Radiation Risk Assessment – Unsealed Sources

as required by the Ionising Radiations Regulations 2017

and Best Available Techniques to minimise volume and activity of waste

as required under the Environmental Permitting Regulations 2016 (amended 2018)

Guidance is available to help you complete this form – please refer to the Safety Office document IR004

Description of work assessed:
Please attach your protocol for reference

Departmental Code:

Location of work:

Planned start date:

Name of assessor/worker:

Review date:

Post/Status:

Signature:

A	People affected	
1	**University employees directly involved in the work:**	
2	**Non-University employees directly involved in the work** (agree on responsibilities of the employers involved):	
3	**Others who may be affected by the work** (other staff, visitors)**:**	
4	**Any pregnant or breastfeeding persons involved in the work, please inform your line manager as soon as possible if this risk assessment indicates that there is a risk to the foetus or nursing infant (see section H14 and consult RPA if necessary). Refer to guidance in section 4.3 of HSD007R, Occupational Health guidance and HSE guidance (RAVEN login required for most hyperlinks)**	

B	Type and amount of radiation used (review annually and as needed)	
1	**Radionuclide, type of radiation and activity (in MBq) per procedure**	
2	**Type of dosimetry, if any**	
3	**Type of contamination monitor**	
4	**A reasonable estimate of number of procedures carried out annually** Keep under review.	
5	**Exposure time during one procedure (in hours)** Include time for waste handling (lab staff).	
6	**Maximum annual exposure time (in hours)** Use for dose estimate below.	

C	**Annual whole body dose** estimate – including accident dose Data for making simple estimates of radiation doses: *See Appendices 2 & 3 of HSD010R*	
1	**Deep tissue dose** 30 cm from source, unshielded	mSv/year
	Accident scenario of ingestion/inhalation Assume one accident per year**.** Refine if necessary (see guidance IR004)	
2	**Internal radiation (Ingestion).** 10% from **one** procedure.	mSv
3	**Internal radiation (Inhalation).** 10% from **one** procedure – even if not normally volatile.	mSv
4	**Total annual whole body dose estimate** C1 + C2 + C3	
5	**How does this figure compare with the whole body effective dose limit and with natural doses?**	

D	**Annual extremities, skin and eye dose estimates** – including accident doses where control measures fail Data for making simple estimates of radiation doses: *See Appendices 2 & 3 of HSD010R*	
1	**External hand contact dose** based on the activity used enclosed in a plastic syringe (consider realistic handling times).	mSv/year
2	**How does this figure compare with the extremity dose limit?**	
3	**Eye dose** at 30 cm from source.	mSv/year
4	**Skin dose** at 30 cm from source.	mSv/year
	Accident scenario of undetected skin contamination Assume one accident per year**.** Refine if necessary, see guidance IR004	
5	**Undetected skin contamination** resulting from 10% of activity used in **one** procedure remaining on the skin for one hour.	mSv
6	**Total skin dose** **D4 + D5**	
7	**How does this figure compare with the skin dose limit?**	

E	**Results of previous dosimetry**, if available	
1	**Whole body dose**	mSv/year
2	**Hand dose**	mSv/year
3	**Other dosimetry/monitoring**	

F	Please justify the work you are planning to undertake considering **BAT** (Best Available Techniques) with the aim of minimising the environmental impact. See section 7 of HSD010R for practical aspects of waste disposal including best environmental options (University Policy on BAT and waste is covered by HSD035R and HSD007R)	
1	**Why have you chosen the above Radionuclide** Consider alternative non-radioactive techniques available, or techniques which use lower activities. Consider alternative techniques which create less waste, or less hazardous waste at disposal.	
2	**How will the waste be minimised?**	☐ Minimal activity ordered ☐ Optimised protocol (using the least activity for the best result) ☐ Avoiding secondary waste through contamination of equipment/work areas ☐ Segregation of waste at generation – avoid mixing with non-contaminated waste – avoid mixing different radionuclides and waste types where practical (if not possible, explain why) ☐ Any entrained solids, if so, how are these excluded and disposed of
3	**Expected waste routes (tick as applicable)** Check with the RPS that sub-permits and local rules cover these. If not, contact the RWA.	☐ Aqueous waste to drain ☐ Solid waste to incinerator ☐ Organic liquid waste (scintillant, solvents or oils) to incinerator ☐ Other (please specify)
4	**Solid waste** Monthly limit: MBq (see EPR sub-permit)	MBq per procedure MBq per month
5	**Aqueous waste** Monthly limit: MBq (see EPR sub-permit)	MBq per procedure MBq per month
6	**Other waste – please specify:** Monthly limit: MBq	MBq per procedure MBq per month
7	**Is the proportion of waste going to the above routes measured, calculated or estimated?**	

G	**Contingency planning / accident scenario** Consider staff and others who may be affected (including members of the public if applicable)	
1	**What are the most likely accident/incident scenarios?** Consider human error and technical failures (including failures of control measures). Specify likely doses to anyone if greater than those estimated above.	
2	**Brief outline of steps to take in the event of an accident** e.g. skin contamination, minor or major spill, equipment failure – consider how to minimise the quantity of waste produced in an accident situation without compromising safety.	

H	**Control measures** to minimise exposure and prevent accidents See general guidance on typical control measures *in Appendix 1 of HSD010R*	
1	**Designation of area proposed for this work: non-designated, supervised or controlled?**	
2	**What warning signs and demarcation are in place?**	
3	**Written arrangements (i.e. System of Work) for controlled areas?**	
4	**Access arrangements for controlled areas?**	
5	**What training is required and how is training for new/existing users recorded?** Attendance at taught courses AND practical training including techniques to ensure ALARP (to minimise doses) and BAT (to minimise waste). Note any specific training and supervision arrangements for those at particular risk.	
6	**List any relevant safety data from manufacturer/supplier (if available)**	
7	**How are principles of time and distance applied in practice?**	
8	**Is airborne and/or surface contamination likely with control measures in place – if so, estimate surface and airborne contamination during <u>normal</u> working conditions and describe additional preventative measures** The answer to this should normally be "No" for normal work (accident situations are covered in section G). If surface or airborne	☐ NO – none expected with control measures in place ☐ YES – Describe source, reason for contamination and additional preventative control measures: ☐ Airborne contamination – Reason: Estimate, with control measures: Bq/m^3 ☐ Surface contamination – Reason: Estimate, with control measures: Bq/cm^2 Additional preventative measures:

	contamination is likely during normal work, state additional preventative control measures, see guidance IR004 and consult RPA/RWA if needed.	
9	**Measures to minimise <u>spread</u> of contamination from the work area and to minimise volume of contaminated <u>waste</u> including monitoring arrangements** Consider containment and limitation of spread of contamination, and consider cleanability of surfaces and any equipment used.	
10	**Required radiation shielding** See Appendix 1 of HSD010R for typical shielding for common radionuclides (if not stated, consult RPA).	
11	**Other engineering controls** (Aerosol tight rotor lids, fume cupboard, automation…)	
12	**Personal Protective Equipment (PPE)** – minimum required: gloves, lab coat and eyewear.	
13	**Additional Precautions for those handling solid waste** Shielding/monitoring/containment. Ensure staff who are handling your waste are aware and ensure Local Rules include any precautions needed for handling waste from this particular work.	
14	**Additional precautions/ for pregnant or breastfeeding staff. If none, state why**. Consider even if situation not expected. See guidance IR004 – the foetal dose can be much higher than the mother's whole body dose.	
15	**Local security measures – material and waste** e.g. policy and arrangements for area access, lockable stock containment.	
16	**Any additional actions needed to prevent accidents, ensure doses are kept as low as reasonably practicable and ensure activity and volume of waste is minimised**	
17	**Has appropriate RPA/RWA advice been sought?** Necessary for any significant new work or if setting up a new work area.	

I	Effectiveness of control measures With control measures in place, is it likely that the following groups could receive ***significant*** doses? If yes, please specify and consult RPA	
1	**Anyone directly involved in the work, receiving a whole body dose or eye dose of over 2 mSv/year?**	
2	**Anyone directly involved in the work, hand/skin dose over 50 mSv/year?**	
3	**Anyone NOT directly involved in the work, whole body dose over 0.3mSv/year?**	
4	**Likelihood of accident** – High, medium or low if above control measures are used.	

J	**Additional risks and control measures:** refer to separate risk assessments or add details of significant risks and control measures to this assessment. Consider all hazards associated with the work: e.g. biological and chemical hazards, manual handling, handling of cryogens, etc.

Assessment Agreed

Research Supervisor/PI/Line Manager: **Name: ……**

Date: ……. **Signature: ……..**

RPS Name: ……

Date: …….. RPS Signature: ……..……

Specify a revision date for this assessment

Review on or before ……

Ensure that the assessor and Supervisor are aware that re-assessment will also be required for any significant change in this work, for instance, changed activity limits or different category of workers (including pregnancy).

The appropriate RPA/RWA must be consulted regarding any significant new work or if setting up a new work area or if ***significant*** doses to staff or others are likely (Part I), or regarding additional measures during pregnancy/breast feeding (Part H14 of this form).