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Standard Waste Drums

A new project has been specified in the last 12-18 months and has just been launched, having finally received funding by the European Commission, concerns the realisation of standard drums for calibrating waste assay.

Nuclear waste assay is becoming one of the most important issues in the fields of safeguards and waste management and disposal. Nuclear waste management is constantly in the public eye. From a technical point of view it is one of the most challenging issues for R&D laboratories. Waste drums can only be assayed by NDA techniques prior to being disposed of, or accounted for by Safeguards Authorities. Measurement problems are linked with the low Special Nuclear Materials (SNMs) content to be assayed and to the absence of well characterised, highly certified reference materials, representative of the waste population currently produced in the EU. Some working standards are presently used in different facilities, but they do not have the level of primary certification, and therefore of international acceptance, that national and European authorities require for waste management and safeguards purposes.

Therefore the ESARDA NDA working group decided to design a project for constructing Pu-bearing reference waste drums, which will be used for calibrating, assessing and improving NDA techniques currently used to assay the Pu content of waste drums.

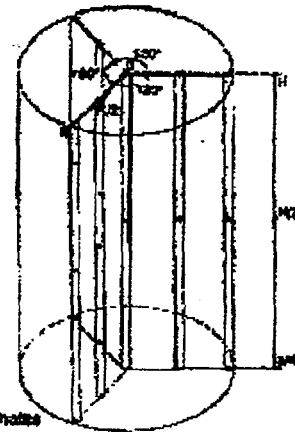
The objective of the project is to design, produce and certify waste drum standards, with variable Pu mass contents, constructed in such a way that different mass and geometric configurations of the Pu sources can be prepared. The problem has been solved by deciding to procure and certify about 100 sealed Pu sources, with Pu content from 5mg to 10g, welded in 35 pins that can be rearranged in different positions inside the drum.

Pu sources will be characterised by JRC-IRMM and welded into pins by CEA-Cadarache. The drums and drum matrices will be provided and characterized by BNFL-Sellafield.

The drums will then be used for a blind round robin to assess performances of waste assay, but the drums will then be kept as international reference materials for any further purpose.

In Table 1 the main drum and source parameters.

| Pu sources | accuracy | pins | drums | matrix |
|------------|----------------|------|---------|----------------------------|
| #105 | .5% on Pu cont | #35 | 8x100 l | .15 g/cm ³ |
| | .1% on Pu239 | | 8x200 l | .15 g/cm ³ +pvc |
| | 2% on Am241 | | | .4 g/cm ³ |



(R,r,z) coordinates
 7 radial positions ($\theta = 0, 90^\circ, 180^\circ, 270^\circ$)
 $r = 0, R/2, R$
 3 axial positions : $z = 0, H/2, H$

Table 1. Details of the ESARDA Standard Drums

Fig 1 ESARDA Standard drum, with the source channels

The paper will present preparation and characterisation criteria of the standard drums. The planned use of the drums in an international round robin exercise for NDA methods on waste is also presented.