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| Requirements for Independent Dosimetric Auditing of Linear Accelerators |
| Management licence condition M1737 |
| OFFICIAL |

# Introduction

The Victorian Radiation Act 2005 (the Act) has the objective of protecting the health and safety of persons and the environment from the harmful effects of radiation. The Department of Health (Department) administers this legislation. The Act seeks to fulfil this objective by establishing a licensing framework to regulate the conduct of radiation practices and the use of radiation sources. Any person who conducts a radiation practice must hold a management licence (unless exempted from that requirement). The management licence holder must comply with every condition of their licence.

Management licence condition M1737 requires compliance with the requirements specified in this document. This document outlines dosimetric auditing requirements for linear accelerators used for therapeutic purposes. The audits specified in this document must be conducted at the specified frequencies by an independent auditor recognised by the department. Auditors recognised by the department for the purpose of the requirements specified in this document are listed in Appendix A.

The dosimetric auditing requirements are divided into three audit levels:

**Level I** audit is an audit of absorbed dose to water per monitor unit for mega-Voltage photon and electron beams under reference conditions using Optically Stimulated Luminescence Dosimeters (OSLD) or equivalent audit kit mailed to the site by the auditor. The OSLD is irradiated by local staff in accordance with specified protocol and returned to the auditor for analysis.

**Level Ib** audit is an audit of absorbed dose to water per monitor unit, for mega-voltage photon and electron beams, under reference conditions using reference class electrometer, ionisation chambers and a water phantom. The determination is made using the IAEA TRS-398 Code of Practice or equivalent international protocol. This audit is conducted on-site by the auditor.

**Level II** audit is an audit of absorbed dose to water, for selected mega-voltage photon beams, within a simple phantom geometry. This is an audit of the beam model within a treatment planning system, where the phantom CT is supplied to the facility for treatment planning and delivery. This audit is conducted on-site by the auditor.

**Level III** audit is an audit of absorbed dose to water delivered to selected points within an anthropomorphic phantom. This is an end-to-end audit where the phantom undergoes all steps within the radiotherapy treatment chain. This audit is conducted on-site by the auditor.

# Scope

This document forms a condition of licence which applies to all management licence holders authorised to possess a linear accelerator for therapeutic purposes and where condition M1737 has been imposed on the authorisation.

# Mandatory requirements

1. The management licence holder must ensure that dosimetric audits[[1]](#footnote-1).of linear accelerators are conducted by an independent auditor in accordance with the following requirements:
   1. Level Ib audit of all linear accelerators must be performed upon commissioning and prior to patient treatment[[2]](#footnote-2). ;
   2. Level III audit of at least one linear accelerator at a new site must be performed upon commissioning and prior to patient treatment[[3]](#footnote-3) ;
   3. Level I audit must be performed at intervals not exceeding 2 years on all linear accelerators;
   4. Level II audit must be performed at intervals not exceeding 4 years on at least one linear accelerator at a site;
   5. Level III audit must be performed at intervals not exceeding 4 years on at least one linear accelerator at a site; and
   6. The audits must be performed by a service provider that is recognised by the department. A list of recognised service providers is provided in Appendix A
2. Following an audit that indicates that the radiation dose delivery performance of a linear accelerator does not meet the relevant criteria in Appendix B, the management licence holder must:
   1. Take action to ensure the radiation dose delivery performance meets the relevant criteria specified in Appendix B; and
   2. Ensure that the radiation dose delivery performance is verified by a recognised auditor to satisfy the criteria specified in Appendix B within 3 months of the audit unless clinical use of the treatment beams that failed to meet the criteria in Appendix B has ceased.
3. The management licence holder must follow any recommendation of the auditor to partially or completely cease treatment following an audit unless otherwise advised by the Department.
4. The management licence holder must retain the following records for each linear accelerator for a minimum of 20 years after the decommissioning of the linear accelerator:
   1. Audit results provided by the auditor;
   2. The recommendations made by the auditor; and
   3. Implementation of recommendations made by the auditor.

# Appendix A: Recognised auditors

| Name of auditor | Contact details |
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| Australian Clinical Dosimetry Service  Australian Radiation Protection and Nuclear Safety Agency | Address: 619 Lower Plenty Road, Yallambie VIC 3085  Ph: 03 9433 2220 Email: [acds@arpansa.gov.au](mailto:acds@arpansa.gov.au)  Web: <http://www.arpansa.gov.au/Services/ACDS/index.cfm> |

# Appendix B: Dose delivery performance criteria

| Audit | Deviation | | | |
| --- | --- | --- | --- | --- |
| Photo beam | Electron beam | 3DCRT | IMRT & IMRT FFF  VMAT & VMAT FFF |
| Level I | ≤ 5.0% | ≤ 5.0% | - | - |
| Level Ib | ≤ 3.0% | ≤ 3.5% | - | - |
| Level II | - | - | ≤ 5.0% | ≤ 5.0%  or  Gamma criteria+  γ ≤ 1 at 3%/3mm  for ≥ 90% points |
| Level III | - | - | ≤ 5.0% | ≤ 5.0%  or  Gamma criteria+  γ ≤ 1 at 3%/3mm  for ≥ 90% points |

+ Global gamma with absolute dose comparison, threshold set to 10-20%.

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1. An audit is considered conducted when the results of the audit are available. [↑](#footnote-ref-1)
2. This requirement does not apply to linear accelerators commissioned before 3 July 2017. [↑](#footnote-ref-2)
3. An audit is considered conducted when the results of the audit are available. [↑](#footnote-ref-3)