

Tritium analysis of polymeric samples utilising a Data Quality Objectives (DQO) sampling methodology to significantly reduce sample numbers from experimental polymer waste streams.

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Correct sentencing of tritium contaminated material as either exempt or as low level radioactive waste under the UK regulatory framework calls for a detailed and precise understanding of sample heterogeneity. Prior to the method described here, sentencing was based on the measurement of the bulk out-gassing rate of tritium. However, this is a time consuming process; the results having a dubious statistical justification, it lacks the ability to detect organically bound tritium and therefore, potentially exempt material is sentenced as LLW ($\geq 0.4\text{Bq/g}$).

Here, a new decommissioning method is described based on the application of Data Quality Objectives to establish a statistically valid distribution of tritium within the polymeric materials contained within a materials storage assembly. A statistically valid sampling methodology was designed and developed capable of achieving a 99% confidence limit at the 0.4Bq/g decision criteria. The experimental and statistical methodologies are described and the limitations of the methodology discussed.

The methodology described only requires a relatively small number of statistically representative samples to be collected from each of a large number of experimental components, thus reducing the analytical lead time. Using this method, a robust and cost effective sentencing criteria of 0.4 Bq/g is achievable.