

Radioactive sources in schools

Background to the survey

The need for a survey to find out exactly what radioactive materials were being held by schools was recognised some time ago. While preparing to carry out such a survey, SSERC was independently asked by the Environment Agencies (SEPA and the EA) to participate in the Surplus Source Disposal Programme (SSDP), a UK-government initiative. Agreeing to this proposal, the survey has been conducted by SSERC and managed by the SSDP Board, with the support of the Scottish Executive.

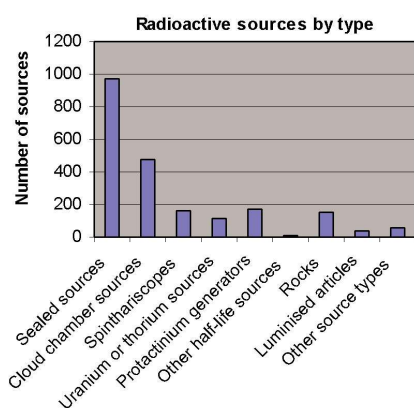
Survey findings

SSERC now has a list of holdings in all council-run schools and all but a handful of independents. Thus the picture we have of the holdings is almost complete.

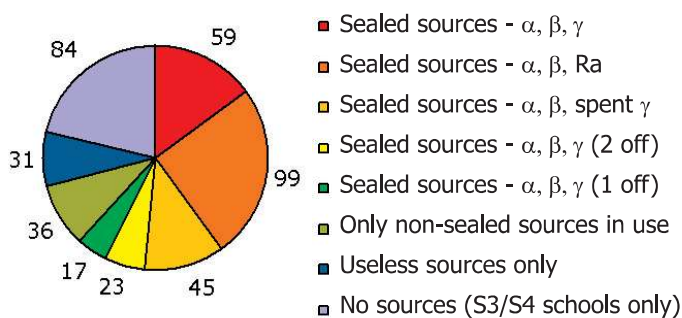
The significance of this is much wider than just radioactive materials. Regarding these substances or articles as a subset of the whole set of laboratory resources the data-set might be regarded as a reflection on the national stock of science equipment in all of Scotland's schools.

Of the 399 schools with an S3/S4 intake, 84 (21%) have no radioactive material, 31 (8%) have materials, but none that are of any use, and 244 (61%) have one or more sealed sources. The other 36 schools seem to be working with radioactive materials that aren't in the form of sealed sources. These materials are rocks mainly.

About 70% of the radioactive materials are between three and four decades old, having been acquired when the school began teaching the then Revised Physics syllabuses that were introduced in the '60s. There have been relatively few sources replaced. The only significant replacements have been:



Distribution of holdings (Number of sources)



- The substitution of a protactinium generator for a thoron generator around 1988-90.
- The replacement of Co-60 sealed sources needed for two set Higher Physics practicals in the '90s or '00s.
- The substitution of old sealed sources with sets of rocks, mainly in the '90s or '00s.

There are only 60 schools with a viable set of alpha, beta and gamma sources (Am-241, Sr-90 and Co-60). Only 67 schools have a Co-60 source that's fit for use in showing the inverse-square law or half-value thickness experiments. That is, 83% of the country's schools have no practical means of showing these effects.

A matter of concern is the large number of anonymous (unmarked or unlabelled) sources (there are about 700 of them), many of which had not been known about before being found by the survey. Another concern are the many stocks of uranium and thorium compounds (in about 100 separate containers). The protactinium generators were a recognised problem. The survey will allow them to be disposed of.

Strategy for the future

SSERC reported to the Annual Conference in December 2006 [2] and will be writing to all schools with sources, and councils, with advice on what to do.

Basically most of the radioactive materials being held should be disposed of now. The list includes radium sources because of the expense, protactinium generators, spent sealed sources and unmarked sources. The UK government will meet the costs where disposals have to be paid for.

Most types of sealed sources and uranium and thorium compounds can be disposed of locally, with refuse (subject to conditions about which you will be notified). Because there is no foreseeable cost in getting rid of many types of sealed source, we advise that

some old sealed sources of the nuclides Am²⁴¹ and Sr⁹⁰ should be retained and used until replacements are obtained. You will be informed about this by letter or email.

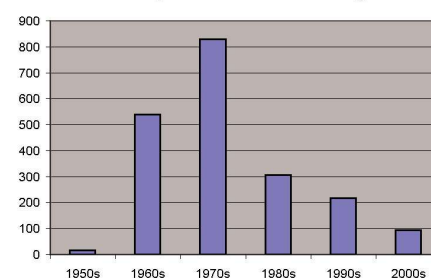
Reviews of two new half-life sources (AEA Cs-137/Ba-137m Isotope Generator and the Cooknell Ionisation Chamber) were published in Bulletin 218 [1]. Both are easy to operate, and both effectively show radioactive decay.

Because science is evidence-based, science teaching, wherever possible, ought to be founded on observation, discussion and experiment. We advise that every school should be stocked with a set of three sealed sources and one or both of the new half-life ones referred to [1].

References

1. www.sserc.org.uk/members/SafetyNet/bulls/218/Half_life_demos.htm
2. Radioactive sources in schools: National survey: Main findings

Decade of purchase: all source types



Use of other materials in schools that do not have sealed sources

