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<b>Title: User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management</b>	

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Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	2 of 25

User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

## Revisions

This document has been revised according to the following schedule:

Revision	Date Approved	Nature of Revision	Prepared by
00	2020/01/16	First Issue	R Swart
01	2020/08/11	Air sampling equipment removed from specification	R Swart
02	See title page	Updated list of RIMTE required as per NLM Sectional requirements	R Swart

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	3 of 25

User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

## Contents:

No.	Description	Page
<b>1.0</b>	<b>BACKGROUND</b>	<b>4</b>
<b>2.0</b>	<b>PURPOSE</b>	<b>4</b>
<b>3.0</b>	<b>SCOPE</b>	<b>4</b>
<b>4.0</b>	<b>REFERENCES</b>	<b>4</b>
<b>5.0</b>	<b>DEFINITIONS AND ABBREVIATIONS</b>	<b>5</b>
5.1	DEFINITIONS:	5
5.2	ABBREVIATIONS:	5
<b>6.0</b>	<b>USER REQUIREMENT SPECIFICATIONS</b>	<b>5</b>
6.1	LIST OF RIMTE REQUIRED	5
6.2	SUPPLIER REQUIREMENTS / FUNCTIONALITY EVALUATION	5
<b>TABLE 1: NLM LIST OF RIMTE</b>		<b>7</b>
6.3	RIMT SPECIFICATION PER IDENTIFIED INSTRUMENT	10

## List of Tables

Table 1: NLM List of RIMTE.....	7
---------------------------------	---

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	4 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 1.0 BACKGROUND

The current Radiological Inspection, Measuring and Testing Equipment (RIMTE) in use by the Radiation Protection Function at the various facilities of Nuclear Liabilities Management (NLM) has for a number of reasons not been repaired; replaced or upgraded to conform to the latest technological advances in this field.

To support the strategic objectives of NLM as presented in the NLM Annual Plan of Action for 2022/2023 [1] the replacement of dysfunctional Radiation Protection equipment has been identified as one of the risk factors likely to affect the execution of aforementioned plan. To mitigate this Risk Factor a project has been initialised to address the replacement of RIMTE in NLM.

The consequences of the unavailability of an adequate RIMTE can result in the termination of key critical projects in NLM and also the compromising of SHEQ and regulatory license conditions. It is therefore of critical importance to rectify the current unsustainable situation pertaining to the lack of RIMTE resources.

### 2.0 PURPOSE

The purpose of this User Requirement Specifications (URS) is to specify the requirements for the RIMTE needed to replace the current dysfunctional equipment at the various facilities of Nuclear Liabilities Management (NLM).

### 3.0 SCOPE

This document specifies the user requirements for the repair, replacement and upgrade of RIMTE required for the various sections within NLM.

### 4.0 REFERENCES

The following documents are referenced in this document:

- |                    |   |
|--------------------|---|
| [1] NLM-PLN-21/006 | NLM ANNUAL PLAN OF ACTION FOR 2022/2023             |
| [2] SHEQ-FRM-8060  | RIMT EQUIPMENT SPECIFICATION                        |
| [3] SHEQ-INS-0246  | CONTROL OF INSPECTION, MEASURING AND TEST EQUIPMENT |

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	5 of 25

User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

## 5.0 DEFINITIONS AND ABBREVIATIONS

### 5.1 DEFINITIONS:

None

### 5.2 ABBREVIATIONS:

NLM:	Nuclear Liabilities Management
RIMTE	Radiological Inspection, Measuring and Testing Equipment
RP	Radiation Protection
RPS	Radiation Protection Specialist
SANAS	South African National Accreditation Scheme
SHEQ	Safety; Health; Environment and Quality
SQEP	Suitably Qualified and Experienced Person
URS	User Requirements Specifications

## 6.0 USER REQUIREMENT SPECIFICATIONS

### 6.1 LIST OF RIMTE REQUIRED

- The following list of RIMTE has been identified by the various sections in NLM and is specified in Table 1 below.
- The list of RIMTE has been drawn up in consultation with a SQEP'ed RPS in accordance with [3]
- RIMTE identified on the list has gone through the RIMT Equipment Specification process utilising SHEQ-FRM-8060 [2]
- RIMT Equipment Specifications are presented in Section 6.3
- Please note:** Due to the required specifications and taking into consideration that in certain instances the RIMTE required can only be provided by a Sole supplier; placement of Purchase Orders for bids that qualified; will either be allocated as a whole to a single supplier or allocated to various suppliers.

### 6.2 SUPPLIER REQUIREMENTS / FUNCTIONALITY EVALUATION

The supplier shall strictly comply with all technical and commercial requirements of the Necsa tender / bid process. In addition the following criteria are **important** to note as part of the Functionality Evaluation of bids submitted.

- Bidder company information
- Original good standing letter from SARS (Tax clearance) OR a letter from SARS with PIN number issued for TAX compliance status.
- Proof of National Treasury Central Supplier Database registration/summary report

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	6 of 25

User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

- d) The Supplier shall be able to demonstrate that the RIMTE complies with the requirements as stipulated in the specifications as presented in Section 6.3. This applies to any alternative instrument presented by the Supplier as identified in Section 6.3.
- e) Suppliers which have similar alternative RIMTE as presented in Section 6.3 can quote accordingly and should provide comparative specifications for alternative RIMTE presented
- f) The Supplier shall be able to demonstrate that “after sales service” for the RIMTE tendered will be readily available; i.e. local workshop / onsite repair or alternatively outline the process if RIMTE needs to be returned to an overseas manufacturer. **A letter stating the provision needs to be included in the bid.**
- g) The Supplier shall indicate on all quotations the currency and exchange rate should the equipment be sourced from an overseas supplier.
- h) The Supplier shall indicate the period of delivery on their quote if an order is placed with them.
- i) The Supplier shall commit to presenting a RIMTE training course (including practical demonstration) on the use of the RIMTE procured. RIMTE user manuals must be provided for each instrument by the supplier to facilitate in-house training.
- j) RIMTE software supplied shall be compatible with Windows 10 Operating System
- k) Calibration of RIMTE (SANAS accredited): The supplier shall indicate if RIMTE will have been calibrated prior to delivery and that the RIMTE can thereafter routinely be calibrated at a local / national calibration laboratory.
- l) Track record: Attach 2 letters from clients within the last five years. References should be presented in a form of a written letter on an official letterhead from clients where similar services have been provided
- m) **Sole supplier status:** The supplier must include a letter stating that they are the Sole Suppliers of specific RIMTE in South Africa if that is the case.

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	7 of 25

User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

**Table 1: NLM List of RIMTE**

Instrument	PDO	DS	LEMS	CAM	D&D	VLP	Charac / External RP	A14/27	Total	SHEQ-FRM-8060
Rad eye B20-ER	2	-	-	-	-	-	-	-	2	Yes
TruDose EPD and software	10	3	8	2	3	10	2	4	42	Yes
EPD: Neutron	6	-	-	-	-	-	-	-	6	No
Teletector 6150AD-t including case	3	-	-	-	-	-	-	-	3	Yes
Rad-Eye SX / G10	2	2	3	2	3	1	8	6	27	Yes
High dose probe and 20m cable to connect to Radiagem (STTC wide gamma range probe)	1	-	-	-	-	-	-	-	1	Yes
CFM11 with SFP-100C smart probe	4	-	4	1	-	2	-	2	13	Yes
Berthold Hand & Foot monitor (LB147/148)	-	-	2	-	2	-	-	3	7	Yes
Neutron Monitor Ludlum (2241-4)	1	-	-	-	-	-	-	-	1	Yes
External probe (BDS-06-01) for Aspect MKC-A03-1	2	-	-	-	-	-	-	-	2	N/A-
External probe	2	-	-	-	-	-	-	-	2	N/A-

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	8 of 25

User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

Instrument	PDO	DS	LEMS	CAM	D&D	VLP	Charac / External RP	A14/27	Total	SHEQ-FRM-8060
(BDS-AB2) for Aspect MKC-A03-1										
Installed radiation monitors (Model 375-Dual)	1	-	3	-	-	-	-	-	4	Yes
Identifier (RIIDEYE XM)	1	-	-	-	1	-	-	-	2	Yes
Spectrometer RS-230BGO Gamma Ray Spectrometer with BGO crystal calibrated For KUT and Dose Rate plus Bluetooth GPS	-	-	-	-	-	-	2	-	2	No

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	9 of 25

User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### RIMTE FOR REPAIR

Instrument	<u>PDO</u>	DS	LEMS	CAM	D&D	VLP	Charac	A14/27	SHEQ-FRM-8060
EPD	10	-	-	-	-	-	-	-	n/a
Electra	2	-	-	-	-	-	-	9	n/a
Teletector	2	-	-	-	-	-	-	-	n/a
Teleprobe	4	-	-	-	-	-	-	1	n/a
Radiagem 2000	2	-	-	-	-	-	-	-	n/a
Rad-Eye B20	1	-	-	-	-	-	-	-	n/a
ThermoFischer Scientific EPD MK1 and 2	-	-	9	-	-	-	-	-	n/a
Interceptor	-	-	1	-	-	-	-	-	n/a

### SPARES FOR RIMTE

Instrument	<u>PDO</u>	DS	LEMS	CAM	D&D	VLP	Charac	A14/27	SHEQ-FRM-8060
Electra PET cables (90 degree)	10	9	10	-	14	-	8	10	n/a
Battery caps for EPD's	5	-	6	-	-	-	-	-	n/a
EPD belt clips	-	-	6	-	-	-	-	-	n/a
Mylar for Electra's and SX	5	-	6	-	-	-	-	-	n/a
Electra grid	-	-	6	-	-	-	-	-	n/a

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	10 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3 RIMT SPECIFICATION PER IDENTIFIED INSTRUMENT

#### 6.3.1 RadEye B20 ER

Identify the equipment: • What equipment is recommended? • What alternatives are available?	Rad eye B20-ER (425068510)
Purpose of the equipment • Where will it be used? • To measure what? • Why has the need arisen? • How will be the new instrument integrated into the RP-Programme?	Used in highly hazardous radiological areas in different weather conditions (e.g. Source Store and SHARS) Counting smears, radiation levels, easy read-out in different units (Bq, Bq/cm <sup>2</sup> , cps, Sv/h, rem/h). Is used as a back-up during SHARS projects, field surveys, source conditioning Our instrument broke and two is needed for different operations – source collections, SHARS projects, decommissioning of sources, field surveys
Define measurement criteria • Define relevant radionuclides • Define levels to be measured (sensitivity) • Define accuracy required (precision)	Alpha, beta, gamma particles. Can also measure X-ray radiation. 0 – 100 mSv/h, 0 – 500 kcps
Evaluation of the equipment • Aspects to be included: o Benefits / Limitations o Operation Cost? o Maintenance cost? o Hidden cost (gas, sources, cables, installation)	Lightweight and compact making it easy to travel with, robust, is already in use, user friendly, easy handling, high precision Versatile operation modes: - Scaler / Timer with preset count and preset time for sample measurements - Continuous ratemeter mode for frisker operation - Dose rate mode
Operation of equipment • Operational procedure which include o Regular checks requirements o Operation requirements o Calibration requirements o Training requirements (RPO to compile procedure and RPS to accept)	PDO will develop a manual/ work instruction derived from the manufacturer's manual and based on the experience with the instrument.
Commissioning of equipment Who will be responsible for: o The initial installation, o Initial set-up, o and operation training	From manufacturer the instrument will be send to the Necsa calibration facility where after the instrument will be ready to use.
Maintenance of equipment • Who will be responsible for: o Maintenance o Keeping core components o Turn-around time for maintenance o Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance) • If Necsa-Instrumentation will be responsible, the following: o Capabilities within Necsa to maintain the instrument must be evaluated and o Necessary training requirements have to be specified and o Core components for maintenance have to be specified.	RPO's will be responsible for the maintenance of the equipment and perform regular checks. Necsa is able to calibrate the instrument (SANAS accredited)
Calibration of equipment • Calibration method & Traceability (sources) • Accreditation • Initial calibration • Training	Instrument is initially calibrated by the manufacturer, however the instrument will be re-calibrated by the Necsa calibration facility before use

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	11 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.2 Berthold LB147 / LB148

Identify the equipment: • What equipment is recommended? • What alternatives are available?	Berthold LB147/LB148 -
Purpose of the equipment • Where will it be used? • To measure what?  • Why has the need arisen? • How will be the new instrument integrated into the RP-Programme?	Decommissioning Personal contamination monitor during decommissioning activities, measure alpha and beta/gamma contamination Replacement of old/broken equipment Already incorporated into RPP
Define measurement criteria • Define relevant radionuclides • Define levels to be measured (sensitivity) • Define accuracy required (precision)	Uranium and daughters expected, unknown since decommissioning work is project related Lower alpha detection -
Evaluation of the equipment • Aspects to be included: o Benefits / Limitations o Operation Cost? o Maintenance cost? o Hidden cost (gas, sources, cables, installation)	Hand and foot detectors Available in Alpha Sense version with special grid modifications Removable hand probe for frisker measurements Alpha, beta/gamma contaminations can be measured simultaneously or as pure alpha or pure beta/gamma. Units – Bq/cm <sup>2</sup> or cps 35-45kg Repairs possibly to be done by supplier/ manufacturer. Calibration cost – Calibrations to be done by CAL. No hidden operational cost.
Operation of equipment • Operational procedure which include o Regular checks requirements o Operation requirements o Calibration requirements o Training requirements (RPO to compile procedure and RPS to accept)	Document to be developed and approved by RPS.
Commissioning of equipment Who will be responsible for: o The initial installation, o Initial set-up, o and operation training	Installation required Set-up required (software) Supplier - Berthold/ OEN
Maintenance of equipment • Who will be responsible for: o Maintenance o Keeping core components o Turn-around time for maintenance o Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance) • If Necsa-Instrumentation will be responsible, the following: o Capabilities within Necsa to maintain the instrument must be evaluated and o Necessary training requirements have to be specified and o Core components for maintenance have to be specified.	General maintenance done by user and repairs done by CAL. Specific repairs done by supplier/manufacturer. Personnel monitoring incorporated into RPP.  Enquire if CAL has the capability to calibrate and repair equipment.
Calibration of equipment • Calibration method & Traceability (sources) • Accreditation • Initial calibration • Training	SANAS accredited facility

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	12 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.3 CM11 A

Identify the equipment: • What equipment is recommended? • What alternatives are available?	CM11 A (Thermo)
Purpose of the equipment • Where will it be used? • To measure what? • Why has the need arisen? • How will be the new instrument integrated into the RP-Programme?	The CM11 is effective as an add-on device to personnel monitors to increase monitoring throughput rates. This contamination monitor also works well as a monitoring station during temporary work such as plant maintenance. The CM11 is ideal where space is restricted. It is easy to install and to set up, and equally easy to assign to the next application. The CM11 is ideal as a backup boundary monitor; to confirm Personnel Monitor alarms, to pin-point the position of contamination and amount per 100 cm <sup>2</sup> , to differentiate radon nuisance alarms from others and for use in an emergency or when AC supplies are down. Monitoring applications arise within power and fuel handling sites, also defence establishments, government laboratories and hot labs in hospitals and industry. The following types of radiation may be monitored: - $\alpha$ , $\beta$ , simultaneous - $\alpha$ plus $\beta$ , - low energy gamma - simultaneous 125I and $\beta$ .
Define measurement criteria • Define relevant radionuclides • Define levels to be measured (sensitivity) • Define accuracy required (precision)	Display Units: cps, cpm, Bq*, dpm*, Bq.cm <sup>-2</sup> *, nCi* (*Probe efficiency and area are entered during setup). Alarm Levels: 0.1 to 100,000 display units. Display Channels: $\alpha$ , $\beta/\gamma$ , $\alpha$ plus $\beta/\gamma$ , 125I plus $\beta/\gamma$ .
Evaluation of the equipment • Aspects to be included: o Benefits / Limitations o Operation Cost? o Maintenance cost? o Hidden cost (gas, sources, cables, installation)	Monitoring clothing in parallel with hand/foot monitors to speed up throughput. - Monitoring items next to an IPM or PCM. - Detection of radon nuisance alarms. - With a DP6 or DP11 probe, to quantify and pinpoint IPM/PCM alarms from diffuse contamination that pancake Geiger's cannot detect. - As a temporary monitoring station. - A workstation or exit monitor in a small zone. - As a sub-change room monitor. - As a specialized monitor for low energy $\gamma$ radiation. - To provide monitoring for feet, identity cards, laundry, tools etc. in combination with special probes.
Operation of equipment • Operational procedure which include o Regular checks requirements o Operation requirements o Calibration requirements o Training requirements (RPO to compile procedure and RPS to accept)	PDO will develop a manual/ work instruction derived from the manufacturer's manual.
Commissioning of equipment Who will be responsible for: o The initial installation, o Initial set-up, o and operation training	From manufacturer the instrument will be send to the Necsa calibration facility where after the instrument will be ready to use.
Maintenance of equipment • Who will be responsible for: o Maintenance o Keeping core components o Turn-around time for maintenance o Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance) • If Necsa-Instrumentation will be responsible, the following: o Capabilities within Necsa to maintain the instrument must be evaluated and o Necessary training requirements have to be specified and o Core components for maintenance have to be specified.	RPO's will be responsible for the maintenance of the equipment and perform regular checks. Necsa is able to calibrate the instrument (SANAS accredited)
Calibration of equipment • Calibration method & Traceability (sources) • Accreditation • Initial calibration • Training	Instrument is initially calibrated by the manufacturer, however the instrument will be re-calibrated by the Necsa calibration facility before use

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	13 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.4 Ludlum Dual Channel Area Monitor Controller Model 375-Dual

<p>Identify the equipment:</p> <ul style="list-style-type: none"> <li>What equipment is recommended?</li> <li>What alternatives are available?</li> </ul>	Dual Channel Area Monitor Controller Model 375-Dual
<p>Purpose of the equipment</p> <ul style="list-style-type: none"> <li>Where will it be used?</li> <li>To measure what?</li> <li>Why has the need arisen?</li> <li>How will be the new instrument integrated into the RP-Programme?</li> </ul>	<p>This instrument will be installed in a high radiological area which will serve as early detection. e.g. to monitor unclassified areas adjacent to the Source Store.</p> <p>Measuring radiation levels, easy read-out display. Gives an alarm when the preset dose rate is exceeded.</p>
<p>Define measurement criteria</p> <ul style="list-style-type: none"> <li>Define relevant radionuclides</li> <li>Define levels to be measured (sensitivity)</li> <li>Define accuracy required (precision)</li> </ul>	Alarm: 000.0 to 9999
<p>Evaluation of the equipment</p> <ul style="list-style-type: none"> <li>Aspects to be included: <ul style="list-style-type: none"> <li>Benefits / Limitations</li> <li>Operation Cost?</li> <li>Maintenance cost?</li> <li>Hidden cost (gas, sources, cables, installation)</li> </ul> </li> </ul>	<p>A common application is gamma and neutron monitoring: one controller monitors gamma radiation and the other monitors neutron radiation. This instrument may also be used to monitor radiation in two separate locations when used in conjunction with appropriate external detectors.</p> <p>Each controller features a four-digit LED display that is readable from 9 meters away. Backlit indicators on each instrument warn of low radiation alarm (yellow), high radiation alarm (red), instrument failure (red), and low battery (yellow). A green status light indicates the instrument is functioning properly. Calibration parameters are stored in non-volatile memory and protected under calibration covers on each controller.</p> <p>Can be made to display in <math>\mu\text{R/hr}</math>, <math>\text{mR/hr}</math>, <math>\text{R/hr}</math>, <math>\mu\text{Sv/h}</math>, <math>\text{mSv/h}</math>, <math>\text{Sv/h}</math>, <math>\mu\text{rem/hr}</math>, <math>\text{mrem/hr}</math>, <math>\text{rem/hr}</math>, <math>\text{cpm}</math>, <math>\text{cps}</math>, and others</p>
<p>Operation of equipment</p> <ul style="list-style-type: none"> <li>Operational procedure which include <ul style="list-style-type: none"> <li>Regular checks requirements</li> <li>Operation requirements</li> <li>Calibration requirements</li> <li>Training requirements</li> </ul> </li> </ul> <p>(RPO to compile procedure and RPS to accept)</p>	PDO will develop a manual/ work instruction derived from the manufacturer's manual.
<p>Commissioning of equipment</p> <p>Who will be responsible for:</p> <ul style="list-style-type: none"> <li>The initial installation,</li> <li>Initial set-up,</li> <li>and operation training</li> </ul>	From manufacturer the instrument will be send to the Necsa calibration facility where after the instrument will be ready to use.
<p>Maintenance of equipment</p> <ul style="list-style-type: none"> <li>Who will be responsible for: <ul style="list-style-type: none"> <li>Maintenance</li> <li>Keeping core components</li> <li>Turn-around time for maintenance</li> <li>Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance)</li> </ul> </li> <li>If Necsa-Instrumentation will be responsible, the following: <ul style="list-style-type: none"> <li>Capabilities within Necsa to maintain the instrument must be evaluated and</li> <li>Necessary training requirements have to be specified and</li> <li>Core components for maintenance have to be specified.</li> </ul> </li> </ul>	RPO's will be responsible for the maintenance of the equipment and perform regular checks. Necsa is able to calibrate the instrument (SANAS accredited)
<p>Calibration of equipment</p> <ul style="list-style-type: none"> <li>Calibration method &amp; Traceability (sources)</li> <li>Accreditation</li> <li>Initial calibration</li> <li>Training</li> </ul>	Instrument is initially calibrated by the manufacturer, however the instrument will be re-calibrated by the Necsa calibration facility before use

**User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management**

### 6.3.5 Neutron Dose Survey Meter Model 2241-4 (Ludlum)

<p>Identify the equipment:</p> <ul style="list-style-type: none"> <li>What equipment is recommended?</li> <li>What alternatives are available?</li> </ul>	Neutron Dose Survey Meter Model 2241-4 (Ludlum)
<p>Purpose of the equipment</p> <ul style="list-style-type: none"> <li>Where will it be used?</li> <li>To measure what?</li> <li>Why has the need arisen?</li> <li>How will be the new instrument integrated into the RP-Programme?</li> </ul>	<p>Used in highly hazardous radioactive areas in different weather conditions (e.g. Source Store and SHARS)</p> <p>Measuring neutron radiation levels, easy read-out display.</p> <p>Is used for neutron measurements in most of our projects/field surveys, source conditioning, shielding verification, etc.</p> <p>WE have a shortage of neutron monitors for all the different operations – source collections, SHARS projects, decommissioning of source, etc.</p>
<p>Define measurement criteria</p> <ul style="list-style-type: none"> <li>Define relevant radionuclides</li> <li>Define levels to be measured (sensitivity)</li> <li>Define accuracy required (precision)</li> </ul>	0 to 100 mSv/h
<p>Evaluation of the equipment</p> <ul style="list-style-type: none"> <li>Aspects to be included: <ul style="list-style-type: none"> <li>Benefits / Limitations</li> <li>Operation Cost?</li> <li>Maintenance cost?</li> <li>Hidden cost (gas, sources, cables, installation)</li> </ul> </li> </ul>	<p>Data is presented on a four-digit LCD with a moving decimal point. Two additional digits are employed for the Scaler mode. A three-position switch labeled Off/Ratemeter/Scaler selects the desired operating mode for the instrument. Other controls include Audio On/Off switch, Fast/Slow Response switch, LCD Backlight pushbutton, Count Reset pushbutton, and Scaler Count/Stop pushbutton.</p> <p>This instrument incorporates independent adjustable alarms for the ratemeter and scaler operating modes. Audible alarms may be silenced (acknowledged) by depressing the RESET switch. The scaler count time, alarm values, and backlight on time are pre-programmed values. This instrument can be programmed via its RS-232 port, which can also be used to output readings at two-second intervals.</p>
<p>Operation of equipment</p> <ul style="list-style-type: none"> <li>Operational procedure which include <ul style="list-style-type: none"> <li>Regular checks requirements</li> <li>Operation requirements</li> <li>Calibration requirements</li> <li>Training requirements</li> </ul> </li> </ul> <p>(RPO to compile procedure and RPS to accept)</p>	PDO will develop a manual/ work instruction derived from the manufacturer's manual.
<p>Commissioning of equipment</p> <p>Who will be responsible for:</p> <ul style="list-style-type: none"> <li>The initial installation,</li> <li>Initial set-up,</li> <li>and operation training</li> </ul>	The initial calibration is done by the manufacturer. The instrument will be send to a calibration facility where after the instrument will be ready to use.
<p>Maintenance of equipment</p> <ul style="list-style-type: none"> <li>Who will be responsible for: <ul style="list-style-type: none"> <li>Maintenance</li> <li>Keeping core components</li> <li>Turn-around time for maintenance</li> <li>Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance)</li> </ul> </li> <li>If Necsa-Instrumentation will be responsible, the following: <ul style="list-style-type: none"> <li>Capabilities within Necsa to maintain the instrument must be evaluated and</li> <li>Necessary training requirements have to be specified and</li> <li>Core components for maintenance have to be specified.</li> </ul> </li> </ul>	RPO's will be responsible for the maintenance of the equipment and perform regular checks.
<p>Calibration of equipment</p> <ul style="list-style-type: none"> <li>Calibration method &amp; Traceability (sources)</li> <li>Accreditation</li> <li>Initial calibration</li> <li>Training</li> </ul>	Instrument is initially calibrated by the manufacturer.

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	15 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.6 High dose probe and 20m cable to connect to Radiagem (STTC wide gamma range probe)

<p>Identify the equipment:</p> <ul style="list-style-type: none"> <li>What equipment is recommended?</li> <li>What alternatives are available?</li> </ul>	High dose probe and 20m cable to connect to Radiagem (STTC wide gamma range probe)
<p>Purpose of the equipment</p> <ul style="list-style-type: none"> <li>Where will it be used?</li> <li>To measure what?</li> <li>Why has the need arisen?</li> <li>How will be the new instrument integrated into the RP-Programme?</li> </ul>	<p>Used in highly hazardous radioactive areas in different weather conditions (e.g. Source Store and SHARS)</p> <p>Measuring high radiation levels inside the hotcell</p> <p>Is used as the primary radiation probe in significant high dose rate areas e.g. SHARS and Area 24 source store hotcell during conditioning of high radioactive sources.</p> <p>The high dose probe is used in conjunction with the Radiagem. We have 2 Radiagems, 1 with one probe. One Radiagem is used for SHARS and the other is used for source conditioning at Area 24.</p>
<p>Define measurement criteria</p> <ul style="list-style-type: none"> <li>Define relevant radionuclides</li> <li>Define levels to be measured (sensitivity)</li> <li>Define accuracy required (precision)</li> </ul>	0 to 10 Sv/h
<p>Evaluation of the equipment</p> <ul style="list-style-type: none"> <li>Aspects to be included: <ul style="list-style-type: none"> <li>Benefits / Limitations</li> <li>Operation Cost?</li> <li>Maintenance cost?</li> <li>Hidden cost (gas, sources, cables, installation)</li> </ul> </li> </ul>	<p>The STTC instrument has a compact and robust metal case which includes the Geiger Mueller detector, the high-voltage power supply and the pulse shaping circuits. supports remote measurements up to 20 m</p> <p>Measurement of H*(10) ambient gamma dose equivalent rate</p> <p>Energy compensated Geiger Mueller detector</p> <p>Gamma dose rate measurement up to 10 Sv/h (1000 rem/h)</p> <p>STTC-W Waterproof version for 25m immersion</p>
<p>Operation of equipment</p> <ul style="list-style-type: none"> <li>Operational procedure which include <ul style="list-style-type: none"> <li>Regular checks requirements</li> <li>Operation requirements</li> <li>Calibration requirements</li> <li>Training requirements</li> </ul> </li> </ul> <p>(RPO to compile procedure and RPS to accept)</p>	PDO will develop a manual/ work instruction derived from the manufacturer's manual and based on the experience with the instrument.
<p>Commissioning of equipment</p> <p>Who will be responsible for:</p> <ul style="list-style-type: none"> <li>The initial installation,</li> <li>Initial set-up,</li> <li>and operation training</li> </ul>	From manufacturer the instrument will be send to the Necsa calibration facility where after the instrument will be ready to use.
<p>Maintenance of equipment</p> <ul style="list-style-type: none"> <li>Who will be responsible for: <ul style="list-style-type: none"> <li>Maintenance</li> <li>Keeping core components</li> <li>Turn-around time for maintenance</li> <li>Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance)</li> </ul> </li> <li>If Necsa-Instrumentation will be responsible, the following: <ul style="list-style-type: none"> <li>Capabilities within Necsa to maintain the instrument must be evaluated and</li> <li>Necessary training requirements have to be specified and</li> <li>Core components for maintenance have to be specified.</li> </ul> </li> </ul>	RPO's will be responsible for the maintenance of the equipment and perform regular checks. Necsa is able to calibrate the instrument (SANAS accredited)
<p>Calibration of equipment</p> <ul style="list-style-type: none"> <li>Calibration method &amp; Traceability (sources)</li> <li>Accreditation</li> <li>Initial calibration</li> <li>Training</li> </ul>	Instrument is initially calibrated by the manufacturer, however the instrument will be re-calibrated by the Necsa calibration facility before use

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	16 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.7 Teletector, Probe 6150AD-t (/H, /E)

Identify the equipment: • What equipment is recommended? • What alternatives are available?	TELETECTOR, PROBE 6150AD-t (/H, /E)
Purpose of the equipment • Where will it be used? • To measure what? • Why has the need arisen? • How will be the new instrument integrated into the RP-Programme?	Used in highly hazardous radioactive areas in different weather conditions (e.g. Source Store and SHARS) Measuring radiation levels, easy read-out display. Is used as the primary radiation monitor in all our projects/field surveys, source conditioning, necsa waste drums to Vaalputs etc. WE have a shortage of extendable radiation monitors for all the different operations – source collections, SHARS projects, decommissioning of source, etc.
Define measurement criteria • Define relevant radionuclides • Define levels to be measured (sensitivity) • Define accuracy required (precision)	0.00 µSv/h to 9.99 Sv/h
Evaluation of the equipment • Aspects to be included: o Benefits / Limitations o Operation Cost? o Maintenance cost? o Hidden cost (gas, sources, cables, installation)	Telescope may be extended continuously up to a total length of approx. 4 m. Robust waterproof aluminium housing, helps to measure at places difficult to reach. Alarm thresholds for both dose and dose rate. Robust waterproof aluminium housing. Easy to travel with, robust, is already in use, user friendly, easy handling, high precision, fast response
Operation of equipment • Operational procedure which include o Regular checks requirements o Operation requirements o Calibration requirements o Training requirements (RPO to compile procedure and RPS to accept)	A manual already exist and is accepted by the RPS and Necsa calibration facility.
Commissioning of equipment Who will be responsible for: o The initial installation, o Initial set-up, o and operation training	From manufacturer the instrument will be send to the Necsa calibration facility where after the instrument will be ready to use.
Maintenance of equipment • Who will be responsible for: o Maintenance o Keeping core components o Turn-around time for maintenance o Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance) • If Necsa-Instrumentation will be responsible, the following: o Capabilities within Necsa to maintain the instrument must be evaluated and o Necessary training requirements have to be specified and o Core components for maintenance have to be specified.	RPO's will be responsible for the maintenance of the equipment and perform regular checks. Necsa is able to calibrate the instrument (SANAS accredited)
Calibration of equipment • Calibration method & Traceability (sources) • Accreditation • Initial calibration • Training	Instrument is initially calibrated by the manufacturer, however the instrument will be re-calibrated by the Necsa calibration facility before use

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	17 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.8 Truedose EPD

Identify the equipment: <ul style="list-style-type: none"> <li>What equipment is recommended?</li> <li>What alternatives are available?</li> </ul>	Truedose EPD -
Purpose of the equipment <ul style="list-style-type: none"> <li>Where will it be used?</li> <li>To measure what?</li> <li>Why has the need arisen?</li> <li>How will be the new instrument integrated into the RP-Programme?</li> </ul>	Decommissioning including Characterization and CAM Accumulated dose and dose rate Hp(10) and Hp(0.07) to beta and gamma radiation expected (unknown since mostly project related) Replacement of old/broken equipment (EPD MK2) Already incorporated into RPP
Define measurement criteria <ul style="list-style-type: none"> <li>Define relevant radionuclides</li> <li>Define levels to be measured (sensitivity)</li> <li>Define accuracy required (precision)</li> </ul>	Uranium and daughters expected, unknown since decommissioning work is project related Low to high dose rates for gamma radiation and beta particles Hp(10) - $\pm 10\%$ , Hp(0.07) - $\pm 20\%$
Evaluation of the equipment <ul style="list-style-type: none"> <li>Aspects to be included: <ul style="list-style-type: none"> <li>Benefits / Limitations</li> <li>Operation Cost?</li> <li>Maintenance cost?</li> <li>Hidden cost (gas, sources, cables, installation)</li> </ul> </li> </ul>	Improved dose rate range. Unprecedented sensitivity as low as $0.05\mu\text{Sv/h}$ Multi-detector technology measuring both gamma and beta radiation AA battery usage Software required Repairs possibly to be done by supplier/ manufacturer. Calibration cost – to be confirmed if CAL can do calibrations since it is newer equipment No hidden operational cost.
Operation of equipment <ul style="list-style-type: none"> <li>Operational procedure which include <ul style="list-style-type: none"> <li>Regular checks requirements</li> <li>Operation requirements</li> <li>Calibration requirements</li> <li>Training requirements</li> </ul> </li> </ul> (RPO to compile procedure and RPS to accept)	NLM-WKI-167 already in use and incorporated into RPP. Document approved by RPS.
Commissioning of equipment Who will be responsible for: <ul style="list-style-type: none"> <li>The initial installation,</li> <li>Initial set-up,</li> <li>and operation training</li> </ul>	No installation required No set-up required Supplier - Thermo Scientific
Maintenance of equipment <ul style="list-style-type: none"> <li>Who will be responsible for: <ul style="list-style-type: none"> <li>Maintenance</li> <li>Keeping core components</li> <li>Turn-around time for maintenance</li> <li>Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance)</li> </ul> </li> <li>If Necsa-Instrumentation will be responsible, the following: <ul style="list-style-type: none"> <li>Capabilities within Necsa to maintain the instrument must be evaluated and</li> <li>Necessary training requirements have to be specified and</li> <li>Core components for maintenance have to be specified.</li> </ul> </li> </ul>	General maintenance done by user/responsible person and repairs by CAL. Specific repairs done by supplier/manufacturer. NLM-WKI-167 already in use and incorporated into RPP.  Enquire if CAL has the capability to calibrate and repair equipment.
Calibration of equipment <ul style="list-style-type: none"> <li>Calibration method &amp; Traceability (sources)</li> <li>Accreditation</li> <li>Initial calibration</li> <li>Training</li> </ul>	SANAS accredited facility

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	18 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.9 Identifinder Ultra

Identify the equipment: <ul style="list-style-type: none"> <li>What equipment is recommended?</li> <li>What alternatives are available?</li> </ul>	Identifinder Ultra -
Purpose of the equipment <ul style="list-style-type: none"> <li>Where will it be used?</li> <li>To measure what?</li> <li>Why has the need arisen?</li> <li>How will be the new instrument integrated into the RP-Programme?</li> </ul>	Decommissioning including Characterization and CAM Nuclide identifinder, spectrum analyser (unknown since mostly project related)  Projects, unknown/historical material Will be used on ad-hoc basis and for identification purposes
Define measurement criteria <ul style="list-style-type: none"> <li>Define relevant radionuclides</li> <li>Define levels to be measured (sensitivity)</li> <li>Define accuracy required (precision)</li> </ul>	Uranium and daughters expected, unknown since decommissioning work is project related Nuclide identifinder, spectrum analyser (unknown since mostly project related) Energy range for NaI(Tl) – 30 keV to 3.0 MeV
Evaluation of the equipment <ul style="list-style-type: none"> <li>Aspects to be included: <ul style="list-style-type: none"> <li>Benefits / Limitations</li> <li>Operation Cost?</li> <li>Maintenance cost?</li> <li>Hidden cost (gas, sources, cables, installation)</li> </ul> </li> </ul>	Dose rate function with 10 hours operating time. Neutron indicator Spectrum memory of 100 spectra at 1024 channels Rechargeable PowerPACK plus x4 AA battery usage in powerPACK Automatic energy calibration and stabilization Detector efficiency calibration Repairs possibly to be done by supplier/ manufacturer. Calibration cost – to be confirmed if CAL can do calibrations.
Operation of equipment <ul style="list-style-type: none"> <li>Operational procedure which include <ul style="list-style-type: none"> <li>Regular checks requirements</li> <li>Operation requirements</li> <li>Calibration requirements</li> <li>Training requirements</li> </ul> </li> </ul> (RPO to compile procedure and RPS to accept)	Document to be developed and approved by RPS.
Commissioning of equipment Who will be responsible for: <ul style="list-style-type: none"> <li>The initial installation,</li> <li>Initial set-up,</li> <li>and operation training</li> </ul>	No installation required No set-up required Supplier - RIIDEYE, Aspect/Dubna
Maintenance of equipment <ul style="list-style-type: none"> <li>Who will be responsible for: <ul style="list-style-type: none"> <li>Maintenance</li> <li>Keeping core components</li> <li>Turn-around time for maintenance</li> <li>Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance)</li> </ul> </li> <li>If Necsa-Instrumentation will be responsible, the following: <ul style="list-style-type: none"> <li>Capabilities within Necsa to maintain the instrument must be evaluated and</li> <li>Necessary training requirements have to be specified and</li> <li>Core components for maintenance have to be specified.</li> </ul> </li> </ul>	General maintenance done by user/responsible person and repairs by CAL. Specific repairs done by supplier/manufacturer. Document to be developed and approved by RPS.  Enquire if CAL has the capability to calibrate and repair equipment.
Calibration of equipment <ul style="list-style-type: none"> <li>Calibration method &amp; Traceability (sources)</li> <li>Accreditation</li> <li>Initial calibration</li> <li>Training</li> </ul>	SANAS accredited facility

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.10 Electra GM

Identify the equipment: <ul style="list-style-type: none"> <li>What equipment is recommended?</li> <li>What alternatives are available?</li> </ul>	Electra GM -
Purpose of the equipment <ul style="list-style-type: none"> <li>Where will it be used?</li> <li>To measure what?</li> <li>Why has the need arisen?</li> <li>How will be the new instrument integrated into the RP-Programme?</li> </ul>	Decommissioning including Characterization and CAM Radioactive contamination and radiation  Replacement for old/ broken equipment Already incorporated into RPP
Define measurement criteria <ul style="list-style-type: none"> <li>Define relevant radionuclides</li> <li>Define levels to be measured (sensitivity)</li> <li>Define accuracy required (precision)</li> </ul>	Detection of alpha, beta/gamma particles and beta/gamma radiation Background to 20mSv/h for internal Geiger, Automatic response time is less than 2 seconds for significant changes
Evaluation of the equipment <ul style="list-style-type: none"> <li>Aspects to be included: <ul style="list-style-type: none"> <li>Benefits / Limitations</li> <li>Operation Cost?</li> <li>Maintenance cost?</li> <li>Hidden cost (gas, sources, cables, installation)</li> </ul> </li> </ul>	Dual probe operations Rapid response to significant changes Integrate mode Neutron indicator X3 C battery usage Repairs possibly to be done by supplier/ manufacturer. 90 degree PET cable connections, mylar screens Calibration cost –CAL can do calibrations.
Operation of equipment <ul style="list-style-type: none"> <li>Operational procedure which include <ul style="list-style-type: none"> <li>Regular checks requirements</li> <li>Operation requirements</li> <li>Calibration requirements</li> <li>Training requirements</li> </ul> </li> </ul> (RPO to compile procedure and RPS to accept)	NLM-WIN-002 already in use and incorporated into RPP. Document approved by RPS.
Commissioning of equipment Who will be responsible for: <ul style="list-style-type: none"> <li>The initial installation,</li> <li>Initial set-up,</li> <li>and operation training</li> </ul>	No installation required No set-up required Supplier - OEN/ ADM
Maintenance of equipment <ul style="list-style-type: none"> <li>Who will be responsible for: <ul style="list-style-type: none"> <li>Maintenance</li> <li>Keeping core components</li> <li>Turn-around time for maintenance</li> <li>Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance)</li> </ul> </li> <li>If Necsa-Instrumentation will be responsible, the following: <ul style="list-style-type: none"> <li>Capabilities within Necsa to maintain the instrument must be evaluated and</li> <li>Necessary training requirements have to be specified and</li> <li>Core components for maintenance have to be specified.</li> </ul> </li> </ul>	General maintenance done by user/responsible person and repairs by CAL. Specific repairs done by supplier/manufacturer. NLM-WIN-002 already in use and incorporated into RPP.  CAL has the capability to calibrate and repair equipment.
Calibration of equipment <ul style="list-style-type: none"> <li>Calibration method &amp; Traceability (sources)</li> <li>Accreditation</li> <li>Initial calibration</li> <li>Training</li> </ul>	SANAS accredited facility

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	20 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.11 DCM 3000 Neutron Module Hp(10)

Identify the equipment: • What equipment is recommended? • What alternatives are available?	DMC 3000 Neutron Module Hp(10)
Purpose of the equipment • Where will it be used? • To measure what? • Why has the need arisen? • How will be the new instrument integrated into the RP-Programme?	Used in highly hazardous radioactive areas in different weather conditions (e.g. Source Store and SHARS) Measuring Dose and dose rate Neutron Hp(10), easy read-out display. Will be used for neutron dose and dose rate in most of our projects/field surveys, source conditioning, shielding verification, etc. We do not have any electronic personal dosimeters during handling of neutron sources - source collections, SHARS projects, decommissioning of source, etc.
Define measurement criteria • Define relevant radionuclides • Define levels to be measured (sensitivity) • Define accuracy required (precision)	Dose : from 1 $\mu$ Sv to 10 Sv (0.1 mrem to 1000 rem) Dose rate : from 100 $\mu$ Sv/h to 10 Sv/h (10 mrem/h to 1000 rem/h)  Accuracy $\pm 10\%$ (AmBe, 0.75 mSv/h, 75 mrem/h) - Hp(10) Typical Energy response from thermal to fast Neutron
Evaluation of the equipment • Aspects to be included: o Benefits / Limitations o Operation Cost? o Maintenance cost? o Hidden cost (gas, sources, cables, installation)	Histogram Features - Additional Hp(10) Neutron measurement (dose, dose rate and maximum dose rate) saved on non volatile memory (EEPROM) at the same time as Hp(10) Gamma measurement in configurable steps (10 s, 60 s, 10 min, 1 hour, 24 hours) • Display Features - Additional Hp(10) Neutron measurement displayed on DMC 3000 high quality white backlighting - Blue top LED for Neutron dose increment indication • Alarm Features and communication - DMC 3000 alarming speaker, vibrator, high efficiency red flash LED, 3 top LEDs and display indicators - Hp(10) Neutron dose/rate alarms, adjustable over the display range - Hp(10) Neutron dose/rate warnings, adjustable over the display range and cknowledgeable  ELECTRICAL CHARACTERISTICS • Powered by DMC 3000 • 8 calendar month battery life for Neutron module and DMC 3000 (typical, 8 h per day, 5 days per week in run mode, without excessive alarms)* • 2000 h battery life for DMC 3000 with Neutron module and DMC 3000 in continuous run, without excessive alarms MECHANICAL CHARACTERISTICS • Rugged, high impact polycarbonate-ABS case • Dimensions with DMC 3000: 131 x 60 x 21 mm (5.1 x 2.4 x 0.8 in) max. without clip 131 x 60 x 28mm (5.1 x 2.4 x 1.1 in) with standard clip • Weight with DMC 3000: < 138 g • Worn by a replaceable clip ENVIRONMENTAL CHARACTERISTICS • Temperature range: -10°C to 50°C (14°F to 122°F) • Storage: -20°C to 71°C (-4°F to 160°F) • Shock, vibration and drop resistant • IP67 protection • EMC: complies and exceeds standards by a large margin ( compliant) - MIL STD 461F RS103 (pulsed electric field): exceeds 200 V/m from 10 kHz to 5 GHz - MIL STD 461F RS101 (magnetic field 30 Hz to 100 kHz)
Operation of equipment • Operational procedure which include o Regular checks requirements o Operation requirements o Calibration requirements o Training requirements (RPO to compile procedure and RPS to accept)	PDO will develop a manual/ work instruction derived from the manufacturer's manual.
Commissioning of equipment Who will be responsible for: o The initial installation, o Initial set-up, o and operation training	The initial calibration is done by the manufacturer. The instrument will be send to a calibration facility where after the instrument will be ready to use.
Maintenance of equipment • Who will be responsible for: o Maintenance o Keeping core components o Turn-around time for maintenance	RPO's will be responsible for the maintenance of the equipment and perform regular checks.

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	21 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

<ul style="list-style-type: none"> <li>○ Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance)</li> <li>● If Necsa-Instrumentation will be responsible, the following: <ul style="list-style-type: none"> <li>○ Capabilities within Necsa to maintain the instrument must be evaluated and</li> <li>○ Necessary training requirements have to be specified and</li> <li>○ Core components for maintenance have to be specified.</li> </ul> </li> </ul>	
<p>Calibration of equipment</p> <ul style="list-style-type: none"> <li>● Calibration method &amp; Traceability (sources)</li> <li>● Accreditation</li> <li>● Initial calibration</li> <li>● Training</li> </ul>	Instrument is initially calibrated by the manufacturer.

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	22 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.12 Neutron Monitor BDN-06 External probe for Aspect MKC-A03

Identify the equipment: • What equipment is recommended? • What alternatives are available?	BDN-06 External probe for Aspect MKC-A03
Purpose of the equipment • Where will it be used? • To measure what? • Why has the need arisen? • How will be the new instrument integrated into the RP-Programme?	Used in highly hazardous radioactive areas in different weather conditions (e.g. Source Store and SHARS) Measuring neutron radiation levels, easy read-out display. Is used for neutron measurements in most of our projects/field surveys, source conditioning, shielding verification, etc. We have 2 Aspect MKC-A03 monitors, but cannot use it to monitor neutron dose rates. This is also needed by NMISA in order to calibrate the instrument.
Define measurement criteria • Define relevant radionuclides • Define levels to be measured (sensitivity) • Define accuracy required (precision)	-
Evaluation of the equipment • Aspects to be included: o Benefits / Limitations o Operation Cost? o Maintenance cost? o Hidden cost (gas, sources, cables, installation)	-
Operation of equipment • Operational procedure which include o Regular checks requirements o Operation requirements o Calibration requirements o Training requirements (RPO to compile procedure and RPS to accept)	A manual for the Aspect MKC-A03 instrument already exist, but must be updated to include the external dose
Commissioning of equipment Who will be responsible for: o The initial installation, o Initial set-up, o and operation training	The initial calibration is done by the manufacturer. The instrument will be send to a calibration facility where after the instrument will be ready to use.
Maintenance of equipment • Who will be responsible for: o Maintenance o Keeping core components o Turn-around time for maintenance o Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance) • If Necsa-Instrumentation will be responsible, the following: o Capabilities within Necsa to maintain the instrument must be evaluated and o Necessary training requirements have to be specified and o Core components for maintenance have to be specified.	RPO's will be responsible for the maintenance of the equipment and perform regular checks.
Calibration of equipment • Calibration method & Traceability (sources) • Accreditation • Initial calibration • Training	Instrument is initially calibrated by the manufacturer.

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	23 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.13 Rad Eye SX (Thermo)

Identify the equipment: • What equipment is recommended? • What alternatives are available?	Rad-Eye SX (THERMO)
Purpose of the equipment • Where will it be used? • To measure what? • Why has the need arisen? • How will be the new instrument integrated into the RP-Programme?	<ul style="list-style-type: none"> <li>• The RadEye SX can operate with dual phosphor <math>\alpha / \beta</math>, NaI(Tl) and plastic probes</li> <li>• Up to 16 different probe configurations are selectable in a submenu</li> <li>• Easy to replace probes in-the-field, with a simple button-push</li> <li>• Weighs only 160 g with rubber protection, without cable, 110 x 67 x 62 mm</li> <li>• Traditional probes can be used for one and two hand operation</li> <li>• Versatile operation modes</li> </ul> <p>•Scaler / Timer with preset countand preset time for sample measurements •Continuous ratemeter mode for frisker operation •Simultaneous <math>\alpha / \beta</math> and gross / ROI operation (distinct audible indication for each measuring channel)</p>
Define measurement criteria • Define relevant radionuclides • Define levels to be measured (sensitivity) • Define accuracy required (precision)	Default: 100,000 cps - extendable by individual probe calibration. Count rate (cps, cpm), surface contamination (Bq, dps, dpm, Bq/cm2), dose rate (R/h, Sv/h, rem/h)
Evaluation of the equipment • Aspects to be included: o Benefits / Limitations o Operation Cost? o Maintenance cost? o Hidden cost (gas, sources, cables, installation)	The RadEye SX is a modern compact multi-purpose survey meter for external scintillator counter tubes. General count rate and surface contamination measurements can be performed as well as dose rate measurements. As part of the growing RadEye product family of high-end stand-alone meters, the RadEye SX is designed to exceed the most demanding user expectations. Due to the clear and large display all essential functions and software parameters can be easily accessed. The display and the alarm-LED can be seen while the instrument is worn in the transparent case. All settings and the data analysis can be done by an optional WindowsTMbased PC-software and a reader device. The last 1500 mean and maximum values of the count rate or dose rate are recorded internally and can be read out via a serial interface. Additionally the RadEye SX logs the last 250 alarms, error messages and changes of the configuration.
Operation of equipment • Operational procedure which include o Regular checks requirements o Operation requirements o Calibration requirements o Training requirements (RPO to compile procedure and RPS to accept)	A manual/ work instruction already exist.
Commissioning of equipment Who will be responsible for: o The initial installation, o Initial set-up, o and operation training	From manufacturer the instrument will be send to the Necsa calibration facility where after the instrument will be ready to use.
Maintenance of equipment • Who will be responsible for: o Maintenance o Keeping core components o Turn-around time for maintenance o Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance) • If Necsa-Instrumentation will be responsible, the following: o Capabilities within Necsa to maintain the instrument must be evaluated and o Necessary training requirements have to be specified and o Core components for maintenance have to be specified.	RPO's will be responsible for the maintenance of the equipment and perform regular checks. Necsa is able to calibrate the instrument (SANAS accredited)
Calibration of equipment • Calibration method & Traceability (sources) • Accreditation • Initial calibration • Training	Instrument is initially calibrated by the manufacturer, however the instrument will be re-calibrated by the Necsa calibration facility before use

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	24 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

### 6.3.14 RIIDEye X Handheld Radiation Isotope Identifier

Identify the equipment: <ul style="list-style-type: none"> <li>What equipment is recommended?</li> <li>What alternatives are available?</li> </ul>	RIIDEye X Handheld Radiation Isotope Identifier
Purpose of the equipment <ul style="list-style-type: none"> <li>Where will it be used?</li> <li>To measure what?</li> <li>Why has the need arisen?</li> <li>How will be the new instrument integrated into the RP-Programme?</li> </ul>	Used in highly hazardous radioactive areas in different weather conditions (e.g. Source Store and SHARS, emergency call-outs, source collections)
Define measurement criteria <ul style="list-style-type: none"> <li>Define relevant radionuclides</li> <li>Define levels to be measured (sensitivity)</li> <li>Define accuracy required (precision)</li> </ul>	-
Evaluation of the equipment <ul style="list-style-type: none"> <li>Aspects to be included: <ul style="list-style-type: none"> <li>Benefits / Limitations</li> <li>Operation Cost?</li> <li>Maintenance cost?</li> <li>Hidden cost (gas, sources, cables, installation)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Unique live spectrum building gives users ability to optimize identification scans in real time.</li> <li>Easy to use SNM Assist maximizes SNM detection by auto-calculating scan times to achieve high confidence results.</li> <li>Color coded peaks in spectrum quickly identify isotopes and classify them for rapid response.</li> <li>Excellent ID speed and accuracy of detection in 30 sec or less.</li> <li>Improved Auto Cal allows stabilization in High BG.</li> <li>Large gamma detector for excellent sensitivity.</li> <li>Low cost of ownership from acquisition to maintenance with free coarse-calibrations and bi-annual optimization of system and free firmware upgrades for life of ownership.</li> <li>Documented ANSI N42.34-2006 compliance.</li> <li>CLYC Neutron detector uses no He3 and is located in handle utilizes body moderation to maximize detection performance.</li> <li>Mechanical Design: Rugged, IP65 and drop resistant to 1m.</li> <li>Excellent weight balance for long use with included shoulder strap and ergonomic handle.</li> <li>More than 45 different isotopes included in Library with user ability to add new libraries and isotopes.</li> <li>Easy data offload via USB memory card or live via serial port connection.</li> <li>Data is compliant with ANSI N42.42-2006 and can be used by most analysis SW including Cambio and PeakEasy.</li> <li>Headphone jack for completely silent operations or operations in high background noise</li> <li>High capacity rechargeable battery lasts 8 hrs or more and can be powered via 6 AA batteries.</li> <li>Includes Pelican™ case with Alkaline battery adapter, shoulder strap, power supply, USB memory card reader.</li> </ul> <p>The RIIDEye M Handheld Radiation Isotope Identifier comes in a multi-configuration, multi-purpose package. It contains the same detection SW and user interface as well as many of the features of the RIIDEye X but its mechanical design is ideally suited for field laboratories and environmental studies. The following features differ from the RIIDEye X:</p> <ul style="list-style-type: none"> <li>Moderated CLYC Neutron detector uses no He3 and is located in electronics case to maximize space.</li> <li>Removable gamma detector allows close inspection of samples with included 5ft extension cable and can be combined with a low background shield for low radioactivity levels in samples such as food, soil or water.</li> </ul>
Operation of equipment <ul style="list-style-type: none"> <li>Operational procedure which include <ul style="list-style-type: none"> <li>Regular checks requirements</li> <li>Operation requirements</li> <li>Calibration requirements</li> <li>Training requirements</li> </ul> </li> </ul> <i>(RPO to compile procedure and RPS to accept)</i>	PDO will develop a manual/ work instruction derived from the manufacturer's manual.
Commissioning of equipment Who will be responsible for: <ul style="list-style-type: none"> <li>The initial installation,</li> <li>Initial set-up,</li> <li>and operation training</li> </ul>	The initial calibration is done by the manufacturer.
Maintenance of equipment <ul style="list-style-type: none"> <li>Who will be responsible for: <ul style="list-style-type: none"> <li>Maintenance</li> </ul> </li> </ul>	RPO's will be responsible for the maintenance of the equipment and perform regular checks.

Doc. No.:	NLM-SPE-00032
Rev. No.:	02
Page No.:	25 of 25

## User Requirement Specification for the Replacement of Dysfunctional Radiation Protection Equipment (RIMTE) within Nuclear Liabilities Management

<ul style="list-style-type: none"> <li>○ Keeping core components</li> <li>○ Turn-around time for maintenance</li> <li>○ Maintenance Programme to be specified (Programme to include calibration and regular checks, preventive/regular maintenance)</li> <li>● If Necsa-Instrumentation will be responsible, the following: <ul style="list-style-type: none"> <li>○ Capabilities within Necsa to maintain the instrument must be evaluated and</li> <li>○ Necessary training requirements have to be specified and</li> <li>○ Core components for maintenance have to be specified.</li> </ul> </li> </ul>	
<p>Calibration of equipment</p> <ul style="list-style-type: none"> <li>● Calibration method &amp; Traceability (sources)</li> <li>● Accreditation</li> <li>● Initial calibration</li> <li>● Training</li> </ul>	Instrument is initially calibrated by the manufacturer.