

University Health & Safety Arrangements: Chapter 25



Ionising Radiation Safety

Target audience: Heads of School, Principal Investigators, all staff and students working with sources of ionising radiation.

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Introduction

1. This document, University Arrangements Chapter 25, should be read alongside [Health and Safety Executive \(HSE\) publication 'Work with ionising radiation' L121 \(2nd Ed.\) 2018](#) . University Arrangement [Chapter 4 'Radiation Safety'](#) also describes the framework for managing activities using ionising radiation within the University, and outlines the responsibilities of different personnel who approve, manage, supervise and carry out work involving ionising radiation.
2. The University of Manchester has responsibility for the management, development and control of work with sources of ionising radiation, for the operation of systems and source accountancy, and also for developing and promulgating knowledge and understanding of radiological protection. The University must ensure compliance with all legislation governing work with sources of ionising radiation. The University uses a large number and range of radiation sources in its teaching and research.
3. Health and safety arrangements are generally made and enforced locally, with the central Radiation Safety Unit (RSU) providing oversight, policy direction, technical and regulatory expertise and guidance.
4. All purchases of ionising radiation sources must be arranged with the approval of the Radiation Safety Unit (RSU) so that the University complies with the terms and conditions of the consents, registrations and permits to keep and dispose of them. To comply with this, users must follow [SOP-23 Purchase of Radioactive Sources](#).
5. The statutory landscape within which the University operates is complex, being framed by the;
 - Ionising Radiations Regulations 2017 (IRR17), which apply to the use of sources of ionising radiation in radiation practices⁽¹⁾.
 - Environmental Permitting (England & Wales) Regulations 2016⁽²⁾ amended by the Environmental Permitting (England & Wales) (EPR) Regulations 2018 which apply to the holding, use and authorised disposal of radioactive materials, and which are discussed in Department for Energy Security & Net Zero (DESNZ) guidance.
 - Scope of And Exemptions from the Radioactive Substances Legislation in England, Wales and Northern Ireland (May 2024).
 - Radiation (Emergency Preparedness and Public Information) Regulations 2019 (REPPPIR), which apply to quantities of certain radioactive materials above specific threshold values.
 - Nuclear Safeguards (EU Exit) Regulations 2019 ([NSR19](#)) which apply to the accountancy, control, tracking, reporting, import/export notification, and regulatory oversight of qualifying nuclear materials such as uranium and thorium.
6. The primary purpose of this Arrangements Chapter is to set in writing the requirements that **must** be followed to ensure that;
 - the University operates within the scope of the consents and permissions laid down by the Environment Agency and Health and Safety Executive
 - and that all radiation exposures are As Low As Reasonably Practicable (ALARP³)

7. The governance structure by which the University manages radiation security and radiological protection can be found in the ancillary Health and Safety Arrangements [Chapter 4 'Radiation Safety'](#), which must be read and understood along with this chapter.

Justification, optimisation, dose limitation and people

8. The corner stone of radiological protection, as laid down by the International Commission on Radiological Protection (ICRP³) are that practices must be justified, optimised and comply to dose limits.
 - **Justification:** A particular use of ionising radiation cannot be justified unless there is a net benefit arising from that use - and there are no viable alternative approaches.
 - **Optimisation:** all practices must be planned so as to reduce the potential for, and magnitude of, exposures. This can be achieved using the philosophy of "time, distance, shielding and activity" as described in [paragraph 30](#) of this document.
 - **Dose Limits:** all exposures must comply with strict statutory dose limits, which in UK legislation⁽¹⁾ means persons are restricted by annual dose limits. The limits that are included in UK legislation are based on the fundamental limits recommended by ICRP. This will be covered in more detail later in Dose limitation, investigation level and overexposure.
 - **People:** The University will treat students as employees in respect of radiological protection, although dose limitations for undergraduate students is set to achieve the lower public limits.

The management of ionising radiation safety

9. Radiation safety and radiological protection arrangements will be managed locally on a day-to-day basis, with oversight provided by the Radiation Safety Unit (RSU). Centrally, RSU will supply governance, technical support, regulatory expertise, and guidance across all areas. When the University operates in shared facilities, the RSU will cooperate with other employers on radiation protection arrangements to ensure regulatory compliance is achieved in (for example, the PET-MR Group).
10. Inventories of radioactive materials, records of transfers and of radioactive waste disposals will be held 'locally', i.e. in Schools with respect to 'local' Environment Agency Permits as detailed in [SOP-26 Apply for a Local Permit](#).
11. The Head of Radiological Safety who is also the Radiation Protection Officer (RPO), the Radiation Safety Unit (RSU) and Radiation Protection Supervisors (RPSs) within individual University Schools will coordinate day-to-day management of radiological safety for the Central Campus. Local Management will be subject to advice from the appointed radiation protection advisor (RPA) / radiation waste advisor (RWAs), and for Dalton Cumbria Facility by the Head of Operations – Dalton Nuclear Institute.
 - Day-to-day management of radiological safety at the University of Manchester Main Campus, Dalton Cumbria Facility (DCF), Wolfson Molecular Imaging Centre (WMIC) and Oglesby Cancer Research Building

- will be carried out by the site RPSs in association with the RSU and Nuvia RPA / RWA / Medical Physics Expert.
- Day-to-day management of radiological safety at the Cancer Research UK Manchester Institute (CRUK-MI), the Proton Therapy Group (Christie Hospital) and the Carys Bannister Dental Education Centre will be carried out by the appointed RPSs and with Christie Medical Physics and Engineering as appointed RPA / RWA / Medical Physics Expert.
 - Day-to-day management of radiological safety at the PET-MR centre (St Mary Hospital) in the Manchester Foundation Trust will be carried out by the site RPSs in association with Manchester Foundation Trust (MFT) RPA / RWA / Medical Physics Expert.
12. The Head of Radiological Safety Unit is ultimately responsible to the University Registrar and Chief Operating Officer through the Head of Safety Services.
 13. The role of the Radiation Safety Unit (RSU) is described in the University Health and Safety Arrangements [Chapter 4](#).
 14. Oversight of radiological safety is undertaken by the Radiation Safety Advisory Group (RSAG), which meets quarterly before the university Health Safety and Wellbeing (HSW) Committee that is chaired by the Registrar and Chief Operating Officer (see Arrangements [Chapter 4](#)). RSAG is attended by the chair of the Ionising Radiation Safety Working Group (IRSWG) and the Non-Ionising Radiation Safety Working Group (NIRSWG), Trades Union Representatives of the University as well as other safety coordinators and faculty members.
 15. The latest radiation safety information and resources can be found at the Radiation Safety Unit's web pages at www.staffnet.manchester.ac.uk/rsu/.

Procedures

Permits, registration and consents

16. A certificate has been issued by the HSE, under IRR17 Reg. 6 to provide for the uses of radiation generators (X-rays), artificial radionuclides (e.g. H-3, C-14, P-32, P-33, S-35, I-125) and naturally occurring radionuclides processed for their radioactive properties (e.g. natural thorium and uranium salts). This effectively means that all routine uses of sources of ionising radiation have been notified to the HSE for all University sites including, for example, Central Campus, Dalton Cumbria Facility, WMIC.

Registration Certificate #IRR00013142.

17. Higher risk practices are permitted subject to HSE 'Consent' [IRR17 Reg.7] and on behalf of all University sites, RSU holds consent certificates for
 - The deliberate administration of radioactive substances to people or animals for medical or veterinary diagnosis, treatment or research #IRR00013143;
 - The deliberate addition of radioactive substances in the production or manufacture of consumer products or other products, including medicinal products #IRR00014054
 - Operation of an accelerator (except when operated for industrial radiography or industrial irradiation purposes and except an electron microscope) #IRR00013145;

- Working with a high-activity sealed source (HASS) (except for industrial radiography or industrial irradiation purposes) #IRR00013144;
 - Industrial radiography #IRR00029986.
 - Temporary consent for industrial irradiation TEMPCON4845094
18. For premises where University and NHS (for example) workers occupy shared premises on a collaborative basis the University consents are matched by NHS consents and ensure both radiation employers are cooperating in the spirit of IRR17 Reg. 16.
 19. Schools may provide the details above to suppliers to secure purchases of equipment, such as hand-held X-ray devices, although permission to purchase should first be obtained from RSU. Further instruction on the acquisition of radioactive materials and devices is given below.
 20. The uses of radioactive materials and the accumulation and disposal of waste is subject to the terms and conditions of permits issued by the Environment Agency under the Environmental Permitting Regulations. The Permits held are as follow:

Type of permit	Site	Permit Number	Date
Unsealed source Permit	South Campus	NP3893SR	13-Nov-2025
	Dalton Cumbria Facility	PB3454TK	22-Oct-2024
	CRUK-MI Paterson Building	AB3598DE	24-Jul-2023
	Wolfson Molecular Imaging Centre	YB3191DW	24-Feb-2023
	Proton Therapy Centre – Christie Hospital	ZB3891DK	25-Mar-2020
	PET-MR – St Mary Hospital	XB3694DK	11-Nov-2016
Sealed Source Permit	South Campus	LP3893SW	9-Jul-2025
	Dalton Cumbria Facility	VB3335DD	3-Oct-2024
Standard Rule Permit	Firs Botanical Grounds	XP3728XF	19-Jun-2023
	Wolfson Molecular Imaging Centre	PB2496DP	25-Jul-2022
	PET-MR – St Mary Hospital	XB3194DJ	26-Sep-2016

21. Local Permits:
 - Areas using open sources of ionising radiation on the south campus receive local permits that limit the holding and usage activities as well as disposal limits and conditions.
 - To acquire a new local permit or amend a local permit users are directed to [SOP-26 Apply for Local Permit](#).

Risk assessment

22. Written risk assessments must be made of all techniques and procedures which have radiation safety implications for staff or students. Risk assessments must be carried out in accordance with the specific requirements of IRR17, and associated Contingency Plans prepared, prior to the equipment being used or the technique being implemented. As a guide, Schools and research groups should each have a set of risk assessments that are tailored to their own practices, and each

assessment should be approved by the RPS and senior leader or a person authorised to act on their behalf (e.g. Head of School, a Head of Department or a Risk and Compliance Manager). These should have been completed in consultation with the RSU and/or the appointed RPA.

23. Risk assessments must be signed by the senior leaders or their nominated deputy (as written in each School's Safety Policy).
24. The RSU and colleagues have prepared several over-arching 'top level' template-style risk assessments that can be adopted by Schools and Research Groups as appropriate, although it may be the case that Schools may need to prepare their own bespoke assessments. These assessments must follow IRR Reg. 8(1-4) and in particular ACoP paragraphs 70 and 71.
25. Where appropriate the over-arching assessments must be supported by supplementary focused assessments that address relatively minor variations or practical considerations on how protocols are amended to reflect operational matters and variations, or how a task must be undertaken. These supplementary assessments should not necessarily follow the ACoP paragraphs as their value is in providing task specific detail and instruction in a concise, readable, and understandable manner.
26. All radiation workers must read and ensure they understand the conditions and requirements of the relevant risk assessments.
27. The RSU (or in the case of DCF the DNI Head of Ops) will consult with an appointed RPA on the suitability of risk assessments.

Restriction of exposure

28. In going further than the regulatory requirement the University will ensure that effective exposures are ALARP by ensuring that dose control measures make it unlikely that a person can receive an effective dose greater than 1 mSv/y.
29. Priority must be given to using engineering controls and 'defence in depth' and adopting other means to restrict radiation exposures.
30. RPSs will ensure that the philosophy of 'Time, Distance, Shielding and Activity' is considered at all times to ensure exposures are ALARP.
 - **Time:** reduce the time spent handling radioactive materials and / or being in proximity to sources of external radiation, which can be achieved by planning and rehearsing experiments
 - **Distance:** increase the distance between people and sources of ionising radiation, for example, use long tongs to handle source vials and sealed sources where possible after considering any loss of manual dexterity
 - **Shielding:** make use of Perspex (or lead impregnated) body shields, storage boxes and beta-cabs, and for strong beta and gamma emitters lead-lined safes to minimise external irradiations
 - **Activity:** use the minimum practicable quantity of radioisotopes to achieve good scientific results.
31. Further to the above, when using X-ray generators consider the operating parameters (kV, mA), hardness of the X-ray source, beam filtration and collimation, and also the current (kV and mA). Instantaneous external radiation dose rates must not exceed 7.5 μ Sv/h and preferably should not exceed 2.5

µSv/h in accessible locations: RSU must be informed where dose rates may possibly exceed 2.5 µSv/h.

32. The RSU must be consulted on the proposed use and thereafter on use for the first time, of X-rays generators. Critical examinations and periodic routine checks will be required as detailed in SOP-29 [Management of X-Ray Generating Equipment](#).
33. Volatile radioisotopes and solutions must only be used under local exhaust ventilation (that is inspected annually) such as fume cupboards, glove boxes, beta cabs or similar wherever reasonably practicable. Fume cupboards may be temporarily designated as Controlled Areas for the purposes of dispensing, in line with relevant risk assessments: seek the assistance of RSU.
34. Where sources of ionising radiation including X-ray generators are used in designated or radiation areas, suitable and sufficient warning notices, signs and labels must be posted ([template signs](#) can be found on the RSU website).

Personal Protection Equipment (PPE)

35. If required by a risk assessment, the University must provide suitable PPE for radiation workers and for use in responsive actions if an accident occurs.

Maintenance and engineering controls

36. Formal programmes of tests of active design features which are embedded within the building such as exhaust systems, LEV, the effectiveness of shielding, interlocks, annunciators, (usually annual) Planned Preventative Maintenance (PPM) programmes etc. must be established in liaison with Estates Services.
37. Passive controls for contamination such as the continued suitability of easy-to-clean surface, surface joints, drainage systems, etc. must also be periodically checked.
38. Equipment safety controls such as safety checks, leak test of sealed sources, equipment maintenance, etc. must be done periodically as indicated in the radiation risk assessment.
39. The condition of PPE e.g. eyewear, laboratory coats must be periodically checked.

Dose limitation, investigation level and overexposure

40. The regulations (IRR17 Schedule 3) specify dose limitations for employees, trainees and members of the public. To comply with these limits, the University has set annual dose limits matching, or more conservative than those set out in the regulations. These are summarised in
41. Table 1.
42. In addition, the university has set dose investigation levels which are shown in Table 2. For each level set there are actions proportionate to the exposure risks. These dose investigation levels are mainly set for users who are issued with dosimetry.
43. The university uses the UKHSA approved dosimetry service for dose monitoring.

Table 1: Dose limits to employees and visitors

Position	Additional Details	Dose limits (mSv/year)			
		Whole Body	Lens of the eye	Skin*	Extremities
Employee	Over 18	20	20	500	500
Employee	Under 18	6	20	150	150
Visitors	n/a	1	15	50	50

* Dose to the skin refers to the effective dose when averaged over an area of 1 cm².

Table 2. Dose investigation levels set for employees and visitors who are issued dosimetry badges.

Description	Dose levels (mSv per event*)		Action
	Whole Body / eye	Skin/Extremities	
Low effective dose	0.1 to 0.4	0.5 to 1.0	Doses reviewed to investigate weaknesses in radiation safety systems
Low trigger dose	0.4 to 1.0	1.0 to 10.0	Recorded in the RSAG reports and investigated by the RPS in conjunction with the RSU
High trigger dose	> 1.0	> 10.0	More detailed investigation where the radiation protection advisor (RPA) will be notified. This needs to be logged on the university events database by the safety advisor for the area

*Dose triggers can only be captured during periods where dosimetry has been worn and the doses calculated by UKHSA, these periods vary depending on the requirements of the facility so any reported event with a dose within these thresholds requires further investigation.

In

44. Table 1, there is a specified dose limit for visitors which allows for schools and colleges to visit radiation laboratories, subject to risk assessments etc.
45. The University does not permit employees or trainees under the age of 18 to work with radiation, although they may visit areas for the purposes of making observations.
46. Supervised (external) visitors may visit University laboratories to make observations, in accordance with School protocols for visitors.
47. Pregnant staff must additionally limit exposure to the abdomen to less than 2 mSv during the pregnancy, with an effective dose limit to the foetus of 1 mSv.

48. All doses are recorded and presented to the RSAG quarterly. An investigation report for particular doses (detailed below) will be considered by RSAG and (at least a summary) provided to the radiation worker.
49. Low effective doses, 0.1 to 0.4 mSv (whole body) are reviewed to investigate weaknesses in radiation safety systems.
50. Low trigger doses, 0.4 to 1 mSv (whole body) and/or 1 to 9 mSv (extremities) are recorded in the RSAG reports and investigated by the RPS in conjunction with the RSU. The purpose of the investigation is to determine the cause, identifying if it is a one-off event, a process failing, safety feature fault, shielding issues or a behavioural matter.
51. High trigger doses, greater than 1 mSv (whole body) and/or 10 mSv (extremities) lead to a more detailed investigation where the radiation protection advisor (RPA) will be notified. This needs to be logged on the university [events database](#) by the safety advisor for the area, a screenshot of the form can be seen in Figure 1.

MANCHESTER
1824
The University of Manchester

**ACCIDENT / NEAR MISS / INCIDENT
NOTIFICATION FORM**

Safety Services use only

[This form is to be used to notify Safety Services of an accident, near miss or incident at work (an 'event'). All mandatory fields (marked *) must be completed.

Completed forms should be sent immediately to: **Safety Services, Simon Building, Brunswick St, The University of Manchester, Manchester M13 9PL.** Or via email to: safetyservices@manchester.ac.uk

WHAT IS BEING REPORTED?

Accident (event involving injury to a person)
 Near Miss (person narrowly missed being injured)
 Incident (event involving no personal injury)

EVENT DETAILS

*Date of Event:	*Time (24hr clock):
*Building/Location:	Room No:
School/Admin Department where event took place:	

INJURED or NEAR MISS PERSON DETAILS
NB: At least one form of contact information must be provided (e.g. telephone or email address)

Employment status: <input type="checkbox"/> Staff <input type="checkbox"/> Student <input type="checkbox"/> Visitor <input type="checkbox"/> Contractor <input type="checkbox"/> Other (specify):		
First name:	Surname:	Staff/Student ID No:
Job Role:		Line Manager/Supervisor:
Tel No:		Email:
Faculty/Directorate/Institute:		School/Department/Division:
*Description of event: <i>Please describe what happened as accurately as you can, starting with what work activity was being undertaken at the time.</i>		

Figure 1: Screenshot of the Accident / near miss/ incident notification form

52. An exposure greater than 3/10th of the dose limit, e.g. 6 mSv (whole body) will lead to an investigation involving the RPA and the Head of Department. Doses to the public exceeding the public dose limits will also result in a similar investigation.
53. An overexposure, one in excess of any of the specified dose limits (

54. Table 1), will lead to a detailed investigation and notification to HSE. This will cover the following:
- the work routine of the worker and their colleagues;
 - the use of alarms and personal monitors;
 - any other known incidents the person may have been involved in;
 - the adherence to local rules, the results of any surveillance, the condition of any physical control measures;
 - training, instruction and competence
55. The process describing the use of dosimeters is described in the [dosimetry flow chart](#) and dosimeter management is covered in RSU [SOP-31: Dosimetry Selection and Management](#). But in brief, the RPSs manage their radiation users' dosimetry and the RSU oversees all radiation dose reports from the dosimetry service.

Restriction of exposure – public doses

56. Excepting medical irradiations in a hospital or treatment setting, for which other legislation applies, the RPS must discuss with the RSU and the appointed RPA where it has been assessed that a member of the public could be exposed to direct radiation or contamination before commencing the planned work.

Restriction of exposure - conduct of investigations

57. It is the jointly held responsibility of Schools, RPSs and Radiation workers to ensure that all incidents / accidents, near misses or 'events' are recorded on the 'Events Database'. This is to ensure that any 'reportable incidents' are reported to the HSE (by the Head of Radiological Safety or the Head of Safety Services if classified as RIDDOR events; www.hse.gov.uk/riddor/) within statutory time scales, that trends in the occurrence of events can be analysed, and also, that the University can continue to learn from events. Your local RPS or safety officer will be able to assist (www.staffnet.manchester.ac.uk/news/display/?id=12265).
58. All events / incidents involving sources of ionising radiation must be recorded on the events database
www.healthandsafety.manchester.ac.uk/toolkits/accidents/reporting.
59. The RSU will undertake (written) investigations of any dose exceeding the high trigger dose investigation level as measured by dosimeters (or suspected doses). It is expected that the RPA will be consulted, but in any event consulted once a whole-body dose of 6 mSv has been determined. In addition to reporting on the events database the circumstances of investigations must be discussed at the Ionising Radiation Working Group and Advisory Group. Compliance and Risk Managers should discuss any learning outcomes at their safety committees with a view to ensure that good practice is refreshed. Records must be kept as directed in the [RSU Information Sheet Retention of Records](#).

Contingency Plans

60. [Regulation 13](#) of the IRR17 requires that any reasonably foreseeable accident that has been identified within a radiation risk assessment must be prepared for using a contingency plan.

61. [RSU SOP-27 Local Contingency Plan Rehearsal](#) has been created to provide the procedure for rehearsal of local contingency plans.
62. [SOP-27](#) details what a contingency plan must include, what a rehearsal plan must include, examples of rehearsals and recommendations of the level of details required. It also describes how often a contingency plan must be rehearsed and how records of rehearsals should be kept.

Arrangements

Radiation Protection Advisers

63. In pursuance of IRR17 Reg14. and Schedule 4 the University has appointed a suitable number of experienced Radiation Protection Advisers (RPAs) and Radioactive Waste Advisers (RWAs). The 'general' RPA that will advise on most routine matters as RPA / RWA is Nuvia (covering main campus, DCF and some other satellite sites); a specialist RPA, Amentum, has been appointed to advise on any radiation work undertaken in the Royce Building.
64. Contact with the RPAs / RWA must be channelled through, and coordinated by, the RSU and for DCF by the DNI Head of Operations. The only exception to this is contact with Amentum on Project Rose 'special projects', which is by agreement between RSU and the Nuclear Laboratory Manager.
65. The role of the RPAs is specifically (though not constrained to) advising on radiation risk assessments, the designation of controlled and supervised areas, the drawing up of local rules and contingency plans, plans assessments, periodic examination and testing of engineering controls and safety features, regular calibration of radiation monitors, dose assessment and recording, and the handling of investigations.

Radiation Worker and training

66. The important aspects of radiation safety training i.e. 'good lab practice' are given locally, being specific to local radiation practice(s). RPSs must ensure all workers receive theoretical and practical training before commencing radiation work for the first time, and refresher training must be given approximately every five years thereafter.
67. Several Radiation Safety Awareness Trainings, which have been developed by RSU, are available to users and must be completed before they commence the work in the laboratory. The most appropriate awareness training will be determined by the RPSs or responsible person.
68. RPSs or responsible persons must ensure that all radiation workers are provided specialist and local induction training on how to work safely in their labs. Training provided here will vary in complexity according with the uses, hazards and risks. Records must be kept locally.
69. RPS training is more complex and delivered by the RPA, and RSU or third-party provider. RSU should be contacted to advise on individual's training needs.

Co-operation between employers (outside workers)

70. When University employees work on sites managed by other employers they have a legal responsibility to fully co-operate with that employer regarding any work with sources of ionising radiation and must comply with that employer's health and safety procedures, instructions and processes. Similarly, where the University shares premises or otherwise collaborates with other 'radiation employers, the employers and their employees must co-ordinate the measures taken and fully inform each other of the risks arising out of their work.
71. The collaborating / sharing radiation employers and their employees must ensure their local rules, instructions and any relevant information are shared and that they have been checked to ensure compatibility between working practices.
72. Details of designated radiation areas and contingency arrangements for action to mitigate the consequences of any radiation accident must be shared.
73. The University has several health and safety Arrangements Chapters that must be complied with when relevant. These include, but are not limited to
 - Chapter 16: [Student Placements](#)
 - Chapter 18: [Working across organisational boundaries](#)
 - Chapter 20: [University and NHS shared premises](#)
 - Chapter 24: [Health and safety in off campus work](#), including field-work etc.
74. In addition to the requirements for co-operation between employers for employees (including research students) visiting outside sites, radiation workers and their RPSs must discuss with RSU any proposals to undertake radiation work on nuclear sites or research facilities such as
 - the European Synchrotron Radiation Facility (ICRF),
 - European Joint Research Centre (JRC),
 - the Institute for Trans-uranium Elements (ITU),
 - Joint European Torus (JET),
 - National Nuclear User Facility (NNUF),
 - Sellafield and UKNNL laboratories,
 - UKAEA-Culham, etc.

Designated areas

New and refurbished facilities

75. Where new radiation facilities are being designed or refurbished a safety brief must be prepared. The purpose of a safety brief is to ensure that radiation safety matters are addressed and to identify the success criteria. The complexity and length of safety briefs should be proportionate.
76. The University [laboratory guidance note](#) must form the basis of design considerations.

Controlled, supervised and 'radiation' areas, de-designation

77. Area designation is a requirement under the Regulation 17 of IRR17. These designated areas, identified and assessed by the University, are locations where radiation doses may exceed defined limits.

78. The dose thresholds for area designation are defined in Table 3 with more specific details surrounding the different designation given in SOP-30 Designation and De-Designation of Radiation Work Areas
79. Access to a controlled or supervised area is permitted to registered radiation workers who have permission to enter from a local RPS or person acting on their behalf. Estates or Security personnel may enter designated areas subject to RPS approval during normal arrangements.

*Table 3. Dose thresholds for area designation, *Additional special measures can also lead to designation a radiation area.*

	Whole Body	Lens of the eye	Skin and extremities
Controlled Area*	6 mSv/y	15 mSv/y	150 mSv/y
Supervised Area	1 mSv/y	5 mSv/y	50 mSv/y

Controlled Area

80. The likelihood of controlled areas being created can be prevented by the use of engineering controls or reduced radioisotope activities. Areas can be temporarily designated as controlled areas for short term use.
81. Controlled areas require the following to be in place: radiation risk assessment(s), local rules, RPS appointment, physical demarcation, access control, signage, personal dosimetry, training and regular monitoring/maintenance and a self-inspection.
82. The requirements of controlled areas including, paperwork, signage and dosimetry are outline in [SOP-30](#).

Supervised Area

83. Designating an area as a Supervised is permitted when working with X-rays or handling radioactive materials providing the likely exposure received by a worker in a year does not exceed that specified in Table 3.
84. Supervised areas require the following to be in place: radiation risk assessment(s), local rules, RPS appointment, signage, training and regular monitoring/maintenance and a self-inspection.
85. The requirements of supervised areas including, paperwork, signage and dosimetry are outline in [SOP-30](#).
86. The RPS must consult the RSU about any proposed changes to area designation, practices or the acquisition of any additional significant sources of ionising radiation in designated areas.

Non-Designated Radiation Area

87. The Non-Designated Radiation Area is an area that utilises a source of ionising radiation but the likely exposure to an individual is less than that specified in Table 3.

Local Rules and Written System of Work

88. Local Rules are written instructions created by the employer to ensure that work with ionising radiation is conducted safely and in compliance with the Ionising Radiations Regulations 2017 (IRR17). They are mandatory for Controlled Areas and Supervised Areas at UoM where radiation risks exist.
89. Local Rules must be concise, area-specific, and proportionate to the risk. Details of what should be included are detailed in [SOP-30](#).
90. Local Rules should reflect normal working conditions and accident scenarios
91. The RSU will consult with an appointed RPA on the suitability of risk assessments and local rules.
92. Local rules must be signed by the RPS and the authorised users must confirm they have read and understood them.
93. Persons may only work in controlled areas under the provisions of a Written System of Work (WSoW). A WSoW may be a document, single use document / instruction or prominently displayed document that is referred to in local rules.
94. Local rules are not appropriate for 'radiation areas', which are best managed through standard operating procedures (SOPs).

De-designation of an Area

95. If work with ionising radiation is discontinued in an area that was previously designated as a controlled or supervised area (or if a designated sink is no longer required for disposal of aqueous radioactive waste) a thorough decommissioning survey or check must be made by the RPS to ensure that no radioactivity remains as contamination. This is outline in [SOP-30](#).
96. Records must be kept as directed in the document [Retention of Records](#).

Inspections

97. Controlled and supervised areas should have an annual self-inspection with findings registered, acted on and reported to RSAG via the faculty compliance report.
98. RSU arranges regular site visits with the appointed RPA to review arrangements in depths. Report and actions recommended by the RPA are tracked via the faculty compliance report which is submitted to RSAG.
99. A list of the names of all persons with special responsibilities for radiation protection within an area must be included in the Local Rules.
100. The regular reviews must also confirm that controlled and supervised areas must remain correctly designated and that suitable legible radiation safety signs are posted.
101. Records must be kept locally.

Radiation Protection Supervisors

102. IRR17 Reg. 18(5) requires that the radiation employer appoints, in writing, one or more Radiation Protection Supervisors (RPSs) for the purpose of securing compliance with the regulations. In the University the duty holders are the senior leader such as the Head of School or their nominated deputy.

103. An RPS is required if an area utilising ionising radiation has been designated as either a supervised or controlled area. An RPS must be a person with relative authority and experience and is required to understand the relevant legislation for the work being conducted.
104. [INF-14 Radiation Protection Supervisors: Roles and Responsibilities](#) details the roles and responsibilities of an RPS including a guide on how to become an RPS and the required training with the refresher at least every 5 years.
105. RPSs should attend the Ionising Radiation Safety Working Group, which meets quarterly.
106. The RPS must accept that appointment in writing.

Radiation monitoring

107. The purpose of radiation monitoring is to check that areas are correctly designated, for which dose rate (health physics) monitors are required, that the spread of contamination is being controlled, for which contamination monitors are required, and that engineered control systems are performing as intended. Monitoring will also confirm decisions made with respect to radiation dosimetry.
108. The RSU must also be consulted before any new or replacement instruments are purchased. Full details on monitor requirements are available in INF-13: [Radiation Monitors: Probe Choice and Calibration](#)
109. Monitoring records must be kept locally for 2years.

Radiation workers

Designation of classified radiation workers

110. As an employer of radiation workers, the University is required to designate as Classified any radiation worker who is likely to receive a dose of ionising radiation which exceeds 6 mSv/y to the whole body, 15 mSv/y to the lens of the eye or 150 mSv/y to the skin or extremities. No person under the age of 18 may be designated as a Classified Radiation Worker. Specific detail surrounding classification and the process of becoming classified are outlined in [RSU INF-18 Classified Radiation Workers](#) which covers requirements, medical examinations, dosimetry (further detail in [SOP-31: Dosimetry Selection and Management](#)) and radiation passbooks.
111. The University must retain the health record of each Classified Worker for 50 years from the date of the last entry whilst the approved dosimetry service must keep dosimetry records until the person is 75 years of age or for 30 years from the date of the last record as detail in the [retentions of records](#) information document.

Non-classified radiation workers

112. When the work performed with ionising radiation does not require the worker to be designated as classified but it is expected that the worker could receive a dose that exceeds 0.6, 1.5 or 15 mSv per year to the whole body, lens of the eye or skin, respectively; then they must be designated as a non-classified radiation

worker. This is described in the flow chart in [RSU INF-18 Classified Radiation Workers](#)

113. Non-classified radiation workers require radiation awareness training and may require dosimetry which is further covered in [RSU SOP-31: Dosimetry Selection and Management](#).

Arrangements for pregnant or breastfeeding workers

114. Nothing in the IRR17 prevents pregnant or breastfeeding workers from working with ionising radiation providing exposures remain below dose limits and that doses are ALARP.
115. A pregnant or breastfeeding worker should notify the employer of their condition as soon as reasonably practicable, and once declared, the employer must ensure that the foetus cannot receive a dose greater than 1 mSv during the period of pregnancy by carrying out a specific Radiation Risk Assessment.
116. The radiation worker must understand the importance of notifying the employer, which must be done in writing, even if the worker would prefer to keep their condition confidential. Line managers should appreciate the wishes for confidentiality.
117. An existing RRA must be modified for a worker when that worker has given written notice, they are pregnant, or have given birth within the last 6 months, or if they are breastfeeding. (It would be usual to prepare a supplementary personal addition to an existing RRA and also written instructions / local rules for the line report rather than modifying the whole RRA).
118. The existing Radiation risk assessments under which pregnant or breastfeeding person works must be reviewed to ensure an unambiguous statement is made as to whether a person is able to continue to work and the (modified) conditions under which they should work.
119. Managers must be cognizant of confidentiality and of the sensitivities around making a declaration of pregnancy and must take full account of legislation aimed at preventing discrimination.
120. HSE information and guidance at www.hse.gov.uk/mothers/, which includes a link to www.hse.gov.uk/pubns/indg334.pdf.

Washing, eating and changing facilities

121. Schools or research institutes must provide suitable and sufficient washing and changing facilities, and accommodation for clothing etc. for persons who enter or leave designated areas where relevant (e.g. designated areas within an X-ray cabinet/bay do not require such facilities), and such facilities must be properly maintained. In changing areas, outdoors clothing must be strictly segregated from lab coats and other PPE so as to prevent the likelihood of cross contamination.
122. The possibility of accidents such as spillages and the spread of contamination must be considered when deciding whether these facilities are appropriate.

123. Washbasins must be of a type that can be operated without using the hands, i.e. by foot or elbow. Soap and disposable towels (not hand blowers) must be provided
124. Workplaces must be designed or have arrangements to ensure goods and materials coming into or leaving facilities are monitored for contamination.
125. Eating, chewing, drinking, (smoking) and similar activities likely to result in the ingestion, inhalation or absorption of radioactive substances is prohibited when working within designated areas.

Control of radioactive substances

Open or closed sources

126. The purchase or acquisition of sources of ionising radiation is not permitted without the prior written consent of the RSU or via local management if they hold their own permit e.g. DCF/WMIC. This is to ensure continued compliance with relevant permits and HSE registrations / consents. This is covered in [RSU SOP-23 Purchase of Radioactive Substances](#) which covers purchasing and receiving.

The acquisition of radioactive materials

127. [RSU SOP-23 Purchasing Radioactive Sources](#) has been created to provide a clear procedure for purchasing sealed and unsealed radioactive source including qualified nuclear material.
128. Where acquiring radioactive materials, the suppliers may wish to see or receive confirmation of EPR permits and HSE consents prior to transaction.
129. Persons (such as earth scientists) attending fieldwork trips must always discuss with their RPS the likelihood of the acquiring / collecting potentially radioactive environmental samples (e.g. rocks, minerals and sediments) before taking such field trips.
130. Proposals to acquire radioactive or contaminated materials, such as slurries, metals, uranium munitions must discuss their proposals with their RPS and the RSU in advance of collecting or receiving such materials.
131. For Schools that employ sealed sources containing short lived radioisotopes such as polonium-210 particle neutralisers that are exchanged under an on-going contract with a manufacturer / supplier it is sufficient that initial approval to purchase is given, and thereafter the RSU is notified when a source is to be exchanged for a (similar) replacement.

Uranium and other actinides

132. [RSU SOP-12 Acquire Actinide & Fissile Materials](#) has been created to provide guidance and structure for purchasing actinides. This must be done with the permission of the RSU and Head of School.
133. The purchase of actinides & Fissile Materials such as alpha sources of isotopes of plutonium and neptunium with activities greater than 10 MBq must also be authorised by the Dean of Faculty or a person authorised by them to act on their behalf.

Accounting for radioactive substances

134. [RSU SOP-24 Radioactive Source Handling and Accounting](#), has been created to provide the procedure for safe handling/use and accountancy for radioactive materials at the University of Manchester (south campus). This covers sealed sources, unsealed sources and irradiated samples.
135. Records of disposal should be kept locally for a minimum of 2 years after disposal by the School or institute and duplicate records, which will become the 'statutory record' by the RSU for the period of time as directed in <http://documents.manchester.ac.uk/display.aspx?DocID=37629>.
136. Satellite sites (off campus) which have their own EA permits will manage their accountancy locally and provide annual report to RSU of their compliance and submit their own PIEDC.

Accounting for Safeguarded Materials

137. The SOP, [RSU SOP-11 ONR Accountancy and Control Plan](#) has been created to provide a clear procedure to co-ordinate the accountancy of qualified nuclear materials covered by the ONR through [The Nuclear Safeguards \(EU Exit\) Regulations 2019](#), and submit mass balance reports (MBR) and physical inventory listings (PIL) as required by the ONR.
138. Qualifying Schools must appoint a Departmental Control Person (DCP) to collate monthly returns, which should be received by the RSU by the 7th of each month. Qualifying Schools, which have no report to make for a particular period, will send a 'nil report' to RSU.
139. Areas holding or using qualifying materials must comply with instructions given in [RSU SOP-11](#).

Accounting for substances of known identity

140. The RSU, after consultation with the RPA / RWA, will assist the group or department for the transfer of life-expired sealed radioactive sources to approved contractors, in accordance with the site Permit issued by the Environment Agency under the EPR.
141. Arrangements have been made and agreed with the Environment Agency and financial provisions put in place with respect of the HASS.
142. Records must be kept as directed in [RSU INF-6 Retention of Records](#).

Accounting for substances of unknown identity

143. On occasions, The RSU may be required to deal with radioactive materials or artefacts of unknown origin and / or activity. The process for managing substances of unknown identity are covered in [RSU SOP-34 What to do if you find radioactive material or artefacts of unknown origin](#).

Maintenance of sealed sources

144. In circumstances where planned maintenance or building operations are necessary in the vicinity of equipment containing sealed radioactive sources, the equipment should, wherever possible, be temporarily decommissioned and the source removed by the RPS for secure storage in a locked, shielded facility. Where this is not possible, all work operations in the vicinity of the equipment should be subject to a Risk Assessment by the area RPS, in association with the relevant Project Manager or a representative of the University Estates team, to determine the likely risk of damage to the source or equipment housing it, e.g. through physical vibration. Particular attention should be focused on the likelihood of disturbance of any integral shielding material(s) that could give rise to a radiation dose in the vicinity of the equipment.

The disposal of sources of ionising radiation

145. Radioactive sources (including stocks) or items of equipment containing embedded radioactive sources must be disposed of if they
- come to the end of their Recommended Working Life (RWL) or agreed extended RWL, which in most cases will be two times the RWL or after an expiry date set in a RWL assessment
 - become redundant and are targeted for disposal
 - (for unsealed sources) have been unused for a period of three years.
146. This is covered in RSU [SOP-24 Radioactive Source Handling and Accountancy](#)

The disposal of radioactive waste

147. [RSU SOP-24 Radioactive Source Handling and Accountancy](#), covers the disposal of radioactive waste including record keeping, procedures and routes of disposal.

Storage / moving radioactive substances

148. Transport of radioactive materials on campus is covered in [RSU SOP-15 Movement of Radioactive Sources on Campus](#). This SOP covers labelling, shielding, containers, dose rates, routes/access, regulatory requirements and when consultation with RSU is required.
149. Off-site transport is not permitted without the prior written consent of RSU. [The Transport Radiation Protection Programme](#) must be complied with; paragraphs 171-174, below, refer.

Notification of occurrences

150. Regulation 31 of the IRR17 states that the employer must notify the HSE in any case where significant quantities of radioactive materials have been released to the atmosphere as dusts, aerosols or gases, or as liquids, or have been released in such a manner as to cause significant contamination. Column 5 or Part 1 of Schedule 7 of the IRR17 specifies amounts that are considered significant by the HSE.
151. For incidents relating to Class 7 transport and Safeguarded materials refer to the [Transport Radiation Protection Programme \(TRPP\)](#).

152. RPSs must, therefore notify RSU of all spillages or unplanned releases of radioactive materials immediately, in writing i.e. by email, of any such events. The Head of Radiological Safety (or acting deputy) must then notify the Head of Safety Services and Director of Compliance & Risk as soon as is reasonably practicable.
153. The loss or theft of radioactive materials must be reported to the Environment Agency by the Head of Radiological Safety (or acting deputy) or DNI Head of Operations for DCF material immediately such an event occurs or is suspected to have occurred. Reporting must be done using the Environment Agency emergency hotline (0800 80 70 60; www.gov.uk/report-an-environmental-incident) and report details should include the time and date, contact names (usually this will be RSU), a brief précis, and an estimation of the risk: the Agency will usually follow up by contacting the RSU or Head of Radiological Safety for more details. This reporting does not include minor spillages etc. that might, time to time, happen in a laboratory.

Duties of manufacturers and suppliers: critical examinations and surveys

154. A Critical Examination must be carried out as described in SOP-29 [Management of X-Ray Generating Equipment](#), in consultation with an RPA, of the way in which the article was erected or installed for the purpose of ensuring that;
 - suitable and sufficient safety features and warning devices are fitted and operate correctly;
 - there is sufficient protection for persons from exposure to ionising radiation. The critical examination must be undertaken by an erector or installer (the legal responsibility rests on the installer). If this is not available, it could be carried out by a competent person.
155. Repeat periodic examinations must be carried out as detailed in the RRA for the specific equipment/area and records must be kept locally.

Duties of Employees

Radiation workers

156. Radiation workers may only work with sources of ionising radiation if they have been trained and authorised by their local RPS.
157. All individuals working with sources of ionising radiation must adhere to the procedures and conditions contained within Local Rules. Prior to commencing work with ionising radiation, each worker is required to sign a declaration confirming that he or she has read and understood the Local Rules and agrees to act in accordance with them.
158. No individual may work with sources of ionising radiation in an unsupervised capacity until they have been trained and authorised by the RPS.
159. All individuals working with sources of ionising radiation must be familiar with the properties and hazards of the ionising radiation and understand that they have a legal duty to protect both themselves and others from any potential hazards associated with their work.

160. All individuals working with sources of ionising radiation must use 'reasonable care' to ensure their own and their colleagues' safety, and they must cooperate with all instructions from their RPS regarding the use of Personal Protective Equipment, dose measurements and assessments and, if relevant, medical surveillance.
161. All individuals working with sources of ionising radiation must not expose either themselves or others to ionising radiation to a greater extent than is reasonably necessary for the work.
162. If a radiation worker intends to work with ionising radiation at another establishment, the relevant RPS and RPA must be informed of the details of such work prior to its commencement. The University RPS will then liaise appropriately with his/her counterpart at the other establishment. All individuals working with sources of ionising radiation must inform the relevant RPA, through the RPS and RSU, of any notifiable incidents, such as an apparent overexposure, spillage of material or loss of a source.
163. Any accident involving ionising radiation must be reported, without delay, to the relevant RPS and the RSU.
164. Records must be kept as directed in [RSU INF-06 Retention of Records](#) .

Group Leaders and Principal Investigators

165. In accordance with the general policy for the Management of Health and Safety within the University, Principal Investigators (PIs) (including independent Research Fellows) have a duty, delegated to them from the senior leaders, to provide such supervision as is necessary to ensure the safety of all persons for whom they are responsible. This includes all postdoctoral, postgraduate and undergraduate students working with sources of ionising radiation. PIs shall seek advice from their RPS in the first instance regarding any work they intend to carry out with ionising radiation and will inform them in advance of any intention to bring radioactive sources onto campus. Upon termination of a project, the PI must ensure that all radioactive materials are disposed of or handed over to another group member by means authorised in the site Permit.

Senior managers

166. "Senior Managers" are Head of Department, Directors of Institutes, Directors and Heads of Service in non-academic areas, the University Librarian, the Directors of the Manchester Museum and the Whitworth Art Gallery, and their equivalents head of Department/Head of Institute, etc. They are responsible for health and safety within their organisational unit, specified areas or as a consequence of their activities.

Heads of Schools

167. Heads of Schools are responsible for ensuring that
 - the local arrangements for ionising radiation safety management are described in the School Safety policy
 - the local RPSs and their duties, submission process for risk assessments, spillage and waste management, accident and incident reporting

- work with ionising radiation is adequately supervised and undertaken in accordance with written Local Rules, and that RPSs will ensure that such supervision is undertaken
- the RPS is provided with a letter of appointment defining their roles and duties
- all registered radiation workers are adequately instructed and trained to carry out their work with ionising radiation
- an inventory of School radiation-monitoring equipment and radioactive materials is drawn up, maintained and reviewed
- procedures for the safeguarding of radioactive materials, and for the safe disposal of radioactive waste are drawn up, maintained and reviewed, such that all requirements of the EPR are satisfied
- no new or modified work activity involving ionising radiation commences unless a suitable and sufficient assessment of the risk to any employee or other person has been performed, and that any remedial actions required by this assessment have been carried out
- upon written notification, the conditions of a radiation worker who is pregnant and/or breastfeeding, the exposure limit is defined in [Arrangements for pregnant or breastfeeding workers](#)
- ancillary staff, such as cleaners, porters and maintenance staff, who are likely to work in the proximity of areas in which sources of ionising radiation are stored or handled, are instructed to recognise radiation warning signs and be aware of any precaution that may be necessary.

168. Head of schools can delegate their responsibilities to senior managers.

Transport of Radioactive materials

169. The transport of radioactive materials as Exempt and Excepted packages is only permitted in accordance with the terms and conditions of a [Transport Radiation Protection Programme \(TRPP\)](#) and associated contingency plan or emergency plan.
170. Hazmat is appointed the Emergency Responder on behalf of the University. RSU must coordinate the involvement of the Emergency Responder in conjunction with Departmental RPSs who have been approved to transport radioactive materials.
171. A [TRPP Form TP1 X](#) must be prepared for each consignment.
172. Materials may be consigned by Hazmat acting as 'consignor' on behalf of the University, but these must be routed through RSU who acts as the 'controlling mind'.

Bibliography

1. Working with ionising radiation. [HSE. L121 \(Second Edition\)](#)
2. [Environmental Permitting Guidance: Radioactive Substances Regulation. DEFRA. 2011 \(Version 2.0\).](#)
3. [The 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 \(2-4\)](#)

Glossary

- **ACoP:** Approved Code of Practice.
- **ALARP:** (Radiation exposures should be) As Low As Reasonably Achievable.

- **Euratom:** Commission Regulation (Euratom) No 302/2005 of 8 February 2005 on the application of the Euratom Safeguards.
- **EPR:** Environmental Permitting Regulations (policed by the Environment Agency).
- **HASS:** high activity sealed source. HASS sources are permitted separately from other sealed sources, although included on the same EPR permit.
- **HSE:** Health and Safety Executive.
- **IRR17:** Ionising Radiations Regulations 2017 (policed by the Health and Safety Executive).
- **LEV:** local exhaust ventilation.
- **PPE:** personal protective equipment.
- **Radiation Employer:** Reg. 2(1) and ACoP 2(1) refer to Radiation Employers as the owners or directors of a company that carry out practices. This is difficult to define in an academic institute but is taken to mean the Board of Directors, Vice Chancellor or Registrar of a university with the assistance of Deans of Faculty / Heads of Schools.
- **Radiation 'practice':** a broad category describing the uses of ionising radiation, for example, X-ray diffraction, X-ray accelerators, X-ray inspection, unsealed radioactive materials in metabolic or tracer studies (H-3, C-14, P-33, P-32, S-35, I-125 count as one group), thoriated / uranyl compounds in environmental studies.
- **RIDDOR:** Reporting of Injuries Diseases and Dangerous Occurrences Regulations 2013 (www.hse.gov.uk/riddor/).
- **RPA:** Radiation Protection Adviser - appointed in compliance with IRR17 Reg. 8 and Schedule 4, the RPA may be an employee or consultant who has a statutory duty advise the Radiation Employer on matters of compliance with the regulations.
- **RPS:** Radiation Protection Supervisor - a person appointed in compliance with IRR17 Reg. 18(5) to assist the Radiation Employer in complying with the IRR17. THE RPS is not responsible for compliance, the Radiation Employer cannot delegate this responsibility.
- **RWA:** Radioactive Waste Adviser - a person appointed in compliance with EPR.
- **RWL:** Recommended working life - of a radioactive source, which is (initially) determined by a source manufacturer.
- **RSU:** University Radiation Safety Unit.
- **WSOW:** Written System of Work - a specific set of instructions under IRR17.
- **1 μ Sv:** 1 microSievert - an SI Unit measure of radiation effective dose.
- **1Bq:** Becquerel (2.7 e-11 Curies) - an SI Unit measure of radioactive quantity.
- **1 kBq:** kilobecquerel - 1000 Bq.
- **1MBq:** megabecquerel - 1000 kBq

Related Documents

[Transport Radiation Protection Program \(TRPP\)](#)

Standard Operating Procedures

- SOP-11: [ONR Accountancy & Control Plan, and User Guide](#)
- SOP-12: [Acquisition of Actinides and Fissile Materials](#)
- SOP-15: [Movement of Radioactive Sources on Campus](#)
- SOP-16: [The Receipt of Consigned Radioactive Sources](#)
- SOP-23: [Purchase of Radioactive Sources](#)
- SOP-24: [Radioactive Source Handling and Accounting](#)
- SOP-25: [Radioactive Waste Disposal](#)
- SOP-26: [Apply for a Local Permit](#)
- SOP-27: [Local Contingency Plan Rehearsal](#)
- SOP-28: [Handover of Designated Area and/or Equipment / Template Handover Form](#)
- SOP-29: [Management of X-Ray Generating Equipment](#)
- SOP-30: [Designation and De-designation of Radiation Areas](#)
- SOP-31: [Dosimetry Selection and Management](#)
- SOP-34: [What to do if you find radioactive material or artefacts of unknown origin](#)

Information Sheet

- INF-06: [Retention of records](#)
- INF-07: [Radionuclide data sheet](#)
- INF-08: [When is uranium and thorium not radioactive](#)
- INF-13: [Radiation Monitors: Probe Choice and Calibration](#)
- INF-18: [Classified Radiation Workers: Designation and Arrangements](#)
- INF-19: [Radiation Protection Supervisors: Role and Responsibilities](#)

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