDL - the evaluated radiation dose is below the Minimum Detection Limit of the dosimeter. Any evaluated dose below this level is not recordable and not considered as occupational exposure. The MDL of the OSLD system is 0.10 mSv.

Below or Above IL - the evaluated dose is below or above the Investigation Limit (IL). For Below IL, dose levels are within the prescribed safety limits, and no immediate radiation controls from the RSO are necessary. For Above IL, the RSO should initiate the review of the facility's radiation safety program and investigate why the personnel was exposed to such level. Additional radiation controls and safety measures may be introduced as necessary. The equivalent IL is 0.50 mSv per month.

Above AL - the evaluated dose has reached the Action Level (AL) and exceeded the dose limit for that monitoring period. The monthly AL is 1.67 mSv, and continued exposures to such levels may lead to overexposure. The RSO should therefore take necessary actions to ensure that the doses received by the personnel are as low as reasonably achievable (ALARA).

Ratio Error (RAT Error) - OSLD reading errors occur when they are exposed abnormally, such as being partially shielded by certain artifacts, used without the dosimeter holder, and/or worn without following the proper orientation, among other reasons.

Exposed Control - During evaluation of the OSLD, the control badge was found to exceed the limit for the monitoring period. The RSO should conduct investigation to determine the cause of this occurrence. The control badge should be placed in a normal background area, away from radiation sources.

DR CODE

CERTIFIED CORRECT

KRISTINE MARIE D. ROMALLOSA
Laboratory Manager

**Whole Body Dose Algorithm for the Landauer InLight LDR Model 2 Dosimeter. (2003). Stanford Dosimetry LLC: Anacortes, WA*

PNRI-RPSS-OSL A
Rev 3 - 23 September 2019
CUSTOMER'S COPY
Page 1 of 2

Radiation Protection Services

Sample OSL Personal Dose Monitoring Report (Succeeding Pages)

Radiation Protection Services Section Laboratory

PERSONAL DOSE MONITORING REPORT

OSL PERSONNEL MONITORING SERVICE

Customer Name: [redacted]

Customer Code: [redacted]

Reference Date: 02/17/2020 11:21:50 AM

Monitoring Period (MP): MAR-JUN 2020

Classification: CONVENTIONAL RADIOLOGY

OSL Serial Number	Name of User	Hp(10) in mSv*	Remarks	Hp(0.07) in mSv	Remarks
XA03223666A	CONTROL BADGE	<0.10	Below MDL	<0.10	Below MDL
XA02839958P	[redacted]	<0.10	Below MDL	<0.10	Below MDL
XA02006416O	[redacted]	<0.10	Below MDL	<0.10	Below MDL
XA02624322P	[redacted]	<0.10	Below MDL	<0.10	Below MDL
XA03076697U	[redacted]	<0.10	Below MDL	<0.10	Below MDL

xxxxxxxxxxxxxxxxxxxxxxx NOTHING FOLLOWS xxxxxxxxxxxxxxxxxxxxxxx

DR CODE

**The relative expanded uncertainty in the measurement of Hp(10) is 15% at k=2 and 95% confidence level.*

ANALYZED BY

JHENIZE CARVINA A. FERNANDEZ
Laboratory Analyst

PNRI-RPSS-OSL A
Rev 3 - 23 September 2019
CUSTOMER'S COPY
Page 2 of 2

D.2 Sample TLD Personal Dose Monitoring Report (Page 1)

Republic of the Philippines
Department of Science and Technology
PHILIPPINE NUCLEAR RESEARCH INSTITUTE

Radiation Protection Services Section Laboratory
PERSONAL DOSE MONITORING REPORT

TLD PERSONNEL MONITORING SERVICE
- 12 - 2019

1. *Customer Name:* [redacted]
   Customer Code: [redacted]
2. *Address:* [redacted]
3. *Reference Date:* December 11, 2019
4. *Monitoring Period:* DEC-JAN 2020
5. *Classification:* INDUSTRIAL RADIOGRAPHY
6. *Date Returned:* June 23, 2020
7. *Date Processed:* June 23, 2020
8. *Date Evaluated:* July 17, 2020

METHOD USED:

Purpose:	Assessment of occupational exposure due to external sources of radiation.
Dosimeter Reader:	Thermo Scientific-TLD READER HARSHAW Model 6600 LITE
Software:	Windows® based - Radiation Evaluation and Management System (WinREMS)
Detector:	Thermo Scientific-TLDCARD-21C001 / TLD-100 TLDCARD-001A1A00-00a50600-A
Detector Holder:	Thermo Scientific-Type 8814 TLD CARD Holder
Radiation Quantity and Unit:	Personal doses are reported in terms of Hp 10 and Hp 0.07 in units of milli-Sievert (mSv).

REMARKS:

Below MDL - the evaluated radiation dose is below the Minimum Detection Limit (MDL) of the dosimeter. Any evaluated dose below this level is not recordable and not considered as occupational exposure. The MDL of the TLD system is 0.10 mSv.

Below or Above IL - the evaluated dose is below or above the Investigation Limit (IL). For Below IL, dose levels are within the prescribed safety limits, and no immediate radiation controls from the RSO are necessary. For Above IL, the RSO should initiate the review of the facility's radiation safety program and investigate why the personnel was exposed to such level. Additional radiation controls and safety measures may be introduced as necessary. The equivalent IL is 0.50 mSv per month.

Above AL - the evaluated dose has reached the Action Level (AL) and exceeded the dose limit for that monitoring period. The monthly AL limit is 1.67 mSv, and continued exposures to such levels may lead to overexposure. The RSO should therefore take necessary actions to ensure that the doses received by the personnel are as low as reasonably achievable (ALARA).

Exposed Control - During evaluation of the dosimeters, the control badge was found to exceed the limit for the monitoring period. The RSO should conduct investigation to determine the cause of this occurrence. Pleae be guided that the control badge should be placed in a normal background area, away from radiation sources.

[redacted]

DR CODE

CERTIFIED BY:

KRISTINE MARIE D. ROMALLOSA
Laboratory Manager

PNRI-RPSS-TLD A
REV 0 - Oct 1, 2019
CUSTOMER'S COPY
Page 1 of 2

Radiation Protection Services

Sample TLD Personal Dose Monitoring Report (Succeeding Pages)

Radiation Protection Services Section Laboratory

PERSONAL DOSE MONITORING REPORT

TLD PERSONNEL MONITORING SERVICE

[redacted]

Customer Name: [redacted]

Customer Code: [redacted]

Reference Date: 12/11/2019 04:51:46 PM

Monitoring Period (MP): DEC-JAN 2020

Classification: INDUSTRIAL RADIOGRAPHY

TLD Serial No.	Name of User	Hp(10) in mSv	REMARKS	Hp(0.07) in mSv	REMARKS
A0000385A	[redacted]	0.36	Below IL	<0.10	Below MDL

xxxxxxxxxxxxxxxxxxxxxxx NOTHING FOLLOWS xxxxxxxxxxxxxxxxxxxxxxx

DR CODE [redacted]

ANALYZED BY

ANGELO A. PANLAQUI
Laboratory Analyst

PNRI-RPSS-TLD A
REV 0 - Oct 1, 2019
CUSTOMER'S COPY
Page 2 of 2

D.3 Sample Personal Dose Monitoring Report - Extremity (Page 1)

Republic of the Philippines
Department of Science and Technology
PHILIPPINE NUCLEAR RESEARCH INSTITUTE

Radiation Protection Services Section Laboratory
PERSONAL DOSE MONITORING REPORT
PERSONNEL MONITORING SERVICE - EXTREMITY

1. Customer Name:	
Customer Code:	
2. Address:	
3. Reference Date:	January 28, 2020
4. Monitoring Period:	FEB-MAY 2020 2020
5. Classification:	NUCLEAR MEDICINE
6. Date Returned:	June 19, 2020
7. Date Processed:	June 23, 2020
8. Date Evaluated:	July 20, 2020

METHOD USED:

Purpose:	Assessment of occupational exposure to extremities due to external sources of radiation.
Dosimeter Reader:	Thermo Scientific-TLD READER HARSHAW Model 6600 LITE
Detector:	Thermo Scientific-TLD EXTREMITY XD-100 26974
Detector Holder:	Pouch and finger strap
Radiation Quantity and Unit:	Personal doses are reported in terms of Hp 0.07 in units of milli-Sievert (mSv).

REMARKS:

Below MDL - the evaluated radiation dose is below the Minimum Detection Limit (MDL) of the dosimeter. Any evaluated dose below this level is not recordable and not considered as occupational exposure. The MDL of the TLD system is 0.10 mSv.

Below or Above IL - the evaluated dose is below or above the Investigation Limit (IL). For Below IL, dose levels are within the prescribed safety limits, and no immediate radiation controls from the RSO are necessary. For Above IL, the RSO should initiate the review of the facility's radiation safety program and investigate why the personnel was exposed to such level. Additional radiation controls and safety measures may be introduced as necessary. The equivalent IL is 12.50 mSv per month

Above AL - the evaluated dose has reached the Action Level (AL) and exceeded the dose limit for that monitoring period. The monthly AL limit is 41.67 mSv, and continued exposures to such levels may lead to overexposure. The RSO should therefore take necessary actions to ensure that the doses received by the personnel are as low as reasonably achievable (ALARA).

Exposed Control - During evaluation of the dosimeters, the control badge was found to exceed the limit for the monitoring period. The RSO should conduct investigation to determine the cause of this occurrence. Pleae be guided that the control badge should be placed in a normal background area, away from radiation sources.

DR CODE

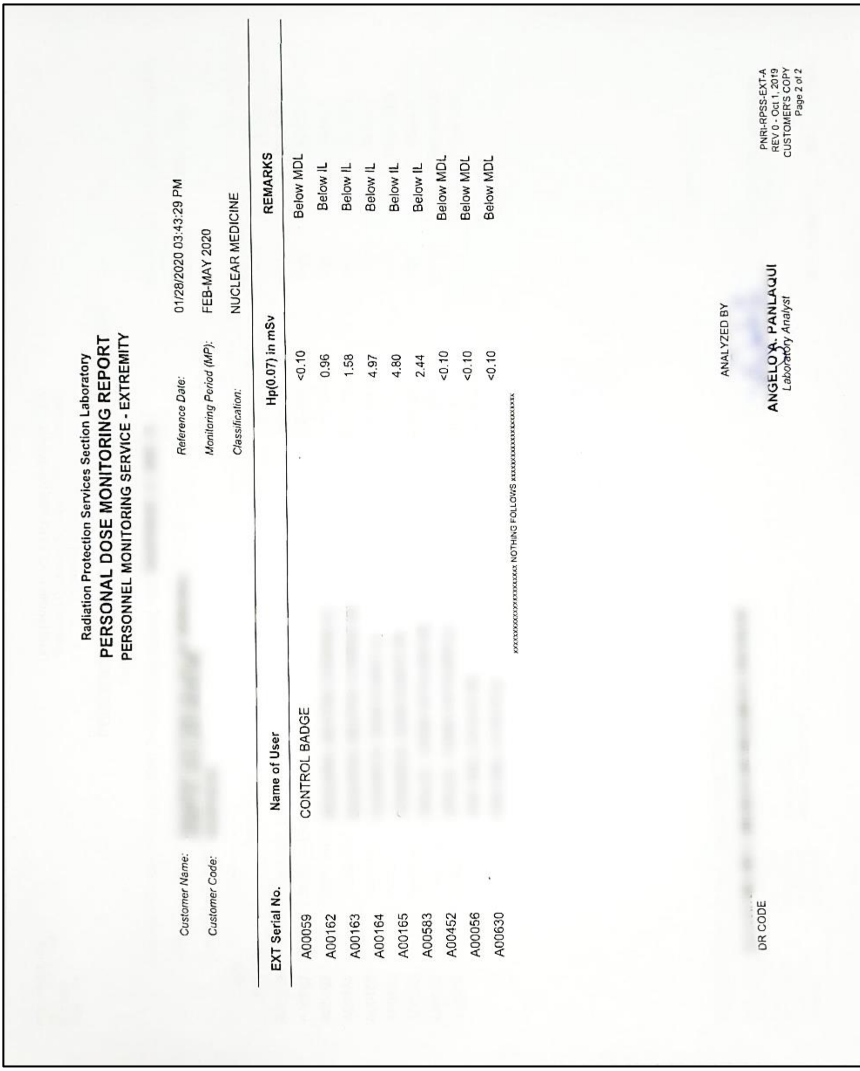
CERTIFIED BY:

KRISTINE MARIE D. ROMALLOSA
Laboratory Manager

PNRI-RPSS-EXT-A
REV 0 - Oct 1, 2019
CUSTOMER'S COPY
Page 1 of 2

Radiation Protection Services

Sample Personal Dose Monitoring Report - Extremity (Succeeding Pages)



Radiation Protection Services Section Laboratory
PERSONAL DOSE MONITORING REPORT
PERSONNEL MONITORING SERVICE - EXTREMITY

[redacted]

Customer Name: [redacted]
Customer Code: [redacted]
Reference Date: 01/28/2020 03:43:29 PM
Monitoring Period (MP): FEB-MAY 2020
Classification: NUCLEAR MEDICINE

EXT Serial No.	Name of User	Hp(0.07) in mSv	REMARKS
A00059	CONTROL BADGE	<0.10	Below MDL
A00162	[redacted]	0.96	Below IL
A00163	[redacted]	1.58	Below IL
A00164	[redacted]	4.97	Below IL
A00165	[redacted]	4.80	Below IL
A00583	[redacted]	2.44	Below IL
A00452	[redacted]	<0.10	Below MDL
A00056	[redacted]	<0.10	Below MDL
A00630	[redacted]	<0.10	Below MDL

xxxxxxxxxxxxxxxxxxxxxxxx NOTHING FOLLOWS xxxxxxxxxxxxxxxxxxxxxxxx

DR CODE [redacted]

ANALYZED BY

ANGELO A. PANLAQUI
Laboratory Analyst

PNRI-RPSS-EXT-A
REV 0 - Oct 1, 2019
CUSTOMER'S COPY
Page 2 of 2

D.4 Sample Personal Dose Monitoring Report – Neutron Dose (Page 1)

Republic of the Philippines
Department of Science and Technology
PHILIPPINE NUCLEAR RESEARCH INSTITUTE

Radiation Protection Services Section Laboratory
PERSONAL DOSE MONITORING REPORT
NEUTRON DOSE MONITORING SERVICE

1. *Client Name:* [redacted]
   Client Code: [redacted]
2. *Address:* [redacted]
3. *Reference Date:* February 18, 2020
4. *Monitoring Period (MP):* FEB-MAR 2020
5. *Classification:* SERVICE FACILITIES
6. *Date Returned:* March 12, 2020
7. *Date Processed:* March 13, 2020
8. *Date Evaluated:* June 25, 2020

METHOD USED:

Purpose: Assessment of occupational exposure due to external sources of radiation.

Dosimeter System: Harshaw TLD Model 6600 Lite with WinREMS ; TLD Card-43C/6776 in Type 8806 Dosimeter Holder

Quantity and Unit: Personal Doses are reported in terms of: Hp(10) in units of milli-Sievert (mSv)

REMARKS:

Below MDL - the evaluated radiation dose is below the Minimum Detection Limit of the dosimeter. Any evaluated dose below this level is not recordable and not considered as occupational exposure. The MDL of the TLD system is 0.05 mSv.

Below or Above IL - the evaluated dose is below or above the Investigation Limit (IL). For Below IL, dose levels are within the prescribed safety limits, and no immediate radiation controls from the RSO are necessary. For Above IL, the RSO should initiate the reveiw of the facility's radiation safety program and investigate why the personnel was exposed to such level. Additional radiation controls and safety measures may be introduced as necessary. The equivalent iL is 0.50 mSv or 27.7 mSv for Ring Badge per month.

Above AL - the evaluated dose has reached the Action Level (AL) and exceeded the dose limit for that monitoring period. The monthly AL is 1.67 mSv or 83.4 mSv for Ring Badge, and continued exposures to such levels may lead to overexposure. The RSO should therefore take necessary actions to ensure that the doses received by the personnel are as low as reasonably achievable (ALARA).

Exposed Control - During evaluation of the TLD, the control badge was found to exceed the limit for the monitoring period. The RSO should conduct investigation to determine the cause of this occurrence. The control badge should be placed in a normal background area, away from radiation sources.

CERTIFIED BY:

[redacted]

KRISTINE MARIE D. ROMALLOSA
Head, Radiation Protection Services Section

NSD-RPSS-NEU 8
REV 0 - June 25, 2020
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Radiation Protection Services

Sample Personal Dose Monitoring Report – Neutron Dose (Succeeding Pages)

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Republic of the Philippines
PHILIPPINE NUCLEAR RESEARCH INSTITUTE
Commonwealth Avenue Diliman Quezon City
NUCLEAR SERVICES DIVISION
RADIATION PROTECTION SERVICES

NEUTRON DOSE MONITORING SERVICE
DOSE EVALUATION SHEET

Client Name: [redacted] *Reference Date:* 18/02/2020 11:38:01 AM

Address: [redacted] *Monitoring Period (MP):* 2 FEB-MAR 2020

Client Code: [redacted] *Classification:* SERVICE FACILITIES

TLD No.		Name of User	Deep Dose Hp(10) in mSv		Remarks	
			Photon Dose	Neutron Dose	Photon	Neutron
2	6	[redacted]	<0.10	1.68	Above IL	Above AL
2	59	[redacted]	<0.10	1.35	Above IL	Above AL
2	97	[redacted]	<0.10	1.30	Below IL	Above AL
2	70	[redacted]	<0.10	0.60	Below IL	Above AL
2	107	[redacted]	<0.10	<0.10	Below MDL	Below IL

Monitoring Badges :	*Date*
Recieved	12/03/2020
Processed	13/3/2020
Doses Evaluated	25/06/2020

ANALYZED BY:

[redacted]

ANGELO A. PANLAQUI
Laboratory Analyst

DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE NUCLEAR RESEARCH INSTITUTE

RADIATION PROTECTION SERVICES SECTION

PERSONNEL MONITORING SERVICE
Customer's Service Guide