RAD 7

BOOK OF ABSTRACTS

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Measurement of long-lived radionuclide activity induced in target components of a cyclotron used for [^{18}F]-[FDG] production

Elio Tomarchio[1], Mariarosa Giardina[1], Daniele Greco[2]

1 University of Palermo – Dipartimento DEIM, Palermo, Italy
2 Centro di Medicina Nucleare, Palermo, Italy

The evaluation of high activity induced in target components in using a medical cyclotron to produce positron-emitting radionuclides for PET (Positron Emission Tomography) diagnostic studies is one of important issue and involves radiation protection concepts when operators are engaged in maintenance and/or substitution of a target or its components.

Most of replaced target components are generally classified and stored in a Pb-shielded container in order to wait for their radioactive decay. However, after some years, it can be necessary to start with the removal of the oldest parts, for a temporary storage of the fresh activated ones. The feasibility of these operations and the waste final disposal depends on the level of activity achieved and in particular on the residual concentration of radionuclides.

In this work we perform a nuclide identification and activity evaluation of some activated target parts by high resolution gamma-ray spectrometry with various HPGe detectors.

The measurements were performed over a decay period of more than 10 years from extraction, which allows to identify radionuclides with different half-lives. In particular, measurements on some Havar foils, stripper foils and titanium parts of a target used inside an IBA CYCLONE 18/9 cyclotron, allow to evaluate the largest activity values related to the most important radionuclides produced by activation of the materials (^{51}Cr, ^{52}Mn, ^{54}Mn, ^{56}Co, ^{57}Co, ^{58}Co, ...) with half-life of 70-80 days, while radionuclides with higher half-lives (^{22}Na, ^{44}Ti, ^{60}Co, ^{207}Bi, ...) were detected in the same samples in measurements performed after a long time period.

In this way it is possible to evaluate in advance the activity level at a time period after the end of maintenance and establish the correct procedures for storage or disposal of waste