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Robert E. Alexander, Chief O-cupational Health Standards Branch

Thru: I.C. Boberts, Chief, Site Standards Branch

REVIEW OF EPA GUIDANCE ON OCCUPATIONAL RADIATION EXPOSURE STANDARDS

I have reviewed the "Dose-to-Risk Conversion Factors," "Summary Status Report - Comparative Risk Evaluation," and "Preliminary Identification," documents provided with your memo requesting our review. The purpose of those papers is not totally clear from the documents themselves. The principal issues associated with changes to the FRC guidance on occupational exposure, i.e.,

- 1. Is the current guidance adequate?
- If not, why not? What are the drawbacks? Are the current risks excessive?
- 3. On what basis should new occupational guidance be formulated?

a. individual risk?

- b. population risk?
- c. cost-effectiveness?

do not appear to be addressed in these documents. These decisions appear to have been made and these documents seem to be technical inputs toward resolving the third item, concerning the basis for formulating new guidance.

The first document concerning dose-to-risk factors is predicated upon a number of poorly supported assumptions. In particular, the assumption that women represent 50% of the work force appears to be inconsistent with actual data. The Fureau of Labor Statistics' 1972 data show 50,630,000 males and 31,072,000 females were employed. Over one-third of the females were employed in clerical jobs (where radiation exposure might be unlikely) so that the male/female ratio in the exposed workforce would be more typically 2:1 not 1:1. This ratio might be expected to be even higher for most radiation installations such as macional laboratories, nuclear power reactors and other non-medical radiation industries. EPA should investigate the actual situation for occupationally exposed workers.



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Supporting evidence for the limiting factor for genetic effects being the reproductive capacity of women also should be provided, particularly in view of the apparently erroneous assumptions regarding the composition of the exposed population.

The estimation of per capita exposure (really average per capita exposure) may be biased by a small number of high exposures and not really reflect the exposure of the average worker. The distribution of doses rather than the "average" dose would be more informative in estimating risk.

The purpose of the comparative risk evaluation document appears to be to support the formulation of standards based upon this concept; however, the on-the-job accident fatality data, particularly the limited data cited, do not seem to be appropriate for doing this. We suggest that radiation exposure from naturally occurring sources might be appropriate. The use of accident risks from high-risk industries does not appear to be appropriate as the accident risk to workers in radiation-related industries . (national laboratories, nuclear power placts, universities, etc.) might prove to be substantially lower than industry in general, not to mention high risk industries. A second problem with the comparative risk analysis is the lack of any qualification or consideration that the linear, nonthreshold hypothesis is an hypothesis, not established fact; thus, the estimates of radiation risk may range from zero to the value given.

The third document identifies a series of questions or issues which will have to be resolved in order to formulate occupational standards. This document has numerous unsupported statements which are identified by marginal notes in the attached copy. The schedule accompanying this document appears to be overly optimistic, particularly concerning the interagency review periods. These marginal notes also provide our thoughts on some of the issues raised in this paper.

Please contact me (36900) for additional information or if you have any questions on our comments.

Harold T. Peterson, Jr. Senior Environmental Health Physicist Site Standards Branch

Enclosure: Annotated Copy Environmental Policy Institute 317 Pennsylvania Ave. S.E. Washington, D.C. 2003 202/5:+-8200

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## Dear Editors:

I am writing in regard to current actitivites of the Environmental Protection Agency (EPA), The Nuclear Regulatory Commission (NRC) and the Occupational Safety and Health Administration (OSHA) to revise ionizing radiation exposure limits for workers. These revisions are taking place partially in the content of the recommendations of the International Commision of Radiation Protection (ICRP) publication No. 26.

ICRP 26 recommends a series of changes eliminating loopholes in current standards, yet still allowing for very large increases in worker exposures. For example, it recommends eliminating the 5(N-18) age formula which allows workers to recieve 3 rems per quarter or 12 rems ... ole body exposure in a given year. ICRP 26 recommends integrating external with internal exposures. Currently, federal standards do not integrate the two. The present system allows a worker to recieve up to 42 rems whole body and internal organ exposure in a given year (by adding the 30 rem bone and thyroid dose to the 12 rem whole body dose permitted under the 5(2-18) age formula). ICRP 26 does not recommend a reduction in the 5 rem per year whole body exposure limit, despite recent studies showing a 10-20 fold increase in cancer cortality risks at the 5 rem level.

ICRP 26 recommendations on internal organ exposures are of principal concern. nder current U.S. standards, based on ICRP 2, a "critical" organ is designated and a limit is set for it. This system does not consider the possibility of radiation causing cancer in a "won-critical" organ. To deal with this problem, ICRP 26 recommends an integrated risk approach where exposure to all organs is considered through a series of "weighting factors" balancing the total risk to all organs. However, this presents a major problem which the ICRP has not discussed with the people at the highest risk. Situations where radiation is deposited in one organ alone (ic. Sr-90 to the bone) will mean very large increases well above current limits as the following table shows:

Organ	Present Valua of MPE or R(rem/yr)		Values of w in ICRP 26	New Values of MPE or R (rem/yr)
Whole Body	5	•	1	5 ,
Gonads	S		. 0.25	20
Breast	15		0.15	32
Red Marrow	5		0.12	42
Lung	15		0.12	42
Tnyroid	30		0.03	. 167
Bone	30		0.03	167
Skin	30			
Remainder	15		0.03	17

arce: Radiation standards and Public Mealth: Paceeodings of a Second Congressional Seminar on low-level Ionizing Radiation, February 10, 1978, P. 13,