

The Sanitary Engineer in Hurricane Floods

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WARNED by radio and newspaper stories on the morning of Friday, August 19, 1955, Public Health Service engineers in the New York regional office curtailed normal activities in readiness for Hurricane Diane.

The anticipated calls for assistance failed to come in during the day. By Saturday morning, August 20, the reasons became clear: Communications had failed, and few people were aware of the immensity of the disaster. In some States, authorities had to wait for the floodwaters to recede before they could determine what assistance would be required. Nevertheless, 10 inches of rain in a 24-hour period over an area extending from the Poconos in eastern Pennsylvania, across the Catskills and Berkshires, and into Connecticut and Massachusetts portended a national emergency.

Not until the following week did the extent

of damage become known. Experience could lend no clue. There was no previous record of so great a rainfall. In northwestern Connecticut, the maximum rainfall was estimated at 20 inches.

The newspapers quoted a general in the Army Corps of Engineers as saying, "Floodwaters have caused more damage in Connecticut in 2 days than all of the strategic bombing in the Ruhr Valley during the entire World War II."

In Winsted, Conn., floodwater from the Mad River reached 9 feet above any known previous record.

Easton, Pa., reported the Delaware River 5 feet above the previous maximum record.

A 300-year-old house in Connecticut, never before flooded, was swept away.

A 100-year-old dam in the Peekskill, N. Y., area had 7½ feet of water over its spillway. The previous record was 4 feet.

Three miles of a 36-inch water supply main was washed away at Scranton, Pa.

Diane came with such destructive force, augmented by bursting dams, that everything in her path was wrecked or damaged. Pavements were torn up. Watermains were ripped out. Highway and railroad bridges were destroyed. Houses and factories were obliterated. Automobiles were tossed around like toys. Worst of all, nearly 200 people were killed.

State health agencies mobilized their personnel immediately and deployed them into the stricken areas. The first arrivals were to make a quick reconnaissance and report on the need for additional assistance, equipment, and supplies.

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Flood waters carried animal carcasses, garbage, and rubbish through Winsted, Conn., in onrushing tide. Heaps of rubble had to be sprayed with insecticides. The Public Health Service shipped stores of these plus chemicals for rat control to New England from its Communicable Disease Center in Atlanta.

Sunday, August 21, saw the arrival in the Pennsylvania flood area of 55 sanitation personnel from all sections of the State. Health workers in other States responded with similar alacrity.

Public Health Service Assistance

Traditionally, the Public Health Service role in supporting State public health services is entirely supplementary, filling in where other health services are lacking or in need of reinforcement.

The first Public Health Service personnel

were dispatched from Region II in New York City on Saturday, August 20. By Friday, August 26, the maximum complement had been assigned to disaster-aid duty. In some instances, selected personnel completed special assignments and withdrew. Other specialists were assigned later. All told, 45 Public Health Service officers were assigned for flood disaster duty to the State departments of health, the Federal Civil Defense Administration, and the National Red Cross.

Public Health Service sanitary engineers assigned to State health departments in the affected areas assisted in evaluating incoming

reports or in coordinating with the department staff and with the Federal Civil Defense Administration and the Army Corps of Engineers. Some were reassigned to county or local health departments or were deployed in the field as representatives of the State sanitary engineer. These groups functioned as personnel of the State or local health department to which they were assigned, and their authority stemmed from State or local authority.

Several sanitary engineers were detailed to the Federal Civil Defense Administration to appraise damage to sanitary facilities and to determine priority of the cleanup operations. Project applications submitted by local officials to the Army Corps of Engineers for restoration of damaged community facilities were first certified as to public health need by Public Health Service officers under Public Law 875 (81st Cong., 2d sess.). Public Law 875 authorizes the expenditure of Federal emergency funds by the Federal Civil Defense Administration. Accustomed as they were to working with State health departments, it was only natural for public health experts to follow similar procedures in this special assignment and to coordinate disaster activities among the various State, Federal, and volunteer agencies.

Officers assigned to the American National Red Cross appraised damage to individual homes and to other forms of housing. Cash allowances by the Red Cross for restoration of private property were based in large part on the appraisals they made.

To meet the Public Health Service's various responsibilities, the New York office drew on other branches of the Service for temporary duty personnel. The Chicago, Kansas City, Dallas, and Atlanta regions, the Washington, D. C., headquarters, the Robert A. Taft Sanitary Engineering Center in Cincinnati, and the Communicable Disease Center in Atlanta assigned Public Health Service officers to disaster-aid duty in the northeastern States.

Twelve Commissioned Reserve Corps officers on inactive status were called to active duty from the city health departments of Cambridge, Mass., Hartford, Conn., Pittsburgh, and Philadelphia; from the housing rehabilitation project in St. Louis; from Vanderbilt University in Nashville, Tenn.; from the State health de-

partments of New Mexico, Oklahoma, Tennessee, and Virginia, and from the health departments of Caroline County, Md., and Mecklenburg County, N. C.

In New York, the regional engineer and his two assistant regional engineers directed Public Health Service activities in the cleanup. The other engineers on the staff were assigned to emergency field duty.

Interstate Carrier Sanitation

The only direct responsibility of the Public Health Service was for interstate carrier sanitation in the flooded area—the sanitation of water, milk, and food supplies which were used by interstate carriers and which might be affected in any way by the floods. Two sanitation specialists checked the condition of railroad watering points in the flooded areas. Their assignment was to find out from State and local waterworks officials whether supply sources for the watering points were affected by the floods and to notify carriers, by telephone or telegram, about the supplies which were unsafe.

Ten watering points were put on prohibited status until the water was safe for use and the sanitation satisfactory. One watering point was still on prohibited status as late as November 15, 1955. One company supplying ice cream to interstate carriers was placed on prohibited status. That action was necessary because floodwaters had temporarily disrupted the city water supply.

Field assignments for Public Health Service sanitary engineers ran the gamut from liaison with State and Federal groups to the organization and direction of spray crews, garbage disposal operations, and other "feet-wetting" tasks at the local level.

The rehabilitation of the 55 municipal water supplies which were either totally or partially interrupted was handled primarily by State health department personnel and by municipal water departments or by private water companies and their consulting engineers. In this connection, the mutual-aid system of neighboring communities assisting each other, which was set up during World War II, and which has been maintained continuously ever since, was highly valuable.



Shattered, splintered avalanches of debris settled on city streets as flood waters roared through Waterbury, Conn. Food stores and other sources of necessities became inaccessible islands in a sea of wreckage like this.

The State health departments issued "boil water" notices in communities where contamination was suspected or known to exist. Heavy chlorination of the water was practiced. Breaks in the water systems were repaired. The "boil water" notices were in effect until water samples were bacteriologically satisfactory. In many communities the usual gas and electricity were not available for heat, and millions of chlorine (halazone) disinfecting tablets had to be distributed along with emergency supplies

of safe drinking water when piped water was not available. For drinking water many communities had to rely on emergency filtration equipment or on water brought in by milk-tank trucks, obtained from individual and school wells located on high ground or from other temporary supplies.

Milk supplies, in general, were not disrupted. The total milk supply was adequate. Raw milk supplies from dairies or pasteurization plants affected by floodwaters or power fail-

ures were diverted and handled through other plants.

Interruptions to sewage treatment and sewer service were not serious. Removal of debris that prevented sewage from flowing in the lines and that caused ponding in some residential areas was the main problem. Floodwaters backing up in a drainage pipe in one sewage treatment plant—the pipe did not have a shut-off valve—caused an estimated \$70,000 damage to motors, sludge-heating equipment, and electrical control equipment. The plant itself was not affected by floodwaters overtopping the entrance, but the structures of two activated-sludge tanks, empty at the time of the flood, were damaged. High groundwater caused the tanks to rise.

Water and Sewer Systems

Sanitary engineers detailed to the Federal Civil Defense Administration were assigned to survey and report on the damage and the cost of temporary repairs to water and sewer systems, on the need for removal of debris, and on other sanitation needs of significance.

The following report of a Public Health Service sanitary engineer describes a typical situation encountered.

“Since none of the small towns I visited had either a water commissioner or a sewer superintendent, and only one had a city engineer (who had nothing to do with streets or utilities), the mayors or councilmen, usually laymen, needed engineering assistance and guidance. One seriously damaged small community which I visited 2 weeks after the flood had seen no public officials from the outside. They were trying to help themselves by renting heavy machinery for cleanup at a cost of \$600 per day, with no assurance as to how the rental fee was to be paid.”

Public Health Service survey reports were used by FCDA in processing the applications submitted by communities for reimbursement under Public Law 875. About August 28 word was received that Army engineers had been instructed to move into the flooded areas and to award contracts for rehabilitation work.

Survey work continued as before, with the Public Health Service turning over its reports

to the Army Corps of Engineers. Consultation with the corps, relative to the protection of public health, produced gratifying results. One Army coordinator observed that a Service representative should advise every Army area on public health measures.

Much of the work involved supervision of the proper disposal of garbage and refuse, spoiled meats and foods, and other putrescible matter. Prolific fly breeding was found in many places. It was feared that the rat populations would increase in dump areas if some control were not exercised. Some of the dumps were visited by as many as 1,000 trucks a day, hauling spoiled foodstuffs and other debris. Arrangements were made to have bulldozers cover the debris, and, when this was impossible, to have the material sprayed with DDT. Malathion was used on flies reported to be resistant to DDT. Rat control measures were taken in some areas.

Approximately 1 square mile in downtown Woonsocket, R. I., was badly damaged by floodwaters of the Mill and Blackstone Rivers. Debris and mud settled heavily in the section, an area occupied by about one-tenth of the population of Woonsocket, or approximately 4,000 to 5,000 people. The tenement-type structures in the heavily populated section often had stores on the first floor.

A Service engineer detailed to the Rhode Island State Health Department was assigned to direct the disposal of all wastes in the damaged area of Woonsocket. Because the space for disposal was limited, combustible material was separated from organic material and then burned—flame throwers were used to start the burning of wet combustible material. Organic material was dumped in landfills. In all, 45,000 cubic yards of refuse was burned, and 2,300 cubic yards was covered with earth.

In Waterbury, Conn., Service personnel assisted in the cleaning and decontamination of flooded restaurants and bars. Their work soon extended to barber shops, soft-drink bottling companies, meat-packing plants, and railroad freight-cars. Washing and chlorine rinse were considered adequate in most cases. Disinfection by gas was recommended where necessary and practicable. Laundering or dry cleaning was suggested for linens and upholstery.



About 35 Federal food and drug inspectors were sent out to look for contaminated food and to supervise its destruction. The inspectors investigated the chance that prescription drugs might have been swept into the open where they could be picked up.

Much of the equipment and materials for conducting sanitation operations were available generally because the stricken areas were near sources of needed supplies. Thus, fortunately, chlorinated lime, insecticides, chlorinating equipment, pumping equipment, bulldozers, and draglines were available. In addition, the Public Health Service contributed power sprayers, hand-pressure sprayers, warfarin rat-bait concentrate, malathion fly-control concentrate, DDT concentrate, red squill rat-bait pellets, halazone tablets, typhoid vaccine, tetanus antitoxin, and penicillin.

Housing sanitation criteria developed by Public Health Service officers in cooperation with the local health officers determined when homes could be reoccupied. Local personnel

were trained in consistent interpretation of the criteria.

Before residents were permitted to return to their homes, building inspectors checked the structural safety of each damaged building. Emergency sanitarians inspected each home to see that there was no water in the cellar and that the mud and silt had been removed; that there was no excessive dampness; that a water supply was available; that at least one sink and one water closet were in operation; that sewer lines were open; that walls, floors, and ceilings were clean and did not present any hazards; that electric wiring and fixtures were safe and satisfactory; that stoves and furnaces were clean and ready for use; and that fire hazards had been removed.

In general, officers returning from flood duty felt that local, part-time health departments lack the facilities, personnel, and funds to cope with emergencies. Their reports revealed that full-time health departments are far better equipped and have the trained personnel needed for these situations; that lessons learned over the years relative to the germ theory of disease may result in the condemnation and waste of large quantities of slightly soiled but salvageable articles; that trained public health personnel, properly organized and deployed, will produce manifold dividends in a crisis; that there is need for carefully developed plans for disaster-aid operations in which administrative lines and duties are well defined; and that close organization is needed at the top of any emergency service.

Nothing can substitute for training and experience in an emergency of this proportion.

Close and friendly cooperation between the Public Health Service, the State departments of health, the Army Corps of Engineers, the Federal Civil Defense Administration, and the American National Red Cross emphasized methods for producing results by the teamwork that was shown. Public Health Service personnel were highly complimentary of the manner in which these organizations carried out their responsibilities. There were, naturally, many misunderstandings, particularly during the initial phases of the operation, but these were ironed out as time went on and as understanding increased. These "growing pains" should serve as lessons, and the knowledge gained therefrom should be used to guide operations in future emergencies of this kind.

Insured Group Medical Care

A detailed picture of the 174 plans using group practice in providing their membership with benefits is described in a report entitled "Group Practice Prepayment Plans: 1954 Survey," by Agnes Brewster, Division of Research and Statistics, Social Security Administration, appearing in the June issue of the *Social Security Bulletin* (vol. 19, pp. 3-11). A general account of all independent medical care and hospitalization plans made by the Social Security Administration in 1954 appeared in the April 1955 *Bulletin*.

Sponsored by consumer groups, unions, fraternal organizations, employer and employee associations, and physicians, these benefit plans give coverage to 3 million members located in 34 States and the District of Columbia. Differences in the plans range from diagnostic services only to the full range of physicians' and specialists' services and hospitalization.

The article delineates the benefits of the plans, together with the methods of financing them. Included are widely or infrequently used physicians' services, obstetricians' and surgeons' services, routine laboratory and X-ray examinations and treatment by X-ray, basal metabolism tests, electrocardiograms, physiotherapy, appliances, extent of provision of ambulance services, and inclusion of pharmacies.

Some plans are fully prepaid; others made extra charges at the time of receipt of services, and still others are at cost.

The various methods used by the group practice plans in providing hospital care include ownership of hospital, contracting with hospitals in the community, cash indemnity benefits, and arrangements with Blue Cross or insurance companies completely separate from the plan. Days of hospital benefit range from 30 to 365.