some of these organisms. It can be anticipated that the enemy will develop heat-resistant strains of pathogens and will also use toxins. Therefore, plans must be developed for the protection of milk plant operations against the possible introduction of biological agents through sabotage activity of enemy agents.

Research and Development Needs

Some of the problems related to milk supply in times of civil disaster, on which we believe further research to be required, are:

1. The use of chemical preservatives and sterilizing agents as a substitute for the heat treatment of milk.
2. Field screening tests for the rapid detection of radioactive and chemical contamination of milk, as well as improved laboratory procedures for the rapid detection of various biological agents and toxins that might be added to milk.

Coordination of Plans and Organization

Plans for milk control services in civil defense must be worked out in detail to fit the specific problems and probable disaster conditions for each likely target area, and must be integrated with the plans of communities designated to provide assistance and support in case of wartime civil disaster. They should then be carefully integrated into, and coordinated with, other civil defense plans at local, State, regional, and Federal levels. It is, of course, of paramount importance that the milk industry and its organizations participate in the development of all plans.

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Food Sanitation Problems In Emergency Feeding

By GORDON E. McCALLUM, B.S.
JOHN D. FAULKNER, M.S.
STEPHEN E. KOELZ, M.P.H.

Emergency food sanitation problems are extremely complex. In solving these problems many of the specific procedures and techniques generally considered to be fundamental in food sanitation will have to be altered.

Factors which normally take precedence in the development of plans concerning administrative and scientific problems related to food supply and emergency feeding in civil defense operations include: (*a*) adequacy of sufficient amounts of principal food items required for the feeding of casualties, refugees, evacuees, and other homeless persons; (*b*) a consideration of the need for possible rationing and distribution of food and supplies; (*c*) the availability of emergency facilities and equipment for adequate storage, preparation, and service of food; and (*d*) food sanitation. We will deal only with food sanitation problems as they affect the operation and administration of emergency feeding programs.

The possibilities of disease dissemination will be greatly increased at times of emergency mass feeding so that adequate control measures will be essential. Therefore, the specific measures directed toward the protection of food assume added significance over those normally practiced.

The principal problems in the establishment of safe food service under emergency conditions relate to: (*a*) the use of equipment and the selection of foods in menu planning for varying degrees of emergency conditions; (*b*) the train-

Mr. McCallum is chief of health emergency planning of the Office of the Surgeon General, Public Health Service. Mr. Faulkner is chief and Mr. Koelz is food sanitation consultant of the milk and food branch, Division of Sanitation, Public Health Service.

ing and mental attitude of all personnel responsible for handling of food, and (*c*) the development of emergency sanitation standards for controlling food-borne disease hazards which are likely to occur during a wartime civil disaster.

Sanitation Programs and Control Procedures

The application of known techniques to food sanitation problems will be complicated by the magnitude of the disaster. It would, of course, be desirable to maintain existing food sanitation and to intensify control procedures. Although this will not be possible, the basic and well-established sanitation principles discussed below will be applicable.

Storage Problems

One of the basic needs in the efficient operation of food service facilities is the adequate storage of food materials, including water, milk, and other food supplies. The storage problem is significant principally because emergency food service usually requires quantity feeding. Storage facilities, therefore, will need to be considered with respect to the construction and design of large storage utensils, refrigeration equipment, and the type of raw food materials to be used in the preparation of the finished food product. The use of packaged and bulk foods requiring little preparation and a minimum or no refrigeration appear to be indicated for use in emergency feeding operations, especially in the immediate postdisaster period.

Wholesomeness of Food and Drink

The wholesomeness of the food is directly related to the storage facilities of emergency feeding operations. This is particularly true when food supply plans provide for the distribution of perishable foods directly to mass feeding centers and other food service establishments. Refrigeration is required for such foods, whether they are distributed in small amounts, in packaged form, or in bulk. Unless adequate equipment and utensils are provided, the use of readily perishable foods should be limited to the amounts to be served at one feeding. In many instances the mere substitution of food and drink which do not require temperature control measures is advisable.

Cleaning and Bactericidal Treatment

The importance of adequate cleaning and proper bactericidal treatment of equipment and utensils cannot be overemphasized. Even under normal conditions, we encounter difficulties in obtaining compliance with this important item of food sanitation. Under emergency feeding conditions the problem will be extremely complex, since special adaptation of established techniques and procedures to varying types of emergency feeding centers will be required.

The public health significance of maintaining thoroughly clean multi-use eating and drinking utensils and equipment is well known. Not so well known, however, is the fact that some methods of bactericidal treatment are not effective unless all soil has been removed from the surfaces to be treated. This is particularly true when chemical germicides such as hypochlorites are used. Therefore, only after thorough cleaning of such utensils should one or both of the following bactericidal processes, or equivalent processes which appear suitable for emergency feeding operations, be applied.

1. Complete immersion in hot water at a temperature of 170° F. or above. The immersion time will vary from 2 minutes' exposure in water at 170° F. to approximately 30 seconds' exposure at boiling temperatures (*1*). This method we believe to be the preferred procedure for emergency feeding operations.

2. Immersion in a chlorine or other chemical germicidal solution. Strengths of solution and exposure times will, of course, vary with the agent used and its concentration (*1*).

To reduce both hazardous conditions and workload at emergency feeding centers, it appears advisable to utilize single-service containers and eating utensils, whenever practicable, as substitutes for multiservice plates, cups and glasses, and knives, forks, and spoons. The use of such single-service containers may also be required due to shortages of water for cleaning.

Other Sanitation Problems

Other matters of sanitary significance which have a direct bearing on safe food service at

emergency feeding centers, and which will require attention, are the personal health of the worker; safe source of water supply; sanitary disposal of excreta; fly, insect, and other vector control; garbage disposal; construction of utensils; and food salvage.

Food Service Personnel

The operation of emergency feeding centers will require the selection and training of large numbers of food service personnel recruited from both the restaurant and hotel industry and lay groups. An understanding by such personnel of the importance of food sanitation and the measures to be observed in food preparation and service is extremely important. Training of emergency food service personnel must, therefore, include these subjects in order to develop mental attitudes that will insure day-by-day observance of food sanitation principles.

Hazards From Special Weapons

Civil defense planning must prepare for problems that will arise in the event of enemy attack on civilian population centers with radiological, biological, and chemical weapons. The use of any of these special weapons will create special hazards with respect to the food supply of the disaster area. Problems of contamination, decontamination, and salvage are involved and must be provided for.

Recent documents (*2*, *3*) have suggested levels of radioactivity in water and food that can be permitted under emergency conditions following an atomic bomb blast or other nuclear explosion. The following table (*2*) furnishes guidance on acceptable values of radioactivity in water and food during a period of emergency immediately following a nuclear explosion.

While the emergency levels given in the table were established for water, the values are considered to be applicable to food as well. On the basis of present knowledge, however, the ingestion of any food which has been radioactively contaminated is probably a calculated risk, and should be avoided. In general, no foods should be used in emergency feeding operations, if the possibility exists that such foods were exposed either to radioactive or chemical contamination, until they have been monitored and released for use by the proper authority. Similarly, food equipment exposed to either form of contamination must be thoroughly decontaminated before use.

The use of food as media for the dissemination of biological warfare agents must not be overlooked. At present little information has been made available on this subject, although procedures for the detection of such agents are now being studied. It must be kept in mind that such agents may be used by saboteurs and could be introduced into the food supply of a critical defense installation. Protection of the food supply against the introduction of these agents is an important element in planning defense against biological warfare.

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Emergency level for beta-gamma activity in water and food

Time water is to be consumed	Safe		Low, acceptable risk	
	Curies per cc.	Disintegrations per minute per cc.	Curies per cc.	Disintegrations per minute per cc.
10 days	3.5×10^{-9}	7.7×10^{3}	9×10^{-8}	2×10^{5}
1 month	1.1×10^{-9}	2.6×10^{3}	3×10^{-8}	7×10^{4}