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From: Chief, Bureau of Medicine and Surgery  
 To: Chief of Naval Research (Code 418)

153141

Subj: Nuclear Weapons Effects Research Long Range Biomedical Requirements

Ref: (a) CNO ltr OP-752D/1c1 Ser:146P75 dtd 19 Aug 1966

Encl: (1) Navy Requirements for NWE Research on Physiological Effects of Radiation to Personnel  
 (2) Navy Requirements for NWE Research in Biomedical Injury  
 (3) Navy Requirements for NWE Research in Medical Defense Problems  
 (4) Navy Requirements for NWE Research in Oculo-Visual Injury

1. In response to reference (a), enclosures (1), (2), (3), and (4) are submitted for consideration and incorporation into the Navy's combined projection of overall Nuclear Weapons Effects Research. The above enclosures summarize the information elements included in the Service Generated Effects Requirements contained in enclosure (2) of reference (a).

2. A combatant ship, shore facility, or functioning Marine unit, must be considered as a single operational entity possessing a multi-faceted weapons system. A great deal of attention is being paid to the susceptibility and the survivability of these units within the framework of nuclear warfare. The ability to fulfill an assigned mission is predicated upon the survivability of the most sensitive subsystems within the unit. For example, a ship possesses ordnance, electronic, engineering, and personnel subsystems. The personnel subsystem is interwoven throughout the other three systems. Considerably less attention has been devoted to the survivability of the personnel subsystem under nuclear warfare conditions than to the other systems. The lagging effort in this vital area of personnel consideration will be further compounded by a projected cut of considerable proportion in DASA Funding.

3. The functional degradation or failure of the personnel subsystem is a composite of immediate effects due to blast (shock), thermal radiation, ionizing radiation, and of delayed effects produced in survivors. It is in the latter area (delayed effects) that the greatest uncertainty exists and where answers are needed the most. The goal of our effort is to increase the survivability of the personnel and to provide a durable and effective operating unit.

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4. Casualties resulting from nuclear weapons are dependent upon a number of factors, but the one factor that seems to be the greatest determinant is the type of burst generated. To determine what human subsystem research is required, one must analyze the categories of casualties generated by various bursts. The type of burst employed is interrelated with the target classification and the desired results. A weapon detonated as an air burst maximizes the production of blast and thermal casualties (burns, flash blindness, retinal burns) and minimizes the number of radiation casualties. When a nuclear weapon is detonated as a surface burst, the blast and thermal energy are confined to a small parameter. Fission fragments are formed that adhere to soil particles, and "fallout" is generated covering an extremely wide area. Therefore, one would anticipate far greater numbers of radiation casualties than blast and thermal casualties from a surface burst. A notable exception to this generalization is achieved during tactical employment of very low yield weapons in which case (air or surface burst) neutron and gamma radiation parameters are of greater concern than blast and thermal effects.

5. The Bureau of Medicine and Surgery supports a research and exploratory development effort in non-weapon radiation effects with the goal of acquiring sufficient knowledge to (1) anticipate health hazards associated with Navy and Marine Corps warfare and support systems in the RDT&E program (2) solve problems of hazards to health which arise in association with the use of existing ionizing radiation sources within the Naval Establishment, and (3) solve medical problems of radiological defense unique to the deployment of Naval and Marine Corps operating forces. Many of the proposed research areas denoted in enclosures (1), (2), and (3) (indicated by asterisks) are related to both Nuclear Weapons Effects Research requirements and to non-weapon radiation effects.

6. Since funding formerly supplied by DASA for this research area has undergone a serious reduction, it is imperative to re-evaluate the Navy's Medical R&D Program to accomplish the following desired goals and concepts:

- a. The projects must be relevant to the Navy's needs.
- b. The projects must be designed to counter strong enemy potentialities
- a. Research must be directed toward a specific problem. The DDT&E "HINDSIGHT" studies indicate that directed research yields dividends superior to undirected research for most major systems.

In other words, there must be a reasonable expectation of finding the answers to the problem with a nominal outlay of money, manpower, and time. It is felt these answers can be found with a properly oriented and supported R&D program.

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