

DISASTER EMERGENCY MANUAL

**KEEP
HANDY**

for
Directors of Health
and staff of
Connecticut State Department of Health

January, 1956
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FOREWORD

This Manual was prepared for reference and use by local directors of health in Connecticut and for the staff of the state department of health by a Disaster Relief Committee appointed by the department. It is based on previous reports of similar committees of the Connecticut State Department of Health, a report of the Disaster Relief Committee of the State and Provincial Health Officers, American Red Cross Disaster Relief Recommendations, experiences during the 1936, 1938 and 1955 disasters in Connecticut and programs worked out in connection with disaster relief under wartime conditions.

The Manual is necessarily of a somewhat general nature. It delineates the principles of state and local health department organization and operation under emergency conditions where regular civil authority is maintained, and the liaisons possibly necessary with other official and voluntary agencies under those circumstances. It does not go into details of the control of various types of epidemics nor into all the welfare problems relating to the care of refugees. It does not attempt to spell out in detail assignment of personnel.

Because many agencies and groups may be concerned in the health and welfare problems of a disaster emergency, Part I of this Manual outlines the authority and responsibility of major groups for informational purposes.

Parts II and III of the Manual are devoted to a briefing of activities of state and local health departments respectively. Check there for your own general responsibilities.

Part IV is a compilation of techniques and procedures, knowledge of which may be important during a natural disaster. It may be considered as a guide to state department of health policy in an emergency.

Part V contains discussions of Federal assistance in natural disasters.

IT IS URGED THAT LOCAL DIRECTORS OF HEALTH AND STAFF MEMBERS OF THE STATE DEPARTMENT OF HEALTH SET THIS MANUAL ASIDE IN A SPECIAL FILE WHERE IT CAN BE READILY FOUND FOR REFERENCE PARTICULARLY IN TIME OF EMERGENCY.

PART I - AUTHORITY AND RESPONSIBILITY OF HEALTH AND
OTHER RELATED AGENCIES

The role of state and local health authorities must be defined with reference to the type of disaster and relationship to other major groups and agencies. In a military emergency (enemy attack) the military forces are responsible for military operations and the office of civil defense for all operations not under military control. The state department of health and other state health agencies, and the American Red Cross are integrated into the civil defense forces under such conditions. The state department of health becomes the central core of the health service division of the office of civil defense. Local directors of health should hold analogous positions in their respective town or area civil defense organizations. In natural disaster, civil authority and responsibility continues but may be supplemented or assisted from several sources.

MILITARY DEPARTMENT

Section 693c of the 1953 Supplement to the Connecticut General Statutes provides for the calling out of the state military forces for duty during natural disaster by the governor. Under Section 1261 of the 1949 Revision of the General Statutes, a local official unable to communicate with the governor may similarly request from the local senior military officer such assistance of the military. In either instance the mission of the military is to aid civil authority. Only when martial rule is proclaimed by the governor does the military replace civil authority, and then competent civil officials will be called upon by the military to perform their normal functions.

*AMERICAN RED CROSS - GOVERNMENT RESPONSIBILITY

The American Red Cross through its local chapters and its national headquarters is organized to meet disaster relief needs in the way of food, clothing, shelter, medical and nursing relief and rehabilitation of families. It assists in warning, voluntary evacuation and rescue.

For the information of local directors of health and other persons engaged in working with the American Red Cross on disaster relief, it is believed of interest to present the following table prepared by the American Red Cross to show how the Red Cross interprets their responsibilities and government responsibilities in disaster relief. American Red Cross responsibility in disaster relief is to assist families and individuals in meeting disaster-caused needs they cannot meet by themselves.

*In appendix I is a statement of understanding between Connecticut Civil Defense and American National Red Cross that was in effect at the time of the 1955 disasters.

Red Cross Responsibility

Relief of persons in need as a result of disaster. (Financed by the Red Cross from voluntary contributions.)

Governmental Responsibility

Protection of life, property, public health and welfare, and maintenance and repair of public property. (Financed by public agencies from tax funds.)

A. Emergency Assistance for Disaster Sufferers on a Mass Care Basis

- (1) Food: Canteen service and other facilities for feeding of homeless persons and volunteer workers.
- (2) Shelter: Temporary shelter for numbers of persons made homeless. Referral service for individual family lodging when available.
- (3) Medical Aid: First aid, nursing, and medical care to supplement local resources.
- (4) Clothing: Distribution from emergency relief stations.

B. Emergency Services on an Individual Family Basis

- (1) Welfare information services on survivors and on those injured, ill, hospitalized or dead.
- (2) Emergency orders for food, clothing, rent, bedding, and similar essentials to enable families to maintain themselves.

C. Rehabilitation of Families

- (1) Casework services.
- (2) Food, clothing, and other maintenance until normal sources of family support are restored.
- (3) Building and repair of owner-occupied homes.
- (4) Essential household furnishings.
- (5) Medical and nursing care.
- (6) Occupational supplies and equipment to restore family self-support.

WHEN LIVES ARE THREATENED

D. Red Cross Assists Governmental Agencies To:

- (1) Disseminate warnings in accordance with official instructions.
- (2) Coordinate Red Cross resources for voluntary evacuation of affected population.
- (3) Mobilize trained volunteers for rescue operations.
- (4) Transport and temporarily store household goods.

A. Emergency Community Services

- (1) Police services within devastated zones and traffic controls, law, and order in the disaster area.
- (2) Safeguards for public health and sanitation, i.e., water supply, sewage, facilities for the control and care of communicable diseases.
- (3) Special police and fire protection for the disaster area and for shelters and relief stations.
- (4) Identification and care of the dead, including temporary morgues.
- (5) Designation of hazardous buildings and areas.

B. The Usual Community Welfare Services for Dependent Persons

- (1) Institutional care for the aged, sick, orphaned, and other dependents.
- (2) Public assistance grants to indigent persons, i.e., OAA, ADC, Aid to the Blind, vocational rehabilitation, general and home relief.

C. Restoration of Community

- (1) Repair of sewage and water systems and of streets and highways.
- (2) Removal of debris from public property.
- (3) Restoration of public transportation and communication facilities.
- (4) Repair of public buildings, i.e., schools, hospitals, etc.
- (5) Inspection of private property for health and safety.
- (6) Salvage of unclaimed property.

WHEN LIVES ARE THREATENED

D. Governmental Agencies

- (1) Issue official warnings and designate hazard zones.
- (2) Enforce evacuation from threatened areas.
- (3) Organize and coordinate rescue activities.

CIVIL DEFENSE

The civil defense agencies, local and state, are busy in times of disaster in providing manpower, supplies, equipment, and sometimes housing. Early in the disaster period and preferably through advance planning, there should be an understanding on the part of the health agencies as to the many ways that civil defense agencies can assist if properly oriented as to the needs, and also on the part of the civil defense agencies as to the need for guidance by the health agencies as to steps involving the public health. Federal financial assistance in natural disaster is channeled through the State Office of Civil Defense.

CIVIL DEFENSE EMERGENCY STATUS

Sections 1451c and 1459c of the 1953 Supplement to the Connecticut General Statutes provide that on proclamation of the governor of a "civil defense emergency" in the event of serious natural disaster, the civil defense forces, under the governor's direction, would assume charge of all operations for disaster relief. The health service division of the office of civil defense would be an integral part of this organization. Certainly, effort should be made in defense planning to establish close working relationship between the local director of health and the local civil defense agency. The governor may, by proclamation under these conditions, supersede any regular provisions of the law when a civil defense emergency is declared.

STATE AGENCIES WORKING IN THE FIELD OF ENVIRONMENTAL HEALTH

Certain special responsibilities in the field of environmental health are assigned by law to the state agencies. Examples are:

<u>Item</u>	<u>State Agency</u>	<u>State Laws</u>
Sanitary supervision of public water supplies	State Department of Health	Sections 4015 to 4020
Supervision of milk	State Department of Agriculture	Chapter 144 of the General Statutes
Supervision of food stores, food processing establishments, establishments for bottling water and soft drinks	State Food & Drug Commission	Chapters 185 and 189 of the General Statutes
Supervision of liquor stores	State Food & Drug Commission and State Liquor Commission	Chapters 185 and 204 of the General Statutes
Supervision of operation of public sewage treatment plants	State Department of Health	Section 4034 of the General Statutes

In all cases it is believed that immediate contacts by the responsible state agencies with local directors of health are desirable early in the disaster so as to arrange for an understanding of the programs that are to be followed out and permit mutual assistance by the state and local agencies where possible.

health services of that office, and with the military department through the surgeon general of the state of Connecticut.

The state department of health should endeavor to coordinate their disaster planning activities with hospital planning disaster activities, so as to clarify plans in advance and to provide for integration of procedures.

Personnel - General. Since the professional personnel of the state department of health have, or will be given definite responsibilities, they should not tie up with municipal or other groups engaged in defense or disaster relief so that they would be unavailable for department activities in these fields in case of need. In times of threatened disaster they should stand ready to assist as directed by their bureau and division heads. Outside of regular working hours in emergencies, they should try to remain available for emergency calls. The supervisor of personnel maintains a listing of home telephones and addresses and should take immediate steps to note vacations, sickness, etc. against such a listing to be made available to the Commissioner.

PRE-DISASTER PLANNING ON A STATE-WIDE BASIS

In certain types of disasters such as hurricanes and floods, there may be opportunity for pre-disaster planning. An extensive hurricane warning system has been developed by the U.S. Weather Bureau, and the state defense and police agencies have participated in transmittal of warning information throughout the state. The effects of the interruption of electric current should be given consideration and may involve the need for filling cars with gasoline, obtaining dry ice or making other provisions for laboratory and biologics refrigeration, and use of battery-operated radios or car radios. Loss of telephone service may require devising other methods of communication.

Inventory of chlorine compounds, biological supplies and insecticide and rodent control compounds, and medical supplies should be made. Emergency chlorinators for water purification should be tuned up. Supplies of dry ice might be needed for refrigeration.

Advance arrangements may be made for department staff members who live around the state to check on conditions and report in to the department office in Hartford. See Appendix A.

(Note: When warning time permits, the pre-disaster alert notice and assignments will be filled in and posted in each building staffed by the department. This would place the whole department on stand-by alert.)

The following suggestions are made with regard to information packs and emergency supply packs which can be made up early in the disaster

The usual methods of disseminating information are:

1. Radio and TV from regular stations.
2. Short wave radio. (State and local police, amateur radio operators and aviation operators, ground and air).
3. Newspapers. Stories to newspapers may be transmitted by mail, telephone or personal messenger, depending on the needs and the facilities available. Short wave radio or the state police notification system also might be used to contact newspapers.
4. Regular departmental bulletins. These bulletins are particularly helpful in warning about impending floods, droughts or epidemics where data justify such warning.
5. Special departmental bulletins to health workers and relief workers, to be sent by mail, telephone, personal messenger or short wave or the state police notification system. Health workers may also be reached through regular radio stations where available.

METHODS OF COMMUNICATION

In endeavoring to contact local directors of health, field workers, etc., the following means of communication should be kept in mind by the state department of health:

1. Personal messenger via automobile, railroad, aeroplane, helicopter or boat.
2. Telephone and telegraph.
3. Regular radio and short wave radio.
4. State and local police and civil defense communication systems.

METHODS OF STATE SURVEY OF EXTENT OF DISASTER

The state department of health will try to contact local directors of health first for information about disasters. Local and state police also may furnish considerable information in case of serious accident, etc.

In past disasters it has been found that until relief workers could be placed intelligently, especially in the case of state-wide disasters, the personnel of the state health department could be used to make a quick survey of the cities and towns in the disaster area, bringing in reports to the central office in Hartford. A questionnaire has been prepared for a flood survey made by the state department of health in recent disasters. A copy of this is appended to the report, marked as Appendix D.

If the telephone is available, quick information can be obtained in this way. Two way radio, police or amateur may also be used for survey work.

Where other methods of transportation are not available, it may be possible to use the aeroplane or helicopter. The State Department of

- b. Cleanliness and safety of homes and other buildings.
- c. Methods of cleaning homes.
- d. Emergency sanitary procedures to be followed in homes.
- e. Handling of contaminated clothes.
- f. Handling and storage of food - safety for eating.
- g. Eliminating flies and rats.
- h. Advice on removing doors of abandoned refrigerators.
- i. Warnings on abandoned chemicals and poisons.

Medical Procedures

- a. Advice on typhoid and other immunization.
- b. Availability of medical supplies - vaccines, sera, etc.
- c. Emergency medical stations - location and service available
(individual counselling)
- d. Care of injuries - persons having open wounds given advice.
- e. Personal hygiene.

General

- a. Reports on morbidity - no case of typhoid, etc.
- b. Give credit to physicians, nurses, etc. for their part in protecting health of people.
- c. Information re health staff - composed of various professional persons and outside consultants.
- d. Information on role of local hospital - effectiveness in meeting needs.

METHODS OF COMMUNICATION

In endeavoring to contact field workers in the local health department or the state department of health or to reach the general public, the following means of communication should be kept in mind:

- 1. Personal messenger via automobile, railroad, aeroplane, boat, Boy Scout signal service or Sea Scout service.
- 2. Telephone and telegraph.
- 3. Regular radio and short wave radio.
- 4. State and local police communication systems.
- 5. Red Cross communications channels.

AGENCIES (LOCAL AND STATE) WHO MAY ASSIST

Health officials, local and state
Office of Civil Defense
Red Cross state representative, and local chapters
Water companies and departments
Medical societies, local, county and state
Nursing organizations, local and state
Local hospitals
Welfare agencies, local and state
Voluntary agencies

Police, local and state
Fire departments
Public works departments
National Guard
U. S. Submarine Base and Coast Guard
Girl Scouts and Boy Scouts (in certain types of disaster)
Veterans' Organizations
State Highway Department
Telephone and telegraph companies
Transportation agencies, railroad, aeronautical and bus
Wallace & Tiernan Company (water disinfection apparatus)
Fischer & Porter Company (water disinfection apparatus)
Proportioneers, Inc. (water disinfection apparatus)
Radio Relay League

It is desirable to prepare and have on hand a telephone index of key people. It is always helpful so far as possible to keep other agencies advised as to plans and whether or not they can render assistance.

LOCAL PLAN OF ACTION

It is difficult because of variations in disaster effects, to lay out any hard and fast program for the local director of health to follow. A survey of the conditions and the damage has already been discussed. The local director of health is confronted often with decisions regarding sanitation control (inspection, personnel, equipment and supplies) and medical and nursing problems (personnel, supplies and housing).

Sanitation

If sanitation personnel or supplies are needed, the state department of health should be contacted as quickly as possible. In the 1955 disaster, the department secured sanitation personnel from outside the state of Connecticut to supplement its own staff. Also, sanitation supplies can be arranged for, such as chloride of lime, high test chlorine powder, water disinfecting tablets, insecticides and rodenticides, water transportation, etc. When sanitation personnel outside of the communities are obtained, they should be organized and directed so as to get efficient results. Depending on the conditions, decision on personnel may be made on the basis of dividing up the community geographically for assignment of personnel or possibly one or more persons might be assigned to one duty such as inspection of damaged restaurants, and others to other duties. Responsibilities of state agencies in various fields have been previously discussed.

Sometimes, sanitation personnel may be loaned directly by one local health department to another community and this may be a quick and necessary way of rendering assistance. However, it is recommended, where possible, that the state department of health be acquainted with the application for loan of personnel or the loan of personnel if already made, where a disaster is of a state-wide nature so as to permit the most effective distribution of trained personnel. Offers of assistance

of sanitation personnel to the state department of health are greatly welcomed in time of disaster and where such offers are made promptly, it greatly facilitates the best use of trained manpower.

Medical and Nursing

Where it becomes necessary or desirable to carry out inoculations such as for typhoid fever, the assistance of local physicians must be sought and the state department of health may also be called on by the local director of health. If the disaster is such that medical and nursing care is needed for sick and injured, there should be coordinated planning with the medical and nursing aid sub-committee of the local Red Cross "Disaster Relief Committee" and with local hospitals and medical societies.

Special Services

In the fields of general sanitation, water and food, disposal of wastes, radiological damage, control of disease, medical and nursing service, identification and disposal of dead human bodies, etc., the local director of health will be called on for discussion of activities on a local level and for advice. For reference under various headings, these subjects are discussed in Part IV.

PART IV TECHNICAL DETAILS OF VARIOUS SERVICES

Following is a discussion of various problems and topics that may come under the purview of the local director of health or the state department of health:

WATER SUPPLIES

The public water supply should be investigated concerning damage to the supply and its effect upon the sanitary quality. It should be repaired and placed in operation as soon as possible. If necessary, an emergency chlorinator should be installed and operated under hourly ortho-tolidine control tests, with records of residual chlorine. Local directors of health as soon as possible should contact local water utilities and the State Department of Health. Radiological damage to water and control measures are discussed separately under a separate heading.

Boiling Notices

In case of question about the quality of the public supply, notices should be issued that the water should be boiled. It should be borne in mind that unnecessary warnings may weaken the morale of the people rather than aid. "Boiling" notices may be issued to the public by radio and TV, by newspaper notice and by personal notification. The State Department of Health has on hand a limited supply of "Boiling" notices and a copy is in Appendix E. In one instance during a Connecticut disaster, the telephone exchange notified individually all telephone users. If it becomes necessary to issue boiling notices, special attention should be paid to conditions in schools or factories. It may be possible to transport bottled water to such locations. In some cases, due to lack of fuel, it is difficult for individuals to boil water. In such case, disinfection with chemicals may have to be resorted to. Methods of disinfection of small quantities of water by chloride of lime and iodine are outlined below.

Note: Neither boiling nor disinfection are of value in case of radiological contamination of water. The use of water so contaminated must be discontinued until checks are made.

Disinfection of Wells and Small Quantities of Drinking Water

Chloride of Lime or High Test Chlorine Powder or Bleach Solution. Prepare a chloride of lime solution by dissolving 1 teaspoonful of fresh chloride of lime in 1 quart of water. Add the water very slowly and rub the chemical so as to assist in dissolving it. Mix thoroughly 1 teaspoonful of this solution with 2 quarts of water to be disinfected. Allow the water to stand for 30 minutes at least before use. Solutions should be prepared fresh every day and kept in well-stoppered bottles because otherwise it will lose strength rapidly. Approximately half the quantity of high test chlorine powder may be used instead of chloride of lime. One teaspoonful of 1% bleach solution will disinfect one gallon of water at a dosage of approximately 5 p.p.m. Many bleach solutions are 5 1/4% hypochlorite solutions which figure as 2 1/2% available chlorine by weight; one-half teaspoonful of 5 1/4% hypochlorite solutions would provide disinfection of 2 1/2 gallons of water at a dosage of approximately 5 p.p.m. Bleach solutions will lose strength unless tightly stoppered.

Iodine. Tincture of iodine U.S.P. can be used as a disinfectant for small quantities of water. Ordinary tincture of iodine from a drug store contains about 2 per cent of iodine. Six to seven drops of this mixed thoroughly with 1 quart of water will produce a safe water after 30 minutes standing. It is to be noted that the effect of iodine on the human system is cumulative and a large excess may have an injurious effect. Therefore, disinfection by iodine as here recommended had best be considered as only a temporary remedy and not as a permanent means of disinfection for water used over a long period of time.

Tablet Disinfectants. For some time chlorine disinfectants have been put up in tablet form for disinfection of small quantities of water. Recently the U.S. Army developed other tablets for the same purpose which are reported to contain tetraglycine hydroperiodide; each tablet liberates 8.0 mg. iodine. Many thousands of these tablets were used in the 1955 floods. Directions for the tablets used called for the addition of two tablets to one quart of water with a waiting period of ten minutes after shaking the mixture.

Disinfection of Wells Affected by Flood Waters

Following is a table of volumes for wells of different diameters:

<u>Diameter</u>	<u>Approximate Volume in Gallons Per Foot of Water Depth</u>
12 inches	6
2 ft.	24
3 ft.	53
4 ft.	94
5 ft.	150
10 ft.	590

For the average size dug well, a volume of 3,000 gallons might be assumed. The following table contains amounts of various chlorine compounds for different disinfection dosages for this size well. While it may result in overdosage, the same quantities given in the table below can be used for disinfecting average driven or drilled wells. The first listed dosage, 5 parts per million by weight, is sufficient for flooded wells under ordinary conditions. If there is known sewage pollution, the higher dosage of 50 parts per million should be used. In case of heavy pollution, it is on the safe side to disinfect the well, pump it out and disinfect it again. Large quantities of the disinfectant are not injurious. The chlorine odor will soon disappear. Effort should be made to stir up the disinfected well water and it should be allowed to stand for at least 30 minutes to obtain adequate contact. Any debris entering the well should be removed.

Suggested Approximate Disinfectant Dosage for Average Size Dug Well

<u>Chlorine Dosage</u>	<u>Chloride of Lime Approx. 25% Chlorine</u>	<u>HTH or Perchloron Approx. 70% Chlorine</u>	<u>Bleach Solution 5 1/2% Hypochlorite (2 2/3% Available Chlorine by Weight)</u>
5 p.p.m.	8 oz.	3 oz.	2.3 qts.
50 p.p.m.	5 lbs.	2 lbs.	6 gals.

Boil for five minutes all well water that may be polluted by river water, until it is disinfected and it is certain the water is safe, to avoid water-borne typhoid, dysentery and diarrhea. If boiling procedures cannot be carried out, use disinfecting tablets as directed.

Equivalents (Dry Measure)

16 ounces = 1 pound
5 ounces = 1 level cup
4 level tablespoons = 1 ounce
1 level teaspoon = 1/10 ounce

Effects of Loss of Power

Loss of power may cripple water pumping plants, electrically operated chlorinators and electrically operated equipment at filtration plants. The state department of health has two emergency hypochlorinators operated by small attached gasoline engines as well as one dry feed (gas type) chlorinator and one combination dry feed or solution feed (gas type) chlorinator. Very few chlorinators in Connecticut are now electrically operated and provision should be made in any such cases for emergency power service. Auxiliary power may be necessary to draw water from emergency sources normally dependent on electric power.

Possible Auxiliary Sources of Water Supply

Where an auxiliary source of water is proposed to be pumped into a public water supply system, the approval of the state department of health is needed and arrangements must be made to check the source and provide for treatment.

If it is proposed to transport drinking water or furnish it at distributing stations, it should be made certain that these auxiliary supplies are safe or are adequately disinfected. The following sources should be considered:

1. Approved well supplies, such as at schools, factories, dairies, bottling plants, etc., provided auxiliary power is available for pumping if power is out. Chlorination should be provided in case of need.
2. Neighboring public water supplies.
3. Pumped, filtered and chlorinated supplies from approved surface sources, such as with U. S. Army purification units.

Transportation of Water

Where drinking water has to be transported, the following methods of transportation may be used:

Watering Carts. Sometimes it is necessary to transport water by tanks or watering carts. These carts should be disinfected for 30 minutes with a dosage of 1 1/2 lbs. of ordinary chloride of lime or 3/4 lb. of a chlorine compound with large chlorine content, per 1,000 gallons of water (approximately 50 parts per million). The cart should then be drained and flushed with water from the public water supply.

Gasoline and Oil Tank Trucks - Method of Preparation for Use. (These trucks may be prepared by taking the following steps, according to tests carried out by the state department of health.)

1. The tanks should be steamed with low pressure steam for 15 to 20 minutes.
2. Tanks should then be thoroughly scrubbed with a high-pressure hot-water steam jet. Hot water and steam may be furnished by a "Hi-pressure Jenny". (This type of equipment is often used for building exteriors.)
3. Tanks should be filled to overflowing with water from the public water supply and then drained off through the tank lines.
4. Tanks should be disinfected in accordance with the instructions under "Watering Carts" and then drained and flushed with city water.

Lead determinations have been made by the state department of health on water which had stood in contact with tanks which had been carrying leaded gasoline, cleaned and disinfected. The contact periods varied from a few minutes to 24 hours. On only one occasion was any appreciable amount of lead taken into solution and even this amount was not of sufficient seriousness as to constitute any health hazard. However, as a precautionary measure, it is recommended that in no case should water be supplied for drinking purposes where it has stood overnight in a tank which has been used for the transportation of leaded gasoline.

The taste and odor conditions noted in water stored in tanks that had been carrying fuel oil, kerosene or gasoline were somewhat varied. However, it was found that as the fillings of the tanks were repeated, the perceptibility of tastes and odors diminished markedly. Also, even where some taste and odor were noticeable in the water of the first filling, these characteristics could be eliminated either by allowing the water to stand in the open or by heating the water. It is concluded, therefore, that the taste and odor problem is not serious with proper cleaning.

Ready-Mix Concrete Trucks. Such trucks might be cleaned and flushed, followed by disinfection as described under "Watering Carts", and then used for transporting water.

Milk Tank Trucks. These trucks are now being used by many dairy companies for the transportation of milk and, if available, can be used without special preparation.

Spring Water Tank Wagons. In some communities there is a demand for spring water that is delivered in large carboys. Where available, these tank wagons make excellent conveyances for water without delay and uncertainty of disinfection.

Small Metal Containers and Small Wooden Tanks. Milk cans of 8-, 20-, and 40-quart capacity are most likely to be available and used for this service. New galvanized iron cans normally produced for ash collection can be used. All such containers should first be cleaned by flushing and then disinfected by filling and allowing to stand for several minutes in a strong chlorine solution. A 1% solution should be satisfactory for disinfecting clean cans, which means one pound of chlorine (or approximately four pounds of chloride of lime) to 100 lbs. of water. All containers should be properly covered.

Some consideration has been given to the purchase of small manufactured wooden tanks which might be placed on trucks and used for transportation of water. Some tanks are round and others are rectangular; they are built of cypress, red wood, fir and yellow pine. They may be obtained with covers. Possibly such tanks might be made up locally, especially rectangular tanks.

Use of Emergency Pipe and Equipment

Use of Light-weight Pipe. The use of aluminum pipe has been developed especially for irrigation purposes in Connecticut and elsewhere. Sometimes emergencies arise in connection with the operation of a water works system when the use of this pipe could be pressed to good advantage. The pipe is easy to handle and can be assembled or disassembled very quickly. Couplers are furnished with the pipe which are provided with rubber rings on either side and the joints are said to be tight. The pipe is reported to withstand pressures of over 175 pounds per square inch. On at least one type of coupler there is a one inch to one and one half inch diameter tap which is threaded; this is for the purpose of running laterals for irrigation purposes but plugs can be obtained to plug these openings.

The sizes of pipe range from 2 inches to 8 inches in diameter. The pipe comes in 20 foot lengths and the cost of 8 inch pipe is reported to be in the vicinity of \$63.00 per 20 foot length. The cost of 6 inch pipe is reported to be in the vicinity of \$34.00 per 20 foot length. Smaller sizes are, of course, less.

Emergency Civil Defense Water Supply Equipment. The State Office of Civil Defense maintains a limited stock pile of emergency water works supplies furnished by the Federal government. These supplies include quick-coupling steel pipe, valves and fittings, portable water treatment units, portable pumping equipment, small water storage tanks and electric generators. The State Office of Civil Defense and the state department of health may be contacted when such equipment is needed under disaster conditions.

Quantity Requirements in Emergencies

Where it becomes necessary to provide emergency water for mass care centers, the Federal Civil Defense Administration states that where both lodging and emergency feeding are provided in a single facility, at least five gallons per person should be supplied within the first ten to twelve hours, and ten to fifteen gallons per person per twenty-four hours thereafter. Where lodging and feeding facilities are separate, they state the immediate requirements at lodging centers will be two gallons per person for drinking and hand and face washing. Water requirements at mass feeding stations for cooking and sanitation will be at least three gallons per person during the first few hours and at least ten gallons per person per twenty-four hours after the first half day. Where sewer facilities are available at emergency lodging locations and toilet flushing is permitted, the total water requirement will be at least twenty-five gallons per person per twenty-four hours.

For homes and apartments, in most instances, five to fifteen gallons per person per twenty-four hours is sufficient for drinking, cooking and cleansing. Where the sewer system is intact and toilet flushing is permitted, up to twenty-five gallons per person per twenty-four hours is desirable.

Emergency Disinfection of Water Mains

It is essential that after damaged water mains are repaired, they be disinfected. Various methods of disinfection are, therefore, outlined.

It is assumed that a section of pipe line is shut off for repairs by closed valves at either end and it is desired to disinfect the section of pipe between the closed valves in order to protect this section and the rest of the system. There may be a steep slope to the section of pipe line or other local conditions which may dictate some variation from the general procedures suggested. Table I gives the quantities of chlorine or chlorine compounds required per 100 feet of pipe to provide a chlorine dosage of 50 parts per million, which is usually recommended for disinfection. Table II lists the quantities of chlorine or chlorine compounds necessary to disinfect various quantities of water.

Preliminary Flushing. Where chlorine can be applied under pressure at one end of the closed section through a chlorinator or pump, it is usually possible to flush the section of pipe line through hydrants before disinfection, which is desirable to remove dirt and other foreign matter. Preliminary flushing may not be possible where chlorine powders are placed in the pipe line or where chlorine solution, or slurries of water and chlorine compound are added to the pipe line by gravity.

Application by Chlorinator or Pumped Chlorine Solution. The preferred point of application of the chlorinating agent should be at the beginning of the valved section of the pipe at the end through which water is to be admitted. A corporation cock is usually employed to make the connection. It is preferable to use a chlorinator which makes up and applies a solution of water and chlorine gas, or a chlorinator or pump which will apply a solution made up by adding a chlorine compound to water. The latter solution may be made up in a barrel or tank. In making up a hypochlorite solution to be used with a hypochlorinator, one would normally make up a solution with a strength of 1% or 2%, but for emergency disinfection of mains, it would be more desirable to use strengths from 10% to 15% available chlorine, because of the large quantities of chemical needed.

Frequently the water injector for delivering a gas-water mixture into the pipe may be supplied from a tap on the pressure side of the gate valve controlling the flow into the pipe section to be disinfected. The use of a dry feed chlorinator for applying chlorine gas to the main is sometimes possible although this set-up cannot be employed where there is considerable pressure in the main to be overcome. Also, a diffuser is desirable at the point of application of the gas into the water. A chlorine cylinder may sometimes in emergency be directly connected to mains but this is not generally recommended.

Knowing the size and length of the main, the necessary quantity of chlorine for disinfection can be computed (See Table I). The setting of the chlorinator dosage will have to be estimated on the basis of the total amount needed and the probable time of filling the section of pipe. (For example, a total of one pound with a time of filling of one-half hour would be at the rate of two pounds per hour or 48 lbs. per 24 hours.) An excess of chlorine will do no harm and it is best to err on the safe side. The chlorinator is started up and the valve is opened slowly to admit water into the section of the pipe. A hydrant at the other end of the closed section is opened. When the chlorinated water appears through this open hydrant, an ortho-tolidine test should disclose a red or brown color. The inlet valve to the section should then be closed after which the hydrant should be closed. The chlorine treated water should be retained in the closed section of pipe for at least three hours to provide adequate contact of the disinfectant before opening up the system.

Ortho-tolidine Testing. Each water utility should have on hand a good supply of ortho-tolidine solution for residual chlorine testing. For quick field work, about one milliliter (one cubic centimeter) or about 15 drops may be added to a half glassful of water. A red color at the point of testing indicates a substantial disinfecting dosage inasmuch as the color from chlorine and ortho-tolidine will turn from yellow to red usually when the chlorine content rises to about 10 p.p.m. When the chlorine residual is in the vicinity of 10 to 20 p.p.m., any precipitate formed deposits rather slowly; when the chlorine residual gets in the vicinity of 50 p.p.m., the reddish color tends to change to yellow because of the formation of a red precipitate. For accurate testing, the chlorinated water can be diluted with chlorine-free water and ortho-tolidine tests made on the diluted mixture with allowances for dilution. If the person doing the testing has been handling hypochlorite powder, he must be very careful not to allow any of the chemical powder to enter the sample and affect the test.

Chlorination of Valves and Hydrants. In the process of chlorinating water pipe, all hydrants, valves or other appurtenances in the closed section should be operated while the pipe line is filled with the chlorinating agent so as to disinfect them.

Application of Dry Calcium Hypochlorite Powder or Chlorinated Lime. Sometimes disinfection may be accomplished by adding the required weight of high test calcium hypochlorite powder or chlorinated lime to the lengths of pipe as they are replaced in the line. If this is done, it is not practicable to flush out the line in advance of disinfection. Water must be admitted very slowly to one end of the section so as not to flush the powder to the far end of the pipe. The same general procedure for ortho-tolidine testing and provision of contact is followed as is mentioned above. Recently the use of a tablet filled with chlorine compound has been developed which can be stuck to the inside of the top of a pipe with some material such as jointing compound; this will dissolve more slowly and will not tend to be washed down the pipe. Where the repaired section has not been flushed prior to disinfection, it is recommended that after the disinfection contact period has elapsed and the water pressure is admitted to the section through the opening of the closed inlet valve, the hydrants in the section be flushed to remove any sediment before opening the second valve and restoring the section to full connection with the rest of the system. If there are no hydrants in the section, other hydrants further along the line will, of course, have to be used for the purpose.

Flushing of Services. After the period of contact disinfection of the main has elapsed, it should be ascertained that services coming off the repaired section are thoroughly flushed by the consumers. In many cases, heavily chlorinated water in the pipe section may be drawn off through the services from the main to disinfect the service pipes before this water is flushed out of the section.

Application of Slurry, Paste or Chlorine Solution. A solution of water and chlorine may be prepared such as by mixing 5 lbs. of chlorine powder in about 12 gallons of water. This proportion may be varied as one wishes, to suit local conditions so long as the total correct amount of chlorine is applied to the main being disinfected. Sometimes prepared solutions of chlorine and water running about 10% or 12% available chlorine by weight may be used. Chlorine powder is usually first made into a paste and then thinned to a slurry. After the required amount has been computed, when it is not convenient to pump the chemical into the main, it is sometimes

TABLE I

Table of Approximate Amounts of Chlorine or Chlorine Compounds
Required per 100 Feet of Main to Provide Dosage of 50 P. P. M.

Size of Pipe	Chlorine Lbs.	Compounds of Large Chlorine Content (60% to 75% Available Chlorine)		Chloride of Lime (20% to 25% Available Chlorine)	
		Lbs.	Oz.	Lbs.	Oz.
4"	0.1		1		2
6"	0.1		2		4
8"	0.15		3		7
10"	0.2		4		11
12"	0.25		6	1	
16"	0.5		11	1	12
18"	0.6		14	2	3
20"	0.7	1	1	2	12
24"	1.0	1	8	3	15

TABLE II

Table of Dosages of Disinfectant for Varying Volumes of Water

Approximate Chlorine Dosages

Gallons of Water	Chlorine 50 p.p.m.	HTH or Perchloron 70% Available Chlorine 50 p.p.m.		Chloride of Lime 25% Available Chlorine 50 p.p.m.	
100	0.1 lb.		1 oz.		3 oz.
500	0.3 lb.		5 oz.		14 oz.
1,000	0.5 lb.		10 oz.	1 lb.	11 oz.
2,000	0.9 lb.	1 lb.	3 oz.	3 lbs.	6 oz.
3,000	1.3 lbs.	1 lb.	13 oz.	5 lbs.	
4,000	1.7 lbs.	2 lbs.	7 oz.	6 lbs.	11 oz.
5,000	2.1 lbs.	3 lbs.		8 lbs.	6 oz.
10,000	4.2 lbs.	6 lbs.		16 lbs.	12 oz.
25,000	10.5 lbs.	15 lbs.		42 lbs.	
50,000	21.0 lbs.	30 lbs.		84 lbs.	
100,000	42.0 lbs.	60 lbs.		167 lbs.	

Equivalents

Dry measure (HTH, Perchloron, or Chloride of Lime):

16 ounces = 1 pound

5 ounces = 1 level cup

1 level tablespoon = $\frac{1}{2}$ ounce

1 level teaspoon = $\frac{1}{10}$ ounce

Solutions:

1 gallon = 3785 milliliters (cubic centimeters)

admitted through hydrants before water is turned into the main. Where this is done, the water should be tested with ortho-tolidine at various points along the closed section after disinfection so as to make sure there is adequate mixing. The necessary contact period must, of course, be allowed for. The same remarks as to flushing apply as are stated in the previous paragraph.

Storage of Chlorine Powders and Solutions. Chlorine powders should be kept in air-tight containers, stored in a cool dry place and inspected regularly for detecting rust holes. If the contents are not used completely when first opened, the container should be closed air-tight to stop ingress of moisture which causes loss of strength and caking.

Hypochlorite solutions lose their strength after a time. They should be kept in a dark cool place to prevent excessive deterioration. It is usually inadvisable to keep large quantities in stock.

Disinfection of Water Distribution Systems

When a number of breaks occur on a distribution system as happened during the 1955 floods, it becomes necessary to step up the chlorine dosage at the point of supply and carry residuals throughout the entire distribution system. In the 1955 floods, free chlorine residuals as high as 6 to 10 p.p.m. were maintained below the regular point of chlorination on the supply mains. It was necessary in some cases to install orifices of larger capacity in existing chlorinators or other changes were made to permit adding greater quantities of chlorine. Supplementing the usual chlorinator operation on water supply mains, high test chlorine powder was used in large quantities. In some communities, large quantities of this powder were dumped into the gate houses of the reservoirs to supplement the chlorine being added in the regular treatment plants. By maintaining these high chlorine residuals below the reservoirs, free chlorine residuals of between 1 and 2 p.p.m. were carried throughout distribution systems. There are also chlorine residual testing discs with a range of from 2.0 to 10.0 p.p.m. to be used with testing outfits or the drop dilution method may be used in making tests in this range.

Disinfection of Tanks, Standpipes and Reservoirs

Such structures should be cleaned thoroughly and one of the three following methods may be used for disinfection:

First Procedure. Prepare a disinfecting solution of 200 p.p.m. available chlorine by adding 1 ounce of chloride of lime to 10 gallons of water, or 1 ounce of HTH or Perchloron to 26 gallons of water, or 1 gill or 1/8 quart of liquid bleach (sodium hypochlorite) of 5% strength to 8 gallons of water. The powders should be made into a paste with a small volume of water and the paste mixed with stated volumes of water. Spray the resulting solution over the inner surface of the empty structure or apply through the use of a wide brush. Do not fill the structure with water until at least 30 minutes have elapsed, and after filling, allow the water to stand for at least 30 minutes and preferably for 6 hours before being replaced by potable water.

Second Procedure. Add to the water used to fill the repaired or new structure sufficient chlorine to provide a dose of 50 p.p.m. (See Table II). Mix the powder into a paste and mix batches of the paste with the water as the structure is filled. Allow the heavily disinfected water to act for at least 30 minutes and preferably for 6 hours before being replaced with potable water.

Third Procedure. Use a portable chlorinator to apply a dose of approximately 50 p.p.m. chlorine to the water flowing through the influent pipe of the structure. If the rate of flow of water is unknown, base the dose upon the rate of rise of water in the structure to give approximately 50 p.p.m. This should provide a concentration of residual chlorine sufficient to give a deep red or brown color with the ortho-tolidine reagent. Allow the heavily disinfected water to act for at least 30 minutes and preferably for 6 hours before being replaced by potable water.

Sampling and Release from Boiling

Public Water Supplies

Arrangements should be made with the Bureau of Sanitary Engineering of the State Department of Health to lay out a sampling program to determine the safety of the public water supply before releasing the supply from boiling notices. Daily sampling at several points on the distribution system should be initiated promptly as soon as disinfection has been carried out so as to speed up the time of release. Samples may be examined in the laboratories of the state department of health or in an approved private laboratory, but sampling arrangements and release notices should be cleared with the state department of health because of their responsibility for safety of public water supplies under the state law.

Private Water Supplies

Under normal conditions, persons requesting analyses of private wells and springs are advised by local directors of health to use the services of private laboratories. The state law delegates to local directors of health the decisions in this matter subject to the approval of the state department of health who must work within limits of laboratory facilities.

Under emergency conditions, local directors of health have frequently requested bottles for collection of samples for bacteriological analysis at least, of suspected wells or springs which have been subjected to flooding, and the state department of health has made every effort to comply with all such requests.

PUBLIC SEWERAGE SYSTEMS

In Connecticut there are no public sewerage systems discharging into public water supplies. In the case of any failures of sewage treatment plants near bathing or shellfish areas, special notification should be given bathers and special restriction should be placed on the harvesting of shellfish. In other cases, the operation of the sewage treatment plant may be of secondary importance from a health standpoint although effort should be made to place plants back in service as soon as possible.

Sewage pumping stations exist on a considerable number of sewer collecting systems in the state. Many of these systems are supplied only with electric power. In case of power failures, sewage overflows may take place. Effort should be made to provide auxiliary power or place disabled units in service as rapidly as possible. If sewage overflows take place near any bathing beach or create any other hazard, the public should be immediately notified and temporary disinfection should be carried out to care for effects of pollution.

If due to stoppage or breakage of public sewers, flooding of homes, food stores, etc., takes place, the precautions for disinfection as outlined under the following headings should be adopted. Temporary pumping facilities may be set up to bridge local breaks.

EMERGENCY PROVISIONS FOR SEWAGE DISPOSAL

In case of failure of water carriage system of sewage disposal, it becomes necessary to dispose of feces and urine directly in the earth, either in pit or trench latrines or by burial after pail collection.

Latrine space should be sufficient to accommodate at one time about 8% of the number of persons served. Privacy may be provided by latrine screens of canvas, plywood or other materials.

Pit Latrines

Pit latrines are adaptations of the earth vault privy. Normally this type latrine consists of a pit 2 feet wide and 4 to 8 feet deep, a seat box and latrine enclosure or screen. The seat boxes should be fly-tight with self-closing seat covers. The length of the pit is determined by the length of the latrine box.

If necessary latrine seats may be improvised by the use of poles supported by cross pieces. These do not protect the pit contents from flies, and dirt excavated from the pit should be used for immediate covering. Deep pits are a safety hazard with this type of seat.

Ground water should be avoided when locating pit latrines.

Trench Latrines

Trench latrines are dug about one foot wide and 2 feet to 4 feet deep. Two feet of trench is considered as space for one individual. The earth removed is piled at the ends of the trenches and a shovel should be provided to permit the use of this dirt for immediate covering of the wastes by each individual. Seats are not usually provided with this type latrine. Trenches can be of any length, but lengths of 2 to 8 feet are usually preferred.

Latrine Pit Closure

When no longer needed, or filled (a deep latrine is considered full when 2 feet below the ground surface and a shallow trench type when one

foot below the surface), latrines should be filled and mounded up with earth, and posted as latrine pit, and the closure date indicated.

MILK PASTEURIZATION PLANTS

Such plants may be affected by lack of power or other difficulties. If the trouble is localized in one plant or one community, arrangements may be made to pasteurize the milk at other plants. In extreme cases, it may be best to discontinue the milk supply and resort to the use of canned milk on a temporary basis. Unpasteurized milk may be safeguarded by boiling to destroy harmful bacteria. Milk may also be safeguarded by pasteurization - heating for 30 minutes at a temperature of 142°F. to 145°F. In the home, boiling is probably the easier procedure.

ICE MANUFACTURING PLANTS

These plants might be subject to contamination by flooding or damage to the source of supply. The use of the plant should be discontinued until adequate measures are taken to safeguard against contamination.

DAMAGE TO FOOD STORES, RESTAURANTS OR SHELLFISH PACKING PLANTS, AND FOOD REFRIGERATION PROBLEMS

Food Stores and Restaurants. In case of floods and other disasters the State Food and Drug Commission assumes responsibility for restoration of operation of food stores, food processing plants, and (jointly with the State Liquor Control Commission) liquor establishments. The sanitation of restaurants comes under the jurisdiction of local directors of health.

In connection with disposition of and treatment of flooded foodstuffs, the following type of bulletin may well be furnished to health and food officials:

"Because of the emergency, general instructions are being issued concerning the procedure which is to be followed in regulating the disposition of foods and drugs which have been submerged in flood water. The emergency character of this operation, and the extreme importance of preventing the consumption of foods and drugs which have come in contact with flood waters, make it necessary to follow procedures which will cause the prompt destruction of all supplies of foods and drugs which may be dangerous to health, or filthy, and bring about the salvaging of other foods and drugs exposed to flood waters in such a way as to obviate injury to the consuming public.

"Protection of the public health demands that fresh fruits and vegetables, foods and medicines in cardboard containers and any other containers which are not hermetically sealed and which have been under flood water, and flour and other commodities in bags shall be destroyed. The same procedure should be followed in the case of screw-top or crown-top glass containers and corked bottles, since experience shows

that under ordinary circumstances these products are potentially dangerous. Products in hermetically sealed glass or tin containers may be salvaged by removing the labels and washing containers in warm soapy water. Follow the cleansing treatment by immersion in a chlorine solution or other sterilizing solution approved by the health authorities. Phenol, cresol or other coal-tar disinfectants are unsuitable, since the odor imparted by such solutions is objectionable and persistent. A chlorine solution providing one pound (about 2 cups) of chlorinated lime per 10 gallons of water is a suitable disinfecting solution. The labels on containers for chlorine compounds include directions which, if followed, will permit making a liquid strength of 100 parts per million available chlorine but as such disinfecting solutions will deteriorate in strength rapidly, stronger solutions are desirable. Cans should be rinsed in fresh water and dried thoroughly before being re-packed in dry cases. If an alkaline chlorine solution is used, rinsing is unnecessary but the cans must be dried promptly to prevent rusting.

"The return for credit of all flooded foods and drugs following treatment with chloride of lime must be approved and invoiced with the medical headquarters before shipping. It may be desirable to set aside before final destruction, containers for liquor, tobacco and other taxable products until settlement of tax refunds can be made."

Careful supervision should be maintained over all places where foods are prepared and served, giving attention to refrigeration, storage, handling and cooking but especially to the washing and disinfection of eating utensils. Where there is a question as to proper disinfection facilities, sanitary single service paper utensils should be used.

Where large areas are affected by disaster, state responsibility in this field may be centered in the Food and Drug Commission by executive proclamation. Following is the suggested wording of such a proclamation based on procedures followed in the 1955 disaster:

After a conference between representatives of the Federal Food and Drug Administration, the Connecticut State Department of Health, the Connecticut Food and Drug Commission, the Federal Civil Defense Administration and the State Civil Defense Office, it has been determined that there is imminent danger to the people of Connecticut from the use of unsafe foods, drugs and cosmetics affected by flood waters.

Because of this danger, I hereby Declare a Food and Drug Embargo in effect in the State of Connecticut for all manufacturing plants, warehouses, processing establishments, retail stores and public eating places or other establishments handling food or drugs, located in areas which have flooded and whose premises have been affected by flood water or power failure.

It is further Declared that no food or drugs can be removed for any purpose from the embargoed premises until inspected and released in writing by an agent of the State Food and Drug Commission authorized by the local director of health.

The Food Problem in Lack of Refrigeration. In case of failure of refrigerator power or lack of ice, certain precautions should be taken in the care of food, (a) Bottles of milk may be left partly submerged in running water. Butter may be kept in the same way in a tightly covered pail or can. (b) If this is difficult to accomplish, dried milk powder may be safely substituted for drinking or cooking. If evaporated milk is substituted, plans should be made to use the entire contents of the can, as the problem of keeping left-over canned milk is the same as for fresh milk. (c) As near the amount of food for one meal as possible should be prepared to avoid left-over food that might spoil. (d) Special precaution should be taken with cream fillings or other foods as these spoil readily when not iced and may lead to serious food poisoning. (e) In the absence of refrigeration, it is well to use instead of fresh meats, such food as cheese, canned fish or canned meats. (f) Canned fruits or vegetables may replace the fresh foods which would be difficult to keep in fresh condition without ice. Dried fruits or dried vegetables may also be used. (g) The use of vegetables to be eaten raw should be avoided at a time when a safe water supply for thoroughly washing them is not available. Arrangements may be made to keep food stores open on Sundays or during extra hours where household supplies of food are exhausted.

Of course, every effort should be made to set in motion machinery for providing refrigeration both in homes and in food stores and other food establishments. The emergency use and distribution of ice and dry ice for refrigeration is discussed under a separate title.

Shellfish Packing Plants. Inasmuch as Connecticut shellfish plants ship shellfish outside of the state in interstate traffic, it will be necessary for the State Department of Health to check these plants as soon as possible and notify the United States Public Health Service at the District Office in New York City as soon as it has been determined that plants and handling methods are safe. If there is any question, notification must be given the United States Public Health Service that the certificates are temporarily discontinued, and the local directors of health in the communities where plants are situated should be notified. Local directors of health should notify the State Department of Health if they find shellfish shipping plants have been adversely affected by tidal waves, floods or other disasters.

EMERGENCY USE OF ICE AND DRY ICE FOR REFRIGERATION

Dry ice is manufactured in cakes weighing approximately 50 lbs. There are no manufacturing plants in Connecticut. The addresses of known distributors in the state appears in Appendix B. The cakes as produced are lightly wrapped in paper. Advantages in using dry ice as against regular ice are that smaller quantities are reported to furnish equivalent refrigeration and there is no liquid residue.

In Massachusetts during the 1954 emergency, distributing stations were set up locally by local health departments or local defense councils. Main wholesale distribution was in the Boston area. The towns sent trucks and requisitions to the Boston area. At first, cakes were cut up by power saw into 5 lb. chunks for household use. The chunks were wrapped loosely in paper such as newspaper and placed in the refrigerators by the householders

with the paper wrapping left on. A 5 lb. chunk in newspaper might last about 24 hours. In the household deep freeze units, they first used 5 to 10 lb. chunks but as the emergency lessened, the householders were given 25 lbs.

A local ice cream or dairy plant makes a good place for local distribution. Sometimes fire stations were used. Preferably there should be emergency power at the distribution point so as to operate a power saw. Sawing by hand is difficult. It is reported that hitting a large meat cleaver with something like a short piece of pipe can be used in an emergency to split the cakes. For large walk-in boxes in stores, 200 lbs. or more were furnished. The large food chain stores asked for 20,000 to 30,000 lbs. at once so as to truck the ice to their stores.

For shipping dry ice, a railroad car will hold approximately eleven hundred 50 lb. cakes; a trailer truck will hold four hundred and fifteen 50 lb. cakes. Military planes were used in Massachusetts recently. Rumors have spread that refrigerator doors need to be kept open to relieve pressure arising from evaporation of dry ice; this is not so as there is sufficient escape of the gas through refrigerator door gaskets. Where men are working in a walk-in box containing dry ice, it is recommended that the door be open while the men are working. Persons handling dry ice should be advised to use protective gloves such as leather or canvas gloves.

Places where dry ice might be used are in homes, food plants, food stores, laboratories, hospitals, and industries. A few industrial operations might be dependent on use of dry ice and effects of interruption of supply may need to be considered.

Emergency loss of power for refrigeration may also be offset by the use of natural or manufactured ice as well as dry ice. There are a number of ice manufacturing plants in the state and it may be possible to set up ice distribution stations which would be a great service to householders and others. Of course, the use of regular ice in electrically operated refrigerators will necessitate provision for water drainage.

DAMAGE TO GROWING CROPS

Following is a letter which was forwarded to local health officials at the time of one Connecticut flood:

"In the case of flooded areas where waters from polluted streams have flowed over growing vegetables such as celery, lettuce or other crops that may be eaten without cooking, local health officers should advise vegetable growers that such vegetables cannot be sold to the public for consumption. There should also be a check made to ascertain that these directions are carried out, as a measure of public health protection."

In the case of flooded tobacco, the department decided that due to the drying, there was no public health danger. Below is a quotation from a

letter written by this department on this subject, this letter being written after a conference with local directors of health:

"Drying will kill off any harmful types of bacteria that might be present in the tobacco within a comparatively few days. Moreover, the types of bacteria which might be present after the tobacco is flooded do not find such conditions a favorable environment for existence and consequently die off very rapidly. No flooded tobacco can be processed until it is dried, and the minimum time in which it can be used would be several weeks.

"This department feels that no public health hazard exists in the use of tobacco because of the destruction of harmful types of bacteria through drying and a lapse of a few days or a week at the most, according to best authorities. As in the case of handling other wet materials, we have recommended that workers be inoculated against typhoid fever before they start handling the wet tobacco or other flooded material.

"While there may be aesthetic objections to the use of any material on which are deposited dead bacteria, there is no public health ground for objection. Of course, pasteurization of milk destroys bacteria which are present in the milk. Drying and sunshine destroy bacteria which may be deposited on apples, pears and other foods, and disinfection of water is depended upon to destroy bacteria that are present in the untreated water. The only public health consideration in the use of all of these articles is to insure that conditions are such that no harmful types of bacteria will survive to cause disease."

FLOODING OF HOMES AND HOME FURNISHINGS

Appendix F, already mentioned, describes methods of cleaning and disinfection of flooded cellars. Appendix G describes disinfection of flooded furniture, curtains and rugs. It is recommended that badly soaked mattresses and upholstered material which cannot be cleaned and dried be discarded. Appendix G also contains directions for treating and disinfecting flooded clothing. It should be remembered that chlorine compounds cause bleaching and cannot be used in all cases for disinfection. It should be emphasized that washing, and thorough scrubbing, or brushing, together with drying furnish the greatest protection in renovating surface contaminated materials. Soap or dry cleaning agents should be used in connection with washing and cleaning, as permitted by the character of the surface to be cleansed. Recommendations for sanitizing flooded home appliances are contained in Appendix G.

In some cases it is necessary for the local director of health to order premises vacated until such time as cleaning and disinfection of buildings can be carried out and it is ascertained that buildings are safe for occupancy. The state department of health has a supply of printed cards which can be used for posting. One of these is shown in Appendix H.

FLOODING OF CLOTHING STORES AND FURNITURE STORES

Considerable trouble is experienced after floods with the handling and disposition of flooded clothing, furniture and similar items that have been in display in stores. At the outset it is highly desirable for the local health department to make an inventory of flooded material in stores and issue orders not to remove or resell materials until approval of the local health department has been secured. State laws place the sale of bedding and upholstered furniture under the State Labor and Factory Commissioner. In some cases, because of the conditions the local director of health may find it necessary to order the destruction of certain badly flooded materials. In other cases, it may be possible by thorough washing and drying and disinfection where necessary or by dry cleaning, to salvage some materials.

Where workers are to be handling flooded materials they should be instructed as to the need for thorough washing of hands and necessary sanitary precautions. In many cases, these workers receive the additional protection of inoculation against disease.

TRANSPORTATION OF MATERIAL FROM ONE TOWN TO ANOTHER

In some instances it develops that local health directors are willing to give permission for the transportation of flooded materials to another city or town for purposes of cleaning and renovation. If such permission is granted, the local director of health should make provision for notifying the director of health in the community that will receive the materials so that he may take whatever steps are considered necessary to safeguard the public health.

PUBLIC SWIMMING POOLS AND BATHING PLACES

In case of disaster, power interruption may interfere with operation of swimming pool recirculation and purification systems, such as in Y.M.C.A., Y.W.C.A. or similar buildings or in public parks. Also, bathing pools or ponds themselves may be damaged or subjected to overflow from broken sewers. In such instances, it may be necessary for the director of health to prohibit the use of the pools temporarily.

HOUSING AND FEEDING FOLLOWING WIDE- SPREAD DESTRUCTION OF PROPERTY

Extensive fires or other disasters which bring about widespread destruction of property leave in their wake problems of housing and feeding which are largely the concern of relief agencies. However, health authorities should in such cases render whatever assistance is practicable and should ascertain that all necessary health safeguards are adopted. Sanitation of refugee centers is discussed below.

DAMAGE TO VITAL RECORDS

Exposure to moisture or extreme heat will cause rapid deterioration or complete destruction of irreplaceable original vital records. Since methods which may be employed to prevent complete destruction of records vary

considerably with the kind and extent of damage, immediate salvage steps should be limited to removing the records from the damaging element. The state department of health should be notified of the kind and extent of such damage as quickly as possible so as to enable the staff to advise and assist in the salvage of records.

IDENTIFICATION AND DISPOSAL OF DEAD HUMAN BODIES

The normal procedure followed out with regard to disposition of dead human bodies as required by law is that a funeral director file a death certificate with the registrar of vital statistics who will, in turn, issue a removal, transit or burial permit. The death certificate of a disaster victim must be signed by a medical examiner. Bodies must be buried at least 5 feet below the ground surface with the top of the containers not less than $2\frac{1}{2}$ feet below the ground surface, within a reasonable period of time. These procedures, even in emergencies, should be followed so far as practicable. The law requires that all burials be done by licensed funeral directors or embalmers. Section 473 of the General Statutes requires that an unidentified dead body should be photographed and fingerprinted provided mortification has not proceeded so far as to make identification impossible or the nature of the cause of death was not such as to make identification impossible.

Bodies Disinterred by Disaster

The 1955 flood experience demonstrated the fact that a disaster can open graves and distribute disinterred bodies over a considerable area. In cases where this problem arises, it is suggested that the local director of health consult with the other town authorities, including the local medical examiner, and endeavor to work out a program for inspection of bodies and handling of unopened caskets and vaults before they are reinterred. Information recorded or recovery of dead bodies should include as many of the following items as possible: date and place of recovery; sex, age, race of deceased; description of body; description of identifying clothing and jewelry; estimated duration of previous interment; and photograph of the body. In the case of unopened caskets and vaults, records should be made of date and place of recovery; information as to identifying plaque or description of casket or vault.

DISPOSAL OF CARCASSES OF ANIMALS

Disposal of dead animals may present a serious problem. Burning is almost out of the question. Where the carcass cannot be removed to rendering plants, burying presents in general the most practicable method. Winter conditions may make it difficult to bury dead animals but fortunately it is less urgent to carry out such burial in cold weather than in the warm months. Covering with chloride of lime and holding until practicable to bury may be necessary. Burial of dead animals should not be within 100 feet of wells or springs or streams tributary to public water supplies without approval of the health authorities.

DISPOSAL OF DEBRIS, REFUSE AND WASTE

Putrescible organic matter should be covered over promptly. In some cases this material may be disposed of with rubbish by burning. If burning

is practiced, care should be taken to avoid spreading of fires and effort should be made to prevent the spread of objectionable odors. Watchmen may be needed at refuse dumps to prevent salvaging of condemned materials.

Flooding and spoilage of foodstuffs along with widespread destruction of buildings may create serious and extensive problems of disposal, as in the 1955 flood disasters in Connecticut. Refuse incinerators may be put out of operation by floods. Every effort should be made in normal times, but especially under such emergency conditions, to use sanitary fill methods of refuse disposal rather than ordinary dumping. Sanitary fill involves the careful placement and spreading of refuse, often in excavated trenches, the compacting of the refuse with mechanical equipment and the prompt cover of the compacted refuse with 18 inches to 2 feet of earth.

Where necessary, insecticides and rodenticides should be used for fly and rodent control, as discussed elsewhere. As required by state law, doors should be removed from abandoned refrigerators.

INSECTICIDES

Method of Mixing Insecticide

To mix five (5) gallons of spray material proceed as follows:

1. Place * quarts of concentrate insecticide into compressed air sprayer.
2. Fill sprayer three-fourths full of water, leaving space for the air to be pumped into the tank.
3. Shake sprayer to insure proper mix.

*Lindane one (1) quart. (20% emulsifiable) or
Benzene Hexachloride two (2) quarts. (11% emulsifiable) or
DDT four (4) quarts. (25% emulsifiable)

Amounts of Insecticides to Use to Control Flies and Mosquitoes

In times of emergency, DDT concentrate is usually the readiest available chemical for spraying. This can be diluted down as outlined above. For small areas, 3 to 5 gallon compressed air sprayers that can be carried on the back work satisfactorily. DDT can also be applied with power equipment over large areas.

It is suggested that as a residual treatment to protect outdoor areas, 5 to 10 gallons of DDT solution of the above strength be used per acre. To control mosquito larvae, 1 to 2 gallons of the above strength should be used per acre of water surface.

If Lindane or Benzene Hexachloride solutions of the above strengths are used, they should be applied at the same rate of application per acre as the DDT solution in the strength mentioned.

Precautions to be Taken by Workers Applying Insecticides with Hand Sprayers

1. Avoid direct contact between skin and spray materials for prolonged periods.
2. Avoid excessive inhalation of spray materials.
3. Avoid spraying into the wind (to prevent spray material from blowing back at worker).
4. Hands and face should be washed thoroughly with soap and water to remove spray material after exposure especially before eating.
5. Avoid contamination of eating and drinking utensils, food and drinking water.

RODENTICIDES

It was found in the 1955 flood that tremendous quantities of spoiled food were disposed of by dumping. Every effort was made to induce local communities to compact such materials and cover them promptly with an earth cover of 10 or 12 inches. However, in order to control rodents, steps were taken to employ a widely used rodenticide, Warfarin, which was placed around areas where there might be rat harborages or rat feeding. This chemical is not poisonous to human beings or to animals. Following is an outline of the method of preparing the rat poison mix:

Rodent Control

For the average community:	100 lbs. to 200 lbs. mix
Ratio:	20 to 1 (Cornmeal to Warfarin)
For the average community:	5 lbs. to 10 lbs. Warfarin

Mix with yellow cornmeal. Set on pie plates.

Procedure:

1. Use a 2 to 3 gallon bucket and long handled spoon for carrying and placing bait.
2. Place about one fistfull amount on each paper plate.
3. Re-check each plate after 2 or 4 days and replenish bait supply if rats have eaten all of it.
4. If paper plates cannot be used in some locations, use long handled spoons and place Warfarin bait in rat harborages so that water and dust does not get mixed up with the bait anymore than possible.

RADIOLOGICAL HAZARDS

Radiological hazards of concern to health authorities may occur under wartime fission or thermonuclear bombing or under peacetime conditions due to accidents in connection with medical and industrial sources of high energy radiation. In either instance, a large land area or large numbers of the population might be involved so as to constitute a health hazard.

Wartime Radiation. As new weapons are developed, the radii of the areas of total destruction and partial destruction from the center of an explosion may increase. Certainly distances of 6 to 10 miles will be involved. With the detonation of fission or thermonuclear devices near the ground or bodies of water, great masses of pulverized debris and water are sucked upward. Radioactive material released by the explosion and vaporized by its heat condenses on the tiny debris particles and is carried back to earth over a period of a few minutes to many hours, dependent on particle size and weather conditions. This is radioactive fallout.

Radioactive material in fallout consists of (1) fissioned material from the bomb, (2) particles made radioactive by neutron bombardment, and (3) unfissioned bomb materials.

Basic personnel protection measures are:

1. Cover, to avoid, insofar as possible, physical contact with the dust and vapor;
2. Protection against beta and low energy gamma radiation by suitable clothing, avoidance of contact with radioactive fallout materials, and washing as a decontamination procedure;
3. Protection against high energy gamma radiation by shielding;
4. Area monitoring to determine the extent and level of the radiation hazard.

The exact nature of the radiation materials will have to be determined by chemical and other analyses after explosion. The two common components of biological significance are iodine-131 with a half life period of 8 days and strontium-90 with a half life of about 20 years, which may be either inhaled or swallowed after an explosion. Radio iodine, the lesser hazard, concentrates in the thyroid gland, while radiostrontium, because of its chemical similarity to calcium, tends to collect in the bones.

Defense measures would be under the direction of the Military Department or the State Director of Civil Defense or both. State and local health officials should have positions assigned in civil defense organization to enable the necessary cooperation to be carried out.

Industrial and Medical Sources of High Energy Radiation. This type of hazard would presumably occur as a result of accident or natural catastrophe and would be the direct responsibility of state and local health officials. In this instance, it is possible to ascertain the nature of the radiological hazard specifically by questioning the industry or

hospital or other source involved. The half life of the radioisotopes involved and the other factors may be considerably different from those found in connection with wartime disasters.

Responsibilities of Health Authorities. Questions which will arise under any condition are: (1) permissible limits and measurements of radiation for the entrance of workers into affected areas, (2) care and hospitalization of afflicted persons, and (3) monitoring of water, food, drugs and premises.

Personnel Safety. Definitive and detailed standards for personnel safety from a bomb explosion will be available through civil defense channels. The following tabulation* is suggested as an emergency guide in determining how long workers entering an area contaminated from any type of catastrophe should be exposed:

<u>Intensity of radiation 1 hour after bomb burst</u>	<u>Persons in area 1 hour after the burst should be evacuated within the next</u>
over 25 r/hr	0 hours.
20-25 r/hr	2 hours
15-20 r/hr	3 hours
10-15 r/hr	6 hours
5-10 r/hr	30 hours
under 5 r/hr	indefinitely

Due to the shortage of radiological monitoring instruments and other technical tools, rough approximations may have to be made for local situations on an emergency basis. If slide rules and charts are not available, rough predictions † of the expected radiological hazards can be made, using the rule of thumb that dose rate will vary inversely with time. Time may be expressed in days, hours or minutes. As examples:

If the dose rate is measured 1 hour after burst as 60 r/hr (the roentgen is the unit of radiation measurement) it would reduce to $\frac{1}{2}$ (30r/hr) at 2 hours after burst; to $\frac{1}{3}$ (20 r/hr) at 3 hours; and to $\frac{1}{4}$ (15 r/hr) at 4 hours; etc.

If the dose rate is measured at 16 hours its value at 17 hours would be $\frac{16}{17}$ (0.94) of the measured 16-hour value; at 18 hours, $\frac{16}{18}$ (0.89) etc.

If measured at 3 days, the dose rate would be $\frac{1}{3}$ that measured at one day; at 4 days, $\frac{3}{4}$ (0.75) the measured 3-day value; at 5 days, $\frac{3}{5}$ (0.60); etc.

The total dose received by an individual may be calculated by using the average intensities between the times in question and multiplying by the time of exposure.

In the first example above, the dose between one and three hours would be $\frac{60 + 20 \text{ r/hr} \times 2}{2}$ hours, or $40 \text{ r/hr} \times 2 \text{ hours} = 80 \text{ roentgens}$.

*Reference: "The Radiological Defense Plan for the State of Connecticut, page B-5.

†Reference: Civil Defense Technical Bulletin, TB-11-19, September, 1955.

The total dose an individual will receive if he stays in a given area indefinitely will be five times the product of the time (in hours since the catastrophe) and the exposure rate (in roentgens per hour measured at the time the individual enters the disaster area): $D = 5 RT$. For practical emergency planning, no person should be allowed to exceed an exposure of 25 roentgens as calculated by this formula.

Care and Hospitalization of Afflicted Persons. Civil defense authorities will be responsible for outlining these procedures in a wartime emergency. For peacetime accidents involving radiological hazards, the following pattern is suggested:

1. If no medical contra-indication exists (shock, fracture, etc.) decontamination at or near the site of the accident by thorough washing of the person and outfitting with new clean clothing;
2. Admission to a general hospital which is accustomed to handling radioactive isotopes. If local decontamination procedure has not been carried out due to a medical contra-indication, inform the hospital of this in advance of taking the patient onto the premises;
3. Monitoring and clinical workup of the patient by the radio isotope therapy team of the hospital;
4. Medical care as indicated.

Water. The state department of health laboratories are equipped to make radiological determinations as to safety of drinking water, and several laboratories around the state are also equipped to cooperate in this work. In the case of question of fallout effects on public surface water supplies, it is probable that there will be little effect on ground water supplies from wells and these could be used in emergency. It is important when considering the use of wells to bear in mind the need for auxiliary power should electricity fail. If radiological damage to water supplies is in question, the state department of health should be called upon for advice and assistance. Local water utilities may also be able to assist, and tests may be arranged for through local defense showing permissible radiation limits for drinking water under emergency conditions, as formulated by the United States Atomic Energy Commission for the Office of Civil Defense. These emergency radiation limits may be measured with portable Geiger meters.

Permissible Radiation Limits*

Suggested Emergency Levels for Drinking Water
in Period Immediately Following Explosion

<u>Water Consumption Period</u>	<u>Acceptable Beta-Gamma Activity Disintegrations per Second per cc.</u>	<u>Acceptable Alpha Activity Disintegrations per Second per cc.</u>
10 days	3,000	180
1 month	1,000	60

*Unless the water to be tested is sent to the state department of health, these limits should be submitted to the testing station in order that they will have this information for interpreting the safety of the water.

Food. The same emergency limits are suggested for food as set forth in the above table under "Water". There is no reason to believe that any food, drugs or beverages in tightly sealed containers immediately beyond the disaster area should be radioactive. Care should be taken to wash thoroughly the outside of such containers before the contents are removed.

Premises. Industries should be responsible for the decontamination of areas contaminated as the result of an accident. The state department of health will assist in advising industries as to the best method of decontamination. After decontamination, and before regular workers re-enter such an area, it should be carefully monitored.

Drugs. The ingestion of radioactivity is undesirable and should be avoided. However, in cases of major disaster, the risk involved in the use of drugs is negligible.* No deterioration of narcotics, antibiotics, hypnotics, sedatives, anesthetics, or cortisone preparations is to be expected as the result of radiation. Insulin is reduced in potency approximately 10%, and Vitamin B¹² approximately 50%. Clear glass containers may show a marked darkening as a result of radiation. Drugs with a high sodium content should be allowed to stand several days before they are used. Little or no radiological health hazard is involved in the normal use of drugs from undamaged, tightly sealed containers provided the outside is thoroughly washed.

REFUGEE CENTERS

The director of health should assist the relief agencies in the selection of quarters. In so far as practicable, the refugees are to be housed in permanent buildings, such as churches, schools, armories and automobile camps. Depending upon the weather and terrain, there is a question as to whether tent camps are desirable. Existing conditions should determine this point.

The director of health should maintain supervision over such quarters to insure safe water and milk supplies, protection against flies and mosquitoes and establish proper methods of excreta disposal. The need for proper hand-washing facilities should be borne in mind. Minimum requirements for refugee camps should give due regard to the danger of overcrowding, the importance of alternating cots head to foot, arrangements for daily inspection of children for contagious diseases, the necessity of a centrally located dispensary for care of minor ailments and prompt reports of illnesses, and the importance of skilled public health nursing service in each refugee center. (See state sanitary code for camp regulations.)

There is a need for individual counseling on immediate problems, as well as help in planning for relocation, employment, etc. There is a need for help to keep children with their parents in order to minimize adverse emotional reactions during the time of the disaster, and for a period of time following the disaster.

There is a need for supervision, under qualified direction, of play activities of children, and provision of activities for adults who are at the center all day.

*Reference: Civil Defense Technical Report TR-11-1, March 1955.

While the relief agencies may have some of these duties as their responsibility, the health department personnel can assist in such activities as planning for refugee center and working with children and adults, both individually and groups.

SOME MENTAL HYGIENE CONSIDERATIONS

In disasters the public health worker is confronted with the fact that feelings of stress and tension are highly communicable and can become a force for disorganization; they also can be channeled so as to become a force for organized effort.

While reactions will vary with the type of disaster and the individuals involved, certain emotional reactions are fairly typical:

Panic - characterized by an overwhelming fear, lowering of critical faculties and resulting suggestibility. Panic can be undercut by early segregation of panicky individuals (if not possible in space, then by "screening", in assigning one or two reliable persons to them) and by channeling violent, explosive feelings in some community effort.

"Griping" - This may be directed towards local officials, outsiders, relief agencies, etc. Some of these hostile, angry feelings will have a reality basis as no organization is entirely adequate for a sudden disaster; some originate with the person himself and are part of an effort to deal with an overflow of strong feelings.

Feelings of guilt - Feelings of guilt, experienced in the past, will often be reactivated by a disaster experience in which one's best efforts are felt to be inadequate. Guilt feelings may lead to depression, anger, griping, faultfinding, or a constant re-living of experienced scenes. Feelings of this kind are most of the time covered up.

Depression, despondency and inability to mobilize oneself for action - This may very well come as a delayed reaction, once the acute stage is over and losses are realized.

Psychosomatic symptoms - Like headache, dizziness, gastro-intestinal upsets, etc., will often be observed as an expression of stress for which the person can find no other outlet. Psychosomatic symptoms often develop in response to a prolonged state of exhaustion.

Anxiety states - May show up in children or adults after the event and often in individuals who have stood up well. Children who have been separated from their parents are especially susceptible.

Implication for the Public Health Worker

Many people during and after a disaster will require psychological first aid and one of the people to give it is the public health worker. He is not the only one and will have the opportunity to refer some of the more pronounced cases to more skilled help, but he can contribute much to an emotional rehabilitation by understanding these reactions.

Recommendations to the Public Health Worker

Encourage expression - Most people have a desire to talk about their experiences and in a disaster often have difficulty in finding an interested sympathetic listener.

Listen with acceptance - No feeling of which the individual is capable - anger, resentment, dependency, despondency, etc., - is unworthy in itself. If understood and accepted, it can be an opportunity for the individual to drain feelings which are fatiguing and exhausting.

Do not upset an individual further by attempting at this time to defend attacked groups - Our sense of loyalty urges us to explain, interpret, or defend if a team organization is unjustly attacked. Our acceptance of the individual's strong feelings does not mean acceptance of his judgment but of his sentiments to which he is entitled.

Do not answer with counter-aggression - Angry, unreasonable and belligerent behavior is hard to take and our first impulse is frequently to respond to it in kind. If we see in it a stress symptom rather than a moral issue, it is easier to keep our own emotional responses out of the way.

Try to engage people, especially those in shelters, in purposeful activity - This will drain off some of the energy, employed negatively, and help the individual to relate to his immediate reality.

Keep up group morale by joint action, stressing the "ongoingness" of life and a "we" feeling as a group.

Take your own feelings and needs into account - Workers in disaster areas are exposed to the same stress situations as are other people. Frequently the time after the disaster is the time for frayed nerves, friction among team workers, irritability, and resentment about the limitations of the situation. The worker will do much toward the maintenance of intact working relationships if he recognizes his own needs for rest, avoids exhaustion, and draws his strength from the service of the unit, rather than from his own part in it.

ACUTE COMMUNICABLE DISEASE CONTROL

Under conditions which usually attend disasters the probability of the spread of communicable disease is greater because of abnormal living conditions, exposure, crowding in refugee centers and the possibility of contamination of water and milk. Cases currently in quarantine should be checked to see that in the confusion they have not broken quarantine thus exposing others. Extra precautions and unusual measures may, therefore, be necessary.

IMMUNIZATION

Immunizing sera and vaccines should be made freely available by local and state health departments. Workers who may handle materials contaminated by sewage should be immunized. It is a good practice to vaccinate against smallpox, particularly persons in refugee centers, when there is any strong suspicion of a single case.

Tetanus antitoxin and tetanus toxoid should be available for all wounds. Test for immunity as well as the use of other convalescent sera and protective measures should receive consideration.

A mass immunization program should be planned with recognition that in an emergency there will be a natural tendency of all personnel to move rapidly and begin the actual procedure at the earliest possible moment. The opening of a center requires careful planning and mobilization of resources for a safe, orderly program as well as a sound preventive mental health measure. A physician must be present at every clinic at all times.

Planning must include the following:

- a. Responsibility for medical supervision of immunization procedures and clinics.
- b. The methods to be used for informing the public of the need for immunization, the location of the center and the hours of the clinic.
- c. The method to be used in securing personnel.
- d. The selection of center: size, number of exits, availability of fuel for sterilization; if electricity, type of current AC, DC, etc. A flow chart taking into account the actual physical setup in which work must be done is helpful.
- e. The resources for securing supplies and equipment: hospital, local and state health departments, school, industrial, private, medical, dental and nursing offices, American Red Cross.

Typhoid Inoculations

Indications for Use of Typhoid-Paratyphoid Vaccine

1. All persons who have had significant bodily contact with flood waters, and will have continued contact.
2. All persons who are extensively handling materials contaminated by the flood.
3. All persons who are assisting in the cleaning up operations.
4. All persons who may be drinking water contaminated by flood waters.

Those persons who need not get vaccine are:

1. Those who have had minimal contact with the flood with no opportunity for contaminated materials to enter their intestinal tracts.
2. Those simply driving through the area.
3. Families of people employed in cleaning up operations but living outside the area. (However, it is advisable that the worker in the family,

on returning home, should undress and wash thoroughly; and that his clothes should be disinfected.)

The Antibody Response to Initial Series of Typhoid Injections

The initial series of vaccine injections traditionally consists of three injections given subcutaneously at intervals of one week. This interval is somewhat elastic and may be 5 to 10 days, but **THE COMPLETE SERIES MUST BE GIVEN TO AFFORD COMPLETE PROTECTION.**

The following is the schedule of doses for the initial three injection series of typhoid vaccine:

Children less than 2	- 1/10 cc
Children 2 to 5	- .15 - .2 cc
Children 5 to 12	- .25 cc
Anyone over 12 years of age	- .5 cc

The full antibody formation in these people is not expected to reach its total height until about 2 weeks after the third injection.

NOTE: The incubation period of typhoid fever is usually 7 to 10 days but may be prolonged as much as 38 days. As an alternative procedure, the series may be given intradermally in the dosage of 0.1 cc.

Antibody Response to Booster Injections of Typhoid Vaccine

A booster injection can produce a sufficiently high antibody level within 2 weeks when given to patients who have received their last typhoid vaccine as long ago as 20 years. Therefore, anyone who has had previous typhoid injections, for example those in the Armed Services, need receive only a booster.

The booster dose will be 0.5 cc subcutaneously or 1/10 cc of typhoid vaccine intradermally to those who have been previously immunized against typhoid fever and who fall into the groups for whom immunization is indicated.

Tetanus Immunization

1. All persons working in the contaminated area prophylactically should receive tetanus toxoid.
2. All persons who have been injured should receive a booster dose of tetanus toxoid if they have previously received the initial immunization either as an infant, child or member of the Armed Forces or a previous booster within 10 years.

Note: An adequate antibody response occurs within 10 days after injection.

3. Those who have not previously had tetanus toxoid and who have been injured, should receive tetanus antitoxin prophylactically.

Suggested Procedure For Emergency Mass Immunization

Following is a procedure that was worked out in connection with emergency mass immunization against typhoid which may be of value for reference.

I. Personnel

Personnel According To Size Clinic

Approximate Clinic Attendance	1 - 100	500	1000	5000
Physician	1	2	3	3*
Nurse	2	4	5	6
Assistant at injection table	0	2	3	4
" for skin preparation	0	2	3	4
" for central supply	0	1	2	3
Receptionist	1	1	1	2
Guide	0	1	1	2
Registrant	1	1	2	4
Sterilizing unit	1	2	2	3
Post clean-up unit	0	2	2	3

II. Equipment

A. Room Set Up

Equipment According To Size Clinic

Approximate Clinic Attendance	1 - 100	500	1000	5000
Tables - total	4	5**	7**	10**
Registration	1	1	2	3
Immunizing team	1	2	3	4
Central supply	1	1	1	1
Cleaning and sterilizing	1	1	1	2

Registration cards - certificate for immunization completed

Pencils, paper clips, elastic bands

Waste baskets

Chairs

2 cots - per center

2 blankets

Drinking water - paper cups

Aromatic spirits of ammonia

Refrigeration facilities for vaccine

Typewriter

Date stamp

*or 1 physician with 3 additional nurses to give injections under medical supervision.

**size of tables will determine actual number needed.

II. Equipment (cont'd.)

B. Equipment for Injection

Note: In estimating the amount of equipment needed, the type of injection, subcutaneous or intramuscular, the method of sterilization, the number of sterilizers and volunteers engaged in cleaning and sterilizing, as well as assisting the physician, must be considered.

Equipment According To Size Clinic

Approximate Clinic Attendance	1 - 100	500	1000	5000
Syringes*				
Size Dose				
5 cc .5 cc	5 - 10	12 - 18	24 - 26	120 - 180
2 cc 0.25 - 0.5 cc	15 - 24	30 - 45	45 - 65	60 - 90
1 cc 0.1 cc	5 - 8			
Needles*				
Gauge Length				
Intradermal 25-26 3/8-1/2	60 - 100	120 - 150	180 - 225	240 - 300
Subcutaneous 24-26 1/2-3/4				
Intramuscular 20-23 1 - 1 1/2				
For filling syringes 20-21 1 - 1 1/2	2	4	6	8
Cotton balls - 2 per injection	200	1,000	2,000	10,000
Containers for cotton balls	1	1 - 2	1 - 3	2 - 4
Alcohol for skin prep. and forceps	1 1/2 pints	6 pints	11 pints	3 gal.
Sterile jars	1	2	3	4
Forceps	2	4	6	8
Sterile towels or containers for needles	6	2 doz.	4 doz.	20 doz.
Adrenalin chlor. sol. 1:1000	2	4	6	8
2 cc. or larger syringe	2	4	6	8
Container for used syringes and needles	2	4	6	8

*Use multifit when possible

II. Equipment (cont'd.)

For cleaning and sterilizing

- Fuses
- Extension cord
- Sterile jar for forceps
- Large forceps
- Hot plate, sterno or other source of heat
- Pad, pencil, clock, minute minder
- Basins for sterilizing needles and syringes
 - 2 for washing needles and syringes
 - 2 for rinsing " " "
- 2 glass tip syringes (5 cc)
- Rubber bands
- Liquid detergent
- Bottle brush
- Whet stone
- Extra wires for cleaning
- Cotton, gauze or cloth for bottom of all basins
- Protective covering for tables and work areas
- Spoons, large
- Hand washing
 - Pitcher - bucket - water
 - Basin - paper towels - soap

III. Operation of Clinic

Receptionist controls the number of persons admitted and directs to registration desk.

Registration card is filled out and given to patient. Patient is informed this is his only record of immunization. (Card should contain the name, address, age, dates of injection, immunizing material received and lot number.)

For each clinic session a minimal record is made of: date, no. staff, hours worked, no. individuals immunized, amount immunizing material used, lot identification number.

Procedure A

- Patient is routed to injection area.
- Skin prepared by nurse, volunteer or M.D.
- Injection given by physician or nurse when physician is in immediate attendance.
- Used needle replaced by nurse using sterile forceps for sterile needle.
- Used syringes and needles placed in receptacle to be taken to work tables for processing as outlined in V.

Procedure B

- Using nursing assistance, depending on the size of the clinic, Volunteer A prepares skin area. (Note: The volunteer may be located at a separate unit to prepare arm and patient routed to injection area.)
- Nurse fills syringe, attaches sterile needle with sterile forceps making sure that bevel edge is on same side as syringe markings, and places on sterile area.
- Physician picks up syringe, gives injection, places syringe on designated unsterile area.
- Volunteer B removes used needle, hands syringe to nurse.
- Nurse applies sterile needle with forceps and places on sterile towel.
- Volunteer C circulates, carries used needles and empty syringes to processing area.

IV. Procedure for Cleaning and Care of Syringes and Needles

- Rinse needles and syringes in cold water and separate. Keep regular and lock type needles separated.
- Clean needles and syringes in separate containers filled with hot detergent solution.
- Cleanse barrels
- Inside barrels - using nylon test tube brush
 - barrel tip - using nail brush.
 - barrel tip canal - using large stylet
- Place barrels on clean surface - clean cloth or paper towels, plate, etc.
- Cleanse plungers using nail brush and place on dry area.
- Cleanse needles using forceps or hemostat
- Attach each needle to a 5 cc syringe and force cleansing solution through needle.
 - Clean canals of needle hub with cotton swab.
- Place cleaned needles on dry area.
- Rinse equipment in three different waters. Shake well and place on clean towel. Flush needles using one of syringes. Let stand and dry if possible.
- Check needles for burrs, using dry gauze or cotton, and sharpen if need be
- Match parts of lock syringes.
- Prepare for sterilization.

V. Preparation for Sterilization

1. By autoclaving, 15-20 lbs. pressure - 20' at 125°C (257°F)
If an institution does the autoclaving, ascertain how packages are to be prepared. Following is a suggested procedure:

Package assembled syringes:
 - a. Container - a large dripping pan or equivalent lined with gauze.
 - b. Place 2 or 3 layers (25 - 30 assembled syringes in the pan. Prepare layers by arranging 2 - 3 rows of syringes with tips pointing to midline length of pan. Separate layers with cloth size of pan. Syringes must fit snugly and pan be full to prevent shocking.
 - c. Wrap pan tightly in sheeting, wrapping paper or equivalent and fasten.*
Package needles:
 - a. Container - medium dripping pan or shallow cake tin.
 - b. Prepare several layers of needles - 50 needles to a layer. Weave two rows of 25 needles into a gauze dressing, points meeting in the midline of length of pan.
 - c. Place four layers on top of each other with gauze between each layer.
 - d. Wrap pan tightly in a towel and fasten.

*Note: Some workers may prefer packaging syringes and needles together in packages of 10 (5 cc) syringes and 75 needles. Needles arranged on separate piece of gauze as described above.

V. Preparation for Sterilization (cont'd)

Mark syringe packages indicating contents by size and quantity in each package.

Mark needles to show gauge and length of needles.

Package towels: 6 towels to a package - 8 packages.

2. By pressure cooker - 15 lbs. pressure - 20' at 125°C (257°F)
Prepare as for autoclave - wrap in brown paper and place on rack above water level. If packages are damp from steam pressure, allow to remain in pressure cooker until thoroughly dry (10 - 15 minutes).
A pressure cooker will handle relatively few small packages.
3. By boiling
 - a. Boil unassembled syringes and needles separately
Protect bottom of pan with cloth
Placing syringes and needles in sieves facilitates handling
 - b. Assemble boiled parts after shaking to dry using caution to keep sterile. Use sterile hemostats if available.
 - c. Assemble syringes (25 or more in 2 or 3 layers) on sterile towels in a sterile pan. Place tips pointing at midline of length of pan.
 - d. Using sterile hemostat, arrange packages or containers with four or five layers of sterile needles. Stick needles into first layer of a sterile gauze dressing (50 needles to one layer of gauze). Place needles in two rows with points meeting in the center. Cover each layer with sterile towel. Layers may be arranged on a sterile pan.
4. By baking - 1½ hours at 166°C - 177°C (330°F - 350°F)
Prepare as for autoclaving. When arranging packages in oven, allow air spaces between packages.
5. By flaming needle (a last resort).
This technique should be used only for intradermal injections.
In situations where reesterilization is impossible, a platinum needle may be used. The needle should be flamed until red hot and allowed to cool one-half minute between each injection. An alcohol lamp or sterno flame will be necessary. This assumes that syringes have been sterilized for first use and may be refilled with vaccine, without reesterilization.

Caution: Since flies may be a problem at times of mass immunization, all sterile goods must be kept covered with sterile towels when not in use. Damp towels ironed dry may suffice.

MEDICAL SERVICE

As a general rule, medical care of communicable diseases will be given by the physicians practicing in the area. However, it is the responsibility of the local director of health to see that each case of communicable disease is properly isolated and cared for in accordance with the state sanitary code. Therapeutic sera should be made freely available. The set-up should include an isolation unit.

Where disaster conditions involve serious and extended occurrence of injuries to human beings, it may be desirable for physicians in the affected areas to call in outside medical aid. Local, county and state medical societies can be contacted and the Connecticut State Medical Society with headquarters at 160 St. Ronan Street, New Haven, can cooperate in contacting physicians throughout the state. First aid stations may need to be set up with cooperation of all available medical and nursing service. Available hospital facilities may have to be mobilized. Supplementary medical and nursing service may be obtained through the local chapter of the American Red Cross.

PUBLIC HEALTH NURSING SERVICE

The activities of the state health department nurses and local public health nurses in a disaster would depend upon the type of disaster and needs created, and would be determined through joint planning with nursing representatives of the Red Cross and the Civil Defense. Some of these activities might be:

State Health Department Nurses

1. Surveying the need for additional public health nurses in local areas
Contacting local public health nursing and other agencies to learn of unusual demands on their service and number of supplementary nurses needed. (Some of this information might be obtained by other personnel of the department surveying local conditions.)
2. Supervising supplementary public health nurses
Supervising supplementary nurses doing public health nursing who are not under the guidance of local agencies.

Local Public Health Nurses and State Health Department Nurses.

Local public health nurses and State Health Department nurses not needed in the above activities might serve where needed in the following activities:

1. Refugee Centers.
Supervising health of refugees in refugee centers.
2. Immunization.
Assisting physicians in mass immunization programs.
3. Emergency Medical Station.
Assisting physicians giving medical care to injured at scene of disaster and at emergency medical stations.
4. Public Health Nursing.

Duties of the Nurse

Nursing Orders. Any treatments given should be ordered by a physician. Signed standing orders should be obtained from a physician in charge. The Suggested Standing Orders approved by the Public Health Committee of the Connecticut State Medical Society on June 11, 1953 may be followed during the emergency period until the physician in charge provides other orders.

Refugee Shelters. The main responsibilities of the nurse at a refugee shelter are:

1. Health supervision of all refugees.
 - Inspect as necessary to detect communicable diseases and symptoms of illness.
 - Give special attention to children, pregnant women and the aged.
 - Locate persons with physical handicaps or diseases such as diabetes and anticipate their special needs.
 - Check on immunization status of all refugees.
2. Care of the sick and injured.
 - Secure emergency medical treatment.
 - Give nursing care as needed.
 - Arrange for removal of sick persons to hospitals as indicated.
 - Provide suitable isolation for patients with communicable diseases.
3. Records and reports.
 - Keep individual records of all patients given nursing care.
4. Guidance of auxiliary nursing personnel.

Emergency Medical Stations. The general responsibilities of the nurse at emergency medical stations are:

1. Obtain standing orders.
2. Arrange for the giving of prompt care to persons most seriously ill and for the segregation of persons with communicable diseases.
3. Be alert to emotional casualties. Take appropriate measures of early segregation and control to prevent mass panic.
4. Arrange to send the seriously ill to hospitals.
5. Records and reports.
 - Assist in keeping individual records of all patients given medical or nursing care.
 - Note on identification tags treatments given.

Public Health Nursing. The general responsibilities of the nurse assigned to public health nursing are:

1. Bedside care to those ill or injured due to the disaster and to assist patient and family to plan for care.
Visit newly reported cases and persons most seriously ill.
Arrange, upon order of physician, for sending patients to hospitals or clinics.
2. Family health supervision.
Instruct in measures necessary to preserve or restore environmental sanitation.
3. Assist with immunization program.
4. Records and reports.
Keep individual records of all patients given nursing care.

EMERGENCY MEDICAL STATIONS

The personnel required for each emergency medical station will include at least one physician, one nurse, and one or two volunteer nurse's aides. Medical and nursing personnel should be increased in proportion to the needs.

Suggested Equipment and Supplies for Medical Station

Equipment:

base plate or oil burner	laundry bag or basket
bedpan	pails for carrying water
blankets	paper bags for waste
chairs	pitchers
cupboard or chest with lock, for storing medical supplies	rubber sheets
dressing basin and ear basin	soap
emergency cots (one or two)	sterilizer
hand basins	canned heat outfits and 12 extra cans of canned heat
hand towels	tables
jars for green soap, cotton, solutions	urinal
kettle for boiling water	water jar

Office supplies:

pads of Medical Record
supply of ink, pens, penholders, blotters, and pencils
1 pad of Request for Nursing Care or Interim Report
50 copies of Daily Report of Disaster Patients Receiving Red
Cross Care

Medical and surgical supplies:

absorbent cotton - 1-pound rolls
artery forceps (as needed)
assorted curved needles (as needed)
assorted silk sutures (as needed)
drugs and medicines (as directed by physician in charge)
forceps and tweezers
gauze dressings - 1-pound packages
hypodermic case and needles
individual gauze packet
individual bandages - 1", $2\frac{1}{2}$ ", and 4"
medium-heavy forceps
medium-sized scissors
medium-sized probe
needles, 26-gauge $\frac{3}{4}$ "
needle holder (as needed)
round rubber tourniquets
scalpel handle with detachable blades
syringes - 1 cc
syringes - 5 cc
thermometers
tongue blades
wood applicators
zinc adhesive - 2" rolls

Emergency medical supplies for 50-75 people:

aspirin - 100
band aids - 100
merthiolate - 1 pint
Phenobarbital ($\frac{1}{4}$ grain tablets) 100
applicator $\frac{1}{4}$ dozen
adhesive $\frac{1}{2}$ inch - 2 rolls
white vaseline - 1 jar
sanitary pads - 3 boxes

EMERGENCY HOSPITALS

Personnel. The number of personnel necessary to staff an emergency hospital of 25 or 50 beds will depend upon the type of injuries or illness. A minimum of one physician, one supervising nurse for day duty, and one for night duty will be necessary. Staff nurses, dietitians, record clerks, cooks, orderlies, ward maids, janitors, and laundresses should be employed as needed. Additional volunteers may be needed for clerical work, handling of inquiries and visits from relatives, messenger service, supervision of housekeeping activities, and care and preparation of supplies and equipment. The chapter subcommittee on medical and nursing aid serves in an advisory capacity to assist in maintaining normal patient-physician relationships. As far as possible, each patient chooses his own physician.

Location and arrangement. The building used as an emergency hospital should include sufficient rooms for wards, operating rooms, storerooms, and kitchens or should be readily adaptable for division into such units. Modern school

buildings generally meet these requirements. Churches, vacant stores, and public buildings may be satisfactory. Tent hospitals should be used only when a suitable building is not available. Heating, lighting, the distribution of a pure water supply throughout the building, toilets, bathing and laundering facilities, stairways or elevators, screened windows, and general sanitary conditions should be carefully considered. After the building is selected, a plan of the floor space should be drawn, indicating the use of each room. The installation of telephone service, plumbing, electricity, and arrangements for bathing and laundering facilities may be necessary.

The following features are essential:

- Admission room for new patients.
- Separate wards for men, women, and children.
- Separate rooms or wards for obstetrical cases and cases requiring isolation.
- Treatment room for surgical dressings and for surgery on minor injuries. (Physicians usually furnish their own instruments)
- Utility room for cleaning and storing equipment used in the care of patients.
- Office space for doctors, supervising nurse, and assistants.
- Storage space for linens and supplies.
- Sanitary toilets if plumbing facilities are inadequate.
- Kitchen space sufficiently large and equipped for cooking and serving food for patients and personnel.

Equipment. Equipment may be improvised or borrowed from national guard armories, hotels, restaurants, or summer camps. A minimum amount, inexpensive, may be purchased. The equipment should include:

Hospital Furnishings. Beds, candles, chairs, cots, cribs, (baskets or boxes), desks, flashlights, lamps or lanterns, mattresses, pillows, screens and tables.

Supplies for Linen Closet. Bath towels, blankets, draw sheets, hand towels, kitchen towels, nurses' aprons, paper towels, patients' gowns, physicians' gowns, pillowcases, rubber sheeting, sheets, washcloths.

Supplies for Utility Room. Bedpans, covered dressing can, covered pails, dressing trays, enameled pitchers, foot tubs, funnel, hot-water bottles, ice caps, irrigation cans with tubing, large bottles with solutions, laundry bags, long-handled brushes, newspapers, paper bags, paper towels, pressure rings, small basins, soap, soap dishes, and hand brushes, toilet paper, urinals and covers, wash basins and waste can.

Medical Supplies and Equipment. Absorbent cotton, adhesive, antiseptic, applicators, assorted safety pins, boric acid, disinfectant, dressing basins, dressing forceps, drinking cups, drinking tubes, drugs and medicines (as requested by physician in charge), gauze bandages, gauze pads and sponges, graduated pint measures, hypodermics, liquid soap, medicine droppers, medicine glasses, muslin, paper bags for waste material, rubbing alcohol, scissors, sodium chloride, splints, sterilizers or sterilizing basins, straight pins, thermometers, tongue blades, triangular bandages and vaseline. A portable X-ray unit is very desirable.

Kitchen Equipment and Supplies. Aprons, boilers, breadboard, butcher knives, can openers, chairs, cleaning cloths, cleaning powder, colander, coffeepots, cups, egg beater, flour receptacle, forks, garbage cans, knives, knife sharpener, ladles, large spoons, measuring cups, orange squeezer, paper napkins, paring knives, pepper shakers, pitchers, plates, refrigerator, roasting pans, salt shakers, saucers, scrub brushes, shelves, soap, soup bowls, soup kettle, spoons, stoves, sugar receptacle, tables, teakettle, towels, trays and water glasses.

Office Supplies and Miscellaneous Hospital Appliances. Blotters, brooms, calendar, carbon paper, chairs, cleaning cloths, desks, dustpans, files, hammer, ink, labels, medical record pads, notebooks, paper clips, paper scratch pads, pencils, pens, physicians' order books, rulers, stapling machine, tables, thumbtacks, trays, twine, wastepaper baskets and typewriter.

Sanitation and accident prevention. Sanitation and safety of all units within the building are important factors in protecting the health of personnel and patients.

Safety measures should be taken to check electric wiring, exposed pipes, dark passageways; to eliminate loose boards, loose plaster, broken steps; and to provide fire extinguishers, adequate exits and entrances, and safe heating and lighting facilities.

Sanitary measures should provide for adequate screening; controlled ventilation and light; adequate plumbing; pure water supply; clean sinks, toilets, and bathing facilities; adequate space for food storage; and covered garbage and waste disposal facilities. Additional measures should be taken for patients with infectious intestinal diseases, as follows:

1. Excreta should be disinfected before disposal according to local health regulations. If local health regulations are not available, immerse excreta for one hour in a disinfectant solution. It should be covered and thoroughly mixed in the solution in a quantity double the volume of the excreta. After standing for one hour, it should be emptied into a sanitary sewer or buried. Urinals and bedpans should be cleaned and then immersed for one hour in a similar solution.

Solution A. Add 1 pound of chloride of lime to 4 gallons of water. This solution should be prepared fresh every day and kept in well-stoppered dark bottles.

Solution B. Add 1 pint of compound cresol solution (Liquor Cresolis Compositus, U.S.P.) to 6 gallons of water.

2. Linen used by patients with communicable diseases should be disinfected by boiling or by immersion for one hour in a disinfectant solution before being sent to the laundry. The following solutions may be used:

Solution A. Add 2 ounces of chloride of lime to 1 gallon of water, prepare fresh solution daily, and keep in well-stoppered dark bottles.

Solution B. Add 1 pint of compound cresol solution to 12 gallons of water.

3. Dishes should be scraped and the refuse burned. After each use, all dishes, knives, forks, spoons, and glassware should be covered with water and boiled in a covered pan for 15 minutes and then washed with soap and water and rinsed in scalding water and allowed to dry without wiping. All articles that cannot be disinfected satisfactorily should be burned.

Duties of supervising nurse. The responsibilities of the supervising nurse are to:

- Assign nurses and auxiliary nursing personnel to specific duties and schedules.
- Interpret nursing policies, procedures, and routines to the staff.
- Instruct nurses in special techniques which are acceptable according to present-day standards.
- Obtain standing orders from the physician in charge and review them with the staff nurses.
- Confer daily with the physician in charge.
- Report daily to the nursing director the number of nurses on duty, the number to be released, the number to be transferred, and any need for additional personnel.
- Report any need for additional equipment to the nursing director.
- Prepare a daily summary of new patients and patients discharged or transferred; send the report to the nursing director and provide a copy for the physician in charge.
- Request volunteers for clerical work and for messenger service.
- Discuss the related social and medical aspects of family problems with the appropriate case worker.

PART V FEDERAL ASSISTANCE IN NATURAL DISASTERS

COMMENTS ON FEDERAL LAWS AND EXECUTIVE ORDER RE DISASTER

Public Law 875, 81st Congress, provides for a continuing means of assistance by the Federal Government to states and local governments in carrying out their responsibilities to alleviate suffering and damage resulting from major disasters, to repair essential public facilities and to foster the development of state and local organizations and plans to cope with such disaster.

Public Law 107, 82nd Congress, amends Public Law 875 by authorizing Federal assistance in providing temporary housing or other emergency shelter for disaster sufferers.

Public Law 134, 83rd Congress, amends Public Law 875 by providing for the donation or loan of surplus Federal equipment and supplies to states for use or distribution by them under Public Law 875.

Executive Order 10427, January 16, 1953, provides that the Federal Civil Defense Administration, acting on behalf of the President, shall:

1. Direct Federal agencies to provide assistance in major disasters.
2. Coordinate activities of Federal agencies in providing disaster assistance and direct them to utilize their personnel, equipment, supplies, facilities, and other resources in accordance with authority contained in Public Law 875.
3. Coordinate plans and preparations of Federal agencies made in anticipation of their responsibilities in natural disasters.
4. Foster the development of such state and local organizations and plans as may be necessary to cope with major disasters.
5. Coordinate assistance and other action of Federal agencies performed under existing policies, practices, or statutory authority of such agency.

COMMENTS ON TYPES OF FEDERAL ASSISTANCE RENDERED

Public Law 875 specifies the types of Federal assistance which may be provided in a major disaster. Section 3 states that assistance may be provided "by performing on public or private lands protective and other work essential for the preservation of life and property, cleaning debris and wreckage, making emergency repairs to and temporary replacements of public facilities of local governments damaged or destroyed in such major disaster, providing temporary housing or other emergency shelter for families who, as a result of such major disaster, require temporary housing or other emergency shelter, and making contributions to states and local governments for purposes stated."

This Public Law provides that Federal assistance may be granted to supplement state and local efforts and resources when the damage caused by disaster is beyond the ability of the state or local government to cope with such danger. The assistance authorized is intended to supplement such efforts rather than supplant them.

Performing Protective and Other Work. No restriction is imposed on the location, type or ownership of property on which protective work may be performed. The Federal contribution for work performed cannot exceed the minimum amount required to prevent further deterioration because of continued exposure to the elements, or from other causes.

Examples of work which may be authorized for the preservation of life and property are construction of emergency dikes and levees or additions to existing dikes and levees, demolition of structures creating safety hazards, shoring up of walls, provision of emergency services and provision of necessary health measures.

Clearing Debris and Wreckage. This work is ordinarily performed on public property. There may be cases, however, where because of the danger to public health or for the protection of life it must be performed on private property. In such instances, the authority to enter on such property and the responsibility for any damage or claim thereto is that of the state or local government.

Emergency Repairs to and Temporary Replacement of Public Facilities. This authority goes beyond the protective and other work essential for the preservation of property At the same time, it is limited to those public facilities which are essential. Examples of the types of public facilities generally deemed to be essential are bridges, roads, culverts, drainage ditches, water works, sewer systems, schools, hospitals, penal and welfare institutions, buildings housing public offices, land and court records, police facilities, etc. Public facilities usually not deemed essential would include auditoriums, zoos, and parks.

Examples of emergency repairs to essential public facilities which generally may be undertaken would include the construction of temporary earth fill to replace material washed from behind a bridge abutment or the "baking out" of an armature of a motor in a city power plant. Renovations beyond those which are necessary for the resumption of essential services are not considered emergency repairs. For example, emergency repairs would not include the permanent repaving of roads in washed-out areas. Occasions will arise, of course, where the only emergency repair that can re-establish the facility may constitute a permanent repair. For example, the valves of a well pump may be so plugged with debris that they must be replaced before service can be resumed.

Temporary replacement of essential public facilities ordinarily is the provision of emergency facilities during a period required for the permanent repair or replacement of the damaged facility. Examples

would be the provision of a temporary bridge while a permanent bridge is being repaired or constructed.

It should be noted that a public facility essential in a major disaster may require both protective and emergency repair, that is; the resumption of the facility's essential service may be necessary and, in addition thereto, protective or other work may be needed to prevent further deterioration.

Property, surplus to the needs of the Federal Government, may be donated or loaned to a state for use or distribution in any area in which the disaster act has been invoked. Such property may be used for the restoration of damaged or destroyed public facilities or for the rehabilitation of individuals. All costs incident to transportation and handling of surplus property must be assumed by state and local governments.

Providing Temporary Housing or Other Emergency Shelter. The work authorized for this purpose is the minimum needed to provide shelter to families on a temporary basis. A temporary basis is considered that time necessary to permit the provision of permanent facilities or the arrangement for other accommodations. The authority may be utilized only when there is an acute shortage of housing facilities and when other sources of available housing (including housing in adjacent localities within a reasonable commuting distance of the disaster area) have been exhausted. When temporary housing is required, it will, where practicable, be provided in the following order: (a) surplus barracks or other surplus housing, (b) tent city housing, or (c) trailer type housing. In determining the need for the provision of temporary housing, Federal Civil Defense Administration in cooperation with the American National Red Cross, the Housing and Home Finance Agency, and local public officials will conduct a survey of available facilities prior to the provision of such housing.

Federal Contributions to States and Local Governments for Work Performed Under Section 3 (d), Public Law 875. Taking into consideration all of the provisions of existing law and regulations, Federal contributions may be made to state and local governments for work performed subject to the following conditions: (a) that the work is properly reimbursable under the agreement with the state and the provisions of individual projects approved; (b) that its cost is directly attributable to the disaster; (c) that the state or local government has accepted responsibility as a sovereign for performance of the work for which a contribution is requested.

At the request of the state or local community, a grant equal to the amount of the agreed cost of the emergency repair or temporary replacement may be paid to the state or local community, to be applied against the cost of the permanent repair or replacement in lieu of the Federal contribution toward the estimated cost of the work agreed to be performed, providing such permanent repair or replacement will

accomplish the protection, repair, or replacement objective for which the individual project was approved. In determining the amount to be considered as a grant, the estimated cost of the preventive or protective work, or the emergency repair or temporary replacement, shall include only those items of work including labor, material, and equipment charges necessary to provide minimum protection or temporary replacement or emergency repair.

FORM OF PREDISASTER ALERT NOTICE AND ASSIGNMENTS (STATE DEPARTMENT OF HEALTH)

I. NATURE OF EMERGENCY _____ DATE AND TIME OF ADVISORY _____
 EMERGENCY EXPECTED _____ ESTIMATED TIME OF ARRIVAL _____
 AREA WHICH MAY BE AFFECTED _____
 OTHER DETAIL _____

II. GENERAL INSTRUCTIONS - all employees: (Post on each building bulletin board)

1. Review your disaster manual
2. Notify supervisor of personnel of your address and phone number if different from normal (Telephone extensions - 647 and 679).
3. See your bureau or division chief for special assignments.
4. Remain on stand-by notice after regular hours until alert is removed.
5. _____

III. FIELD COVERAGE

A. STAFFING	Name	Address	Phone	Towns
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____
6.	_____	_____	_____	_____
7.	_____	_____	_____	_____
8.	_____	_____	_____	_____

B. INSTRUCTIONS

- See _____ for briefing.
- Take emergency information pack for each town from stockroom.
- Take emergency supplies for each town from stockroom.
- Distribute immediately information.
- Distribute immediately supplies.
- Contact immediately local director of health by telephone.
- See local director of health for conference on situation.
- Distribute materials as soon as possible if emergency occurs.
- Distribute materials only if notified.
- Complete survey forms on towns assigned.
- Report activities and accomplishments (Tel. JACKSON 7-6341, Ext. 801)

IV. DISASTER EMERGENCY COMMITTEE

A. STAFFING	Name	Home Phone
Administration and liaison	_____	_____
Sanitation service	_____	_____
Medical service	_____	_____
Auxiliary medical service	_____	_____
Nursing service	_____	_____
Communication & clerical assistance	_____	_____
Supplies and transportation	_____	_____

B. INSTRUCTIONS

- Stay on duty
- Assemble on notification
- Other _____

Date _____ Time _____ Signature _____

*SUPPLIES - WHERE OBTAINABLEAntitoxin and VaccineChlorinators

Wallace & Tiernan Co., Newark, New Jersey
 Francis Griffith, Meadow Street, Shelton, Regent 5-2962
 Proportioneers, Inc., Washington St., P.O. Box 655, Islington,
 Mass., DEdham 3-5690
 John A. Leach, Brown Road, Brooklyn, Conn., PRescott 4-3460
 Fischer & Porter Co., Hatboro 16, Pennsylvania

Chlorine Gas (may often be secured from water departments, sewage plants,
 and swimming pools)

Disinfectants (may often be secured from water departments, sewage plants,
 and swimming pools)

Chloride of LimeHTH

Mathieson Chemical Company, 60 East 42nd Street, New York City

Perchloron

Pennsylvania Salt Mfg. Co., Widener Building, 1335 Chestnut
 Street, Philadelphia, Pennsylvania

Chemical Corporation, 54 Waltham Avenue, Springfield,
 Massachusetts, CH 7-3223 (Hartford Telephone)

Other High Test Chlorine PowdersChlorine Disinfecting SolutionsDry Ice

Esquire Gas Products, 876 Enfield Street, Thompsonville, Conn.,
 Riverview 5-6674
 Liquid Carbonic Corp., 98 Rowe Street, New Haven, Conn., UNiversity 5-8310
 Pure Carbonic Co., 7 Minor Street, New Haven, Conn., SPruce 7-4436

Inhalators and Gas Masks

Mine Safety Appliance Co., 5-45 49th Avenue, Long Island City 1, N.Y.
 Fire Departments
 State Armory
 Water and sewage treatment plants (chlorine gas masks)
 Local gas companies

*Suggested for local listing in each community.

Medical Supplies

Milk Dealers

Milk Plant Supplies

Pasteurizing Equipment

Bottles and Cans

Motors, Pumps, Engines, Generators

Electric Motors and Generators

Pumps

Diesel Engines

Gasoline Engines

Rodenticides - Warfarin

Prentiss Drug & Chemical Company, 110 William Street, New York, N.Y.

Sand Bags

Fertilizer Dealers, Produce Dealers and Grain Dealers

Sign Painters

Tents

Trucks

Many private trucking concerns are listed in classified sections of telephone books. State highway department and local departments of highways and public works may furnish trucks in emergency.

Connecticut State Department of Health

REQUISITION FOR SUPPLIES

Date _____

Name of Town _____

Requisition from _____

	<u>Amount Requested</u>	<u>Amount Filled</u>
Chloride of Lime	_____	_____
High Test Chlorine Powder	_____	_____
Typhoid Vaccine	_____	_____
Tetanus Antitoxin	_____	_____
Tetanus Toxoid	_____	_____
Penicillin	_____	_____
Other Anti-biotics	_____	_____
Water Disinfection Tablets	_____	_____
DDT Solution	_____	_____
Rodenticides	_____	_____

Delivered by _____

Date of Delivery _____

Connecticut State Department of Health

FLOOD SURVEY INFORMATION TO DETERMINE
EXTENT OF ASSISTANCE NEEDED BY LOCAL AUTHORITIES

Date _____ Time _____

1. Name of town _____
2. Estimated number of houses vacated _____
3. Estimated number of houses occupied but only partially flooded _____
4. Where are refugees being collected? _____
5. Estimated number of private wells flooded _____
6. Are any additional physicians needed? _____
7. Are any additional nurses needed? _____
8. Are any additional sanitarian services needed? _____
9. Do you need chloride of lime? _____ How much? _____
10. Do you need high test chlorine powder? _____ How much? _____
11. Do you need water disinfection tablets? _____ How many? _____
12. Do you need DDT solution? _____ How much? _____
13. Do you need typhoid vaccine? _____ How much? _____
14. Do you need tetanus antitoxin? _____ How much? _____
15. Do you need tetanus toxoid? _____ How much? _____
16. Do you need penicillin or other antibiotics? _____ For what? _____
17. If your food supplies in stores and warehouses were flooded, have you inspected them? _____ Do you need help? _____
18. Briefly indicate damage to: _____ Public water supply _____
19. What is your power situation (gas, electricity, telephone)? _____
Sewers _____

The state department of health offices
will be open for emergency calls.
Telephone - Hartford, JACKSON 7-6341.

Information obtained from _____

Information obtained by _____

WARNING

BOIL DRINKING WATER

Due to a temporary emergency, all consumers of water from the public supply are hereby notified to boil all water used for drinking or cooking, until further notice.

CLEANING UP AND DISINFECTION AFTER FLOODS

Where to Obtain Chlorinated Lime. This is a chlorine disinfectant known as chloride of lime or chlorinated lime and is not ordinary lime or hydrated lime. This disinfectant can be obtained through drug concerns, grocery stores and chemical supply houses.

Disinfection of Wells Affected by Flood Waters. Wells and springs exposed to floods should be disinfected with a solution of chloride of lime and water. Six to eight ounces of chloride of lime (or about two tumblersful) dissolved in a pail or two of water strained through cloth and poured into an average size dug well will disinfect it heavily. Large quantities of the disinfectant are not injurious. The chlorine odor will soon disappear. Effort should be made to stir up the disinfected well water and it should be allowed to stand for thirty minutes to obtain adequate contact. If the well has been badly polluted, it is safer to pump it out after disinfection and disinfect it again. Any debris entering the well should be removed.

BOIL FOR FIVE MINUTES ALL WELL WATER THAT MAY BE POLLUTED BY RIVER WATER, TO AVOID WATER-BORNE TYPHOID, DYSENTERY AND DIARRHEA.

Flooded Cellars. After these are drained or pumped out, wash them down with a hose with clean water and brush and scrub them. Then finish up by applying with a brush, broom or rags a disinfecting solution of chloride of lime and water. This can be made up with 1 lb. of chloride of lime in 6 to 10 gallons of water. Do not throw a lot of chloride of lime into a lot of cellar water as the strength of the disinfectant will be rapidly wasted by the dilution. Clean out the cellar or house first.

Cresol Disinfectants. If chloride of lime is not used, such disinfectants as lysol or cresol can be used to wash down any surfaces exposed to flood waters and sewage. Four tablespoonsful or two ounces of such disinfectants per gallon of water can be made up for a disinfecting solution. Care should be taken to avoid burns which may be caused by full strength of the disinfectants without dilution with water.

Precautions by Flood Workers. Flood workers should be cautioned to guard against infection. They should not get their hands near their mouths after handling polluted surfaces or polluted water until their hands have been washed with soap and clean water. They should also not handle food without clean hands.

C L E A N - U P

I--DESTROY ALL MATERIAL NOT WORTH SALVAGING.

II--BOIL EVERYTHING THAT CAN BE BOILED, SUCH AS CLOTHING AND BEDDING.

FLOODED DWELLINGS--Clean up and disinfect as described in separate notice.

FLOODED FURNITURE--Rugs and Hangings

Curtains-- (a) Wash with hot water and soap or detergent when the fabric will not be injured by hot water.

(b) Dry thoroughly in the open air and sunshine.

(c) Press with hot iron, or dry clean.

Rugs-- (a) Flush off with clear water while still on floor.

(b) Dry thoroughly in the sunshine.

(c) Use a mild soap and lukewarm water to shampoo - then rinse and dry.

Furniture--(a) Wash with strong soap and water all surfaces that can be reached and will not be harmed, such as wood, metal, leather, cane and composition materials.

(b) Upholstered materials. Wash whatever materials can be surface-washed and dry thoroughly, preferably in open air and sunshine.

DISCARD WHATEVER CANNOT BE CLEANED AND DRIED SUCH AS
BADLY SOAKED MATTRESSES AND UPHOLSTERED MATERIAL.

FLOODED CLOTHING-- Wash all washable fabrics with hot water and soap or detergent. For fabrics that would be injured by hot water, dry thoroughly, in the sunshine, and sterilize by pressing with a hot iron or by dry cleaning.

FLOODED FOODSTUFFS-- No foodstuffs subjected to contamination from flood waters should be used unless such foodstuffs have been stored in watertight containers, in which case the outside should be thoroughly sterilized with boiling water or disinfectant. It is best to "play safe" and discard any questionable foodstuffs. No flooded foodstuffs are to be sold to the public.

RECOMMENDATIONS FOR SANITIZING HOME APPLIANCES

1. Disconnect all electrical appliances Do not try out or operate any electrical appliances until house wiring has been found safe.
2. Wash off silt and dirt Hose down with cold water, appliances that have been completely submerged. Clean inside and out with a mild solution of soap and water.
3. Dry and air out If practicable, move appliances into sunlight after preliminary cleaning. Use fans to aid air circulation where possible.
4. Guard against rust Cover with household oil or vaseline all areas that have begun to rust.
5. Call your service man for advice In the case of flooded motors or of other possible extensive damage to electrical equipment such as hidden insulation in stoves, refrigerators or heaters.

This Building is Declared

UNFIT FOR

OCCUPANCY

By the Director of Health

It is Not to Be Reoccupied Without
Permission of the Director of Health

STATEMENT OF UNDERSTANDING
BETWEEN
CONNECTICUT CIVIL DEFENSE
AND
AMERICAN NATIONAL RED CROSS

DISASTERS RESULTING FROM ENEMY ACTION

1. Civil Defense is fully responsible.
2. Civil Defense will utilize all community agencies, including Red Cross, in carrying out this responsibility.
3. Civil Defense will assume total financial responsibility and will operate in accordance with existing Civil Defense policy and procedure.

DISASTERS RESULTING FROM NATURAL CAUSES

- 1-A. The American National Red Cross will continue to carry out its traditional services to those in need as a result of disaster by providing such assistance as food, clothing, shelter, medical care, household furnishings, building and repair of homes and occupational rehabilitation. The Red Cross in carrying out its relief program will exercise administrative and financial control over its own operations.
- 2-A. Members of Civil Defense welfare units are encouraged to cooperate with and assist the Red Cross in carrying out these functions.
- 3-A. When an emergency is declared by the governor, the Civil Defense Administration will assume over-all responsibility in accordance with authority delegated by the State of Connecticut, but will look to the Red Cross to assume its traditional responsibilities for welfare services as outlined under 1-A above. This concurs with FCDA Advisory Bulletin #138, which states: "Federal funds authorized under Public Law 875 will not be used to reimburse states and localities for expenditures made by them within the area of Red Cross disaster responsibilities."

LIAISON

There are arrangements for national and regional liaison, mutual planning and exchange of information regarding disasters, between the American National Red Cross and the Federal Civil Defense Administration. It is urgent that there be established continuous liaison between Civil Defense and Red Cross on the local level. It is urged that Civil Defense representatives be assigned to the local Red Cross disaster committees and that Red Cross representatives be assigned to the Civil Defense Advisory Councils.

/s/ Leo J. Mulcahy
 Leo J. Mulcahy
 State Director of Civil Defense

July 20, 1955

(Date)

/s/ Harold B. Nearman
 Harold B. Nearman, Manager
 Eastern Area, American National
 Red Cross

July 12, 1955

(Date)