

HW - Ecological Study ~~SECRET~~

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Dear Al:

Reference is made to the Acting General Manager's letter of 27 November 1962 which forwarded for comment a draft report entitled, "The Biological and Environmental Consequences of Nuclear Attacks Using Clean Weapons," which was prepared by the Technical Analysis Branch, Division of Biology and Medicine. The draft report was read with interest and thanks are extended for the effort which went into its preparation.

Although it is well recognized that there is a great deal yet to be learned about the biological and ecological effects of nuclear radiation exposures, it seems that the analysis provided in the draft report could have treated these matters more quantitatively than has been done. In addition, the report seems to avoid commenting on the significance of such results as are arrived at. Specific comments on the draft report are attached.

The letter transmitting the draft report also requested general comments as to the scope, emphasis and degree of detail appropriate for studies such as the draft report represented. For the first approach, the scope, as discussed with me on 4 April 1962 by Mr. Hollister and confirmed in an attachment to his letter of 20 April 1962, would form an adequate basis, provided the necessary calculations were made, the essential comparisons performed, and the significances reasonably estimated. The comprehensive results of the first approach based upon the present state-of-the-art are required now. However, in the interest of obtaining a substantive report, the submission of the results of the first approach phase could be extended until the end of FY 1963.

For the first approach mentioned above the current AEC draft report would serve as a good basis, subject to the attached comments, suggesting ways of making it more meaningful and useful. In general, the first approach should dwell more specifically on long-range effects and devote less effort to the short-term effects which are presented in

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Monica Oyola-Coeur
Date: 03-09-2017

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the DODDAC report. However, it is realized that a certain amount of short-term effects information is required in order to serve as a comparative basis or framework for the other effects. More precise information should be given on the status of the survivors in terms of malignant neoplasms, life-shortening, genetic effects, etc. The reader should be able to obtain answers to the following types of questions:

- a. How many cases (or percent) of the above-mentioned effects? How many deaths can be expected (where applicable)? What is the extent of life-shortening?
- b. Are the USSR and Red Satellites habitable from the standpoint of external radiation? Internal radiation (to include tritium)?
- c. What is the status of the nation's supply of meat, milk and other foods?
- d. What is the status of the nation's agriculture according to the first year's crops, later crops, etc.?
- e. What is the effect of fire on crops and woodlands?
- f. What links, if any, are disrupted or subjected to hazardous levels in the ecological chain embracing the nation, the hemisphere, the world?
- g. In all these cases, what are the absolute and relative effects of clean weapons in contrast to those of standard weapons?

The follow-on approach would involve the continuing effort to understand the fundamental processes underlying radiation effects as they relate to somatic and genetic damage and the processes of cellular metabolism, growth, reproduction, immunology, aging, and other dynamic phenomena. In addition, further effort appears to be

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warranted in the entire field of ecology and the sensitivity of the various ecological elements to the effects of ionizing radiation. As pertinent information is developed, such data should be applied to the weapon-attack situations and the results reported.

On balance, the results of a substantive study would provide a desirable input to individuals who have to weigh the relative merits and consequences of standard and clean weapons.

Sincerely,

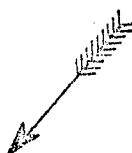
Signed: Jerry

Gerald W. Johnson
Assistant to the Secretary
of Defense (Atomic Energy)

Attachment
Specific Comments
on Draft Report

Major General A. R. Luedcke, USAF, (Ret.)
General Manager
U. S. Atomic Energy Commission

cc: OASD/Civil Defense (Mr. Strobe)
Chief, National Military Command
System Support Center
GWJ/CMD/gjp/31Jan63
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~~SECRET~~Specific Comments on Draft Report"The Biological and Environmental Consequences of Nuclear
Attacks Using Clean Weapons"

a. Pages 7-22: The information and data contained in pages 7-22 of the draft report are contained in the DODDAC report. Since the data are not put in a more usable form and no significant additional interpretations or conclusions are drawn, the inclusion of the previously published information in such detail is considered to be of questionable value.

b. Table III, Page 15: The significance of Table III is not apparent. It would be more meaningful if several significant or hazardous levels of contamination were established and the proportion of land so contaminated were tabulated correspondingly for each of the given weapon-attack cases.

c. Table IV, Page 17: Same comments as for Table III.

d. Pages 18-19: H+I dose rates are not too meaningful for agricultural contamination. Correlation in terms of specific hazard levels would be helpful.

e. Item 2, Page 23: The lifetime external gamma dose for the survivors (also appears on Page 9) were obtained from averaging data in the DODDAC report which indicated the number of survivors receiving specified doses. It would be helpful if this study would provide information concerning the long-term biological effects which are associated with the specific lifetime external gamma dose levels, in terms of the numbers of survivors so exposed for the various weapon-attack cases.

f. Pages 28-29:

FOIA(b) (3) - 42 USC 2162(a) - RD DOE EO13526 6.2(a)

However, the energy of their emissions are different.

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and there was no indication that relative solubilities had been taken into consideration. Therefore, assessing relative hazards solely on the basis of MPC's and relative abundance is subject to question.

FOIA(b) (3) - 42 USC 2162(a) - RD DOE EO13526 6.2(a)

g. Table VII, Page 31: A brief discussion on the basic data and procedure for obtaining the indicated doses would be helpful.

h. Table VIII, Page 39: The applicability of Table VIII is not readily apparent.

1. Does the table apply to all plants?
2. What are the LD-100's for various plants?
3. What is the duration of the chronic doses required to produce the indicated responses?
4. Is the indicated dose delivered by both internal and external sources?
5. How can the data be applied to the given problem? Specifically, what proportions of agricultural areas have contamination levels resulting in various plant injuries and deaths? What are the implications for the surviving population and other animals?

i. Table IX, Page 40: It would appear that the criteria listed in this table could be used to compute the damage to pines and possibly other plants. Such a tabulation for the various weapon-attack cases would be helpful.

j. The first six conclusions are restatements (without further interpretation or amplification) of the results of the BODRAC work and do not pertain directly to the presumed objective of this report. The scope of the present study is not clearly defined in the text and the intended objectives as inferred from the topics treated, appear to be two:

1. Exposure dose from internal emitters.
2. The effects of ionizing radiation on terrestrial ecosystems.

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k. The seventh conclusion states that survivors of clean-weapon attacks survive with a lower lifetime gamma exposure dose -- "a factor relevant to the subsequent state of their health." The statement is derived from the DODDAG results. It must refer to the potential decreased incidence of late somatic effects (leukemias, life-shortening, etc.) and genetic effects. Yet these biological effects are not discussed in the report and no indication is given of the potential significance of the difference in exposures. Quantitatively the difference in average dose is a factor of about 3, or for the most severe attacks, about 200 R for the clean weapon as against, about 600 R for the normal weapon. The unanswered question is what is the likely significance of the difference in terms of the outcome for the survivors and their descendants?

l. Conclusion eight restates the generality that clean weapons will expose plant life to lower doses than normal weapons. As an example, it is stated that crop damage may be lessened by clean attacks. However, there is no analysis in the text to back this statement, the only quantitative information (Table IX) referring to pine trees. Even these data are not related to the attacks studies so that the reader is not furnished information upon which to base a comparative judgment as to how pine trees would have fared for the various weapon cases.

m. Conclusions nine through eleven apparently refer to the question of the uptake of internal emitters but only in general terms. The implications in terms of the "fate of agriculture" are not drawn. The text is somewhat more quantitative, indicating that internal exposures from clean weapons would be about 4 percent of those from normal weapons. But Table VII shows that the estimated total dose from Strontium and Cesium for normal weapons is at most 30 to 130 rads. This suggests that the problem is not significant for either weapon type. Conclusion thirteen bears somewhat on this question by proposing that if the population had better shelters, the internal emitter dose might become relatively more important, but the absolute significance is not estimated.

n. The twelfth conclusion deals with the thyroid exposure to I-131. Whether the estimates represent the state of the art is questionable because, as pointed out, the upper part of the stated range is unlikely because the milk cows will not survive. Both Carl Miller and

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George LeRoy have made calculations that account for this fact. Their results give an upper limit of several thousand rads, well below the ablative doses for either children or adults. The whole problem may be somewhat overplayed because this sort of damage could easily be prevented by blocking the thyroid with stable iodine.

o. The last conclusion would be considered more germane, if the limits of our current understanding had been more completely exhausted.

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