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OFFICE OF

DEPARTMENT OF THE ARMY  
THE CHIEF OF RESEARCH AND DEVELOPMENT  
WASHINGTON 25, D. C.

8 April 1957

SUBJECT: Technical Memorandum ORO-T-357, "Biological Effects of Whole-Body Gamma Radiation on Human Beings" (U)

3-78

Atomic Energy Commission 6 Cys  
1901 Constitution Avenue, N.W

TO: Washington 25, D.C.

1. A copy of subject Technical Memorandum, a working paper of the Operations Research Office, is forwarded for your information and retention.

2. This paper is an analysis of certain experimental data on radiation injury in an attempt to predict the more immediate effects of prolonged irradiation of man. This is an excellent initial effort but it is pointed out that the problem is far from solution. At present there are several points of technical disagreement on certain aspects of the memorandum. Among these are the use of 1.33 as the negative decay exponent, the exclusion of available data on exposure of humans and monkeys, and questioned statements as to the recovery of the Marshalese. Additional data is becoming available to compare with Blair's theory and modifications thereof.

3. The Department of the Army considers this memorandum to be a timely, provocative and useful presentation of a difficult and complex problem of long standing. Perhaps its greatest value lies in focusing attention on the problem by analyzing experimental data and discussing possible implications. It is recommended for review by research workers and those engaged in research administration. Research within the Department of the Army and its agencies is continuing for the purpose of refining the theory with the goal of furnishing basic planning assumptions.

4. Specific comments on the recommendations of the Operations Research Office are contained in Inclosure 1.

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MEDICINE, HEALTH & SAFETY 3-1

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SPECIFIC COMMENTS ON RECOMMENDATIONS CONTAINED ON PAGES 3 and 4  
OF TECHNICAL MEMORANDUM ORO-T-357.

1. Recommendation No. 1

Comment:

a. The immediate limitation is on scientific personnel of sufficient experience and willing to work on such problems, rather than on funds.

b. Choice of biological test objects is dependent upon specific effect being studied. Larger and longer-lived animals are more expensive to procure, more difficult to obtain in a healthy condition, more expensive to maintain and require more time for experimentation. Before such animals are used, valuable clues as to possible mechanisms can be obtained from investigation of effects on lower animals or plants. Many biological processes in larger mammals are unlike those occurring in man.

c. The white blood cell response to radiation is one of the most sensitive indicators of irradiation, but has not been shown to quantitatively correlate with individual injury. This response has been recorded in this connection since the twenties.

2. Recommendation No. 2.

Comment: While there is no objection perceived to the use of the LD 50/45 as recommended, the LD 50/30 should also be calculated since this figure permits comparison with animal results and is standard in toxicity studies.

3. Recommendations Nos. 3, 4 and 5.

Comment: Measurement of dose in roentgens (gamma radiation) is the most practical solution. For planning purposes, the figures given in the recommendations are acceptable subject to correction when and if adequate data so indicate. The damage to biological systems is dependent on energy transfer in or near the system, that is, that energy traversing a system unchanged is not of consequence to that system.

4. Recommendation No. 6.

Comment: Deposition of fallout on surfaces of, or near, the earth does not occur at a time sufficiently predictable to make this recommendation meaningful.

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Incl. 1  
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5. Addressees who desire to comment on Technical Memorandum ORO-T-357 are invited to do so directly to the Director, Operations Research Office, The Johns Hopkins University, 7100 Connecticut Avenue, Washington 15, D. C. It is requested that a copy of any comments so transmitted be furnished the Office, Chief of Research and Development, Department of the Army, Washington 25, D. C., ATTN: Operations Research Division.

FOR THE CHIEF OF RESEARCH AND DEVELOPMENT:



ROLAND P. CARLSON  
Colonel, GS  
Chief, Operations Research  
Division

- 2 Incl
1. Specific Comments on ORO Recommendations.
  2. TM ORO-T-357