Appendix B: Worked example

Department of Physics

Risk Assessment Form for Use of Radiation Generators or Radioactive Sources

Location of Work	*Room 194*
Description of Work	*Undergraduate experiment using a Cs-137 source*
Planned start date	*Ongoing*
Source of ionising radiation. Specify:Maximum energy, activity, radionuclide etc.	*Cs 137, 3.7 MBq* *Emits gamma radiation, 0.66 MeV.*
Employees involved	*Heads of Class, Classes technicians*
Others involved	*Postgraduate demonstrators, undergraduate students.*
Any pregnant or breastfeeding persons involved?	*Possible*
Nature of risk	*External radiation hazard (gamma)*
Possible accident situations	*Fire, unauthorised removal of source.*
Estimated dose/dose-rates to persons	*400 GBq gives 34 mSv h^{-1} at 1 m. Thus estimates for this source are: 0.314 μ Sv h^{-1} at 1 m, 1.26μSv h^{-1} at 0.5 m, or 3140 μSv h^{-1} at 1 cm.*
Possibility of contamination and estimated levels	*None, this is a sealed source.*
Results of previous dosimetry/monitoring in this or similar situations.	*Measured dose rate, using calibrated Geiger counter, at hand position when placing the lead sheets: (this is to be measured)*
Advice about equipment use and maintenance	*Not applicable*
Engineering controls and design features in place or planned	*Source is mounted with a lead backing, locked into the experimental table. Additional lead is placed around. Emission is through a small hole.*
Planned system of work	*Students do not handle the equipment. Demonstrator inserts lead shielding.*
Personal protective equipment provided	*Demonstrator wears latex gloves, for handling the lead shielding (due to its toxicity)*
Any restrictions on access	*Undergraduates, those in charge of classes, members of staff of the laboratory and accompanied visitors only.*
Estimated maximum annual dose to employees and others	*Worst case: the technician who sets up the experiment, and measures the background. Assuming ten minutes setting-up time at 1 cm: 523 μSv to hands, or 0.21 μSv at 0.5 m (whole body).*
Estimated annual risk to employees and others (use 5 x 10^{-2} Sv^{-1})	*1 in 100 million from whole body exposure - negligible. Worst case dose to hands is 1/1000 of relevant dose limit.*

Actions required to achieve radiation exposure that is **A**s **L**ow **A**s is **R**easonably **P**racticable.

Dose constraints for planning	*2 mSv (for a worker) per year.*
Additional controls, design features and testing regimes	*Area should be marked with signs indicating restrictions on access.*
Additional systems of work	
Additional personal protective equipment	
Estimated dose to employee with additional controls in place	
Re-calculated annual risk	
Estimated maximum dose to others with additional controls in place	
Estimated annual risk	*Negligible*
Designation of controlled and supervised areas and limitations on access	*Immediate area to be designated supervised.*
Local rules and radiation protection supervisor	*Local rules to be written and incorporated into class instructions. RPS is Jane Blunt.*
Personal monitoring and need for classification	*Class technician wears radiation badge to record whole-body doses, while setting up and putting away sources.*
How compliance is to be achieved	*Experiment supervised by Heads of Class/demonstrators.*
Dose investigation level	*2 mSv (triggers University level investigation), 0.3 mSv (triggers department investigation).*
Training requirements	*Students to have verbal and written instruction.*
Altered working for pregnant or breastfeeding staff	*None required*
Likelihood of an accident	*Biggest risk is theft of source. Fire is also a possibility*
Consequence of an accident, maximum dose estimate and disruption	*Dose to thief: could be large, if it is placed in a pocket. Disruption, adverse publicity, prosecution. Fire could damage shielding.*
Steps to prevent an accident	*Heads of class, technicians and demonstrators to be made aware of the importance of security. Fire detection is automatic.*
Steps to limit the consequence of an accident.	*After fire, contact Jane Blunt to plan recovery of sources.*

Assessment prepared by …….

Date: …….. Review date: …….

Signed: …… Position: ……..