

ABSTRACT

THE USE OF PASSIVE PERSONAL NEUTRON DOSEMETERS TO DETERMINE THE NEUTRON COMPONENT OF COSMIC RADIATION FIELDS IN SPACECRAFT- UPDATE

D T Bartlett, L G Hager and R J Tanner

Health Protection Agency, Radiation Protection Division, Chilton, Oxon OX11 0RQ, UK

Secondary neutrons are a major contributor to dose equivalent and effective dose inside a spacecraft for the altitude range and inclination of the International Space Station. Personal neutron dosimeters of simple design, and processed using simple techniques developed for personal dosimetry may be used to estimate the neutron component of the radiation field in spacecraft. Electrochemically etched pits in poly allyl diglycol carbonate (PADC or CR-39[®]) etched track detectors are identified and counted using fully automated read-out procedures. A calibration factor is applied which is appropriate for the neutron plus neutron-like (high energy proton) component. The tracks observed are produced not only by secondary charged particles from interactions of the neutron and neutron-like component of the radiation field, but also in part by the directly ionizing proton and energetic heavy charged particle components of the radiation field at the location of the dosimeter. This leads to an overestimate of the neutron component. This can be corrected for using knowledge of the radiation field characteristics, or a simple chemical etch can be used to identify the non-neutron produced tracks. Recent results for 100 MeV neutrons have allowed an update of the response characteristics.