

Commissioner Curtiss ✓

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555

October 22, 1990

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MEMORANDUM FOR: Margaret Federline, OCM/KC
FROM: *Ray Fraley*
R. F. Fraley, ACNW
SUBJECT: EPA STANDARDS FOR THE HIGH-LEVEL WASTE REPOSITORY

When we talked a few days ago you mentioned some uncertainty about ACNW comments regarding the stringency of the EPA standards.

Dr. Moeller has provided the attached for additional information regarding the basis for his comments at the NAS symposium on the EPA standards.

Dr. Moeller wants it to be clear that these are his own comments and have not been reviewed or approved by the other ACNW members.

Perhaps Chairman Carr will find them of interest.

Attachment:
Comments on Stringency of EPA HLW Repository Standards dated October 15, 1990 by Dade W. Moeller

Dade W. Moeller
October 15, 1990

COMMENTS ON STRINGENCY OF EPA HLW REPOSITORY STANDARDS

In developing its Standards for a High-Level Radioactive Waste Repository, it appears that the EPA has incorporated a number of features or methodologies that have led to excessive stringency. These features include those used in setting both the basic and the subsystem Standards. Listed below are several examples of specific situations that illustrate the incorporation of stringency. Please note that these examples are those of the author, only. They have not been discussed in detail with other members of the Advisory Committee on Nuclear Waste, nor have the other members reviewed and concurred in this report.

1. As a foundation for the establishment of their Standards, EPA officials stated that one of their goals was to assure that the health impacts of the repository were no greater than those that would have been associated with the unmined uranium ore that would be needed to provide the fuel for the nuclear power plants that produced the waste that was to be placed within the repository.

At the time the original EPA calculations were made, the scientific community was not aware of the importance of radon as a source of exposure to the general public. If the impacts of radon releases from the unmined ore were not taken into account [an assumption on my part], then the doses [and health impacts] of the unmined ore may have been underestimated.

This omission would have, in turn, led to the establishment of Standards for the repository that were too low [too stringent].

2. In setting permissible limits for the release of individual radionuclides from the repository, the EPA assumed that the releases affected the population of the entire world -- projected to number a constant level of 10 billion people over the 10,000 year assessment period.

In taking this approach, the EPA did not specify a "critical" population group, nor did they specify a dose limit for the people who might be exposed. Rather, they summed the resulting collective doses over the population of the world and set the release limits so as not to exceed a given collective dose

limit [which, in turn, was used to predict the associated health impacts].

Depending on whose numbers you use, the individual whole body dose rates that were used in these tabulations were in the range of 10^{-3} to 10^{-5} rem per year and these dose rates served as a basis for calculating the associated collective doses.

This is in contrast to the procedures recommended by the National Council on Radiation Protection and Measurements [NCRP]. In fact, this organization has defined a "Negligible Individual Risk Level" [NIRL], which is regarded as "trivial compared to the risk of fatality associated with ordinary, normal societal activities and can, therefore, be dismissed from consideration" (NCRP Report No. 91, pages 43 - 45 [see enclosure]). The NCRP defined the NIRL as an annual level of risk of 10^{-7} , which corresponds to a dose rate of 0.01 mSv [1 mrem, or 10^{-3} rem] per year or less, and they recommended that "assessments of increments of collective annual effective dose equivalent from any particular source or practice should exclude those individuals whose annual effective dose equivalent from such a source is 0.01 mSv [0.001 rem] or less."

So, in essence, it appears that a major portion of the individual doses that EPA used in estimating the collective dose due to radionuclide releases from a repository should not have been included. The implications of this approach on the part of EPA are several. First of all [as stated above], the collective doses estimated by EPA for releases from the repository are too high. Secondly, this leads to an over-estimation of the health effects due to releases from the repository which, in turn, leads to the setting of release limits for individual radionuclides that are too low [too stringent].

In fairness to EPA, however, it is important to note that the NCRP recommendation was not officially issued until June 1, 1987. Now that it has been issued, however, EPA should reassess their calculations.

NOTE: Because of widespread misinterpretation of the correct methods to use in calculating collective doses to large population groups, the NCRP recently established a new Scientific Committee to review this matter and to offer more definitive guidance on the subject.

3. D. C. Kocher of the Oak Ridge National Laboratory has conducted a review of radiation protection and environmental radiation standards for the public and has published the results of his review in Nuclear Safety (Vol. 29, No. 4, pages 463 - 475, October-December, 1988) [See copy attached].

In this report, the author has reviewed the EPA Standards [40 CFR 191] and has estimated that the lifetime risk associated with the EPA Standards for cumulative releases of radionuclides to the accessible environment from a HLW repository over 10,000 years is 5×10^{-8} .

Assuming that the NCRP Negligible Individual Risk Level of 10^{-7} per year corresponds to a lifetime negligible risk level of about 10^{-5} , the lifetime risk level associated with the EPA Standards is a factor of two hundred lower than the NIRL.

Comparisons of the EPA HLW Standards to other regulatory limits, such as the NRC Appendix I regulations and the EPA Drinking Water Standards, reveals that the HLW Standards are stringent. In fact, according to Dr. Kocher, the EPA HLW Standards are the lowest of any radiation standards being applied to the U.S. population today [see accompanying figure].

4. The Office of Radiation Programs of the U.S. Environmental Protection Agency has the responsibility for controlling the problems of indoor radon in the U.S. as well as setting Standards for the High-Level Waste Repository. In terms of these two assignments, the following observations may be of interest.

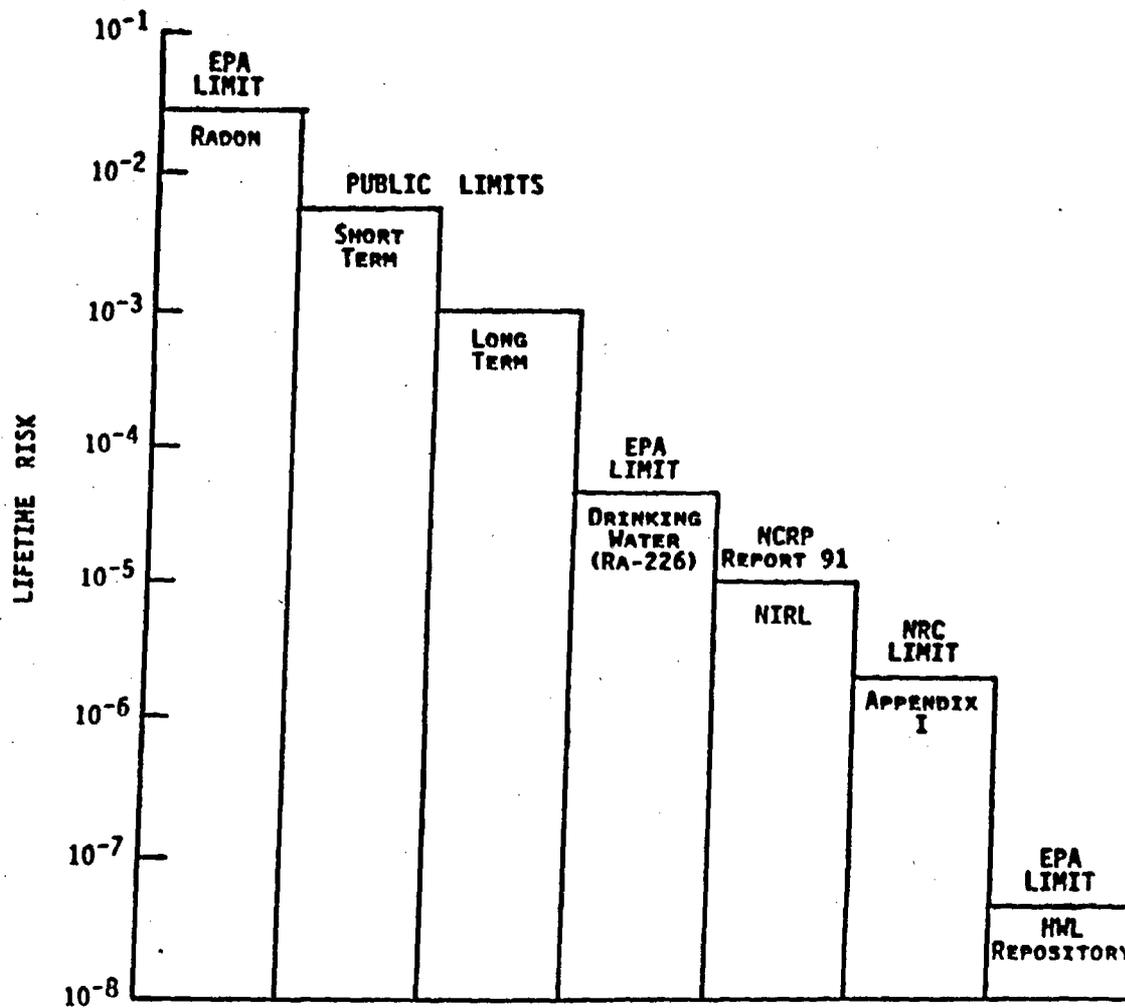
EPA estimates that the presence of radon inside buildings in the U.S. is producing up to 20,000 lung cancer deaths annually, plus several thousand deaths due to cancers in other body organs. In fact, radon is estimated to be the source of over half [55%] of the dose currently being received by the U.S. population from all sources of ionizing radiation.

The EPA Standards for a HLW repository limit the number of deaths [per 100,000 MTHM] to 1,000 over the first 10,000 years.

If one compares the number of deaths annually being caused by radon to the limits that EPA has set for a HLW repository, the following observations can be made:

The EPA Standards would limit the number of deaths occurring each year due to operation of a HLW repository to less than the number being caused by indoor radon every three minutes;

The EPA Standards would limit the number of deaths occurring over the first 10,000 years of operation of a HLW repository to less than the number being caused by indoor radon every three weeks.



COMPARISONS OF LIMITS ON DOSES TO THE POPULATION FROM VARIOUS RADIATION SOURCES