Eskom	WORKING PROCEDURE	Allocation Centre 38A	Reference Number KWH-B-017	Rev 3
NNR: NO No.:	TLD PROCESSING AND DOSE RECORD UPDATING			PAGE 1

KORC	ACCESS	IMPORTANCE CATEGORY	NEXT REVIEW DATE	DATE AUTHORISED
NO	Nuclear Restricted	NSA	2025-12-10	2020-12-10

COMPILED / REVISED	REVIEWED	AUTHORISED
(Sgd) D DE VILLIERS	(Sgd) pp P KWINANA	(Sgd) T KARSTEN
D DE VILLIERS	N MASHAO	T KARSTEN
SENIOR RADIATION PROTECTION ASSISTANT	PHYSICIST RADIATION PROTECTION	MANAGER RADIATION PROTECTION
DATE 2020-12-03	**DATE** 2020-12-08	**DATE** 2020-12-10

THIS PROCEDURE HAS BEEN SEEN AND ACCEPTED BY:

D de Villiers	Document Custodian
N Mokoto	Senior Licensing Physicist RP
P Kwinana	Radiation Protection Development Manager

CATEGORY 3 – PROCEDURE FOR REFERENCE

FCA	ALARA REVIEW	SUPERSEDES
PROTECTION	NO	KWH-B-017 Rev 2 dd. 2016-12-13 FULL REVIEW

PAGE STATUS INDEX

	REVISION							
Page	2	3						
1	x	x						
2	x	x						
3	x	x						
4	x	x						
5	x	x						
6	x	x						
7	x	x						
8	x	x						
9	x	x						
10	x	x						
11	x	x						
12	x	x						
13	x	x						
14	x	x						
15	x	x						
16	x	x						
END								

	REVISION							
Page								

CONTENTS **PAGE**

1.0 PURPOSE

1.1 To describe the process for reading TLDs, processing readings on the RADPRO computer system and updating dose records.

2.0 SCOPE

2.1 Applicable to:

- Monthly wearing period TLDs;
- Emergency reading and processing;
- Special Person TLDs;
- Extremity TLDs;
- Neutron TLDs;
- Environmental TLDs;
- Dose received due to contamination;
- Urine analysis dose;
- Whole body count dose;
- Dose from noble gas exposure.

3.0 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions

3.1.1 **Controlled Zone** – A controlled zone in terms of this procedure is an area containing radiological hazards to which access is permitted to qualified persons. Entry, exit and activities performed within such areas are controlled so as to minimise the hazard to persons working in these areas and to prevent the spread of contamination.

3.1.2 **Dosemeter** – An instrument or device designed to measure radiation dose. The dosemeter may either be a direct reading type, e.g. electronic dosemeter or an indirect reading type, e.g. thermoluminescent dosemeter.

3.1.3 **Legal or Principal Dosemeter** – A dosemeter used for assessing a person's legal dose, which will be recorded on the Radiation Workers Dose Register. The legal dosemeter at Koeberg is the thermoluminescent dosemeter (TLD).

3.1.4 **Query** – Software tool on TLD Reader application that can be used to check reader transactions.

3.1.5 **Radiation Worker (Radworker)** – A radiation worker is a person who has responsibilities on site, is required to enter Controlled Zones and meets the criteria specified for a radiation worker.

3.1.6 **Special Person** – A person who, under exceptional circumstances, for reasons approved by the Power Station Manager or his deputy, requires entry to a Controlled Zone, but does not meet all the criteria specified for classification as a radiation worker. A Special Person only receives his dosemeter on the date specified on the Control Zone Pass, after which it must be returned to RPDOS / RPOO.

3.1.7 **Thermoluminescent Dosemeter** – A passive device for measuring ionising radiation, consisting of a sealed holder together with a quantity of special material. This material, when subjected to controlled heating after exposure to radiation, releases measurable quantities of light proportional to the quantity of radiation absorbed.

3.2 Abbreviations

3.2.1 **ADMIN** – Administrative

3.2.2 **DosiGui** – Dosiserv Global User Interface

3.2.3 **ECF** – Element Correction Factor

3.2.4 **EPD** – Electronic Personal Dosemeter

3.2.5 **ESL** – Environmental Surveillance Laboratory

3.2.6 **PC** – Personal Computer

3.2.7 **QC** – Quality Control

3.2.8 **RADPRO** – Radiation Protection Dose Management Computer System

3.2.9 **RADWORKERS** – Radiation Workers

3.2.10 **RPDOS** – Radiation Protection Dosimetry Section

3.2.11 **RPOO** – Radiation Protection Operations Office

3.2.12 **SABS** – South African Bureau of Standards

3.2.13 **TLD** – Thermoluminescent Dosemeter

4.0 REFERENCES

4.1 Referenced Documents

4.1.1 238-48, Rev 0b: Thermoluminescence Dosimetry Requirements

4.1.2 238-54, Rev 0b: Radiological Protection Licensing Requirements for Koeberg Nuclear Power Station

4.1.3 335-2, Rev 5: Koeberg Nuclear Power Station Management Manual

4.1.4 KAA-500, Rev 13: The Process for Controlled Documents

4.1.5 KSA-011, Rev 14: The Requirements for Controlled Documents

4.1.6 KSH-001, Rev 9: The Administration and Quality Control of Radiation Dosimetry

4.1.7 KWC-RC-ESL-1, Rev 5: Environmental Thermoluminescent Dosemeters: Preparation, Placement, Retrieval and Processing

4.2 Applicable Documents

4.2.1 KFC-RC-033: Radiation Protection TLD Requisition Form

4.2.2 KFH-HP-023: Results for Batch Samples Analysed for Tritium in Urine

4.2.3 KFH-HP-041: Personnel Contamination Event Report for Greater than or equal to 100 ccpm

4.2.4 KFH-HP-044: Skin Dose from Noble Gas

4.2.5 KFH-HP-045: Neutron Dosimetry TLD Issue

4.2.6 KFH-HP-046: Extremity TLD Issue

4.2.7 KSH-008: Radiological Radiation Protection Records, Data and Information Management

4.2.8 KWH-B-014: Dosimetry Quality Control Programme

4.2.9 KWH-I-068: Operation, Calibration and use of the Panasonic TLD Readers

4.2.10 KWH-S-015: Airborne Contamination Surveys

4.2.11 KWH-S-021: Access Control

4.2.12 KWH-S-026: Decontamination of Personnel and Skin Dose Assessment due to Personal Contamination

5.0 PREREQUISITES

5.1 Only qualified (on-job trained) RP Dosimetry staff are allowed to read out TLDs, process readings and update dose records.

5.2 The TLD Reader must pass all the QC checks for reading TLDs as specified in KWH-B-014 before reading any TLDs.

5.3 The TLD Reader must be calibrated every six months, after instrument repair or whenever calibration validity is in doubt, i.e. after unsuccessful QC checks.

5.4 Personnel and background dosemeters must be stored in a low background area after the monthly changeover while waiting to be read.

5.5 All exposed QC TLDs shall be stored in the TLD safe.

5.6 Any ESL TLDs that require reading or annealing must be accompanied by a signed request form, KFC-RC-033, from the ESL indicating what type of process is required, before any processing will be performed by RP Dosimetry.

6.0 PRECAUTIONS AND LIMITATIONS

6.1 It is the responsibility of the operator of the TLD readers to check that the reader has a valid calibration and that all the QC checks for reading TLDs specified in KWH-B-014 have passed before reading any TLDs.

7.0 PROCEDURE

7.1 Reading TLDs

7.1.1 Monitoring Period and Special Persons TLDs.

NOTE: *Before reading any of these TLDs, the TLD reader must have passed the QC tests specified in KWH-B-014: 7.1.3.*

7.1.1.1 Set up the TLD Reader and PC in accordance with KWH-I-068 for reading TLDs to the PC.

7.1.1.2 All requirements in accordance with KWH-I-068 must be complied with before reading out TLDs.

7.1.1.3 Remove the Background, Monitoring Period and Special Persons TLDs from the holders and load into the TLD racks.

7.1.1.4 Read the Background, Monitoring Period and Special Persons TLDs to the PC.

NOTE: *QC check is done before processing and repeated, before reading every batch of 500 TLDs and after all badges have been read.*

7.1.1.5 When all badges have been read successfully, the raw readings must be checked for any abnormal responses.

NOTE: *Any abnormal readings must be investigated by the Dosimetry Supervisor. Where necessary, TLD readings may need to be corrected.*

7.1.1.6 Check that the number of data entries on the PC compare with the number of TLDs processed as per KWH-B-014: 7.1.4. If not, then the matter must be investigated.

7.1.2 Emergency TLDs and Monitoring Period TLDs that must be Emergency read due to an anomaly or an overexposure.

NOTE: *Before reading any of these TLDs, the TLD reader must have passed the QC tests specified in KWH-B-014: 7.1.1*

7.1.2.1 Remove the TLDs from the holders and load into the TLD racks.

7.1.2.2 Read the TLDs together with a background TLD to the PC.

7.1.2.3 Check that the number of data entries on the PC compare with the number of TLDs processed as per KWH-B-014: 7.1.4. If not, then the matter must be investigated.

7.1.3 Neutron Dosemeters

7.1.3.1 Remove the TLDs (802 and 809) from the holders and load into the TLD racks.

7.1.3.2 Read the TLDs together with a background TLD to the PC.

7.1.3.3 Check that the number of data entries on the PC compare with the number of TLDs processed as per KWH-B-014: 7.1.4. If not, then the matter must be investigated.

7.1.4 Extremity TLDs

7.1.4.1 Remove the extremity TLDs from the holders and load into a TLD rack.

7.1.4.2 Read the TLDs together with a background TLD to the PC.

7.1.4.3 Check that the number of data entries on the PC compare with the number of TLDs processed as per KWH-B-014: 7.1.4. If not, then the matter must be investigated.

7.1.5 Environmental TLDs

7.1.5.1 Remove the Environmental TLDs from the holders and load into the TLD racks.

7.1.5.2 Read the TLDs together with the background TLDs to the PC.

7.1.5.3 Check that the number of data entries on the PC compare with the number of TLDs processed as per KWH-B-014: 7.1.4. If not, then the matter must be investigated.

7.2 Data Processing

7.2.1 Processing of Monitoring Period, Special Persons and Emergency Read TLD Readings

7.2.1.1 Processing of raw TLD readings (as read out by the TLD Reader) for Monitoring Period, Special Persons and Emergency Read TLDs is done by the System Admin Application; Monitoring Period Processing on the RADPRO system.

7.2.1.2 All files for the monitoring period are linked together. This includes emergency processed files that were read during the monitoring period.

7.2.1.3 Readings are examined for anomalies and data processed through the dose algorithm.

7.2.1.4 EPD and TLD data is compared and anomalies flagged.

7.2.1.5 Month is closed out whereby Radworker dose records are updated.

7.2.2 Processing of Neutron Dosemeter Readings

7.2.2.1 Processing of Neutron Dosemeter readings is done by the System Admin Application on the RADPRO system:

- Log on to System Admin;
- Select File, Open, TLD File Processing;
- Load the applicable file by clicking on the Load button and selecting the required file;
- Select the successfully loaded file in the list view and click on the Neutron Dose button;
- The file will be listed;
- Select the TLD number and click on Edit/Assign SABS;
- Assign SABS numbers as obtained from the Neutron Dosimetry TLD Issue Form (KFH-HP-045; KWH-S-021);
- Process the results;
- Print the results from the Reports menu.

7.2.3 Processing of Extremity TLD Readings

7.2.3.1 Processing of Extremity TLD readings is done by the System Admin Application on the RADPRO system:

- Log on to System Admin;
- Select File, Open, TLD File Processing;
- Load the applicable file by clicking on the Load button and selecting the required file;
- Select the successfully loaded file in the list view and click on the Extremities button;
- The file will be listed;

  NOTE: *Raw readings and processed readings are listed on the same screen.*

- Select the TLD number and enter the corresponding SABS number as obtained from the Extremity TLD Issue Form (KFH-HP-046: KWH-S-021);

  NOTE: *The TLDs are in the same order as in the rack when read in the reader.*

- Enter the background value as 0 by clicking on Edit (This value is only used for processing single element Finger TLDs. We no longer use single element Finger TLDs therefor the value will always be 0);
- When all the SABS numbers have been entered select Preview and print the results.

7.3 Updating Dose Records

7.3.1 Dose from Monitoring Period and Special Person TLDs

7.3.1.1 Monitoring Period and Special Persons dose readings, are updated from Monitoring Period TLD processing in System Admin.

7.3.1.2 When a close out is performed for a monitoring period the Radworker dose records are updated.

7.3.2 Dose from Emergency Processed TLDs

7.3.2.1 All emergency processed files that were read during the monitoring period are linked to processing of monitoring period TLD Readings and the monthly close out.

7.3.2.2 When a close out is performed for a monitoring period the Radworker dose records are updated.

7.3.3 Dose from Neutron Dosemeters

7.3.3.1 When performing processing of monthly TLD Readings, neutron files that were read during the monitoring period are linked to the close out.

7.3.3.2 When a close out is performed for a monitoring period the Radworker dose records are updated.

7.3.4 Dose from Extremity TLDs

7.3.4.1 Extremity dose is updated in the DosiGui application on Radpro as external measurement.

7.3.4.2 Log onto the DosiGui application.

7.3.4.3 Enter your User Name and Password.

7.3.4.4 Select Search for a worker from the worker category submenu in the worker menu in the navigation panel.

7.3.4.5 Locate the relevant Radworker and double click on the line to open worker information screen.

7.3.4.6 Select the Non-electronic dose tab in the dosimetry tab.

7.3.4.7 Enter the doses for specific locations as follows:

- Select start and end date of extremity wearing period;
- Select the extremity location from the measurement type list e.g. right hand / forearm;
- Enter dose value;
- Enter RPC number in the comments field;
- The dose that was received by the badged hand/foot must also be assigned to the unbadged hand/foot.

7.3.5 Contamination Dose

7.3.5.1 Contamination dose is obtained from the Personnel Contamination Report (KFH-HP-041, KWH-S-026) and updated in the DosiGui application on RADPRO.

7.3.5.2 Log onto the DosiGui application.

7.3.5.3 Enter your User Name and Password.

7.3.5.4 Select search for a worker from the worker category Submenu in the worker menu in the navigation panel.

7.3.5.5 Locate the relevant Radworker and double click on the line to open the worker information screen.

7.3.5.6 Select the manual tab in the contamination tab.

7.3.5.7 Enter the applicable description, date of the contamination incident and specific doses for specific locations.

7.3.6 Incident Dose

7.3.6.1 Incident dose is updated in the DosiGui application on RADPRO as an external measurement.

7.3.6.2 Log onto the DosiGui application.

7.3.6.3 Enter your User Name and Password.

7.3.6.4 Select search for a worker from the Worker Category submenu in the Worker Menu in the Navigation Panel.

7.3.6.5 Locate the relevant Radworker and double click on the line to open the worker information screen.

7.3.6.6 Select the Non-electronic dose tab in the dosimetry tab.

7.3.6.7 Enter the specific doses for specific locations as follows:

- Select start and end date of incident;
- Select incident to add or incident not to add from the measurement type list as applicable;
- Enter dose;
- Enter the description of the event in the Reason Field;
- Enter other applicable information i.e. occurrence report and RPC number in the Comments Field.

7.3.7 Urine Analysis Dose

7.3.7.1 Urine analysis dose is obtained from the Urine Analysis results form KFH-HP-023 and updated in the DosiGui application on RADPRO as an external measurement.

7.3.7.2 Log onto the DosiGui application.

7.3.7.3 Enter your user name and password.

7.3.7.4 Select search for a worker from the Worker Category submenu in the Worker menu in the Navigation Panel.

7.3.7.5 Locate in the relevant worker and double click on the line to open the Worker Information Screen.

7.3.7.6 Select the Non-electronic dose tab in the dosimetry tab.

7.3.7.7 Enter the dose as follows:

- Select start and end date of analysis performed;
- Select urine analysis from the measurement type list;
- Enter Routine or Special as applicable in the Reason field;
- Enter dose;
- Enter other applicable information i.e. concentration (Bq / cm^3) in the comments field.

7.3.8 Whole Body Count Dose

7.3.8.1 Whole Body Count Dose is updated in the DosiGui application on RADPRO as an external measurement.

7.3.8.2 Log onto the DosiGui application.

7.3.8.3 Enter your user name and password.

7.3.8.4 Select search for a worker from the Worker Category submenu in the Worker menu in the Navigation Panel.

7.3.8.5 Locate in the relevant worker and double click on the line to open the Worker Information Screen.

7.3.8.6 Select the Non-electronic dose tab in the dosimetry tab.

7.3.8.7 Enter the Whole Body Count as follows:

- Select start and end date of count;
- Select the Whole Body Count type from the measurement type list as applicable i.e. investigating, routine, baseline, termination;
- Enter effective count as dose;

- Enter other applicable information i.e. contamination number, occurrence report number, showered or not, nuclide activity, etc. as applicable in the comments field;

- Enter when whole body count is due to a contamination event in the Reason field.

7.3.9 Dose from Noble Gas Exposure

7.3.9.1 Dose from noble gas exposure is obtained from the Skin Dose from Noble Gas form KFH-HP-044; KWH-S-015, and updated in DosiGui application on RADPRO as an external measurement.

7.3.9.2 Log onto the DosiGui application.

7.3.9.3 Enter your user name and password.

7.3.9.4 Select search for a worker from the Worker Category submenu in the Worker menu in the Navigation Panel.

7.3.9.5 Locate in the relevant worker and double click on the line to open the Worker Information Screen.

7.3.9.6 Select the Non-electronic dose tab in the Dosimetry tab.

7.3.9.7 Enter the dose as follows:

- Select start and end date to noble gas exposure;

- Select noble gas from the measurement type list;

- Enter dose;

- Enter other applicable information in the comments field.

8.0 ACCEPTANCE CRITERIA

N/A

9.0 RECORDS

9.1 Records generated by this procedure:

The Dose records generated by this procedure form part of the RADPRO electronic Dose register.

9.2 These records must be handled in accordance with KSH-008 requirements.

10.0 ATTACHMENTS

Appendix 1 – Justification

APPENDIX 1

JUSTIFICATION

Revision 2

1. Full review.
2. References updated.
3. Changed Monthly TLDs to Monitoring Period TLDs.
4. Added Precautions and Limitations.
5. Removed steps to do QC before reading TLDs. Referenced procedure KWH-B-014 to do the QC.
6. Removed steps for processing single element TLDs.
7. Added forms KFH-HP-044, KFH-HP-045 and KFH-HP-046 to applicable documents.

Revision 3

1. Scheduled review.