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Report Ad hoc Comm. Med. Care in  
Public Fallout Shelters - 28 Aug. 1964

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MEDICAL CARE  
IN PUBLIC FALLOUT SHELTERS

28 August 1964

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**REPORT OF AD HOC COMMITTEE ON MEDICAL CARE  
IN PUBLIC FALLOUT SHELTERS**

**28 August 1964**

**With the Support of  
Office of Civil Defense,  
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## SECTION I

### The Development of the Report

During fiscal year 1964, the medical aspects of the Public Fallout Shelter Program of the Office of Civil Defense (OCD), Department of Defense, came under sharp criticism, particularly by elements of the Executive Office of the President. Although the precise nature of this criticism has not been made known to the NAS-NRC, it is understood that the objections involved an alleged inadequacy of the medical supplies being stocked in public fall-out shelters.

In the spring of 1964, the Director of Research, OCD, sought advice from the NAS-NRC in a letter to the Chairman of the NAS-NRC Advisory Committee on Civil Defense (Appendix A). Because the problem so referred was principally a medical one and the Committee had no special competence in this area, the Chairman of the Committee turned to the Chairman of the Division of Medical Sciences, who agreed to assume the task and to develop a report for the Advisory Committee on Civil Defense.

The staff of the Division of Medical Sciences (DMS) held several informal discussions with representatives of the OCD, and the Division of Health Mobilization, Public Health Service (DHM, PHS). The purpose of these meetings was to define the problem in more specific terms to assist in determining the most appropriate administrative approach to its handling, to establish staff-level working arrangements and sources of information, to determine what information was available, and to begin to collect information.

On the basis of this experience, the Chairman of the Division concluded that to review the entire civilian defense medical program in depth would be an impossible undertaking in the time and with the resources that might be made available. He decided, instead, to place major emphasis on an evaluation of the medical supply aspects of the current Fallout Shelter Program, and to review the over-all federal medical program for civilian defense and related activities only as they might have an influence thereon. In addition, he decided that some attention should be given to possible future modifications of the Fallout Shelter Program that might involve its medical aspects.

To assist with the evaluation the Chairman of the Division established an Ad Hoc Committee on Medical Care in Public Fallout Shelters, as specified in Appendix B. The criteria used in selecting the members are listed in Appendix C.

After reviewing the information accumulated by the staff, Dr. Norvin C. Kiefer, Chairman of the Ad Hoc Committee, in consultation with the Chairman,



DMS, defined the conceptual approach the Committee might adopt in dealing with its assignment. In formulating this approach, it was apparent that the most obvious task the Committee might undertake was to review the list of components in the medical kit being stocked in fallout shelters, and to render professional judgments on its adequacy. However, it was decided that the more appropriate way to begin was to examine the fundamental issues involved in the Federal Government's decision to stock medical supplies in fallout shelters in anticipation of an event that is not a certainty. Only with an adequate understanding of the emergency situation that the nation might be called on to face, as well as the problems concerning the over-all civilian defense medical care program and the interrelationships, purposes, and objectives of the major elements of this program, can the medical portion of the Fallout Shelter Program be examined in proper perspective.

In keeping with this concept, steps were taken to familiarize the Committee members with all elements of the civilian defense program that were considered to have a bearing on the primary tasks of the Committee. The OCD and the DHM, PHS, cooperated wholeheartedly in these efforts and provided not only copies of the informational booklets that are issued to the general public, but also material from the unclassified files, including intra- and inter-agency correspondence and complete research reports listed in Appendix D. In addition, on the afternoon of 4 June 1964, representatives of the OCD met with the Committee and described the Public Fallout Shelter Program. This presentation included a review of the considerations that led the Secretary of Defense to initiate the program, the problems encountered in its implementation, the purposes, objectives, and limitations of the program, and the plans for the future. The health and medical aspects were stressed and the presentation was so arranged as to permit full discussion, of which there was an abundance. On the morning of 5 June 1964, representatives of the DHM, PHS, met with the Committee and described the PHS's civilian defense medical care program. This included a description of the medical emergency stockpiling program of which the Civil Defense Emergency Hospital program is a part, the health and emergency medical care training and research programs, and the role that the PHS has and continues to play in the Public Fallout Shelter Program. In addition, the Committee visited a shelter area and examined the various types of supplies stocked therein by the Federal Government.

During the two meetings, the medical kit being stored in fallout shelters was discussed at considerable length. The origin of the list of medical items included in the kit was described, as were the deliberations leading to the selection of each item on the list. In addition, several proposed medical care assemblies were described which ranged in sophistication from lists of supplies that might be used to augment the currently standard kit to a comprehensive list of items that would make it possible to provide complete hospital care in a shelter.

Extensive back-up material supporting the programs of the OCD and the DHM, PHS, was furnished to the Committee in addition to that presented during the briefings.

Following the presentations on 4-5 June, the Committee met for one-half day in executive session and developed a preliminary assessment of the problem. During the next several weeks the members reviewed selected reports and other material bearing on the subject. On 28 August 1964, the Committee met again and completed its business.

## SECTION II

### The Pertinent Facts

The Committee determined, to its own satisfaction, the facts that are essential to bear in mind in evaluating the health and medical aspects of the Public Fallout Shelter Program. These facts are listed in this section under four main headings.

### Concerning a Possible National Disaster Following an Attack with Thermo-nuclear Weapons

1. The capabilities that modern military forces have for employing thermonuclear weapons have drastically modified the concepts of warfare. It is now entirely possible for a nation with this capability to apply highly destructive physical forces directly against all the material assets of another nation and against all segments of its population. The weapons delivery systems in use currently make it possible for one nation to attack another any place in the world at any time and to deliver a highly destructive attack within a very brief interval. Active defense is by itself relatively ineffective against such an attack; the capabilities inherent in the offense so far exceed those of the defense.

2. Therefore, the conventional concept of a "theater of operations" in which a nation's military forces conduct combat operations, and an intact "zone of the interior" in which the civilian population, safe from attack, produces the resources required for support of the war, no longer obtains. In modern war there is no such distinction between combatants and non-combatants.

3. In such a war the survival of a nation as an organized entity is at stake.

4. One of our national objectives is to ensure national survival in the event of a major thermonuclear war. Accordingly, in the over-all national planning to deal with such a disaster, the overriding mission is the attainment of this objective. Priority will be accorded those courses of action that can be shown to contribute to this end. Other courses, however, desirable they may appear from other viewpoints, are subordinated if they do not so contribute and are rejected if they interfere with the accomplishment of the mission. This, in effect, is the application at the national level of the principles used in military operational planning, including military medical planning. The primary military medical objective is to support the wartime mission and to provide, within this frame of reference, the best possible medical care. So, in analyzing a major disaster situation the loss of large numbers of persons as a direct result of enemy attack is accepted. Also, it is recognized that additional losses of personnel would occur

following the attack, as a result of unavoidable and uncontrollable situations. Because of temporal, relative, or absolute lack of capabilities to deal with medical problems under every circumstance and in every instance, some persons would receive inadequate care; some would receive none at all. Therefore, in military medical operational planning, priority is given first to the prevention of illness and injury, second to treatment of the sick and injured who have the greatest promise of making the most prompt return and, last, to the care of the seriously sick and injured who require the application of large amounts of medical resources or whose chances of recovery are in serious jeopardy.

5. Both active and passive defensive measures contribute to the survival of a nation in a thermonuclear war, and the nature of the war is such that both types of measures must be employed to attain an effective balance. Several such measures are being developed, and if all were to be fully implemented, the nation would appear to possess a high state of readiness to recover from a major attack. (Note: As discussed later, this does not imply that in such a case national survival would be guaranteed nor that the nation as a whole would not suffer extensive damage and losses. No measures so far proposed offer assurance of complete protection against destructive attack.)

6. Full implementation of the proposed defensive measures is extremely costly, and it appears that the resources that have been applied for this purpose to date leave some doubt that a truly high status of national readiness to survive in a major thermonuclear war has been attained. (Note: The Committee did not attempt to establish whether this is because total national resources are inadequate to meet all of the essential national commitments or simply because the responsible national authorities have not seen fit to commit the resources.)

7. It has been necessary, therefore, to allocate available resources among various programs and projects for national defense to maintain the best over-all defensive posture.

8. The concerned federal agencies have made what appear to be realistic assessments of the damage that could be caused by attacks of different magnitudes and types on this country. The number of persons killed and injured would depend, of course, on the magnitude and type of the attack. However, it is apparent that as many as 145 million casualties could be caused within a few hours or, at most, within a few days. Many of these casualties would result from the direct effects of the blast pressure, heat and ionizing radiation from the explosion, against which there is little chance for effective protection. A significant proportion of the casualties, possibly as large as one-third, would result from exposure to radioactive fallout that would begin to accumulate in effective concentrations within a few hours after an explosion. The areas of the country in which dangerous concentrations of fallout would accumulate would depend on climatic conditions and the magnitude of the attack. However, it is possible that almost all of the country would be affected and that the major part of the population that survived the direct effects of the explosions would be subjected to an unacceptable risk of death or serious injury if exposed directly and continuously

to the fallout. To avoid becoming casualties, these persons would need to take shelter that would protect them from exposure to hazardous doses of radiation. Depending on the initial intensity of the radiation, this danger and the requirement to stay "pinned down" would last from two or three days to weeks. The initial intensities of radiation would be greatest in the vicinity of the areas where the weapons exploded, but radiation might be sufficiently intense to cause serious injury to 90 per cent of exposed persons at least 300 miles downwind from the site of a single explosion.

9. The Department of Defense has studied the effectiveness of the employment of three possible defensive measures, the use of blast shelters, the use of antiballistic missiles, and the use of fallout shelters, for reducing the number of casualties caused by different types of attacks. The types of attacks included bombing of military installations only, bombing of population and industrial centers only, and combinations thereof. In these studies, computations were first made of the total number of casualties that might result from a possible attack assuming that no passive defense measures were used. The effects of the employment of the measures singly and in combination were then examined.

10. It was shown that under any circumstances, approximately 31 per cent of the total possible number of casualties would be unavoidable.

11. A system employing blast shelters for 130 million persons would reduce the number of potential casualties by about 16 per cent. This system would involve the construction of special-type facilities capable of withstanding blast over-pressures that would destroy most facilities intended for other use. The estimated cost to the Federal Government would be about \$16.7 billion.

12. A system employing antiballistic missiles for the defense of 20 to 25 cities would reduce the number of potential casualties by about 20 per cent and would cost the Federal Government between \$16 and \$20 billion.

13. A system employing fallout shelters involving the use of currently existing structures would result in the reduction of 33 per cent of the total number of potential casualties. The estimated cost to the Federal Government of a system providing 240 million shelter spaces would be about \$2.35 billion.

14. In studies in which attacks of different magnitudes were postulated, it was demonstrated that the heavier the attack, the greater the casualty-preventing potential of fallout shelters. Under very heavy attacks, the proportion of the population that would survive solely as a result of protection from ionizing radiation afforded by fallout shelters would be critical to the ability of the nation itself to survive.

15. On the basis of these findings, the Secretary of Defense concluded in 1961 that a fallout shelter system offers the single most effective and economical means for reducing the number of casualties in a national disaster. Because our most potential enemy has a capability of launching an attack currently, the Executive Branch decided it would be prudent to undertake such a program immediately. This decision was supported by the President and the Governors of the 50 states. The Congress appropriated funds for its initiation, and the development of an effective Public Fallout Shelter Program became a national objective of high priority.

16. In planning the fallout shelter program the responsible officials in the Office of Civil Defense, Department of Defense, were faced with the lack of many required, but unobtainable, facts. Thus, it was impossible to know exactly when and where an attack might occur and what its type and magnitude might be. It was impossible to predict with certainty the exact size of the population within the next four or five years, where people will be at any particular moment, the state of health of such persons, how they will react under stress, and how many and what types of casualties will result from an attack. However, the OCD officials had to begin to take definitive actions promptly if measurable accomplishments were to be forthcoming within a reasonable time. Accordingly, they were forced to make certain planning assumptions.

#### Concerning the OCD Public Fallout Shelter Program

1. The placement of the Office of Civil Defense within the Office of the Secretary of Defense made possible a free and complete exchange of information between the persons responsible for the active military defense of the country and those responsible for passive defensive measures. It appears that full advantage has been taken of this arrangement and that OCD personnel responsible for the Public Fallout Shelter Program are well informed about possible national emergency situations. It is evident that the military and civil defense offices obtain the information for which there is a mutual need from common sources.

2. In developing its Public Fallout Shelter Program, the OCD defined the primary purpose of a shelter as affording shielding against radioactive fallout resulting from an enemy attack on this country and thereby reducing the number of casualties in such an event.

3. The OCD might have proposed to build special-purpose facilities, designed and outfitted to house persons during periods of danger from fallout. However, because the costs of such a program were considered to be prohibitive and because existing structures could be used much more economically and would provide the degree of protection against fallout radiation that is considered to be effective, a reduction of the effective dose by a factor of at least 40 to 100, the decision was made to use such facilities.

4. In FY 1962 the Secretary of Defense initiated a program to provide space for 240 million persons in shelters (or 240 million shelter spaces) in existing structures. This program was considered adequate for a population of 210 million persons, based on projections for 1968-1970, allowing a 15 per cent overage to compensate for differences in daytime and nighttime locations of people.

5. The essential operational elements of the program were to:

a. Locate suitable structures. These structures might be privately owned, or the property of a local or state government or the Federal Government.

b. Inspect the structures and if they met certain criteria, to designate them or a part thereof as a fallout shelter.

c. Draw up a formal agreement with the owner of the facility for its use as a shelter and for the storage of "shelter supplies."

d. Stock the shelter with food, water, medical, sanitation and radiological monitoring supplies and equipment.

6. The criteria used in the selection of structures for use as fallout shelters are specified in the Office of the Chief of Engineers document, "Fallout Shelter Survey Instructions" (Appendix D). (Note: The Committee did not attempt to assess the engineering features of these criteria, nor the need for and adequacy of the radiological monitoring equipment. However, the Committee did attempt to evaluate those features of the criteria for selecting shelters and the need for and adequacy of all other supplies in the light of their possible influence on the health and welfare of persons who might be confined in a shelter during an emergency.)

7. The Federal Government defined its purpose in stocking shelters as the provision of the types and quantities of items that are considered to be essential for survival of the occupants of shelters, and took the position that it cannot be completely responsible for all of the needs of every person. In recognition thereof, the OCD has urged, and continues to urge, state and local communities, organizations, and private citizens to anticipate special needs and to augment the basic level of supplies provided by the Federal Government.

8. The OCD consulted with the Public Health Service, the NAS-NRC Food and Nutrition Board and the Advisory Committee on Civil Defense, the military departments, and industrial and nongovernmental research activities concerning the types and quantities of food, water and sanitation supplies to be stocked in the shelters, and with the Public Health Service concerning the medical supplies.

9. In consideration of its basic purpose, the OCD made several compromises in implementing the advice it obtained from these sources. As a result, the following decisions were made concerning the supplies of food, water, and medical items that would be stocked in the shelters:

a. The number of persons that would occupy a shelter would approximate the number that each shelter is designated to accommodate and the shelters would be stocked with the supplies and equipment to satisfy the needs of this number of persons for as long as 14 days.

b. Food would be stocked in the form of dried biscuits, in quantities to provide 10,000 calories per rated shelter space (or per person).

c. Water would be stocked in amounts that would provide  $3\frac{1}{2}$  gallons of water per shelter space. Additional needs would be obtained from other sources within or close by the facility housing the shelter.

d. Medical supplies of the types and quantities that would be required by a "normal, healthy group of persons" during a 14-day enforced stay in a shelter would be stocked (Appendix E). No supplies required for definitive medical care of severely traumatized persons would be included. The provision of special items required for medical care of chronic illnesses, such as diabetes and heart diseases, and for special conditions, such as pregnancy, would not be the responsibility of the Federal Government.

10. In 1962, the Congress appropriated funds for the first phase of the program as proposed in the budget of the Secretary of Defense. This amount provided \$9 million, or about 30 cents a person, to be allocated for the medical items for approximately 28 million people.

11. To date, about \$146.5 million have been spent for the total shelter program. Shelter spaces for about 24 million persons have been selected and stocked, and spaces for an additional 30 million persons have been selected but not stocked, although the supplies have been purchased for this purpose. In the FY 1965 budget the Congress did not allocate funds for the stocking of additional shelters.

12. Since its inception, the OCD has continued to study and evaluate the program. For example, research studies have been conducted to test the habitability of shelters. On the basis of these continuing studies, plans are being made for the refinement and modification of the program. In general, the implementation of these plans would result in a more costly program. From a medical viewpoint, the most notable of the possible modifications are:



a. Improvement of the habitability of shelters by provision of accessory means for improving ventilation and control of humidity in shelters that are considered to be marginal or substandard in these respects.

b. Increase the availability of water to shelter areas.

c. Modification of the list of medical supplies, if necessary, in consideration of developing concepts of the essential medical needs to be met in shelters.

d. Increase the magnitude of the present program of training persons to fit them to function as managers of shelters under emergency situations.

e. The assignment of persons with special skills to specified shelters.

f. The "hardening" of shelters in selected areas to afford additional protection against the blast effects of explosions.

13. The use of the term "fallout shelter" implies the existence of some sort of a standardized entity. However, there is no "typical" fallout shelter. Because program limitations do not permit construction of specially fortified blast shelters, existing facilities are being used without structural modification. The selection of the location of these facilities is made in consideration of the possible hazards of radioactive fallout. Some shelters are large enough for only 50 persons; others may accommodate two or three thousand. Some are above ground and are well ventilated; in many instances there is ready access to supplies of food and water to supplement those stocked in the shelter by the Federal Government, and to existing or improvised sleeping facilities and other accommodations that would improve the habitability of the space. Other shelters are below ground; the ventilation, temperature and humidity may be of minimal acceptability, and there may be questionable access to supplemental supplies and equipment. Some shelters are located where there is little likelihood that weapons would be exploded. Others are located in or adjacent to target areas, so there is a high probability that many of these would be destroyed in an attack. However, many of the shelters in target areas that happened to be in the areas of moderate to light damage - that is, located within a radius of 7 to 15 miles from the center of the actual impact - may not be destroyed. If these shelters were occupied at the time of the explosion, it is quite probable that some of the occupants in some of the shelters would be injured. Also, it is quite probable that some persons who were injured outside of the shelters would find their way to the shelters.

14. Because of the many uncertainties concerning the use of the shelters, it is impossible to predict the exact number, sex, and age of persons who might enter a particular shelter. Attack patterns, season of

the year, or the time of day that persons might be forced to enter a shelter cannot be predicted, nor can the exact length of time that persons would be required to stay in a shelter. If in some cases the initial intensity of radiation is light, the occupants may leave the shelter after three or four days. In other cases, the enforced stay might last for weeks. However, even in these latter cases, it may be possible for some of the occupants who would accept a limited risk of radioactive exposure to leave the shelters for short periods, after the initial intensity of radiation had abated somewhat, in order to forage.

#### Concerning the PHS Medical Civilian Defense Program

1. The Medical Civilian Defense Program, for which the Division of Health Mobilization, Public Health Service, is now responsible, was begun in 1948 as a planning activity in the medical office of the National Security Resources Board. In 1950, with the onset of the Korean War, the program became operational under the management of the Federal Civil Defense Administration. Since then, the responsibility for the program has been reassigned, first to the Office of Civil and Defense Mobilization, and then to the Division of Health Mobilization, Public Health Service. However, the primary purpose of the program has not substantially changed.

2. This purpose is to provide for the essential medical needs of the non-military population surviving an enemy attack on the nation.

3. The major operational elements of the program pertinent to this study are:

a. To provide policies, plans, and procedures for the mobilization of the nation's non-military medical resources (manpower, facilities, and supplies) in support of the essential medical needs of the surviving population.

b. To establish and maintain a stockpile of medical supplies and equipment to care for casualties and other survivors postattack. This activity includes:

(1) The Civil Defense Emergency Hospitals, most of which are now prepositioned under local custody in all states and territories.

(2) The back-up medical reserve supplies which are maintained in federal warehouses.

c. To stimulate and assist with training of medical and allied medical personnel to contribute effective and efficient medical services to the surviving population, both under emergency postattack situations and during the recovery phase.

d. To conduct a Medical Self-Help Training program to train laymen how to provide their own medical care for themselves and families.

e. To support a Research Program that will help to resolve some of the medical problems that confront the program planners.

4. From its inception, the governmental agencies that were responsible for development and operation of the Medical Civilian Defense Program have obtained advice and assistance from outside sources. These sources include the leading national, state, and county medical and paramedical societies, individual medical and paramedical professional persons, and governmental and nongovernmental agencies, including research activities such as the NAS-NRC. Currently, the PHS has several professional and technical advisory committees, consisting of outstanding medical and paramedical persons, that review all aspects of the program frequently. Several parts of the program that lend themselves to experimentation have been tested many times in simulated conditions and on a few occasions in natural disasters.

5. Since the program started, there has been an important change in the tactical situation the program was designed to meet. In 1950, the weapons available were of the relatively small size that were employed during World War II. In the military operational concept, these weapons were to be exploded in the air to inflict damage mainly through the direct effects of the explosion. Radioactive fallout, as we know it today, was not considered to be a major hazard. In the initial assessments of damage caused by an attack on this country with such weapons, a casualty load of five to eight million persons was estimated. By 1953, however, thermonuclear weapons had been introduced. With these tremendously more powerful weapons, it is possible to raise great quantities of radioactive material into the atmosphere - the familiar radioactive fallout. These developments required a change in the concept of passive defense. Formerly, there could be relatively unimpeded movement soon after an attack. Attack casualties could be evacuated almost immediately from the less severely damaged areas to places where they might receive medical care. The concept, therefore, was one of movement and speed. Accordingly, the civilian defense hospitals and medical supplies were placed near target areas and the plan was to mobilize these resources in the support of casualties as soon as possible after an attack. In consideration of the hazard of fallout and the destructive force of the new weapons, free movement postattack has become problematical. This change in the situation forces one to the conclusion that there will be lessened opportunity to provide medical care to casualties immediately after an attack. It is possible that, should means be at hand outside the area of total destruction, casualties could be given medical care soon after an attack. However, it is highly improbable that many such casualties could be evacuated for any distance or that casualty treatment centers could be set up to receive them. Accordingly, unless a person who was injured by the direct effects of an explosion could get to a place where medical assistance was available within a short time following the explosion, as determined by the rate of accumulation of fallout, the person would not receive medical care until the danger from fallout abated. Unless a severely injured person receives medical care within a few hours after injury, his chances of recovery are slim. Life-saving treatment of severely injured persons requires the availability of a high order of professional medical competence.

6. Accordingly, the Civil Defense Emergency Hospital was redesigned to provide hospitalization services of a more general nature than the original model that was intended to serve primarily as a casualty treatment center. Also, the requirements for hospitals and the bulk medical supplies were increased. These items were relocated and are now stored beyond possible target areas for use, as the situation requires and permits, following the attack. Therefore, the purpose of the PHS Civil Defense Medical Program remains the same, but some of its operational aspects have been modified.

7. Currently, the PHS has a requirement for 9,500 Civil Defense Emergency Hospitals, representing 1,900,000 beds, and for approximately six months' operating levels of bulk medical supplies. The value of this program totals \$950,000,000. To date, funds have been appropriated for procurement of about 2,680 hospitals and back-up reserves totaling in value about \$205,000,000.

8. Early in 1962, the OCD sought advice from the PHS concerning the types and quantities of medical items that might be placed in shelters. In making this request, the OCD made little time available to the PHS and did impose a monetary limitation, there having been a definite amount of money allocated for medical supplies prior to the time the request was made. Also, the initial request concerned only a preliminary trial project involving procurement of supplies for shelters for 100,000 persons. In responding to this request, therefore, the PHS had little time and, due to the funding arrangements, was limited in the types and quantities of items it might choose. However, the PHS had given the problem considerable thought previously and was able to respond to the request quickly. The monetary limitation caused some difficulties, but apparently no major ones. The PHS had ample time to revise its original recommendation to the OCD before large-scale procurement of supplies was initiated later in 1962. There is no evidence that the PHS has since formally recommended major revisions of its original recommendations.

9. The PHS has developed several lists of additional medical items that might be placed in shelters. Some of these lists might be used by the Federal Government for procurement purposes; others might be used by states or municipalities. The lists were designed to provide the medical material in shelters to make it possible to render various levels of medical care ranging from the type that a physician, using his medical bag, might provide in a home, to that that might be provided by a hospital staff in a Civil Defense Emergency Hospital. To date, none of these augmentation lists proposed by the PHS have been accepted for procurement.

#### Concerning Other Factors Bearing on the Problem

1. The Committee, being unable to obtain an adequate description of the status of health of the so-called "normal health population," undertook to collect some additional information on the point. From

the data so acquired, Appendix F, it can be seen that a large percentage of the persons who might enter a shelter would be suffering from one or more diseases or conditions that would require some sort of medical treatment. Also, a large number of these persons would be at one or the other extreme of age.

2. There are at present about 278,275 physicians in the United States. Using the current ratio of number of facilities used per number of shelter spaces made available, 112 million shelter spaces in 132,000 facilities, there will be about 277,000 facilities designated as shelters when the program objective of obtaining shelters for 240 million persons is completed. Theoretically, therefore, if one assumed a perfect distribution, an obvious impossibility, and no losses during an attack, one physician could be present in each shelter postattack. However, because of the concentration of physicians in metropolitan areas that are also prime target areas, percentage losses among physicians in an attack would be somewhat higher than losses among the population as a whole.

3. Some medical students and some dentists, veterinarians, and nurses, as well as students preparing for these professions, are capable of providing initial life-saving medical treatment for attack casualties and of handling many of the medical problems that would arise among uninjured persons occupying a shelter. However, the development of this capability requires special training. Reliable information is lacking about the numbers and locations of persons who have received such special training.

4. Currently the OCD and the PHS programs are planned and operated independently. Good staff liaison exists between the Washington headquarters, but there appears to be no formalized mechanism whereby the planning and operation of the programs can be accomplished. In the field, the operation of the programs seems to be entirely independent. There are instances when close coordination would be beneficial. For example, in the selection of a particular shelter an OCD field representative may locate a facility near which it would be feasible and desirable to store a PHS Civil Defense Emergency Hospital. Under the current policies and procedures, however, there is no opportunity for coordination of action between the OCD and PHS programs on either the local or federal level.

5. The OCD and the PHS have both undertaken projects to inform the public about their respective programs. These include efforts to familiarize the people about the nature and extent of a major disaster and about the need for people to make certain preparations on their own. However, there is a great lack of public awareness about these facets of the problem. For example, the Committee found that few of the health agencies that were established to deal with special diseases, such as diabetes, heart diseases, and hemophilia, have done much about the problem. The American Diabetes Association has issued some advice that might be helpful to a diabetic in the event he had to occupy a shelter.

However, it is obvious that this advice was written without a full realization of the situation the entire population could be presented with.

6. Even within the government there is a reluctance or inability to evaluate the health and medical aspects of a possible major thermonuclear war from a truly practical standpoint. The occurrence of such a disaster would result in medical problems on a scale with which we are currently unfamiliar, and for which there are no satisfactory solutions. For example, there can be no effective control of either the number or types of persons who would enter a particular shelter, and no assurance that in this shelter there would be a physician. There are in any group of persons representing a cross-section of the general population a number of persons who present psychiatric or psychological problems. These include frank and incipient psychotics, alcoholics, and persons with psychoneurotic disorders. The behavior of such persons, such as that of an alcoholic who develops delirium tremens two or three days after confinement without alcohol, constitutes a menace to himself and to others. The effectiveness of the management of these persons in a shelter during a disaster situation when trained medical persons are not available could be critical to the safety and well being of all the occupants of the shelter. It is apparent, however, that effective measures for the control of dangerous persons in this situation would have to be taken promptly by nonprofessional persons.

7. Various aspects and elements of the over-all civilian defense program have been tested. However, short of an actual occurrence, the situation that would prevail during a disaster cannot be duplicated in experimental studies.

### SECTION III

#### Discussion

Today, humanitarianism governs the approach to health and medical care in the United States. Ideally, each ill person is treated, when he presents himself, on the basis of his individual needs, without regard to his relative importance in the national scheme and without real question of the availability of means. In general this ideal is attained; the essential needs of each person are provided and most individuals' preferences for lesser medical attention are also satisfied.

In a major national wartime disaster in which the preservation of the integrity of the nation becomes the overriding wartime mission, the traditional distinction between military combatant personnel and civilian noncombatants no longer obtains. Everyone becomes directly involved in the war and so constitutes a positive or a negative contribution to the national wartime mission. From this viewpoint, a relative order of preference would exist between the persons whom it would be considered essential to preserve and those who, regrettably, would have to be considered as expendable. This might be the case particularly when total available resources would not be sufficient to satisfy total requirements. To date, the resources made available by the Federal Government are inadequate to meet total foreseeable requirements for the health and medical needs of the surviving population in a major disaster. It also appears to be beyond the capabilities of the government to correct this deficiency without unduly interfering with other activities that are essential to the national defense and therefore the attainment of the national wartime mission.

One might suggest, therefore, that the preparations being made by the Federal Government should be augmented from other sources so that peacetime standards of medical care could be preserved. However, even the most cursory analysis shows that, because of the overwhelming magnitude of the total requirements for medical care of casualties that could be generated by a major attack, it would be impossible to cope with the over-all situation if peacetime standards of medical care were employed even though the total medical resources of the nation were mobilized for this one purpose. In addition, because of the chaos that would follow such an attack in certain geographical areas, it would be impossible to provide adequate medical treatment for all of the casualties in need even though the surviving medical resources in those areas might be adequate to the task. This situation would result from the lack of communications and transportation, the distances involved, and the limited time in which treatment must be initiated if it is to be effective.

In the development of the Federal Public Fallout Shelter Program, it is obvious that the OCD selected the military operational planning approach. The primary purpose of the program is to conserve the nation's manpower resources by providing places for protection from radioactive fallout for as many people as possible within the means available. However, because some people may need to stay in shelters for as long as two weeks, it becomes necessary to the attainment of the primary purpose of the program to supply the essential means for such persons to survive in the shelters.

The OCD made judgments concerning the definition of the essential means, and the propriety of these judgments is now being evaluated. In making its evaluation, the Committee has taken the attitude that it is essential to consider all the pertinent factors that influenced the initial judgments, and also to consider current proposals and plans for the future revision of these judgments.

Thus, several criticisms of the health and medical aspects of the current Fallout Shelter Program could be stated immediately. For example, serious question may be raised about the effects that the environmental conditions that would exist in some shelters and that the quantities of water and the types and quantities of food that are stocked would have on the ability of the aged, the very young, and the infirm to survive. Provisions are inadequate for managing emotionally upset persons in the absence of medical supervision, and for controlling the potential spread of communicable diseases. No medical supply items for treating casualties from the direct effects of weapons have been stored in any of the shelters, although in certain shelters there is a possibility that medical personnel and other necessities for providing such care would be available.

Such criticisms, however, do not offer sufficient reason to condemn the program or the OCD's management of it. The OCD has been forced to adopt compromises and to accept marginal circumstances because of monetary limitations. It has done so, however, with recognition of the risks involved and either has developed or is in the process of developing plans to overcome deficiencies should the current monetary limitations be eased. In recognition of the inability of the Federal Government to provide for all of the medical needs of every person who might enter a shelter, the OCD is encouraging state and local governments, associations, industrial and other organizations, and private citizens to augment the means provided by the Federal Government, and to supply special means for special needs. The current shelter program is relatively new and its implementation has been pushed vigorously. There has been little time or opportunity to effect major modifications or to establish mechanisms for formalized medical, professional, and technical review of the program. However, the fact that the OCD has an ongoing research program, that it has asked the NAS-NRC to review the health and medical aspects of its program, and that it has displayed interest in considering suggestions for its modification, attests to a healthy awareness of the desirability of taking such actions.



One may take exceptions to the medical items that are being stocked in shelters, but the basis of such criticism should not be a simple preference for one item over another. To be valid, recommendations for changes in the list should be based on a thorough understanding of the current purpose of placing medical supplies in shelters, and on the best definition that can be derived of the truly essential needs for medical care of the persons who may occupy shelters. Also, in recommending changes one should keep in mind the logistical, programming, educational and other problems, and the monetary costs that are involved in making even relatively minor changes. This does not mean, of course, that no changes should be made. It may be beneficial to make some revisions that can be accomplished within funding limitations and without interfering unduly with the over-all program. On the other hand, there appears to be no valid need to make drastic changes currently.

Expansion of the OCD list of items to make it possible to give medical care to attack casualties would involve extensive revision of the list and major changes in the Fallout Shelter Program. The wisdom of making such changes on an over-all basis is open to question. It is highly improbable that attack casualties would present themselves for treatment in every shelter in the country. On the other hand, it does seem reasonable to expect that some casualties would present themselves in some shelters, particularly in those located within a radius of about 7 to 15 miles of an explosion. In such instances the availability of the needed medical supplies would be beneficial, but the provision of such supplies would be no guarantee that the casualties would be adequately treated. Such treatment requires not only the availability of supplies but also the attendance of persons possessing a high order of surgical skill, and adequate space, lighting, and other facilities. So, before deciding to stock additional supplies in or near shelters for the care of casualties, it would appear prudent to consider: the feasibility of locating those shelters in which there would be a high probability that attack casualties would enter; the probability of the concurrent availability of persons capable of treating injured persons; and the essential minimum physical characteristics of facilities permitting such treatment. It is possible that, employing these criteria, certain shelters might be designated additionally as casualty treatment stations, but this designation would need to be on a highly selective basis.

However, even if this is done, an additional factor should be borne in mind. Being material things, supplies may be produced and purchased at will, and adequate facilities may be found if sought for diligently. However, "production" of persons capable of treating numbers of casualties necessitates costly, time-consuming, and intensive training, and the number of persons who could be so trained is limited by the peculiar requirements of the undertaking. So when the over-all resources that can be applied to better the national defense are limited, procurement of medical supplies for treatment of casualties in shelters could not only be wasteful but detrimental to the program as a whole. In such a situation, excessive expenditure of funds for supplies would mean that

less money was available for other purposes. The training program might suffer and an imbalance in the availability of the three prime essentials for medical care - materiel, trained personnel, and facilities - would result.

If, on the other hand, changes are made in basic national objectives and the purposes of defense programs, major modifications of the medical elements of these programs could be recommended. If, for example, the Federal Government decides to provide specially constructed blast shelters, criteria should be considered for improving habitability in consideration of the needs of all ages of potential occupants and the status of health of the entire population. Inclusion of special facilities for the care of the sick and injured should be evaluated, and methods for assigning physicians and qualified paramedical personnel to duty in these shelters should be investigated.

There is very obvious duplication between the OCD and the PHS in the assignment of responsibility for medical care in disasters. As a result, there are:

- a. Differing concepts within the government concerning how the several elements of the over-all program should be integrated and coordinated.
- b. Failures to adequately resolve certain logistical problems.
- c. Duplications in planning and execution.
- d. Opportunities, and some tendencies, to point to "the other" concerning real or alleged shortcomings that may develop.

There is as yet, however, no evidence that a real duplication of medical supplies exists. Currently, both the OCD and the PHS are so short of their programmed stockpiling objectives that the total available assets do not approach the total national requirements. Of greater importance, however, the purposes for which the OCD and the PHS are procuring medical items and, in general, the conditions under which these items would be used, are distinctly different. There is a chance of duplication of stocks, however, if the OCD were, on its own, to begin stocking medical items permitting the provision of more definitive medical care in shelters.

On the other hand, there is little chance currently for the OCD to take advantage of opportunities that may exist to improve the medical material capabilities of at least some shelters by applying some of the stock assets held by the PHS.

Regardless of the excellence of the medical preparations made by the Federal Government, success in handling health and medical problems in a disaster will be greatly influenced by how the population reacts

under disaster conditions. In turn, these reactions, and also current public acceptance of what the government is doing now, is greatly influenced by the extent of the public's understanding of the situation and the knowledge of specific actions that are expected and demanded of each individual. Publications that describe the effects of an attack with thermonuclear weapons are available to the general public. However, it is obvious that the public is unaware of the nature and scope of the damage that could be inflicted. The sudden first realization of these facts at the time of attack would certainly add to the medical problems. Many publications have been issued to inform persons about what they should do for their own protection and survival. Instructional manuals and training courses are offered to improve the capabilities of both medical and non-medical persons to provide medical care. Again, however, it is obvious that many, many persons have little knowledge of and feel no sense of personal responsibility for such things.

The habitation of fallout shelters by large numbers of persons as envisioned in the current plans would create situations and conditions that are new and unique, both in nature and in magnitude, and are extremely important from a health viewpoint. In some instances the currently available information about the problems that might result from these situations is distressingly inadequate. Illustrative areas in which this lack of information is particularly evident relate to the incidence and severity of diarrheal diseases that might prevail in shelters and to the nutritional adequacy for some persons of the currently standard food ration.

It is a common observation that a substantial number of persons in a group of inexperienced travelers develop an acute, nonspecific diarrhea soon after they begin their journey. This illness seems to be associated with a sudden change in diet and fluid intake and exposure to stressful situations. Although the illness is seldom, if ever, life-threatening, the sufferers are usually quite quickly incapacitated, become dehydrated, and experience considerable thirst, but in most instances they respond promptly to treatment. However, in situations where there would be limited sanitation facilities, particularly when these facilities were communal, extremely unsanitary conditions might quickly develop, even when only a relatively few persons in a group were ill.

Diarrheas of infectious origin are also frequently observed in groups of persons who are suddenly brought together and required to live in close contact with each other, such as when a new group of students enters a boarding school. This illness, which usually appears as an explosive outbreak several days after the group is formed, is usually caused by the transmission throughout the group of an infectious agent from a person already infected at the time he joined the group. The illness is usually more severe and affects a higher percentage of persons in a group than the nonspecific form of diarrhea. The problems attending therapy and maintenance of acceptably sanitary conditions are thereby compounded.

It seems evident that the conditions which the occupants of a shelter would experience in a fallout situation would favor the occurrence of both nonspecific and specific diarrheal diseases, and it is easy to visualize the results if adequate means of control were not available. There are, however, inadequate data from which to derive estimates of even such basic factors as the anticipated over-all incidence of diarrheal disease one might expect and the part of the population that would be most affected. Such data are badly needed, not only for use in evaluating the current program, but in planning for its modification. In this respect, it seems quite certain that the quantity of antidiarrheal medication currently being stocked in shelters is inadequate. However, on the basis of available information, it is impossible to recommend a precise revision. It is entirely conceivable that the incidence of diarrhea from all causes might be as high as 20 per cent, even though the occupants were required to stay in the shelters for less than two weeks. If a 20 per cent incidence rate were accepted for planning purposes, the impact on the current supply program would be considerable. In this case, if the amounts of an antidiarrheal preparation necessary for adequate treatment were provided, the quantities stocked would have to be increased by a factor of about 10.

The evaluation of the adequacy of the current food ration is also hindered by a lack of information. There is acceptable evidence that persons who are in reasonably good health and are between 7 and 67 years of age can subsist on the standard ration for as long as 14 days and not suffer undue adverse effects. Also, a member of the Ad Hoc Committee demonstrated that if the food wafer is ground up and the resultant powder is suspended in water, the physical properties of the suspension permits its use for bottle feeding of infants. Because of the high ash content of the wafers, the preparation would have to be made up so that its caloric value is about 20 calories per ounce: one wafer suspended in two ounces of water. However, in other respects, the wafer would appear to meet the essential short-term nutritional requirements of normal newborn and suckling infants. Theoretically, therefore, the wafers would be sufficient to sustain the lives of most infants and young children who might occupy shelters for periods up to about 14 days.

There is also considerable evidence that adults in reasonably good health can survive with little or no food for at least two weeks if they have an adequate intake of water. On this basis, the assumption might be made that, if sufficient water were supplied, and in consideration of the curtailment of physical activity that occupancy of a shelter would impose, the essential nutritional requirements of even elderly persons and those suffering from nutritional disorders might be supplied by the standard ration. However, acceptable data to support the supposition that the standard ration would meet either the essential short-term nutritional requirements of such persons or those of newborn and suckling infants are not available. It would seem that these data could be acquired rather easily, and the acquisition would serve a most useful purpose.

The Committee has been informed that as a result of experimental studies, the OCD has recently added a carbohydrate supplement to the

currently standard ration. From a medical viewpoint, this addition is a desirable one.

Persons suffering all degrees of mental and emotional illness will enter shelters, and it is to be expected that psychiatric casualties will occur immediately prior to and during the period of shelter occupancy. The disruptive effect that even one severely disturbed person could cause in a shelter makes it imperative that such cases be properly and promptly managed. The medical manuals that are currently in shelters deal with the probable stress responses of persons suffering from moderate to mild, and probably overtly transient, degrees of psychopathology; little information is presented about the moderate to severe degrees of psychopathology. As a result, a person who must depend upon these manuals for his sole or principal source of instruction on how to handle medical problems in shelters is not at all prepared, or even informed, that he may well be faced with the necessity to deal with some of the harsher psychiatric realities such as the agitated manic-depressive, the aggressive homosexual, and the actively hallucinating and deluded schizophrenic.

Granted that the overly vivid written portrayal of active psychiatric episodes could be alarming to nonmedical persons, it still seems that some forewarning of the occurrence of such episodes in shelters, as well as measures for their control, should be included in the shelter medical manual. A review of the current manual by one or more experienced psychiatrists with a view toward a subsequent revision to correct this defect would be desirable. In addition, it would be useful to conduct studies to more firmly establish the expected incidence of severe psychiatric casualties in shelters, and to devise methods for managing such casualties that could be effectively used by nonmedical persons with the resources available in shelters.

The Committee also noted the absence of an effective item in the current shelter stocks for alleviating severe pain. It must be assumed, however, that a sufficient number of persons will suffer coronary artery occlusion, renal or biliary colic, perforations of gastric ulcers, and other such suddenly-developing, painful experiences in shelters to make the management of such cases a problem to be reckoned with. The plight of a person in severe pain is distressing to everyone in attendance. The suffering of even one severely afflicted person could have profoundly adverse effects on all of the occupants of a shelter. Relief of severe pain requires more potent agents than aspirin; usually nothing short of a narcotic is effective. The Committee accepts the fact that it is impossible to stock narcotics in shelters, and is also aware of the efforts of pharmaceutical houses to develop, for commercial reasons, a non-narcotic preparation which is a truly effective analgesic. However, if the OCD should determine that there is a requirement for such an item in connection with the Fallout Shelter Program, it would seem reasonable for the Federal Government to lend support to research and development in this area.

## SECTION IV

### Conclusions

1. In assessing the plans and programs of the Federal Government for managing the health and medical aspects of civilian defense in a major disaster, it is necessary to revise the criteria generally used in evaluating medical care activities. It is essential to recognize that in a major disaster it would be utterly impossible to provide the care that would meet current peacetime standards for all those in need. In preparing to handle the medical problems in a thermonuclear disaster, primary emphasis must be placed on the prevention of illness and injury. The loss of millions of persons must be accepted as inevitable. The objective of medical care of the sick and injured must be directed primarily toward the conservation of medical resources and the application of these resources in a way that will save the lives of, and prevent the extension of illness in, as many persons as possible.

2. From this viewpoint, the Public Fallout Shelter Program offers an acceptable means for preventing casualties in a major disaster. p. 3

3. There are deficiencies in the health and medical aspects of the Program even when viewed from the perspective of its limited purposes. However, correction of these deficiencies would necessitate only minor modifications in the current program and should not delay its implementation.

4. Major modifications of the health and medical aspects of the Public Fallout Shelter Program should be initiated only if basic changes are made in the objectives and purposes of the federal civilian defense programs as a whole.

5. If such major modifications are made, it will be essential to maintain a proper balance among the supplies, trained manpower, and facilities that are made available so that all resources essential to the effective accomplishment of the task are on hand. This is especially true if one of the objectives of a revised program is to treat attack casualties in either fallout or blast shelters.

6. There is an undesirable duplication in the assignments of responsibilities to the PHS and the OCD for the health and medical aspects of civilian defense.

7. There is a need to better inform the general public about all aspects of the civilian defense problem, and to continue to encourage training and the participation of individuals in civilian defense activities so that they can contribute to their own survival and well being in the event of a disaster.

8. There is also a need to continue and extend research studies on medical and other health problems.

## SECTION V

### Recommendations

The Committee unanimously recommends that:

1. As a preventive medical measure the Public Fallout Shelter Program, as currently designed, be pushed to completion if in the opinion of responsible federal policy-makers a sufficient threat of a thermonuclear war still exists.

2. No changes be made in the list of items in the medical kit being stored in shelters currently if such modifications would interfere unduly with the orderly attainment of the presently-defined goal of the Program.

3. Consideration be given to the following modifications of the kit for the reasons presented in Appendix G:

- a. Delete the cascara sagrada and the fountain syringe.
- b. Increase the quantities of the following items as specified:
  - (1) Double the amount of penicillin, aspirin, and phenobarbital.
  - (2) Increase the number of triangular bandages in Kit A to 3 and in Kit C to 12.
- c. Add an adhesive bandage to provide approximately 100 bandages for each 50 persons.
- d. Review the item nomenclatures and, where indicated, revise the terminology on the labels and in the instructional manuals so that terms that are familiar to laymen are used throughout. "Rubbing alcohol" or "rubbing compound," for example, will be better understood than "isopropyl alcohol."
- e. Although insufficient data are available on which to base precise recommendations, pending the acquisition of the required data, consider provision of a quantity of an antidiarrheal preparation in dry form sufficient to treat diarrhea in 20 per cent of shelter occupants.

- f. Place the water purification tablets with the sanitation supplies.

These modifications should be considered for immediate adoption to the extent that in so doing the attainment of current program objectives would not be jeopardized.

4. As a general policy, kits stocked in shelters not be augmented to include items of the type that could be used effectively and safely only by physicians or highly trained paramedical personnel. This applies particularly to the items that would be needed to treat severely injured persons and persons suffering from chronic diseases.

5. In view of the fundamental differences between the OCD shelter program and the Civil Defense Emergency Hospital Program, the hospitals not, as a general policy, be prepositioned in shelters. However, at the local level of operations, planning for the selection of sites to be designated as shelters and sites for the storage of the hospitals pre-attack and their activation post-attack should be more closely coordinated so that, where desirable, the hospitals would be stored in reasonable proximity to shelters. This rule would apply particularly in the perimeters of target areas where there is likelihood that, post-attack, there would be surviving attack casualties and other resources for provision of definitive casualty and related medical care would be available.

6. Consideration be given promptly to the establishment of a mechanism for the integration under a single authority of all federal civilian defense health and medical activities, including policy-making and planning and operation of programs.

7. Consideration be given to the establishment of a formally-constituted organization to review and report on the health and medical aspects of the Public Fallout Shelter Program on a recurrent basis. The membership of this organization should include civilians who can speak competently and authoritatively for the medical, nursing, dental, public health and other related professions.

8. The Federal Government not stock special foods that might be required by persons suffering from chronic diseases, by infants, and by the aged in fallout or blast shelters, even though currently stocked items might not be ideally suited for such persons.

9. The informational and training programs already inaugurated be vigorously supported and pursued, including: training in medical self-help, training of physicians and related medical and other health personnel to provide medical care in emergency situations, and training of persons to serve as managers of shelters. In the educational program, particular emphasis should be given to informing the public about the nature and effects of an attack with thermonuclear weapons.



10. The Federal Government clearly state and widely publicize the limitations inherent in its Shelter-Stocking Program. The government should also vigorously encourage states and local communities, industrial organizations, schools, hospitals, medical associations and societies, and other such agencies, as well as individual citizens, to plan on augmentation of the supplies provided by the Federal Government to meet special local needs that are beyond the ability of a central agency to forecast or provide. In these efforts, the Federal Government should give positive guidance so that any augmentation undertaken at the local level would be made with a clear understanding of the situation to be faced, particularly with respect to the limitations on the ability to use certain supplies and equipment in shelters. For example, attention should be called to the need for persons suffering from such diseases as epilepsy, cardiovascular diseases, diabetes, arthritis, and asthma to see that provisions are made for their own requirements for essential medications. On the other hand, plans for acquiring supplies or complicated equipment that are used in hospitals in medical emergencies in peacetime but which could not be used effectively in shelters should be discouraged.

11. The operational research program be vigorously supported and pursued, with particular emphasis on:

- a. The development of economical and practical means for improving ventilation and controlling humidity in shelters;
- b. The development of practical measures that can be used effectively by nonmedical personnel for the management in shelters of emotionally disturbed persons;
- c. The better definition of the problem that might be presented by specific and nonspecific diarrheal diseases among persons in shelters;
- d. The development of an effective non-narcotic preparation for use in controlling severe pain; and
- e. The determination by experimental feeding of the nutritional adequacy of the food currently stocked in shelters for infants, for the aged, and for persons with various chronic diseases including nutritional disorders.

Appendix A

DEPARTMENT OF DEFENSE  
OFFICE OF CIVIL DEFENSE  
Washington, D.C. 20301

Feb. 18, 1964

Dr. Lauriston S. Taylor  
Chairman, Advisory Committee  
on Civil Defense  
National Academy of Sciences -  
National Research Council  
Washington, D. C. 20418

Attention: Mr. Richard Park

Dear Dr. Taylor:

Within the scope of contract CDM-SR-59-34 between this office and the National Academy of Sciences, it is requested that the Academy convene a technical panel to provide advice to the Office of Civil Defense that will assist in a comprehensive review of the character of medical supplies that are being or should be provided by the Government as part of the stores in public fallout shelters.

As you may know, medical kits have been procured and are presently part of the supplies being placed in shelter areas under the current program. These kits, a summary of which is enclosed, were developed early in 1962 for the objective of providing a capability for meeting the basic health needs of a confined shelter population during a critical period of unsafe radiation levels. The confinement period was expected to last up to two weeks.

The selection of items for these kits was based upon recommendations of the Public Health Service Professional Advisory Committee for Health Mobilization. The items selected were intended to represent those of fundamental necessity that would be reasonably safe for use by a typical but not precisely predictable shelter population within the intent of the shelter provisioning program.

Subsequently, the Public Health Service has developed augmentation lists of priority medical supplies to be procured by local communities with matching funds available from the Federal Government. These lists include supplies for childbirth and child care in shelters, contents for an expanded physician's medical bag, and other lists that provide components on a scale up to a hospital-type capacity.

It is the opinion of the Office of Civil Defense that a comprehensive review of the contents of the shelter medical kits and of the objectives of Federal responsibility concerning provision of medical supplies to meet the needs of the sheltered survivors of a nuclear attack is desirable at this time in view of the probable initiation in the near future of a shelter development program that would help correct, over a period of years, the deficiencies in fallout shelter space remaining after marking and stocking that space identified in existing buildings. To aid in such review, it is requested that the National Academy of Sciences undertake the following:

(1) Review the available reports and other data bearing on the probable incidence of medical ailments and accidental injuries in a confined shelter population, the likely achievable level of medical or allied medical training in the shelter population, and other pertinent matters and evaluate the consequences of the availability for use of the medical supplies currently being procured as well as any other medical supply items that might reasonably be provided.

(2) Review the available reports and other data bearing on the probable character and incidence of injuries due to immediate nuclear weapon effects that might occur to a sheltered population or in the vicinity of fallout shelters, the likely achievable level of mass casualty care that could be undertaken in public shelter areas, and other pertinent matters and evaluate the consequences of the availability for use of medical supplies for casualty treatment in public shelter areas.

(3) If the results of (1) above reaffirms the essentiality of the stocking of medical supplies for maintenance of health in sheltered populations, consider to the extent practicable the preferred allocation of funds available for shelters and shelter stocks among the competing requirements with a view toward providing advice on the character of medical supplies that would be appropriate to a "balanced" shelter system at several levels of austerity. Cost per se should not be used, however, as a constraint on the consideration or recommendation of any medical survival item. In particular, if a minimum essential level of medical supplies can be deduced below which assignment of resources would be considered unwise at the national level, such minimum level of supplies should be described without consideration of present stocking policy.

(4) If the results of (2) above affirms the essentiality of provision of medical supplies in public shelter areas for care of injured survivors, consider the preferred allocation of resources as in (3) above for this purpose, evaluate the extent to which the supplies provided for shelter health would be useful for casualty care purposes, and investigate the question as to whether a single medical kit designed to meet both health and casualty care needs should be stocked in all public fallout shelters or whether a basic kit for shelter health purposes should be continued with an augmenting casualty-care

kit added to those shelters located where casualties from immediate weapon effects are considered reasonably probable.

(5) In the foregoing evaluations and by specific discussion, review the relationships between the DOD shelter stocking program and the medical supplies and equipment stockpiling program of the Department of Health, Education, and Welfare as they bear on the questions of providing for the health and casualty-care needs of a surviving population and the degree to which shelter medical supplies should or could contribute to the over-all program for medical care.

The nature of the problem as defined above indicates that, in addition to competent medical advice such as could be made available through the Academy's Medical Sciences Division, the technical panel should also include persons knowledgeable with respect to other competing civil defense requirements as well as those familiar with the program of the DHEW.

The output of the technical panel should, to the maximum extent practicable, provide specific recommendations as to the medical supply items that should be stocked by the Federal Government in public fallout shelters under both current and near-term shelter programs. A letter report of the results of review and evaluation, including recommendations, is desired by 15 July 1964 so that it can be considered in the FY 1965 procurement cycle and the FY 1966 budget planning cycle.

Sincerely,

Walmer E. Strobe  
Director for Research

Enclosure

SUMMARY OF CURRENT MEDICAL KITS

Background

The medical kits were developed early in Fiscal Year 1962. The selection of items for the kits was based upon recommendations and consultations with personnel of the U.S. Public Health Service, the Department of Defense, and the military services. The kits were designed in two sizes: one to provide for 50 to 65 people and the other for 300 to 325 people: each kit contains identical items but varying quantities.

The kits are packed in weather-resistant fiberboard boxes with physical characteristics as follows:

	<u>Dimensions</u>	<u>Weight (lbs.)</u>
Kit A	15-1/2" x 12-3/4" x 8-1/2"	21
Kit C	29-1/2" x 19-1/2" x 15"	104

Procurement of the component parts and assembly of the kits was conducted by the Defense Medical Supply Center, Brooklyn, N. Y. Over forty contractors in fourteen states were involved in supplying the components. The kits were assembled in three Army depots. Competitive bidding prescribed by the Armed Forces Procurement Regulations was used in obtaining the best prices possible, consistent with quantity and delivery requirements. The experience of the Defense Medical Supply Center personnel was invaluable in expediting the procurement.

Quantities of medical kits procured using Fiscal Year 1963 and prior funds total 235,207 of the "A" type and 117,783 of the "C" type.

The costs of the separate items in the medical kit incurred in the latest procurement for both "A" and "C" kits are shown in the attached list. (Note: See Appendix E.)

Appendix B

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL  
Division of Medical Sciences

AD HOC COMMITTEE ON MEDICAL CARE IN PUBLIC FALLOUT SHELTERS

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Bethesda, Maryland 20014

Appendix C

QUALIFICATIONS OF MEMBERS SELECTED TO SERVE ON  
AD HOC COMMITTEE ON MEDICAL CARE IN PUBLIC FALLOUT SHELTERS

1. Interested in problems of civilian defense.
2. Possibly participating currently in an unofficial capacity in a state or local civil defense activity.
3. Not associated with the program for medical care in shelters sponsored by the Office of Civil Defense.
4. Professional interests to be represented by total membership:
  - a. Public health; epidemiology and environmental health
  - b. General medicine
  - c. General surgery
  - d. Psychiatry; psychology
  - e. Pediatrics
  - f. General nursing
  - g. Experience in dealing with the medical problems of large numbers of injured and uninjured persons who are displaced as the result of a disaster.
5. No vested interests in the program, e.g., commercial affiliations, affiliation with a state civil defense program in an official capacity, contracts with government for studies on the Fallout Shelter Program.

Appendix D

PUBLICATIONS, DOCUMENTS, AND CORRESPONDENCE REVIEWED BY NRC STAFF  
AND COMMITTEE FOR ASSEMBLING DATA TO STUDY PROBLEMS OF  
MEDICAL CARE IN PUBLIC FALLOUT SHELTERS

Office of Emergency Planning (OEP)

1. The National Plan for Emergency Preparedness. Chapter 4, Health, June, 1964.

Office of Civil Defense (OCD), Department of Defense

1. Casualty Criteria - Used in charts for briefing Ad Hoc Committee on Medical Care, 4-5 June 1964.
2. Dual Purpose Suburban Community Shelter for 100, 500 & 1,000 Persons and a Blast Capacity of 5, 25 & 50 Psi, Protective Structures Shelter Design Series C 45-2, June, 1963.
3. Emergency Sanitation at Home, H-1, U. S. Gov't Printing Office, June, 1963.
4. Fallout Shelter Effectiveness - The U. S. Civil Defense Program, July, 1963.
5. Fallout Shelter Medical Kit Instructions, July, 1962.
6. Fallout Shelter Program, November, 1963.
7. Fallout Shelter Program, June, 1964.
8. Family Guide - Emergency Health Care, November, 1961.
9. Family Guide Emergency Health Care, U. S. Gov't Printing Office 0-665199, 1963.
10. Guide for Community Fallout Shelter Management, SM-16.1, U.S. Gov't Printing Office 698564, July, 1963.
11. Handbook for Emergencies, H-3, U.S. Gov't Printing Office 0-687880, May, 1963.
12. Home Protection Exercises, MP-1, U.S. Gov't Printing Office 0-664832, November, 1962.



13. Information Bulletin, No. 5 - Facts on Water Storage for Emergency Use, October 20, 1961.
14. Information Bulletin, No. 98 - Defense Secretary Emphasizes Lifesaving Potential of Shelter. Testimony by Defense Secretary, R. S. McNamara, January, 1964.
15. Letter with enclosures from W. P. Durkee, Director of Civil Defense, to V. V. McRae, Office of Science and Technology, Executive Office of the President, January 28, 1964.
16. Medical Care in Shelters, U.S. Gov't Printing Office 725183/10261, April, 1964.
17. Medical Self-help Training for You and Your Community, PHS Publ. No. 1042, U.S. Gov't Printing Office 0-688-985, June, 1963.
18. Memorandum of Understanding between the Office of Civil Defense and the Office of Emergency Planning. Part B, Chap. 1, App. 28. McDermott, E. A. (OEP), and Pittman, S. L. (OCD), January, 1964.
19. Research Studies on Shelter Health Problems (Specially prepared charts), June, 1964.
20. Shelter Management Instructor's Guide, IG-16.1, January, 1963.
21. Technical Bulletin - Probability of Fallout Debris Deposition, TB-11-31, U.S. Gov't Printing Office 0-682803, April, 1963.
22. Technical Report - Fallout and the Winds, TR-22, U.S. Gov't Printing Office 0-663800, December, 1963.

Office of the Chief of Engineers, Department of Defense

1. Fallout Shelter Survey Instructions, November, 1961-March, 1962.

Public Health Service (PHS), Department of Health, Education, and Welfare

1. Central Supply Section of the Civil Defense Emergency Hospital, PHS Publ. No. 1071 F-3, U.S. Gov't Printing Office 0-714-016, 1964.
2. Community Emergency Health Manpower Planning, PHS Publ. No. 1071-I-1, U.S. Gov't Printing Office 0-719-231, 1964.
3. Current Programs and Status - Civil Defense Medical Stockpile, November 18, 1963.
4. Determination of Medical Items for Community Shelter Program, Project Report #4, March 15, 1962.

5. **Diagnosis of Communicable Diseases - Current Status, OCD Project 2411D, September, 1963.**
6. **Establishing the Civil Defense Emergency Hospital, PHS Publ. No. 1071-F-1, U.S. Gov't Printing Office 0-690-677, 1963.**
7. **Evaluation of Thermal Environment in Shelters, TR-8, August, 1963.**
8. **Fallout Shelter Medical Kit Instructions, July, 1962.**
9. **Family Guide - Emergency Health Care, November, 1961.**
10. **Family Guide Emergency Health Care, U.S. Gov't Printing Office 0-665199, 1963.**
11. **Inspection and Maintenance - Prepositioned Civil Defense Emergency Hospitals, February 5, 1962.**
12. **Medical Care in Shelters, GPO 867-237, December, 1963.**
13. **Medical Care in Shelters, U.S. Gov't Printing Office 725183/10261, April, 1964.**
14. **Medical Self-help Training for You and Your Community, PHS Publ. No. 1042, U.S. Gov't Printing Office 0-688-985, June, 1963.**
15. **Medical Stockpile Program Analysis, November, 1963.**
16. **Memorandum - Official Documents Relating to Shelter Stocks of Medical Items and Associated Instructions for Use. Enclosures: Letter, March 20, 1962, from C. J. Wagner to G. R. Gallagher, transmitting contents of medical kits for Public Fallout Shelter Program, and Letter, April 16, 1962, from C. J. Wagner to G. R. Gallagher, transmitting instructions for use of medical supplies in shelters.**

Children's Bureau, Department of Health, Education, and Welfare

1. **Maternal and Newborn Care in Fallout Shelters, Project 2406, GPO 944145, 1963.**
2. **The Care of Infants and Children in Community Fallout Shelters, Project 1502, GPO 944144, 1963.**

National Academy of Sciences-National Research Council (NAS-NRC)

1. **Environmental Engineering in Protective Shelters, Proceedings of the Meeting On, February 8, 9, 10, 1960.**

2. Human Behavior in Extreme Situations: A Survey of the Literature and Suggestions for Further Research, Committee on Disaster Studies, Publ. No. 390, 1956.
3. Minimal Allowances of Water and Food for Fallout Shelter Survival, Food and Nutrition Board, April, 1962.
4. Tornado in Worcester - An Exploratory Study of Individual and Community Behavior in an Extreme Situation, Committee on Disaster Studies, Publ. No. 392, 1956.

Other

1. Choice of Drugs for Emotional Disorders. The Medical Letter 6: (Issue #141), June 5, 1964.
2. Emergency Health Problems Study, Research Triangle Institute, 31 July, 1963.
3. Guide to Shelter Organization and Management, Engineering Psychology Program, American Institute for Research, 30 September, 1963.
4. Manageable Group Sizes in Large Shelters, Engineering Psychology Program, American Institute for Research, 28 June, 1963.
5. Physiological and Psychological Effects of Overloading Fallout Shelters, Dunlap and Associates, Inc., Western Division, April 15, 1963.
6. Planning and Organizing Shelter Non-operational Activity Programs, Engineering Psychology Program, American Institute for Research, 28 June, 1963.
7. Shelter Medical Support System Study, Research Triangle Institute, 31 August, 1963.
8. Shelter Occupancy Studies at the University of Georgia, University of Georgia Psychological Laboratories, 1962-1963.
9. Statement on Emergency Medical Care, Committee on Emergency Medical Care, Diabetes 12:March-April, 1963.

Appendix E

PRESENT CONTENTS OF MEDICAL KITS

Federal Stock Number	Nomenclature	Unit of Issue	KIT A		KIT C		Total Cost
			Quantity	Unit Price	Quantity	Unit Price	
6505-112-9010	Cascara Sagrada Extract Tablets, 100's	Bottle	1	\$ .21	6	\$ 1.26	
6505-133-8025	Petrolatum, White, USP, 1 lb.	Can	1	.37	3	1.11	
6505-141-5000	Sodium Bicarbonate, USP, 1 lb.	Can	1	.24	2	.48	
6505-146-2200	Sulfadiazine Tablets, 1000's	Bottle	-	-	3	17.40	
6505-153-8379	Eugenol, USP, 1 oz.	Bottle	1	.23	1	.23	
6505-153-8750	Aspirin Tablets, USP, 1000's	Bottle	-	-	3	2.04	
6505-237-8480	Penicillin G Tablets, 250,000 Units, 100's	Bottle	2	1.14	12	6.84	
LL 6505-619-8867	Phenobarbital Tablets, USP, 1000's	Bottle	-	-	3	1.80	
LL 6505-687-3560	Sodium Chloride, USP, 1 lb.	Bottle	1	.27	2	.54	
6505-754-2809	Eye and Nose Drops, 1/2 fl. oz. (14.8 ml.)	Package	3	.51	18	3.06	
LL 6505-889-3482	Soap, Surgical, 1-3/4 oz. (50 gm.)	Case	6	.24	36	1.44	
LL 6505-889-3483	Sulfodiazine Tablets, USP, 500's	Bottle	1	2.80	-	-	
LL 6505-889-3484	Phenobarbital Tablets, USP, 32 mg. (1/2 gr.) 500's	Bottle	1	.35	-	-	
LL 6505-889-3485	Acetylsalicylic Acid Tablets, USP, 0.324 gm., 500's	Bottle	1	.38	-	-	
LL 6505-889-3551	Isopropyl Alcohol, IP, 1 qt. (946 ml.)	Can	1	.33	6	1.98	
6505-890-1657	Kaolin and Pectin Mixture, Dehydrated, 40 gm.	Bottle	3	.93	16	4.96	
6510-200-4000	Bandage Gauze Roller, 2x6, 12's	Package	1	.69	6	4.14	
6510-201-1755	Bandage Muslin Triangular, 37x37x52	Each	1	.19	6	1.14	
6510-201-4000	Cotton Purified, 1 lb.	Package	1	.80	3	2.40	
6510-203-8448	Pad Gauze Surgical, 4x4 in., 200's	Package	1	1.00	6	6.00	
6515-303-8250	Applicator, Cotton Tip, Wood	Package	1	.14	6	.84	
6515-324-5500	Depressor, Wood, 100's (Tongue)	Box	1	.17	3	.51	
6515-333-2200	Forceps Dressing, 3-1/2 in.	Each	1	.17	1	.17	
LL 6515-889-3480	Thermometer, Clinical, Human (Oral or Rectal)	Each	1	.42	4	1.68	
6530-782-2095	Syringe, Fountain	Each	1	.85	1	.85	

KIT A                      KIT C                      C

(LL 6545-CA5-5650)                      (LL 6545-CA5-5670)

Federal Stock Number	Nomenclature	Unit of Issue	Unit Price	Quantity	Total Cost	Quantity	Total Cost
6850-250-2620	Tablets, Water Purification	Bottle	\$.08	2	\$.16	12	\$.96
7340-815-1459	Scissors, Pocket, Straight, 4 Double Blunt	Each	.23	1	.23	3	.69
8315-787-8000	Pin, Safety, 1-1/2 in., 12's	Card	.04	3	.12	12	.48
7610-C-06-9965	Family Guide, Emergency Health Care Manual	Each	<u>MC</u>	1	<u>MC</u>	3	<u>MC</u>
7610-C-06-9970	New FHS Instructions for Special Medicines	Each	<u>MC</u>	1	<u>MC</u>	3	<u>MC</u>
				Total Cost of Contents	\$12.94		\$63.00
LL 8115-C15-5000	Box Fiberboard, Type A )			Additional Packaging Costs	<u>2.06</u>		<u>9.50</u>
LL 8115-C15-6000	Box Fiberboard, Type C )			Grand Total	\$15.00		\$72.50

Appendix F

**AGE SPREAD IN THE POPULATION\***  
(Per 1,000 persons)

Infants						
<u>Under 2 yrs.</u>	<u>2-4 yrs.</u>	<u>5-14 yrs.</u>	<u>15-24 yrs.</u>	<u>25-44 yrs.</u>	<u>45-64 yrs.</u>	<u>65 yrs. &amp; over</u>
43	71	200	154	240	200	92

\*Bureau of the Census.

**CHRONIC CONDITIONS\*\***  
(Rate per 1,000 persons)

	<u>Over-all</u>	<u>0-44</u>	<u>45-64</u>	<u>65 yrs.</u>	<u>Male</u>	<u>Female</u>	<u>Urban</u>	<u>Rural</u>	
	<u>yrs.</u>	<u>yrs.</u>	<u>yrs.</u>	<u>&amp; over</u>				<u>Nonfarm</u>	
								<u>Farm</u>	
Heart Conditions	30.2	7.9	55.3	153.8	31.0	29.5	30.8	27.9	33.0
High Blood Pressure	32.3	8.8	69.4	137.5	20.2	43.8	33.6	28.0	35.7
Diabetes	9.8	2.5	22.1	40.7	9.2	10.4	10.8	8.1	8.9
Peptic Ulcer	15.9	10.1	32.7	23.2	22.6	9.5	15.3	15.8	18.8
Arthritis & Rheumatism	65.6	15.5	147.8	281.5	48.0	82.4	64.5	58.2	88.5
Asthma & Hay Fever	66.5	64.6	71.9	69.1	66.5	66.4	66.9	69.7	56.6
Chronic Bronchitis	10.9	8.8	14.3	19.5	10.5	11.2	11.2	11.3	8.2
Tuberculosis	2.2								
Epilepsy	5.0								
Pregnancy	22.4								
Alcoholics	26.0								

\*\*Department of Health, Education, and Welfare.

PER CENT OF POPULATION  
WITH ONE OR MORE CHRONIC CONDITIONS

	<u>Total All Ages</u>	<u>Under 15 yrs.</u>	<u>15-44 yrs.</u>	<u>45-64 yrs.</u>	<u>65 yrs. &amp; over</u>
Chronic Conditions	44.5	19.5	46.0	64.3	81.2
Without limitation of activity	32.1	17.5	37.9	43.6	32.3
With limitation of activity	12.4	2.0	8.0	20.7	48.9

Division of Health  
Interview Statistics  
Public Health Service

INJURIES IN THE UNITED STATES

<u>Kind</u>	<u>Average Number Occurring Per Day</u>	<u>Average Duration of Injury in Days</u>	<u>Total Injuries On Any One Day</u>
Fractures	13,000	19 days	247,000
Sprains & Strains	23,000	7-1/2 days	172,500
Wounds & Lacerations	40,000	2.6 days	104,000
Contusions & Superficial Injuries	31,000	3.8 days	117,800
Other	36,000	3 days	108,000
		<b>Total</b>	<b>749,300</b>

$$\frac{749,300}{190,000,000} \times 1,000 = 4$$

Division of Health  
Interview Statistics  
Public Health Service

NUMBER OF ACUTE CONDITIONS PER 1,000 PERSONS PER QUARTER IN THE UNITED STATES  
 JULY 1962 - JUNE 1963

	<u>July September</u>	<u>October December</u>	<u>January March</u>	<u>April June</u>
<u>All Acute Conditions</u>	357	591	785	454
<u>By Category</u>				
Infective and Parasitic Diseases	33	54	88	69
Respiratory Conditions	145	374	536	216
Upper Respiratory	99	248	285	139
Influenza	38	112	236	69
Other	8	14	15	8
Digestive System Conditions	30	30	26	27
Injuries	81	62	64	69
All Other Acute Conditions	68	70	71	73

Department of Health, Education, and Welfare



## Appendix G

### RATIONALE ON WHICH RECOMMENDATIONS FOR MODIFICATION OF THE SHELTER MEDICAL KIT ARE BASED

The NAS-NRC Ad Hoc Committee on Medical Care in Public Fallout Shelters unanimously recommends that the deletions, changes, and additions discussed in this Appendix be made in the Public Fallout Shelter medical kits. In developing these recommendations, the Committee concerned itself primarily with the health and medical problems to be dealt with by persons in shelters during a fallout situation; monetary limitations and administrative and logistical considerations that might influence or actually determine decisions in other circumstances were recognized but were viewed as of secondary importance. In so doing, the Committee believed that it was acting in complete accord with its terms of reference and with the understanding that before implementing any of the recommendations, the operating agencies of the government will take into full account all appropriate funding, logistical, and administrative considerations.

The Committee is also fully cognizant of the lack of data that are needed to make precise judgments concerning the kinds and quantities of medical items to be stocked in shelters. There exists no experience with the exact situations that will certainly obtain in a major thermonuclear disaster, and it is not possible to duplicate such situations for purposes of experimental study. Accordingly, the information that is available for planning purposes is drawn from peacetime experience or has been extrapolated from the results of studies of relatively minor disasters and from experiments in which disaster situations were simulated. For this reason, judgments concerning the medical supplies in the shelter kits are necessarily heavily weighted by professional opinion.

The Committee has critically reviewed the contents of the kits that are being placed in shelters currently and agrees that, in general, the items provided therein serve the essential minimum health and medical objectives of the Public Fallout Shelter Program. Accordingly, the Committee sees no compelling reasons for interfering with the implementation of the current program or for modifying the kits as a matter of high priority. The Committee strongly recommends, however, that additional research be undertaken now to acquire more information about the health and medical problems that would be encountered in shelters during a fallout situation. Also, for the reasons specified in the following paragraphs, the Committee recommends that the contents of the currently standard medical kits be modified at some future time when such changes will not disrupt the orderly progress of the over-all Shelter Program.

1. Delete the cascara sagrada (#6505-112-9010, Cascara Sagrada Extract Tablets 100's). Constipation is not considered to be a serious threat to life and under the conditions that would prevail in fallout shelters, is not viewed as an important enough medical problem to warrant making provisions therefor. On the other hand, the ill-advised administration of a cathartic to certain persons might aggravate a mildly active or incipient illness, such as a low-grade inflammation of the appendix, and precipitate a serious or even life-threatening sickness.

2. Delete the fountain syringe (#6530-782-2095, Syringe, Fountain). No essential medical use for this item in public fallout shelters can be defined. Conversely, it might be used communally as an alleged hygienic item and thereby constitute a dangerous source of spread of infectious disease.

3. Increase the quantities of the following items: (Note: Kit A, supplies for 50 persons for 14 days, is used as the model for ease of presentation. However, the recommendations specify the changes for both Kits A and C.)

a. Double the quantity of penicillin (#6505-237-8480, Penicillin G Tablets, 250,000 Units, 100's). Stocks in Kit A provide penicillin for about 50 man days of treatment for adults. This amount might be adequate for treatment of some 10 to 15 patients, depending upon their illnesses. However, because of the prevalence of respiratory infections at all seasons of the year (Appendix F), it is to be expected that at least one person in every shelter would constitute a potential source of spread of some form of respiratory illness. The environmental conditions in shelters would favor the rapid dissemination of infectious diseases. It is anticipated, therefore, that there will be a rapid spread of bacterial and viral respiratory illnesses and other infectious diseases among the population in shelters. During a 14-day period, it is likely that at least half of the persons exposed will become infected and many of these will exhibit symptoms. Treatment given in shelters will be symptomatic, there being no opportunity for making etiological diagnoses, and in most instances laymen will supervise and administer the treatment. In spite of the precautions specified in the instructional manuals that are in the medical kits, it seems reasonable to expect that, as a practical matter, when a person in a shelter has fever and other symptoms of an infectious disease, he will take or be given penicillin. Therefore, the Committee considers that the demand for penicillin in shelters will be at least twice that which was estimated for procurement purposes.

Admittedly, the validity of this demand may be questioned on a scientific basis. Some of the illnesses for which the penicillin will be given would be viral in nature and would not be influenced by administration of penicillin. Others, however, would be bacterial and some of the viral illnesses might be complicated by or actually favor the occurrence of bacterial infections as sequellae. The Committee agrees, therefore, that the liberal use of penicillin in shelters in a fallout situation would be more beneficial than harmful because a prophylactic as well as therapeutic purpose would be served.

b. Double the amount of aspirin (#6505-153-8750, Aspirin Tablets, USP 1000's). At present, the quantities stocked provide enough for 10 tablets, or 50 grains, of aspirin per person. Data on the amounts of aspirin sold currently indicate that each person in the United States consumes the equivalent, in aspirin of all types of preparations, of an amount equal to approximately eight 5-grain aspirin tablets every two weeks.<sup>1</sup>

Aspirin is a relatively safe and quite efficacious item for alleviating minor pain and discomfort. It is the only analgesic, or "pain-reliever," in the kit. The physical and psychological stresses to which persons would be subjected during a major disaster and in a fallout situation can be expected to cause a sharp increase in the incidence of headache and painful episodes of rheumatoid diseases, conditions for which salicylates are often effective. The relief of the attendant and, potentially, many other discomforts would contribute to the ability of individual persons to endure a stay in shelters and to the preservation of a more tranquil relationship among the occupants of shelters. Accordingly, it is anticipated that the average demand for aspirin in shelters would be forty 5-grain tablets per capita in a 14-day period. It would appear to be in the best interests of the program to prepare to satisfy this demand.

c. Double the amount of phenobarbital (#LL6505-619-8867, Phenobarbital Tablets, USP, 1000's).

At present, the amount of phenobarbital stocked in Kit A is 500  $\frac{1}{2}$ -grain tablets, or 10  $\frac{1}{2}$ -grain tablets per person. Current sales data indicate that the consumption of all barbiturates, expressed as  $\frac{1}{2}$ -grain tablets of phenobarbital, is 1.5 tablets per person in two weeks.<sup>1</sup> In addition, many persons take other sedatives such as bromides and tranquilizers. Some people have come to rely upon sedatives to assist them in meeting the stresses of every-day life during peacetime. The Committee has no good information about the total current demand for sedatives other than the barbiturates, but in the opinion of the members, this demand is substantial.

Following a major thermonuclear attack and during confinement in fallout shelters, the surviving population will be subjected to severe stresses. Consequently, many otherwise normal persons will experience emotional disturbances. Most of the persons who use sedatives more or less frequently in their regular lives will have an increased need for these items. Following confinement in a shelter for a few days, alcoholics will exhibit some degree of a withdrawal syndrome, and many severely neurotic and psychotic persons will become dangerously disturbed. Adequate control of all disturbed persons will be essential, not only for the good of the individuals affected, but for the protection and well being of other persons. In some cases, such as in severely agitated psychotics and in delirium tremens, the quantities of sedative required for adequate control are considerable. Therefore, the Committee is of the opinion that there will be a need for the liberal use of a sedative

in a fallout situation. The exact extent of this need is difficult to state, but the essentiality of meeting the need adequately cannot be denied. As with the provision of penicillin, therefore, the Committee is agreed that it is in the best interests of the government to stock phenobarbital in fallout shelters in amounts that approximate the estimated optimal rather than any lesser requirement.

d. Increase the number of triangular bandages (#6510-201-1755, Bandage Muslin Triangular CP 37x37x52) in Kit A to 3 and in Kit C to 12.

This bandage has many uses, such as securing splints and dressings, arm slings, and restraints. Particularly in the hands of laymen, it is more useful than gauze roller bandage, and in many cases is an effective substitute for adhesive tape, which is not stocked in the shelter kits. Extensive instruction in its use is standard in Red Cross and most other first-aid training.

4. Add an adhesive bandage (#6510-597-7469, Bandage Absorbent Adhesive, 3/4 x 3 inch, 100's). Provide 1 box, 100 bandages, in Kit A and 6 boxes, 600 bandages, in Kit C.

Currently, on any one day there are approximately 200,000 persons who are suffering from abrasions, superficial wounds, and other such minor injuries, and approximately 70,000 persons receive such injuries each day (Appendix F). It is to be expected, therefore, that at least one person with an existing minor skin wound would enter each shelter during a fallout situation. Also, it is reasonable to expect that the incidence of such injuries would be higher than normal during an attack when persons are excited and fearful, and among groups of persons confined in unfamiliar surroundings during a fallout situation. Because of crowding and the relative lack of facilities for personal hygiene in shelters, it is to be expected that there would be a greater than usual possibility that superficial wounds would become infected. Therefore, there is a clearly-defined requirement in shelters for a simple and effective means for the care of persons with minor superficial wounds.

The most effective treatment for such injuries is to cleanse the wound with soap and water and to cover it with a protective dressing to protect it from further trauma and bacterial contamination. The "band-aid" is an admirably-suited protective dressing because it is sterile, easily applied to almost any part of the body, and remains firmly in place. Almost everyone is familiar with its use, whereas most persons, including those who have had first aid training, find it difficult to apply a dressing with gauze pads and roller bandages. In most instances, the dressings so applied become contaminated in the process, are ineffectively applied, are prone to become displaced, and are relatively expensive.

5. The Committee believes that a sufficient amount of a proven, dry antidiarrhea preparation should be stocked in shelters to treat at least 20 per cent of the persons who would be expected to occupy shelters.

The Committee agreed that diarrhea would pose a difficult problem in shelters, but has inadequate information on which to base reliable estimates of the incidence of the disease. Accordingly, the Committee is reluctant to recommend a precise amount of antidiarrhea preparation to be stored in shelters, but does strongly recommend that additional information be acquired promptly concerning the nature and scope of the problem that specific and nonspecific diarrhea might pose in shelters.

6. Remove the water purification tablets (#6850-250-2620, Tablets, Water Purification) from the medical kits and arrange to store this item with the sanitation supplies.

The Committee is cognizant of the administrative problems that are involved in the implementation of this recommendation. The Committee is also aware of the fact that in the armed forces, the tablets are carried as a medical item and that they are used appropriately by troops in the field. However, the Committee is convinced that in a civilian defense situation the tablets, being classified as a medical item, would frequently not be used for their intended purpose. This belief is supported by the records of usage of medical items by groups of persons living in fallout shelters in the four experiments done at the University of Georgia under OCD sponsorship. These records indicate that none of the tablets was used in any of the experiments, although the different groups of persons who participated in the studies remained in shelters for from four days to two weeks.

It might be preferable, therefore, to store the water purification tablets with the water supplies. A packet of tablets, sufficient to treat one container of water, might be affixed to the inside of the cover of each water container.

#### Reference

1. Department of Commerce, U. S. Tariff Commission sales data, 1962. Personal communication, 1964.









NATIONAL ACADEMIES LIBRARY

