

## TRAINEE INDUSTRIAL RADIOGRAPHER PRACTICAL AND OJT TRAINING LOGBOOK

### GAMMA RADIOGRAPHY

|                                       |            |
|---------------------------------------|------------|
| <b>NAME:</b> <i>(Print full name)</i> | <b>ID:</b> |
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| <b>AUTHORITY HOLDER PROVIDING TRAINING:</b> | <b>SPBNDD AFFILIATE NO.:</b> |
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1. The trainee must provide documentation of successful completion of on-the-job training (OJT) with a minimum of 480 hours under the supervision of an approved and authorized industrial radiographer. *(Code of Practice Gamma section 2.4)*. The training plan below should to be completed and signed off by the Trainee, Trainer, RPO and Authority Holder.
  
2. The following reference documents are required to facilitate this training:
  - Document No: SPBNDD/IRPAP/001, available on SPBNDD website [www.professional-body-ndt.org.za](http://www.professional-body-ndt.org.za))
  - Regulations relating to Group IV Hazardous Substances No. R. 247, 26 Feb 1993. Section 5);
  - Code of Practice for Industrial Radiography (Gamma Radiography);
  - IAEA Specific Safety Guide No. SSG-11, 2011.
  - Authority Holder’s organization local rules.
  
3. All Trainers should complete the table below:

| Name and Surname | SPBNDD No | Specimen Signature |
|------------------|-----------|--------------------|
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| Activity   | #<br>Hours | Date<br>completed | Trainer<br>Signature |
|--|------------|-------------------|----------------------|
| <b>1. Administrative and Medical Requirements</b>  |            |                   |                      |
| Company induction.   |            |                   |                      |
| Introduction to the senior manager designated as having overall responsibility for overseeing radiation safety and verifying that industrial radiography be carried out in accordance with regulatory requirements. <i>(Regulations relating to Group IV Hazardous Substances No. R. 247, 26 Feb 1993. Section 5)</i>  |            |                   |                      |
| Introduction to the company RPO/s and ARPO/s.  |            |                   |                      |
| Explain the Management structure and policies. <i>(Company Quality Management System)</i>  |            |                   |                      |
| Explain the assignment of individual responsibilities for radiation safety. <i>(While the primary responsibility for radiation safety lies with the operating organization, radiographers (including trainees and assistants) have a responsibility to work safely and to take all reasonable actions to restrict their own exposure and those of other workers and members of the public)</i> |            |                   |                      |
| Explain the role of the Radiation Protection Officer <i>(Code of Practice, section 6.1)</i>  |            |                   |                      |
| Explain initial training requirements <i>(Code of Practice, section 6.2)</i>   |            |                   |                      |
| Explain periodic training <i>(Code of Practice, section 6.3)</i>   |            |                   |                      |
| Explain 3 monthly observations <i>(Code of Practice, section 6.4)</i>  |            |                   |                      |
| Explain and demonstrate records of training and observations <i>(Code of Practice, section 6.5)</i>  |            |                   |                      |
| Explain the education and training programme including overview of the SPBNDT Radiation safety Programme. <i>(Document No: SPBNDT/IRPAP/001, available on SPBNDT website www.professional-body-ndt.org.za)</i>   |            |                   |                      |
| Explain the local rules and supervision. <i>(Specific to Authority Holders organisation)</i>   |            |                   |                      |
| Introduction to designated controlled or supervised areas. <i>(Specific to Authority Holders organisation)</i>   |            |                   |                      |
| Explain the Monitoring of workers and the workplace, including the acquisition and maintenance for radiation protection purposes. <i>(Code of practice, Gamma section 9))</i>  |            |                   |                      |
| Explain Health surveillance programme. <i>(Code of practice, Gamma section 2, X-ray section 2 and local rules)</i>   |            |                   |                      |
| Explain the System for recording and reporting all relevant information relating to the control of exposures, decisions regarding measures for occupational radiation protection and safety, monitoring of individuals. <i>(Local rules)</i>   |            |                   |                      |
| Explain and demonstrate the Emergency preparedness plans. <i>(Specific to Authority Holders organisation)</i>  |            |                   |                      |
| Explain the Mechanism for the review and updating of the arrangements. <i>(Specific to Authority Holders organisation)</i>   |            |                   |                      |
| Explain the Regulatory compliance inspection and enforcement. <i>(Code of Practices)</i>   |            |                   |                      |
| Explain the Human factors and practical applications pertaining to the work environment including the impact of substance abuse, fatigue and stress. <i>(Specific to Authority Holders organisation)</i>   |            |                   |                      |
| <b>Actual Hours</b>  |            |                   |                      |
| <b>Required Hours</b>  | <b>16</b>  |                   |                      |

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| <b>2. Facilities and Resources. (Gamma)</b>   |  |  |  |
| Demonstrate the Company facilities.   |  |  |  |
| Demonstrate the Company resources.  |  |  |  |
| Explain Radioactive source control.   |  |  |  |
| Demonstrate Marking and labelling of sources.   |  |  |  |
| Demonstrate the use of Collimators.   |  |  |  |
| Demonstrate the use of Ancillary equipment.   |  |  |  |
| <b>3. Equipment Specifications and Periodic Testing and Maintenance of Equipment</b>  |  |  |  |
| Explain that source containers must in general comply with requirements of ISO 3999 and IAEA requirements.  |  |  |  |
| Explain and demonstrate the locking of containers in the shielded or "off" position.  |  |  |  |
| Explain and demonstrate the indelible marking of a trefoil symbol and manufactures type and serial number.  |  |  |  |
| Explain that equipment may only be submitted to a Radiation Control authorised institution for periodic testing.  |  |  |  |
| Explain that Pigtails must be cleaned and inspected with every radioactive source change, and at intervals not exceeding 6 months for Co 60 sources.                            |  |  |  |
| Explain that source containers must be tested and certified at intervals not exceeding 24 months at an approved facility.   |  |  |  |
| Explain that Guide tubes, Winding cables and Winding cable sheaths must be tested and certified at intervals not exceeding 24 months at an approved facility.                   |  |  |  |
| Explain that Sources not exchanged within 6 months must be leak tested at intervals not exceeding 6 months.   |  |  |  |
| Explain that the holder of authority must keep documentary evidence of all tests and inspections for a period of at least 3 years   |  |  |  |
| Explain and demonstrate the approved transport label.   |  |  |  |
| Explain the use of transport over packs when transport labels will obscure other required markings and labels on the source container.  |  |  |  |
| Explain the maximum dose rates allowed when the source assembly is in the locked position. <i>(Code of Practice, section 3.5)</i>   |  |  |  |
| Explain portable containers, mobile containers and fixed containers.  |  |  |  |
| Explain the use of protective caps or plugs during storage or transport.  |  |  |  |
| Explain the length of winding cables in open areas. <i>(Code of Practice, section 7.2.12)</i>   |  |  |  |
| Explain that graphite powder is recommended for lubrication of winding cables and that oils must not be used.   |  |  |  |
| Explain and demonstrate the check for Air scattering of radiation (or 'sky shine') and scattering from objects outside enclosures without shielded roof.                        |  |  |  |
| <b>4. Specification for Enclosed Exposure Facilities</b> <i>(Code of Practice, section 4)</i>   |  |  |  |
| Explain that an enclosed exposure facility is a dedicated system such as those built into a production line. It is not an exposure bay with walls, maze and portable equipment. |  |  |  |
| Explain and demonstrate that the remote control must be placed outside the enclosure.   |  |  |  |

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| Explain that the enclosed exposure facility may not be located in an area zoned for domestic use.  |  |  |  |
| Explain the facility markings, including warning signs and contact persons.  |  |  |  |
| Explain and demonstrate the positive indication when an exposure is underway.  |  |  |  |
| Explain the interlock systems.   |  |  |  |
| Explain and demonstrate the device, which makes it possible for a person accidentally left in the enclosure, to open one of the doors easily and leave.  |  |  |  |
| Explain and demonstrate the locking of additional doors that the operator does not control.  |  |  |  |
| Explain and demonstrate the maximum dose rate outside the exposure facility. Preferably not to exceed 2.5 $\mu\text{Sv/h}$ (0.25 mR/h) at a distance of 1 meter, but must not exceed 7.5 $\mu\text{Sv/h}$ (0.75 mR/h). |  |  |  |
| Explain that enclosed installations must be provided with a sign stating the maximum rating and limitations on the primary beam directions established for that installation.  |  |  |  |
| <b>5. Storage Requirements</b>   |  |  |  |
| Explain that radioactive nuclides may not be stored on any premises zoned for domestic use.  |  |  |  |
| Explain that when in storage, sources must be in the "off" (fully shielded) position.  |  |  |  |
| Explain warning signs to be displayed at the entrance to storage facilities.   |  |  |  |
| Explain dose rates outside storage facilities must not exceed 2.5 $\mu\text{Sv/h}$ (0.25 mR/h)   |  |  |  |
| Demonstrate the notices containing the names and telephone numbers of contact persons in the event of an emergency.  |  |  |  |
| Explain that storage facilities must be lockable and unauthorized entry shall not take place.  |  |  |  |
| Explain that it is the responsibility of the authorized radiographer to personally return the source to the store and may not be delegated to the assistant or trainees.   |  |  |  |
| Explain and demonstrate the use of RN 780, log of gamma equipment.   |  |  |  |
| Explain that sources may not be stored with, or in close proximity to any corrosive, combustible or explosive materials.   |  |  |  |
| Explain that outside storage facilities must be weatherproof.  |  |  |  |
| Explain the security measures required at storage facilities.  |  |  |  |
| Explain that a vehicle containing a source may not be left unattended and the exception thereof.   |  |  |  |
| Explain the use of sources in isolated high-risk areas.  |  |  |  |
| <b>6. Radiography in Shielded Enclosure</b>  |  |  |  |
| Explain that a shielded exposure facility is an exposure bay with walls, maze and portable equipment.  |  |  |  |
| Explain and demonstrate the Sources that may be used and the specific work to be carried out.  |  |  |  |
| Explain and demonstrate the check for Air scattering of radiation (or 'sky shine') and scattering from objects outside enclosures without shielded roof.   |  |  |  |
| Explain and demonstrate Door interlocks.   |  |  |  |
| Explain and demonstrate Warning signals and notices.   |  |  |  |

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| Explain and demonstrate Emergency stop buttons or pull-cords.   |  |  |  |
| <b>7. Procedures for Radiography in Shielded Enclosure</b>  |  |  |  |
| Explain the Level of competence required for gamma radiographers  |  |  |  |
| Demonstrate the availability of written operating procedures and emergency procedures.  |  |  |  |
| Demonstrate the Use of radiation survey meter during entry to shielded enclosure.   |  |  |  |
| Explain and demonstrate Dose rates outside the shielded enclosure including reference levels.   |  |  |  |
| Explain and demonstrate the check for Functionality of the survey meter at the beginning of each shift.   |  |  |  |
| Explain Verification that no one is inside before exposure.   |  |  |  |
| Explain Procedures for radiographing unusually long items that do not fit behind closed doors.<br>(Use site radiography procedure)  |  |  |  |
| <b>8. Procedures for Site Radiography</b>   |  |  |  |
| Explain that a qualified radiographer must be physically present at all times during radiography work, and they <b>assume full responsibility</b> for actions of trainees.  |  |  |  |
| Explain the need for work permit procedures and demonstrate completion of documentation. (Own Organisation and Client)  |  |  |  |
| Explain and demonstrate Preparation for site radiography.   |  |  |  |
| Explain Cooperation with the client.  |  |  |  |
| Explain and demonstrate Demarcating the boundary of the controlled area.  |  |  |  |
| Demonstrate Warning signals.  |  |  |  |
| Demonstrate Notices.  |  |  |  |
| Explain the use of TLD's and digital audible-alarm dosimeters with a history function.  |  |  |  |
| Explain that radiography equipment must be checked daily by the radiographer before use and after use and records are kept.   |  |  |  |
| Explain and demonstrate the use of collimators and additional shielding.  |  |  |  |
| Explain calculation off and erection of barriers to ensure instantaneous dose rate at the barrier does not exceed 10 $\mu$ Sv/h (1mR/h).  |  |  |  |
| Explain that during the course of work, no individual is exposed in excess of: <ul style="list-style-type: none"> <li>Workers not wearing Personal dosimeters : 20<math>\mu</math>Sv (2 mrem) in any one day;</li> <li>Members of the Public: 4<math>\mu</math>Sv (0.4 mrem) in any one day.</li> </ul> |  |  |  |
| Explain and demonstrate Patrolling and monitoring the boundary.   |  |  |  |
| Explain and demonstrate Monitoring with portable survey meters and Personal dosimeters and alarm monitors.  |  |  |  |
| Explain Selection of lowest activity source consistent with obtaining the desired radiograph.   |  |  |  |
| Explain Benefits of using lower activity sources.   |  |  |  |

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| Explain Good working order of equipment.   |  |  |  |
| Explain Transient dose rates. <i>(Dose rates outside the boundary when the source is in its collimator during wind-out and wind in operations for radiography source will be much higher than the dose rates during actual exposure. Additional care should be taken during these operations, especially to confirm that there are no persons standing at the boundary of the controlled area, and wind-out and wind-in operations should be conducted quickly).</i> |  |  |  |
| Explain Storage of sources at remote locations.  |  |  |  |
| Explain Completion of work and removal of source from site.  |  |  |  |
| <b>9. Radiation Monitoring Requirements</b>  |  |  |  |
| Explain that no radiation worker may perform industrial radiography without a TLD issued in his/her name. <i>(Members of a radiography team must not be issued with BLANK TLD's)</i>   |  |  |  |
| Explain that all members of industrial teams, as well as any other workers who are likely to receive more than 200 µSv during any one day must be issued with a direct-reading dosimeter or a digital audible-alarm dosimeter, with a full-scale deflection of at least 2 mSv (200 mR)   |  |  |  |
| Explain that daily doses must be accurately recorded, and such records be kept for at least 5 years.   |  |  |  |
| Explain that these dosimeters must be checked for correct response at periods not exceeding 26 months.   |  |  |  |
| Explain that dosimeters must be worn at all times during the course of their work.   |  |  |  |
| Explain that a radiographic team performing radiography in an open area must use a radiation monitor (dose-rate meter) with a range sufficient to measure 10 µSv/h (1R/h) and that it requires calibration every 7 months.   |  |  |  |
| Explain that work must not be carried out unless dosimeters and monitors are in proper working order.  |  |  |  |
| <b>10. Dose Limitations</b>  |  |  |  |
| Explain that radiation doses to individuals must at all times be kept as low as is reasonable achievable (ALARA).  |  |  |  |
| Explain that radiation doses to individuals (including themselves) do not exceed the limits specified. <i>(Code of Practice, section 10)</i>   |  |  |  |
| Explain the information regarding medical examinations and blood tests.  |  |  |  |
| <b>11. Transport of Radioactive Sources</b>  |  |  |  |
| Explain and demonstrate Movement of sources within the worksite.   |  |  |  |
| Explain and demonstrate Transport of sources to another site.  |  |  |  |
| <b>12. Emergency Procedures</b>  |  |  |  |
| Explain emergency plans  |  |  |  |
| Explain Types of emergency as identified and included in organisations assessment repots.  |  |  |  |
| Explain regular audits   |  |  |  |
| Explain the immediate action to be taken in order to prevent excessive radiation doses.  |  |  |  |
| Explain the internal and external notification procedures.   |  |  |  |

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| Explain and demonstrate the procedures for dealing with the incident and returning the situation to normal.  |   |  |  |
| Explain if a direct-reading or digital audible dosimeter is found to be off-scale, the exposure must be terminated immediately and the occurrence must be treated as a suspected overexposure. |   |  |  |
| Explain training exercises   |   |  |  |
| <b>13. Practical Training</b>  | <i>The Trainee is to physically perform the following as relevant</i> |  |  |
| <b>Prior to operations</b>   |   |  |  |
| Use a direct reading dosimeter, audible dosimeter, dosimeter issued by licensed dosimetry service, and radiation survey meter.   |   |  |  |
| Turn on alarming dosimeter and survey meter before starting exposure.  |   |  |  |
| Check power level of batteries.  |   |  |  |
| Check equipment for valid calibration dates.   |   |  |  |
| Zero DRD prior to use and ensure a minimum of 2 mSv (200 mR) total dose range  |   |  |  |
| Continuity/Function check for radiation detection equipment  |   |  |  |
| Sign out of the exposure device  |   |  |  |
| Survey and record surface dose rates on the exposure device. «2 mSv/hr)  |   |  |  |
| Use all required daily records required by Authority Holder  |   |  |  |
| Check that emergency equipment is available and in working condition   |   |  |  |
| Perform a job hazard assessment of work area   |   |  |  |
| Procedure to quarantined broken or deficient equipment   |   |  |  |
| Post sufficient # of signs and barriers to prevent entry into area   |   |  |  |
| Evacuate persons from the controlled area  |   |  |  |
| Place equipment safely to prevent any incidents  |   |  |  |
| Use the survey meter during equipment assembly prior to operation  |   |  |  |
| Perform equipment checks prior to operation  |   |  |  |
| Device checks - Company contact labels (name/phone #), source radiation label, fasteners, shipping plug/safety, and cover protective covers.   |   |  |  |
| Remote control checks- handle, fittings, protective covers and inspect the length for cuts, dents, or damage   |   |  |  |
| Remote control drive cable checks - free movement, flex test, visual check for fraying, kinks, or corrosion  |   |  |  |
| Head hose/guide tube - Checks fittings, connectors, threads, source stop and length of conduit for dents, cuts, damage or debris that may affect safe operation                                |   |  |  |
| Source assembly (go/no go gauge-if applicable)   |   |  |  |
| Collimator and/or effective use of shielding   |   |  |  |
| Connect the remote controls, the guide tube, collimator and device together to prepare for an operation.   |   |  |  |

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| Use of transportation over pack   |  |  |  |
| Use of emergency equipment requirements   |  |  |  |
| <b>During operations</b>  |  |  |  |
| Proper use of survey meter  |  |  |  |
| Unlock and safely connect the exposure device and associated equipment in the correct order according to the manufacturer's specification.  |  |  |  |
| Expose the source   |  |  |  |
| Verify barrier dose rates and radiation warning sign positions on first exposure using the survey meter   |  |  |  |
| Retract the source  |  |  |  |
| Observe the survey meter and alarming dosimeter during source movement  |  |  |  |
| Observation of proper operation and location of source position indicator (cable drive only)  |  |  |  |
| After each attempt to move the sealed source assembly to the shielded position within the exposure device, use a radiation survey meter to ensure that the source assembly has returned to the safe shielded position |  |  |  |
| Operational procedures are followed   |  |  |  |
| Implementation of ALARA and basic radiation protection principles   |  |  |  |
| <b>Post Exposure</b>  |  |  |  |
| Survey post exposure  |  |  |  |
| Ensure the safety lock indicates that the source is locked and in safe position (may not be applicable for some devices)  |  |  |  |
| Disassemble the equipment in the correct order according to the manufacturer's specifications   |  |  |  |
| Install retaining plug and/or port cover/cap  |  |  |  |
| Secure and lock the exposure device, properly store with protective covers and caps   |  |  |  |
| Final site survey sweep   |  |  |  |
| Removal of posted radiation warning signs and barriers  |  |  |  |
| Sign exposure device back in to secure storage area   |  |  |  |
| <b>Record Keeping</b>   |  |  |  |
| Accurately record daily doses measured by direct-reading dosimeter.   |  |  |  |
| Signing out device (dates/locations of use)   |  |  |  |
| Survey reading on surface of device   |  |  |  |
| Documenting equipment checks required by Authority Holder   |  |  |  |
| PAR - push/pull length & flex test, spring length (end coiled over) & kinks   |  |  |  |
| DRD readings  |  |  |  |
| Trainee supervisor consent form   |  |  |  |



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| <b>Emergency Preparedness</b>   |           |  |  |
| Recognize an emergency situation  |           |  |  |
| Location of required emergency equipment  |           |  |  |
| Location of emergency procedures  |           |  |  |
| Initial emergency steps in an emergency   |           |  |  |
| Use of Long Handled Tongs and shielding material  |           |  |  |
| Correct contact information   |           |  |  |
| <b>Transportation</b>   |           |  |  |
| Verifying the device is locked and secured  |           |  |  |
| Using the appropriate shipping document   |           |  |  |
| Use of Type A and Type B package requirements.  |           |  |  |
| Use of proper labelling/placarding with the radiation symbol, UN#, contact information.   |           |  |  |
| Placing the equipment correctly within the vehicle for transport.   |           |  |  |
| <b>Security</b>   |           |  |  |
| Controlling the device throughout operations.   |           |  |  |
| Locked the device and securing it inside two (2) levels of locked enclosure and the expected response to an alarm in the event of an attempted intrusion. |           |  |  |
| Explain and demonstrate Storage of radioactive sources.   |           |  |  |
| Explain leak tests and whom should do these tests.  |           |  |  |
| <b>Actual Hours</b>   |           |  |  |
| <b>Required Hours</b>   | <b>40</b> |  |  |

**Remarks:**







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|  |       |            |       |
| I the RPO declare that the trainee has successfully completed the training as per this logbook and is ready for final assessment by the Responsible Registered RT Level 3. | Name: | Signature: | Date: |
| I the Authority Holder declare that the trainee has successfully completed the training as per this logbook.   | Name: | Signature: | Date: |