IS TRACK-ETCH DOSIMETRY READY FOR NEUTRON PERSONAL DOSIMETRY AT HIGH ENERGY ACCELERATORS?

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Experiments in high energy particle physics began with Ernest O. Lawrence's cyclotrons at the University of California, Berkeley. The original and still current favorite personal monitor for neutrons is a Kodak photographic emulsion (Type A, or "NTA film"). Research at LBL and other accelerator laboratories suggests that electrochemically etched CR-39 plastic detectors have sufficient spectral response and sensitivity to replace NTA film as a personal neutron dosimeter. The primary advantages to CR-39 are its lack of photon response and minimal loss of latent track images.

We have compared responses of CR-39, NTA film, and bubble detectors in neutron fields where the spectra and dose equivalent rates were determined by Bonner spheres and NE-213 spectrometry techniques. Experiments at the Bevalac and the 88-Inch Cyclotron provided data which support the hypothesis about the appropriateness of CR-39. Other measurements also verified the "blind region" between ~6 and ~12 MeV. However, most of the dose equivalent is delivered by neutrons in excess of 10 Mev. Spectrometry at the Bevalac suggests that about 80% of Hn meets this limitation. It appears that (n,alpha) reactions and recoiling carbon and nitrogen nuclei cause the high energy response in CR-39.

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