



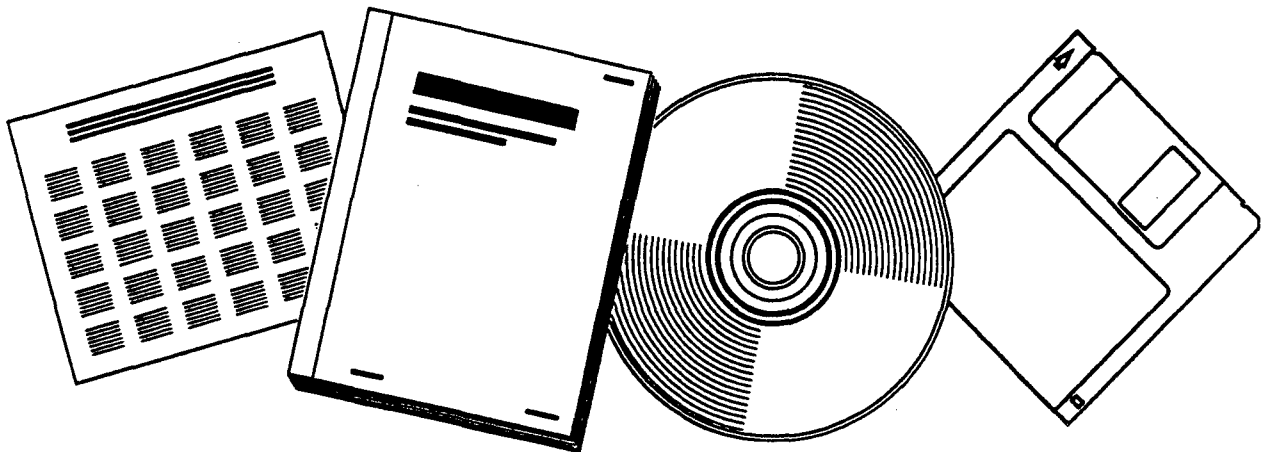
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NIOSH COMMENTS ON DOE NOTICE OF PROPOSED RULEMAKING AND PUBLIC HEARING ON RADIATION PROTECTION FOR OCCUPATIONAL WORKERS MARCH 25, 1992

(U.S.) NATIONAL INST. FOR OCCUPATIONAL SAFETY AND HEALTH
ROCKVILLE, MD

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U.S. DEPARTMENT OF COMMERCE
National Technical Information Service



Comments



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COMMENTS FROM THE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
ON
THE DEPARTMENT OF ENERGY
NOTICE OF PROPOSED RULEMAKING AND PUBLIC HEARING ON
RADIATION PROTECTION FOR OCCUPATIONAL WORKERS

10 CFR Part 835
Docket No. EH-RM-91-835

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
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National Institute for Occupational Safety and Health

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16. Abstract (Limit: 200 words) This testimony concerned the views of NIOSH regarding the proposed rule changes for protecting workers from radiation hazards on the job. The Department of Energy addressed three alternate approaches including lowering the annual dose limits for stochastic effects, adopting a different lifetime dose limit, and adding an average annual individual dose requirement of 2 rem to the present single year limit of 5 rem. NIOSH contends that the proposed specific exposure limit should minimize the risk of excess deaths and serious genetic effects among Department of Energy workers. The proposed annual dose equivalent limit of 0.5 rem for pregnant women workers is of concern. The risk of severe mental retardation to the unborn child is about 4 in 1000 live births per rad when exposure occurs between 8 and 15 weeks after conception. Generally NIOSH recommends that the maximum levels for occupational exposures protect the health and functional capacity of the most susceptible member of the worker population. NIOSH would urge that the Department of Energy reduce the current 5 rem maximum level of radiation exposure for all workers to a level that is as protective as feasible for this susceptible subpopulation.			
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Introduction

The National Institute for Occupational Safety and Health (NIOSH) submits the following comments on the rule "Radiation Protection for Occupational Workers" proposed by the Department of Energy (DOE) and published in the Federal Register on December 9, 1991 [56 FR 64334].

DOE proposes to promulgate a series of limits for ionizing radiation in dose equivalents (rem) with a provision that exposure shall be reduced below these specified limits according to "ALARA" principals.

DOE states that these proposed limits are in response to increases in the estimates of risk associated with exposure to radiation. Radiation risk estimates have increased as a result of continuing evaluation of the atomic bomb survivor studies. DOE cites both the United Nations Scientific Committee on the Effects of Atomic Radiation and the National Research Council/National Academy of Sciences Committee on the Biological Effects of Ionizing Radiation (BEIR V Committee). DOE also cites Dr. Warren Sinclair, President of the National Committee on Radiation Protection (NCRP), as stating "...the net effect of the dosimetry on the risk estimates for cancer is to increase them by a factor of between 1 and 2..."

Exposure Assessment

DOE addresses three alternate approaches suggested to reduce the increased risk:

- 1) Lowering the annual dose limits for stochastic effects;
- 2) Adopting the NCRP lifetime dose limit - the workers lifetime occupational dose in rems should not exceed their age in years;
- 3) Adding an average annual individual dose requirement of 2 rem to the present single year limit of 5 rem.

DOE rejects the third proposal on the basis that it is premature to address this issue. DOE rejects the first two proposals on the basis that most workers are presently exposed to much less than any of the proposed limits so the new limits would have minimal effect on reducing the collective dose. DOE furnishes data that 57.4% of DOE and contractor employees in 1987 received no measurable dose, 98.1% received less than 1 rem, and only 1.9% received over 1 rem. No workers were reported to have received a dose equivalent greater than 4 rem [56 FR 64336, section (c)].

The corollary to this argument is that 1.9%, approximately 1,540 workers (1.9% of 81,028 workers), are exposed at between 1 rem and 4 rem. Based on the BEIR V Committee estimates (Table 4-2), an exposure of 1 rem per year for 47 years (age 18 to age 65) results in 28.8 excess cancers per 1000 workers [NRC 1989]. Therefore, for each 1 rem reduction in exposure for this population of 1,540 workers, 44.3 excess cancers among this population would be prevented over a working lifetime according to the BEIR V Committee estimates.

Data published in 1990 for 1988 exposures of DOE and DOE contractor employees indicate that 1988 exposures were even lower than 1987 exposures. In 1988, over 99% (81,093/81,629) of the workers were exposed to less than 1 rem and no workers were exposed to over 3 rem [DOE 1990]. These data imply that it is feasible for DOE to reduce the specified exposure level to "occupational workers" to below 5 rem.

Occupational Worker Exposure Limits

The specified limits appear in § 835.202 et. seq. of the proposed rule. For occupational workers, the exposure limits are:

§ 835.202 occupational workers

(1) annual dose equivalent of 5 rem for stochastic effects

(2)(i) annual dose equivalent of 15 rem for the lens of the eye

(2)(ii) and (iii) annual dose equivalent of 50 rem for non-stochastic effects other than the eye.

The ALARA principals are defined in § 835.2:

ALARA means "As Low As is Reasonably Achievable", which is an approach to manage and control exposures (both individual and collective) to the work force and to the public at levels as low as is practicable, taking into account social, technical, economic, practical and public policy considerations. As used in this part ALARA is not a dose limit but a process, which has the objective of attaining doses as far below the limits of this part as is reasonably achievable. [§ 835.2; p. 64342 of FR]

DOE cites the 1977 International Commission on Radiological Protection (ICRP) estimate of risk, from ICRP publication 26. The estimate given in the proposed rule for excess fatalities or serious genetic effects, referred to as stochastic effects, is 1.65×10^{-4} per person-rem. At the proposed annual effective dose limit of 5 rem/year extrapolated over a 45-year working lifetime (age 20 to 65), this results in a cumulative risk of:

$$(45 \text{ years}) (5 \text{ rem/year}) (1.65 \times 10^{-4}) \frac{\text{stochastic effects}}{\text{person-rem}} = 3.7 \times 10^{-3} \frac{\text{stochastic effects}}{\text{person}}$$

This 1977 ICRP risk estimate has been updated by ICRP publication 60 [ICRP 1991] to approximately 4×10^{-4} deaths or serious genetic effects per person-rem. Substituting this value in the above equation yields 90 deaths or serious genetic effects per 1000 workers.

The proposed specified exposure limit should minimize the risk of excess deaths and serious genetic effects among DOE occupational workers. An

incidence of excess deaths and serious genetic effects from 37 to 90 workers per 1000 is much greater than the risk generally accepted in setting regulatory standards for occupational hazards. The Supreme Court has noted that at an incidence rate of 1 death in 1000 "a reasonable person might well consider the risk significant and take appropriate steps to decrease or control it" [Industrial Union Department v. American Petroleum Institute 448 US 607 (1980)].

Pregnant Workers

The proposed annual dose equivalent limit of 0.5 rem for pregnant women workers raises two concerns. First, the risk of severe mental retardation to the unborn child cited by DOE is "about 4 in 1000 live births per rad" if the exposure occurs between the 8th and 15th week after conception. This proposed level is at least 5 times the 0.1 rem per year, CEDE + EDE External proposed for children under 18. The basis for providing less protection to unborn children is not explained. Second, the 0.5 rem level can only be invoked by a written declaration from the pregnant worker. For workers who do not recognize their pregnancy early, this would leave them potentially exposed to the higher limit of 5 rem per year. This is particularly problematic during the 8th to 15th week when the fetus is at highest risk [56 FR 64339].

Generally, NIOSH recommends that the maximum levels for occupational exposures protect the health and functional capacity of the most susceptible members of worker populations. This policy is based on the OSH Act [PL 91-596, Section 6(b)(5)] which requires:

"The Secretary [Department of Labor], in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life."

Consistent with this provision, the Act requires NIOSH to develop criteria describing exposure levels including those at which "no employee will suffer impaired health or functional capacities or diminished life expectancy as a result of his work experience." The functional capacity of concern for this DOE occupational worker population is the ability of female DOE workers to bear healthy children. Because women of childbearing age are the most susceptible members of this population, NIOSH would urge that DOE reduce the current 5 rem maximum level of radiation exposure for all DOE workers to a level that is as protective as feasible for this susceptible subpopulation.

Planned Overexposures

The data submitted by DOE and the more recent exposure data strongly imply that there is no need for a "planned overexposure" to a 5 rem limit. According to the DOE data cited in the proposed rule, no workers were exposed at over 4 rem. More recent DOE data indicate that no workers were exposed over 3 rem in 1988 [DOE 1990].

It has been a repeated experience in occupational safety and health that, where protection exposure limits are established and enforced, employers have readily succeeded in overcoming challenges in achieving lower worker exposure concentrations that were previously believed to be infeasible on a technical or economic basis [NIOSH 1974; 1990a; 1990b].

Conclusion

The BEIR V report indicates that the risks associated with exposure to ionizing radiation from radionuclides is higher than previously recognized. The DOE exposure and risk data and ICRP risk estimates indicate that there is a significant risk of cancer and hereditary effects for occupational workers and significant mental retardation for the fetus at the proposed 5 rem stochastic effect level, despite the proposed lower exposure limit for pregnant workers. These risks would be reduced by lowering the proposed stochastic effect level for occupational workers and by eliminating any planned overexposures.

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