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GUIDANCE FOR PROGRAM PLANNING FOR FY 1952

Prepared by the Joint Panel on Medical Aspects of Atomic Warfare

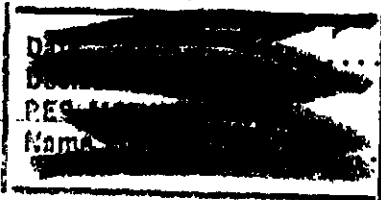
Chairman: Dr. Joseph C. Aub

1. Military Goals.

The program of the joint Panel on Medical Aspects of Atomic Warfare involves only one operational category of the Master Plan. This category is "AW", Atomic Warfare Operations. Within this category, four technical objectives are of concern, namely: AW-5a, 5b and 5c (AW Agent Detection, 5a; Protection, 5b; and Decontamination, 5c); and AW-6 (Medical Problems Peculiar to Atomic Warfare).

Areas of interest within technical objective AW-5a, 5b and 5c are four in number: (1) Dosimetry and Monitoring Equipment, (2) Individual Protection and Collective Protection, (3) Decontamination Studies, and (4) Field Test of Detection, Protection and Decontamination Equipment and Techniques. These are of concern to the Panel only insofar as they relate to personnel.

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The entire field of technical objective AW-6 is of primary interest and may conveniently be divided into the following six areas: (1) Blast Studies, (2) Thermal Studies, (3) Psychological Studies, (4) Biological Effects of Radiation, (5) Radiation Treatment, and (6) Medical Participation in Atomic Bomb Tests.

The military goals within these ten areas of AW-5 and AW-6 may be considered from the standpoint of both immediate and future goals. Immediate goals should be realized within the next three years, while the time for the accomplishment of future goals is extended to three additional years.

1.1 Immediate goals. In view of the technical capabilities of the enemy, as outlined by the Strategic Guidance of the JCS which states that our adversary will have atomic bombs and possibly radiological weapons and will use them ruthlessly unless deterred by fear of overwhelming retaliation, it is considered that the objectives as indicated below for each major area are immediate goals.

1.1.1 Dosimetry and Monitoring Equipment. The following should be accomplished within the next three years: (1) Development of service models of individual dosimeters, portable survey type instruments, field laboratories, airborne intensity meters and dosimeters, beta-gamma air monitors, cloud detortrackers, dropable gamma telemetering and surface (from air) survey systems to permit initiation of service procurement early in fiscal year 1952. (2) Development of interim models of the following to permit procurement in Calendar Year 1950: Portable high-range dosage rate meter (up to 50 r/hr.), portable low-range dosage rate meter, individual dosage indicating device (up to 200 r), airborne gamma dose rate meter. (3) Development of prototype models of ships or shore laboratories, balloon-borne sondes and ship or shore systems.

1.1.2 Individual Protection and Collective Protection. The cornerstone of all decisions concerning protection is the assessment of radiation dose versus severity of effects for critical biological responses, such as survival rates, hematopoietic disturbances, immediate physiological disturbances resulting in incapacitation and late effects. This first objective is a high priority immediate goal. Immediate goals of lesser priority in this area are to develop techniques and equipment for avoidance of radiation including development of means of testing filters and gas absorbents with radioactive materials; evaluation and modification of existing

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protective clothing and equipment (masks, mobile shielding units, etc.) with respect to atomic attack and RW, BW and CW agents; determination of effectiveness of buildings and structures in shielding against neutrons and gamma rays; improvement of the means of protecting personnel and material from thermal radiation and the incorporation into the techniques of pertinent information available from the time distribution of the radiation resulting from an atomic explosion.

- 1.1.3 Decontamination Studies. The goal in the next three years is to develop methods for removal from personnel and material of contamination produced by atomic bombs and RW agents, using readily available materials and equipment.
- 1.1.4 Field Test of Detection, Protection and Decontamination Equipment and Techniques. The immediate goal is the development and engineering of presently planned equipment laboratory checking and interim field testing for the purpose of devising techniques in its use.
- 1.1.5 Blast Studies. It is known that the physical characteristics of the shock wave produced by an atomic explosion differ from those of an ordinary high explosive blast. While the effects of atomic blast on structures have been evaluated and are well understood, it is not known whether this type blast per se will produce unique and characteristic injuries in personnel. The immediate goal in this area is to determine if the characteristic atomic blast shock wave produces effects on the human body which demand specific consideration beyond the requirements of the common injuries produced by secondary blast effects.
- 1.1.6 Thermal Studies. The goal in the next three years is to analyze and evaluate the operational hazards of the thermal radiations of atomic explosions, develop techniques for simulating these thermal radiations for biologic experimentation, determine the nature of high intensity flash burns, develop methods of protection against flash burns including evaluation of protective films and clothing fabrics, develop and evaluate techniques in treatment and mass handling of all burn casualties including those complicated by radiation injury and radioactive contamination.

- 1.1.7 Psychological Studies. The immediate goals in this area are related to the following specific requirements: (1) Maintenance of the effectiveness of troops (including supply services) in the presence of the hazards of AW, (2) Preparation of personnel for the operation of radioactive engines or materials, (3) Readiness to calm civilian panic from AW hazards, (4) Crystallization and promulgation of a policy in regard to evacuation, treatment and control of persons injured by irradiation, (5) Development of a technique of handling incipient panic, and (6) Improvement of the morale of troops in training and in the field under threat of atomic or radiologic warfare.

Within three years the following objectives should be realized in relationship to the above requirements: (1) Definite advances in the psychology of fear, (2) Development of a program for pre-indoctrination of troops and populace in regard to tolerable AW hazards; this includes more precise evaluation of human tolerance to radiation, (3) Advances in the psychology of panic, (4) Development of a program of popular education in radiation hazards (to undo prejudice re 0.1 r/day), (5) Drafting of the necessary directives regarding care of wounded; tolerable exposure in rescue operations; freedom of movement of soldiers, civilians and prisoners of war who have suffered irradiation but are not yet ill; and (6) completion of an empirical study of the psychology of disasters.

- 1.1.8 Biological Effects of Radiation. Immediate and future goals cannot be differentiated in this area of fundamental research where the timing of end results is unpredictable. The ultimate goals are: (1) To understand the biologic mechanisms underlying radiation damage so that potential radiation injury can be prevented, minimized or treated, and (2) to determine the levels of radiation delivered acutely and at various dose rates which are not permanently damaging to humans and which cause physiologic response of clinical importance.
- 1.1.9 Radiation Treatment. Successful accomplishment of definite goals in this area is dependent upon progress of research in the determination of the exact nature and mechanism of radiation damage and therefore will involve principally fundamental research. The immediate and ultimate goal is to develop effective therapy aimed to care for large masses of people affected by atomic warfare agents, and to develop

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methods of rapid segregation of casualties into survival and non-survival groups.

- 1.1.10 Medical Participation in Atomic Bomb Tests. Immediate goals in this area are based upon the accomplishment of the next scheduled atomic bomb test and include: (1) Advances in fundamental knowledge concerning the prevention, diagnosis, care and treatment of AW casualties and acquisition of more knowledge concerning calculated risks involved in handling the various implements and materials of atomic warfare; (2) more precise analyses of the various components concerned in production of casualties and disabilities including pathological, physiological and lethal effects under various conditions; biological dosimetry; depth dosage and thermal effects; (3) development of equipment, techniques and basic data in the continental United States prior to conduct of the next atomic test; and (4) carrying out of the designed test program at the Eniwetook Proving Ground, compilation of the data and early reporting of findings to interested agencies.

- 1.2 Future Goals. The nature of future military goals in the Panel's program depends largely upon discoveries in fundamental research, pursuit of new ideas and the continuation of long term studies, such as those in the field of genetics. Discernible goals for the future in the ten major areas of interest are enumerated in the following paragraphs:
 - 1.2.1 Dosimetry and Monitoring Equipment. Future goals are: (1) Refinement of service models of instruments, (2) development of service models of ship or shore laboratories, balloon-borne sondes and ship or shore systems, and (3) development of instruments based on new ideas.

 - 1.2.2 Individual Protection and Collective Protection. The future goals are: (1) Test for RW effectiveness new types of filters and gas absorbents as developed for BW and CW, (2) Ensure that new types of protective clothing and equipment give maximum possible protection against RW, and (3) development of prophylactic medication for persons actually or potentially exposed to radiations.

 - 1.2.3 Decontamination Studies. The future goal in this area consists of the improvement of the methods of decontamination as new information on this subject is obtained.

 - 1.2.4 Field Test of Detection, Protection and Decontamination Equipment and Techniques. Future goal: The continued

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improvement of existing equipment and techniques and correction of shortcomings determined from their application in the next bomb test and at the Dugway Proving Ground tests.

- 1.2.5 Blast Studies. Future goals in this area will consist of: (1) Fundamental studies in the mechanism of specific primary atomic blast injury if the accomplishment of the immediate goal determines that such injury exists and, (2) development of methods of treatment and possibly prevention of such injuries.
- 1.2.6 Thermal Studies. Future goals in this area will necessarily depend upon the exploitation of the discoveries made in research under the immediate goals by improving methods of protection against and treatment of thermal burns as new ideas become available.
- 1.2.7 Psychological Studies. Future goals will involve continued and expanded research in: (1) Psychology of fear, (2) improvement in pre-indoctrination programs for troops and populace in regard to tolerable AW hazards, and (3) psychology of panic.
- 1.2.8 Biological Effects of Radiation. See immediate goals (1.1.8).
- 1.2.9 Radiation Treatment. See immediate goals (1.1.9).
- 1.2.10 Medical Participation in Atomic Bomb Tests. The future goals involve the further extension of research under immediate goals and extrapolation of experimental results to human beings including follow-up studies and analyses of data obtained in the presently scheduled tests.

2. Deficiencies of Present Equipments and Systems in Meeting Requirements.

Existing major deficiencies which are considered to be serious potential deterrents to the accomplishment of the objectives of the presently planned programs within the armed services are presented in order of their relative importance.

- 2.1 Lack of data to permit evaluation of sublethal radiation dosages and effects in humans.
- 2.2 Inadequate analysis and evaluation of the hazards of thermal radiation of atomic explosions.

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- 2.3 Lack of information which can be utilized in the development of equipment and techniques for field or shipboard decontamination of personnel, food, water and equipment contaminated by radioactive materials.
- 2.4 Lack of a set of technically feasible military characteristics and an evaluation of operational use of detection, dosage and monitoring instruments by operating personnel.
- 2.5 Inadequate knowledge in the field of psychology of fear, panic and disasters, especially as applied to atomic warfare.
- 2.6 Inadequate development of facilities and mechanism for collection, correlation and promulgation of doctrines and policies relating to pre-indoctrination of troops; popular education in radiation hazards; care of wounded; tolerable exposure in rescue operations and freedom of movement of soldiers, civilians and prisoners of war who have suffered irradiation, but are not yet ill.
- 2.7 Lack of effective dissemination of information with regard to: (1) shielding (buildings, barriers, etc.), and (2) evasive action which involves removal to safe areas and seeking of shelter at the time of detonation.
- 2.8 Lack of effective organization to implement and achieve avoidance of radiation under field conditions.
- 2.9 Lack of available data concerning the effects on man produced exclusively by the primary atomic blast wave.

3. Present Research and Development Program in Support of Requirements.

- 3.1 Technical Feasibility. In general the present program in the field of atomic warfare agent detection, protection, and decontamination has goals which are technically feasible of accomplishment with few exceptions. In the field of atomic warfare agent detection, there is some doubt as to the technical feasibility of successfully developing the following instruments or techniques: (1) cloud detector-tracker, (2) surface (from air) survey, and (3) the following types of individual dosimeters: chemical, color crystal, phosphor, electret and film badge. In the field of protection the feasibility of providing portable protectors against gamma rays appears to be questionable. Goals in certain areas of the field of decontamination appear incapable of achievement; however, the programs must be pursued since there are no alternative programs with greater promise.

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Research in the medical problems encountered in atomic warfare shows good technical feasibility provided sufficient personnel are made available for the proper conduction of field tests. There are a few aspects of the program concerned with psychological studies where the probability of early success is less encouraging but which should be continuously explored, namely, research in the psychology of fear, panic in general, and indoctrination of military and civilian population in regard to atomic warfare hazards.

- 3.2 Military value of expected technical developments resulting from the program. Urgently needed detection instruments will be made available to the services, which together with information on shielding devices for the protection of personnel, will be of inestimable value not only from the standpoint of prophylaxis in connection with atomic warfare casualties, but equally important in keeping up morale and preventing panic. The program is expected to reduce materially the effectiveness of enemy attack and reduce the long time hazards of atomic warfare. In this connection, the correlation of physical measurements of phenomena observed during field testing, with animal and other biological material studied will also be of great value if properly carried out.

Complete and accurate temporal and spatial information concerning the thermal, nuclear radiation and blast hazards of atomic bomb detonation together with information permitting the evaluation of sublethal radiation dosages and effects in humans will furnish the only true foundation for effective personnel defense against atomic warfare and, therefore, is of unlimited military value.

Discovery of effective means of handling and treating the mass casualties to be expected in atomic warfare will be of inestimable military value.

- 3.3 Probability of successful outcome in reasonable time and at reasonable cost. Most of the present program shows a good probability of success. It is believed that research in means of protection against, and techniques of avoidance of atomic warfare agents is especially capable of achievement, since much of the information needed has been ascertained and needs only integration and promulgation. However, in the fields of decontamination and radiation treatment, research programs will probably not have a completely successful outcome, as is the case in research into the psychology of fear and panic where the ends are indefinite, but nevertheless continuous prosecution of these programs must be undertaken as even partial achievement will be fruitful.

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- 3.4 Alternative programs. None is recommended.
- 3.5 Evidence of duplication, gaps or work of questionable value. In general, there is little evidence of duplication. There is some over-lapping existing between the projects of the Army Chemical Corps and the NRDL, but this is minor and not undesirable in the present state of knowledge. With respect to the development of means of protection against atomic warfare agents, the program must be confined to the essential problems, else diffusion of limited talent and support will dilute the results in unwise fashion.
- 3.6 Factors seriously interfering with the effective conduct of the program. The deficiencies outlined in section 2 of this report hamper the effective conduct of the program. Need for an adequate manual of techniques in protection and decontamination for use by the services has been recognized and efforts are being made to hasten the preparation of such a manual at NRDL. In this connection, attention has been drawn by this Panel to the inadequate financial support granted to the NRDL for FY 1950. Research on decontamination techniques will be enhanced when previously approved facilities are actually obtained. The factor of adequate and wise planning is quite important in the handling of disasters as this country has really had little experience in major disasters in wartime. Experience in peacetime disasters, although probably not comparable in scope to what may occur in future wars, should be fully exploited by an empirical study of the psychology of disasters. Adequate plans should also be made effectively to integrate and disseminate available information on the techniques of avoidance of radiation, and finally, to concentrate the program in this field of protection against atomic agents on essential problems.

4. Conclusions and Recommendations.

After careful review of programs within the field of interest of the Panel currently underway and planned within the Department of Defense in the light of military requirements and with due consideration of benefits being derived from related programs in other governmental agencies, it is the general opinion of the Panel that the over-all program as planned is commendable, has no serious over-laps and few significant gaps. In order to eliminate the few deficiencies and to provide maximum support of military requirements of the program, the following recommendations for new programs and modification of existing programs are made:

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- 4.1 The following recommendations are made concerning programs under technical objectives AW-5a, 5b, and 5c.
 - 4.1.1 In the research program concerned with the development of means of detecting atomic warfare agents, emphasis should be placed on the development of interim types for emergency use. The general level of effort should be expanded in FY 1951 and FY 1952 provided the technical promise of essential instrument development warrants expansion to obtain production items by 1955. The dose range of an individual dosage indicating device should be increased to include the domain between 200 r and 600 r, without loss of resolution in the 0 to 200 r domain.
 - 4.1.2 The CAE approved level of effort for FY 1951 in research programs in protection (AW-5b) is considered adequate and it is considered appropriate that this level may be somewhat reduced for this field in FY 1952.
 - 4.1.3 The most essential aspect of research in individual and collective protection should be emphasized. This will entail an intensification of efforts toward assessing the severity of radiation effect as against dose for critical biological responses including the initiation of human studies.
 - 4.1.4 It is strongly recommended that an operations research project be consummated as soon as possible by the immediate collection, evaluation, integration and promulgation of the available knowledge regarding all hazards of AW and RW and techniques for personal protection against these hazards. This may be accomplished by the publication of an interim manual on the subject of Personnel Protection against AW.
 - 4.1.5 Increased fiscal support of the NRDL program in decontamination techniques is recommended.
 - 4.1.6 In regard to programs related to the field test of detection, protection and decontamination equipment, it is recommended that the present programs be continued pointing to their completion and interim testing prior to the 1951 field test, and it is further recommended that interim testing be done at service laboratories and schools and at the Dugway Proving Ground in conjunction with the RW test program.

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