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November 13, 1956

AEC 141/33

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ATOMIC ENERGY COMMISSION

RADIOLOGICAL SAFETY CRITERIA FOR THE
NEVADA TEST SITE

Note by the Secretary

1. The General Manager has requested that the attached report by the Director of Biology and Medicine be circulated for consideration by the Commission during the week of November 12, 1956

2. The criteria proposed in the attached report are those referred to in AEC 944,* "Nevada Test Site Activities for Calendar Year 1957".

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ATOMIC ENERGY COMMISSION

RADIOLOGICAL SAFETY CRITERIA FOR THE
NEVADA TEST SITE

Report to the General Manager by the
Director of Biology and Medicine

THE PROBLEM

1. To establish radiological safety criteria for exposures to gamma radiation from fallout to populations around the Nevada Test Site.

SUMMARY

2. The trend in thinking of the International Commission on Radiation Protection, the National Committee on Radiation Protection, and the National Academy of Science is toward more restrictive criteria for standards of radiation protection.

3. In light of the above, it is recommended that radiological safety criteria for exposures to gamma radiation from fallout to populations around the Nevada Test Site should be as follows:

a. The current criterion of 3.9 roentgens for any one year; plus an additional restriction of

b. 10 roentgens in a period of 10 years, with the first of the successive ten-year periods starting in the spring of 1951.

4. These should be construed to be operational guides rather than maximum permissible limits, since exposures somewhat in excess would not be hazardous.

STAFF JUDGMENTS

5. The Divisions of Military Application, Information Services, Office of the General Counsel and the Office of Classification concur in the recommendation of this paper.

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RECOMMENDATION

6. The General Manager recommends that the Atomic Energy Commission:

- a. Approve the radiological safety criteria for gamma exposures set forth in paragraph 3 above.
- b. Note that an appropriate public announcement of the criteria will be stated in the announcement of the next test series at the NTS (Appendix "H", AEC 944)
- c. Note that operational means for giving effect to the criteria in paragraph 3 above will be developed by the Test Manager and the Division of Military Application with the technical guidance of the Division of Biology and Medicine.
- d. Note that the Joint Committee on Atomic Energy the GAC, and the MLC will be advised of this action by letter such as Appendix "B".

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APPENDIX "A"

BACKGROUND AND DISCUSSION

BACKGROUND

1. The trend in thinking of the International Commission on Radiation Protection, the National Committee on Radiation Protection, and the National Academy of Science is toward more restrictive criteria for standards of radiation protection. The National Academy of Science Report recommends, "---That for the present it be accepted as a uniform national standard that X-ray installations (medical and nonmedical), power installations, disposal of radioactive wastes, experimental installations, testing of weapons, and all other humanly controllable sources of radiations be so restricted that members of our general population shall not receive from such sources an average of more than 10 roentgens, in addition to background, of ionizing radiation as a total accumulated dose to the reproductive cells from conception to age 30.---" The NAS Report also states, "---That individual persons not receive more than a total accumulated dose to the reproductive cells of 50 roentgens up to age 30 years---".

DISCUSSION

2. The dividing line between "individual persons" and "general population" is not distinct in the NAS Report. The numbers of people involved around the Nevada Test Site might not constitute a "general population" yet it probably would be difficult to categorize many thousands of people as "individual persons." Further, there is in a sense "inbreeding" within this population.

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3. Judging from past experience at the Nevada Test Site, it would not be operationally feasible to limit exposures to 10 roentgens in 30 years. The situation becomes one of facing the problem frankly and in the interests of the National Defense defining the degree of risk, as the Commission has done in the past. It would appear that a reasonable figure would lie somewhat between the 10 and 50 roentgens per 30 years. The acceptable value of exposure within this range is dependent upon one's philosophy with respect to the imperativeness of the nuclear testing program since even the highest value (50 roentgens in 30 years) would not be considered a dangerous exposure in terms of the individual's health nor of major consequence genetically. (Fifty roentgens might double the mutation rate, but this would be for a relatively small number of persons in terms of the general population.) Based on such reasoning we are recommending that the operational guide be arbitrarily established at 10 roentgens in a period of 10 years with the first of the successive ten year periods starting in the spring of 1951. (The date of the first nuclear tests in Nevada.) This criterion should not be construed as a maximum limit beyond which serious effects might be expected, but rather it should be thought of as an operational guide.

4. The operational feasibility of 10 roentgens in 10 years may be estimated by noting that during the five years of testing at Nevada Test Site the highest total accumulated exposure to any community has been about four and one-half roentgens (about 15 people living at a motor court received about seven to eight roentgens). This might suggest a degree of ease in meeting the criteria that does not in fact exist. The relatively low exposures are the result of the most exacting plans and procedures for

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conducting the tests including many long delays until weather conditions were favorable. The permissible sectors and distances around NTS for deposition of relatively heavy fallout are limited, thus requiring a continuation of strict criteria in the timing of the detonations. The use of higher towers, surfaced areas around ground zero, and the possible use of balloons for suspending the nuclear devices as well as other methods of detonation under consideration, should assist in reducing the fallout outside the Nevada Test Site.

5. Unlike accumulation of doses by small increments (as in an atomic energy installation) providing opportunity for preventive action as established limits are approached, the occurrence of fallout on a community can be a quanta event and once it has occurred certain exposures will ensue unless rather drastic action such as evacuation is taken. Therefore, operational requirements would indicate a relatively large radiation exposure guide for a single year. The criterion of 3.9 roentgens per year has been in effect, widely reported by the Atomic Energy Commission and used in educational programs with the people around the NTS. Therefore, in the absence of any compelling reason to the contrary, it is recommended that this criterion be retained. As with the criterion of 10 roentgens in 10 years, it should be made clear that 3.9 roentgens per year is an operational guide, and exposures somewhat in excess of this should not be construed as being hazardous.

6. The method of estimating the gamma doses shall be according to AEC 141/15 (as possibly amended, following re-evaluation of the relevant data), radiological safety criteria and procedures for protecting the public during weapons testing at the Nevada Test Site.

APPENDIX "B"

DRAFT LETTER TO JCAE, MLC AND GAC

1. The trend in thinking of the International Commission on Radiation Protection, the National Committee on Radiation Protection, and the National Academy of Science is toward more restrictive criteria for standards of radiation protection.

2. In keeping with this philosophy the Atomic Energy Commission has recently approved an additional restrictive criterion for exposure to gamma radiation from fallout to populations around the Nevada Test Site. To the current criterion of 3.9 roentgens for any one year which will be retained, there will be an additional restriction of 10 roentgens in a period of 10 years, with the first of the successive 10-year periods starting in the spring of 1951 (the date of the first nuclear series at the Nevada Test Site).

3. These criteria are construed as operational guides rather than maximum permissible limits since exposures somewhat in excess of these values would not be considered hazardous.