

PROPOSED REVISION OF 10 CFR PART 20--
USNRC STANDARDS FOR PROTECTION AGAINST RADIATION

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Following issuance of ICRP Publication 26 in 1977, there was increased awareness in the U.S. Nuclear Regulatory Commission (NRC) staff of the need to review and make recommendations on revising the NRC's present 10 CFR Part 20, "Standards for Protection Against Radiation." An interoffice drafting group was established in 1981 to develop a proposed revision.

The staff considered several alternative plans to revise Part 20. One such option was to update only those sections, such as values of concentrations of radionuclides in air and water, which would be most affected by the increases in scientific understanding of biological models, of biochemical behavior of specific radionuclides, and of assessment of risks. However, updating these features alone would incur a large portion of the impact of a complete revision of Part 20 without the benefits associated with a consistent radiological protection system which includes summation of risk from external and internal doses, and consideration of weighted doses to multiple organs from any number of radionuclides.

ICRP APPROACH

The revision would be consistent, in principle, with most of the recommendations of the ICRP set forth in ICRP Publications 26, 30, and 32. It would, however, retain the so-called "special units" (curie, rad, and rem), which are more familiar to NRC and State licensees than the International System of units.

The proposed revision would adopt the ICRP risk-based system which provides dose limits based on estimated risks, comparing health risks in the nuclear industry with health risks in other industries, and adding doses from dissimilar exposure modes.

OCCUPATIONAL DOSE LIMITS

A 5-rem dose limit for occupational exposures would apply to the sum of the whole-body dose (deep dose equivalent) from sources outside of the body and the committed effective dose equivalent (the sum of the 50-year committed dose equivalent to each organ or tissue multiplied by the weighting factor appropriate to that organ or tissue) contributed by radionuclides taken into the body.

The proposed revision would provide an exception to the basic limits, that are based on 50-year committed effective doses, for a few very long effective half-lived radionuclides, such as plutonium. For these long-lived radionuclides, it would provide retrospective control of the exposures of an individual worker on the basis of annual effective dose equivalent. A number of provisions would be added, including prospective use of estimated committed effective dose equivalent in the design and operation of facilities, an added constraint of 3 rems/year on the contribution from specified long-lived radionuclides, and provision of reporting both the annual and committed dose estimates to the worker, along with instruction concerning the significance of both. The staff believes that the proposed exception, in essence, would codify good contemporary practices and would permit implementation at a very nominal cost.

The present Part 20 permits whole-body external exposures up to 3 rems/quarter, but over many years of exposure would not allow an individual to exceed an average of 5 rems/year (the 5(N-18) dose-averaging formula). Internal exposures are controlled by limiting exposure conditions, but the doses are not added to external doses in meeting the present quarterly limits.

The proposed revision would remove the 5(N-18) "dose-averaging" provision in the present Part 20, but would contain a provision for "planned special exposures." This provision is designed to be used only in exceptional situations when alternatives which might avoid the higher exposure are unavailable or impractical. In the proposed planned special exposures, doses as high as one times the annual dose limits would be permitted for a single event, but an individual's dose due to all planned special exposures could not exceed one times the annual dose limits in a year, or 5 times the annual dose limits in a lifetime.

In developing the proposed revision, consideration was given to regulating the exposure of classes of workers who might be at relatively higher-than-average risk from radiation exposures, e.g., minors and pregnant women (embryo/fetus). For minors (persons less than 18 years of age), the proposed annual limits would be 1/10 of those for an adult worker. Consideration is being given to providing a dose limit for the embryo/fetus of a declared pregnant woman. It would place on the woman the responsibility for the decision, after instruction, whether or not to declare her pregnancy. Following such a declaration, the licensee would be required to limit to 0.5 rem the dose to the embryo/fetus from occupational exposure of the pregnant woman throughout the period of pregnancy.

ALARA

The proposed revision would require all licensees to incorporate ALARA considerations into their radiation protection programs. However, the Part 20 revision would not require quantified optimization studies because of the difficulties in performing the analyses and because it is recognized that the decisions must be largely judgmental in any event.

PUBLIC DOSE LIMITS

The proposed revision of Part 20 would explicitly set the annual dose limit as 0.5 rem to an individual member of the public, considering all sources of both external and internal dose, other than natural background and medical diagnosis and therapy.

REFERENCE LEVEL

A licensee would be assumed to meet the 500 mrem/year limit if the licensee controls exposure to members of the public to doses within a 100 mrem/year reference level from its own operations. A licensee could apply to the NRC for prior authorization of operations which might result in public exposures greater than the 100 mrem/year reference level. Such applications would include the licensee's program which assesses and controls dose within the 500 mrem/year limit; would demonstrate a clear need to operate in excess of the reference level; and would be supported by an explanation to do so in terms of ALARA requirements.

DE MINIMIS

Consideration is being given to a de minimis feature, a level of risk (or dose rate, as a surrogate measure) so low that it would be a trifle in comparison to the risks which the individual is subjected to daily as part of normal living habits and activities. It would constitute a level of risk so low that no resources could be justified to control it, or to be further concerned with it.

However, concern has been voiced over the possible abuse in applying the provision for a "de minimis" individual exposure (1 mrem/yr) to activities, such as waste disposal and the use of radioactive material in consumer products, and the feature is being reconsidered. Another proposed de minimis provision would truncate consideration of collective dose at the point where individual doses do not exceed 0.1 mrem/year.

HIGH RADIATION AREAS

The requirements in the existing Part 20 for controlling very high radiation areas (500 rads/hour at 1 meter), applicable only to irradiators, would be modified and applied to all licensees.

STATUS

Our approach to the development of the proposed revision of Part 20 has been different from the usual rulemaking procedure. Before, and in addition to receiving formal review inside NRC, the issues in the draft revision have been discussed informally with individual members of the NRC technical staff, and several hundred representatives of national and international radiation protection communities, Agreement States, licensees, labor unions, and others. These individuals provided useful views, particularly in regard to technical and administrative problems foreseen in implementing the revision and identifying impact potential. The drafting group has attempted to address each of the principal issues in the draft statement of considerations. The draft revision reflects and attempts to resolve many of these issues with minimal impact, while maintaining the central thrust of the revision to ensure that protection against radiation is adequate when judged by contemporary standards.

Drafts of the proposed revision were circulated for formal NRC Office level review in May 1983. The drafting group is now considering changes to the proposed rule, statement of considerations, and all of the many supporting documents to reflect changes in response to suggestions from these Offices and other interested parties. Formal reviews of the proposed revision also will be provided by the NRC's Advisory Committee on Reactor Safety and the Committee for the Review of Generic Requirements. It is expected that these changes will require several months. Subsequent to these reviews, the plan is to submit the proposal to the NRC Commissioners for their decision on publishing the rule as a proposal for public comment. This is expected to occur in 1984.

EPA

Members of an interagency working group, including NRC and other involved Federal agencies, Conference of State Radiation Control Program Directors, and NCRP have been involved in discussions with the U.S. Environmental Protection Agency (EPA) concerning proposed "Federal Radiation Protection Guidance for Occupational Exposures." It appears that the revised EPA guidance will reflect much of the system of dose limitation recommended by ICRP.

CONCLUSION

The expected result of promulgating and implementing the proposed revision is an improved rule that provides better assurance of protection, establishes a clear health protection basis for limits, applies to all licensees in a consistent manner, and reflects current information on health risk, dosimetry, and radiation protection practices and experiences.