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SKIN INJURIES FROM DISCRETE RADIOACTIVE PARTICLES (DRP)

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HOT PARTICLES; BETA RADIATION; 10CFR 20; SKIN EXPOSURE

Principal Investigator:

Texas A&M University
ENCORE Technical Resources, Inc.

Project Manager:

C. Hornbrook
Electric Power Research Institute
P.O.Box 10412
Palo Alto, CA 94303
U.S.A.
Phone: (415) 855-2022

Objectives: To investigate skin injuries produced by a variety of beta-emitting sources, including sources covering a broad range of sizes, beta energies, and sources with and without gamma radiation components; to compare the results of these experiments with existing DRP exposure guidelines.

Comments: DRPs are very small radioactive particles. Because they primarily emit beta rays with penetrating power, the principal concern was that they could be a source of skin injuries. Researchers fabricated sources from a variety of beta emitters, simulating both activation product DRPs and nuclear fuel DRPs. They also obtained an actual DRP from a U.S. PWR. The endpoint beta energy of these sources ranged between about 0.2 MeV to 3.0 MeV. Source size ranged between 300 um to 11 mm. The researchers characterized the sources and used them for a series of skin irradiation experiments on Hanford miniature swine. The researchers monitored skin injury progression for a board range of exposures for 20 weeks. They assessed injury severity and examined the potential for injury in light of current DRP exposure guidelines.

Potential for dose limitation: The most severe skin injuries produced in these experiments were small open sores, comparable in severity to very small cuts, abrasions, and related injuries that workers might receive on or off the job. The data suggest that DRP exposure guidelines should be made less stringent. To do so would produce no significant skin injuries but should reduce the whole-body exposure to the workforce associated with DRP monitoring and control practices.

References: EPRI TR-104781, Final Report, December 1994.

Duration: from: 1992 to: 1994

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Status: Completed

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