

Beta and Gamma Individual Monitoring With Thermoluminescent Dosemeters

Leticia Lucente Campos and Luiz Antonio Ribeiro da Rosa*
Instituto de Pesquisas Energeticas e Nucleares (IPEN-CNEN/SP)

Due to the recent ^{137}Cs radiation accident at the end september, 1987, in the city of Goiânia, Brazil, the Dosimetric Material Production Laboratory of the Instituto de Pesquisas Energéticas e Nucleares (IPEN) developed special light beta/gamma discriminating thermoluminescent (TL) dosemeters which were placed on the skin of the most injured accident victims in order to assess the external contamination on their bodies, what could be done by the evaluation of the beta radiation absorbed dose to air, D_{β} . This dosemeter was also utilized, as wristlets, for the individual monitoring of some technicians involved in the radiological protection procedures in Goiânia. The dosemeter is composed of four 0.20 mm thick $\text{CaSO}_4:\text{Dy}$ -PTFE pellets, produced by IPEN, sealed in a black plastic film. Two pellets are shielded with 315 mg.cm^{-2} thick PTFE filters and are used for gamma radiation absorbed dose to air, D_{γ} , assessment. The other two remaining pellets are unshielded and permit D_{β} assessment. After appropriate calibration procedures, an algorithm, for evaluating D_{β} and D_{γ} , was written. With respect to the victims external contamination, some dosemeters did not detect any beta radiation absorbed dose rate to air, D_{β} , value at all, an indication of no external contamination, although gamma radiation absorbed dose rate to air, D_{γ} , values, like 0.098 and 0.221 mGy.h^{-1} , could be evaluated, indicating that these victims were internally contaminated by ^{137}Cs . With the remaining dosemeters, different D_{β} values could be measured from 0.016 mGy.h^{-1} up to high values like 38.27 mGy.h^{-1} , indicating an obvious high external contamination. All dosemeters were able to evaluate D_{γ} values from 0.127 up to 7.24 mGy.h^{-1} . It was verified that only a few dosemeters worn by radiological protection technicians presented beta radiation dose equivalent results.

*On leave from Instituto de Radioproteção e Dosimetria (IRD-CNEN/RJ)