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Bulletin 275 Health & Safety

Working with radioactive sources - risk assessment

The task of risk assessment can often be viewed in a negative light, however here at SSERC we prefer to think of it as a positive process that leads to making exciting and interesting practical work possible and safe.

Radioactivity is an area of the curriculum that particularly benefits from practical work. On a recent SSERC course we had a teacher comment that they find radioactivity difficult to teach because you cannot see it. Practical work in this area really helps to make it more engaging, tangible and accessible. You might not be able to see the actual radioactive decay however you can see and hear the effects of it. There is nothing more mesmerising than watching tracks appear in a cloud chamber (Figure 1) and the spark counter (Figure 2) is impressively visual.

Not to mention that hearing one click on the GM tube counter represents a single atom event, there are very few other times a learner will experience that! When a topic is seemingly abstract, it is all the more important to convince learners of the science you are teaching them with actual experimentation rather than just telling them or using a simulation which is unlikely to make it seem anymore real. We are keen that no school is put off from doing practical work in a particular area because of the requirement to risk assess it and recognise that radiation

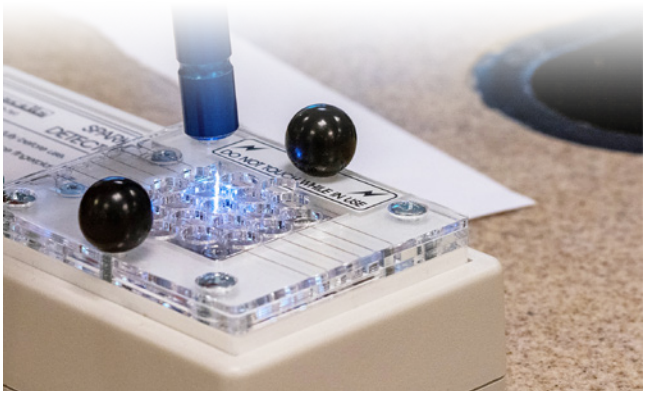


Figure 2 - The spark counter in action.

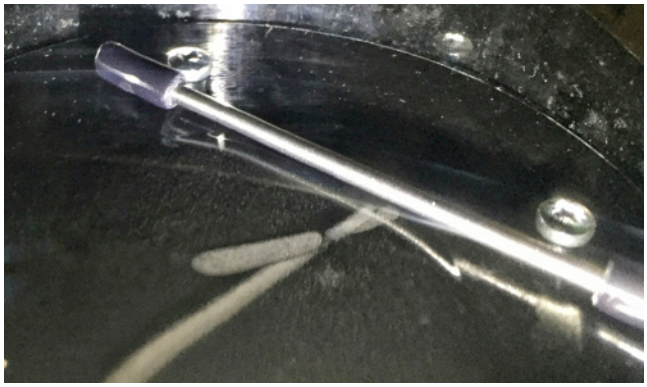


Figure 1 - Tracks in a cloud chamber.

risk assessment can be seen as particularly daunting. This is why, as part of providing RPA services for Scottish schools, we aim to provide as much assistance with it as possible.

Before any radioactive source is approved for use in schools it goes through what is known as a prior risk assessment. This looks at its safety and suitability for use in schools. A prior risk assessment evaluates a variety of factors about the source, for example its construction, and it considers the dose received by those in its vicinity not only during standard operation of the source but also in situations where there is an accident or improper use, in some cases it even goes as far as considering the environmental impact. These prior risk assessments are of course necessary and useful. However, they do contain a lot of highly detailed information which isn't needed for normal school use of radioactive sources. >>

Other topics

Until recently we provided these prior risk assessments on the SSERC website to aid schools with writing their own risk assessments for working with radioactive sources. After a recent review we decided that we could take this a step further and create example operational radiation risk assessments which focus on the information and control measures that need to be considered by the user when performing standard demonstrations with radioactive sources.

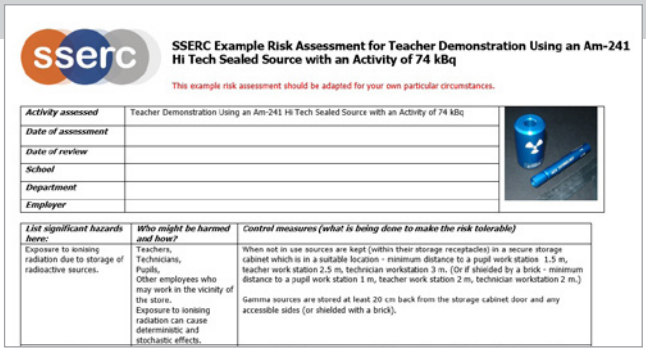
When producing these risk assessments, the relevant sections of the code of practice associated with the ionising radiation regulations have been consulted to ensure they cover what is legally required of a radiation risk assessment (RRA). The most important outcome of an RRA (and also a legal requirement) is to limit radiation exposure as far as is practical to all those in the vicinity of a radioactive source. This will be achieved by following the control measures set out in our user risk assessments.

These user risk assessments have been created using what HSE used to refer to as the 'five steps' approach. Therefore, they should be in a format which is familiar to you (Figure 3) and this also ensures that not only do they satisfy the requirements for a RRA but they also form a complete risk assessment.

Part of this five-step process is to implement the findings from a risk assessment. Performing a risk assessment is only useful if the control measures identified in it are communicated clearly to the users. As such we have also produced some example 'operating procedures' documents to provide you with an idea of how you might want to disseminate the information within the risk assessments.

Both these new user risk assessments and example operating procedures can be found by logging in to our website and visiting the ionising radiation pages (Figure 4) of our health and safety section [1].

We are in the process of providing risk assessments for all the main radioactive sources permitted for use in Scottish schools and the standard demonstrations involving them. If you wish to perform an experiment out with this scope, please first ensure you are using a permitted source and the activity you wish to carry out is justified. If in doubt, contact us [2]. You will then need to create a risk assessment specific to this experiment, however the user risk assessments provided by us should still help and further advice can be provided by us if required. Likewise, these user risk assessments produced by us only cover teacher demonstrations. Students under 16 must not work with radioactive sources. Students aged 16 and over may work with sources so long as there are no under 16s in the same room, they are supervised, they have received appropriate training and a separate risk assessment specific to this has been carried out.



SSERC Example Risk Assessment for Teacher Demonstration Using an Am-241 Hi Tech Sealed Source with an Activity of 74 kBq

This example risk assessment should be adapted for your own particular circumstances.

Activity assessed	Teacher Demonstration Using an Am-241 Hi Tech Sealed Source with an Activity of 74 kBq
Date of assessment	
Date of review	
School	
Department	
Employer	

List significant hazards here:	*Who might be harmed and how?*	*Control measures (what is being done to make the risk tolerable)*
Exposure to ionising radiation due to storage of radioactive sources.	Teachers, Technicians, Pupils, Other employees who may work in the vicinity of the store. Exposure to ionising radiation can cause deterministic and stochastic effects.	When not in use sources are kept (within their storage receptacles) in a secure storage cabinet which is in a suitable location - minimum distance to a pupil work station 1.5 m, teacher work station 2.5 m, technician workstation 3 m. (Or if shielded by a brick - minimum distance to a pupil work station 1 m, teacher work station 2 m, technician workstation 2 m.) Gamma sources are stored at least 20 cm back from the storage cabinet door and any accessible sides (or shielded with a brick).

Figure 3 - Example risk assessment.

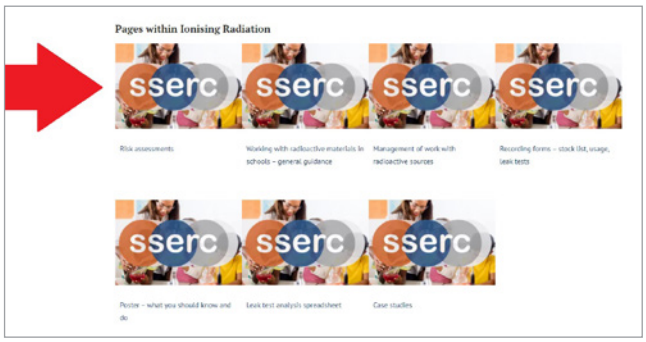


Figure 4 - Ionising Radiation web page.

Again, we can provide support with producing this type of risk assessment if required.

Finally, it must be stressed that although we have tried to provide as much assistance with this process as possible, the user risk assessments and operating procedures produced by us are generic as circumstances will vary from school to school. Therefore, it is vitally important that schools read through these and adapt them for their own situation. It is also essential that all users of radioactive sources within a school are aware of the corresponding risk assessments and the control measures within them that they must put into action – this should be covered in the training provided to them prior to using the sources and the information on control measures made easily accessible, for example in operating procedure documents. These risk assessments, as with all risk assessments, should also be reviewed at appropriate intervals to ensure that they are still fit for purpose.

Next time your risk assessments are up for review please consult this updated area of our website to ensure your own risk assessments contain all the information required. Or if you are new to owning radioactive sources or considering purchasing them, please be assured that there is plenty of support available for putting your risk assessments in place along with full guidance on all areas of working with radioactive sources in schools. So- there is nothing to stop you and your classes enjoying the wonder and enhanced learning of practical work with radioactive sources in a safe way. <<

References

[1] https://www.sserc.org.uk/health-safety/physics-health-safety/ionising-radiation
[2] Email: rpa@sserc.scot