quantities of solvents; to incinerate varnish wastes and dispose of the varnish fumes innocuously; especially for the disposal of water-aniline mixtures; and with a multiple hearth for the incineration of vacuum-filtered primary treatment sewage sludge. In recent years air-pollution control officials have leveled a valid charge against many industrial incinerators, primarily because of improper operation or overloading beyond design capacity, which results in troublesome air-pollution problems—production of obnoxious odors and large amounts of fly ash.

The sanitary landfill method of solid waste disposal evolved out of a need to control the open dump. Essentially, this method utilizes heavy equipment, such as crawler tractors, to spread and compact the refuse in cells of approximately one third of its original volume, and then cover the compacted waste with an earth cover two feet in depth. The waste is placed in the cells, which are either excavated or placed in low-lying areas, and then covered. In order to be maintained in a sanitary condition, the landfill must be originally designed as an engineering project and properly operated at all times. Without such control the sanitary landfill reverts to the open dump status.[20]

III. Assurance of a Safe Food Supply

The objective of food sanitation, as of other environmental health activities, is the prevention of illness. It is evident that the technological and economic aspects of purveying food play an important role in the application of effective control measures. In addition, it should be the aim of a food sanitation program to accomplish its goal without reducing the nutritional value of the food.

A. ILLNESSES DUE TO INGESTION OF FOOD

Illnesses due to the ingestion of food vary in their nature. They may be divided broadly into four classes: (*1*) infections, which are due to the ingestion of living pathogenic organisms (bacterial or viral) contained in the food; (*2*) intoxication resulting from the ingestion of food in which preformed microbial toxins have developed; (*3*) animal parasitism; and (*4*) poisoning by certain chemically contaminated food.

1. Microbial Infections

In the United States many important food-borne diseases are caused by bacterial contamination. Some of the microbial infections spread by contaminated food are: salmonella infections (including typhoid fever), diphtheria, bacillary dysentery, scarlet fever and other streptococcal infections, staphylococcal infections, tularemia, Weil's disease, and tuberculosis. It is probable that viral diseases are also transmitted in food, but to date the difficulty of propagating and identifying these organisms has made this an unproved assumption in most cases. When contamination is heavy or when the particular bacteria are highly virulent, infection may follow ingestion of the food even though it has been stored under optimal conditions. More frequently, however, the bacteria originally contaminating the food multiply to dangerous numbers during prolonged storage at a temperature between 50 and 150° F. (the so-called incubation zone). Foods most commonly found to be vehicles of the bacterial infectious agents are milk and cream, ice cream, seafoods, meats, eggs, salads, mayonnaise and salad dressings, custards, cream-filled pies, eclairs, and other filled pastries. Unfortunately, the food contaminated by these disease agents is not necessarily decomposed or altered in taste, odor, or appearance.

There are different ways in which bacterial contamination of food may occur. Infected persons may transmit bacteria by droplets (sneeze or cough) from the respiratory tract, by discharges from skin infections of the hand, and by contamination of hands with feces, nasopharyngeal secretions (failure to wash after blowing the nose), and discharges from open or draining sores elsewhere on the body (failure to keep these covered). In some instances the infected person is without symptoms or signs of illness and therefore difficult to detect and control. Another source of bacterial contamination of food is the multiplication of bacteria in improperly cleaned utensils with transfer to foods subsequently served, stored, or prepared in them.

Mice, rats, and roaches may contaminate foods and utensils by bacteria carried mechanically on their feet and bodies from an infected to a noninfected area, or they may contaminate food with their urine and feces which may contain pathogenic organisms such as, in the case of rats, *Salmonella* and *Leptospira icterohaemorrhagica* (cause of Weil's disease). The source of infection in meat and poultry may be their infection before killing, or contamination may occur subsequent to killing, as with other foods.

The clinical symptoms of acute gastric enteritis due to bacterial infection usually have their onset 6 to 24 hours after ingestion of the infected food. Cramping abdominal pain, diarrhea, nausea, and vomiting are the chief manifestations; often these are accompanied by headache, pyrexis, and general malaise.[21]

2. Bacterial Food Poisoning

Bacterial food poisoning is caused by bacteria that, while usually harmless to man, produce toxic substances when they grow in food. These toxins, when ingested in sufficient amount, give rise to serious or fatal disease, even though there is no further multiplication of the organisms in the body. Bacteria of the staphylococcus group, often found in skin infections (pimples, boils, carbuncles) and respiratory tract infections, may form a virulent enterotoxin when allowed

[20] Analysis of refuse collection and sanitary landfill disposal, *Tech. Bull.* No. 8, Series 37, University of California, Berkeley, 1952.

[21] K. F. Maxcy, "Contagious Disease Spread Largely through Fecal Discharge." *Preventive Medicine and Hygiene.* 8th ed., Appleton-Century-Crofts, New York, 1956, Ch. 3.