PUBLIC HEALTH ENGINEERING

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SANITARY ENGINEERING IN A COUNTY HEALTH DEPARTMENT *

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SUFFOLK County occupies the eastern two-thirds of Long Island and has an area of about 920 square miles. It is 90 miles long and varies in width from 12 to 20 miles. It is a county of small communities, having 48 with a population of 1,000 or more, the largest with only 11,000. The total population of the county is about 160,000 but this is greatly increased in summer by the thousands of people who enjoy the recreational advantages of the seashore. Moreover, the permanent population showed an increase in the last decade of 50 per cent, which is much larger than in the preceding 10 years.

Suffolk County consists of 10 townships and 28 incorporated villages, making 38 separate health districts before the establishment of the County Health Department. These 10 towns vary in population from 1,000 to 30,000 people and in size from one of the smallest towns in the state to the largest, which is almost as large as the combined area of the three counties which constitute the remaining one-third of the Island. Moreover, only 11 of the 48 communities mentioned are incorporated. These communities have spread beyond their boundaries so that in the largest community about one-third of the population lives outside the incorporated limits.

With such rapid growth and overlapping of town and village jurisdictions, a county health department with adequate power and a full-time personnel was distinctly needed, and one was organized in November, 1928. It was the second in New York State and the first organized entirely by the people of the county.

With its organization the local boards of health, except in the 7 villages having a population of over 3,000, were abolished and the boards of health and health officers in these 7 villages were placed under the supervision of the County Board of Health, which immediately fell heir to all the sanitary problems in the county. The department as organized consists of a Board of Health of 7 members, a commissioner, deputy commissioner, sanitary engineer, veterinarian, two milk and dairy inspectors, bacteriologist, two clerks, several nurses and part-time assistant deputies.

The duties of the sanitary engineer in a county health department, or of the county sanitary engineer, may be divided into two broad divisions—that of assisting the Engineering Division of the State Health Department in the protection and supervision of the public water supplies and of the installation and operation of sewer systems and sewage disposal plants, and as agent of the local board of health in dealing with

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local problems in sanitation as hereinafter discussed.

The county sanitary engineer supplements the work of the state on one hand, and acts as consulting engineer to the town and village authorities on the other. In no way, however, does he interfere with the professional consulting engineer, but on the contrary does a great deal to stimulate the engaging of competent sanitary engineers by local authorities in order properly to carry out his recommendations.

The promotion of sanitation in communities is a very important duty and one that is difficult to evaluate, as it is chiefly accomplished by personal contacts and conferences with the authorities and civic organizations in these communities.

WATER SUPPLY

The chief and most important duty of the state and county sanitary engineers is the protection and supervision of the public water supplies. In New York State the State Health Department has full authority over the sanitary conditions of public water supplies, but as there are over 600 of these, it is difficult for the State Health Department to maintain continual careful supervision over all. It therefore devolves upon the local health department, in this case the county sanitary engineer, to maintain such close supervision and to do the necessary field work. He is greatly aided in this work by the existence of a laboratory in the County Health Department with a competent bacteriologist in charge.

In Suffolk County there are 31 public water supplies, 2 of which were recently discovered. These range in size from one serving about 100 to one serving about 50,000 people. Of the 48 communities having a population of over 1,000, all but seven, or 72 per cent of the population, are served with public supplies and these 7 communities will soon have public supplies. All these supplies except 2 are derived from wells, chiefly shallow wells, as Long Island is underlain with an extensive and practically pure ground water supply which is cheaply and easily obtainable. This fact somewhat prevents the extension of public water systems in the smaller communities, as it is comparatively easy for the home owner in a sparsely settled village to drive a small shallow well and derive fairly pure water at small cost.

During the last year samples of water have been collected from all water supplies once a month and a sanitary inspection of each supply is made at the same time. The rapid growth of population, and the consequent construction of many new houses, necessitates a careful watch by the county sanitary engineer on the sources of supply in order to prevent the location of any cesspool or other source of pollution near the supply. In some cases, the engineer supervises the installation of proper individual disposal plants placed beyond the required minimum distance from the wells. In other places he has helped to eliminate sources of possible pollution. In some instances where the presence of organisms of the *B. coli* group had been indicated, the seeming contamination was due to defects in the system and was soon cleared up.

The 7 chlorination plants in the county are inspected semimonthly, residual tests for chlorine are made, advice to the operator on the operation of the chlorinator is given and a check-up is made on the report furnished by the operator to the State Health Department. The maintenance of a residual of chlorine of at least 0.1 p.p.m. has been rigidly adhered to. Except for the 2 surface water supplies, the chlorine demand of the waters in Suffolk County is extremely low and careful control over chlorination must be maintained in order to prevent tastes due to over dosages.

The county sanitary engineer is frequently called upon to inspect and report upon the sanitary condition of many private water supplies. In the first year of the laboratory, 47 of these supplies were examined. Including public supplies, the total number of samples collected by the sanitary engineer during that year was 200.

He is also called upon to assist communities in the securing of more palatable water supplies, a service not necessarily of a sanitary nature, but yet somewhat affecting public health because if the taste of a public supply is unpleasant, the people will complain to the Health Department and tend to drive their own wells, which, in the built-up sections, will be more or less contaminated.

In particular, a certain village had a water supply which was high in salt content, high in iron, carbon dioxide and with a low pH. Under the recommendation of the county sanitary engineer, a new piece of property was secured and a test well driven. The results of analyses of samples collected from this well showed it to be satisfactory from all standpoints, and accordingly it was recommended that the village install a new system but particularly to locate the wells as far apart as possible and never to pump them over the rate used on the test well. These recommendations were fully carried out only after considerable time and patience had been expended to convince the village authorities.

In the two years in which the county has had a sanitary engineer, 4 new sources of water supply have been approved and the sources of pollution have been entirely removed from 3 supplies which had been threatened with potential pollution for many years.

SEWERAGE AND SEWAGE DISPOSAL

The satisfactory disposal of sewage on a broad scale in the communities in Suffolk County, particularly in the western part, is the big sanitary problem and the most difficult one to solve properly. When numerous complaints are received from nuisances caused by insanitary conditions due to overflowing cesspools or the discharge of raw sewage into creeks and bays, it is the duty of the county sanitary engineer to agitate and stimulate the construction of a proper sanitary sewer system and disposal plant. Where the State Health Department has already made a sanitary survey recommending sewers, he endeavors to have these sewers installed by developing a plan and a tentative estimate of cost. The difficulty of promoting sewer systems on Long Island, particularly in Suffolk County, is manifold for the following reasons:

1. The comparative ease of disposal of sewage into the generally prevalent sandy and gravelly soil by means of individual plants on small lots makes the great bulk of the population not in favor of them.
2. The flatness of the land and the high level of the ground water, especially on the south side of the island, makes the construction of sewers expensive.
3. The necessity for the protection of shellfish bearing areas and bathing beaches, which are usually in shallow and not well circulated waters, makes the cost of treatment high.
4. The lack of incorporation of practically all the large villages makes the legal method difficult.
5. The rapid growth of the communities in the western part of the county and the consequent expenditure of public money for other necessary improvements make the growing communities reluctant to spend a large amount of money from which only the business and comparatively small built-up areas will receive especial benefit at that time.

The above reasons explain partly the fact that out of the 48 communities above mentioned, only 7 have sewer systems and 1 of the 7 has an adequate and comprehensive sewer system and disposal plant. However, 1 community is now constructing a system and another has been ordered by the State Health Department to construct one.

The county sanitary engineer has completed thorough reports on proposed sewer systems and disposal plants for 2 communities. With the publication of these reports, he will endeavor to seek their adoption and completion by continual personal work with the local committees, organizations and authorities.

The supervision of operation of existing sewage treatment plants is a very important duty of the county sanitary engineer because only 1 of the 7 plants above mentioned has a full-time, trained operator. The operators of the other 6 plants are only part-time and have varied occupations. They had to be convinced of the necessity for the regular report on operation which could be submitted to the State Department. It is almost physically impossible in 3 of these plants to make the regular orthotolodine residual test so the chlorine rate in these plants is fixed according to the maximum flow of sewage. However, all these plants excepting 1 make regular reports to the state and maintain fairly constant chlorine control.

There are numerous places, particularly in the western part of the county, where sewers are needed and it is to be hoped that a broad and comprehensive plan on an economical and logical basis can be worked out and established. With its establishment, it will be the duty of the county sanitary engineer to see that all the installations of sewers and sewage treatment plants are developed and installed according to that plan.

GARBAGE AND REFUSE DISPOSAL

The supervision of garbage and refuse disposal rests to some extent in the Board of Health. Garbage and other organic matter in the process of decay cause disagreeable odors and breed flies and rats. Also, such material is liable to catch fire and sometimes does, which produces smoke which has an obnoxious odor. The indiscriminate dumping of garbage, together with the presence of many public dumps, causes nuisances detrimental to the health of considerable numbers of people in the vicinity of the congested and built-up areas.

The local health department receives many complaints concerning this improper garbage disposal. Where numerous complaints are received in one vicinity, the county sanitary engineer makes a thorough investigation noting the location of dumps and dumping areas and their proximity to houses and built-up sections and the existing facilities in that area for the collection and disposal of garbage and refuse. He then recommends the most logical, economical and sanitary method for collection and disposal. Investigations have already been made concerning the garbage and refuse situation affecting about one-half the people in the county and certain definite results accomplished.

The proper method for each locality differs, but the main point is at first to recommend a place and method of disposal and then build up the collection systems around this focal point. According to present-day practice, the most sanitary and economical method of destroying garbage and refuse is by means of a properly designed and operated incinerating plant.

Because of the conflicting political subdivisions on Long Island it was necessary (in the four chief investigations made by the County Health Department) to recommend different operating procedures to accomplish efficient waste collection and disposal. In one case the *township* was advised to establish an incinerator, in another, a combined incinerator and garbage collection *district* was formed, and in the other two cases, the construction of incinerators was recommended to the incorporated *villages*.

With the providing of incinerators in areas in the county, the towns and vil-

lages are prevailed upon to pass strict ordinances making it criminal to deposit any refuse and garbage in any places other than those provided, and in this way it is to be hoped that the county will be rid of this nuisance producing garbage and refuse dumping.

The County Health Department has already accomplished very definite results in the four chief investigations made. Two places have already spent $110,000, another town has engaged an engineer and will spend about $60,000, and in the fourth, the erection of a suitable incinerating plant is being favorably agitated by the inhabitants. In still other areas, the department will help to stimulate further action in order to provide as soon as possible the proper central incinerating plants for the disposal of all garbage and refuse.

NUISANCES

The investigation and abatement of nuisances is a function of the local health department and one that unfortunately at times consumes a considerable amount of the time of the engineer and the officials of the department. In Suffolk County, all complaints regarding alleged nuisances made to the Health Department are immediately investigated, largely by the county sanitary engineer.

The existence of a nuisance detrimental to health is largely a question of fact and it devolves upon the one who investigates it to decide whether a health nuisance exists or not. Many complainants are satisfied with a personal visit of an investigator because a large number of complaints are only disputes and do not come under the jurisdiction of the Health Department.

Where the department receives numerous complaints from one community relative to improper garbage or sewage disposal, the procedure is usually as mentioned above, that is, a thorough investigation of the whole community's needs is made along these lines. Where isolated cases of these two conditions or similar conditions which might affect health are found, the engineer visits the place and in practically all cases secures voluntary compliance without recourse to legal action. In this way, a great number of major health nuisances, some of which have long existed, have been cleaned up by the County Health Department. In the second year of this department, 74 nuisances and complaints were investigated, 63 of which were entirely abated.

STREAM POLLUTION

The elimination and prevention of stream pollution is a subject which has recently engaged the attention of the Health Department in one particular instance. In this case, the river is a tidal stream, and it was a large shellfish bearing area. A year ago this area was condemned by the Bureau of Marine Fisheries for the taking of shellfish because of high bacterial counts and the apparent presence of human contamination. At the request of the town board of the town in which this river is located, a survey was made by the county sanitary engineer. The result of the survey showed the chief points of pollution to be near the head of the river where there were a group of houses, restaurants, and a hotel, and near the mouth of the river where there was a large state institution having an overloaded sewage plant and a large storm drain, the contents of which showed heavy pollution.

The County Health Department secured the voluntary elimination of the sources of pollution from the storm drain and also was able, by letter of recommendation, to have a new chlorinator installed at the sewage plant and the old one placed in proper operating condition. It was able, through the same procedure, to have the residents along the river remove their sources of

pollution and install proper sanitary disposal plants at a sufficient distance from the river. A thorough re-survey of this stream has been recently made by the department and it was found that the results of bacterial analyses had decidedly improved.

MILK SANITATION

The supervision of installation and operation of milk pasteurizing plants is placed under the direction of the sanitary engineer. In Suffolk County there are 2 dairy and milk inspectors whose function it is to supervise the dairies, of which there are between 200 and 300 producing milk sold in this county. The number of pasteurizing plants has been doubled in the county in the last 3 years so that there are now 12. Continual checking up on the recommendations made by the State Health Department concerning these plants resulted in the final approval of the plants existing at the time of the formation of the County Health Department.

The installation of the new plants was carefully watched by the county sanitary engineer in order that they would entirely fulfil the 75 provisions of the *State Sanitary Code* relating to construction, apparatus and sanitation because it is felt that the placing of a pasteurized milk cap on a bottle means to the milkman an insurance and to the public assurance that the milk contained therein is especially safe and a definite safeguard against the transference of any disease.

CAMPS

The County Health Department through its engineer enforces the provisions of the *State Sanitary Code* relating to camps, including the supervision of water supplies, milk supplies, disposal of garbage and sewage, and elimination of insects, particularly flies, and the issuing of the annual permit. In a survey made last summer there were found about 50 camps in the county many of which had never been inspected before the formation of the County Health Department.

The installation of an adequate water supply under pressure and a water-carriage sewer system with a small sewage treatment plant has greatly helped in the prevention of water-borne diseases and in making the camp a healthful place. The chief difficulty found in sanitation is the proper collection and disposal of garbage and kitchen wastes with a consequent fly problem. The best way to prevent flies, it was explained to the camp directors, was not to allow the exposure of any garbage or other organic matter; in other words, all garbage should immediately be put into properly covered metal cans.

Various methods of disposal of garbage were in use. Some camps had it removed by farmers; some tried burning it; others had it buried; while others were so situated that the garbage was removed by a public collection system, which method is, of course, the best. With the exception of the latter method, burying under at least 6 inches of dirt each day seemed to be the simplest and best method and it was recommended in most places. Keeping the kitchen and its surroundings clean and free of any exposed organic matter was found to be the most satisfactory method of preventing or eliminating flies.

Of the 50 camps, only 33 were given permits last year and some of these only after repeated visits to clean up certain insanitary conditions. It was estimated that about 12,000 people were in the camps in Suffolk County during the summer of 1930.

SWIMMING POOLS

The *State Sanitary Code* prescribes regulations for the construction and operation of artificial and partly artificial swimming pools which regulations are to be enforced by the local health de-

partment. A survey made last year by the county sanitary engineer indicated that such pools in Suffolk County were open to the air and operated only during the summer months. Only 6 pools were found, all located on the south shore, adjacent to public bathing places and operated on the draw and fill method.

These pools were carefully inspected, visits being made on hot Sundays when the bathing was at its maximum peak. As no purification or disinfection process was being used, particular emphasis was laid on the bacterial quality of the water. The sources of supply of the water were carefully examined, and all except one were found to be satisfactory. The results of analyses of samples collected from the pools, with the exception of the last mentioned, showed a bacterial quality above the standard required by the *Code*. This last pool was slightly below the standard, due undoubtedly to the somewhat unsatisfactory source of the water. A special effort will be made before this pool opens this year to have the quality of the water improved either by disinfection or changing the source to wells or some other satisfactory method. A special permit or license is required for the operation of these pools.

In concluding this subject, it might be added that the particular problems mentioned would be somewhat different in other counties, but it is the duty of the county sanitary engineer, trained in the broad principles of sanitation laid down by the State Health Department, to apply these principles toward the solving of the particular problems in his jurisdiction.

DISCUSSION

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MR. COOK'S paper presents an excellent review of the manifold functions of the sanitary engineer in a county health department. Through the engineer, and the inspectors working under his direction, many important contacts are made and services rendered to the individuals composing the population of the health district. Engineers of a state health department deal largely with municipalities and confine their activities primarily to the major problems of the water supply and the disposal of wastes. The county sanitary engineer has intimate contact with the officials of the municipalities or other governmental units within his territory and in addition renders service to smaller groups, organizations, institutions, and individual householders in numerous matters.

The sanitary engineer finds frequent opportunity to act as mediator and arbitrator between local municipalities or areas, and between various departments of the local government, where jealousies and suspicious attitudes or misunderstandings must be reconciled in order to promote a public good. There are many occasions when the differences of communities or groups of individuals with regard to matters of sanitation or conditions of environment need sympathetic and rational handling by the engineer. Such differences frequently arise over the disposition of garbage and the discharge of sewage.

Supervision of milk supplies can only be effective when all of its details are