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Official Publication

International Association of Milk, Food and Environmental Sanitarians, Inc.

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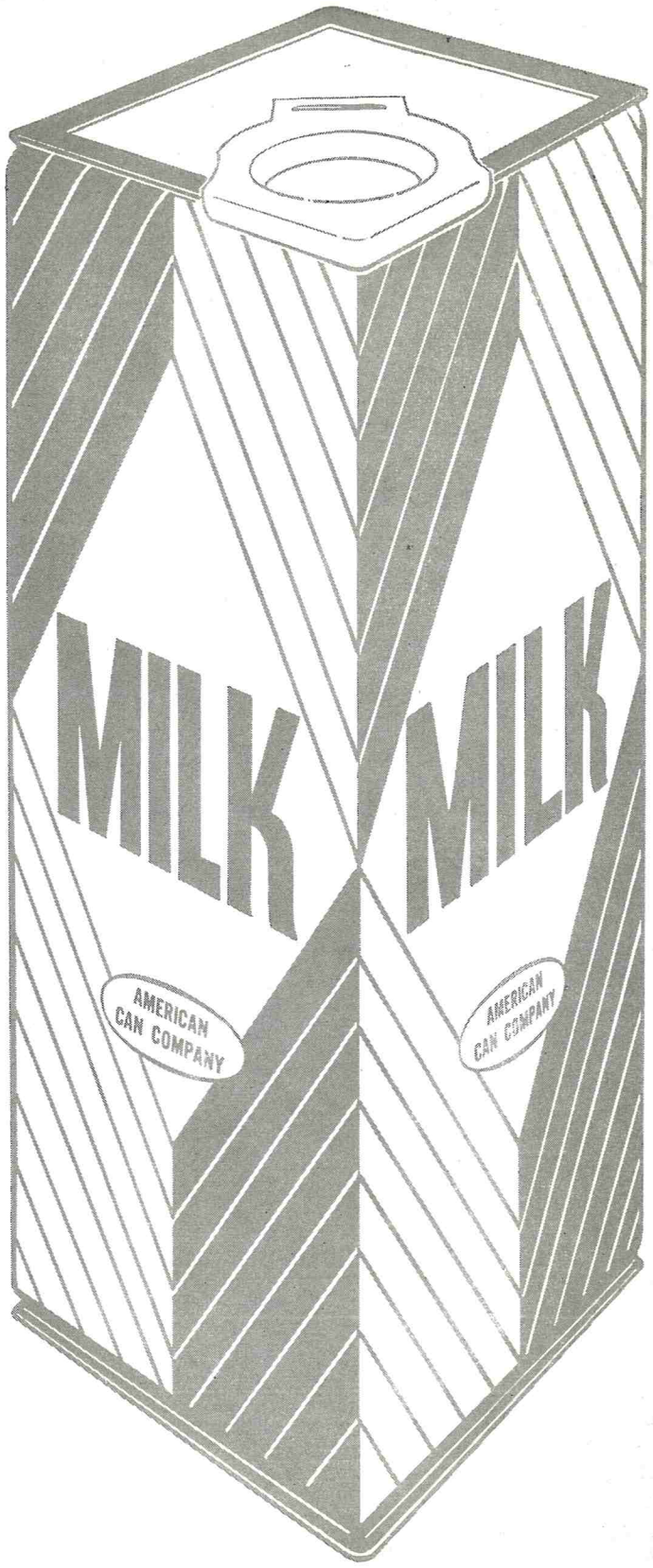

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SAFE AND SANITARY – At American Can Company, carefully controlled modern production procedures insure that customers receive milk at its best in the best possible sanitary container.

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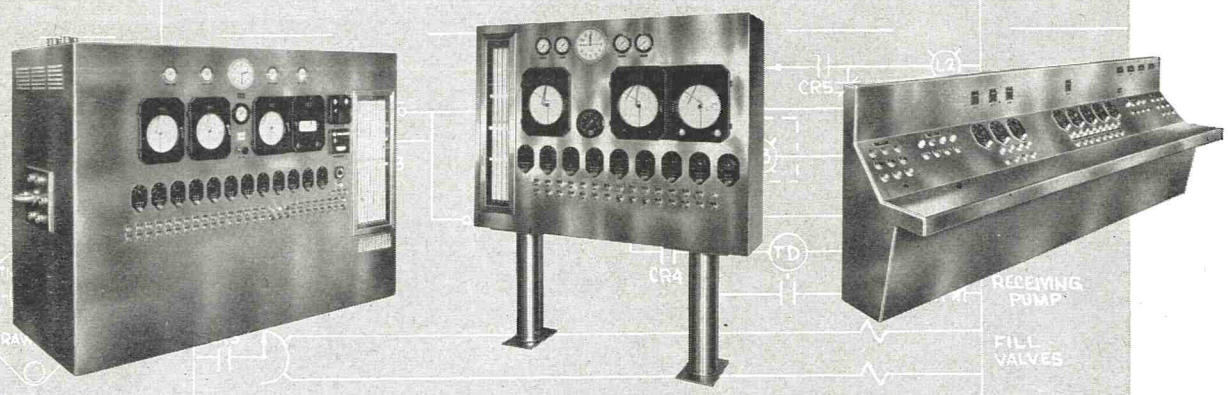
Sanitation Must Be Designed Into . . .

Centralized Process-CIP Control Systems

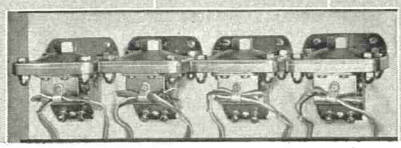
SINGLE ORGANIZATION **KLENZADE** RESPONSIBILITY



KLENZADE CUSTOM-DESIGNED CONTROL PANELS

Centralized Process-CIP control cubicles are employed where extensive process instrumentation is required close to the production area. Smaller floor or wall-mounted panels meet the control needs of less complex operations. Where the control operator need not have access to production areas, desk-type consoles are ideal.

INTERIOR VIEW—CONTROL CUBICLE



TANK LEVEL CONTROL

Interior View— Control Cubicle

This construction provides accessibility to all panel components — rotary switches, push buttons, pressure switches, relays, delay timers and other auxiliaries—for inspection and maintenance. Also readily adaptable to expansion for future needs.

Tank Level Control

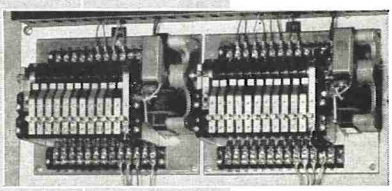
Pressure switches piped in parallel with manometers provide automatic high-level cut-off and low-level alarm, as well as CIP interlock protection.

Valve Sequencing Control

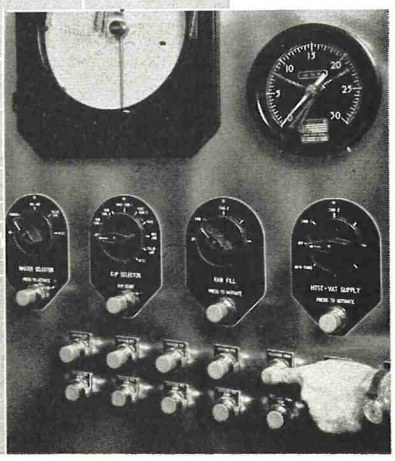
Heavy-duty stepping switches are used for controlling in-place cleaning of air operated valves.

Product Flow Control

Rotary switches and push buttons establish completely automatic product flow control circuits and CIP cleaning circuits.



VALVE SEQUENCING CONTROL



PRODUCT FLOW CONTROL

Automation Engineering-Equipment-Detergents **KLENZADE PRODUCTS, DEPT. 21H BELOIT, WIS.**

Editorial

CHANGE AND PROGRESS

The 1964 World's Fair to be held in NeW York City will have, at least to many of us, some radical innovations in the sanitary supervision of its food services.

The 1939-1940 World's Fair, in the same general area, was subject to regulation and supervision by a regulatory group drafted from the New York City Health Department and the several State agencies.

Today, believe it or not, it is to be a function of the Pinkertons, fundamentally a security agency, who have contracted for all sanitary services in all eating establishments, rest rooms and grounds as well as the security of the Fair.

Almost two years ago there was made available to vendors, concessionnaires and exhibitors a copy of a "sanitary code" governing the regulation and sanitary control at the Fair.

Does this typify a trend? A trend which was aborning many years ago.

I have a picture in my desk captioned "New York City's First Corps of Country Milk Inspectors"—twelve gentlemen, eleven of whom wore derby hats. They were appointed in 1906. I mention these gentlemen because, weather permitting, they undertook the task of inspecting every farm producing milk for consumption in New York City. Over the years this work has been passed off on industry. The field sanitarian was developed; the laboratory could ferret out the violators and self inspection was encouraged in plants.

Among the regulatory agencies we now see accepted reciprocity, certification and sworn statements as replacing frequency of inspection. Administrators have justified this trend by flattering industry in that perhaps it has come of age, and, like the backward countries there are other fields in the environment that need all the attention they can get.

What now may you and I foresee in the future? Like the Pinkertons will the trade associations, foundations, etc., eventually be charged with the sanitary control of their members? Will the regulatory sanitarian now become the industry sanitarian? Will the health administrator of the political subdivision develop a system of licensing which will deputize the industry sanitarian as a quasi-regulatory representative?

Industry, of itself, must take an impersonal attitude. Sanitation is a cost of doing business. It is reflected, like other costs, in what the consumer pays.

If the end result is the same, it doesn't make much difference if the cost involved is paid to the tax collector or the supermarket, or does it?

Many outstanding regulatory sanitarians have migrated to industry. Specialization is kept very much alive. Most important though, be it civil service, management or union, if we are worthy of the name sanitarian, there will always be a place to practice our profession.

FRED E. UETZ,
Assistant to Vice-President
In Charge of Production,
Pioneer Ice Cream Division, The Borden Company
New York, New York

SANITARIAN MANPOWER

ISRAEL LIGHT, MARYLAND Y. PENNELL AND DAROLD W. TAYLOR[1]

Public Health Service
U. S. Department of Health, Education, and Welfare
Washington, D. C.

The sanitarian is a strategic member of the public health team. Because of his contributions to the Nation's health and welfare, his identity and functions need to be crystal clear. In a larger context, the continuing critical manpower shortage in the health-oriented occupations makes it mandatory to husband the available human resource. Therefore, it is important that *all* groups in the health field know who they are, what they do, how and why their objectives change and their functions expand, and what new and different competencies are required of them to render maximum effective service to their fellowmen in a rapidly changing environment.

In viewing kaleidoscopically the history of medical advances and public health developments in the United States in the past 100 years, the sanitarian has proven an invaluable assistant to the basic professional specialists in these areas. In early days it was the physician who functioned as a sanitarian responsible for the health and welfare of a community. As the importance of environmental health was recognized, the sanitarian was charged with water, sewage, milk and food control and other aspects of the physical environment that are involved in combatting communicable, infectious diseases. Changes in the pattern of health and disease and the rise to prominence of new environmental health problems have brought into sharp focus the increased challenge to the field of sanitary science.

In the face of this growing specialization, sanitarians have themselves felt the repeated need to re-assess their role and clarify their status. The pioneering work of such people as Mangold, Bliss, and Dwork are well known. In recent years the State of Pennsylvania has made at least three surveys of its sanitarians *(5, 6, 8)*. The California Association of Sanitarians examined the experience and educational background of sanitarians in that State *(2)*.

The need for a major survey was expressed five years ago by Mangold *(3)* who stated, "Because of the rapid growth of the responsibilities of the sanitarian, a new appraisal is vitally needed. This study would enhance the prestige of the sanitarian and should tell a complete story, whereas in the intervening years, we have only studied parts of his activities. This type of factual study would be of direct benefit in drafting or readjusting curricula in sanitary science, in describing and assembling examination items for this position by civil service commissions, in giving more complete information to state legislatures, boards of supervisors, and city councils. We must not depend upon our sporadic efforts or those of other public health workers to inform the public of our responsibilities in maintaining a sanitary and healthy environment."

Recognizing the need for as comprehensive a picture as possible, the U. S. Public Health Service last year (1962) conducted the first truly national manpower survey of the professional characteristics of thousands of people who claimed themselves to be sanitarians.

In comprehensive terms, the objectives of the survey were to help point toward a more accurate definition of Sanitarian with implications for educational institutions to plan more and/or different academic training of sanitarians, supply data which would be helpful to State legislative bodies in establishing and/or changing registration standards, provide information on salary and other items which would be helpful to the occupation's leadership in strengthening the sanitarian's role and position among the health-related groups.

There is no single definition acceptable to all interested parties. The American Public Health Association *(1)* issued a definition in 1956 which is worth noting: "A public health sanitarian is a person whose education and experience in the biological and sanitary sciences qualifies him to engage in the promotion and protection of the public health. He applies technical knowledge to solve problems of a sanitary nature and develops methods and carries out procedures for the control of those factors of man's environment which affect his health, safety, and well-being." An A.P.H.A. subcommittee has met to consider the qualifications of public health sanitarians and may wish to revise this definition. The

[1]All the authors are with the U. S. Public Health Service. Dr. Light, now at the National Institutes of Health, was assistant to the Chief of the Office of Resource Development (Environmental Health) while the survey was under way. Mrs. Pennell is Health Manpower Branch Chief in the Division of Public Health Methods. Mr. Taylor is Milk Sanitation Section Chief in the Milk and Food Branch of the Division of Environmental Engineering and Food Protection and is designated as Public Health Service Liaison Officer with the sanitarian profession.

Public Health Service has its own description of sanitarian eligibility for employment.

The national professional sanitarian societies have their own definitions. There must be many more in existence. All have been attacked as either too comprehensive or too limiting. Perhaps the functions, duties, and responsibilities of sanitarians today are such as to make them a group more easily described than defined. At the same time, it should be a matter of concern to the occupation that 2 out of 5 survey respondents who reported themselves as engaged in sanitarian-type work did not have the title of Sanitarian. A good case can be made for uniformity of title and identification in terms of professional visibility, public image, State certification and registration, salary equity, standards of training, and levels of competence.

With the initial assistance of the three national professional sanitarian associations that provided their membership rosters, a master mailing list of some 16,000 names was constructed. Questionnaires were mailed to this entire file in May and June of 1962, with a followup later that summer. A third request took the form of a postcard. As a result of unavoidable duplications, deaths, incorrect addresses, and outright failure to reply, a final roster of some 10,700 people professing themselves to be sanitarians has been compiled. Of these 7,263 full-time employed persons returned completed questionnaires. All the finally published data on professional characteristics of sanitarians are based on these 7,263 returns. Probably there are considerably in excess of 14,000 sanitarians currently employed in the United States.

The roster indicates a national ratio of 5.7 sanitarians per 100,000 population in mid-1962, or 1 per 18,000 persons. This may be compared to a widely used figure of 1 sanitarian or sanitary engineer for every 15,000 persons as a basic and minimum public health service requirement *(4)*. This standard was established in 1950 and should be reviewed in the light of current public health practice. Milk, food and meat technology as well as water, refuse, wastes and vectors have probably been recognized in this ratio as areas of work experience of sanitarians. It is doubtful that allowance has been made for the sanitarians' role in such fields as air pollution, radiological health, and occupational health. Also housing and institutional sanitation may or may not be a part of the local public health program. Hence, the ratio of sanitarians to population has to be evaluated in terms of the responsibilities assigned to the profession.

The Western region of the country has relatively more sanitarians in relation to population than any of the other three regions. The 13 western States have a total of 2,400 sanitarians or 7.8 per 100,000 population. The South has more sanitarians (3,700) but a lower ratio (6.4). The North Central region with a ratio of 4.9 and the Northeast region with a ratio of 4.4 are considerably below the South and West.

California is the State with the largest number of sanitarians listed in the roster. The count of 1,135 located there is nearly double the number in New York State. Ten States account for half of the total.

High ratios of sanitarians to population prevail in many of the western States. Hawaii is at the top, with 15.4 sanitarians per 100,000 population, followed by Wyoming, Alaska, Oregon, Utah, and Colorado. Although California led in actual numbers of sanitarians, its ratio of 6.7 is lower than that of 20 other States.

Major survey findings are grouped into the following categories: for whom sanitarians work, what they do, their areas of competence and specialization, their salary, their education and training, and general characteristics.

FOR WHOM DO SANITARIANS WORK?

State and county governments are the major employers, accounting for 61% of the respondents. City governments account for a further 17%. The Federal Government's 6% is divided among civilian employees, those in military service, and the PHS commissioned corps.

The nongovernment segment of 16% is divided among business including self-employment, education,

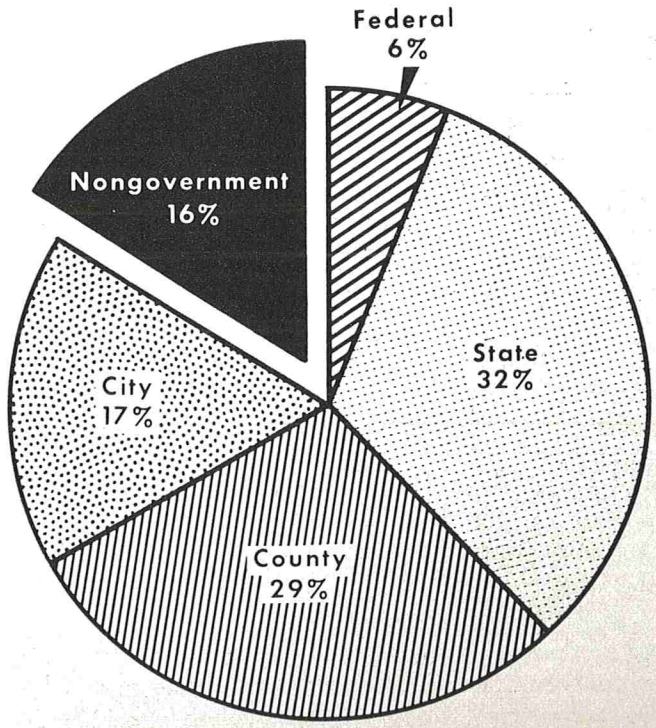


Figure 1. Employers of sanitarians in the 1962 survey

nonprofit organizations, and other types of employment. If information were available for the total manpower supply, the proportion employed outside government might exceed the 16% tabulated (Figure 1).

In order to learn something about position descriptions of persons who regard themselves as sanitarians, each person was requested to furnish his official payroll title. Three out of 5 claimed the title of sanitarian. One out of 5 claimed the title of inspector, officer, or aide. The remaining 1 out of 5 wrote in his title which took many forms. Some used occupational classifications such as bacteriologist, chemist, industrial hygienist and so on. Some gave indication of grade such as director, chief, associate, assistant—usually followed by the name of the unit supervised.

WHAT DO SANITARIANS DO?

Half the respondents report their primary activity in terms of working time to be in the field of inspection, testing, and/or quality control. Almost another fourth are in the management-administration category. Of the remaining respondents 5% are in research-teaching-writing, 5% in consulting, and 17% have general duties or are involved in production, sales, or marketing.

A larger proportion of the nongraduates than of the graduates were engaged in inspection, testing, or quality control—58% compared with 46%. The reverse was true for the field of management or administration, with relatively more of the graduates having this type of work.

WHAT ARE THE SPECIALIZED BACKGROUNDS OF SANITARIANS?

Slightly more than one-third of the group report food and meat technology as being their area of greatest competence. Another third report milk as their specialized field. Less than 7% indicate any other single area among 15 listed.

In recent years sanitarians have been assigned various functions, duties, and responsibilities in such relatively new fields as air pollution, radiological health, and occupational health. These combined fields were chosen as representing their major specialty by only 3% of the respondents. The sanitarian occupation is acquiring greater perspective and growing numbers of specialists in these specialties can be expected.

Such hope and expectation lead naturally to the consideration of *education*. Almost two-thirds (63%) of the total group surveyed are college graduates. Many reported 2 or 3 years of college but had not completed the full course leading to the bachelor's degree. That 2 out of 3 respondents had graduated from college may reflect a greater response among the better educated in the occupation. The mailing lists were essentially members of the professional sanitarian associations and persons so affiliated are usually assumed to be among the better educated in any calling.

The college-graduate group are divided into two-thirds with the bachelor of science and one-third with the bachelor of arts. Relatively more of the nongovernment than of the government employees are college graduates (Figure 2).

A wide variety of background fields are represented among the respondents: 29% in agriculture, 25% in the biological sciences, 24% in public health and/or veterinary medicine, and 13% in the physical and earth sciences. Only 4% majored in the sanitary sciences, which constitute a relatively new grouping of health related specialties offered primarly at the graduate level. Opportunities for advanced study in environmental health are becoming more frequent and should attract greater numbers of persons.

Fourteen percent of the respondents indicated that they had earned a master's degree. Three-fourths of the degrees were either the master of science or master of public health.

A doctor's degree had been earned by 3% of the total. This was more likely to be a PhD degree than any of the other doctorates.

The varied background majors of the respondents suggest that there is as yet no clearly defined and sharply focused basic curriculum to produce sanitarians with initial competence on the job. The great variety of majors represents a measure of the many facets of a sanitarian's work leading to later specialization.

The survey shows that enrollment for specialized short-term courses is characteristic for practically all respondents. However, the sanitarians tended to concentrate within their own specialties. The greatest number of respondents are specialists in milk, food, or meat technology and these individuals enrolled for short courses in their same fields. In the face of the need for sanitarian generalists, this concentration should be examined. That sanitarians report taking so many specialized short courses could be an indication that: *(a)* they have a keen interest in keeping abreast of new developments in rapidly expanding technologies; *(b)* they are being assigned to a greater variety of fields in many of which they have little or no substantive background; and/or *(c)* their original basic education and training may have been inadequate in some areas. The survey points out the need for continued emphasis on in-service training programs.

WHAT ABOUT SALARIES?

The median annual salary is $5,960; that is half the respondents receive less and half receive more. Who the sanitarian works for makes a difference. Median salaries are highest for those in teaching or in business ($8,840) and lowest for those employed by State and local governments ($5,660).

Education made a difference, too. College graduates have a median salary $1,000 higher than that of nongraduates ($6,350 compared to $5,350). But the advantage of a college education discloses much greater spreads by type of employer. The differential is about $3,000 for Federal and nongovernment sanitarians but only about $700 among State and local government employees (Figure 3).

That one-fourth of the respondents receive less than $5,000 per year and half receive less than $6,000 reflects the obviously depressed salary schedule among the major employers. State and local governments employ 3 out of 5 sanitarians, yet they pay the lowest and show the smallest differential for a college education.

These data are representative of the many facts to be found in considerable detail in the Health Manpower Source Book titled *Sanitarians*, recently issued by the U. S. Public Health Service (7). This questionnaire also asked for information on such general characteristics as year of birth, sex, length of work experience, membership in professional association, and State licensing. Three-fourths of the sanitarians reported that they belonged to one or more national professional associations.

DISCUSSION

The survey raises many questions and identifies many problem areas to which the authors feel organized sanitarian leadership can address itself with profit. In the desire to be initially comprehensive, the survey could not investigate certain areas in depth. Future studies of specific aspects of sanitarian work would illuminate many relationships which remain obscure.

For example, age distribution was poorly reported in the survey, with the result that the expansion or contraction of manpower in the occupation cannot be determined. There are great differences in concentration of sanitarians throughout the Nation. Is there an adequate supply to serve the needs in all areas? Is there a deficit of trained sanitarians, with increasing shortages predicted for the future?

The reported years of work experience suggest that a significant number of sanitarians do not enter the occupation directly from school. Why not? How can recruitment be made more effective?

There are no data at present on the number of college graduates with majors in the agricultural, biological, and health-related sciences who become sanitarians. Should there be a basic curriculum for

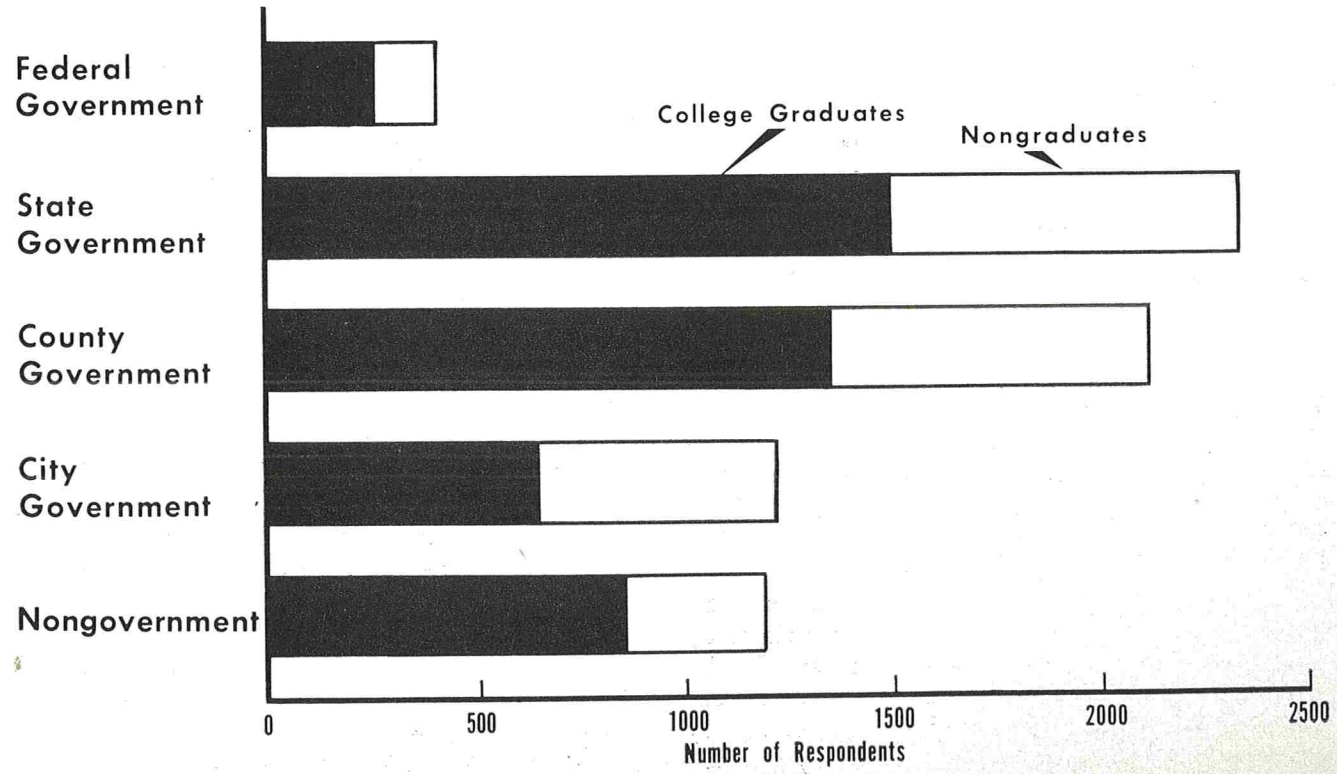


Figure 2. Education related to employer of sanitarians, 1962

all sanitarians regardless of their later specialization? Or should there be two distinct curricula, one for the generalist and one for the specialist? The nature and extent of short-term, specialized courses should be further examined for clues that might disclose limitations in the basic education of sanitarians.

Further study should be made of the great spread in salaries among regions, with particular attention to differences in levels of competence and performance. Are the functions, duties, and responsibilities of sanitarians today too varied and diverse for effective on-the-job performance? Has the professional sanitarian outgrown certain functions which should be assigned to lesser trained personnel?

The survey data will be interpreted differently by sanitarian societies, by employers of sanitarians, by those who educate and train sanitarians, and by the sanitarians themselves. All interpretations and analyses should lead to further study, and further study can lead only to improvements, individually and collectively for those in the occupation.

To develop sufficient data for an effective study of manpower requires consideration of the supply of sanitarians, their utilization, and the need for their services. The measurement of supply involves the collection of data describing those currently in the profession and those in training to become sanitarians. From such data as mortality rates and anticipated population growth the manpower investigator can develop information on the current sanitarian-population ratio, the anticipated supply, and replacements required to cover deaths, retirements, and expansion. Supply data must be accompanied by information on the degree of utilization of those currently employed, the demand or need for personnel with such training, and the unmet need for sanitarian services. The present duties and reponsibilities of the sanitarian have evolved to meet modern needs and can be expected to change with future growth of the profession. Single copies of the Source Book are available free by writing to the Public Inquiries Branch, U. S. Public Health Service, Washington, D. C., 20201.

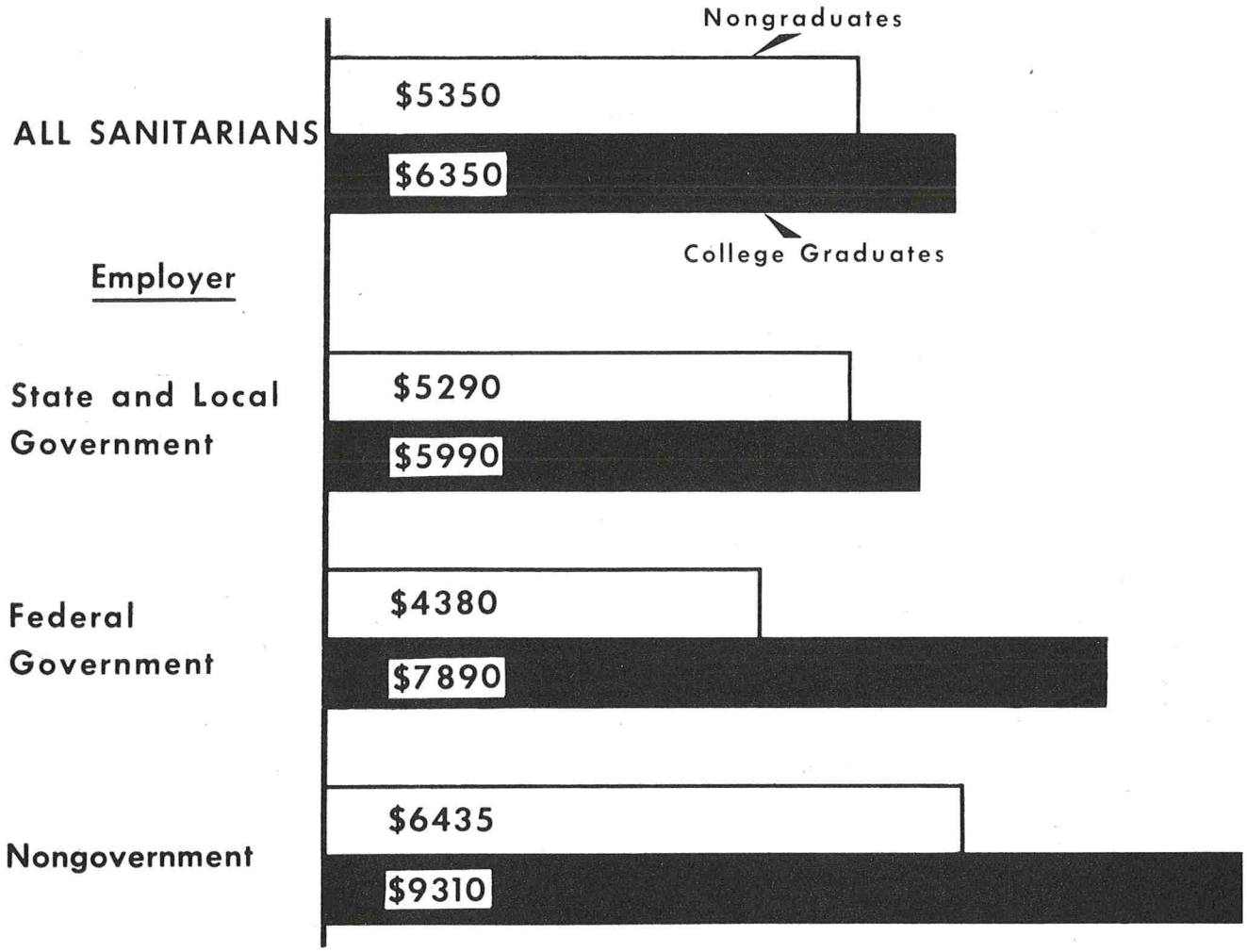


Figure 3. Salary related to education and employer of sanitarians, 1962

REFERENCES

1. American Public Health Association, Committee on Professional Education. Proposed report on educational and other qualifications of public health sanitarians. Am. J. Public Health, 46:1149-1156. 1956.

2. California Association of Sanitarians, Committee on Salaries. Experience educational background survey (Mimeographed) January 1959.

3. Mangold, W. S. Why Sanitarians? The Sanitarian 21: 71. 1958.

4. Mountin, J. W., and Greve, C. H. Public health areas and hospital facilities. PHS Publication No. 42, p. 7. U. S. Government Printing Office, Washington, D. C., 1950.

5. O'Brien, H. R. and Neill, A. H. A pilot survey of sanitarians and their backgorund. Public Health Reports, 70: 1222-1228. 1955.

6. O'Brien, H. R. A baseline survey of Pennsylvania sanitarians and their backgrounds. Public Health Reports, 74: 559-563. 1959.

7. Pennell, M. Y., Light, I. and Taylor, D. W. Health manpower source book 16. Sanitarians. PHS Publication No. 263, section 16. U. S. Government Printing Office, Washington, D. C., 1963.

8. Steigman, H., Kohler, F.A., Franklin, B. R., and Tresville, Jr., W. M. S. Career development of Pennsylvania sanitarians. Public Health Reports, 77: 811-814. 1962.

TECHNIQUES FOR EVALUATING VECTOR CONTROL MEASURES

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SUMMARY

Monitoring devices for determining population characteristics of the fly, roach, miscellaneous insect pests, and rodents are described along with ecologic factors. Entomologic surveillance of fly populations is accomplished by use of the fly grill, fly trap, and visual observations. These all require periodic evaluations to determine population changes. Cockroach evaluations are made by direct count and observations, coupled with nocturnal inspection of premises timed to coincide with peak roach activity. Other insect populations are monitored for presence or absence by checking sites such as windows for flying insects, and examining floors, pallets, and walls for insects that have emerged. Sacked grains and cereal infestations are checked for insect presence by examining the exteriors of the bags and the stitched ends. Presence or absence of rodents is usually determined by searches for rodent signs. However, total rodent populations can be estimated. Most sanitarians consider the presence of a single fly, rat, or other pest in a milk or food establishment objectional. Until this goal of complete exclusion of insects and rodents is reached, food and milk sanitarians should give serious thought to developing improved monitoring tools based on insect and rodent ecology.

As milk and other foods travel the route from producer to consumer, there are many opportunities for them to become contaminated by vermin. Our goal is complete exclusion of insects and rodents from foods. In the past, we have been unsuccessful in our attempts to completely "build them out" because insects are so mobile and rodents are so resourceful *(9)*. Until we are able to build them out, we must keep ourselves aware of the status of insect and rodent populations and apply the most effective reduction techniques.

There are many points along the producer-to-consumer route where vermin populations should be measured. For example, in the milk-producing industry population measurements should be done at the farm, in the milking shed, and at the bottling plant. In meat production, vector populations should be assessed on the packing plant premises and inside the plant. In the food-serving industry, population measurements should be done on the restaurant premises and in the restaurant. Surprisingly, although vector-monitoring devices, e.g., fly grills, bait traps, and light traps, have been available for some years, few milk and food sanitarians have made use of them. During the remainder of this discussion, I shall review the characteristics of our problem vectors and the devices available for monitoring their populations.

FLY CHARACTERISTICS AND MONITORING DEVICES

Flies undergo complete metamorphosis. Most species of fly oviposit (a few species retain the eggs within the body and give birth to larvae). The eggs that are laid, hatch into larvae which continue growth until they are ready for pupation. In the quiescent pupal stage, the organs and structure of the mature fly are formed. At the end of the pupal stage, the pupal case is split open and the adult fly emerges.

Adult fly populations have been measured by using a "fly grill". This technique was developed and described by Scudder *(8)*. The large grill, used to measure outside populations, is a grid-like device consisting of 24 wooden slats, each 36 in. long, 3/4 in. wide, and 1/4 in. thick, fastened 3/4 in. apart on a Z-shaped frame. A smaller 18-in. grill has been developed for use in restaurants and similar situations. The fly grill technique is based on the tendency of

flies to concentrate in clusters while resting or feeding. To make a fly count, the grill is lowered over the fly concentration. The flies alight on the slats of the grill as they seek to return to the resting, feeding, or breeding area and may then be counted. In food establishments, rapid counts are made at various sites, enabling one to obtain an estimate of the adult fly population.

Welch and Schoof *(11)* discussed the merits of visual observation as compared to counts made with the fly grill. They concluded that a trained observer can make a comparable visual estimate of the flies in a 36-in. area without utilizing the 36-in. grill. However, grill indices averaged higher than visual-count indices. To compare the number of flies "visually estimated" with the number actually counted with the aid of a grill, eight, 2-man teams used both methods at 2,850 fly-attractive sites. The "visual estimate" technique agreed with the grill method (by the same inspector) with a range of 69 to 89% accuracy. They concluded, "the results of this study show that visual estimate technique is a useful extension of the Scudder grill method for appraising adult fly densities."

Another device used to measure fly populations is the fly trap, a cylindrical screen-wire cage with an inverted-cone entrance. A bait is put in the trap to attract the flies. The flies, being phototropic, fly toward the light that enters the small end of the inverted cone. Schoof *(6)* stated, "Grill indices and fly trap volumes frequently show conformance during a single time period, whereas later the two methods may exhibit complete disagreement as to the level of the fly population. As a result, the fly trap is presently regarded primarily as a qualitative tool for measurement of fly populations." However, he further stated that when the conflicts between data derived from grills versus fly traps are considered, the question arises as to why more validity is ascribed to grill indices in community fly appraisal. The answer lies in these factors: (*a*) grill data have been readily correlated with disease trends and with determinations of community fly control levels; (*b*) fly grill indices usually coincide more closely with the impression of fly prevalence, as observed under field conditions; (*c*) fly grill surveys extend over the entire community so that the sampling area is definite; and (*d*) the large number of observations in grill surveys reduce the relative effect of errors in methodology.

In addition to the techniques that have been described, other methods have been utilized in inspection programs to measure fly populations. The compact nature of dairies, food establishments, and food processing areas enables the use of bait-counts or fixed-area counts. Fly-paper or strip surveys are a rapid method, but the data obtained have little numerical reliability. Fly-egg counts have also been used in some surveys in the food-handling industry such as those having to do with tomato products *(3)*.

COCKROACH CHARACTERISTICS AND MONITORING DEVICES

Pratt *(5)* noted that approximately 55 species of cockroaches are established in the United States but only 7 or 8 species normally invade man's habitations. In general, these "domestic" roaches can be divided into two groups, the small cockroach and the large cockroach. The "small" group, usually roaches five-eighths of an inch long or less, includes the German roach, and the brown-banded roach. The "large" group, those five-eighths of an inch or more in length, include the American, Oriental, wood, smoky-brown, brown, and Australian roaches.

All roaches develop from an egg capsule called an ootheca. The female roach attaches the ootheca to the underside of tables, chairs, and similar articles or drops them in suitable locations. The roach eggs hatch and tiny nymphs emerge. The nymphs resemble adult roaches but do not have wings. Growth continues through successive molts until the roaches reach maturity. Most cockroaches are nocturnal and appear during daylight only if disturbed.

A thorough knowledge of roach ecology must be obtained if roach populations are to be measured accurately. Many evaluations in food and milk processing programs are made during the daytime, when roach activity is at a minimum. The density of roach populations should be measured by direct count during nocturnal inspection of premises.

OTHER INSECTS—CHARACTERISTICS AND MONITORING DEVICES

There are several species of insect pests that may infest grains and other food products. These include certain beetles, weevils, ants, and the larvae of certain moths. Most of these insects undergo complete metamorphosis, and the damage they do occurs during the larval and adult stages. To determine infestation, the sanitarian should inspect warehouses thoroughly at weekly intervals during the warm months and at monthly intervals during the cool months, inspecting each location where susceptible foods are stored. Beans, hams, cereals, and improperly packaged cheeses should be checked thoroughly. Counting of actual populations is not usually done.

It is a good practice to check sites such as windows for flying insects and to examine floors, pallets, and walls for insects that have emerged. Insects affecting sacked grains and cereal products may be

found on the exterior of the bags and at the ends where bags are stitched. A flashlight is useful in making these examinations. Should destructive pests be found, the contents must be sampled in order to determine the condition of the food and the abundance of infesting insects *(7)*.

RODENT CHARACTERISTICS AND MONITORING TECHNIQUES

Rats and mice have followed man throughout the world. Zinsser *(12)* stated that, "In following man about all over the earth, the rat has—more than any other living creature except man—been able to adapt itself to any conditions of seasonal change or climate."

Field rodents may start contamination of products outdoors, but this discussion will be limited to the three most common "domestic" rodents, the house mouse, the Norway rat, and the roof rat.

The reproduction potential of the rat is recognized as one of the major factors in the persistence of large populations under highly competitive conditions. Rat characteristics affecting reproduction include long duration of fertility and high frequency of litters *(2)*. The rodent gestation period averages about 25 days and litter size averages 6 to 14.

Rats and mice are nocturnal and secretive and are rarely seen except when an area is heavily infested. The occurrence of rodent signs is usually sufficient to determine the presence of rodents. Most people engaged in milk and food sanitation do not attempt to determine the actual rodent populations.

Rodent surveys are usually used to detect rodent signs. These rodent signs include: rub marks, runways, tracks, gnawings, burrows, droppings, urine stains, hairs, dead or live rats, nests, or the characteristic odor which may occasionally be encountered in rodent-infested areas.

A common characteristic that gives microscopic evidence of rodent infestation is the shedding of hairs. Estimates have revealed that a rat has about 500,000 hairs on its body, and hairs are shed and replaced twice annually in the spring and fall. Molting over-laps, however, and hairs are dropping out and being replaced continually. Some technicians have utilized open petri dishes to collect hairs from the dust coming in contact with agar in the dish *(10)* but this technique is very time-consuming.

Many health workers utilize "black-lights" (ultraviolet) to disclose rodent-urine stains, which fluoresce. It must be remembered that this is not conclusive evidence of rodents, since all urine will fluoresce. The health worker should remember that a combination of signs and evidence should be used to certify infestation.

Brown, et al. *(1)* noted that one of the more difficult problems in rodent control is the accurate evaluation of rodent population changes as a control program proceeds. Major changes in the rodent population are usually apparent, but an accurate measure of lesser change is difficult to obtain. In Baltimore, 22 bakeries and 570 retail stores were inspected to determine if rats were present. Rats were found in 63 of these establishments. To determine the actual number of rats, 14 places were chosen at random, were inspected, and determined to have an average of 5 rats per infested establishment.

EXCLUSION

Exclusion is of primary importance in preventing insect and rodent infestations. The old adage, "An ounce of prevention is worth a pound of cure", should be practiced by all who are responsible for the processing of food and milk. The term "exclusion" used here means the use of protective barriers, self-closing entranceways, rodent stoppage, and necessary construction to eliminate breeding areas both in and about processing plants. If there are no places in the processing areas where insects or rodents may nest, and if there is lack of an adequate food supply, neither insects nor rodents will remain. Those responsible for food and milk processing are often unable to exclude pests from processing areas despite screening or closing of entranceways. Studies have shown that insects and rodents often enter with the workers or when an apparatus is brought into the plant.

DISCUSSION

In general, the present vector-monitoring devices are not entirely adequate. However, food and milk sanitarians have failed to develop new techniques for measuring vector populations, and have often failed to use known techniques.

New measurement techniques are difficult to develop because of the many complex variables in the population-dynamics of the vectors *(4)*.

If more adequate monitoring devices are to be developed for use by milk and food workers, the following factors should be considered: (*a*) a detailed knowledge of the ecology of the pest; (*b*) the monitoring device should be used on continuous inspections; (*c*) nocturnal, as well as diurnal monitoring, should be scheduled to coincide with peak activity period of the species; and (*d*) insect and rodent population-densities should be correlated with insect and rodent signs to give a good estimate of total population.

Efforts should continually be made to completely exclude insects and rodents from the processing line. Perhaps eventually complete exclusion of these species will be accomplished.

REFERENCES

1. Brown, R. L., Sallow, Wm., Davis, D. E., and Corkran, Wm. G. The Rat Population of Baltimore, 1952. Am. J. of Hygiene, 61:89-102. 1955.

2. Brown, Robert Z. II. Biological Factors in Rodent Control. U. S. Department of Health, Education, and Welfare, Public Health Service, Communicable Disease Center, Atlanta, Ga.

3. Buss, C. D. Method for Fly Egg Counts in Tomato Products. Food Technology, 12:391-392. 1958.

4. Lindsay, D. R., Scudder, H. D. Non-biting Flies and Disease. Annual Review of Entomology, 1:323-346. 1956.

5. Pratt, H. D. Cockroach Identification. Pest Control, 23(5):9-12. 1955.

6. Schoof, H. F. Survey and Appraisal Methods for Community Fly Control Programs. Public Health Service Publication No. 433, U. S. Government Printing Office, Washington, D. C., 1955.

7. Scott, G. H. Household and Stored Food Insects of Public Health Importance. U. S. Department of Health, Education, and Welfare, Public Health Service, Communicable Disease Center, Atlanta, Ga. 1960.

8. Scudder, H. I. A New Technique for Sampling the Density of Housefly Populations. Public Health Reports, 62:681-686. 1947.

9. Searls, E.M. A Bugs Eye View of Dairy Plant Architecture. The Milk Dealer, Dec. 1949.

10. Searls, E. M. Getting Rid of Rodents. The Milk Dealer, June. 1947.

11. Welch, S. F., and Schoof, H. F. The Reliability of "Visual Surveys" in Evaluating Fly Densities for Community Control Programs. A. J. Tropical Medicine and Hygiene, 2:1131-1136. 1953.

12. Zinnser, Hans. Rats, Lice and History. Little Brown & Co. Boston, Mass. 1935.

NOTICE

The membership of the International Association of Milk, Food and Environmental Sanitarians is hereby notified that the below proposed Constitutional and By-Law change is to be voted upon at the Annual Business Meeting, October 24, 1963, at the Annual Meeting in Toronto, Ontario.

KARL K. JONES
Secretary-Treasurer

CONSTITUTIONAL CHANGE

Article IV - 1

Delete the last sentence. This Article reads:

"A second vice-president and secretary-treasurer shall be elected by majority ballot at the annual meeting of the Association."

Previously in this section it is pointed out that the officers shall be elected or appointed as provided in the by-laws. Leaving this portion of the section will make elections more flexible and allow the Association to change voting procedures at a later date without a constitutional change, if mail balloing should prove unsatisfactory.

BY - LAW CHANGE

Article IV - Section II

Each year the president-elect shall appoint a nominating committee at the annual meeting prior to next year's election, in ample time for them to meet at that meeting. This committee shall consist of seven members other than officers of the Association. At least one member shall have been a member of the nominating committee of the previous year. The nominating committee shall submit the names of at least one nominee for the office of second vice-president and one for secretary-treasurer to the executive secretary, as directed by the president-elect. These names, with a picture and biographical sketch of the nominee, shall be published in the Journal not later than April 1 following the meeting. The next issue of the Journal shall contain a ballot listing the nominees and a space for write-in votes. All ballots must be in the hands of the executive secretary by July 1 for checking against the eligible voter list and then forwarded to the tellers committee for counting. The person receiving the greatest number of votes for each office shall be certified to the president at least one month in advance of the annual meeting.

SOME APPLICATIONS OF PSYCHOLOGICAL PRINCIPLES IN A SANITATION PROGRAM[1]

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and
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A sanitation program involves the human element as well as the physical aspects of the environment. Consideration of the human element is within the province of psychology. The development of sanitary standards and, more particularly, their interpretation are influenced by personal characteristics that vary in accordance with the social and psychological development of the individuals involved. The results of psychological research have been applied in many other fields. Well developed techniques from this work are available and can be applied in the field of sanitation.

An approach has been suggested for the use of presently available knowledge and the application of research techniques common in the field of psychology. The results of this work should be helpful in establishing a more constructive sanitation program, selection of competent personnel, training at all levels, and the administration of a going program.

The field of sanitation is broad and complex. It involves biological, physical, and mechanical phenomena, and it involves the problems of human behavior. The field of sanitation, already complex because of the many variables involved, is aggravated because of the widely different characteristics of the people involved.

The actions of the individual often depend on his interpretation of so-called well established procedures. This interpretation is influenced by the interpreter's environment, intelligence, education, values, personality traits, and a variety of other characteristics. The effects of such personal variables on human behavior is within the province of psychology. The application of principles of psychology to problems of sanitation, therefore, seems a useful yet frequently neglected process. This paper is intended to explore some of the approaches that might be taken toward the utilization of psychological principles in a sanitation program.

Problems of Application

Several areas in which principles of psychology are being applied successfully are job analysis, selection of personnel, and personnel development *(1)*. Psychological principles have had little, if any, application in the field of sanitation. One reason may be the emotional and attitudinal components of many sanitation problems. If this premise is true, the application of psychological principles would be even more fruitful in the field of sanitation than it has been in other fields.

The Personal Element

Personal attitudes toward sanitation can be expected to play a major role in the formulation and enforcement of the common regulatory codes. For the most constructive future for sanitation in the dairy and food industry and the field of sanitation in general, regulatory activities should be based on objectively established principles rather than on idiosyncratic attitudes or emotions. A methodical approach toward understanding the influence of personal variables on decisions in sanitation is certainly needed.

Personal variables involve past experiences. Experiences from earliest childhood, for example, almost certainly affect later attitudes toward sanitation. Meticulous children overly concerned with neatness and cleanliness could be expected to have, as adults, different views of sanitation than would children for whom soil is a natural part of the environment. Similarly, differences in childhood experiences that arise from differences in socioeconomic status, in the psychological climate of the home, and in many other environmental variables can be expected to influence adult views of good, bad, and irrelevant sanitary practices.

Personal values or philosophies may act as mediators between experiences and the practice of sanitation. Such statements as, "Cleanliness is next to Godliness," illustrate the interaction of philosophical values and sanitation. As Freedman *(3)* has pointed out, the inspector (AEDILIS) of the fourth century Roman Empire checked on both morals and public sanitation. And from St. Matthew (23, 24 - 27) comes, "Ye blind guides . . . ye are like unto whited sepulchres, which indeed appear beautiful outward, but are within full of dead men's bones, and of all

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uncleanness." Most religions deal with the cleanliness of the inner person or the soul. Modes of approach to this concept may vary from one extreme with adherents of fundamental, emotional religions to the other extreme with agnostics. The former may make associations with the word "clean" that would be quite foreign to the latter. Some religious rites include physical acts that symbolize the washing away of sins and cleansing of the soul at the time of repentance and/or being born again.

These illustrations of the close ties between sanitation, widely accepted personal values, and religious attitudes suggest that implementation or change in sanitary practices may be fraught with emotional complications. Philosophical and emotional considerations, however, should not be allowed to interfere with the development and execution of a well managed sanitation program.

The Social Element

Other practices bearing on sanitation are related to social mores. An example has been provided by Kinsey, *et al. (4)*, who pointed out that attitudes toward kissing are dependent on the social group. Certain groups accept the physical contact in kissing without considering from a sanitary standpoint its biological significance. Yet people who reject kissing on the basis of a consideration for sanitation may accept the common drinking cup without qualm. This lack of consistency has a sequel in public sanitation. Lipstick on a glass may be repulsive to the same person who accepts kissing indiscriminately.

Individual development from birth to death determines personal characteristics that influence approaches to sanitation. The diversity of developmental processes leads to a great range in the ways in which problems in the field of sanitation are identified and solved. This diversity also leads to a variety of interpretations of intended uniform codes.

Although the discussion to this point has been centered on processes of normal development, psychopathology also has relevance for sanitation. For example, hand washing as an obsessive compulsion is generally interpreted as a neurotic attempt to cleanse oneself of guilt. Other less overt forms of behavior, such as obsessive aversion to feces, may represent neurotic responses that have implications in sanitation.

A social-psychological factor that complicates problems of sanitation is the taboo against discussing personal sanitation and personal practices in the elimination of body wastes. Variation in the freedom with which habits of personal cleanliness are discussed produces variation in practices in the field of sanitation. For example, a city reared sanitarian working with farms may be horrified at the thought of defecating in the gutter of the milking barn, while the farmer may see no objection.

ANALYSIS OF THE PERSONAL ELEMENT

In the preceding paragraphs the view has been developed that psychological characteristics such as attitudes, value systems, and more general personality traits are closely involved in the ways sanitation practices are developed and carried out. If this view should be accepted, the knowledge of the field of psychology could be usefully applied in the field of sanitation. Techniques from the field of psychology could be used to improve procedures for selection of personnel, for the establishment of standard inspection procedures, and in the administration of an overall program. Specifically, such a device as the critical incident technique developed by Flanagan *(2)* might be used to identify areas in sanitation that are most strongly affected by psychological variables. These areas and the problems found in them could then be studied more intensively to find possible methods of improvement in the present practices in the field of sanitation.

In the critical incident technique, a number of people familiar with sanitation practices would be asked to describe specific incidents that represent either good or bad sanitation methods or physical facilities. The common elements in a variety of critical incidents described by a number of people could be considered representative of the important aspects of sanitation as perceived by the people describing the incidents. Several uses could be made of carefully collected sets of critical incidents. Differences in perception or in emphasis between laboratory and field personnel could be described. The components in sanitation that receive the least uniform treatment could be identified. Sets of standard situations covering a broad range of practices could be developed and used for training and evaluating sanitarians. Variation in responses to standard situations could be related to psychological variables such as value patterns or personality traits and these could then be used in the selection and training of personnel to minimize variability in the application of sanitation regulations. Finally, standard sanitation practices could be modified to minimize their sensitivity to variability in interpretation without sacrificing present achievements in sanitation.

APPLICATION OF PSYCHOLOGICAL DATA

The following hypothetical example might help to make the use of the critical incident technique more clear. Among a group of sanitarians asked to describe examples of good and bad inspection procedure, several made a statement similar to the fol-

lowing to describe an example of poor inspection. "The sanitarian did not note that the milker handled the cow after washing his hands, but before milking." Since several sanitarians considered this kind of incident important, it was one of a number of incidents that each of a large group of experienced sanitarians was asked to rate on a scale from 1 to 7 to indicate the degree of goodness or badness of this kind of sanitarian behavior. (Important is the point that the sanitarian's behavior, not the milker's, was being rated good or bad.) If almost everyone agreed that this was an example of poor inspection, the item has apparent importance and should be considered as such in training programs. If almost everyone agreed that this was not an example of poor inspection, then the item should be reconsidered on the inspection form. If considerable disagreement existed as to whether this was good or bad sanitarian behavior, laboratory tests might be looked to for an answer. The laboratory results should indicate the true significance, and the inspection form could be written accordingly.

In a similar way, substantial disagreement among sanitarians about an incident involving adequate ventilation of the milking barn might lead to a clearer statement of ventilation standards so that uniformity could be achieved. A set of incidents on which substantial agreement exists among sanitarians and which are supported by laboratory tests could be used to evaluate the knowledge of inexperienced sanitarians about sanitation procedures. A further study might establish that certain types of people, such as those without a farm background, were poor prospects as sanitarians.

As indicated earlier, consistent disagreement between laboratory and field personnel might lead to further laboratory testing and modification of the point of view of either the laboratory personnel or the field personnel; or the disagreement might be removed by a slight revision of standard sanitation practices that would retain the same degree of protection from contamination.

Psychological variables are currently being used in the selection of people for such varied occupations as cab drivers, policemen, salesmen, foreign service employees, management trainees, production supervisors, and astronauts. Commonly, the first step in developing sound selection procedures is to establish what it is the people selected are expected to accomplish. An attempt to find ways to select competent research scientists, for example, started with the notion that high performance ratings by superiors, high creativity ratings by superiors, and high numbers of patent disclosures were three indications of good performance by research scientists, and people should be selected who would score high on these three variables (5). Other criteria might have been used with equal justification. Effectiveness in promoting group productivity, the number of usable ideas produced, the number of scientific papers published, or the ability to translate ideas into hardware might be considered appropriate criteria for the selection of reasearch scientists.

Ultimately, selection of criteria is almost always arbitrary. Devices such as Flanagan's critical incident technique, however, can be used to gather information about the nature of "good" performance. This information can then be used to define the kinds of performance that are important in a job. Another approach might consist of mathematically analyzing performance ratings to find what elements of performance were considered important. A number of procedures commonly used in psychology are available to define just what it is that makes a good sanitarian.

Having found some basis for defining criteria of desirable performance, an investigator can look for and then test various attributes that seem likely to act as predictors of desirable performance. Several different kinds of predictors of job success have been used. One kind has been items of personal history, e.g., other jobs held, marital status, and educational level. Another kind has been self reports of attitudes, interests, and activities, e.g., statements of preference for leading a small discussion group rather than giving a lecture before a large group. A third kind has been more subtle personality tests, e.g., measures of flexibility, aggressiveness, and dependence.

Initial selection of promising predictors is usually based on an understanding of the criteria to be predicted, but investigation sometimes turns up useful predictors of job success purely fortuitously. In the study previously cited, for example, preference for urban as opposed to rural residence was associated with success as a research scientist. In any case, though, the process of testing and retesting predictors against several measures of the same criteria is necessary.

The same devices by which criteria for selection are defined can help also to standardize job procedures. If a certain area of job performance is found to be defined differently by different people in the job, comparable levels of performance would not be likely to occur. Redefinition of the job in terms of its underlying dimensions could then stabilize job performance. Redefinition of the sanitarian's job or of sanitation standards might result in redefinition of criteria for selection of sanitarians. Definition of the job and definition of standards of selection are interrelated processes.

A study of the psychological dimensions that underlie satisfactory performance of regulatory stand-

ards and of sanitarians themselves could be useful in several ways. Certain items on the present inspection forms are of little value because of the lack of concrete criteria for evaluation by the sanitarians. The least significant items might be eliminated and some revisions of forms might be made to emphasize those items found to be of major importance. Reevaluation of the items on an inspection form would parallel the development of systems for evaluating persons to do the inspection work, and job definition. Methods for assessing the effectiveness of the inspection forms and the individual sanitarians could be expected to emerge. Regulations that can be more uniformly and constructively applied should result.

Finally, procedures for selection of sanitarians could be developed. The result should be a general raising of standards of sanitation inspection, greater uniformity in the way sanitation regulations are applied, and greater facility in assessing the quality of inspection being performed.

The preceding description of the ways a knowledge of psychological variables can be used in personnel selection and job description has been presented in general terms. The aim has been to present the tools, and explain their applicability. Thus, the means have been presented for the development of improved sanitation programs.

REFERENCES

1. Dunnette, M. D. Personnel Management. Ann. Rev. Psychol., 13:285-314.1962.

2. Flanagan, J. C. The Critical Incident Technique. Psychol. Bull., 51:327-358.1954.

3. Freedman, B. A History of Sanitation. Modern Sanitation, 6(11):28.1954.

4. Kinsey, A. C., Pomeroy, W. B., and Martin, C. E. Sexual Behavior in the Human Male. W. B. Saunders Co., Philadelphia. 1948.

5. Smith, W. J., Albright, L. E., Glennon, J. R., and Owens, W. A. The Prediction of Research Competence and Creativity from Personal History. J. Appl. Psychol., 45:59-62. 1961.

3-A SANITARY STANDARDS FOR PUMPS FOR MILK AND MILK PRODUCTS, REVISED

Serial #0203

Formulated by

International Association of Milk and Food Sanitarians
United States Public Health Service,
The Dairy Industry Committee

It is the purpose of the IAMFS, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards program, to allow and encourage full freedom for inventive genius or new developments. Milk pump specifications heretofore or hereafter developed which so differ in design, material, construction, or otherwise, as not to conform with the following standards, but which in the manufacturer's or fabricator's opinion are equivalent or better, may be submitted for the joint consideration of the IAMFS, USPHS, and DIC, at any time.

3-A Standards For Centrifugal And Positive Rotary Type Pumps

A. *MATERIAL*:

1. All metal pump parts having any surface in contact with the product shall be constructed of dairy metal consisting of stainless steel, nickel alloy, or equally corrosion resistant material that is nontoxic and nonabsorbent.

a. All milk contact surfaces shall be finished to an equivalent of not less than 120 grit finish properly applied.

b. All outside surfaces shall be smooth and easily cleanable.

2. Exteriors of structural parts not in contact with the product shall be of corrosion resistant material with a smooth finish; or shall be rendered corrosion resistant or painted, and shall be constructed as to be easily cleanable.

3. Pump impellers or rotors, and cases or stators which operate in conjunction with a metallic counterpart, may be made of, or covered with, rubber or rubber-like materials. Rubber or rubber-like materials used for pump impellers or rotors, and cases or stators, shall be of such composition as to retain their surface and conformation characteristics under conditions encountered in normal use and cleaning operations.

4. All rubber and rubber-like materials when used for specified applications shall meet the applicable provisions of the "3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used As Product Contact Surfaces In Dairy Equipment, Serial #1800."

B. *CONSTRUCTION*:

1. All milk contact surfaces shall be readily removable or accessible for cleaning and inspection. All exterior surfaces shall be self-draining.

2. The parts forming the space between the motor and the pump body shall be constructed in such a way that they are easily accessible for cleaning, and drain freely.

3. If legs are used, they shall be smooth with rounded ends and no exposed threads. Legs made of hollow stock shall be sealed. On pumps with legs designed to be fixed to the floor the minimum clearance between the lowest part of the base and the floor shall be four inches.

a. Readily portable pumps not permanently attached may have leg heights of 2 inches. (Readily portable pumps are defined as those having a base area of not more than one square foot, or, in the case of motor mounted pumps, an area encompassed by the legs that does not exceed one square foot.)

b. Bases when used shall be constructed without ribs or flanges and shall have a smooth top and bottom surface.

4. Pumps which because of their size and type cannot be mounted on legs, shall be mounted on a base designed for grouting and sealing.

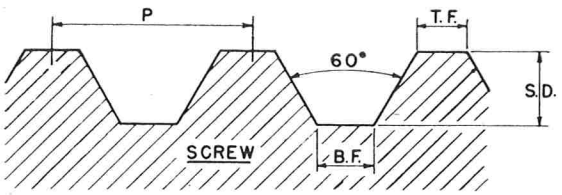
5. The driving means between the impeller or rotor and the pump shaft shall be so arranged as not to form a pocket or crevice that is not readily cleanable.

6. There shall be no threads in the milk zone, except where necessary for attaching the impeller to the shaft. In such case(s) the thread shall conform to the following drawing known as the "brass valve stem" thread. The threaded angles shall be not less than sixty degrees and with not more than eight

threads to the inch, nor less than five-eights inch major basic diameter. The length of the nut shall not exceed three-quarters of the thread basic major diameter and the nut shall be of the open type.

7. All surfaces in contact with the product shall

BRASS VALVE STEM THREAD



P = PITCH	$P = \frac{1}{T.P.I.}$
S.D. = SINGLE DEPTH	S.D. = .381 x P
T.F. = TOP FLAT	T.F. = .280 x P
B.F. = BOTTOM FLAT	B.F. = .280 x P
T.P.I. = TH'DS PER INCH	

have smooth, rounded corners and shall be readily accessible for cleaning.

8. The rubber or rubber-like coating of pump impellers or rotors, and cases or stators (if covered) shall be bonded in such manner that the bond is continuous and mechanically sound, and so that in normal service the rubber or rubber-like material does not separate from the base metal. The final bond shall conform in all respects to the criteria established in paragraph A(4).

9. The surface of rubber or rubber-like covering of pump impellers or rotors, and cases or stators shall be equal in cleanability to stainless steel with 120 grit finish properly applied.*

*Pending development of a standard procedure for measuring the cleanability of surfaces, conformance with this item may be judged by comparing the removal of standard soil from the rubber or rubber-like material and from the stainless steel having a 120 grit finish, when standardized cleaning procedures are used. A technique for such comparisons has been developed by Dr. O. W. Kaufman, Michigan State University.

C. *OPENINGS*:

Inlets and outlets shall conform with the 3A "Sanitary Standards for Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products," dated April 1950.

D. *SHAFT SEAL*:

Shaft seal shall be of the sanitary type easily removable for inspection and cleaning, and shall be constructed of material not injurious to milk.

E. *GASKETS*:

Single service gaskets of the sanitary type, or removable rubber type gaskets that can be easily cleaned, shall be used.

F. *MOUNTINGS*:

Mountings of motor, pump, and drive shall be of sanitary construction and shall be either sealed to the base or mounted to permit easy cleaning with minimum clearance of not less than one inch.

G. *SEALING*:

Timing pumps used in connection with high temperature short time pasteurizing equipment shall be provided with an easily accessible or externally visible seal or seals to limit the maximum capacity of the pump. The seal or seals shall prevent the changing of the maximum speed of the pump, either by adjustment of the drive or replacement of pulleys or belt.

These standards shall become effective on November 20, 1963, at which time the 3-A "Sanitary Standards for Pumps for Milk and Milk Products", Serial 0201 and the 3-A "Amendment to Sanitary Standards for Pumps for Milk and Milk Products Serial 0202" become null and void and are thereby superseded by these "3-A Sanitary Standards for Pumps for Milk and Milk Products, Revised Serial 0203."

TO TEST MILK OR INSPECT FARMS – THAT IS THE QUESTION[1]

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This topic was suggested by recent statements made privately by sanitarians in regulatory work and by quality control or fieldmen in the dairy industry. If we had enough sanitarians to inspect farms and plants the quality of the milk would be excellent, according to the men enforcing milk sanitation regulations. On the other hand, stated industry men, milk could be tested to assure its high quality without the expense and inconvenience of repetitious, contradictory, and needless farm inspection regulations. Now there is merit and fallacy in both assumptions. It is my objective to discuss this question and to propose more logic and facts as the basis of future policies.

Let us define high-quality milk and differentiate between public health and other commercial qualities of milk. "The attributes of quality in pasteurized milk are absence of pathogenic bacteria and toxic substances, cleanliness, low bacterial count, good flavor, satisfactory keeping quality, and high nutritive value *(p 112–See footnote[2]).* All of these attributes are essential to high-quality milk, yet only the first three are of public health significance on the basis of strict interpretation. The last three quality factors might be termed commercial qualities.

The important consideration is the contributions that inspecting farms and testing milk make toward a high-quality milk supply. In some instances data are meager or completely lacking. Some interesting data and conclusions have been presented in the reference[2] mentioned above (Nat'l. Res. Council Publ. 250). For example, "As all of the pasteurized milk was safe and wholesome and generally complied with all standards, there was no opportunity to obtain data to show the value of each regulation." *(p 124).* However, some correlations in the variations in attributes of quality and regulations could be established.

"There was a slight correlation of little practical significance between the number of inspections of farms by the sanitarians of the health department and the sanitary quality of the milk. These visits by sanitarians of the city health departments varied from an average of none to 10.6 per farm per year." *(p 107).* In the city with no dairy farm sanitation inspections the state department of agriculture planned on one inspection of each farm per year. Data were not obtained on the number of farm visits by fieldmen of milk processors, of milk marketing cooperatives but, "There was a small degree of direct correlation between the average number of farms per [industry] fieldman and the average bacterial counts of the raw milk for the eight cities [in the study]." *(p 107).* "This correlation between average bacterial counts and the average number of farms per fieldman was much better than the correlation between the average bacterial counts and the average number of farms per sanitarian in the health department." *(p 47).* The explanations given for this situation were "The fieldmen had much more information on the bacterial counts of the milk supplies available to them than did the milk sanitarians so that the fieldmen could concentrate their efforts on the producers whose milk was not in compliance with standards. Furthermore, much time of the sanitarians in all cities was occupied with routine farm inspections to determine compliance with regulations rather than on specific producers to lower bacterial counts." *(p 47).* Thus, it is clear that it is difficult to associate the number of farm inspections with lower bacterial counts.

"A study of the scores reveals that the raw milk with the very lowest bacterial numbers was produced by cows that received the highest scores for cleanliness and that were housed in barns and milked in barns that were rated cleanest by the sanitarian. In such dairies the milk houses were clean." *(p 106).* "Farmers with the cleaner utensils had milk with lower bacterial counts. Furthermore, the data also showed that cleaner barns, cows, and milk houses were found generally on the farms with cleaner utensils." *(p 106).* "It is possible to produce clean milk of low bacterial count in dirty surroundings, but it is generally not done." *(p 107).* Obviously, the virtues of cleanliness cannot be overemphasized.

"The bacterial counts of the milk decreased as the number of samples of milk tested yearly per producer [by industry] for bacteria increased. There was no significant relationship between the bacterial

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[1]Presented at the 16th Annual Meeting of the Dairy Products Improvement Institute held in New York City on February 14, 1963.

[2]All quotations given in this address are followed by the page number on which they occur in the following publication: "Sanitary Milk Control and its Relation to the Sanitary, Nutritive, and Other Qualities of Milk". A. C. Dahlberg, H. S. Adams, and M. E. Held. National Academy of Sciences – National Research Council Publication 250, Washington, D. C. 1953.

counts of the milk and the number of tests made by the health departments." *(p 123).* "When the samples of milk of individual producers were tested at least twice a month, sufficient information was obtained on milk quality to enable the fieldman of the milk companies and farm cooperatives and sanitarians of the health departments to work intelligently with dairymen to assure reasonable compliance of the milk with bacterial standards." *(p 123).*

These general relationships of industry inspection and milk testing are not as useful in quality milk production as one would wish because "The sanitary conditions of milk production on the farm were related to the bacterial counts of the raw and of the fresh pasteurized milk, but they were not related to the initial flavor and the keeping quality of the pasteurized milk." *(p 125).*

So the issue is clear that the problem is not one of whether to test milk or to inspect farms, but it is one of coordinating the work to attain the best quality milk supply with the least effort and expense. Health departments recognize that the public health aspects of milk sanitation are no longer urgent problems and industry knows that milk quality is generally satisfactory, but workers in both areas realize the situation could change rapidly through neglect. Budgets of health departments are apt to be assigned to more popular and urgent subjects; profits in the milk industry are low so the situation is difficult.

FARM INSPECTIONS

Certain desirable sanitation conditions on the farm can be assured only by proper regulations enforced by a government agency. The history of the dairy industry substantiates this statement. For example, there was a time and there were areas in which milk produced for cheese making was very much better in quality than milk produced for fluid consumption. Efforts to protect the public health on a local level eventually gave consumers high-quality grade A milk in spite of the lethargy of the dairy industry in some areas.

The principal objectives of dairy farm inspection by the regulatory agency are to be sure that each milk producer has the facilities required by the ordinance and that these facilities must be in good condition in proper buildings. The American Dairy Science Association Dairy Farm Sanitation Report provides that these facilities involve (*a*) health of cows, (*b*) milking area, (*c*) milk house or room, (*d*) utensils and equipment, (*e*) cooling facilities, (*f*) water supply, and (*g*) toilet and sewage disposal. No dairy farm should be approved for producing grade A milk until these required facilities are available. Acceptance of the milk must be the responsibility of the local or state regulatory agency; however, the dairy farms inspection forms ought to be developed at the state or federal level.

This initial inspection assures adequate farm facilities to produce high-quality grade A milk; however, it does not guarantee milk of such quality. Also, so far as possible, it should provide housing and equipment of good useful design for the producer. This reduces the chance of contamination of the milk supply with disease-producing bacteria but the total bacterial counts standards are sufficiently low to avoid the presence of bacterial toxins in milk. The consumer should be pleased with the conditions under which the milk is produced, a fact which should not be overlooked by personnel of the dairy industry and by regulatory officials.

How often should farms be reinspected? To that question there can be no answer based upon research data. Routine farm inspections should be made twice yearly by a sanitarian of the health or agricultural department or by a fieldman approved by the proper regulatory agency. The regulatory department sanitarian should inspect at least bi-yearly, in fact, semi-yearly if the budget permits. There is no need for more frequent official inspections as milk quality will not be improved thereby.

Under present conditions it seems obvious that the responsible state agency, if it has not already done so, must develop educational and experience requirements for sanitarians and fieldmen. A list of approved sanitarians may be available in each state. It should be compulsory to employ persons from this list assuming the list is ample to give some choice. Such a policy gives prestige and reliability to the inspection service as well as assisting in salary increases to sanitarians, which are so necessary in most states.

Responsibility at a local level is in the city or county health department. At the state level authority is divided about equally between the health departments or in the departments of agriculture and markets. In states where a department is in charge that has little interest in enforcing and improving laws and lacks an adequate staff to promote this field of activity it would be well for the dairy industry and others to study the situation. Possibly the proper solution is to transfer grade A milk sanitation to another state department, or it may be that expressed and continued interest by industry will redevelop activity by the responsible agency. In any event, providing a high-quality, safe milk supply for consumers is a very broad problem affecting many people and work on it must not lag even under reduced financing. The dairy industry is too important in the economy and the nutrition of this nation to permit it to stagnate through inferior quality products due to lax regulations and enforcement.

Industry Inspections and Milk Examinations

"The bacterial counts of the milk decreased as the number of samples of milk tested yearly per producer for bacteria increased." *(p 123).* This statement applies only to industry testing of milk. "The routine semi-monthly tests of the raw milk should include temperature, sediment, total bacterial count, and thermoduric count, the last expecially when the total bacterial count was not reduced sufficiently be pasteurization." *(p 123).* Obviously, odor must be checked daily along with visual observation of conditions. The number of tests should be specified but need not be held constant forever under all situations. It could be varied according to conditions and the quality of the milk.

As the number of farm inspections by fieldmen did have a relationship to milk quality, it should be emphasized that these fieldmen usually visit farms which are experiencing trouble in meeting quality standards. If the approved fieldmen make official farm inspections for regulatory officials there is no necessity for requiring additional inspections of all farms by them; however, it may be necessary to make several closely spaced visits to farms producing milk of unsatisfactory quality. It should be the duty of the sanitarian in regulatory work to be intimately acquainted with the reasons for degrading or rejecting a producer's milk supply by the fieldman or to do so himself.

To give consumers pasteurized milk of satisfactory quality, the keeping quality, as measured by flavor and bacterial counts after a reasonable storage period, must be very good. "The sanitary conditions of milk production on the farm were related to the bacterial counts of the raw and of the fresh pasteurized milk, but [unfortunately] they were not related to the initial flavor and the keeping quality of the pasteurized milk." *(p 125).* It may be that sometimes we misinterpret the values of farm inspection for even though the farm conditions and the bacterial counts on the raw milk are excellent, the pasteurized milk may not be satisfactory. Hence, official farm inspections cannot replace examination of the milk. "Therefore, keeping quality tests on pasteurized milk [as packaged in the processing plant] should be made each week for flavor and for psychrophilic and coliform bacteria as an aid in improving this important characteristic of milk." *(p 125).*

Industry and Regulatory Responsibilities

In view of the facts herein presented, the responsibilities of men in industry and in regulatory work may be more clearly defined.

Official inspections of farms determine the degree of compliance with laws and ordinances; hence, it must be the responsibility of regulatory agencies. Although such inspections usually are directed through local municipal or county health departments, the work is handled also by state regulatory agencies. In either instance, the original inspection to qualify a new producer ought to be made by a regulatory sanitarian; however, thereafter much of the official inspection work may be done by approved industry fieldmen. The official inspection assures facilities and methods to ease the effort to produce a safe, high-quality milk supply in satisfactory surroundings.

The major protection to the public health by regulatory agencies lies in systematic inspection of processing plants and key procedures, such as pasteurization, distribution and retailing facilities, and examination of the packaged pasteurized milk. There is much divergence of opinion on the frequency with which this work should be done but, except where conditions prove otherwise, I favor a weekly examination of the pasteurzied milk and inspection of vital processes. Excellent plant control work, particularly in respect to pasteurization, does not mean that the raw milk supply need not be protected against contamination with harmful bacteria. This refers particularly to approved health of cows, acceptable water supplies, and proper sewage disposal. It is something like disregrading precautions in using a gun during hunting because the safety is on except when shooting.

It is the responsibility of the milk industry to produce, process, and deliver pasteurized milk of fine initial quality and good storage characteristics under conditions and with facilities which would be approved by consumers as well as by regulatory sanitarians. The basis for conditions on farms being satisfactory to consumers usually is determined by official regulations. The milk industry should never delegate its responsibility to any regulatory agency by paying it a fee to do this work. The milk industry is in the best position to control the quality of its own products by virtue of its experience, its contact with all details of the processing and handling, and its association with the men doing the actual work from production to sale. If industry should fail to produce high-quality milk for any reason, including failure of regulatory agencies to do a good job, such failure may be fatal in the competition for the consumers' food dollar.

Nearly every conceivable means has been tried by the milk industry and by regulatory agencies to improve milk quality. Great progress has been made during this century in the production of safe, nutritious, good-tasting milk. Today some local conditions have stopped or reversed this trend, and in

some areas there has been accelerated improvement in quality. A situation inducive to possible retrogression is the unfortunate forced connection in some markets between pricing and health regulations as shown in one municipality where "the health department could not accept additional milk irrespective of its good sanitary quality." *(p 25)*. An example of the possibilities of material improvement in quality without excessive costs is a quality control laboratory which handled milk testing and quality control for milk producers, milk companies, and the regulatory agencies, with all parties participating in the management.

Finally, the recent agitation about contamination of milk with antibiotics, pesticides, and radioactive fallout emphasizes the possibilities of new methods by which foods, including milk, may become a public health hazard. The national scope of the problem and the need for federal standards and action is obvious. There has been considerable success in reducing or eliminating contamination of milk with antibiotics. There is urgent need for extended research in this area for all foods. The combined efforts of regulatory agencies at all levels and of the milk industry are necessary to keep the contamination of milk at a minimum.

SPECIAL FEATURE

INFORMATION ON C. I. P. CLEANING

DAIRY INDUSTRY COMMITTEE
WASHINGTON, D. C.

Automation is in its first generation and succeeding generations will perfect automation beyond anything we can imagine at this time. Many changes will come in the next few years and management should keep itself informed. When they feel that the progress made meets their problems they should consider installing automation. In many cases reality of these installations are years off and the purpose of this report is to help in planning for future needs.

Buying an automated system without proper planning can be very expensive and very costly to correct.

A proper plan for a dairy plant should not become fixed. It should be flexible and geared for changing conditions. Certain decisions however, have to be made and the following steps suggest means of putting a master plan in operation.

1. A floor plan of the entire plant should be made to scale and filed with a regulatory agency.
2. Templates should be used for best positions in relation to over-all picture.
3. Future equipment needs should be projected as closely as possible.
4. After equipment is arranged on theoretical basis, it should be measured with cost and a realistic plan formulated.
5. Processing lines now and for future expansion should be drawn in.
6. After processing lines have been laid out, return lines should be drawn so that everything can be cleaned with C.I.P. system.
7. After all C.I.P. circuits and return lines have been put in, work toward having all lines starting and ending at a central point. This point becomes an ideal place for an automation unit.

Equipment Considerations—

There are several things although small in themselves, which can prevent an automation unit from preforming as expected.

1. STORAGE TANKS

Before storage tanks or processors can be cleaned, there are conditions to be met.

a. The tank must be properly pitched for prompt free draining. Many spray ball installations have failed because of mixing of pre-rinse and cleaning solutions. This dilution of concentrations of cleaning solutions results in unsatisfactory washing.

b. Outlet should be of adequate size; 2½ to 3 inch outlet preferred.

c. The tank must be high enough off the floor to allow the solution return pump to operate in full flooded suction. Tanks too close to the floor will cause return pump to cavitate and fail to recover suction causing solution to build up in the tank and seriously affecting the dependability of the timing mechanism.

d. Proper location of spray equipment in storage tanks. Additional spray equipment may be necessary to thoroughly cover all areas behind baffles and agitator shafts.

2. PIPE LINES

Pipe lines should have proper pitch about 1/8 of an inch per foot. Pipes should be anchored to prevent sagging and puddling of cleaning and sanitizing solutions in the line.

Valves, especially air operated valves, should be

anchored rigidly so there will be no stress on the valve. Hand operated valves should be conveniently located so they may be dismantled and hand cleaned each day.

3. Pumps

Circulation pumps must be properly sized to insure sufficient velocity in C.I.P. lines and adequate pressure to spray units for cleaning storage tanks and processors. Return pumps must be properly sized so that the solution is returned promptly and should be self-priming to avoid delays due to cavitation. Suction lines to return and circulating pumps must be as short as possible and of sufficient size to insure keeping pump flooded at all times.

4. Solution Tanks

The number of solution tanks to be used varies with the type of cleaning, whether an adequate fresh water supply line is present or whether solutions are to be re-used. The tank should be 25 per cent to 50 per cent larger than required to completely circulate any line or spray any storage tank. Solution tanks should be equipped with temperature controls to maintain automatically, solution temperatures.

5. Automation Unit

Timer should be properly set and understood by plant personnel. Planning automated systems and following latest trends should be exercised with care in order to save many costly errors.

News and Events

DISA To Consider Constitutional Change To Include Food Industry

Members of Dairy Industries Supply Association will vote on proposed constitutional changes in organizational structure at the forthcoming autumn dairy convention in Dallas the week of November 3, DISA's Washington staff headquarters announces.

Proposals to be considered include changing DISA's name to Dairy and Food Industries Supply Association, and broadening eligibility rules for 1964's DISA Exposition, to be held in Chicago, to permit displays of supplies and equipment for food processing fields beyond the dairy industrial fields. At the same time, attendance rules would be broadened to admit food processors from beyond the dairy industrial field.

These proposals were originally put before the DISA membership at the regular annual business session of the supplier-equipper group in New Orleans in April of this year. Although the proposals then received Board endorsement, further study was indicated. DISA committees most concerned with the proposed changes are to meet during these summer months and to report to the DISA Board which will meet in early September to prepare the agenda for the November meeting at which the vote will be taken.

NORCOLD MARKETS UNIQUE DISPENSER

Tiny thermoelectric modules cool a new line of milk and cream dispensers shown by Norcold, Inc., at the National Restaurant Show. The miniature electronic cooling units, a company spokesman points out, make possible dispensers that are exceptionally compact and efficient yet have no moving parts. They are designed to handle the latest type of milk packaging, plastic lined bulk cartons.

Four models are offered: a 12-gallon size for restaurants, hospitals, schools and other large food-service facilities; a five-gallon size for smaller restaurants and soda fountains; a five-gallon counter size designed for the home kitchen and a commercial cream dispenser.

"Both the dispenser and the new, hermetically-sealed, disposable cartons result in worthwhile savings," Norcold officials stated. "There are no empty cans, bottles or cases to store or return and the dispenser takes up less space and operates at less cost than those now used," they suggested.

Other features of the Norcold milk dispenser include lower initial cost than compressor or absorption-type dispensers, a free convection cooling system that means no motor, fan, compressor, evaporator or condenser, low current consumption, and light-weight anodized aluminum body and adjustable thermostat on all units.

Minutes Of Eastern Section Of Dairy Farm Practices Committee Of IAMFES

The meeting was held on July 15, 1963, in the offices of the Maryland and Virginia Milk Producers Association, 1530 Wilson Boulevard, Arlington, Virginia. The meeting was called to order at 2:00 p.m. by Chairman A. K. Saunders. The following members were present.

Dr. R. W. Metzger—Dairymen's League Cooperative Association, Inc.

Chester Bletch—Maryland and Virginia Milk Producers Association

Professor Henry V. Atherton—University of Vermont

Jim Smathers—Maryland and Virginia Milk Producers Association

Chairman Saunders indicated that it was unfortunate that this meeting had to be called at a time when so many of the active members of the Committee were on vacation.

The Chairman made a very strong point that the Farm Practices Committee is a working committee. All *final reports* from subcommittee chairmen are to be in his hands on or before September 1, 1963.

The active subcommittees of the Farm Practices Committee and their chairmen are as follows:

(1) Sediment—E. E. Kihlstrum
(2) Antibiotics, Pesticides and Adulterants—Milton Held
(3) CIP and Transfer Systems—Harry Stone
(4) Bulk Tanks—M. W. Jefferson; A. K. Saunders, alternate
(5) Relation of Dairy Cow Housing to Quality Milk Production—Jim Smathers
(6) Compatibility of Detergents—John Dean
(7) Education—Vernon Nichols

Chairman Saunders gave a detailed activity report of the various subcommittees and a re-hash of the meeting in Louisville on July 8, as follows:

Sediment

E. E. Kihlstrum reported working subcommittees that are used to make recommendations and brought the Committee up to date as to the work which had been done in 1963. Over 6,400 controlled sediment tests made on bulk tanks which were graded and correlated as to bucket and pipeline type operations. A meeting was held at the United States Department of Agriculture in Washington, D. C., to set up standards on bulk tank sediment testing. It was indicated that further education is needed with the producers as to proper methods and to indicate what he is presently doing wrong which is creating the exceptionally high number of 3 and 4's sediment test grades in pipeline milking operations. It was also suggested that milking time calls be made by sanitarians.

Bulk Tanks

A. K. Saunders will re-evaluate and re-edit report on bulk tanks plus recommendations for installation and use of spray balls. Also recommendations as to uniform milk temperature with or without agitation so that the temperature of the milk when in the tank will remain consistent.

CIP & Transfer Systems

Harry Stone read the various members' reports from his committee. There is indication that plastic tubing, when used in portable transfer systems, is not generally accepted by Grade A, although indications are that it has been used in some areas for manufacturing milk. Much more needs to be done. His committee members feel that stainless or glass tubing is cheaper than plastic tubing in the long run. Members also indicated that plastic tubing does constitute a cleaning problem. The committee present felt that re-evaluation and possible re-editing of the previous report on installation of CIP be brought up to date as to known cleaning methods with special emphasis as to the length of time and temperature of the water. Re-evaluation also applies to plastic tubing as indications are that it is going to be used by the dairymen and suggestions should be made as to how to clean, dry and to keep in a sanitary manner.

Compatibility of Detergents to Farm Water Supplies

Lyman Knierem stressed the importance of cleaning tanks and pipelines because of the difference in water in various areas, the various brands of detergents used and the difference in stainless steel piping, glass and tubing. He indicated that the program in the Louisville area has been underway for about 60 days. Two farms were selected, three detergents used and each detergent used for 30 days with varying temperatures. They are now into the third period. Knierem indicated that they are endeavoring to wash at less than 135 to 140°. Temperatures above those seem to create problems. Because this is the age of specialization, it seems that it's necessary as to detergents that products should be designed to fit the need of the individual farm and his specific water problems. The findings to date are tentative and will be summarized later.

Education

Chairman Saunders indicated in the absence of Vern Nichols the need for education of the dairyman and his hired hands in the proper preparation of the cows as indications are that an excessive

amount of sediment is finding its way into the bulk tank as indicated earlier by the report. The incidence of milk abnormality is also evident and more education is needed in this area as well.

Although a considerable amount of work has been done by the National Mastitis Council as to research and correlation, no information has as yet been sent to the producers.

In the Arlington meeting Prof. Atherton gave an interesting report of the work being done on the compatibility of detergents to farm water supply. The research that is being done with relation to the temperature and time control in CIP systems versus the compatibility of certain detergents is at this time inconclusive. It indicates however that progress is being made in getting good results with lower washing temperatures. Some interesting details of this work will no doubt be ready for our annual meeting.

Smathers reported that the work of the Committee on the Relation of Dairy Cattle Housing to Quality of Milk Production is being confined at this moment to a study of the so-called "free stall" housing of dairy cattle.

The meeting was adjourned at 5:30 p.m.

Submitted by:
James B. Smathers

3A Committees Name Effective Dates For Recent Standards

The 3A Sanitary Standards Committees have recently announced the completion of work on several standards of current interest. The Standards are: 3A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment; Eleven Amendments to conform Standards to Rubber Standard; Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products, and Product Contact Surfaces.

The final validating signature was affixed to the new 3A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Serial #2000, on July 26, 1963. The new Standard becomes effective one year hence on July 26, 1964, and will be published in the *Journal of Milk and Food Technology*, April, 1964, following which reprints of the Standards will be available from the International Association of Milk, Food and Environmental Sanitarians, as well as from the offices of most national dairy trade organizations.

The new 3A Plastics Standards are similar to the 3A Rubber Standards in that they are materials standards only and do not provide for fabrication criteria (other than surface evaluation). Materials standards are cross referenced where applicable in published 3A Standards by amendments. 3A Standards which provide for plastics are being amended to refer to the new Plastics Standards, so that the latter will provide uniform criteria for plastic materials where permitted.

The long awaited Plastics Standards are the culmination of nearly seven years work to develop guidelines for evaluating the cleanability characteristics of plastics as multiple-use contact surfaces for dairy products.

The scope of the Plastics Standards does not include single service application, nor does it provide for multiple-use plastic milk containers, since the latter require criteria which evaluate the finished complete container, rather than the material alone.

It is believed that the new Plastics Standards will be welcomed by industry and sanitarians alike as a vital working tool for the understanding of plastics for use in food contact.

The 3A Sanitary Standards Committees have promulgated 11 short amendments to published 3A Standards to provide a cross-reference to the 3A Rubber Standard. All amendments become effective on July 26, 1964, and will be published in this *Journal* in May, 1964. Reprints of these amendments will be available from the Association office as well as from most national dairy trade organizations.

The published 3A Standards affected by these amendments are:

Amendment to 3A Sanitary Standards for Fittings Used on Milk and Milk Product Equipment and Used on Sanitary Lines Conducting Milk and Milk Products, Serial #0807

Amendment to 3A Sanitary Standards for Thermometer Fittings and Connections Used on Milk and Milk Product Equipment, Serial #0902

Amendment to Supplement No. 5 to the 3A Sanitary Standards for Fittings Used on Milk and Milk Product Equipment and Used on Sanitary Lines Conducting Milk and Milk Products, Serial #0805A

Amendment to 3A Sanitary Standards for Milk and Milk Product Evaporators and Vacuum Pans, Serial #1601

Amendment to 3A Sanitary Standards for Farm Milk Cooling and Holding Tanks — Revised, Serial #1302

Amendment to 3A Sanitary Standards of Plate Type

(continued on page 273)

Food Supply Rated By FDA As "Nutritive" And "Safe"

The safety and high nutritive value of the American food supply are again confirmed by the latest results of FDA's continuing "total diet" studies released July 15.

The studies are made on market basket samples collected from grocery stores in five major U. S. cities. Groceries selected are representative of those that would be in a nutritionally satisfactory diet of a hypothetical average 16-19-year-old boy—biggest eater in the U. S. population.

The new results support these conclusions, FDA said:

The Strontium-90 content is still well within guidelines established by the Federal Radiation Council as acceptable for lifetime consumption under normal peacetime conditions. This is true, FDA said, even though it has found that the Strontium-90 content of the diet has increased steadily from May 1961, when the study was begun, through February 1963, date of the last sampling from which results are complete.

Pesticide residues detected were well within the amounts to be expected from compliance with safe limits ("tolerances") established for individual crops.

Food readily available at ordinary groceries and supermarkets contain ample quantities of vitamins. Analyses were made after normal kitchen preparation and cooking of foods usually cooked before eating.

The "total diet" studies, which began in May, 1961, were originally planned to discover how much Strontium-90 and Cesium-137 are in all food and drink consumed daily. They were expanded to include pesticide residues and vitamin content. "Market basket" samples consisting of about 60 pounds of groceries — a one week's supply — were obtained every 3 months from chain groceries in the Washington, D. C., area. Beginning May, 1962, similar samples were collected also in Atlanta, Minneapolis, St. Louis and San Francisco.

Foods and quantities sampled were from the "moderate income" food list furnished by Household Economics Research Division of the Department of Agriculture. The food was prepared in the diet kitchens of the National Institutes of Health, Bethesda, Md.; the Mt. Alto Veterans Hospital, Washington, D. C.; the Crawford W. Long Memorial Hospital, Atlanta; University of Minnesota, St. Paul; the Veterans Administration Hospital, St. Louis; and the U. S. Public Health Service Hospital, San Francisco.

Analysis for Strontium-90 and Cesium-137 showed the following:

There was a steady increase of Strontium-90 in the total diet from May, 1961 through February, 1963. Waste segments of the market basket which constitute only 6 per cent by weight contain about half of the Strontium-90. The dairy products, which constitute 25 per cent by weight of the total diet, contain over half of the Strontium-90. The largest proportion of the increase in Strontium-90 in the total diet over the year covered during this study is contributed by the dairy products. There is about two to three times as much Cesium-137 in the total diet as Strontium-90 and a general correlation between the levels of the two nuclides exists.

Analysis for pesticide residues showed the following:

All pesticides detected in the foods were at very low levels, many at the minimum detectable by the methods used. Twenty different chlorinated pesticide residues would have been detected had they been present. However, only nine different chlorinated pesticide residues were detected. No one sample contained all nine. Eight different organophosphate pesticide residues were detected. No one sample contained all eight.

Analysis for protein and vitamin content showed the following:

In each instance the amounts of nutrients present in the samples after preparation were greater than estimates from food composition tables. Analyses for protein, vitamin A, thiamine, riboflavin, niacin, vitamin B_6 and vitamin B_{12} were done. FDA said this is reassuring evidence that such tables can be relied upon to assess dietary adequacy. The foods readily available from the ordinary grocery or supermarket can provide ample amounts of needed vitamins even after preparation for serving. There is no need to use special "health foods" or vitamin supplements in order to meet one's daily vitamin requirements.

FDA said four more cities have been added to the five from which the reported samples were taken. They are Dallas, Denver, Boston and Seattle.

ON MILK SAMPLES

RECOMMENDS PROCEDURE

We suggest that to preserve producer respect of a bacteria count, and to save funds, that inspection agencies should be authorized by Standard Methods to use where desired, an incubated sample on bulk tank milk. This count should be recorded as one of the minimum number of samples required.

Present standards were established considering normal incubation in the warmer can milk not tanks where no growth is more often the case. PLEASE SEE CLASSIFIED AD, Page 281, Dairy Technology, Inc., (Editorial Advertisement).

3A Standards . . . .

Heat Exchangers for Milk and Milk Products, Serial #1101

Amendment to 3A Sanitary Standards for Stainless Steel Automotive Milk Transportation Tanks for Bulk Delivery and/or Farm Pick-up Service, Serial #0504

Amendment to 3A Sanitary Standards for Internal Return Tubular Heat Exchangers for Use with Milk and Milk Products, Serial #1201

Amendment to 3A Sanitary Standards for Milk and Milk Products Filters Using Disposable Filter Media, Serial #1001

Amendment to 3A Sanitary Standards for Fillers and Sealers of Single Service Containers for Milk and Fluid Milk Products, Serial #1701

The practical effect of this series of amendments is to provide in a uniform reference the criteria for rubber in published standards where rubber is permitted. Future 3A Standards likewise will refer to the 3A Rubber Standard where rubber provisions for any given equipment are written.

New 3A Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products and Product Contact Surfaces will become effective July 26, 1964.

Officially announced by the 3A Sanitary Standards Committees on July 29, 1963, these new practices, Serial #2100, will also be published in this *Journal* in May, 1964. After this publication date, reprints will be available of the practices as they are of the Standards.

The practices are guidelines for the sanitary production of clean air for contact with dairy products. Air applications, such as agitation, movement of product, and incorporation of air, are included in the practices.

Like the 3A Standards for Rubber and for Plastics, the Air Under Pressure Practices will serve as a reference standard to 3A Standards which provide for the use of air. Appropriate cross-references to provide air criteria will be made by amendment in published 3A Standards.

3A Standards for dairy equipment are the result of cooperation among three groups: (1) dairy processors, the users of dairy equipment; (2) dairy industrial suppliers and equippers, the manufacturers and sellers of dairy equipment; and (3) public health officials and sanitarians, the regulatory officials under whose jurisdiction the equipment is installed and used.

The 3A program, which is supported by every national dairy trade association, is an entirely voluntary undertaking which has resulted in standards being issue for 19 items of dairy industrial supplies or equipment.

Generally speaking, 3A Standards are acceptable in public health jurisdictions in nearly every town, city, or state in the United States. The 3A Sanitary Standards are cited in the recommended Milk Ordinance and Code of the U. S. Public Health Service.

INSTITUTE ANNOUNCES CALL FOR TECHNICAL PAPERS

The Institute of Environmental Sciences announces its first call for papers for its Tenth Annual Technical Meeting to be held in Philadelphia, April 13, 14 and 15, 1964. The theme of the meeting will be "Reliability versus Reality."

Papers in environmental data collection simulation and laboratory management are solicited. This year's program will be emphasizing the presentation of material which translates technological facts into information suitable for direct application by the environmental engineer and his management. Articles to be submitted would be concerned with expanding the knowledge and effectiveness of the engineer in influencing the product from the proposal stage throughout design and production.

Richard F. Hahn, Technical Program Committee coordinator, states, "Engineers and managers of environmental laboratories having acquired a knowledge of environmental effects must feed this information back into future products and their design. This symposium will emphasize the technical and management mechanism by which the engineer can achieve this goal."

Sessions being planned and developed at this time cover the environments of Space, Marine, Earth, Electro-Magnetics, Shock, Acceleration, Cryogenics, Solar Radiation, Nuclear Radiation, Vibration, and Acoustics. Additional sessions on "Data Handling and Instrumentation," "New Products," and "Special Test Programs of the Gemini Program" are currently scheduled.

Panels are proposed to cover the: "Laboratory Management Organization," "Facility Sharing—A Practical Solution?" and "Communication to Management and the Engineering Staff."

Abstracts should be submitted in 200 words by October 1, 1963 to: Institute of Environmental Sciences, Technical Program Committee, 34 S. Main Street, Mt. Prospect, Illinois. Acceptable papers will be required for final submittal by January 15, 1964.

South Dakota Affiliate Holds Fifteenth Seminar

The Fifteenth Annual Seminar of the South Dakota Association of Sanitarians and the Division of Sanitary Engineering, State Department of Health was held July 10, 11 and 12, at the Northwestern Public Service Hospitality Room in Aberdeen, South Dakota.

There were approximately forty-five members and guests in attendance and the program was highlighted by discussions of new legislation by Charles E. Carl, Director, Division of Sanitary Engineering, State Department of Health, Pierre, and the 1962 Food Service Ordinance and Code by Harold E. Thompson, Regional Milk and Food Consultant, Public Health Service, Kansas City, Missouri. Chemical Sanitizers for Food Handling was discussed by William Wollschleger, Milk and Food Consultant, PHS, Kansas City.

Milk quality, insecticides, pesticides, residues and sewage waste disposal problems were discussed on July 11 by personnel from South Dakota State College in Brookings. The Annual Banquet that evening featured H. L. "Red" Thomasson, Executive Secretary of the International, Shelbyville, Indiana, as the guest speaker.

On July 12, Mr. Fred Harmston, biologist, PHS, State Aids Section, Greely, Colorado, gave an informative talk on mosquito cotrol, with particular emphasis on the cooperative mosquito control project by water level management on Lewis and Clark Lake near Yankton, South Dakota.

Comments from the Indian sanitarians working on reservations in South Dakota concluded the program. These men discussed the problems which they faced and the methods used to accomplish improvements in the sanitation field. As a unique closing to their presentation, they played taped recordings of Indian dances with music and chants in the native language.

The new officers elected at the Annual Business Meeting are: *President,* Harold C. Pengra, Mitchell; *President-Elect,* Robert Leiferman, Mitchell; *Secretary-Treasurer,* Edward P. Michalewicz, Pierre. Mr. Casey Anderson was re-elected to the Executive Board.

VACUUM IS TOPIC OF BABSON FILM

Help lick mastitis by having a better supply of milking vacuum. That's the theme of a color film ready to go to work for the dairyman.

"*The Story of Vacuum*" brings to the screen in vivid animation the way vacuum works to milk a cow. It shows how milking vacuum can be accurately determined on any dairy set-up.

For those folks wanting to get a complete vacuum picture of an entire milking, *and on every one of their own cows,* this film tells how.

The address is Film Department, Babson Bros. Dairy Research Service, 2843 West 19th Street, Chicago, Illinois, 60623.

TEST BAN TREATY HOLDS HOPE FOR LESS CONTAMINATION

[1]The proposed treaty banning the testing of nuclear weapons in the air, on the land, or under the sea has raised hopes that further contamination of the atmosphere with radioactive fallout may be eliminated or at least greatly reduced. Since Red China and France have both indicated little willingness to sign the treaty, there are chances that these two nations may be sources of further atmospheric contamination.

It is interesting to note that discussions of the treaty and its importance by heads of governments and others working on the treaty have put heavy stress on the dangers from fallout from the tests.

Speaking to the nation July 26 about the treaty, President Kennedy said, in outlining reasons why he is urging the Senate to approve the treaty, ". . . the treaty can be a step freeing the world from fears and dangers of radioactive fallout. Our own atmospheric tests last year were conducted under conditions which restricted such fallout to an absolute minimum. But over the years the number and yield of weapons tested have already increased—and so have the radioactive hazards from such testing.

"Continued unrestricted testing by the nuclear powers, joined in time by other nations which may be less adept in limiting pollution, will increasingly contaminate the air that all of us must breathe.

"Even then, the number of children and grandchildren with cancer in their bones, with leukemia in their blood, or with poison in their lungs might seem statistically small to some, in comparison with natural health hazards. But this is not a natural health hazard – and it is not a statistical issue.

"The loss of even one human life, or the malformation of even one baby—who may be born long after we are gone—should be of concern to us all."

The President's words, being a very strong emotional appeal to the country for support of the treaty, certainly may come back to plague a good many people if the treaty is not adopted or if it is violated and nuclear weapons testing again fill the atmosphere with radioactive debris.

[1]Reprinted from "*For Your Information,*" July 31, 1963. Published by American Dairy Association.

Safe Driving Adopted As Theme For MIF - IAICM Crusade Child Safety

More than 350 milk and ice cream plants are expected to participate in the industry's *1963 Crusade Child Safety.* Under the joint sponsorship of the Milk Industry Foundation and the International Association of Ice Cream Manufacturers, *Crusade* is an annual event designed to stimulate year-round safe driving.

The major objective of *Crusade* is to safeguard children on their way to school and at play. Four principal objectives have been determined and are: 1. save lives and reduce injuries; 2. improve community relations; 3. improve employee relations; and 4. reduce costs.

The *'63 Crusade* will begin on September 1 and continue through the month. Safe driving programs will be conducted by individual companies and by groups of companies on a market-wide basis. A comprehensive "Blue Print for Action," which offers detailed guidelines for conducting a *Crusade Child Safety* program, has been prepared. Activities outlined in the "Blue Print" include safety meetings for drivers, safe driving pledges, safety buttons for children, proclamations by public officials, displays of *Crusade* materials, and cooperation with public safety officers.

According to Carl C. Clements, chairman, *Crusade Child Safety Committee* and of the Milk Industry Foundation's Accident Prevention Committee, *Crusade* has been a highly effective program in reducing accidents. Referring to a study made in 1961, Mr. Clements said, "Responding participant plants had average accident costs of three-tenths of a cent per mile while responding non-participants had accident costs of four-tenths of a cent per mile. *Crusade Child Safety* saved those who participated $1000 per million miles of truck operation. Another measure of Crusade's effectiveness is the accident rate. Participants had an accident rate of 10.4 accidents per million miles. Non-participants had a rate of 14.1 accidents per million miles of operation."

Enrollment in *Crusade* has averaged between 350 and 400 plants each year. Over two million pieces of promotional material are mailed annually to participating plants. A four-man industry committee is directing the *Crusade Child Safety* program. Members are: Carl C. Clements, National Dairy Products Corporation, *chairman;* F. T. McGowan, The Borden Company; S. W. Parsons, The Carnation Company; and E. S. Swenson, Roberts Dairy Company, Omaha.

USDA Report Advises On Mites

How two environmental factors, temperature and humidity, can be regulated so as to be effective against cheese mites is the subject of a recent report issued by the U. S. Department of Agriculture.

The report will be of considerable interest to those concerned with the operation of cheese storage warehouses or curing rooms. Not only can the mites consume a considerable quanity of cheese, but infested cheese becomes unsightly and unsalable, and is subject to condemnation and confiscation by government inspectors. Control of cheese mites is essential to prevent such losses.

Due to the ever-increasing demand by the general public for the safer use . . . or even the elimination . . . of insecticides on or near food, the Agricultural Marketing Service ordered its Market Quality Research Division to investigate the effects of some nonchemical treatments on mites infesting cheese. This study by Stored-Product Insects Branch scientists of AMS was carried out in their Madison, Wisconsin, laboratories where the mite studies on cheese are in progress.

A copy of the report, "Effects of Temperature and Humidity on Cheese Mites," Marketing Research Report No. 599, may be obtained from the Office of Information, U.S.D.A., Washington 25, D. C.

RESIGNS WITH AUGUST ISSUE

EDITOR LEAVES TO RETURN TO OHIO FOR GRAD STUDY

The Executive Board recently disclosed that John Simpkins, assistant executive secretary and assistant managing editor, will be leaving the employ of the Association with the publication of this issue of the Journal.

Simpkins, who joined the Association staff a year ago, has been headquartered in Shelbyville, Indiana, with Red Thomasson, executive secretary, and was the first to hold the position created last year. He is leaving to accept a graduate assistantship at Ohio University, Athens, Ohio, where he was graduated in June, 1962. He will begin study this fall on his Masters degree which he hopes to earn by the end of 1964.

A journalism graduate, Simpkins has been primarily concerned with the publication of the Journal of Milk and Food Technology. He has done some writing, editing, and all of the production aspects of the publication. Of his year with the Association, Simpkins said, "I have had many interesting associations with the International and have certainly gained from the experience. However, without the sage advice and guidance received from Red Thomasson, I'm certain many of the experiences would not have been as meaningful."

DIVERSEY PRODUCT RECEIVES FDA APPROVAL FOR NO-RINSE

SAF-SOL—a mixed-halogen bactericide, disinfectant, sanitizer and deodorizer—has received FDA approval as to its use on food processing equipment without a subsequent potable-water rinse. This is the first product to receive such approval.

SAF-SOL is used in small concentrations and the amount that could possible be introduced into food is extremely small. In fact, end products of SAF-SOL residues are present in foods as naturally-occurring substances. Tests of this sanitizer show that in distilled water concentrations of 6.25 ppm (expressed as available chlorine) at 25 C satisfactory kill concentrations for *Staph* and *E. coli* were 6.25 and 12.5 ppm, respectively, for the same time period. Concentration of 6.25 ppm provided satisfactory kills for *Aerobactor aerogenes*, *Salmonella typhosa*, and *Proteus vulgaris*.

Composition of SAF-SOL is 3.25 per cent sodium hypochlorite, 89.82 per cent sodium phosphate, 2.00 per cent potassium bromide and 4.83 per cent inerts. Development of SAF-SOL originated during an investigation when bromine salts were found to increase bacteria kill effect. It is non-corrosive to such materials as stainless steel, tinned copper and iron, glass, ceramic, Tygon, rubber and most plastics when used as directed.

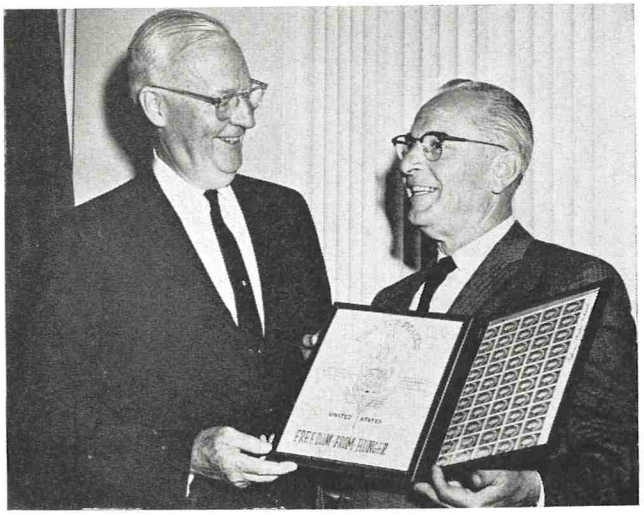
Supplier of SAF-SOL is The Diversey Corporation, 212 West Monroe Street, Chicago, Illinois.

Ex - Cell - O Receives Recognition For Part In "Food For Peace" Program

George D. Scott, vice-president, Ex-Cell-O Corporation and national chairman of June Dairy Month, was recently honored with the first commemorative "Food For Peace — Freedom From Hunger" five-cent U. S. postage stamp.

The presentation was made by Ephraim Martin on behalf of J. Edward Day, the U. S. Postmaster General, on the occasion of Scott's address to the members of the Dairy Councils of Massachusetts.

It is the first time such an honor has been bestowed upon a corporation and was given to Scott in recognition of his company's vast contributions to Project HOPE, the U. S. hospital ship which has instituted medical and nutritional programs in newly developing countries of southeast Asia and Latin America.



George D. Scott is honored with "Food For Peace-Freedom From Hunger" stamp. Scott is pictured here (right) receiving the U. S. Government presentation.

Ex-Cell-O, in cooperation with the dairy industry and Foremost Dairies, equipped the mercy ship with the world's first sea-going dairy. In addition to the contribution of a $50,000 Pure-Pak milk packaging machine, the corporation instituted a widespread campaign to acquaint the American public with the purposes of the program through their Academy Award-winning film "Project HOPE."

COMING EVENTS

September 3-5: National Association of Dairy Equipment Manufacturers, (Members only), O'Hare Inn, Chicago, Illinois. Write: John Marshall, 1012 14th Street, N.W., Washington, D. C.

September 9-10: Wisconsin Association of Milk and Food Sanitarians, Annual Meeting, Dell View Hotel, Lake Delton, Wisconsin. Write: L. Wayne Brown, 421 Chemistry Building, University of Wisconsin, Madison, Wisconsin.

September 30-October 2: New York State Association of Milk Sanitarians and Cornell University Department of Dairy and Food Science, Annual Conference, Hotel Syracuse, Syracuse, N. Y. Write: R. P. March, 118 Stocking Hall, Cornell University, Ithaca, New York.

October 14-16: Annual Conference, Institute of Sanitation Management, Cleveland, Ohio. Write: Executive Officer, Institute of Sanitation Management, 55 W. 42nd Street, New York 36, N. Y.

October 14-18: PHS Training Course (1 week), Control of Gaseous Emissions, Taft Engineering Center. Write: Director, Training Program, Robert A. Taft Engineering Center, 4676 Columbia Parkway, Cincinnati, Ohio. (No regis. fee charged.)

October 22-25: International Association of Milk, Food and Environmental Sanitarians, Inc., 50th Annual Meeting, Royal York Hotel, Toronto, Ontario, Canada. Write: H. L. Thomasson, P. O. Box 437, Shelbyville, Indiana.

October 30-31: 1963 Nutrition Conference for Feed Manufacturers, Cornell University, Ithaca, New York. Write: Professor William G. Merrill, Department of Animal Husbandry, Cornell University, Ithaca, New York. (Conference held in cooperation with the American Feed Manufacturers, Association.)

November 3: Dairy Society International, Annual Meeting, Statler-Hilton Hotel, Dallas, Texas. Write: George W. Weigold, 1145 19th Street, N. W., Washington, D. C.

November 3-6: International Association of Ice Cream Manufacturers, 59th Annual Convention, Sheraton-Dallas Hotel, Dallas, Texas. Write: Robert H. North, 910 17th Street, N. W., Washington, D. C. 20006

Methods And Instrumentation To Highlight NIE Equipment Exhibit

Plans have been completed for the Thirteenth Annual Instrument Symposium and Research Equipment Exhibit to be held October 7-10 at the National Institutes of Health. The Institutes, located at Bethesda, Maryland, serve as the center of research activities in the U. S. Public Health Service.

More than thirty-five scientists of national and international repute will discuss recent developments in research methods and instrumentation in the symposium. The concurrent exhibit will display the lastest products of seventy-six of the nation's leading manufacturers of research equipment.

Mr. George A. Bradfute, Division of Research Services, National Institutes of Health, will serve as chairman of the opening session on the research application of lasers.

Primary topics of discussion for subsequent sessions include atomic absorption spectroscopy, automation in biochemical analysis, methods of molecular structure analysis, new methods in immunology and immunochemistry, high resolution microscopy, radiation biology, advanced x-ray and electron technique spectroscopy, molecular separation by size and charge, and physiological monitoring.

Dr. James A. Shannon, director of NIH, will welcome participants at the opening meeting in the Clinical Center Auditorium at 2 p.m. on October 7. Other sessions are scheduled for that day.

The research equipment exhibit will be located in Building 22 at NIH. It will be open daily from 10 a.m. to 5 p.m., Ocober 7-10, and will remain open until 9 p.m. on Tuesday, October 8.

Complementing the exhibit, special instrumentation sessions will be held in Building 16 each morning throughout the meeting. Technically qualified representatives will discuss and demonstrate newly developed items and their application in laboratory-clinical research.

All persons with an interest in research instrumentation are invited to attend the symposium and exhibit. In 1962, nearly 7000 visitors were registered from the medical and health-related professions, colleges and universities, and industry.

PAPERS PRESENTED AT AFFILIATE MEETINGS

Editor's Note: The following is a listing of subjects presented at recent meetings of Affiliate Associations. Copies of these papers may be avaliable through the Secretary of the respective Association.

Associated Illinois Milk Sanitarians
TWENTY-FIRST ANNUAL SPRING CONFERENCE

Holiday Inn, Aurora, Illinois
May 6, 1963

Secretary: James A. Meany, 8949 S. Laflin St., Chicago 20, Illinois

Finger Printing Quality By Sediment Tests—Richard E. Vaughn, Divisional Manager, Filter Products Division, Johnson and Johnson

Our Changing Times—Karl Gardner, Ph.D., University of Illinois

Results of Recent Studies of Some Pesticides—George Decker, Ph.D., Principal Scientist and head, Illinois Natural History Survey, Urbana, Illinois

The Food and Drug Administration Milk and Food Sampling Program—John H. Guill, Jr., Director, Chicago District, Food and Drug Administration, Department of Health, Education and Welfare

Florida Association of Milk and Food Sanitarians
FOURTEENTH ANNUAL SHORT COURSE

Holiday Inn Motel, Gainesville, Florida
May 8-10, 1963

Secretary: Kenneth L. Smith, Dairy Lab., Florida Agricultural Experiment Station, Gainesville, Florida

Collection and Care of Samples - Dairy Products, M. Laird Minear; *Foods*, Tony Damanda; *Water*, John Taylor, Jr.

Radiologicals in Milk and Food Surveillance—George McCall, Health Physicist, Pinellas County Health Department, St. Petersburg, Florida

Public Relations of Sanitarians with Milk Producers and Processors—Emmett Dozier, Plant Superintendent, Velda Dairies, Jacksonville, Florida

Quality Control of Ice Cream, Including Counter Freezer Products—Leon E. Mull

Why Controls? - Standard Plate Count, Coliform Count, Phosphatase Test, Inhibitor Test, Shelf Life—Kenneth Smith, professor, Dairy Science Department, University of Florida, Gainesville, Florida

Innovations in Dairy Processing and Testing Equipment—Richard Jolley, Director of Quality Control, Hood's Dairy, St. Petersburg, Florida

World Without Bacteria—Calvin A. Page, President, Science Associates Inc., Orlando, Florida

Pesticides In Milk—Raymond E. Hamilton, Inspector, Food and Drug Administration, Jacksonville, Florida

Panel Discussion: *Dairy Barn, Milk and Ice Cream Plant Construction*—George Tworogers (moderator), manager, Expert Dairy Service Inc., North Miami, Florida

New Aspects of the Inhibitor Test—Hugh Butner, bacteriologist, Florida State Board of Health, Jacksonville, Florida

Evaluation of Course—Leon Sheumaker, consultant, State Board of Health, Jacksonville, Florida

Central Ontario Milk Sanitarians Association
FIFTH ANNUAL MEETING

Pickfair Restaurant, Toronto, Ontario
January 30, 1963

Secretary: Fred W. Hamilton, Dairy Science Department, Ontario Agricultural College, Guelph, Ontario

My Impressions of Dairy Plant Operations in Europe—A. M. Pearson, professor, Dairy Science Department, O.A.C., Guelph, Ontario

Dairy Farms in Britain and Scandinavian Countries—C. K. Johns, head, Dairy Section, Research Branch, Canada Department of Agriculture, Ottawa, Ontario

Symposium: *Milk Flavors: Types and Causes, Techniques to Evaluate Flavors, Flavor Control*—D. R. Arnott, (chairman), Dairy Science Department, O.A.C., Guelph, Ontario

Training of Dairy Personnel in Britain, Denmark, Holland and Germany—Alec Bradfield, professor, University of Vermont, Burlington, Vermont

Indiana Association of Sanitarians
THIRTEENTH ANNUAL MEETING

Rice Auditorium, Indiana State Board of Health
Indianapolis, Indiana
June 6, 1963

Secretary: Karl K. Jones, Food and Drug Division, Indiana State Board of Health, Indianapolis, Indiana

Recognition and Eradication of Pests—Robert M. Lewis, president, Lewis Pest Control, Muncie, Indiana

Essential Elements of Hot Water Service—R. M. North, R. M. North Company, Fort Wayne, Indiana, and R. C. Perry, Rund Mfg. Company, Chicago, Illinois

Swimming Pools—Simplifying Chemical Treatment—William V. Pitkin, Ulrich Chemical Company, Indianapolis, Indiana

Pesticide Residues in Raw Milk—T. E. Eddleman, director, Food, Drug and Dairy Laboratory, Indiana State Board of Health, Indianapolis, Indiana

Indiana Milk Protection Plan—James R. Harton, chief, Manufactured Milk Section, Division of Dairy Products, Indiana State Board of Health, Indianapolis, Indiana

Selling Milk Protein—J. Orville Yound, Dairy Manufacturing Specialist, Purdue University, Lafayette, Indiana

Misbranding Food at Retail Level—Frank E. Fisher, director, Division of Food and Drugs, Indiana State Board of Health, Indianapolis, Indiana

Radioactivity in Relation to Foods—W. M. Decker, D.V.M., chief, Special Projects Section, Milk and Food Branch, Public Health Service

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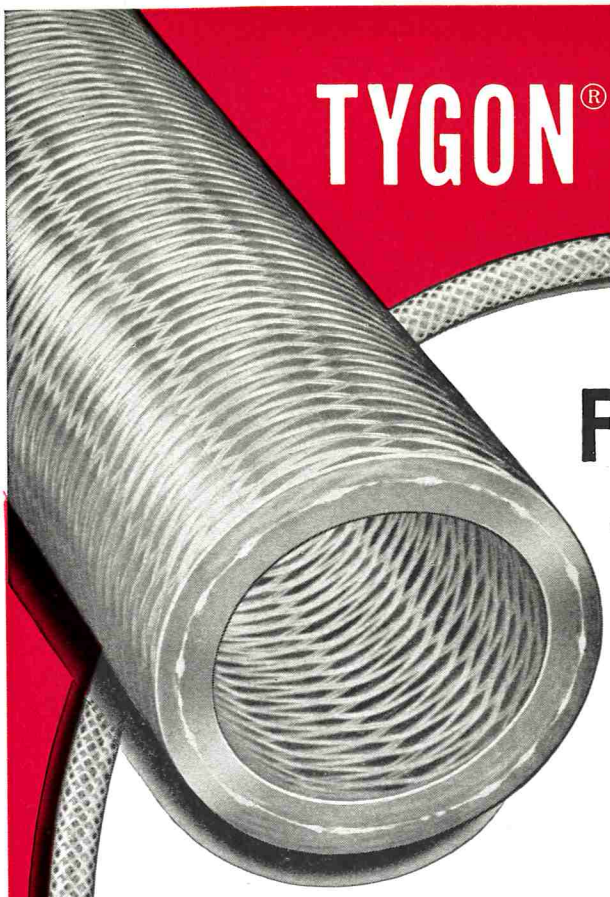

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