The canning industry has always had to consider sanitation, but as the result of a "spot" survey, an intensive educational nation-wide program was authorized in 1945, and the development is described. An early conclusion was the necessity of each plant having a trained man responsible for the plant sanitation. Cannery sanitation as compared with Public Health Sanitation is largely a matter of plant efficiency, product quality and esthetics. Various categories of canny sanitation and their application are described. There is an important place for the industry sanitarian as well as the enforcement sanitarian, and there is need for a standardization of concepts between the two.

The canning industry is tremendously important to the health and economy of our country. In the last quarter century our population has tended to concentrate in urban areas which has brought more and more dependence on commercially preserved foods. Economically the canning industry gives support to hundreds of thousands of people with a payroll of $600,000,000 to $700,000,000. The average annual pack of canned foods is about 560,000,000 cases or approximately 16,900,000,000 cans a year, and is being pushed higher because of government needs for the armed forces. The value of canned products shipped in 1950 was about $2,500,000,000, and the value added by manufacture was about $1,000,000,000. These figures emphasize the importance of the canning industry to our overall economy. It is even more important when we realize canning provides an outlet throughout the year for a vast amount of our seasonally grown agriculture products, and agriculture we are told is the backbone of our country. During the last two World Wars great quantities of canned foods were used to feed the armed forces and are still being used for this purpose. In the recent struggle, canners produced two-thirds of the food supply of our fighting men. In recent years we have come to realize the importance and safety of canned foods for feeding of civilian populations that may be so unfortunate as to experience present day atomic, biological or chemical warfare. More generally appreciated, however, are their convenience, economy and indispensable role in the nutrition of the American people.

Sanitation Program of NCA

The National Canners Association is an organization of packers of canned foods, established in 1907, whose broad objective is to increase the use of canned foods and to improve the efficiency of operation of its members. The Association has members in 44 states and three territories, and its membership packs from 75 percent to 90 percent of the industry’s total production. It is a non-profit association supported by dues paid by the members and contributions from can and glass manufacturers. The activities are governed by a board of directors from the membership, and standing and special committees. A large part of the Association’s budget is expended in fundamental and applied research in the laboratories in Washington, D. C., Berkeley, California, and Seattle, Washington. The Sanitation Program is a part of the laboratory activities.

The canning industry has always had to consider sanitation in order to put up a product that would keep. However, it was in 1945 that the Board of Directors inaugurated an intensive sanitation program as such, both in the Washington laboratory and the Western laboratory at that time in San Francisco.

The program has had a logical development. We began by making voluntary and confidential critical sanitary surveys of as many plants as possible, which served to demonstrate our concept of sanitation to our members in a practical way and in terms of their own operations and problems. It also taught us a good deal about the industry and its sanitation problems and gave us a practical basis on which to build our program. It soon became apparent that we could not accomplish our objective through inspections alone without an unreasonable staff. Also, we did not feel policing our member plants would be a proper function. We were convinced, and still are, that an educational program to teach the principles of good sanitation and the reasons behind them,

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would result in the most lasting benefits. It is our endeavor to have at least one trained man in each canning organization. Many of the larger organizations now have well trained and experienced men in charge of their sanitation departments. Inasmuch as the canning industry is in a large part seasonal, only a few of the smaller organizations or single plants have found it feasible to attach a full time, experienced sanitarian to their permanent year round staff. For this reason we have offered sanitation training to qualified men from the plants who are already familiar with the plant operations and personnel.

Since 1945 we have given 8 training courses in food plant sanitation varying from 8 weeks to 1 week each. They have covered fundamental and up-to-date information concerning sanitary science and its application to plant problems. Such training is sketchy, but many of the men who attended have accomplished amazing things, not because they were trained scientists, but because of their common sense, tact and practical knowledge of the plant and its personnel. These men need the cooperation of their associates and managers, and we have taken every opportunity to discuss the subject with management, and have held a number of one- and two-day conferences in various canning centers with superintendent and foreman groups. In addition, we act as consultants on sanitation problems and as a source of information. Each month we put out a brief sanitation news letter called "The Conveyor" which we try to give popular appeal. This serves to keep the thought of sanitation constantly before the industry.

Association of Food Industry Sanitarians

Another group you will be interested in knowing about is the Association of Food Industry Sanitarians. As the name implies, this is a group of food industry sanitarians who have incorporated for the purpose of maintaining and improving the high sanitary standards in the canning, freezing, dehydration and other food processing industries throughout the United States and its territories by fostering and encouraging research and the dissemination of information which would aid in the practical application of the most advanced scientific sanitation principles in these industries, to publish, or cause to be published, useful information related to sanitation, to cooperate with other associations in the solution of sanitation problems, etc., and to maintain a high degree of skill and efficiency among its members.

We hold annual meetings and distribute to the members only, a monthly Bulletin. The most ambitious project has been the writing of a book on food plant sanitation in cooperation with the National Canners Association. The complete title is Sanitation For The Food Preservation Industries. We have attempted to make it a practical book and as non-technical as possible. It covers all phases of sanitation applicable to food plants; in particular, canning, freezing and dehydration, although the principles are applicable any place. We have covered organization of plant sanitation programs, inspection techniques, housekeeping, animal and insect pests, microorganisms, water, chlorination, construction, cleaning, employee facilities, feeding and housing, wastes, and laboratory aids to the sanitarian. The publisher is the McGraw-Hill Book Company of New York who have published it as one of their food technology series.

Principles of Sanitation

The principles of sanitation are the same in all fields. Public health considerations, while of the utmost importance, do not require a great deal of the cannery sanitarian's time, except the industrial hygiene and feeding phases as applied to the employees. Heat processes for commercial sterilization of canned foods of public health significance have been established by the National Canners Association and other agencies, through intensive scientific study over a great many years. Cannery sanitation therefore, becomes largely a matter of plant efficiency, product quality and esthetics, all of which are important. The industry sanitarian has the Governmental laws and regulations to guide him, but he is expected, in addition to avoiding violations, to also determine for his company how poor sanitation practices can be corrected in the most practical way. He should consider sanitation as related to product quality and production efficiency without limitation to minimum legal requirements. It is the duty of an enforcement official to specify, within his legal authority, what results must be attained and maintained, but it is up to the plant itself, to determine how to obtain these results. Suggestion will often be requested and appreciated, but the procedure should not be made a requirement. There are exceptions of course, where this is not practicable.

It is not possible to define limits of sanitation, because it is closely tied up with quality control and production. However, for discussion we can divide it into categories such as housekeeping or tidiness, control of rodents or insects, control of microorganisms, water supply, construction and maintenance of buildings and equipment, cleaning, industrial hygiene, maintenance of facilities for employee comfort and welfare, treatment and disposal of wastes, and in some plants the feeding and housing of employees.

Tidiness means, of course, a place for everything and everything in its place. A plant that is littered with unused and unwanted machinery, scrap iron, pipe, nuts, bolts, sacks and debris, is not a place where quality and production will be at its best. A slovenly plant tends to induce poor workmanship on the part of employees. Rubbish and debris may harbor insects and rodents that may contaminate the product. The mere presence of de-
bris, dust and dirt in a plant may in itself, be the cause of contaminating food with foreign material. In addition, the tidiness of a plant is the first impression anyone gets when visiting the plant.

Rats, mice, and other animal and bird pests, may be a source of serious contamination. The same is true of various insects such as houseflies, fruit flies (Drosophila), roaches and the stored product insects. Much of the insect contamination of some products originates in the field, but even with complete elimination of the field problem, failure to consider sanitation at the warehouse or plant may be disastrous.

If the control of significant microorganisms is inadequate, they may cause a lowering of product quality, or spoilage. In canning, recontamination and spoilage may occur because of high microbial populations in can cooling water. Organisms of a heat resistant type, which may multiply in the equipment, may cause spoilage. Slime and mold on equipment and building structures grow rapidly and are problems for the sanitarian that may affect the quality of the product. The uncontrolled build-up of acid producing microorganisms on equipment and in concrete floors, may greatly accelerate corrosion. Germicidal materials and methods of their application must be such that equipment will not be damaged, and off-flavor will not result. Also, they must comply with pure food laws. An outstanding development in the last 5 years has been the continuous application of a germicidal solution of chlorine using the breakpoint method to obtain a chlorine residual in almost all of the plant water. This has not proven to be a "cure-all", nor has it eliminated the necessity for clean-up but it has helped a great deal in reducing slime growths and the build-up of microorganisms in equipment. It results in a cleaner plant and a better place to work, increases efficiency, and reduces the time and cost of keeping the plant clean.

In cleaning the plant, a great deal of time and money can be wasted if the program is not properly organized. The person responsible for sanitation should make a study of the cleaning job in his plant, to eliminate lost motion. He should determine where detergents can be used to the best advantage, how they can be applied most effectively, where other cleaning aids such as high-pressure water and special brushes can be used, where germicides should be applied, and by no means the least important, what degree of cleanliness is necessary in the various equipment. Some pieces of equipment may need more frequent or more thorough cleaning than others.

Water is one of the commonest materials used in food plants. It serves as a packing medium for many products; is used for fluming foods and waste materials; and serves for cooling, heating (steam), cleaning and drinking purposes. To obtain a high quality product, water must be of proper chemical and bacteriological quality. Certain chemicals in water have a bad effect on some products, on cans, boilers and other equipment. The hardness of the water and type of hardness will govern, to a certain extent, the type of cleaning compounds that can be used. The water must be bacteriologically safe and esthetically satisfactory for drinking and for use on the product, and it must not cause biofouling of the distribution system. The coliform presumptive test is not always a satisfactory criterion. In the face of water shortages, it may be necessary to devise ways of saving water and reusing it for various purposes. This raises many problems in determining where certain waters can be safely reused. The use of water greatly affects the problems of disposing of liquid or semi-liquid plant wastes. This is becoming increasingly important because much attention is now being given to reducing pollution so as to obtain the most economical and beneficial use of our natural waters for the greatest number of people. Many plants are having to re-evaluate their production of waste and means of its disposal, and the problem of liquid waste disposal, coupled with water shortages, may make necessary some changes in production methods. Solid wastes also present disposal problems in some areas, and the possibility of utilization of the various types of wastes to reduce disposal costs are being considered. The sanitary handling of wastes within the plant is also of importance in that insect breeding and other insanitation is not encouraged.

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The construction of equipment and buildings is of great importance. The cost of a piece of equipment is its original cost plus the expense of maintenance and cleaning during its entire useful life. Therefore, equipment purchased or built with sanitation and ease of cleaning in mind, may be more economical in initial cost, but will usually be more economical to keep in a sanitary condition and significant over-all savings will result. Quality losses and spoilage have, on many occasions, been traced to poorly designed and improperly constructed equipment.

The employees' health, welfare and mental attitude are also of great importance. More and more skill is being required in this period of greater production and higher quality, and it is expensive to hire new and untrained people. Much of any employee's time is spent in his working environment, and if we want to keep him healthy, happy and efficient, we should provide comfortable and sanitary facilities for his personal service. Clean toilets, locker rooms, rest rooms, warm water for washing, elimination of work hazards, etc., are of more immediate and personal interest to the individual worker.
than the plant production record or profit for the year.

In some plants, housing is provided for employees, and more and more plants are providing cafeterias where the employees can obtain nutritious, wholesome meals at reasonable cost. Most plants believe this is a valuable service to the workers and results in greater efficiency. However, group feeding brings the danger of transmission of communicable diseases if not operated in a sanitary manner. A poorly operated, insanitary cafeteria can result in many workers being incapacitated in a matter of hours due to food poisoning and food infections from improperly prepared or stored foods. This could be disastrous when tons of perishable raw products are waiting for processing.

Various laws and regulations apply to food industry sanitation, but laws and regulations, by their very nature, can establish only minimum requirements. While some of these requirements may be difficult to attain, most progressive industrialist desire to conform to the greatest possible extent, and in many ways even go far beyond the minimum required. Frequent inspection by government agents and enforcement of regulations alone merely serve to maintain minimum standards. However, such inspection is necessary and of value in disclosing conditions that have been overlooked, and in keeping the recalcitrant individual, who refuses to recognize his responsibilities, from threatening the reputation of the rest of the industry. It is far better that plant managers recognize sanitation in its true relationship to their entire operations. Self inspection to find and correct insanitary conditions leading to possible trouble before it occurs is a sensible approach.

So, in practice there is an important place for the sanitarian both in private industry and in government enforcement. Fundamentally, the work is similar, but in practical application it may be quite different. Nevertheless, it is a professional obligation to standardize our thinking, concepts, interpretations and application of the sanitary sciences to as great a degree as possible. Men entering this and related fields from public health and food technology departments of our colleges and universities should have uniform training in food industry sanitation so their concepts will not vary greatly in different sections of the country. Reference books, such as the one I have mentioned, and the various published papers will all help us to progress together. And most important of all, meetings such as this, where private industry and government representatives can become acquainted and exchange views, will aid us in our mutual responsibility of assuring the public of the availability of good quality, nutritious foods.

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**Efficiency of Machine Dishwashing**


**Third National Conference on Interstate Milk Shipment**

The Third National Conference on Interstate Milk Shipment was held at the Hotel Statler, St. Louis, Missouri, June 10-12th. Representatives of various milk control authorities and industry from twenty-seven states participated in the Conference.

General agreement was reached on a number of problems and several were assigned for further study.

Maintenance of an informal type of organization was decided upon by the general assembly. An executive committee was elected which in turn chose their chairman for 1953. J. L. Rowland, of Missouri was re-elected by the committee to serve as Chairman of the Executive committee.

Remarkable progress has been made through the three conferences toward solving the many problems connected with the interstate shipment of milk. The need for better education and participation of local control authorities with regard to the interstate program is becoming more apparent. The various states were urged to expend much greater efforts toward dissemination of information. The complete report of the conference will be published in this Journal in the near future.