immediately. The one-inch thickness of the curd on the conveyor then moves under a deluge of water at 48°F that has been recovered from the refrigerated water cooling section. The water tempers the curd with a pre-cooling and washing.

Next the curd moves through the refrigerated water (33°F) section. Here the water sprays up through the curd as well as down. Progressively the curd is thoroughly washed and cooled, with only fresh refrigerated water passing through the curd.

Between the cooling section and the press section the curd goes under a grader or leveler that again distributes the curd evenly one inch thick on the conveyor. The curd then enters the press where a converging belt, running at the same speed as the conveyor, gently squeezes the curd to the desired moisture content. Any desired moisture content can be acquired by adjusting the end opening on the press. Once adjusted, the moisture content remains constant.

After leaving the press, the curd falls into the creamer. The creamer consists of a screw conveyor that gathers and mixes the curd while a calibrated amount of cream is sprayed on it. This creaming operation eliminates the need for violent agitation as it progressively mixes given amounts of curd and dressing.

The creamed curd then moves into the discharge hopper for loading into containers, or is transferred to the packaging machine.

The temperature of the curd at the discharge end is 40°F. This temperature remains constant since there is no latent heat held in the curd.

Drainage from the entire machine permits recovery of all the fines that were washed from the curd. A perforated stainless steel drum is revolved to keep the fines from adhering to the drum. The water is piped to the drain, leaving the fines in the fine storage tank. During the day's run, the fines can be removed from the fines storage and put back into the next vat of cheese being processed, or they can be added to the finished product. A complete recovery of all fines in usable condition is accomplished.

The principle behind the fast washing, cooling and drying is something like the plate cooler. The one-inch layer of curd is readily exposed to the continuous processes where each kernel of curd gets its individual treatment. All the final refrigerated water used for washing the curd is fresh chlorinated water, used only once. There is no dilution factor as in vat washing. The curd is processed uniformly each day. The washing, cooling and drying process is thorough and immediate.

In recent years, the dairy industry through necessity, has adopted more and more automation and mass production techniques in its processing. In the manufacture of cottage cheese very little has been done along these lines. It still remains basically a hand operation. Now, with one press of a button, the Curd-O-Matic makes the processing of cottage cheese automatic.

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SECOND IN A SERIES

TRAINING OPPORTUNITIES FOR THE SANITARIAN

SPECIALIZED IN-SERVICE TRAINING

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The term "In-Service Training" does not defy definition or description—it seems to invite it. This happy fact permits one to choose, or to invent, any description that suits his ends, and only incidentally confuses the subject to the extent that no definition is widely accepted or understood. This state of affairs is not the result of caprice on the part of those concerned with continuing education, but results from varying interpretations of the objectives and training methods to be included in the term.

To establish a ground of common understanding, for the purpose of this presentation, arbitrary limits are given to the scope of our subject, "Specialized In-Service Training." This training requires a pre-prepared instruction plan and learning situation. It is structured and formalized regardless of teaching methods employed and whether or not the structure is evident to the trainee. The training is identified as a short course of instruction and may include classroom, laboratory, and field exercises. A com-

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An extensive special study.

Training conducted within these limitations will have one or more of the following specific objectives. Some of these objectives also relate to other methods of instruction, but all these listed have tried and proven application in in-service training.

1. Orientation of newly-hired personnel.
2. Specific job training of newly-hired personnel.
3. Bridging the gap between academic training and job application.
4. Refresher and up-dating training in specific technical areas with particular emphasis on recent developments.
5. Providing an introduction to, and developing competency in, a new technique within an individual's field of specialty.
6. Equipping an individual to undertake a field of specialty or move from one specialty to another.
7. Preparing field personnel to assume higher administrative responsibilities.
8. Stimulating attitudes and skills required in dealing with individuals, groups, and the public.
9. Training to meet emergent situations, newly recognized problems, or newly authorized activities.
10. Acquisition of generalized background information necessary in understanding problems, making sound judgments, and in appreciating the entire operation of his organization.
11. Providing opportunity for formal and informal exchange of information and views between persons with similar interests.
12. Correction of non-productive routine operations and lagging interest.
13. Stimulating administrative changes to meet current and anticipated program needs.
14. Meeting requirements of merit system for tenure and advancement.

Objectives

Oppportunities

Even for one who is engaged full time in the development and presentation of training courses for environmental health personnel, a detailed inquiry into the in-service training opportunities for sanitarians is an amazing experience. Not only do the types and numbers of courses offered seem almost limitless, but also the numbers and kinds of sponsoring agencies involved seem virtually too numerous to identify. The compilation of a comprehensive listing would not be possible without conducting an extensive special study. In lieu of such a report, certain readily identifiable resources will be discussed and others indicated.

U. S. Public Health Service

Within the U. S. Public Health Service, some sixty-eight short courses for which sanitarians may apply are sponsored by the Robert A. Taft Sanitary Engineering Center, the Communicable Disease Center, and the Division of Health Mobilization.

The Sanitary Engineering Center offers to qualified candidates survey and advanced technical courses in radiological health, milk and food sanitation, water supply and pollution control, air pollution control, metropolitan planning and occupational health. Many of these are offered as headquarters courses in Cincinnati, Ohio, as field courses in the states, and as cooperative presentations in colleges and universities. In Fiscal Year 1962, 170 sanitarians were enrolled in these classes; 55 in radiological health, 55 in milk and food sanitation, 41 in water supply and pollution control, 11 in air pollution control, and 8 in metropolitan planning.

Also, in the last fiscal year, 1129 sanitarians were enrolled in the several presentations of twenty of the sixty-two headquarters and field courses offered by the Communicable Disease Center. Those courses emphasize, in whole or in part, the environmental aspects of the control of a disease or group of diseases, or relate directly to program operation in this field of interest. An exception is health mobilization training conducted in cooperation with the Division of Health Mobilization. These courses may be grouped as follows with the figure in parenthesis indicating the number of courses offered by Sanitary Engineering Center in 1962:

- Symposia on specific diseases (258), epidemiology and general communicable disease control (116), vector control (260), environmental control of communicable diseases (278), venereal disease control (62), training methods and aids (48), communicable disease control organization and orientation (9), and health mobilization (91).

The Training Program Bulletins issued annually by the Sanitary Engineering Center and the Communicable Disease Center describe the courses, indicate dates and place of presentation when feasible, state the desired qualifications of applicants, indicate the method of application, and give pertinent information on the training facilities. These bulletins are widely distributed throughout the states prior to the start of each fiscal year. In addition, courses are frequently announced through the mailing of special course announcements. Other Public Health Service training opportunities of interest to the sanitarians are those offered by the Division of Health Mobilization headquarters in Washington, D. C., and by the Evening School operated by the National
Institutes of Health. The former conducts short field courses that apply emphasis to environmental aspects of chemical, biological, and radiological warfare. The Evening School presents a wide variety of basic and applied courses in the traditional semester pattern and are therefore limited to residents of the metropolitan Washington area.

Other federal agencies

A large number of other Federal agencies conduct courses pertaining to environmental health in their area of interest. Of particular note is the vast complex of courses available from the several branches of the Armed Forces. While these are intended primarily for active duty and reserve members of the Armed Forces, civilian enrollment may be permitted in some instances. In addition to courses requiring personal attendance, some are offered through correspondence. It is beyond the scope of this paper to list the courses available or to describe the many categories of eligibility requirements, and it is suggested that sanitarians with reserve status or interested civilians obtain detailed information on courses and requirements from Army, Navy, and Air Force headquarters in their area. The U. S. Department of Agriculture Graduate School located in Washington includes in its catalog, a large variety of courses pertinent to the activities and interest of sanitarians. Applications for these courses, both residence and correspondence, are accepted with priority given Department of Agriculture personnel, but others are accepted if facilities permit. A detailed catalog is available on request and it is of interest to note that the school maintains a reference service that will direct applicants to other training facilities throughout the country if it cannot provide the training requested. The Food and Drug Administration schedules courses of in-service training for those engaged in activities in its sphere of interest. Information on such courses may be obtained directly from the Food and Drug Administration headquarters in Washington and may also be available through the several district offices. While these agencies are the ones that come immediately to mind, they represent only a sample of those that on a regular basis, or at least from time to time, offer valuable training. Virtually every large Federal agency supports a training operation which will be glad to furnish specific course information upon request.

Universities and colleges

In addition to graduate and undergraduate curricula, many colleges and universities through extension and similar services list extensive in-service training opportunities. A few, such as the University of Oklahoma, the University of Indiana, and East Tennessee College, provide basic orientation to and training in environmental health. In addition to such introductory courses, colleges and universities offer, in the field of sanitation, short course presentations up through the graduate level. These may be offered by the institution itself or may be given in cooperation with other agencies. They are normally listed, or specifically referred to, in the catalog published by the institution. In some areas where particular interest has been indicated, special announcements of such courses are distributed through the sanitarians’ organization in the state. For sanitarians who live within reasonable distances of institutions of higher learning, it is normally possible to register for individual courses from the regular curriculum. Not infrequently these are offered as night courses, or attendance may be scheduled in with regular employment. Some of these courses in administrative and technical fields provide immediate useful information and others may be taken as prerequisites to specialized training. For example, an individual desiring qualification in radiological health may find it necessary or desirable to correct personal deficiencies in physics and mathematics. While some might question the inclusion of work toward a degree as in-service training, it should be mentioned that opportunities for this exist. In the area of housing hygiene, for example, sanitarians have found it desirable to acquire a law degree through night study. Frequently, junior colleges and technical schools offer certification programs in subjects directly related to environmental health.

State agencies

A number of state health departments have developed excellent short courses for sanitarians. These also range from basic to highly advanced and have the advantage of being geared to the conditions and objectives peculiar to the state. The problem of general sanitation training for new employees has been solved in several states by the regular presentation of excellent introductory courses. It is understood that in some of these, candidates from other states will be accepted as facilities permit. At least one state is offering correspondence courses to sanitarians as an extension service of the State Health Department. It has been encouraging to note that sanitarians’ seminars conducted annually or semi-annually by state health departments more and more are planned as carefully constructed in-service training sessions. To meet specific needs and interests in at least two states during the past year, outstanding courses in administration for sanitarians were planned and conducted.

County and city agencies

Specifically identified in-service training courses conducted by city and county health departments ap-
pear at the moment to be confined almost exclusively to a relatively few large departments. These follow the general pattern and have the same advantages of courses conducted by states. It is particularly desirable to explore the possibilities and practicality of specialized in-service training at this level.

*Private industry*

At least one seminar in environmental sanitation sponsored by a private industry has attained national recognition. While this is rather an exception, it should not obscure the fact that many industries will offer training to the sanitarian on request. Requests for an acceptance of such training should, of course, be made with proper consideration for legal and ethical relationships. However, certain types of instruction are obtainable only from such sources and are effectively utilized by health departments as well as many other public agencies.

*Professional organizations*

Professional organizations such as this and related voluntary groups by constitution and by-law almost invariably commit the organization to in-service training as a major objective. A particular tribute is due the officers, program committees, and membership in recognition of the ever increasing special approach being made to the meeting of this important objective.

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**INDIVIDUAL INITIATIVE ESSENTIAL**

It would seem appropriate to conclude this discussion with a few general remarks on in-service training. It would seem apparent that any sanitarian, whatever his training needs or objectives, can find suitable training courses available to him if he will make the effort to search them out. This relates directly to the amount of determination and drive that an individual has to continue his education. It is rare that training to meet momentary enthusiasm or short-term goals will prove effective and, as a result, time can well be spent in the careful preparation of a long-range personal development program. Frequently the successful completion of such a program requires the support and understanding of a person's agency and supervisory personnel, and considerable effort may be required to have training accepted as an investment rather than an expense. The individual's own attitude and activities will do much to supplement the efforts made by far-seeing management and training institutions to promote this concept. It will also be profitable to keep in mind that, although much training is taken to meet immediate needs, employment in environmental health is not entirely a day-to-day concern and some training opportunities should be sought that will equip the sanitarian to appreciate and grow with the future in this field.

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**RAPID DETECTION OF FAECAL COLIFORM BACTERIA IN THE FOOD PROCESSING PLANT**

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A medium composed of 2% tryptone and 0.5% bile salts incubated at 44.5-45°C is quite selective in the detection of faecal coliform bacteria. Production of indole after 24 hours of incubation constitutes the positive test. Through the use of large test tubes, samples of materials weighing 1 or more grams may be taken directly at the sites of operation within foods processing plants. The medium and the procedure are sensitive to 1 to 2 cells per inoculum, and it has detected Escherichia coli in samples yielding no colonies of coliform bacteria when plated at 1:10 on violet red bile agar.

Although one may question the value of the coli-

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form plate count of some foods as obtained on plating media such as violet red bile (VRB) and deoxycholate agars, as some authors have done recently (3, 4, 5), there can be no question as to the significance of *Escherichia coli*. The organism thrives exclusively in the intestinal tract of man and of warm-blooded animals, a fact most recently reaffirmed by Geldreich et al. (1).

Producers of partially or completely-cooked foods are keenly aware of the implications, and they are quite anxious that their products be kept free of this organism. Up to the present time, however, no readily applicable method for the detection of *E. coli* has been developed for the benefit of operators of the smaller processing plants. Methods presently in use—however excellent—require trained personnel