Food Sanitation in Civil Defense

During the scientific section meetings of the Combined Conference on Administrative and Scientific Aspects of Food in Civil Defense held in England last winter (see pages 607 to 626), sanitation considerations were explored in some detail. The five papers presented here were selected as being of particular interest and value to public health and civil defense workers in the United States.

Examination and Salvaging Of Food Supplies

By WINTON B. RANKIN, M.S.

The methods the Food and Drug Administration, Federal Security Agency, employs to determine whether foods are suitable for consumption after damage by blast, fire, or water, or contamination with radioactive materials are described here.

Radiation Hazards to Foods

A nuclear explosion may contaminate food with unfissioned materials, with fission products resulting from the explosion, or by inducing radioactivity in materials located near the explosion.

Careful analysis of available data indicates that there will be no significant induced radioactivity in foods which are far enough away from the center of an explosion to escape destruction. The slight radioactivity which may be induced in a stock located in a well-protected shelter near ground zero will be predominately short-lived. It will be virtually dissipated by the time salvage crews are able to enter the area for clean-up operations.

Thus, we are concerned only with fission products (beta-gamma emitters) and with unfissioned bomb material (an alpha emitter). These contaminants will be deposited as a fine dust or a mist upon containers or directly upon food or drink itself. They penetrate in the same manner as nonradioactive dust or mist. Materials in undamaged, well-closed warehouses, rooms, or packages will not be contaminated. Soluble radioactive elements dissolve in water or liquids, and thus may be carried in water through porous containers.

The contaminants are removed by washing waterproof containers with a detergent and by dusting or brushing other containers. Surface layers of bags, cases, or bulk food showing heavy contamination may be removed and impounded to permit decay of radioactive isotopes. Later analysis in a laboratory will show whether the contents are safe for consumption. Permeable containers, such as cloth bags and porous paper wrappers, may permit radioactive dust or mist to seep through and contaminate the food itself. Likewise, exposed food may be seriously contaminated. In such cases, surface contamination must be removed as completely as possible, and the field test described below must be applied to determine whether the food is safe.

Food and water which contain the following amounts of beta-gamma contamination may be consumed if other supplies are not available. (Emergency tolerances are those announced by the Civil Defense Administration and the Atomic Energy Commission.)

Time food or water is to be consumed	*Acceptable beta-gamma activity in disintegrations per minute per cc.*
10 days	200,000
30 days	70,000

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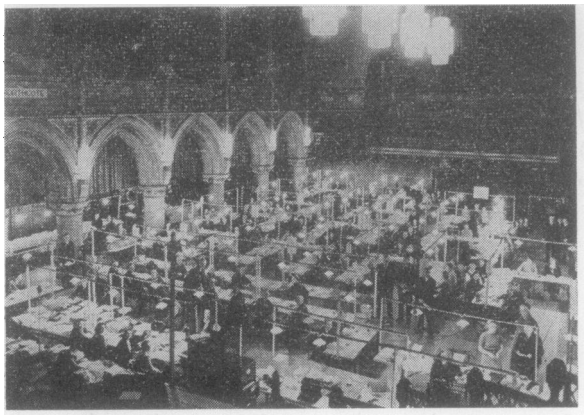
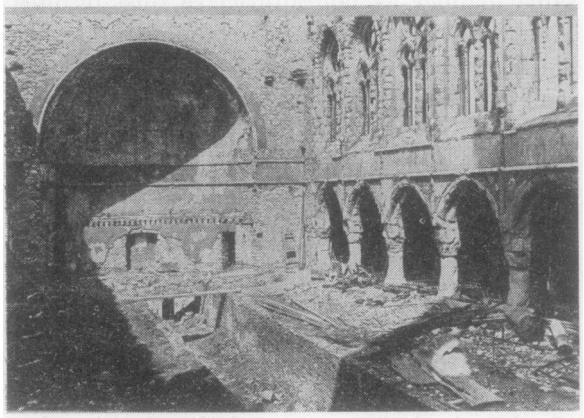
Plymouth Food Office Incident





In October of 1939 Plymouth's old Guildhall was used as the local food office (upper photograph). In June of 1943 the Guildhall was bombed during a raid (center picture). The food office was reorganized and at work in a marquee 48 hours after the raid (lower photograph).

The consumption of these quantities of radioactivity during the periods indicated will cause less damage than withholding essential supplies from a stricken community.

A portable Geiger-Mueller survey meter will detect readily these tolerance levels of radioactivity.

Each survey team is supplied with a reference standard giving the equivalent of 200,000 beta-gamma disintegrations per minute per cc. The team places a sample of the contaminated material in a container of the same size as that holding the reference standard and compares the activities of the sample with the standard.

Samples with greater activity than the standard are not safe for use. Samples with less activity are suitable for use for a 10-day period. Samples with less than one-third the radiation given off by the standard are suitable for use for a 30-day period.

While this procedure is reasonably accurate for thin layers of liquids, research is required to confirm its reliability with solid or semisolid samples.

No effort will be made in the field to determine whether contaminated food may be used longer than 30 days. Peacetime tolerances for radioactivity are so small that an accurate measurement of them should be made with a conventional scaler.

Emergency tolerances for permissible alpha activity in drinking water or food also have been calculated. These are:

Time food or water is to be consumed	*Acceptable alpha activity in disintegrations per minute per cc.*
10 days	11,000
30 days	3,700

We do not have a portable field instrument which will measure satisfactorily these levels of contamination with alpha emitters. Possibly a portable scintillation counter would be suitable. Such an instrument is needed.

Except where a bomb fails to fission properly, the amount of beta-gamma radiation resulting from fission products is so much greater for the first month than the amount of alpha contamination from unfissioned material that we can forego direct measurement of alpha radiation during that period. If the beta-gamma

contamination is less than its tolerance value, the alpha contamination is below its tolerance value.

These emergency tolerance values should not be applied beyond 30 days.

Crops which grow on soil heavily contaminated with radioactive elements, and seafood which grows in radioactive waters, may take up significant amounts of radioactivity. This hazard will not develop suddenly. After the acute emergency following a nuclear explosion, perhaps after 30 days or more, food coming from radioactive soils or waters should be examined in the laboratory to determine whether they contain more than the peacetime tolerance for radioactivity.

Blast and Fire Hazards to Foods

The technical problems associated with food salvage following blast and fire damage of war are essentially the same problems which accompany major blast and fire disasters in peacetime. Many major fires are fought with impure water from rivers or harbors; thus, we also must consider water damage.

Perishable products probably will deteriorate beyond salvage if located near a major disaster. If salvable, they should be cleaned as thoroughly as possible and cooked promptly to destroy harmful bacteria.

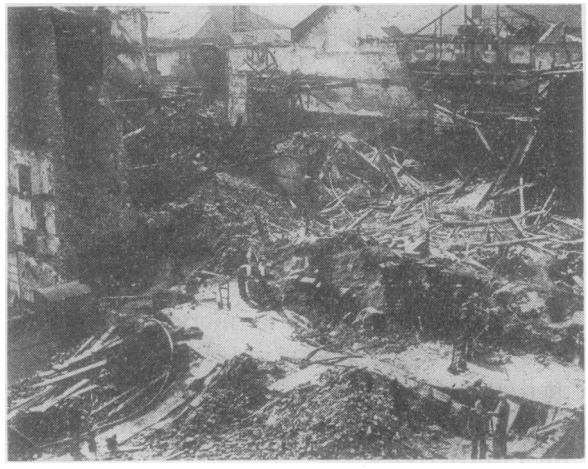
Semiperishable materials, such as dried fruits, deteriorate rapidly when they are mois-

Salvage of typical foods

Kind of food or package	Possible salvage procedure in case of—		
	Contamination with radioactivity	Blast and fire damage	Water damage (pollution)
Perishable: Fresh fruits and vegetables, fish, poultry.	Remove outside portions of lot containing most radioactivity. If remaining contamination is less than emergency tolerance, release interior portions. Washing of fruits and vegetables may be of value.	Look for contamination with poisons. If carriers of pathogens are present sterilize before using.	Wash to remove surface contamination. Cook to kill bacteria.
Nonperishable: Dried fruits and vegetables; flour and grains; bulk sugar stocks.	As above (except that washing is not feasible).	As above	Prompt sterilization and use of fruits and vegetables. Remove flour and grain which is not caked. Cook before using. Re-refine sugar.
Cardboard and paper containers.	As for flour, above. Removal of dust by brushing, Remove outer wrappers.	As above	If salvage attempted, sterilize food in water-damaged containers before it is consumed.
Sugar (bulk stocks)	As for flour, above	As above	Re-refine.
Canned goods: Hermetically sealed cans.	Wash outside of container with detergent, or remove radioactivity by brushing. Interior portions of stacks may be relatively free of radioactivity.	Look for and destroy cans with ruptured seams or closures. Remove abnormal cans. Look for spoilage from thermophilic organisms.	Sterilize surfaces of cans. Watch for pinholing of metal. Use damaged stocks promptly.
Containers with screw caps, friction type lids, etc.	As above. Test contents before releasing for use.	As above	Difficult to remove contamination from beneath or around closure. Sterilize foods before using.

Food Salvage Operations in England, 1944

At Streatham on the night of June 16, 1944, a fly bomb completely demolished a building containing 650 tons of foodstuffs. Salvage operations, completed in 6 weeks, resulted in recovery of 636 tons.



On the night of August 4, 1944, a fly bomb attack at Dudins Wharf, Bermondsey, resulted in a direct hit on a building containing 9,000 tons of cereals and oilseeds. Fires resulting from a burst gas main raged for 4 days. Salvage operations lasted 3 months, resulting in the recovery and utilization of 8,000 tons. The picture at top shows a general view of the site during salvage operations. The photograph below illustrates the problem of fly infestation which hampered salvage operations.

tened. If molding or decomposition has not set in when salvage is possible, damaged containers should be earmarked for prompt consumption; sterilization is required if the foods are polluted.

The surface of flour cakes when it is moistened. Some water-damaged flour may be salvaged by removing the uncaked material from inside bags or bins. Bulk lots of grains swell and form a solid mass; large quantities which have not been wet may be salvaged from inside elevators which have been subjected to heavy water damage.

Any food may be exposed to poisonous materials scattered about the storage area by blast. Often insecticides and foods are stored in the same warehouses, leading to the possibility of mass poisoning from the scattering of the poisons over foods.

Hermetically sealed cans may be ruptured by blast; they should be examined carefully for sprung seams which will permit spoilage. Decomposition resulting from damaged cans should be apparent in 7 to 10 days; adequate salvage will then be possible. Cold weather may retard the appearance of swells or leakers.

Hermetically sealed cans which are heated and cool slowly may develop spoilage from thermophilic organisms. The spoilage may not be apparent from the outside of the container. Such lots should be examined in a suitable laboratory.

Hermetically sealed cans exposed to pollution from water or other sources should be sterilized before release to the public. The cans may rust and develop pinholes before salvage.

If not, they should be used promptly after release because of the danger of pinholing.

Glass jars with screw caps, cans with friction-top lids, and similar containers without hermetic seals, and hermetically sealed jars with anchor- or crown-type closures are difficult to salvage following contamination with polluted water or other filth. Pathogenic bacteria lodge under the caps or beneath rubber gaskets and may be introduced into the food when the container is opened. Foods in such containers should be sterilized before consumption.

Foods in cardboard cartons, paper wrappers, and similar containers may be contaminated with toxic bacteria or poisons through breaks in the packages. Water damage to this type of package calls for adequate sterilization of the contents before use if salvage is possible.

If transportation and manufacturing facilities are available, large stocks of some foods, sugar for example, may be salvaged by refining even though they are heavily contaminated.

The table gives a summary of some of the salvage methods suggested.

The most pressing problems which remain unsolved are: how to measure alpha contamination in the field with portable equipment; and how to cope effectively with sabotage of the food supply.

A Safe Water Supply In Civil Disaster

By GORDON E. McCALLUM, B.S.
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Water, although not a food, is essential to life and therefore a necessary component of man's diet. Furthermore, water is important in the preparation, processing, and distribution of many foods. Any comprehensive study of the food aspects of civil defense, therefore, should consider those changes in the quality and quantity of the public water supply which are likely to occur in a civil defense emergency. Civil defense officials will be particularly concerned inasmuch as they may be faced with the problem of providing an emergency supply of water in the event of failure or serious contamination of the public supply.

Contamination of Public Water Supply

While similar in many respects water differs from other utility services, such as gas and electricity, because of its vital public health significance. Possible contamination of the public water supply is one of the greatest hazards to the health of the community. Although it is well recognized that water readily transports organisms causing such diseases as typhoid, cholera, and dysentery, its safety is seldom questioned by the citizen of the modern community. This record of safety and achieved assurance did not just happen. It is the result of more than 100 years of effort, study, surveillance, and careful sanitary control. Continuous research has brought about marked improvements in water works equipment and materials as well as in their operation and use. Furthermore, these resources are now under the control of more competent personnel. However, these safeguards in the form of modern collection and treatment of sewage and purification and protection of public water supplies are man made. Consequently, they can be suddenly destroyed, particularly so by man himself.

Wartime attacks upon civilian populations would break down many of these safeguards and at the same time intensify public health hazards. In addition there would be new dangers arising from possible use of special weapons of war. Scientific research on biological, chemical, and radiological substances indicates that some of these agents could contaminate public water supplies. Such contamination might occur as a direct or incidental result of attack, or by sabotage.

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