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BIOLOGICAL ASPECTS OF RADIOLOGIC WARFARE

This paper is submitted by Dr. Shields Warren for consideration in conjunction with item 3(c) of the agenda.

In consideration of radiologic warfare there are several points to be considered from the biological angle.

First: The objective

1. Is it to be directed against human beings primarily?
 - a. Is it desired to kill? If so, how promptly?
 - b. Is it desired to disable? If so, how soon and for how long?
 - c. Is it desired to so nauseate personnel that the evacuation of areas will be forced?
 - d. Is it desired to merely make areas untenable from the point of long-range occupancy?
2. Is it to be directed against personnel secondarily?
 - a. By contamination of water supply?
 - b. By contamination of food supply for local consumption?
 - c. By contamination of food supply for general consumption?
 - d. By contamination of basic material for textiles such as cotton and wool?

In any contamination of material to be taken into the body one must calculate the effect not only of the amount and type of radiation but on the metabolism of the material particularly in relation to selective localization in the body and length of time that it will remain in the region where localization has occurred. By appropriate regulation of materials and amounts a wide range of effects from anemia to cancer production may be expected after a lapse of several years.

Second: The human reaction

In an anti-personnel application of radiologic warfare it is important to keep the following points in mind:

1. The psychology of Asiatic and most European population, aside from Scandinavian, parts of Germany, the Low Countries, the United Kingdom and perhaps two or three large cities of France, is such that warning to evacuate will make no impression at all. For example, in the Balkans not only is illiteracy high but people are not accustomed to getting information from the printed word and in all probability would not credit such information.

Declassified by DNA, Chief, ISTS

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Date: 7/1/95

DEPARTMENT OF DEFENSE INFORMATION REVIEW	
REVIEWED BY: <i>Krusgalle</i> 3/22/94	DATE: 3/22/94
REVIEWED BY: <i>WBSchmidt</i> B	DATE: 7/6/94
CLASSIFICATION CANCELLED	
DECLASSIFIED INTO BRACKETED	

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HRC-1015

CSBauer 7/1/94

2. Unless the population was actually nauseated within the first two days the chances are that no significant impression would be made upon them in time to save their lives.
3. A dose that would produce nausea within the first two days is in all probability a dose that would be lethal to a considerable portion of those exposed. It may be assumed that a fair number of people could receive 200 R of total body radiation given over a period of several hours or longer before experiencing a appreciable nausea. It may be assumed therefore that a level capable of producing nausea in two days would produce death in a fair number of persons who had experienced such exposure for five or six days. Thus it is quite possible that there will be a factor of safety of only three between the dose which nauseates a fairly large portion of the population and the dose which will kill most of them. Moreover if the intensity is relatively low, say not over 100 R per day, a lethal dose would be obtained a number of days before prostration occurred assuming a material with 30 days or more half-life were used.
4. A dose which produced no striking symptoms for the first two weeks might well be sufficient to produce some fatalities several months after cessation of exposure.
5. It is probable that at the present day any use of radiologic warfare would have far more effect if directed against our own population than against any foreign population assuming that sub-lethal amounts are to be used.

Third: Problems of distribution

From the standpoint of distribution the following points should be considered. Even distribution will be extraordinarily difficult to obtain and in the effort to give most of the population a nauseating dose undoubtedly a fair percentage will receive a fatal dose. If the material is distributed in the form of large particles (as for example coated BB shot) the possibility of clearing up at least the greater part within a short period of time is very real, thus rendering the area safe for occupancy. If the material is scattered in aerosol form the chances are very great that in order to achieve a symptom-producing level of activity it will heavily contaminate surface dust and open spaces. In the course of traversing these the chances of inhaling radioactive particulate material stirred up with the dust would be very great indeed.

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