

United States of America
Nuclear Regulatory Commission

In the Matter of)
)
Proposed Rulemaking on)
The Storage and Disposal) PR-50,51
of Nuclear Waste) (44 FR 61372)
)
(Waste Confidence Rulemaking))

Statement of Position
by
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It is my position that there is no confidence that safe disposal of radioactive waste from licensed nuclear facilities will be available by 2007 -2009. It is further held that it is unlikely if such safe disposal will ever be available. Given enough time, on-site disposal or storage will prove to be unsafe. This last position follows from the two which preceded it. On-site storage can only be useful and safe for a short period of time (few decades). If permanent storage is never developed, then the waste must remain in this on-site storage beyond this time period, and become leaky and unsafe.

This position is taken in response to the U.S. Department of Energy's "Statement of Position" in this proceeding (Ref. 1). The main thrust of this position is that an acceptable means of disposal for nuclear waste can be found in a mined geological formation.

Dose rates below background are Significant

The Department of Energy (DOE) takes the position that releases from a waste depository with consequences of a few

millirem to a few tens of millirem per year will be considered acceptable (Ref. 1, page II-9). If this is applied to the present world population of 4×10^9 people, using the conclusions of the 1972 BEIR report (Ref. 2), the conclusion is a steady state death rate of 2700 to 6600 persons per year. In 100 years this would accumulate 270,000 to 660,000 deaths. I Cannot agree that such health effects are acceptable.

This acceptance of consequences of a few tens of millirems per year dose rate is used by the DOE in its definition of Isolation for nuclear waste(Ref. 1, page II-9),. This definition is therefore rejected. Rather actual consequences will be assessed.

The Iodine-129 impact

The total inventory of fission products to be accumulated by the year 2000 has been estimated by Blomeke and Bond (Ref 3) to be approximately 10^{11} curies. Of this approximately 7000 Curies will be iodine -129, an amount close to the EPA estimate of 1973 (Ref. 4). The DOE suggests that it can guarantee that the geological depository will remain intact for 10,000 years (Ref. 1). This is probably a factor of ten too optimistic, but is still very short compared to the 17×10^6 year half life of I-129. Suppose that the depository remains intact not for a mere 10^4 years, but for 10^6 . And then suppose that it takes a second million years for the iodine to leak out. This is in keeping with the DOE results of sections II.F.1.4.2.3 and II.F.1.4.3.4 (Ref. 1, pages II-231 and II-235). To simplify the calculation, consider that the I-129 become uniformly diluted in the stable iodine of the biosphere. I estimate that there may be as much as 10^{14} kilograms of such stable iodine available to the biosphere. This defines a minimum concentration, of I-129. The standard human thyroid contains 7 milligrams of iodine (Ref 5). From this, the activity in a standard thyroid can be calculated, and in turn, using the methods of ICRP Publications 10 and 2, the dose is obtained (Ref 6).

The world population is assumed, conservatively, to remain at its present level of 4 billion. Then, the total dose is only 127 person-rem each year to the thyroids, initially. ~~22 2x~~ Summing this over the total decay period for the iodine-129, results in a total of 3×10^9 person-rem to the thyroids. Using the method of EPA (Ref. 7) which uses the linear, non-threshold theory and the 1972 BEIR report (Ref. 2), a total of 30,000 to 40,000 thyroid cancers is estimated. Of these, 5000 to 10,000 would be fatal at current rates. This number of health effects is not considered to be acceptable. In fact this number is comparable to the EPA estimate for the entire nuclear industry thru the year 2020 (Ref. 4).

The Uranium-238 Impact

The Interagency Review Group estimate of 148GWe nuclear capacity by the year 2000 would result in 88,600 MT of heavy metal discharged as spent fuel (Ref. 8). Pohl and Kepford (Ref. 9, 10) have pointed out that the natural radioactive decay leads to the production of radon-222 in large quantities. This matter has been reviewed by Dr. R.L. Gotchy of the NRC staff (Ref. 11). The uranium in the spent fuel will yield a total of 1.3×10^{16} curies of radon-222.

To provide an estimate of the health consequences of radon releases, the world populations and population distributions are assumed to remain at present levels. The NRC suggests that a release of 4,200 curies of radon-222 from a mine or mill in the west will result in 0.023 excess deaths (Ref. 12, page 11, 18). This provides a ratio of 4.8×10^{-6} deaths per curie. Thus, the radon produced could cause about 6×10^{10} deaths if it all escaped to the atmosphere. This value would be diminished only by the average fraction of the uranium which remains buried. If the depository were to be uncovered by erosion the health consequences would be proportional to the time uncovered. It should be noted that the erosion of the Grand Canyon is twice

as deep as is planned for these wastes. Thus, erosion is not totally impossible.

Conclusions:

The DOE position that very small dose rates in the order of 10 millirems per year, or less is acceptable can lead to very serious consequences, if allowed to persist for long periods of time. This should lead to a new definition of what is acceptable. In particular, the consequences of Iodine - 129 are almost certainly too large to be acceptable. It would not be possible to guarantee the containment of the waste for hundreds of millions of years as this would require.

The decay of Uranium - 238 to radon-222 has potentially severe consequences. Here the major factor is what fraction of the time, what fraction of the uranium is close enough to the earth's surface for the radon to escape into the air before it decays. Erosion will tend to uncover the waste. Erosion will also tend to re-bury it. The average result is unclear, and very ~~xx~~ site-specific.

For these reasons, any scenario for nuclear waste disposal in a mined geologic disposal site will be unacceptable.

It is noted that the very long term impacts must be considered. Footnote 12 of NRDC v. USNRC, 547 F.2d 633 (1976) requires that consideration be given to the full detoxification period for the wastes. Also Calvert Cliffs Coordinating Committee v. USAEC, 449 F.2d 1109 at 1115 (1971) mandates a particular sort of informed decision-making, and states that if the ~~xxx~~ decision was reached procedurally, without individualized consideration of environmental factors, it is the responsibility of the courts to reverse. Thus it ~~ix~~ is the responsibility of the agencies to not adopt a procedure that all dose rates of ten millirems per year are acceptable.

References

- 1 "Statement of Position of the United States Department of Energy in the Matter of Proposed Rulemaking on the Storage and Disposal of Nuclear Waste" PR-50,51 (44FR61372), U.S. DOE, 15 April 1980, DOE/NE-0007
- 2 "The effects on Populations of exposure to low Levels of \bar{X} Ionizing Radiation", BEIR committee, National Academy of Sciences-National Research Council, 1972
- 3 "High-Level Waste Management Research and Development Program at Oak Ridge National Laboratory", in "High-Level Radioactive Waste Management", M.H. Campbell Ed., 1976, American Chemical Society
- 4 "Environmental Radiation Dose Commitment: an Application to The Nuclear Power Industry", EPA., 1973-002
- 5 International Commission on Radiological Protection , Publication No. 2, Pergamon Press, 1959
- 6 Ibid, and International Commission on Radiological Protection, Publication No 10, Pergamon Press, 1968,
- 7 E.P.A. 1973-002, page D-17 , op. cit.
- 8 "Report to the President by the Interagency Review Group on Nuclear Waste Management" TID-28817, Draft, October 1978
- 9 R.O. Pohl, "Health Effects of Radon-222 from Uranium Mining" Search, 7(5), 345-350 (August 1976)
- 10 Testimony of Dr. C. R. Kepford, "Health Effects Comparison for Coal and Nuclear Power" in the matter of Three Mile Island unit 2 (Docket 50-320) operating license hearings.
- 11 Affidavit of R.L. Gotchy, "Appendix", "Radiological Impact of Radon-222 Releases", USNRC, in the matter of Three Mile Island Unit 2, Docket 50-320, January 20, 1978
- 12 "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives" NUREG-0332, Draft, U.S. NRC, September 1977

Respectfully Submitted
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Certificate of Service

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I hereby certify that copies of "Additional Material supplied by petitioner Lochstet subsequent to Prehearing Conference on 6-8 January 1982" have been served upon those persons on the attached Service List by deposit in the United States Mail, first class, postage prepaid, this 14 th day of January 1982.

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