TREATMENT AND DISPOSAL OF DISUSED SEALED SOURCES

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Sealed radioactive sources are used in a wide range of applications in medicine, industry, research, and consumer products. At the end of their useful life, sources are defined as spent or disused but, because of the residual activity still present, these sources are treated as radioactive waste. The Radioactive Waste Management Laboratory (LRR) at the IPEN is the main collection center of this kind of waste in Brazil, accepting sealed sources from all regions of the country. At the LRR, sources are handled in three different waste streams, according to the treatment process needed to suitably prepare them for final disposal:

a) sealed sources formerly used in industrial gauges, industrial radiography, well-logging gauges, brachytherapy and teletherapy irradiators, and research equipment;

b) replaced lightning rods with attached americium or radium sources;

c) replaced 'ionic' smoke detectors.

The R&D work undertaken at the LRR in connection with the management of these waste streams is divided in three areas: designing the facilities to handle these sources; designing the disposal containers; and developing the concept of a deep, fully-dedicated repository to dispose the sealed sources. Work in the first area aims to separate sources, usually a few-cubic-centimeter piece of metal, from their much larger shield and containers, thus reducing drastically the volume of waste to be disposed, and to pack these sources in the compact standard disposal container. (FIG.1) shows the hot cell designed to handle the sources of stream 'a', that is under construction at the LRR.

An alpha-tight glove-box was designed to disassemble the lightning rods and extract the ^{241}Am or ^{226}Ra sources from the rods, reducing the volume of radioactive waste and allowing the recycling of the remaining metal scrap. Sources in the third waste stream are low activity sources that require no special handling equipment, except usual individual radio-protection equipment. Final disposal of sealed sources are an unresolved issue at the international level and is receiving more attention because of the radiological risk posed by the increasing number of stored sources, mainly in developing countries.

The contribution of the LRR in this field is the development of a concept of repository that is technically and economically feasible for developing countries facing the problem of securing large inventories of disused sealed sources. (FIG.2) shows the outline of the repository designed to receive the three hundred thousand sealed sources of the Brazilian inventory. This study will cover the period 2002 - 2006.

FIGURE 1 - Hot cell designed to handle sources.

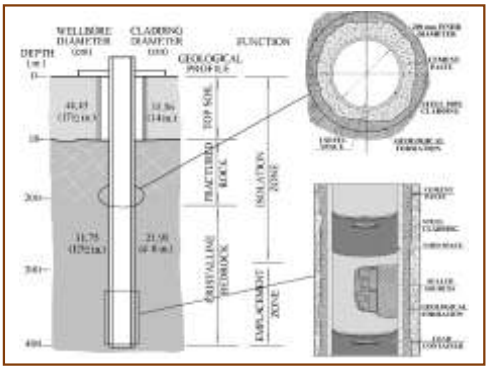

FIGURE 2 - Concept of the repository for sealed sources.