N99. Setting New Protection Standards For Radiation

The ICRP's new recommendations for dose limits will be published this spring. The recommendations represent a comprehensive review of the state of knowledge of the effects of ionizing radiation, and incorporate this knowledge into a conceptual framework for radiological protection.

Although there are effects other than cancer associated with radiation exposure, the main focus of attention remains on cancer. The new recommendations review the current data on deterministic (previously non-stochastic) effects and on hereditary defects, but these data have not changed markedly in recent years. The fatal cancer risk following whole body irradiation is 5%/Sv for a population of all ages. For a work force, assumed to be of ages between 18 and 65, the fatal cancer risk is 4%/Sv. Additional analysis results in a detriment risk figure of 7.2%/Sv for a population of all ages, and 5.5%/Sv for a working population.

Dose Limits. The dose limit is set such that continued exposure at a dose just above the limit would be unacceptable on any reasonable basis. Continued exposure just below the limit might be tolerated, but would not be welcome, so that in order to be acceptable, doses have to be somewhat below the limit. Considering occupational exposure, the Commission calculated the consequences of working from age 18 to 65 at the annual doses of 10, 20, 30, and 50 mSv. An annual risk of death of 1 in 1000 is often the highest that is found in high-risk sub-groups in conventional industry and this figure would be exceeded by a radiation worker in the mid-50s for an exposure rate of 50 mSv/y, and in the mid-60s after 20 mSv continuous annual exposure. On the basis of considering the time distribution of risks, the probability of dying of a radiation-induced cancer, and the contribution of the other components of detriment, the Commission has decided to set the dose limit at 20 mSv/y, to be averaged over a period of five years, with no more than 50 mSv in a single year. At this rate of exposure, which the Commission considers verging on the unacceptable, the lifetime risk of induced cancer (fatal plus weighted nonfatal) or hereditary defects is 4.8%, similar to the corresponding figure for 1977, which did not include non-fatal cancer.

Public Exposure. For members of the public, similar considerations have lead the Commission to reaffirm that the dose limit is 1 mSv/y. However, there is provision for the figure to be higher in exceptional circumstances so long as the 1 mSv average is ensured over five years.

Pregnant Women. The basis of control of occupational exposure of women who are not pregnant is the same as that for men. However, if a woman is or may be pregnant, additional controls are recommended to protect the unborn child.

Taken From: "Setting New Protection Standards for Radiation," Roger H. Clarke, Nuclear Engineering International, pp. 20-23, February 1991.