



THE UNIVERSITY OF
MELBOURNE

RADIATION SAFETY



Portable Density/ Moisture Gauge Radiation Management Plan

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1. PURPOSE

The Portable Density/Moisture Gauge Radiation Management Plan (Plan) outlines the University of Melbourne requirements for the safe use of a portable density/moisture gauge containing a radioactive source¹.

2. SCOPE

The Plan applies to all personnel controlling, using, accessing, storing, transporting and maintaining portable density/moisture gauges at the University of Melbourne.

All personnel involved in activities (as listed above) with a neutron probe shall read the Plan.

3. REFERENCES

Radiation Act 2005 (Vic)

Radiation Regulation 2007 (Vic)

Code of Practice and Safety Guide: Portable Density/Moisture Gauges Containing Radioactive Sources (Commonwealth)

Code of Practice for the Safe Transport of Radioactive Material (Commonwealth)

Radiation Safety Standard. Standard for Sealed Radioactive Substance Incorporated in Sealed Source Apparatus Used to Carry Out Moisture/Density Measurements (Qld)

Ionising Radiation Risk Management (UOM 324)

University of Melbourne Radiation Management Plan

4. RESPONSIBILITIES

4.1 General Responsibilities

General responsibilities with regards to ionising radiation are outlined in the University of Melbourne procedure *Ionising Radiation Risk Management (UOM 324)* and the University of Melbourne *Radiation Management Plan*.

4.2 Specific Responsibilities

4.2.1 University of Melbourne Radiation Safety Advisor

The University of Melbourne Radiation Safety Advisor or their delegate shall manage and control University of Melbourne portable density/moisture gauges to ensure compliance to:

- legislation;
- University of Melbourne requirements; and
- this Plan.

¹ The radioactive source is normally referred to as the "probe".

The University of Melbourne Radiation Safety Advisor (or delegate) shall ensure that:

- personal monitor results are:
 - monitored;
 - reviewed; and
 - recorded.
- remedial or corrective action is undertaken where personal monitor results are above the radiation levels of exposure as outlined in the University of Melbourne *Radiation Management Plan*;
- local risk assessments and standard operating procedures (SOP) are assessed prior to undertaking activities associated with portable density/moisture gauges;
- wipe tests (also referred to as a leak test) are conducted and recorded annually;
- licensing requirements are identified and documented in accordance with the Plan, including;
 - portable density/moisture gauges are listed on the University of Melbourne Radiation Management License; and
 - authorised users hold a current Use License;
- security requirements are met for portable density/moisture gauges when not in use.

4.2.2 Authorised User

The Authorised Portable Density/Moisture Gauge User (Authorised User) shall hold a current Use License issued by the Department of Health.

The Authorised User shall justify using a portable density/moisture gauge by providing:

- the evidence (eg research project) that an activity requires its use;
- the planned locations of its use; and
- the planned dates of its use.

The Authorised User shall ensure that:

The Authorised User shall ensure that:

- risk assessments and SOP are developed and maintained prior to undertaking activities associated with portable density/moisture gauges;
- risk assessments and SOP are assessed by the University of Melbourne Radiation Safety Advisor (or delegate) prior to undertaking activities associated with portable density/moisture gauges;
- personnel undertaking activities associated with the portable density/moisture gauge have read and are familiar with the associated risk assessment and SOP;
- personnel undertaking activities associated with the portable density/moisture gauge have completed radiation training – *Safe Radiation Practices – Ionising*;

- personnel undertaking activities associated with the portable density/moisture gauge have completed radiation training – *Safe Radiation Practices – Neutron*;
- personnel undertaking activities associated with the portable density/moisture gauge hold a current Department of Health Use Licence;
- passengers that are not trained or licensed to use a portable density/moisture gauge are briefed on emergency procedures;
- personal monitoring devices are worn by themselves and the personnel undertaking activities associated with the portable density/moisture gauge (see Section 7.1);
- emergency procedures are immediately put into effect where required (see Section 8);
- damage to a portable density/moisture gauge is reported as soon as reasonably practicable (see Section 8);
- storage and transport requirements are met as outlined in Section 9; and
- security requirements are met for a portable density/moisture gauge under their direct supervision.

4.2.3 Authorised Assistant

The Authorised Portable Density/Moisture Gauge Assistant (Authorised Assistant) shall hold a current Use Licence issued by the Department of Health.

The Authorised Assistant shall ensure that:

- risk assessments and SOP are identified and read prior to undertaking the activity;
- risk assessments and SOP are complied with;
- a personal monitor is worn when undertaking activities associated with the portable density/moisture gauges (see Section 7.1);
- passengers that are not trained or licensed to use a portable density/moisture gauge are briefed on emergency procedures; and
- incidents are immediately reported to the Authorised User.

4.2.4 Passengers

Passengers who travel in the car with an Authorised User/Authorised Assistant and are not trained or licensed to use a portable density/moisture gauge shall ensure that all emergency procedures and instructions are complied with.

5. GENERAL REQUIREMENTS

5.1 Contacts

The following table lists the University of Melbourne portable density/moisture gauge radiation safety contact during an emergency.

RADIATION SAFETY EMERGENCY CONTACTS

Title	Phone Number
Emergency telephone number	8344 6666

The following table lists the University of Melbourne portable density/moisture gauge radiation safety contacts.

RADIATION SAFETY GENERAL CONTACTS

Title		Phone Number	Email
Steve Guggenheimer	University of Melbourne Radiation Safety Advisor	8344 3052 0411 111 265	s.guggenheimer@unimelb.edu.au
Susan Butler	Manager, OHS Common Services	8344 3085 0448 717 986	susanb@unimelb.edu.au
David Keizer	Parkville campus Radiation Store portable density/moisture gauge radiation contact	8344 2218 0407 779 524	dkeizer@unimelb.edu.au
Carmel Lancaster	Dookie campus Radiation Store portable density/moisture gauge radiation contact	5833 9241	carmell@unimelb.edu.au

Note: A local area may have additional emergency or other contact requirements. These should be identified and highlighted in the local risk assessment and/or SOP.

5.2 Minimum Requirements Density/Moisture Gauge

University of Melbourne minimum requirements of a radioactive source for portable density/moisture gauges is per the *Radiation Safety Standard, Standard for Sealed Radioactive Substance Incorporated in Sealed Source Apparatus Used to Carry Out Moisture/Density Measurements (Qld)*.

[Minimum Requirements of a Radioactive Source for Portable Density/Moisture Gauge \[.pdf\]](#)

6. WORK PRACTICES

6.1 Risk Assessment and Controls

The General Manager OHS & Injury Management (or delegate) shall develop, maintain and publish a risk assessment for each portable density/moisture gauge:

- CPN503DR Hydroprobe (H36117263) – Parkville
- CPN503DR Hydroprobe (H37107953) – Parkville
- CPN503DR Hydroprobe (H37107954) – Dookie
- CPN503DR Hydroprobe (H39078993) – Parkville

The portable density/moisture gauge risk assessments take into account risks associated with the plant and, with the exception of the outdoor environment, do not consider risks that are associated with the task/activity being undertaken. Therefore Authorised Users shall ensure that they develop and maintain a risk assessment for the activity they are undertaking.

The portable density/moisture gauge risk assessments have been undertaken using the University of Melbourne Plant Risk Assessment Template. The following risk assessment templates should be considered when assessing the risks associated with the activity:

- [2-Variable Risk Assessment](#)
- [3-Variable Risk Assessment](#)

- [2-Variable Task Risk Analysis](#)
- [3-Variable Task Risk Analysis](#)

The General Manager OHS & Injury Management (or delegate) shall develop, maintain and publish a SOP for each portable density/moisture gauge.

- CPN503DR Hydroprobe (H36117263) – Parkville
- CPN503DR Hydroprobe (H37107953) – Parkville
- CPN503DR Hydroprobe (H37107954) – Dookie
- CPN503DR Hydroprobe (H39078993) – Parkville

In addition to the above SOP the Authorised User shall ensure that they develop and maintain a SOP for the activity they are undertaking.

[SOP Template](#)

6.2 Training and Licensing

In accordance with the University procedure *Ionising Radiation Risk Management (UOM 324)* the General Manager OHS & Injury Management shall maintain a radiation Management Licence that includes the portable density/moisture gauges.

6.2.1 Authorised User

The Authorised User undertaking any activity associated with a portable density/moisture gauge is required to:

- successfully complete in-house training “Safe Radiation Practices – Ionising”;
- successfully complete in-house radiation training “Safe Radiation Practices – Neutron”;
- successfully complete the Department of Health examination “Radiation Protection in the Use of Nuclear Density Moisture Gauges”;
- demonstrate competency² to use and supervise Authorised Assistants participating in portable density/moisture gauge activities; and
- obtain a Use Licence from the Department of Health.

[Portable Density/Moisture Gauge Competency Checklist](#)

6.2.2 Authorised Assistant

The Authorised Assistant undertaking any activity associated with a portable density/moisture gauge shall be:

- under the supervision of an Authorised User.

The Authorised Assistant is required to:

- successfully complete in-house training “Safe Radiation Practices – Ionising”;
- successfully complete “Safe Radiation Practices – Neutron”;

² Competency will be assessed by the Radiation Safety Advisor (or delegate).

- successfully complete the Department of Health examination “Radiation Protection in the Use of Nuclear Density Moisture Gauges”;
- demonstrate competency³ to use a portable density/moisture gauge; and
- obtain a Use Licence from the Department of Health.

6.2.3 Passengers

Passengers who travel in the car with an Authorised User/Authorised Assistant and are not trained or licensed to use a portable density/moisture gauge shall be:

- briefed on the emergency procedures.

7. MONITORING REQUIREMENTS

7.1 Personal Monitoring Devices

A personal monitoring device capable of monitoring the type of radiation emitted by the portable density/moisture gauge will be supplied to all Authorised Users and Authorised Assistants using a portable density/moisture gauge. This will normally be issued to the Authorised when taking control of a portable density/moisture gauge.

Personal monitor results will be screened by the Radiation Safety Advisor (or delegate) in accordance with the University of Melbourne Radiation Management Plan.

Personal monitor results shall be documented and maintained in accordance with the University of Melbourne Radiation Management Plan.

7.2 Survey Meters

A survey meter capable of monitoring the type of radiation emitted by the portable density/moisture gauge will be supplied to the Authorised User when taking control of a portable density/moisture gauge.

8. EMERGENCY

8.1 Immediate Response

Immediate portable density/moisture gauge response requirements for the Authorised User and the Authorised Assistant shall be in accordance with the University of Melbourne SOP⁴ (Section 6.1) and include:

- secure area – at least 5 meters
- secure gauge from further damage
- prevent unauthorised access
- keep supervised until appropriate help arrives
- provide shielding if required

³ Competency will be assessed by the Authorised User.

⁴ As per the relevant SOP CPN503DR serial number H36117263, H37107953 or H37107954

- provide first aid if required
- report immediately to the emergency contact: 03 8344 6666

8.2 Follow Up

Following notification of an incident the University of Melbourne Radiation Safety Advisor (or delegate) shall commence follow up actions in accordance with University of Melbourne Radiation Emergency and Compliance Procedures.

Follow up procedures shall take into account:

- notification to the Department of Health, in accordance with the Department of Health publication *Radiation Incident Reporting Requirements*;
- implementation of appropriate measures and controls to mitigate risks associated with the incident;
- estimation of radiation doses that are known or suspected as a result of the incident; and
- submission of personal monitoring devices for assessment.

The Radiation Safety Advisor (or delegate) shall investigate and record the incident in accordance with the University of Melbourne procedure *Incident Reporting and Investigation – EHS Requirements (UOM 364)*.

9. STORAGE AND TRANSPORT

9.1 Storage

9.1.1 Radiation Store

The portable density/moisture gauges shall be stored at the University of Melbourne radiation stores, Parkville and Dookie campuses. Storage arrangements are outlined in the University of Melbourne *Radiation Management Plan* and take into account:

- security requirements including restricted access by authorised personnel only;
- expected radiation levels;
- physical protection of the gauges – kept in secured case, appropriately labeled with the source (probe) fully retracted and in the key locked position;
- separation from explosives and dangerous goods (combustibles, corrosives and oxidisers); and
- labelling and signage requirements.

The Parkville campus radiation store normally holds:

- CPN503DR Hydroprobe (H36117263);
- CPN503DR Hydroprobe (H37107953) ; and
- CPN503DR Hydroprobe (H39078993).

The Dookie campus radiation store normally holds:

- CPN503DR Hydroprobe (H37107954).

9.1.2 In the Field

Where a portable density/moisture gauge is under the control of an Authorised User, secure storage requirements shall include the following criteria:

- physical protection of the gauges – stored in a secured case with the source (probe) fully retracted and in the key locked position;
- labeled appropriately;
- expected radiation levels are not exceeded (as outlined in the SOP);
- controlled and under their supervision; and
- placarding and signage requirements are met.

9.2 Transport

The following is required when transporting a portable density/moisture gauge:

- the source (probe) is fully retracted and key locked in the shielded position;
- the portable density/moisture gauge is locked in the supplied case;
- the portable density/moisture gauge is stored away from the vehicle occupants as far as possible;
- the portable density/moisture gauge is secured to mitigate shock and vibration; and
- radiation signs, in accordance with the *Code of Practice for the Safe Transport of Radioactive Material*, are displayed on the vehicle (sides and back).

10. RADIATION LEVELS

Expected radiation levels shall be in accordance with University of Melbourne risk assessments and University of Melbourne procedure *Ionising Radiation Risk Management (UOM 324)*.

Expected radiation levels whilst working shall be identified for each portable density/moisture gauge and documented on the risk assessment and SOP (<1mSv per year).

11. MAINTENANCE AND REPAIRS

11.1 Maintenance

Prior to the first use of a gauge, and at intervals not exceeding 12 months, the Radiation Safety Advisor or delegate shall ensure that the gauge is examined to:

- ensure that the gauge complies with Schedule B of the *Code of Practice and Safety Guide: Portable Density/Moisture Gauges Containing Radioactive Sources*;
- ensure the gauges is free of any damage or wear;
- demonstrate that the source assembly and retraction mechanism operate correctly and safely;
- demonstrate that the gauge performs satisfactorily when used in accordance with the manufacturer's instructions;

- confirm that all labels are still intact, appropriately fitted, and legible;
- demonstrate that the dose rates does not exceed those specified in clause B2.1 of Schedule B of *Code of Practice and Safety Guide: Portable Density/Moisture Gauges Containing Radioactive Sources*; and
- ensure that the shutter or source control mechanism, where fitted, operates correctly and is free of dirt or other clogging agent.

The Radiation Safety Advisor (or delegate) shall ensure that for each portable density/moisture gauge:

- an annual wipe test is completed and recorded; and
- a five yearly service completed and recorded by a competent technician.

The Radiation Safety Advisor (or delegate) shall ensure that each survey meter is calibrated annually.

11.2 Repairs

All repairs shall be undertaken by a competent technician who is licensed with the Department of Health and in accordance with University of Melbourne procedures;

- *Ionising Radiation Risk Management (UOM 324)*; and
- *Unsafe Plant and Equipment – EHS Requirements (UOM 347)*.

11.3 Damaged Equipment

Where a portable density/moisture gauge is found to be faulty or damaged any work/activity should cease immediately. The portable density/moisture gauge should be tagged out and removed from service in accordance with the University of Melbourne procedure *Unsafe Plant and Equipment: EHS Requirements (UOM 347)*.

Where there is a suspected radiation leak from the source (probe) the Authorised User shall commence emergency procedures as outlined in Section 8.

12. RECORDS

The Radiation Safety Advisor (or delegate) shall maintain auditable records including:

- maintenance of portable density/moisture gauges;
- calibration of survey meters;
- wipe test results;
- training – Authorised User;
- demonstrated competency – Authorised User;
- training – Authorised Assistant;
- demonstrated competency – Authorised Assistant;
- Use License holders;
- booking arrangements of portable density/moisture gauges;

- portable density/moisture gauges log sheets;
- incident records; and
- annual system review results.

13. BOOKING ARRANGEMENTS

Booking arrangements can be made:

- via telephone (see Radiation Safety General Contacts – Section 5.1); or
- online.

The online booking arrangements for portable density/moisture gauges are available for Authorised Users only. The Authorised User can apply for access to online booking through the Parkville campus contact (Section 5.1).

At the time of booking the portable density/moisture gauge, the Authorised User/Authorised Assistant shall provide:

- the evidence (eg research project) that an activity requires its use;
- the planned locations of its use; and
- the planned dates of its use.

14. ADDITIONAL EQUIPMENT

When a portable density/moisture gauge is issued to an Authorised User the following additional equipment shall be provided:

- manufacturer's/supplier's operating manual;
- University of Melbourne risk assessment;
- University of Melbourne standard operating procedure;
- portable density/moisture gauge log sheet (or equivalent);

[Portable Density/Moisture Gauge Log Sheet](#)

- survey meter;
- personal monitoring badge(s);
- portable density/moisture gauge charger;
- chain and padlock;
- placards (3);
- radiation signs;
- tag out labels; and
- emergency equipment (hazard tape).

The Authorised User/Authorised Assistant is required to supply the first aid kit.

15. PLAN REVIEW

The General Manager OHS & Injury Management shall ensure that the implementation of the Plan shall be reviewed triennially.

Criteria for review shall include:

- accident/incident data;
- changes to relevant legislation, Standards, Codes of Practice;
- Authorised User details and licensing;
- Authorised User competency;
- Authorised User risk assessments and SOP;
- Training:
 - Authorised User
 - Authorised Assistant
- records and results of calibration and maintained of equipment and portable density/moisture gauges;
- personal monitor records and results; and
- security and storage arrangements.

<LINK pending: Plan Review Template>