ISSN: 1043-3546

February • 1993

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Vol • 13 • No. 2 • Pages 65-144



DAIRY, FOOD AND ENVIRONMENTAL

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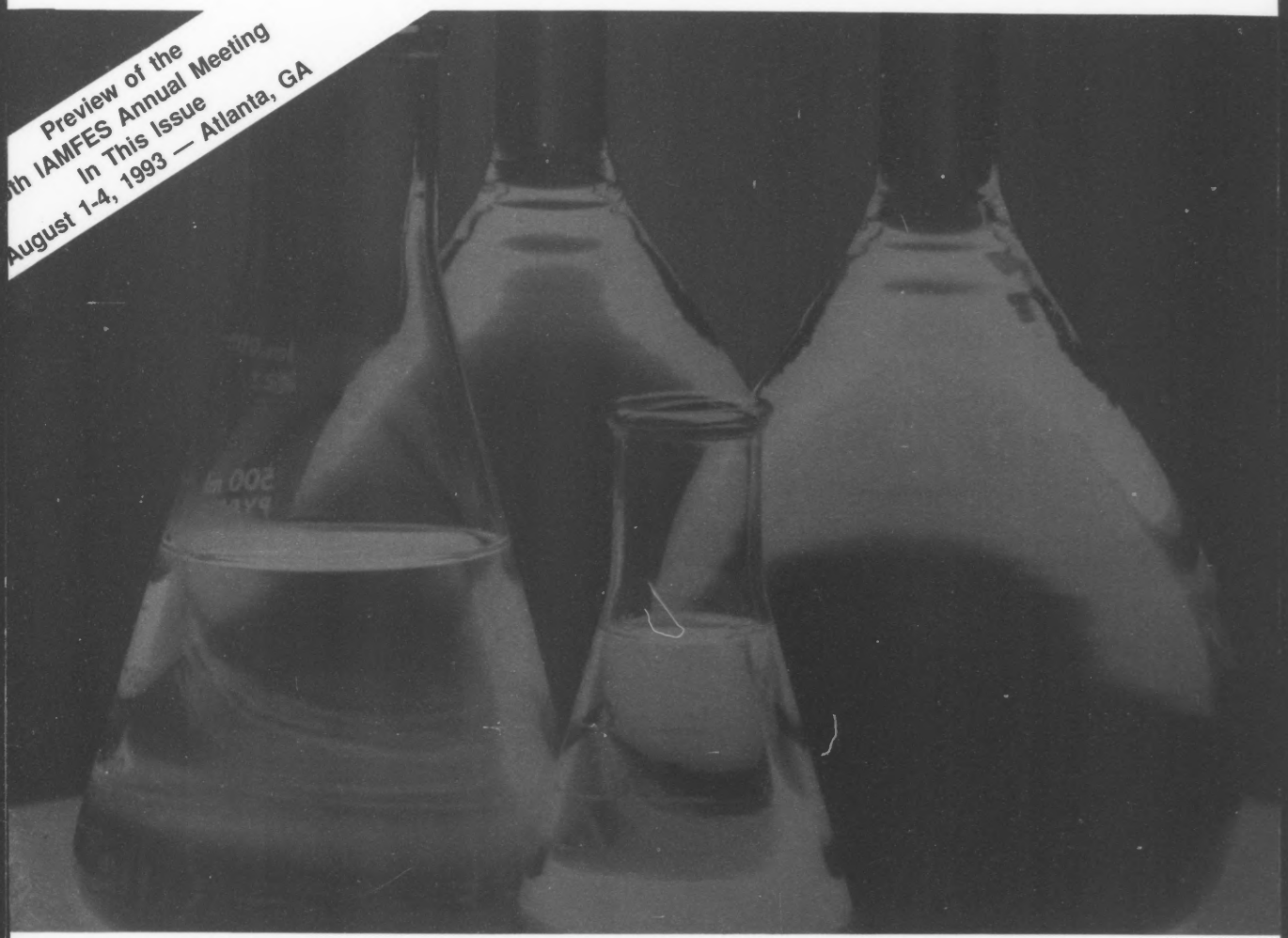


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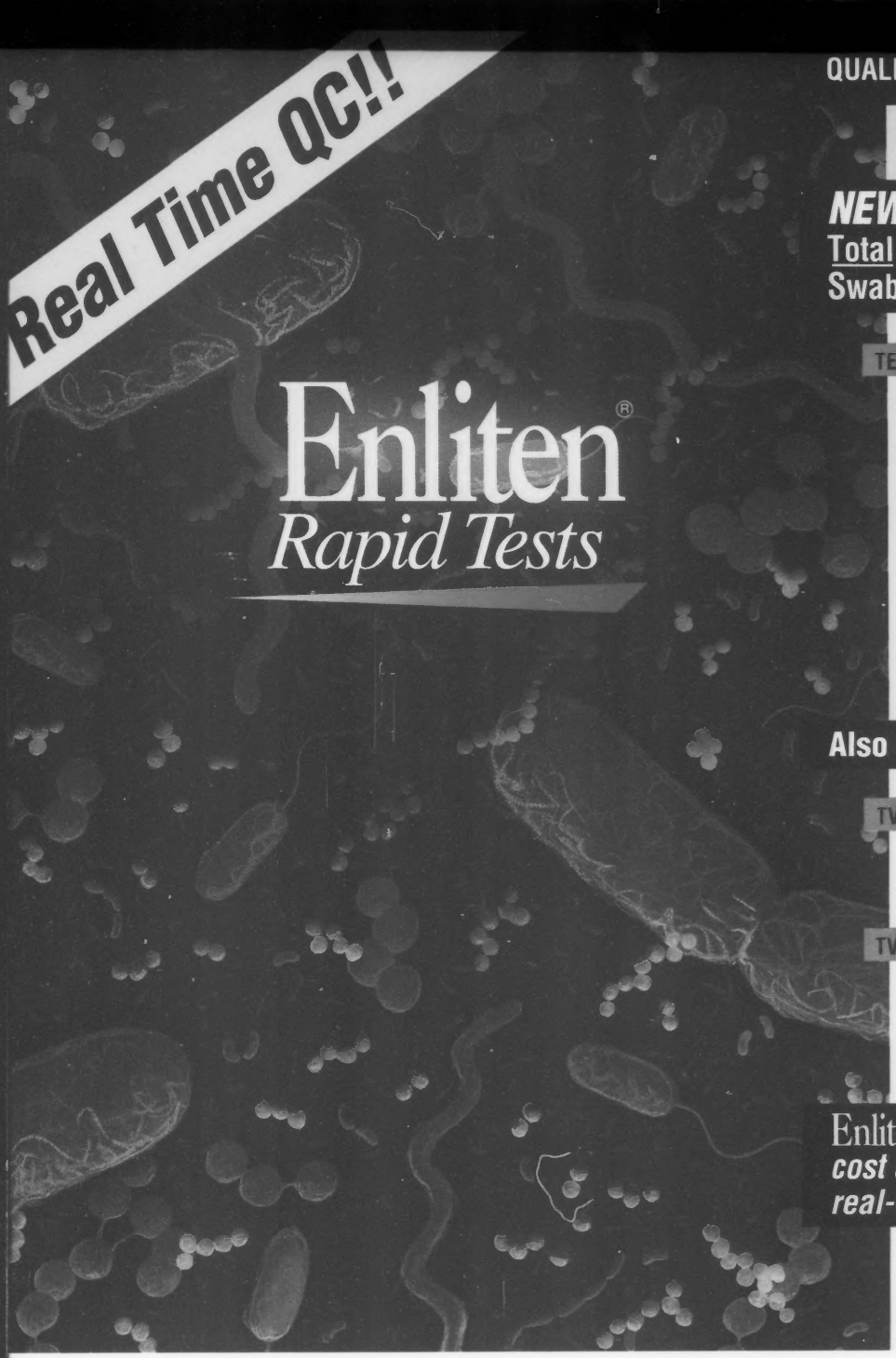


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# Thoughts From the President . . .

By
**Michael P. Doyle**
**IAMFES President**

## What is the International Life Sciences Institute?

As you read through this issue of DFES you will notice information about the International Life Sciences Institute (ILSI) and its involvement in the 1993 IAMFES Annual Meeting. I would like to acquaint you with this organization and provide some thoughts on why your Executive Board is excited about the opportunity IAMFES has to host the ILSI Symposium on Foodborne Microbial Pathogens during the Annual Meeting.

ILSI is an internationally recognized organization whose objectives are to promote scientific understanding and consensus in food safety, nutrition, toxicology, and environmental health. It is comprised of seven worldwide branches and five institutes that work to promote cooperation among scientists from academia, government, and industry to address and resolve scientific issues of common concern.

The Food Microbiology Committee of the ILSI North America branch, since its formation in 1987, has been a major player in funding research on the microbiological safety of food. More than $1 million have been spent on projects ranging from developing methods to control, detect, enumerate or differentiate *Listeria monocytogenes* in foods and processing plants, to studies on the prevalence and strain differentiation of enterohemorrhagic *Escherichia coli* in cattle, humans, and retail foods. These studies have led to a better understanding of these food-associated pathogens and have been helpful in developing approaches for pathogen control.

The Committee's interest in sharing the results of this research with the scientific community prompted ILSI to approach IAMFES to host a symposium on foodborne pathogens. This symposium will not only include reports of past ILSI-sponsored research, but will also include four sessions presented by an international panel of scientists that will examine international issues concerning *L. monocytogenes*, *E. coli* O157:H7, and *Campylobacter* and their impact on food safety.

This is an excellent opportunity for IAMFES, which is rapidly becoming a nationally/internationally recognized forum for food safety issues, to host a premier symposium of major interest to IAMFES members. Members of the ILSI North America Committee on Food Microbiology have worked closely with the IAMFES Annual Meeting Program Committee to organize a program that will set a new standard for IAMFES Annual Meetings of the future.

We welcome ILSI's participation in the 1993 IAMFES Annual Meeting and look forward to enjoying one of our all time best ever meetings.

# On My Mind . . .

*By*
*Steven K. Halstead, CAE*
*IAMFES*
*Executive Manager*

. . . the PAC Committee

Each year its seems that my February thoughts deal with the Program Advisory Committee (PAC). That could be because the PAC meeting is always held in January and it always provides me with the opportunity to be impressed by the quality of people who make up our association. This year is no exception.

In just four short years, I have seen a tremendous evolution in the work of the PAC. The first PAC meeting I attended was devoted to placing the submitted papers in appropriate groupings (called "Technical Sessions") and scheduling the rest of the meeting around these.

Once that was done, the PAC would "fill in the holes" with symposia consisting of invited papers. At that point, the PAC would more or less brainstorm topics, conveners (whose job it is to line up appropriate speakers) and speakers.

My staff and I would then spend the next several months scrambling to make sure that the conveners were doing their jobs and that everything was on schedule. It was not unusual for us to have the abstract book go to press missing abstracts noting "Abstract not available at press time."

The process is very different now. The 1993 PAC left the 1992 annual meeting pretty much knowing the titles of the symposia and all but one or two of the conveners. By the time the January PAC meeting rolled around, we had topics, presenters, and several abstracts in our office. I don't believe that we were short any abstracts last year and I expect a repeat of that this year.

One of the major innovations has been the opportunity for members' input. This is done via a "public" meeting of the PAC during the Annual Meeting. This gives members the chance to suggest symposia and speakers that they would like to hear. The PAC then meets a second time to synthesize that input and to name names. The results are clearly seen from the above discussion.

This year, we plan to take this process a step further and issue a "Call for Symposia" to the general membership in the June issue of the Journals. Our hope is that this will give us even more knowledge of what you want to learn at the Annual Meeting.

The "Public" meeting of the PAC will be Sunday, August 1, 1993 from 4:00 PM to 6:00 PM at the Waverly Stouffer Hotel. I invite you to come to that meeting with your ideas. If you can't be there in person, send us your suggestions or call the 1994 PAC Chairperson, Norm Stern, and discuss them with him. Norm's phone number is (404) 546-3516.

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**Dairy, Food and Environmental Sanitation** (ISSN-1043-3546) is published monthly beginning with the January number by the International Association of Milk, Food and Environmental Sanitarians, Inc. executive offices at 200W Merle Hay Centre, 6200 Aurora Avenue, Des Moines, IA 50322-2838 USA. Each volume comprises 12 numbers. Printed by Heuss Printing, Inc. 911 N. Second Street, Ames, IA 50010 USA. Second Class Postage paid at Des Moines, IA 50318 and additional entry offices.

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*Dairy, Food and Environmental Sanitation, Vol. 13, No. 2, Pages 70-73 (February 1993)*


# Occurrence of *Escherichia coli*, *Pseudomonas aeruginosa* and *Listeria monocytogenes* in Abnormal Milk

**Sabah I. Moustafa and Elmer H. Marth**
**Department of Food Science and The Food Research Institute,**
**University of Wisconsin-Madison, Madison, Wisconsin 53706**

## Abstract

A total of 195 quarter milk samples from 50 cows were tested with the California Mastitis Test (CMT) and *Pseudomonas aeruginosa*, *Listeria monocytogenes*, and *Escherichia coli* were sought. Forty-eight percent of the samples were abnormal by the CMT and of those about 40% yielded what appeared to be one of the pathogens being sought. Eleven isolates of *E. coli* were serotyped and five were in serogroup O. All isolates were sensitive to piperacillin and none was sensitive to gentamycin, neomycin, and streptomycin. From 18 to 82% of the isolates were sensitive to six other antibiotics. Two isolates of *P. aeruginosa* were sensitive to carbenicillin and tobramycin, one of the two was sensitive to ampicillin and piperacillin, and none was sensitive to gentamycin. *L. monocytogenes* was not recovered from the milk samples.

## Introduction

Mastitis sometimes occurs in every dairy herd, but the extent varies widely among herds. More than 80 species of microorganisms have been identified as causal agents (30).

Coliforms and pseudomonads are the most important secondary pathogens in most herds. The increasing incidence of coliform mastitis in cows in recent years has resulted from several factors (1,14), including changes in husbandry practices which often increase exposure of cows to coliform organisms (18). The routine use of control measures, such as teat dipping and dry cow therapy, by reducing the level of subclinical infections has increased the number of quarters with low somatic cell counts; these are then vulnerable to infection with opportunistic pathogens present in the environment (6). Mastitis caused by *Pseudomonas aeruginosa* usually occurs sporadically, but occasionally a herd infection can occur in enzootic proportions (3, 39).

Evidence for bovine mastitis caused by *Listeria monocytogenes* appears to be rare and the literature on the subject is scanty (9,17). Isolation of the organism from apparently normal milk and udders has been reported on several occasions (4,11,15,40).

Development of antibiotic resistance by pathogenic bacteria isolated from the udder is a regular phenomenon which requires periodic study to determine sensitivity of such bacteria to different antibiotics, so that the proper treatment can be employed. Antibiotic sensitivity tests on different isolates from mastitic udders have been done (11,17,21,22,35,38).

The purpose of the present study was to determine the occurrence of *L. monocytogenes*, *P. aeruginosa*, and *Escherichia coli* in abnormal quarter milk samples and to determine the sensitivity of the isolated strains of the bacteria to different antibiotics.

## Materials and Methods

Milk samples from 195 teats, of 50 animals, were aseptically collected in sterile bottles after discarding the first 2-3 squirts of milk. Individual quarter milk samples were screened by the California Mastitis test (CMT) according to the procedure described in *Standard Methods for the Examination of Dairy Products* (24), using the CMT reagent (Dairy Research Products, Inc. Spencerville, IN).

Microbiological tests for diagnosis of bovine mastitis caused by *L. monocytogenes*, enteropathogenic *E. coli*, and *P. aeruginosa* were done. Two 10-ml milk samples were used to detect *L. monocytogenes*. The first 10-ml sample was inoculated into a bottle containing 50 ml of tryptose broth (TB) (Difco, Detroit, MI), which was then incubated at 35°C for 24 h, followed by streaking loopsfull of the culture onto plates of McBride's Listeria Agar (MLA) (25). Inoculated plates were incubated at 35°C for 48 h. Colonies typical of those formed by *L. monocytogenes* (smooth, bluish grey, slightly raised, translucent, watery consistency, 0.5-1.5 mm in diameter, and weakly B-hemolytic) were transferred to tryptose agar (TA) stants, incubated at 35°C for 24 h, and stored at 3°C for confirmation. The second 10-ml sample was mixed with an equal volume of Levintal broth (31) which was incubated at 35°C for 7 d. Subcultures were made on trypaflavine-naladixic acid serum agar (TNSA) (Difco) plates (32) after 2, 4 and 7 d; plates were incubated at 35°C for 48 h. Colonies resembling *L. monocytogenes* were kept on TA slants at 3°C. Confirmatory tests done on isolates thought to be *L. monocytogenes* included catalase reaction, observance of tumbling motility in TB-grown cultures incubated at 21°C for 24 h (12), and presence of distinct blue-green colonies on TA and TNSA when observed under obliquely transmitted light as described by Henry (13). Furthermore, milk samples were directly streaked onto MLA

and TNSA plates and colonies resembling *L. monocytogenes* were evaluated as previously described.

*Escherichia coli* was isolated using MacConkey and eosin methylene blue (EMB) agars (Difco). Inoculated plates were incubated at 35°C for 24 h. Colonies typical of or most closely resembling *E. coli* were isolated; biochemical characterization of the isolates was accomplished by the API 20-E Enterobacteriaceae (Analytab Products, Plainview, NY) system. All methods and reagent preparations were according to the package insert. Serological slide agglutination tests were done on all *E. coli* isolates according to the manufacturer's instructions, using commercially prepared O antisera (Difco) to serotype possible enteropathogenic strains of *E. coli*.

Colonies characteristic of *P. aeruginosa* on Pseudomonas Agar (PA) (Difco) plates were isolated and the isolates were identified biochemically by the API 20 E system (Analytab Products).

The antibiotic resistance patterns of *E. coli* and *P. aeruginosa* isolates were determined by a disc diffusion method according to recommendations of the manufacturer of the antibiotic discs (Difco). Eleven antibiotic discs that were used include ampicillin 10 µg, carbencillin 100 µg, cephalothin 30 µg, chloramphenicol 30 µg, erythromycin 15 µg, gentamicin 10 µg, neomycin 30 µg, piperacillin 100 µg, streptomycin 10 µg, tetracycline 30 µg, and tobramycin 10 µg per disc.

*(cont. on p. 72)*

## Results

In this study, results of the CMT test indicated that milk from 94 of 195 samples was abnormal, suggesting the possibility of mastitis. The positive samples came from 40 of the 50 cows in the study. Of the 94 positive samples, 27, 26, 17, and 24, respectively, came from the right front, right rear, left rear, and left front quarters. The front quarters yielded somewhat more samples of abnormal milk than did the rear quarters; this observation differs from results of Joshi et al. (19). More quarters on the right rather than left side of cows yielded abnormal milk; this is in accord with observations of Joshi (19).

Of the 94 CMT-positive samples, more than 50% had a CMT score of 1+ and about 16% of these samples yielded what was presumed to be one of the pathogens of interest (Table 1). Nearly 30% of the samples had a CMT score of 2+ and about one-fourth of those samples yielded what was presumed to be one of the pathogens being studied (Table 1). About 18% of the samples had a CMT score of 3+ and of these 17% presumably yielded a pathogen of interest. It also is noteworthy that what appeared to be a pathogen was recovered from 21% of the 101 samples that were negative by the CMT test (Table 1).

Identification of a limited number of isolates revealed that 11 were *E. coli*, two were *P. aeruginosa* and none was *L. monocytogenes* (data not shown). Five of the *E. coli* isolates were in the O-serogroup and the other six could not be serotyped by the method we used. The serotypes represented by the isolates include 086a, 026a/026b, 0124, 0111a/0111b, and 0128ab/0128ac.

The sensitivity to antibiotics of the *E. coli* and *P. aeruginosa* was determined (Table 2). All *E. coli* isolates were sensitive to piperacillin and 9 of 11 were sensitive to chloramphenicol. From 18 to 55% of the *E. coli* isolates were sensitive to ampicillin, carbencillin, cephalothin, erythromycin, and tetracycline. None of the isolates was sensitive to gentamycin, neomycin, and streptomycin. The two isolates of *P. aeruginosa* were sensitive to carbenicillin and tobramycin and both were resistant to gentamycin. One of the two isolates was sensitive to ampicillin and piperacillin.

**Table 1. Number and percent of samples positive by the California Mastitis Test (CMT) that yielded isoolates thought to be the pathogens that were sought.**

| CMT score | No. of samples | Bacteriological tests[a] | |
|---|---|---|---|
| | | Positive (%) | Negative |
| 0 | 101 | 21 (21) | 80 |
| 1+ | 49 | 8 (16.3) | 41 |
| 2+ | 28 | 7 (25) | 21 |
| 3+ | 17 | 3 (17.7) | 14 |
| Total | 195 | 39 | 156 |

[a] Tests yielding colonies thought to be *Pseudomonas aeruginosa, Listeria monocytogenes,* or *Escherichia coli.*

**Table 2. Number and percent of isolates of *Escherichia coli* and *Pseudomonas aeruginosa* sensitive to antibiotics.**

| Antibiotic | No. (%) of isolates | |
|---|---|---|
| | *E. coli*[a] | *P. aeruginosa*[b] |
| Ampicillin | 4 (36.4) | 1 (50) |
| Carbencillin | 6 (54.6) | 2 (100) |
| Cephalothin | 6 (54.6) | - - |
| Chloramphenicol | 9 (81.8) | - - |
| Erythromycin | 2 (18.2) | - - |
| Gentamycin | 0 - | 0 - |
| Neomycin | 0 - | - - |
| Piperacillin | 11 (100) | 1 (50) |
| Streptomycin | 0 - | - - |
| Tetracyccline | 6 (54.6) | - - |
| Tobramycin | 2 | 2 (100) |

[a]Number of isolates tested = 11.
[b]Number of isolates tested = 2.

## Discussion

Control of bovine mastitis is difficult. Part of the difficulty relates to herd management, types of housing, and prevalence of organisms causing mastitis (2,27,29,36). Mastitis is a problem for every herd. However, rates of infection and types of bacteria causing mastitis vary among herds.

Coliform mastitis may range in severity from fatal acute cases to subclinical infections detectable only on cultural examination. Several authors have reported isolation of coliform organisms from milk samples in the absence of obvious inflammatory signs (16,28,34). Such subclinical infections may be common in a herd in which coliform mastitis has become enzootic.

*E. coli* is a frequent cause of bovine coliform mastitis. The source of *E. coli* is believed to be the feces and infection can result from gross fecal contamination of the teat orifice (8, 14). The finding of five O-serogroups; among the 11 *E. coli* isolates suggests that coliform mastitis can be caused by more than one or two specific pathogenic serotypes. It also has been shown by others (6,7,23,26,33) that where *E. coli* is involved in herd outbreaks many different serotypes are usually involved.

*Pseudomonas aeruginosa*, a soil and water organism, can cause acute mastitis which may be preceded or followed by a subclinical infection; frequently there are recurrences of mild clinical symptoms. The organism can remain in the udder for several years, and the original infection may not cause clinical symptoms, which makes it more difficult to discover the origin of the infection (14).

Despite the ubiquitous distribution of *L. monocytogenes* (10) there are few reports in the literature on bovine mastitis caused by this organism. This is surprising in view of the marked increase in the incidence of bovine mastitis but, unless specially sought, *L. monocytogenes* may easily escape detection in routine examination of material submitted to a diagnostic laboratory.

However, *L. monocytogenes* was not detected in our study. Apparently our milk samples were free of the pathogen when examined by the methods we used. Alternatively, our observation could be the result of microbial antagonism in milk. In this regard, Butko (2) found that *Bacillus subtitis, Proteus, Pasteurella multocida, E. coli* and staphylococci can inhibit *L. monocytogenes* in mixed culture. Also, he reported that the diluted extract of various tissues from cattle, pigs, rabbits, horses, and chickens and milk inhibited growth of *L. monocytogenes.*

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The cases of *Listeria* mastitis reported in the literature varied in severity; some were acute, some chronic, and some subclinical. Sometimes only one quarter was affected, sometimes all four and the organism was excreted for months or even years (17,37).

*Listeria monocytogenes* has been reported to localize in the bovine udder and create hazards to human health (15). The prolonged excretion of the organism in milk, the apparent normal appearance of the milk in some instances and consumption of raw milk, especially on farms, could be important factors in the transmission and epidemiology of *Listeria* infection.

Since *L. monocytogenes* is ubiquitous and subclinical infection occurs frequently (20), consumption of raw milk and its products should be avoided.


## ACKNOWLEDGMENT

Research supported by the College of Agricultural and Life Sciences, University of Wisconsin-Madison.


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*Dairy, Food and Environmental Sanitation, Vol. 13, No. 2, Pages 74-79 (February 1993)*


# Lead, Follow or Get Out of the Way: The New PMO SCC Policy

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## Introduction

Beginning in July of 1992, all Grade A milk sold in the commercial marketplace will not be allowed to exceed a somatic cell count of 750,000 per milliliter of milk. This limit or standard was adopted by the 1991 National Conference on Interstate Milk Shipments (NCIMS), and codified into regulation within the national Grade A Pasteurized Milk Ordinance (PMO) by the Food and Drug Administration (FDA), also in 1991.

This minor reduction of SCC from 1 million to 750,000, supported by the nation's dairy organizations, appears to have stirred the caldron of concern. The concern seems to say, "Can they do it?" and "What will be the impact?" The answers to these questions are a simple "You bet" and "Darn little." Analysis of milk quality regulation in the West may provide a window into the future performance of dairy farms and milk quality for other parts of the country and the nation as a whole, as they address the quality and economic concerns imbedded in this regulatory change.

## The Purpose and Effects of Milk Quality Regulation

The somatic cell standard and the other new provisions of the PMO, do raise concerns regarding compliance, enforcement, penalties, and equity. A larger, more significant question needs to be raised about the role and effect of government regulations on milk quality and safety. Historically, the role of such regulations was to ensure that milk and dairy products do not compromise the health of the consuming public. FDA's mandate is not one of commercial market control. Its mission is to assure the safety of the nation's food supply and the safety and efficacy of drugs used in food production and human health management. Hence, the mission of the agency is legally constrained to seek and assure regulatory compliance. Compliance in terms of milk safety and the PMO, means that all Grade A milk must meet a set of criteria. These criteria specify the conditions that milk is produced within, and objective measures of milk quality such as the SCC and various bacterial counts, including the Standard Plated Count (SPC), Laboratory Pasteurized Count (LPC), and the Coliform Count (CC). Research has shown that farm conditions (12), hygienic practices (8), and udder health (5,18) can affect the bacterial quality of milk. Attainment of milk quality and production compliance under the PMO can be achieved by just meeting or exceeding the minimum conditions and standards as specified under the PMO. States and local jurisdictions can impose higher standards at no consequence under the PMO. Failure to comply with the minimum standards of the PMO may result in demotion to B Grade status, and inability to move the milk or product across state lines. The milk may not be processed and sold into markets supported by federal milk orders or price supports. The effect of the regulations and enforcement at the farm and processor level is understood by the industry. The message is clear; comply or else! Unfortunately, there is a second, and perhaps unanticipated, effect of a policy of this nature. With compliance as the goal at the farm level, we should not be distressed to find that regulatory **minimums** become the operational **maximums** for many producers. For example, if the highest quality milk and production practices receive an "A" grade, it is suggested that milk that just meets the compliance standards of the PMO gets a "D" grade or "barely passing."

Dairy professionals are frustrated by producers who fail to see the benefits in improving milk quality and mastitis control by striving for low bulk tank somatic cell counts. At the same time, we must acknowledge that the effect of the federal PMO SCC policy pushes many to do only what is needed to keep the milk salable and nothing more. The question then is, given the mandate of the FDA and the purpose of the PMO, can we expect anything more than compliance? The answer has to be a clear and loud NO!

Arguments that have successfully modified the PMO in the past have had to show a clear benefit for the safety of milk. The classic example is the pasteurization requirement. The cause-and-effect relationships of pathogens, disease, and pathogen removal by heat treatment of milk are beyond argument. In this post-modern era, simple cause-and-effect improvements in milk quality and safety will be few, if not non-existent. On the other hand, there is a rationale for milk quality regulations that take advantage of statistical associations. For example, our data from California clearly shows that as herd SCC is lowered there is a very significant reduction in specific milk pathogens and bacteria in general (5). The adoption of the 750,000 is movement to safer milk, and was supported by statistical relationship arguments such as those revealed in the California work. The New York work demonstrates that mastitis control practices also tend to result in milk with lower overall bacteria content (8).

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Recent work by Ginn and Packer (1991) show good relationships between BTSCC below 500,000 and bacteria counts freezing point. This data further supports the improvement of the SCC standard.

These relationships may provide the rationale for newer and refreshing approaches to milk quality and safety regulations. It is appropriate to ask of milk quality and safety regulations, "What is their role?" Furthermore, will they lead, follow, or are they in the way? Are they in the way, by fostering the compliance mentality among producers and processors alike? If that is the case, perhaps it is time for the commercial sector to become leader in milk quality control and leave PMO to its basic role of preventing the classic food-borne disease problems.

## The California Experience

The history of the SCC standard in California may be a window into the future for the country's dairy industry, and provide some light on the question of the effect of milk quality regulations on industry performance. In 1965, Grade A bulk-tank milk that contained more than 3.5 million cells per ml. was unsalable. The test used to screen tank milk was the California Mastitis Test (CMT). A score of two on the bulk-tank milk was reason to confirm the count microscopically and reject the milk accordingly (14). Reflect on that for a moment. Grade A milk was processed and sold with 3 million SCC. It is no wonder that centrifugal clarifiers were common. The processors had to remove the results of a pervasive herd mastitis problem; billions of pus cells. Not a pretty picture.

In 1970, the PMO was modified to limit the SCC standard to 1.5 million — a dramatic improvement —based on the argument that dairy products would be safer. Figure 1 depicts the SCC legal limits for California and the nation from 1965 to 1990. In 1986, the NCIMS recommended the SCC standard be further reduced to 1 million per milliliter of bulk tank milk. By this time, the use of SCC information for herd management (6,22), cost saving mastitis control (23,15,13,16), and improvement of milk quality (11,25,3) were well documented. Progressive farms and processors were adopting processes and programs to further reduce the SCC in farm milk (10,17).

In 1989 and 1990, California, in an almost predictable fashion, departed from the federal standards and, with industry support, adopted 800,000 and 600,000 SCC standards in those years, respectively. In both years, there was little concern or empathy for those farms that were unwilling to join the vast majority of the producers. The State Department of Food and Agriculture is not constrained by statute to limit milk quality regulations to only those that are justifiable in public health terms. The industry, with the state's assistance, used regulation to advance milk quality within the state. In so doing, industry supported regulation moved milk quality far ahead and the compliance mentality has become the exception among producers.

In retrospect, where did California go as a result of the combination of PMO policies and those adopted recently by the state? Figure 2 depicts the results of a tank milk survey conducted in 1963 on 3600 herds. Thirty-one percent of the herds had BTSCC over 1 million. Seventy percent of the farms would be in violation of today's SCC standards for the state. Only 18% of the herds had BTSCC of less than 400,000. In stark contrast, a similar survey conducted in 1989 to assess the potential impact of the lower SCC standards revealed the newer standards would have minimal effect (Figure 2). In that survey, 89% of the herds had BTSCC of 400,000 or less. Only 2.8% would be affected by the new regulations.

In 1986, producers received a message that BTSCC of greater than 1 million would evoke penalties. In California, it was rigidly enforced. In 1989, and again in 1990, the state continued the trend by reducing the SCC to 600,000. This stepwise downward trend sent a clear signal to the industry and the industry responded. Alternatively, and perhaps more simplistically, the regulatory minimums decreased and dairy managers responded in order to keep the farm in compliance. Or perhaps more realistically, once the trend for decreasing the BTSCC began and the benefits to Grade A producers became quite obvious, motivated producers and processors pushed change well ahead of regulatory policy.

Figure 4 depicts this stepwise trend that began in California in 1986. In one respect 1986 is 1990 for the balance of the country. The year 1992 will bring the first step increment and initiate a trend. Certainly, most producers will respond to the mandate and do that which is needed to comply. What will or should happen in 1994? The opportunity to continue the trend is at hand. Will the industry settle for another decade of compliance attitudes or become the advocates for making the next logical step — a step toward excellence in quality and away from mere compliance?

## The Problem Farm

Regardless of what is written or said, there will be at least one farm that is caught by surprise by the new BTSCC standards. Some would say, "Too bad, there was plenty of notice." It is a competitive world, and getting more so, especially as we approach the possibility of international food safety and quality standards as part of the international General Agreement on Trade and Tariffs (GATT).

For the problem farm, there is ample opportunity for improvement if, and only if, management is willing to change behavior. The information on how and why to use herd and cow SCC information was recently reviewed by Reneau (1990), and provides analysis of the many monitors for mastitis control and milk quality improvement. Easy to understand publications, like the National Mastitis Council's *Current Concepts in Bovine Mastitis* (1978), provide the mechanics for mastitis control. Central to the effective control of BTSCC is knowledge of the SCC from the milk from all cows in the herd. A recent survey of DHIA and USDA information suggests a problem, in that only 19% of the herds and 29% of the cows in the country are enrolled in some type of DHIA cow somatic cell information. Figure 5 (5).

The herd in jeopardy of loosing its Grade A market, that does not have individual SCC information on all milk cows on regular basis, is at risk. At a minimum, the herd should seek veterinary assistance and have composite sample Cali-

fornia Mastitis Test or Wisconsin Mastitis Test information on each cow. Alternatively, the herd may enroll in a DHIA SCC program and then seek professional assistance.

Armed with individual SCC information, a herd at risk of losing grade A status because the BTSCC exceeds 750,000 has a quick and fast tool to maintain or regain compliance. The tool is culling. By culling some of the highest SCC cows in the herd, significant and immediate improvements can be made in the bulk tank SCC.

### A Culling and BTSCC Model

In order to demonstrate how significantly a few cows with high SCC can influence the BTSCC, a mathematical model was constructed for this analysis. A small herd of approximately 176 cows were distributed by SCC ranges corresponding to the common DHIA linear score categories, as shown on Table 1 (26). Daily milk weights, typical of a good modern herd, were assigned for each group. The weights are not adjusted, they are simply for calculation for the group's contribution of Somatic cells to the bulk tank. The eight cows in the highest SCC group contribute 31.6% of the SCC in the BTSCC. There is little doubt that these animals are infected with mastitis pathogens (1) and most likely have been for months, if not years. The weighted average BTSCC for the herd is 865,000. In Table 2, the effect of culling seven of the highest problem cows and adding one heifer of low SCC is demonstrated. The BTSCC is reduced to 643,000 and the herd is now in compliance. Compliance has saved the day, but the farm is far from plugging the financial holes that mastitis punches in the farm milk tank. According to a 1989 USDA National Health Monitoring System report, the typical California dairy looses $14,804 per year due to udder disease (19). The herd in Table 2 still has 56 cows that have high SCC and are seriously infected with some agent like *Strep ag.* or *Staph. aureus* and could easily continue to loose large sums of revenue and fall out of compliance with the SCC standard of the PMO. Alternatively, it could go on culling the worst of the SCC cows and suffer the consequences of culling for reasons other than "genetic" low production.

**Table 1. Model depicting the Somatic Cell contribution from cows in a mastitis problem herd.**

| No. of Cows | SCC Range (1000) | Mid Point | Linear Score | Ave. Prod. lb/day | Total SCC/day (Million) | Percent of herd SCC/day |
|---|---|---|---|---|---|---|
| 0 | 0-17 | 12.5 | 0 | 51 | .00 | .00 |
| 1 | 18-34 | 25 | 1 | 52 | .57 | .01 |
| 5 | 35-70 | 50 | 2 | 55 | 6.03 | .15 |
| 27 | 71-140 | 100 | 3 | 59 | 69.84 | 1.79 |
| 55 | 141-282 | 200 | 4 | 61 | 294.17 | 7.54 |
| 27 | 283-565 | 400 | 5 | 59 | 279.35 | 7.16 |
| 28 | 566-1130 | 800 | 6 | 54 | 530.29 | 13.59 |
| 15 | 1131-2262 | 1600 | 7 | 55 | 578.69 | 14.83 |
| 12 | 2263-4525 | 3200 | 8 | 54 | 909.07 | 23.29 |
| 8 | 4526+ | 6400 | 9 | 55 | 1,234.53 | 31.63 |
| 178 | | | | | | |

Estimated Milk per Day (Gal) 1196.860
Total SCC per Day (mill) 3,902.53
BTSCC (per ml) (1000) 865

**Table 2. Model depicting the affect of culling seven high SCC cows on bulk tank SCC.**

| No. of Cows | SCC Range (1000) | Mid Point | Linear Score | Ave. Prod. lb/day | Total SCC/day (Million) | Percent of herd SCC/day |
|---|---|---|---|---|---|---|
| 0 | 0-17 | 12.5 | 0 | 51 | .00 | .00 |
| 1 | 18-34 | 25 | 1 | 52 | .57 | .02 |
| 7 | 35-70 | 50 | 2 | 55 | 8.44 | .30 |
| 27 | 71-140 | 100 | 3 | 59 | 69.84 | 2.47 |
| 55 | 141-282 | 200 | 4 | 61 | 294.17 | 10.41 |
| 27 | 283-565 | 400 | 5 | 59 | 279.35 | 9.89 |
| 28 | 566-1130 | 800 | 6 | 54 | 530.29 | 18.77 |
| 15 | 1131-2262 | 1600 | 7 | 55 | 578.69 | 20.49 |
| 12 | 2263-4525 | 3200 | 8 | 54 | 909.07 | 32.18 |
| 1 | 4526+ | 6400 | 9 | 55 | 154.32 | 5.46 |
| 173 | | | | | | |

Estimated Milk per Day (Gal) 1164.884
Total SCC per Day (mill) 2,824.72
BTSCC (per ml) (1000) 643

In contrast, the herd in Table 3 has implemented the common mastitis control strategies and reduced the size of the infected cow population to a point where 55% of the BTSCC is attributed to cows under 200,000. This herd is light years ahead of the PMO, is not concerned with compliance, is economically benefiting from the control of udder disease, and is the likely beneficiary of milk quality premiums.

**Table 3. Distribution of cow SCC in herd with a low bulk tank SCC.**

| No. of Cows | SCC Range (1000) | Mid Point | Linear Score | Ave. Prod. lb/day | Total SCC/day (Million) | Percent of herd SCC/day |
|---|---|---|---|---|---|---|
| 2 | 0-17 | 12.5 | 0 | 51 | .56 | .06 |
| 3 | 18-34 | 25 | 1 | 52 | 1.71 | .19 |
| 14 | 35-70 | 50 | 2 | 55 | 16.88 | 1.84 |
| 51 | 71-140 | 100 | 3 | 59 | 131.91 | 14.37 |
| 94 | 141-282 | 200 | 4 | 61 | 502.76 | 54.76 |
| 9 | 283-565 | 400 | 5 | 59 | 93.12 | 10.14 |
| 3 | 566-1130 | 800 | 6 | 54 | 56.82 | 6.19 |
| 1 | 1131-2262 | 1600 | 7 | 55 | 38.58 | 4.20 |
| 1 | 2263-4525 | 3200 | 8 | 54 | 75.76 | 8.25 |
| 0 | 4526+ | 6400 | 9 | 55 | .00 | .00 |
| 173 | | | | | | |

Estimated Milk per Day (Gal) 1229.419
Total SCC per Day (mill) 918.09
BTSCC (per ml) (1000) 198

### Self-fulling Prophecy and the Dairy Farm

The change to a 750,000 SCC standard should have very little impact on the dairy farms in this country. Yes, there are a number of farms that exceed that standard today. For those who wait for the BTSCC implementation date, by default or design, and then sing a tale of woe, too bad. Processors should set expectations for the new standard immediately. Furthermore, when the enforcement day comes, states are advised to enforce fully. Nothing is more confus-

ing and arbitrary than to set a rule and fail to enforce it. The mixed message will be devastating, morally, politically, and economically.

There were many that resisted the 750,000 compromise that emerged from the NCIMS conference. They argued that the farmers of their states are not, and would not, be able to meet the new standard. Such rationale is just a little short of 100% pure nonsense. The dairy industry in these regions has a compliance mentality and, as such, the expectations set forth exact nothing more. To suggest there is something inherently unique about farms in the West and that their success is not repeatable elsewhere, is absurd as well. There are truly excellent farms in every region of the country. States with poor performance in milk quality are getting what they expect. State dairy regulators and other leaders are teachers. The expectations of teachers are shown to significantly affect the performance of students. Low expectations yield low performance and vice versa. The basis for the power of the self-fulling prophecy is well researched and documented (2) and taught in schools of business and education.

## The Future

The case should and will be made at the next NCIMS conference to lower the BTSCC further to 500,000, as originally proposed by the National Mastitis Council and endorsed by the American Association of Bovine Practitioners. The question of human health justification will again be asked earnestly by the states and FDA. Others will argue the lack of clear evidence of public health benefits of further reducing the BTSCC as a means of protecting the mediocrity of their state.

The BTSCC standards trend started in 1970 should be continued through the 750,000 and onward to 500,000 in 1994. Further improvement in the BTSCC standard should continue, until such a time when the public health concerns that existed when milk could be legally marketed from farms with a bulk tank SCC of 3 million, remain no longer. This will appear as a radical proposal, but consider the facts. Farms in the future will be vastly fewer in number, and much larger in herd size and far greater production per cow. Processors will be larger and will serve huge populations of consumers. The risk posed by a small percentage of high BTSCC herds in 1965 is vastly different for that same small percentage in the year 2000 (eight years away). Lastly, the concern for the public's health in 1965 moved the legal BTSCC to 1.5 million. The concern then, and now, is one of probabilities. Some argue that to lower the BTSCC standard to 500,000 offers no significant public health benefit. The same argument could have been offered in 1965, as the relationship is not one of cause and effect. What happens to the public health benefit when the BTSCC standard was lowered from 1.5 million to 1 million, that does not occur when it is lowered from 1 million to .5 million? The argument is nonsense. Further reduction in the BTSCC will have about the same benefits. The resistance arises from prejudiced perception, geo-politics, and something other than logic.

Presently, there are serious regulatory, public health, and consumer concerns about the adulteration of milk and dairy products with animal drugs (9,19). The case will be made and data will support the argument that reducing the legal BTSCC from 1,000,000 to 750,000, and further to 500,000 will reduce the potential for animal drugs in the milk supply. Reducing the number of infected animals will reduce the quantity of drugs used to treat disease. A Midwest cooperative reports that fieldman visits to dairy farms regarding antibiotic adulterated milk declined as the BTSCC of the patrons declined (24).

The 1991 NCIMS conference directed two additional and significant actions. First, it directed that a third-party database be developed to monitor violative residues in milk, and provided for the official use of residue tests that will detect drugs in addition to the penicillins or beta lactams. The second, was a motion encouraging the state and processors to cooperate in the formation of an annual national herd BTSCC survey. These data will further define the relationships between BTSCC and milk quality. It is postulated that the relationship will be bi-modal, that is high, and a lesser proportion of low BTSCC herds may be associated with increased frequency of violative residue. This may arise from mastitis therapy in high cell count herds associated with beta lactam drugs, and mastitis therapy in low BTSCC herds directed at clinical mastitis due to environmental pathogens. The drugs used in the latter class will likely be other than beta-lactams, and occur in a smaller population of herds. The argument that low BTSCC is a reflection of low cow SCC is correct. It is not correct to ascribe greater mastitis susceptibility to cows and herds with lower SCC (27).

## Conclusion

The new Somatic Cell Count standard of 750,000 will not adversely affect the herds in the country. Rather, for those herds whose goal is compliance, the low standard will provide a new goal; one that is consistent with the market demands that are, and will be, placed on farm milk quality. In this respect, the federal standard is providing the beginning of a milk quality improvement trend that is and will be accelerated as commercial market forces replace the federal commodity system.

To provide continued leadership and to continue to ensure the safety and quality of milk, the industry and the FDA should support a further reduction in the BTSCC to 500,000, to be implemented in 1994. At that point, the US will be aligned with the other major milk producing countries of the western world.

To the question of blessing or curse, the answer lies in perception. For those who want to keep government out of the business and at the same time ask government to keep the playing field level for all players, the new standard is a curse. For those who believe the government's role is to stimulate innovation and competitiveness through health and safety programs, it is a blessing. As the dairy industry approaches world markets, greater accountability to consumers, and ever-increasing competition, it ought to consider carefully its role and that of the government; lead, follow or get out of the way.

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*Dairy, Food and Environmental Sanitation, Vol. 13, No. 2, Pages 80-83 (February 1993)*


# Importance of Proper Maintenance of Your Bulk Milk Cooler

**Mat Tormey, Alfa-Laval Agri, Inc., Hubert, NC**

## Introduction

Today's marketplace places a great deal of emphasis on the shelf life of dairy products and their freedom from objectionable off flavors such as rancidity, sour taste, etc. Maximizing milk quality starts with production of high quality milk. This involves maintaining excellent udder hygiene, proper milking procedures, keeping a low cell count herd with a low mastitis incident rate and maintaining a clean, sanitary milking system. Adhering to such a program will allow high quality milk to be harvested.

Milk, even of the highest quality, is quite perishable if not properly handled. The most critical step, immediately after removal from the udder is to rapidly cool it from approximately 95-98° F to 38° F without excessive agitation. Doing so minimizes bacterial multiplication and reduces enzymatic reactions. This, in turn, maintains the high quality of the harvested product.

The rapid cooling is accomplished by the bulk cooler or bulk cooler in combination with some form of heat exchanger.

When the cooling system is sized properly and functions correctly, it assures that a high quality, good tasting product is available to the processor. When cooling systems function inadequately, it very well may mean that the product available to the processor has undergone some deterioration. Unfortunately, processors can't fix such problems once they have occurred.

The most common bulk tank complaints are that the tank runs too long or the blend temperature gets too high. In the majority of cases, the problem can be located and corrected by following a scheduled maintenance procedure. Some of the common causes of slow cooling include 1) inadequate fresh air supply to the condenser, 2) recirculating hot air through the condenser, 3) dirty or plugged condenser and 4) improper starting procedure.

### Cleaning Procedures for Air Cooled Condenser

1. Run condensing unit until condenser is warm.
2. Turn off all electrical power to condensing unit and bulk cooler control panel.
3. Mix Con-Coil concentrate or other brand condenser cleaner according to manufacturer's recommendations.
4. Saturate condenser coils with condenser cleaning solution.
5. Allow solution to soak for 10 minutes.
6. Rinse condenser thoroughly with cool, clean water.
7. NOTE: If condenser was extremely dirty and oily, the cleaning procedure may have to be repeated.

### Starting Procedure for First Milking Into an Empty Cooler

1. Start with cooler off.
2. Milk into the cooler until milk level is up part way onto the agitator blades.
3. Turn on cooler.
4. NOTE: It is not recommended to run the refrigeration system with the cooler empty.

### Starting Procedure for Second, Third and Fourth Milking

1. Turn on agitator or manual timer and set it to run the agitator until the blend temperature is raised 2-3°F. At that point the thermostat contacts will close and control the cooler until the milk is cooled.

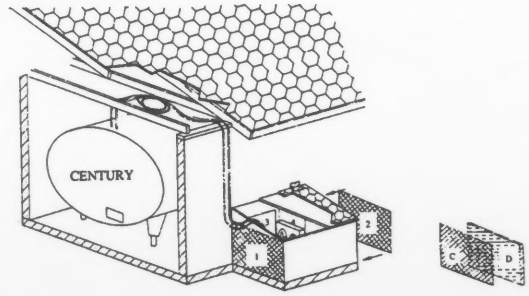
### Recommended Location of Air Cooled Condensing Units

Facts to consider when troubleshooting or planning new condensing units installation.

1. An adequate amount of fresh air must reach the condenser and must not be recirculated through the condenser.
2. The condenser must be kept clean and free of obstructions to air flow.
3. The ambient temperature around the condensing unit must be maintained above zero degrees Fahrenheit (0°F).
4. All electrical components must be protected from moisture.
5. Openings for screens, grills, and/or air flow control panels need to be 1-1/3 times the area of the face of the condenser unit.

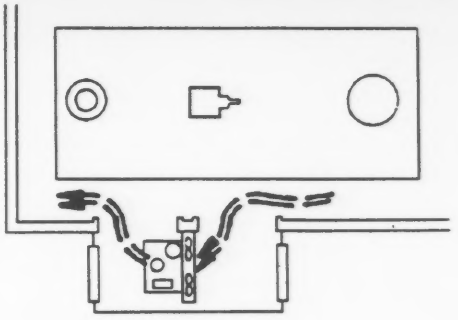
The following two illustrations describe proper procedures for indoor and outdoor installation of air cooled condensing units.

### Recommended Installation of Air Cooled Condensing Units

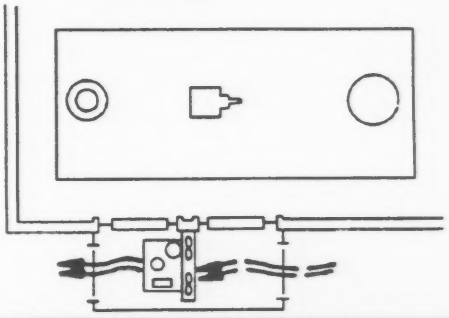


**Outdoor Installation of Air Cooled Condensing Unit with Shelter**

1. For operation during summer, slide grill C in place at openings 1 and 2 and install panel D in place at openings 3 and 4.
2. For operation during winter, install panel D in place of openings 1 and 2 and slide grill C in place at openings 3 and 4.
3. Make openings, grills and panels 1-1/3 times the area of the face of the condenser unit.
4. Condensing unit enclosure may be un-insulated for operation above 35°F, but must be insulated for operation at or below 35°F. Add an auxiliary heater if needed.
5. Do not locate vacuum pump exhaust where oil fumes will be drawn into the condensing unit by the fans.
6. When using precharged tubing, coil excess tubing in attic if possible. (as shown here)



Winter



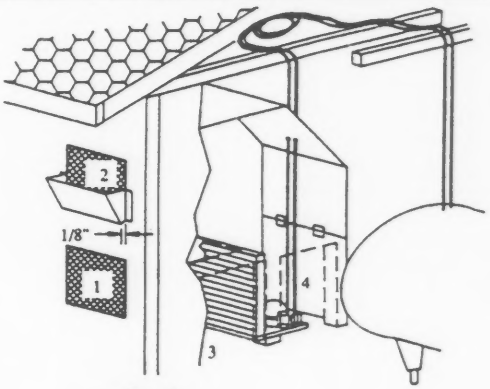
**Recommended Installation of Air Cooled Condensing Units**

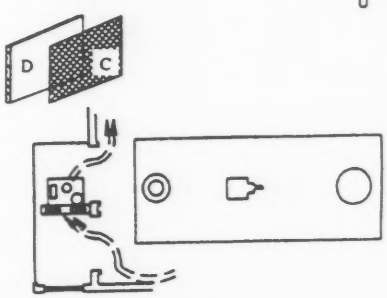
Principles to keep in mind when planning for indoor and outdoor air cooled condensing unit installations.

1. An adequate supply of fresh air must reach the condenser and must not be recirculated through the condenser.
2. The condenser must be kept clean and free of obstruction.
3. The ambient temperature around the condensing unit should be maintained above 30°F.
4. The electrical components must be protected from moisture.
5. Make openings, grills and panels 1-1/3 times the area of the face of the condenser unit.

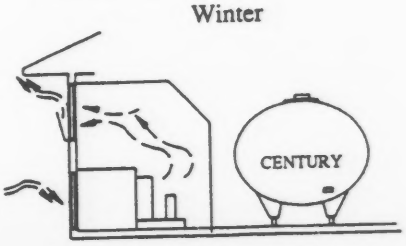
**Indoor Installation of Air Cooled Condensing Unit**

1. For operation during summer, slide grill C in place at openings 1 and 2 and install panel D in place at openings 3 and 4.
2. For operation during winter, install panel D in place at openings 1 and 2 and slide grill C in place at openings 3 and 4.
3. Make openings, grills and panels 1-1/3 times the area of the face of the condenser unit.
4. If the building interior temperature is maintained above 32 degrees F, insulating and heating of the unit enclosure is not needed.
5. Do not locate vacuum pump exhaust where oil fumes will be drawn into the condensing unit by the fans.
6. When using pre-charged tubing, coil excess tubing in attic if possible.
7. Eave overhang must prevent air outlet deflector from gathering rain or snow and a 1/8" drain space must be provided at the bottom of the air deflector.




Winter




Summer

**Scheduled Maintenance and Troubleshooting Guidelines for Cooling Systems**

1. Check condenser fan motors. Are they running full speed? NOTE: When these motors start to short out, they still run but at about half speed seriously affecting the ability to remove the heat from the refrigerant as it passes through the condenser. If fan motors are running full speed, they should have a few drops of light oil added to the oil ports. If they are not running at full speed, you must install a new motor.
2. Check the calibration of the thermometer. NOTE: Use a known accurate thermometer to check temperature of milk in cooler, then compare to temperature indicated on the cooler thermometer.
3. Check agitator for noisy operation.
   A. If agitator drive is belt reduction, check the condition and tension of belts.
   B. If agitator drive in gear reduction, check the condition of the gears and check the oil level.
4. Check thermostat for accuracy of operation.
   A. Check the temperature of thermostat cut out that stops the refrigeration system. NOTE: Should be set to cut out at (38 degrees F).
   B. Check the temperature of thermostat cut that starts the refrigeration system. NOTE: Should cut in at (39 to 41 degrees F). If milk temperature goes above (41 degrees), the thermostat should be changed as it is very important for the refrigeration system to start as quickly as possible after hot milk starts entering the cooler.

**Bulk Tank Cleaning Procedures**

Each time the bulk tank is emptied, it must be thoroughly rinsed, washed out and sanitized before milk is again added. Failure to do so, regardless of the cause, may contribute to bacteria and milk quality problems.

1. Make certain water inlet screens are clean.
2. Rinse tank interior thoroughly with clean, lukewarm water until all milk residue is flushed.
3. Check temperature of water entering cooler during the detergent wash cycle. NOTE: The water should be 160-170° F. Check ending wash water temperature. It should not fall below 120° F.
4. Use quality cleaning compounds according to manufacturer's instructions during the wash cycle.
5. Rinse the system following the wash cycle to remove any detergent residue.

Many of today's new installations incorporate a C.I.P. automatic washing system that allows these procedures to be followed automatically. This does not eliminate the need to periodically check and make certain that the washing system is performing properly and that all tank interior surfaces are clean and free of any buildups or deposits.

**Checking Efficiency of Refrigeration System**

1. Near the end of a milking (with milk covering the cooling plate), shut off the cooler until you have finished milking.
2. After you have finished putting milk in the cooler and the surface of the milk is calm, take a dip-stick reading, convert to pounds on your chart, and record.
3. Check the temperature with a known accurate thermometer inserted directly into the milk and record.
4. Check time and record.
5. Immediately start cooler and run until the milk is cold and thermostat cuts out (stops) refrigeration system.
6. Check time and temperature when cooler stops and record.
7. To get the BTUs of heat removed from the milk, subtract the temperature at cut out from the temperature at start.

| | | |
|---|---|---|
| EXAMPLE: | Temperature at Start | 45 Degrees F |
| | Temperature at End | -38 Degrees F |
| | Degrees of Heat Removed | 7 Degrees F |

8. Multiply the pounds of milk in the cooler by the degrees of heat removed

| | | |
|---|---|---|
| EXAMPLE: | Pounds of Milk in Cooler | 2,000 |
| | | x 7 |
| | BTUs of Heat Removed | 14,000 |

9. Subtract the time the cooler was started form the time the cooler stopped to arrive at the total minutes refrigeration ran.

| | | |
|---|---|---|
| EXAMPLE: | Time Cooler Stopped | 7:00 P.M. |
| | Time Cooler Started | 6:35 P.M. |
| | Total Minutes Cooler Ran | 25 minutes |

Now let's convert these facts to information we can use to determine if the cooler is operating at maximum efficiency. NOTE: A condensing unit connected to a bulk milk cooler, cooling milk from (45 degrees F) to (38 degrees F) is rated at 10,000 BTUs per horsepower per hour. (Do not confuse milk cooling with air conditioning where the temperature/pressure relativity is much higher and the same condensing unit would be rated at 12,000 BTUs per horsepower (12,000 BTUs/hour = 1 ton of refrigeration).

EXAMPLE: Assuming you have a (5 H.P.) Condensing Unit

| | | |
|---|---|---|
| 1. | 5 H. P. = 10, 000 BTUs per H. P. Per Hour | 50,000 BTUs |
| 2. | 50,000 BTUs Divided by 60 Minutes Rated Capacity of Refrigeration System | 833 BTUs |
| 3. | BTUs of Heat Removed From Milk During Efficiency Test | 14,000 BTUs |
| 4. | Total Number of Minutes Cooler Ran During Test Period | 25 Minutes |
| 5. | Divide BTUs on Line 3 by Minutes on Line 4 | 560 BTUs |
| 6. | Multiply BTUs on Line 5 by 60 Minutes | 33,600 BTUs |
| 7. | Divide Actual BTU Removal on Line 6 by Rated BTU Capacity on Line 1 | 67% |

8. System is only operating at (67%) efficiency, if you have done all of the suggested scheduled maintenance

procedures, you need to call in a *qualified refrigeration person* to locate the reason that the cooler is only operating at the 67% efficiency level.

One to One to One

A simple formula for sizing your bulk milk cooler refrigeration system or condensing unit or units.

Properly installed and operating condensing units sized using this formula will cool milk at the same rate that it enters the cooler, resulting in faster cooling, less agitation of the milk by the agitator, a much lower blend temperature, and better quality milk going to the market.

FORMULA: 1-BTU to Change 1-Pound 1-Degreee

NOTE: Most bulk cooler refrigeration systems are rated at 10,000 BTUs per hour per horsepower.

Check accurately the pounds of milk entering your cooler per hour and record.

| | | |
|---|---|---|
| EXAMPLE: | Pounds per Hour to Cooler | 1,000 Lbs. |
| | X Temperature Drop 98 - 38 = 60 Degrees | 60 Degrees |
| | = BTU per Hour to be Removed | 60,000 BTUs |
| | Divided by 10,000 BTUs = Total Horsepower Required | 6 H.P. |

NOTE: This can be accomplished by two 3 H. P. condensing units, but more importantly it can be accomplished by one 4 H. P. condensing unit and a properly sized and installed plate or tube type heat exchanger (pre-cooler).

# News

## *FDA gives Two-year Approval to AIB Nutrition Labeling Data Base*

FDA approved the use of the American Institute of Baking's nutrient data base to create food labels for bakery foods January 6 in a letter from Fred R. Shank, Ph.D., Director of the Center for Food Safety and Applied Nutrition in Washington, D.C.

In practical terms, approval means bakers who use the AIB system, formally titled, *A Model System for Determining Nutrient Content of Bakery Foods*, receive two immediate, concrete benefits:

- Approved food labels at a great savings over the alternative of determining nutrient content by analysis — about $50 versus an analysis cost of about $600;
- According to an FDA policy dating to December 21, 1979, if labels determined by the data base are found not to be in compliance "with applicable nutrition labeling regulations, the agency will work with the firms responsible for the product in question and with the appropriate authorities who are maintaining the applicable nutrient data base to correct the problem before initiating compliance provision actions."

In the letter approving the system, Shank wrote, "... we commend AIB for its efforts to date and look forward to the further development of this system. We believe that this model system can ultimately have a very positive impact on nutrition labeling and provide a useful service to the baking industry."

FDA's approval is for a period of two years. Approval means AIB and FDA will continue working to perfect the system during the two-year period of approval and beyond. Again, from Shank's letter, "... because of the significant advances you have made in your model system, and because the values derived using the data base developed by AIB are expected to be within regulatory requirements, the model system developed by AIB may be used on an interim basis for labeling purposes, provided that AIB agrees to continue working on the system to meet the above criteria. At the end of a two-year period FDA will again review the status of your model system to determine what further corrective actions might be necessary."

AIB's nutrient data base is the only such labeling tool operating with the approval of FDA, says Dr. James. L. Vetter, Vice President-Technical.

The data base has been developed based on analysis of ingredients in cooperation with enrolled bakeries and ingredient suppliers. Using the computer data base, formula and processing information for a particular bakery food will provide all the data needed for a correct nutrition label. AIB guarantees the confidentiality of all companies' formula data.

Shank's letter to Vetter included a detailed discussion of characteristics expected in a model system such as AIB's that is used for labeling purposes. The letter also stated that an organization using a data base as part of a model system must be able to verify quality of the nutrient content information in the data base.

Ron Hanck who has worked in the area of regulatory compliance in the American baking industry will manage the data base system for AIB.

For additional information about the system or to enroll, call Hanck or Dr. Vetter at AIB, 1-800-633-5137, 913-537-4750, FAX 913-537-1493, or write Nutrient Date base, Attention, Ron Hanck, 1213 Bakers Way, Manhattan, KS 66502.

## *NFI Products Catalog Now Available*

Are you looking for merchandising videos to boost seafood sales? Technical publications for your reference library? Or information on seafood trends, HACCP inspection, and more? The National Fisheries Institute's (NFI) new "Products Catalog" features valuable educational and scientific materials, as well as training tapes which are available to you free of charge or for a nominal cost.

As the seafood industry's largest trade association, the NFI offers a wide variety of products to meet your needs. Here is a brief list of items featured in the catalog:

- NFI Green Book, a three-volume reference manual
- Guidelines for the Air Shipment of Fresh Fish & Seafood, 2nd Edition
- Seafood Source Newsletter
- Seafood Inspection "Bill of Rights," Part I & II
- Retail Seafood Identity System Manual
- The Legal Workshop Audiocassette
- HACCP Manuals
- Seafood Plant Sanitation Videotape, Part I
- The Easy Gourmet Point-of-Purchase Videotapes for Retailers
- Seafood safety brochures and more!

For a copy of the NFI "Products Catalog" which offers product descriptions, contact NFI Communications at 703-524-8881.

The NFI is a non-profit trade association of 1,000 companies involved in all aspects of the U.S. fish and seafood industry — producers, processors, wholesalers, distributors, brokers, importers, exporters, and members of allied supportive industries. The Institute provides government relations, technical, communications and educational services in support of industry objectives and goals.

## *Listeria monocytogenes* Multiplies in Ultrafiltered Skim Milk

Ultrafiltered milk doesn't always behave like unfiltered milk in the dairy plant. As many cheesemakers know, UF milk produces higher cheese yields. *Listeria monocytogenes*, a foodborne pathogen, grows faster and reaches higher populations in UF skim milk than in unfiltered skim milk, research at the College of Agricultural and Life Sciences has shown. Listeria grew in UF milk and permeate at refrigeration temperatures and at cheesemaking temperatures.

CALS researchers studied Listeria in samples of skim milk, UF skim milk concentrated twofold or fivefold, and permeate. The samples were inoculated with one of two strains of Listeria: V7 or California, which killed people in an outbreak of listeriosis in 1985. Inoculum levels ranged from 1,000 to 100,000 cells per milliliter of product, representing moderate to severe contamination.

When incubated at 4°C (39°F) for 30 days, Listeria grew faster in UF milk than in unfiltered milk, according to E. H. Marth, emeritus professor of food microbiology at the University of Wisconsin-Madison. The pathogen reached final populations of about 10 million/ml in skim milk and about 100 million/ml in UF milk.

Listeria probably grew more quickly in UF milk because of the higher content of total solids, protein, fat and ash, Marth notes. UF milk had a slightly higher pH than unfiltered milk, which may have allowed Listeria to reach slightly higher populations. The pathogen tended to reach higher final populations in 5x milk than in 2x milk. Proteins in the 5x milk behaved differently at 4°C, which may have enhanced the growth of Listeria, according to Marth.

Listeria grew to hazardous levels in permeate, reaching populations of 1 million to 10 million cells/ml.

Listeria grew at about the same rate in UF milk and unfiltered milk incubated at 32°C (90°F) and 40°C (104°F). Maximum populations tended to be slightly higher at 32°C and 40°C than at 4°C, with the highest counts in all products appearing at 32°C. Listeria grows best at 30°C to 37°C (86°F to 99°F), Marth notes.

During cheesemaking, UF milk retains lactalbumin and lactoglobulin, which can increase yields by up to 20 percent. These proteins escape in the whey when unfiltered milk is used to make cheese. Other benefits of UF milk include reduced energy, equipment and labor costs; more consistent product flavor; and possible production of new byproducts.

The unfiltered skim milk contained about 9.3 percent total solids, .1 percent fat and 3.2 percent protein. The 5x milk contained 21 percent total solids, .7 percent fat and 14 percent protein; 2x milk contained 12.9 percent total solids, .3 percent fat and 6.2 percent protein. Permeate contained about 5.5 percent total solids, no fat, and .3 percent or less protein.

The UF milk and permeate in these trials provided an excellent breeding ground for Listeria, especially at temperatures used in cheesemaking. Using skim milk or UF skim milk contaminated with Listeria for cheesemaking could lead to contaminated cheese, according to Marth.

Other studies have shown that Listeria can survive cheesemaking and 60 days of ripening in a variety of cheeses. While listeriosis rarely threatens healthy adults, it can sicken newborn babies, people with weakened immune systems, and pregnant women, and cause stillbirths and miscarriages. As few as 1,000 Listeria cells can sicken susceptible people. Infections can produce meningitis and encephalitis, as well as less-serious ailments.

Marth worked on this study with Fathy E. El-Gazzar, an associate professor of dairy microbiology at the University of Assiut, Assiut, Egypt; and Hans F. Bohner, now at the Technical Center, General Mills, Inc., Minneapolis, MN.

For more information contact Elmer Marth at (608)265-2690.

## *University of Minnesota will Host Dairy Policy Conference*

Dairy price supports, free trade, and state milk pricing initiatives are among topics that will receive attention at the University of Minnesota's upcoming Dairy Policy Conference.

The conference will be March 11 at the Earle Brown Continuing Education Center on the university's St. Paul campus. Registration will begin at 8:20 a.m., and the program will begin at 8:40 a.m. and end at 4 p.m.

The conference is designed for dairy producers, directors of dairy cooperatives, dairy marketing managers, officials of farm organizations, government officials, members of the news media, and others with an interest in policy issues affecting the dairy industry.

Conference speakers will include business leaders, government officials and university faculty members who are involved in analyzing and resolving dairy policy issues.

Needs for expanding and increasing the viability of Minnesota's dairy industry will be the topic for the first morning session. Speakers will be Jim LeFebvre, dairy farmer from Elk River, MN; Marvin Duncan, head of the Department of Agricultural Economics at North Dakota State University; and Earl Fuller, extension agricultural economist at the University of Minnesota.

The second morning session will provide perspectives on state initiatives in milk pricing. Speakers will be Bob Wellington, quality control manager with Agri-Mark, Inc.; Richard Low, general manager of DairyGold, Inc., Seattle, WA; and Constance Tipton, vice-president of International Dairy Foods Association, Washington, DC.

Implications of the General Agreement on Tariffs and Trade (GATT) and North American Free Trade Agreement (NAFTA) for the U.S. dairy industry will be

the first afternoon topic. Speakers will be Peter Vitaliano of the National Milk Producers Federation, Arlington, VA; Milton Hallberg, professor of agricultural economics at Pennsylvania State University; and Steve Neff, economist with the Dairy Research Section, Economic Research Service, USDA, Washington, DC.

The final session will focus on current issues in federal dairy price and marketing programs. Calvin Covington, general manager of National All-Jersey, Inc., will look at multiple component pricing in federal orders. J. B. Penn, vice-president of Sparks Companies, Inc., Washington, DC, will discuss the outlook for the dairy price support program.

The registration fee for the Dairy Policy Conference is $35 per person. To register, send your name and the name of your firm, and your home address and phone number, along with the registration fee, to Extension Special Programs, 405 Coffey Hall, 1420 Eckles Avenue, University of Minnesota, St. Paul, MN 55108. Make checks payable to the University of Minnesota. To obtain a conference registration brochure or additional information, call (612)625-1214 or 1-800-367-5363.

## *Announcement of the 1993 Davis Calvin Wagner Sanitarian Award*

The American Academy of Sanitarians has announced the eleventh (11th) Annual Davis Calvin Wagner Award. The Award, to be presented at the Academy Luncheon during the Annual Educational Conference of the National Environmental Health Association will consist of a plaque and a $500 honorarium. The Award is open to all Diplomates of the Academy. The recipients should be one who:

1. Exhibits resourcefulness and dedication in promoting the improvement of the public's health through application of environmental health and public health practices.
2. Demonstrates professional, administrative and technical skill and competence in applying such skills to raise the level of environmental health.
3. Continues to improve oneself through involvement in continuing education type programs to keep abreast of new developments in environmental health and public health.
4. Is of such excellence to merit Academy recognition.

The nominations for the Award may be made by a colleague or a supervisor and must include the following:

1. Name, title, grade and current place of employment of nominee.
2. A description of nominee's educational background and professional work experience.
3. A narrative statement of how the person meets the criteria for the Award including a description of specific accomplishments and contributions on which nomination is based.
4. Three endorsements (an immediate supervisor and two other members of the professional staff or other persons as appropriate).

The deadline for receipt of nominations is April 15, 1993. Three copies of the nomination must be submitted and should be sent to:

John G. Todd, Dr. P.H., Chairman
AAS Davis Calvin Wagner Award
17309 Fletchall Drive
Poolesville, MD 20837

## *Safety Workers Can Gain from OSHA Update Seminar*

Safety professionals in the United States and Canada can benefit from two regional seminars, OSHA Update for 1993 and its Safety Roundtable. The first one will be presented in Portland, Oregon, March 18-19, followed by a repeat performance in Appleton, Wisconsin, April 1-2.

Conducted by the Safety Department of the American Institute of Baking, this seminar has been designed by working professionals who conduct comprehensive safety audits in industries of every type in every area of the country.

"The level of all regulatory activity could increase in 1993," commented Jim Dykes, Director, Safety Department, AIB. "Because of this, we believe it is cost effective to prepare before the OSHA inspector comes calling. AIB Safety has more experience in regulatory compliance than anyone."

Participants will learn about actual cases and what companies did to satisfy OSHA. The real-life illustrations will demonstrate the best and easiest way to set a foundation for a safety program. Specific subjects covered include recordkeeping, lockout/tagout, forklift safety, confined space safety, respiratory protection, hearing conservation, chemical process safety, and blood borne pathogens.

All meetings in Portland will be at the Red Lion Hotel - Columbia River and in Appleton at the Paper Valley Hotel and Conference Center. Tuition fees are $375 per participant. For further information write to the Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502, or call (913)537-4750 or (800)633-5137.

# Food and Environmental Hazards to Health

## Arboviral Disease—United States, 1991

During 1991, state and local health departments reported 122 cases of human arboviral encephalitis to CDC. More than half (69) of the cases resulted from outbreaks of St. Louis encephalitis (SLE) in Arkansas and Texas. In addition, an epizootic of eastern equine encephalitis (EEE) extending from the Atlantic and Gulf coasts into the upper midwest caused sporadic human cases and a substantial loss of livestock. This report summarizes the reported cases of arboviral encephalitis in the United States during 1991 and underscores the continuing need for arbovirus surveillance and control.

**St. Louis encephalitis.** SLE activity in the United States during 1990-1991 was at the highest level since 1976. From July through September 1991, 25 laboratory-confirmed SLE cases occurred in Pine Bluff, Arkansas, and 41 SLE cases occurred in Harris County (Houston), Texas, resulting in annual incidence rates of 44 and 1.5 cases per 100,000 population, respectively. Additional sporadic SLE cases were confirmed from Arkansas (three), California (three), Florida (one), Louisiana (one), North Carolina (one), Texas (two) and Washington (one). Travel histories suggest that two of the three California patients and the Washington patient contracted SLE during visits to Arizona and New Mexico.

**LaCrosse encephalitis.** In 1991, 38 laboratory-confirmed cases of LaCrosse encephalitis (LAC) were reported from Illinois (13), Minnesota (four), North Carolina (one), Pennsylvania (one), and Wisconsin (19). Although LAC is generally the predominant cause of arboviral encephalitis in the United States, it is often undiagnosed and underreported.

**Eastern equine encephalitis.** In 1991, an EEE epizootic occurred among horses in states along the southeastern seaboard, with intense transmission occurring in Florida, Georgia, and South Carolina. The epizootic also extended into the midwestern states, causing deaths among horses in Ohio and Michigan. A cluster of five laboratory-confirmed human EEE cases occurred in northeastern Florida in June and July 1991, resulting in two deaths. Six additional human cases occurred in Georgia (two), Michigan (two), Louisiana (one), and South Carolina (one). For the first time, EEE virus was isolated from *Aedes albopictus* mosquitoes collected at a tire depot in central Florida.

**Western equine encephalitis.** In 1991, one laboratory-confirmed human case of western equine encephalitis (WEE) occurred in Colorado. Since 1980, zero to 40 human cases of WEE have been reported annually, primarily from the western United States.

**Editorial Note:** The isolation of EEE from a potential new mosquito vector (*Ae. albopictus*) and the increasing trend in human SLE cases that began in 1990 indicate the continuing need for arboviral surveillance and control in 1992.

The last nationwide SLE epidemic in 1975 resulted in 1,815 human cases in 31 states. This epidemic was preceded by an increase in cases in 1974, particularly in the southeastern United States. SLE virus is transmitted by the mosquito *Culex quinquefasciatus* in the south-central and southeastern United States, except in Florida, where it is transmitted by *Cx. nigripalpus*. Virus activity generally peaks in August and September. The 1991 SLE outbreak in Pine Bluff was the first reported from that community but was similar to outbreaks occurring in the Midwest in 1975. During 1991, seroepidemiologic studies indicated that 10% of residents in Pine Bluff had antiflaviviral IgG (CDC, unpublished data, 1991), indicating unrecognized SLE transmission in this area.

Control measures that may reduce the risk for SLE infection include targeting vector-control efforts at open storm drains near housing developments, eliminating water-holding containers on premises, and reducing exposure to the vector mosquito at dusk and during the evening hours by staying indoors and using insect repellents. For those who must be outdoors in the evening, long-sleeved shirts and long pants reduce exposure to mosquito bites. Light-colored clothing is less attractive than dark clothes to most mosquitoes. Residents of areas where SLE is epizootic should repair window and door screens and avoid sitting on unscreened porches at dusk. In particular, prevention efforts should be aimed at elderly persons (>60 years old), who have the highest age-specific SLE attack rates during outbreaks. Although precise prediction of SLE epidemics is not possible, the increased level of SLE activity in the southern and southeastern United States during 1990-1991 suggests that continued SLE activity is likely in 1992.

LAC encephalitis, caused by an arbovirus of the California serogroup transmitted by *Ae. triseriatus*, is most common among young children. LAC virus is prevalent primarily in midwestern states; however, serosurveys and active surveillance programs have demonstrated this virus has a wide geographic distribution in the United States. LAC may be underreported in many areas and should be considered in the differential diagnosis of pediatric viral encephalitis in states where hardwood forests and woodlots are common.

Although fewer than 10 human cases of EEE are reported annually in the United States, this virus is associated with a high case-fatality rate. An effective equine vaccine is licensed in the United States and is recommended for livestock in areas where EEE transmission is known to occur. However, revaccination during a single transmission season may be necessary. Specific control measures to prevent human EEE cases are difficult to implement because the disease is rare, even during a major equine epizootic.

The recent detection of *Ae. albopictus* in the United States has prompted concern because of its potential for transmission of EEE virus. This mosquito was imported from Asia to Texas, where it was discovered in 1985, and has since become widespread in the central and southern United States. *Ae. albopictus* is an aggressive biter that

thrives in both forest and suburban habitats. This species, therefore, potentially could serve as an important bridging vector for EEE virus from swamp habitats into populated areas. although there is no evidence to indicate this has occurred.

Clinicians should be encouraged to obtain acute and convalescent arboviral antibody titers on all suspected cases of arboviral encephalitis. Patients with arboviral encephalitis should be reported promptly to state and local public health authorities.

Morbidity and Mortality Weekly Report 7/31/92

## Lizard-Associated Salmonellosis—Utah

During June 1992, CDC identified a rare *Salmonella* serotype, *S. poano*, from a stool specimen from an infant. The specimen was sent from the Utah Division of Laboratory Services. This report summarizes the epidemiologic investigation of this case.

In April 1992, an 8-week-old infant was taken to a pediatric clinic because of bloody diarrhea, flatulence, and fever of 101 F (38.3 C). *S. poano* was isolated from a stool specimen. The infant was treated with an antibiotic for 7 days and symptoms resolved. Follow-up stool specimens were negative. The infant was partially breast fed and partially fed iron-enriched infant formula. No household members were symptomatic. The infant attended a child day care facility 3 days a week; no one else at the center had symptoms.

The only household pet at onset of illness was a python. One month before onset of illness, the family pet had been a 2-foot-long savannah monitor lizard (*Varanus exanthemapicus*), which the parents reported had had loose stools for the 8 months it was in their possession. In March, they returned the lizard to the pet store and traded it for the snake. Specimens obtained from the snake and its plastic cage did not yield *Salmonella*. However, *S. poano* was recovered from fecal specimens left on the cage carpet and stone water dish by the lizard nearly 3 months earlier.

The infant had not had contact with either reptile; they were handled only by the father. Because of the height of the cage, the father had to climb in it to handle the lizard and clean the cage. He did this with bare feet, a potential means of spreading contamination in the home. Heat rocks from the cage were washed in the kitchen sink, and may also have been a source of household contamination.

**Editorial Note**: *S. poano* was first isolated in 1968 from a snake in Ghana. Since then, only three animal isolates have been reported in the United States, all during 1991 from savannah monitor lizards (two from California and one from Maryland) (National Veterinary Services Laboratory, unpublished data, 1992).

Savannah monitor lizards are imported primarily from Ghana and Togo and sold as pets through wholesalers and retail pet shops. No quarantine or health inspections are required for their entry into the United States. Since 1990, more than 13,500 savannah monitor lizards have been imported annually (U.S. Fish and Wildlife Service, unpublished data, 1992).

Transmission of *Salmonella* from household pets, particularly birds and reptiles, to humans has been previously described. Survival of *Salmonella* for up to 30 months in animal feces has been documented, and as in this case, direct contact with the reptile does not appear to be necessary for transmission.

Infants are more likely than adults to develop symptomatic *Salmonella* infections from any source. Factors that may put infants at increased risk for salmonellosis following low-dose exposures include reduced gastric acidity and rapid emptying of gastric contents. In a previous report, two infants with *S. marina* infection acquired from pet iguanas were fed either powdered formula or iron-enriched formula and breast milk. Two case-control studies support the association between formula feeding and infant salmonellosis. In Guam, infants with salmonellosis were more likely to have been fed iron-enriched formula than control infants, and bottle-feeding was associated with infant salmonellosis in Arkansas.

Reptiles carry a wide variety of *Salmonella* serotypes, and fecal carriage rates may be as high as 84%-94%. Persons who handle or care for these animals should carefully wash any items that come in contact with the animal or its environment. Pet reptiles present a particular danger in homes with infants, elderly persons, or others at increased risk for *Salmonella* infections.

MMWR 8/7.1/92

## Lyme Disease Knowledge, Attitudes, and Behaviors - Connecticut, 1992

Lyme disease (LD), caused by infection with the spirochete *Borrelia burgdorferi*, is the most commonly reported tickborne illness in the United States. Because no vaccine is available and effective measures to control tick populations are experimental, education is the most important approach to preventing LD. LD was identified in Connecticut in 1975; in 1991, Connecticut had the highest rate of LD in the United States (36 per 100,000 population), and cases were reported in residents from 134 of Connecticut's 169 cities. To assess knowledge, attitudes, and behaviors related to LD, the State of Connecticut Department of Health Services and the University of Connecticut conducted a telephone survey of adults in Connecticut during the first 2 weeks of May 1992. This report summarizes the results of the survey.

A random sample of 200 households, stratified by the proportion of the state's households in each of Connecticut's eight counties, was contacted. Respondents were identified as the male or female head of household. The results may be interpreted with a $\pm$ 7% error margin.

The median age of respondents was 43 years (range: 18-88 years); 109 (55%) were women, and 181 (91%) were white. Nearly two thirds (122 [61%]) resided in a suburban setting, 56 (28%) in a rural setting, and 22 (11%) in an urban setting. Nearly half (86 [43%]) reported knowing someone who has or had LD, and four (2%) reported having been told they have or had LD.

Fifty (25%) respondents reported they knew "a lot" about LD; 81 (41%), "some"; and 69 (34%), "a little." Most (194 [97%]) believed a person can acquire LD from the bite of an infected tick; 170 (85%), that LD is not transmitted by touching or other direct contact with a person with LD; and 125 (63%), that LD is not transmitted by touching or other contact with infected pets or other animals.

One hundred forty-five (73%) respondents believed that an expanding red rash was the most recognizable early symptom of LD. Most (127 [64%]) respondents believed that appropriate treatment of LD includes antibiotics and will result in recovery; 60 (30%) believed treatment of LD includes medication but that the infected person may not recover. Thirteen (6%) believed there was no treatment of LD or did not know of any treatment.

Respondents categorized their chances of acquiring LD in the coming year as high (15 [8%]), medium (60 [30%]), low (109 [54%]), or none (16 [8%]). Most (163 [82%]) believed LD is either fairly common or extremely common in Connecticut; 31 (15%), that it occurs rarely; and six (3%), did not know. Most (170 [85%]) believed LD is a serious or very serious disease; 22 (11%), that it is a problem but not a serious disease; and eight (4%), that it is either not a problem to worry about or that they were unsure of whether it is a problem.

Most (177 [89%]) respondents believed they could protect themselves from acquiring LD by looking for and removing ticks after they have been in wooded or grassy areas; 173 (87%), by wearing long pants in the woods; 171 (86%), by removing ticks from pets; 170 (85%), by avoiding wooded areas; and 113 (57%), by using insect repellent on their skin. Eighty-six (43%) had taken steps to prevent LD during the past year.

Respondents who reported they knew "a lot" about LD were more likely to have taken precautions to prevent LD during the past year (60% [30/50]) than were those who reported they knew "some" (54% [44/81]) or "a little" (17% [12/69]) about the disease ($p<0.001$; chi-square test for trend). Respondents who categorized their chances of acquiring LD in the coming year as high were more likely to have taken precautions to prevent LD during the past year (60% [9/15]) than were those who categorized their chance as medium (50% [30/60]), low (40% [44/109]), or none (21% [3/14]) ($p=0.02$; chi-square test for trend). Respondents who have personally known someone with LD were more likely to have taken precautions during the past year (53% [46/86]) than were those who did not know someone with LD (35% [40/114]) (relative risk=1.5; 95% confidence interval=1.1-2.1).

Most (110 [55%]) respondents believed the general public has been given "too little" information about LD; 82 (41%), that the right amount of information has been given; and two (1%), that too much information has been given; six (3%) respondents did not know. Respondents reported the most helpful sources of information on LD were articles in newspapers (81 [41%]), public service announcements (56 [28%]), and pamphlets and other written materials (47 [23%]). Sixteen (8%) believed no source was helpful.

**Editorial Note**: This is the first statewide survey of knowledge, attitudes, and behaviors related to LD. The preliminary findings in Connecticut support the importance of educating persons about LD and suggests that those who believe they are well-informed about, and at risk for acquiring, the disease are more likely to take precautions than are persons who do not. Additional studies can assist in targeting and evaluating the effectiveness of educational programs for LD.

Persons who live or travel in areas in which LD is endemic should be aware of the need to avoid tick bites, the importance of recognizing the early symptoms of LD (especially the expanding red rash known as erythema migrans), and the need to seek treatment for the disease as soon as symptoms develop.

The week of July 26 - August 1, 1992, is National Lyme Disease Awareness Week. Many state and local health departments distribute educational materials on LD. Information about LD, including availability of educational materials, is available from many state and local health departments or CDC (telephone [303] 221-6453). Information about LD is also provided by the CDC Voice Information System; telephone (404) 332-4555.

MMWR 7/17/92

# Updates . . .

## 1993 IAMFES Workshops

### Quality Assurance in Microbiology

Conducted by Michael H. Brodsky, Ontario Ministry of Health

July 30-31, 1993, Stouffer Waverly Hotel, Atlanta, GA

If an auditor paid a surprise visit to your laboratory, would your QA program and your practices be adequate for accreditation purposes? Are your SOP's documented? Have you been meaning to develop or introduce a QA program but "haven't found the time" or are unsure how to do it?

If any of these questions make you feel uncomfortable, uneasy or embarrassed, register for the one-and-a-half day Quality Assurance Workshop for Microbiology Laboratories and put your mind at ease.

Learn how to confidently describe the QA program operating within your laboratory and outline procedures related to specific analytical protocols. Be confident in the results generated by your laboratory and ensure that your clients will not doubt the validity of the data.

### Rapid Microbiological Methods

Conducted by Daniel Y.C. Fung, Kansas State University and James Dickson, Iowa State University

July 30-31, 1993, Stouffer Waverly Hotel, Atlanta, GA

A one-and-a-half day workshop on Rapid Microbiological Methods will be conducted under the direction of Daniel Y.C. Fung and Jim Dickson. The program will include lectures and hands-on experience on some systems. Commercial companies will be invited to demonstrate their systems and instruments in the workshop. With increasing awareness and concern about food safety, rapid methods in microbiology is essential as a first step to help monitor the microbial safety of our food supply and when problems arise these methods are needed to quickly pin-point the source of the problem so that actions can be taken. The workshop is designed for laboratory directors, food scientists, applied microbiologists and consultants. Appropriate hand-out materials will be provided.

**Informational Brochures will be available soon**

**Workshop Hours will be:**
Friday, July 30 - 1:00 to 5:00 p.m.
Saturday, July 31 - 8:30 a.m. to 5:00 p.m.

**Workshop Registration Fees are:**

| Before June 1, 1993 | | After June 1, 1993 | |
|---|---|---|---|
| Member | $195 | Member | $225 |
| Non-Member | $235 | Non-Member | $265 |

**Informational Brochures will be available soon**

For further information, please contact IAMFES at
(800)369-6337 (US), (800)284-6336 (Canada), FAX (515)276-8655

## REGISTRATION FORM

❑ **Rapid Microbiological Methods Workshop**
❑ **Quality Assurance in Microbiology Workshop**

**Stouffer Waverly Hotel — Atlanta, GA — July 30-31, 1993**

**First Name** (will appear on badge) (please print) **Last**

**Title** **Employer**

**Mailing Address (Please specify: Home Work)**

**City** **State/Province** **ZIP/Postal Code**

**Area Code & Telephone #** **FAX #**

**Charge Card Payments: VISA/MASTERCARD/AMERICAN EXPRESS**

**Account #** _____

**Name on Card:** _____

**REGISTRATION:**

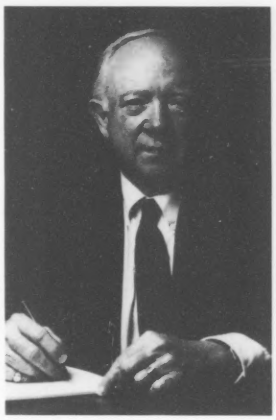
| | Before 6/1/93 | After 6/1/93 |
|---|---|---|
| **IAMFES Member** | **$195** | **$225** |
| **Non-Member** | **$235** | **$265** |

**TOTAL AMOUNT ENCLOSED:** $ _____
US FUNDS on US BANK

**Limited Seating—RESERVE NOW. (Subject to cancellation)**

**Exp. Date** _____

**Signature:** _____



# A Mind Set

**Donald J. Graham**
**Senior Food Technologist**
**Sverdrup Corporation**
**St. Louis, MO**

## CHECKLIST - PART 3 - WALLS, FLOORS, CEILINGS (CONT.)

As discussed in the first five items of part 3, walls, floors and ceilings give rise to numerous sanitary design decisions. The balance of the walls, floors and ceilings checklist takes into account drains, drop ceilings, docks, hangers, lights and the elimination of horizontal surfaces.

6. Are floors properly sloped to the drains at 1/4 inch per foot?

Standing water becomes a breeding place for bacteria, molds and other organisms. One of the most common faults of food plant floor construction is the incorrect sloping of the floor away from instead of toward the floor drains. Tile floors should be laid so the grout joints lead toward the drains at the recommended 1/4 inch per foot slope. In some instances a slope of 1/8 inch per foot is acceptable such as in rectangular bays. Floor drains, at a minimum, should be spaced at one drain for every 400 square feet of floor area. Drains should be trapped and contain a screen to prevent solids from entering the waste lines. The screens should be easily accessible so they can be kept clean both during processing and the cleanup shift. Cleaning and sanitizing the floor drains periodically during the production shifts is gaining more and more importance since it was found that Listeria abounds around them and can become a source of product contamination.

7. Are the drains constructed for automatic flushing (trench type drains)? Are nontrench drains designed to prevent water retention in or around the drains?

Trench drains are often used in other than meat, poultry or egg plants. The old-time trench drains often had square corners at the bottom and were difficult to clean and to keep clean. New developments have made trench drains much more sanitary and decidedly easier to clean. The new type are preformed and inserted into the floor. They are formed with rounded bottoms and are presloped. They are usually made out of a poly material and are inert to attacks from food acids or cleaning compounds. The floor grates are fitted flush to the floor and become part of the insert, making them easy to clean and sanitize. If trench drains are to be part of a new plant or a plant renovation then these new preformed products should be considered. These drains can be piped to automatically flush so product does not bunch up in the trench.

Standing water around a floor drain can become a trap for dirt, debris and a breeding place for bacteria. Care must be taken during the installation of the floor drains to prevent any ledges from forming, impeding the flow of wastewater to the drains.

8. Have drop ceilings been avoided in product processing areas?

Drop ceilings have often been thought of as a remedy for covering up pipes, air ducts, etc. in a process area. However, some drop ceilings can cause more problems than they solve. It is often better to leave the pipes exposed so that they are accessible for cleaning on a programmed basis. Double tee roofs are one of the more sanitary types after a good concrete sealer is applied to prevent dusting. Sanitary-type pipe hangers can be designed to be hung from double tees.

Older buildings that have been converted into food processing plants constructed without sanitary design in mind do need a barrier between the process area and the roof trusses. The recommended barrier is a walk-on type ceiling that is hung permanently and cannot be breached from below. Once in place, the only way to

gain access to the area is through an opening at one end. The interspacial area between the facility roof and the permanent ceiling must be ventilated, periodically inspected and be included on the rodent/insect control program. Utility drops should be vertical through the ceiling, and any hole for the utility line should be sleeved and secured so nothing can gain access to the process area or vice versa. Older installations that already have drop-type ceilings consisting of 2x4 or larger panels hung in a suspended frame should have the panels fastened directly to the frame. If maintenance has to dislodge one or more of the panels to gain access to the area above to work on air units, pipelines, etc., then it should be strict practice that the panel or panels must be replaced and refastened securely to prevent contamination from traveling in either direction.

9. Have horizontal surfaces (pipe hangers, beams, duct work) over exposed product areas been eliminated?

Vertical drops through solid ceilings are the recommended solution for eliminating overhead horizontal surfaces. If this solution is impractical, then enclosed pipe runs can be considered. Rerouting pipe runs so they follow walkways or corridors can also be a solution. Air ducts should be round instead of rectangular. Round ducts still collect dust on top but the area is smaller and usually easier to clean. Removing horizontal surfaces from above product or process areas very often requires customization to the individual situation. The standard is that overhead horizontal surfaces are a threat to good sanitation in a processing plant and should be eliminated.

10. Are ceiling lights adequately protected to prevent glass or other contamination from falling into product due to breakage?

Overhead lights do not often break but should have a protective cover in case an accident happens. The cover not only protects the product from flying glass, but also protects the workers from injury caused by the glass. The older incandescent and fluorescent lights all require some kind of a clear, unbreakable shield. The newer metal halide lights usually come equipped with suitable shields. The regulatory agencies look closely at light fixtures to make sure they are protected.

11. Is lighting adequate to permit adequate cleanup?

Good lighting is a must in a food processing facility. USDA is requiring at least 60 foot candles at the work surface in the processing areas. Good lighting makes good sense. If dirt can be easily seen then odds are it will be cleaned up. Good lighting promotes better morale among workers. Studies have shown that when a work area is well lighted then workers tend to keep it clean and more orderly than they do in less well lighted areas.

12. Are threaded pipe hangers, unistrut, or similar supports prohibited?

These items are all dirt catchers and are almost impossible to clean. It takes constant attention to details to keep these kinds of dirt catchers out of a food processing plant. They are easy to use and contractors and maintenance people like them. There are plenty of pipe hangers, pipe supports, machinery supports and hangers that are considered sanitary and should be used in food processing plants. A sanitary design mind set enables the engineer to select the correct sanitary support, hanger, etc., to fit the situation.

13. Are the truck docks located above grade level to prevent rodent entry?

Truck docks are a primary area for rodents, birds and insects to enter a food plant warehouse. The older docks that are depressed can become a prime entry point. Usually they are not well drained and water, dirt and debris collect at the bottom. A well designed dock will be at grade level, and the pavement will be sloped away from the building. The older docks have canopies over them to protect product from exposure to the elements during loading or unloading. Birds will perch and nest on and under these canopies. As soon as the open door is unattended the birds will be in the plant. In addition rodents find their way into the plant unless precautions are taken. Precautions can consist of a 6-inch lip at the top of the dock to discourage them climbing around and into the facility. Another prevention consists of installing a smooth piece of sheet metal such as galvanized, stainless steel or smooth plastic in the area between the ground and the top of the dock. Rodents cannot get a foothold and climb into the plant. Other precautions include rodent gates at the top of any stairs leading into the plant from the dock area. Air curtains can be used to prevent flying insects from entering the open dock doors. The latest in dock/truck seals eliminate canopies and are very effective in protecting the product from the elements during loading and unloading and from providing access to birds. These seals plus brush rather than rubber gaskets in the dock leveler pits are proving to be effective in preventing rodents from entering the plant through that route.

## 1992 Revision of the National Shellfish Sanitation Program Manual of Operations, Part I "Sanitation of Shellfish Growing Areas" and Part II "Sanitation of the Harvesting, Processing, and Distribution of Shellfish;" Availability

**Agency**: Food and Drug Administration, HHS.

**Action**: Notice.

**Summary**: The Food and Drug Administration (FDA) is announcing the availability of the 1992 revision of the National Shellfish Sanitation Program (NSSP) Manual of Operations, part I, "Sanitation of Shellfish Growing Areas" and part II, "Sanitation of the Harvesting, Processing, and Distribution of Shellfish." This project was initiated in cooperation with the Interstate Shellfish Sanitation Conference (ISSC) to help assure that only safe and sanitary shellfish are offered for sale in interstate commerce.

**Addresses**: Submit written requests for single copies of the manual (free of charge) to the Food and Drug Administration, Shellfish Sanitation Branch (HFS-407), 200 C St., SW., Washington, DC 20204. Requests should be identified with the docket number found in brackets in the heading of this document. Send two self-addressed adhesive labels to assist that office in processing your requests. The manual is available for public examination in the Dockets Management Branch (HFA-305), Food and Drug Administration, rm. 1-23, 12420 Parklawn Dr., Rockville, MD 20857, between 9 a.m. and 4 p.m., Monday through Friday.

**For further information contact**: David M. Dressel, Office of Seafood, Center for Food Safety and Applied Nutrition (HFS-407), Food and Drug Administration, 200 C St., SW., Washington, DC 20204, (202)254-3971.

**Supplementary Information**: FDA is responsible for the Federal administration of the NSSP, which is a voluntary program involving State shellfish control agencies, the shellfish industry, FDA, and other Federal agencies. Six foreign countries also actively participate in the NSSP through international bilateral agreements.

The NSSP is concerned with the sanitary control of fresh and frozen molluscan shellfish (oysters, clams, mussels, and scallops) offered for sale in interstate commerce. The program has been in existence since 1925. In the interest of assuring uniform administrative and technical controls, the NSSP has developed and maintained recommended shellfish control practices. These control practices have been published in the form of a Manual of Operations, parts I and II.

In 1982, interested State officials and members of the shellfish industry formed the ISSC. The purpose of the ISSC is to provide a formal structure wherein State regulatory authorities can establish updated guidelines for improving shellfish sanitation and safety. The ISSC has established uniform procedures for developing and adopting new guidelines. Those persons interested in obtaining additional information about the ISSC should contact Kenneth Moore, Chairman, Interstate Shellfish Sanitation Conference, c/o South Carolina Department of Health and Environmental Control, 2600 Bull St., Columbia, SC 29202.

FDA and the ISSC entered into a memorandum of understanding (MOU) that was published in the Federal Register of March 30, 1984 (49 FR 12751). This agreement states, among other things, that FDA will provide technical assistance to the ISSC, including participating in the cooperative efforts of the Conference, to develop or revise program criteria and guidelines.

Based on the MOU, FDA developed draft revisions of the NSSP Manual of Operations, parts I and II, in cooperation with the ISSC. FDA announced the availability of the 1986 revision of part I in the Federal Register of June 5, 1987 (52 FR 21375). The initial working draft of part II was made available for comment in the Federal Register of September 11, 1985 (50 FR 37055), with a revised second draft being made available for further comment on July 11, 1986 (51 FR 25261). Based on the comments received, and in consideration of the comments and views expressed on parts I and II by State regulatory officials, industry representatives, and other interested parties at the ISSC's 1987 and 1988 annual meetings in Austin, TX, and Denver, CO, respectively, FDA announced the availability of the 1988 revision of the completed Manual of Operations in the Federal Register of February 17, 1989 (54 FR 7281). Subsequent revisions were announced in the Federal Register of April 25, 1990 (55 FR 17503) and December 13, 1990 (55 FR 51341).

Continuing with this arrangement, FDA and ISSC are now announcing the availability of the 1992 revision of the NSSP Manual of Operations, Part I, "Sanitation of Shellfish Growing Areas" and part II, "Sanitation of the Harvesting, Processing, and Distribution of Shellfish." The 1992 revision contains changes and improvements to the NSSP considered and passed at the 1991 and 1992 ISSC national meetings held in Fort Lauderdale, FL, and Schaumburg, IL.

The revised manual includes: (1) A completely new section devoted to aquaculture; (2) inclusion of scallops intended for consumption in the "whole animal" or "roe-on" product forms (scallop products consisting of only the adductor muscle are not covered by the NSSP); (3) guidelines that suggest increased frequency of data analysis by State officials who monitor and classify shellfish growing waters; and (4) new inspection criteria for use by State officials when certifying shellfish processors for listing in the Interstate Certified Shellfish Shippers List. Major topics include: General administrative and laboratory procedures; growing area surveys and classification; contingency plans for the control of marine biotoxins; and the accepted sanitary procedures for the harvesting, handling, shucking, and packing of shellfish.

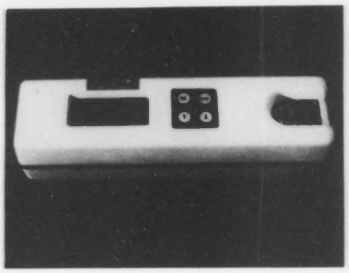
Dated: January 6, 1993.

**Michael R. Taylor**

*Deputy Commissioner for Policy*

(FR Doc. 93-693 Filed 1/12/93; 8:45 a.m.)
Federal Register/Vol. 58, No. 8/Wednesday, January 13, 1993/Notices

# Industry Products



## *LCD Digital Refractometer - Range 0-32% - For Multiple Uses*

Kernco Instruments Co., Inc. is pleased to introduce its Model TRM-110 LCD digital refractometer (battery operated) designed for accurate measurements of Brix, solids and concentrations in the range of 0-32%, with readability of 0.1%, making it ideal for many applications where accurate readings are required. Unit is handheld, weighing only 8.8 oz., and measures a compact 7"W x 2"H x 2"D. Unit is easy to use; simply place a drop of solution on the sample plate, then push button for instant LCD readout of solution being measured. Unit is temperature compensated; it has a digital temperature readout, as well as the readout in Brix % or concentration %. The TRM-110 is available with optional 110 VAC adaptor for continuous use.

Special features are:

- Automatic measurement with optical sensor
- Automatic temperature compensation (reads out temperature)
- Corrosion resistant stainless steel sample stage
- Large 0.5" LCD display
- Minimizes the possibility of human error associated with other refractometers
- Displays battery condition
- Displays error message for over and under range

General Specifications:

| | |
|---|---|
| Range: | 0-32% |
| Resolution: | 0.1% |
| Accuracy: | ±0.2% |
| Measuring Temperature: | 10-30°C (automatic temperature compensation) |
| Power: | 1 ea 9V alkaline battery or optional AC adaptor |
| Dimensions: | 7"W x 2"H x 2"D |
| Weight: | 8.8 oz. |

**Kernco Instruments Co., Inc. - El Paso, TX**

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## *R-Tech Adds Armfield Swept Surface Aseptic Processing System*

R-Tech, a business unit of Land O' Lakes, Inc., announced today an addition to its list of specialized pilot plant equipment of an Armfield swept surface aseptic processing system.

This small batch system will allow R-TECH clients to economically evaluate aseptic sauces, beverages and other non-particulate foods. The system is available for runs as short as two hours and, if required, is fully supported by scientists and process engineers.

**R-TECH - Arden Hills, MN**

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## *Newly Revised 68-page Hamilton HPLC Application Catalog*

Hamilton Company introduces a newly revised *HPLC Application Catalog* for locating application chromatograms and literature references quickly and easily for polymeric reversed phase, ion chromatography, anion exchange, cation exchange, ion exclusion, and carbohydrate columns.

This 68-page catalog contains four sections: Section I includes 201 chromatograms, cross-indexed alphabetically by compound and sample matrix. Section II consists of 201 application chromatograms. Section III contains an alphabetical, cross-indexed listing of compounds and sample matrices for more than 130 published literature references. Section IV lists part numbers and sizes for various column packings.

**Hamilton Company - Reno, NV**

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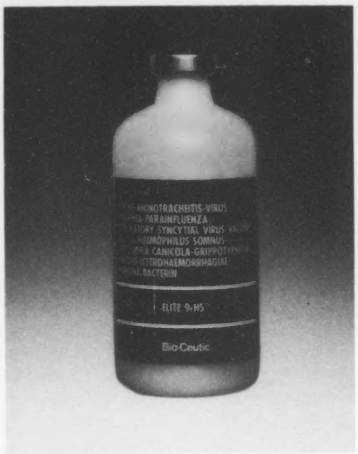


## *Bio-Ceutic Introduces ELITE 9-HS Vaccine*

Bio-Ceutic, a division of Boehringer Ingelheim Animal Health, Inc., announces the introduction of ELITE 9-*HS*™, the first killed virus vaccine/bacterin combination available for immunization of healthy susceptible dairy and beef cattle against disease caused by IBR, BVD, $PI_3$, BRSV, 5 serotypes of Leptospirosis and *Haemophilus somnus*.

ELITE 9-*HS* virus antigens are produced in the exclusive EDGE BioGrowth™ System (Electronically Defined Growth Environment) for maximum consistency in purity and potency. The EDGE BioGrowth System keeps the vaccine components sealed in a closed system from start to finish. The environment is electronically controlled to keep optimum growth conditions for each individual antigen. For example, the pH is monitored and controlled electronically instead of using a chemical that changes color at different pH levels.

In addition, ELITE 9-*HS* vaccine makes use of the unique MATRIX Adjuvant System that physically encompasses the antigens within the structure of the adjuvant. The antigens in ELITE 9-*HS* are preserved using the PRESERVE IMMUNE Process which kills each antigen without affecting the antigenicity of the vaccine.

ELITE 9-*HS* is an all killed, white product that is safe for use in all cattle including nursing calves, veal calves, and pregnant cows.

ELITE 9-*HS* has demonstrated efficacy in direct challenge testing with virulent IBR, BVD, and BRSV.

Elite 9-*HS* is available in 250 mL (50 dose) and 50 mL (10 dose) vials.

New ELITE 9-*HS* is available through veterinarians.

**Boehringer Ingelheim Animal Health, Inc. - St. Joseph, MO**

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## Microbiology Analyses

Lancaster Laboratories offers a wide range of microbiology-related services that can help prevent costly product scares or provide additional QA/QC support capabilities. Services include plate counts and bacteriological identification, pathogen detection, vitamin assays, shelf-life analyses, consumer complaint testing, extraneous matter analyses, and environmental sanitation inspections. All analyses follow standardized methodology and approved procedures. Expedited service is available, and results can be provided by fax or computer interface.

**Lancaster Laboratories, Inc. - Lancaster, PA**

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## New Technical Brochure Guides Actuated Ball Valve Selection

A new eight-page brochure and selection guide provides technical and application information on the complete line of Hayward corrosion resistant PVC and CPVC electric and pneumatically actuated ball valves.

Complete specifications for each type of actuator are shown in concise, easy-to-read tables and options are presented in detail. Sample engineering specifications make it simple to identify the right actuated valve for a particular application. Actuator operation is illustrated in electric schematics and cutaway drawings.

Electric actuator options include limit switches, feedback potentiometers, heaters, positioners, cycle length controllers and mechanical brakes. Options for pneumatic actuators are solenoids, spring returns, limit switches, position stops, positioners, I/P controllers, angle transducers and speed controllers. "How it works" information is provided for each option and application examples are included.

**Hayward Industrial Products, Inc. - Elizabeth, NJ**

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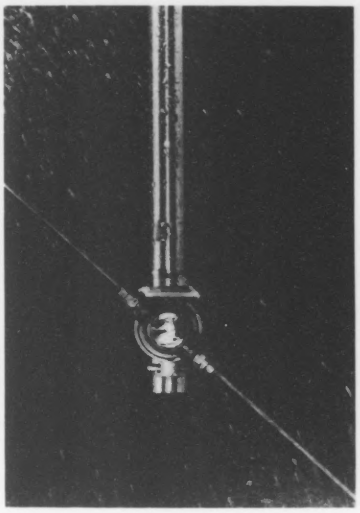

## Spraying Systems Co. has Developed the new 28500 Tank Washing Nozzle for Applications in the Food and Beverage Industries

Spraying Systems' new 28500 tank washing nozzle is engineered for cleaning applications in the food, dairy, and beverage industries which require sanitary connections.

The fluid-driven rotary nozzle cleans all internal vessel surfaces completely, without the need for an external drive system. The velocity of the liquid flow spins the nozzle. This spinning motion, combined with the multiple orifice design, produces 360° spray coverage.

The 28500 nozzle is molded out of FDA approved TEFLON® and is constructed with a threadless inlet connection. It is secured to the inlet pipe by a stainless steel locking pin, enabling quick disconnection without tools.

For added efficiency, the nozzle's simple two-piece construction prevents internal flow obstructions. Self-lubrication and self-flushing performance provides low maintenance and excellent sanitation. The 28500 is ideal for cleaning integrated vessles which hold a variety of materials at different times.

The compact nozzle accomodates 3/4", 1", and 1 1/2" pipe or tubing. Flow rate capacity at 40 psi, (3 bar) for the 3/4" size is 23 gpm (87 l/min); the 1" size, 33 gpm (125 l/min); and the 1 1/2" size, 53 gpm (200 l/min).

Spraying Systems Co. manufactures over 19,000 different spray nozzles and accessories for industrial applications.

**Spraying Systems Co. - Wheaton, IL**

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## Micro Slide Files — A Microscope Slide Cataloging and Storage System

A descriptive data sheet featuring Cargille Micro Slide Files for cataloging and for storage of prepared microscope slides is available upon request. The files make it easy to find slides by providing a storage system that will also protect and catalog them for future referral. Each file contains 48 partitioned compartments which will hold approximately 10 (1 x 3") slides per cell storing 480 slides or 10 (3 x 2") slides storing 240 slides, with each compartment numerically indexed.

Cargille Micro Slide Files are designed to provide maximum storage capacity in minimum space.

Request data sheet MSF--659 for more information and prices.

**R. P. Cargille Laboratories, Inc. - Cedar Grove, NJ**

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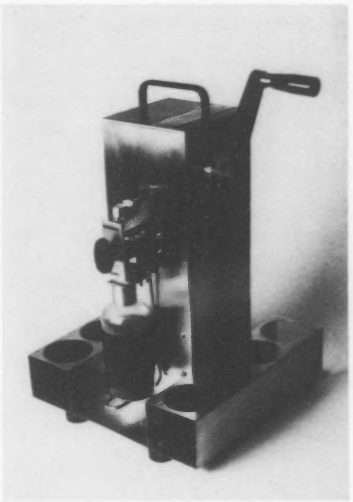

## Portable VaporLess Sampling

PMMI has developed a VaporLess Sampling System to meet EPA standards for volatile hazardous air pollutants.

The portable VaporLess Sampler attaches to your barge, tanker, tank, etc., by two quick disconnect couplings. This easy-on/easy-off connection and single 3 way valve operation makes portable or field sampling quick and efficient.

Using readily available, industry approved components reduces down-time because the VaporLess Sampler is field repairable by your maintenance personnel. Individual valves, fittings, needles and lines are available in stainless steel, monel and hastelloy.

The portable VaporLess Sampler is hand powered, so you decide where portable or field sampling will be done. It also has compartments to carry eight sample bottles, a real convenience.

**PPMI, Inc. - Old Ocean, TX**

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## *ILC Dover, Inc. introduces the Technological Breakthrough in Temporary Process Storage*

ZipTank, a revolutionary concept in collapsible storage tank design, provides high tech solutions for manufacturers' temporary process storage problems.

A unique, two-component system, ZipTank features a high strength fabric outer restraint and a chemically resistant, inexpensive, replaceable inner liner.

ZipTank offers:

- **Minimal Floor Space Needed.**
  - When not in use, ZipTank folds compactly for storage and thus provides the manufacturer the freedom necessary to quickly address temporary storage needs.
  - ZipTank's high strength outer restraint results in a storage tank with a significantly smaller footprint than found in the common "pillow" tank.
- **No Time Consuming/Costly Cleaning.** With its inexpensive replaceable liner, ZipTank eliminates costly tank cleaning.
- **Allows Sequential Storage of Incompatible Material.** ZipTank's replaceable liner also permits the sequential storage of incompatible products.
- **No Costly Tank Replacement.** The cost of ZipTank's replaceable liner represents a fraction of the cost of a standard tank replacement.
- **No Fugitive Emissions and Air Contamination.** Since ZipTank collapses to fluid level, fugitive emissions and air contamination concerns are practically eliminated.

**ILC Dover, Inc. - Frederica, DE**

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## *New Brochure Describes the Series 410 Quaternary LC Pump for Top Performance and Reliability*

A new, four-page, four-color brochure from Perkin-Elmer which describes the Series 410 Quaternary LC Pump is now available. The pump provides outstanding flow rate reproducibility and compositional and gradient accuracy over a broad flow rate range for all applications from routine analysis to basic research.

The brochure features a detailed schematic of the pump's components and functions. Benefits of the patented design, including elimination of cavitation, unsurpassed compositional accuracy, and thorough and accurate mixing are discussed. The Series 410 Quaternary LC Pump also provides easy setup of pump methods, increased sample throughput with built-in methods chaining, and system status at a glance through real-time display of back pressure. The pump is also available in a biocompatible version for biotechnology applications with a titanium construction that resists corrosion and withstands pressure up to 6200 psi.

Perkin-Elmer is the leading worldwide manufacturer of analytical instrument systems and major supplier of materials technology.

**The Perkin-Elmer Corp. - Norwalk, CT**

**Please circle No. 242**
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## *New Non-Glass pH Electrode*

Sensorex announces the availability of a new non-glass PVC membrane pH electrode. A special PVC membrane is recessed inside a polymer body, affording protection to the measuring surface.

The PVC measuring membrane is specially suited for applications where fluoride ions are present, or non-glass pH sensors are desireable. Food applications where non-glass sensors are preferable or wastewater containing hydrofluoric acid which attacks glass are ideal applications for this electrode.

**Sensorex - Stanton, CA**

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## *Pressure Datalogger*

A versatile new meter for the Heating, Ventilating, Air Conditioning Engineer/Contractor.

Measure low air pressure drops for air balancing with resolution to 0.001 inches $H_2O$. Monitor compressed air lines and valve status with a high air pressure range up to 150 PSI. Check differential liquid pressures in chilled and hot water systems. Datalog barometric pressure or vacuum pressures. Solomat's new MPM-4000 Pressure Datalogger offers a complete range of probes, incorporating the latest and most accurate electronic pressure sensors, to accomplish such tasks and many others.

Portable, in-situ or semi permanent configurations allow one up to 32 sensors to be monitored. A 4 1/2 digit LCD displays the readings with a switch selectable choice of unit symbols. Datalog up to 12000 measurements on timed, alarmed or contact closure intervals. Download stored readings to the display, to a printer or to a PC where Solomat's MPM Analyst Software enables simple data file management, analysis and report generation.

The MPM-4000 Pressure Datalogger has been designed with the flexibility to adapt to a variety of applications. It incorporates numerous enhanced features including air velocity and volumetric flow readout; averaging to display or to file, and signal conditioning for additional inputs (ie; RTDS, %RH, etc). A user programmed display prompting feature also enables the instrument to be customized to a specific application with simple instructions for ease of operation.

**Solomat Neotronics - Norwalk, CT**

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## *The Ultimate in Steam Cleaning Versatility — Delco's Versa 100 2+2 is Two Machines in One*

Delco's VERSA 100 2+2 is the ultimate in heavy duty cleaning versatility . . . combining both water and steam cleaning capabilities. Designed to handle situations where water cannot be used, the Versa 100 2+2 is ideal for cleaning fuel tanks, construction sites, oil fields or where ever heavy duty grease, grime and dirt are the target.

The "Interpump" plunger provides long and durable life for the Delco pressure system. All wetted parts of the pump are ceramic or stainless steel for corrosion protection. And maintenance is easy with the one-piece unitized check valves.

Operator safety was in mind when the Delco Versa 100 2+2 was designed. A high limit switch senses the water temperature, so, if the temperature should become excessive, the flow of fuel to the burner is automatically stopped. In addition, a heavy-duty schedule 80 heating coil extends the life of the unit.

Each Delco Versa 100 2+2 comes with a 40' by 3/8" R-2 safety wire braid high pressure hose and a fully insulated gun assembly. The flow rate is 150 gph, when steam is utilized. There is a 2.5 gpm flow, with an operating pressure of 1,000 psi, when hot water is used.

**Clarke Industries, Inc. - St. Louis, MO**

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# IAMFES Secretary Candidates

*Michael Brodsky*

Michael graduated from the University of Toronto in 1967 with a B.Sc. He continued his studies at the School of Hygiene in Toronto and obtained a Diploma in Bacteriology in 1968 and his Masters Degree in Microbiology in 1971. Michael was certified as a Specialist in Public Health and Medical Laboratory Microbiology by the American Academy of Microbiology in 1975 and as a Registered Microbiologist in Food, Dairy and Sanitary Bacteriology by the Canadian College of Microbiologists in 1980.

Following graduation, Michael was hired by the Laboratory Services Branch of the Ontario Ministry of Health and was appointed as a Research Scientist in Environmental Bacteriology in 1972. In 1979, Michael became Head of the Antigen-Antisera Production Unit in the Central Public Health Laboratory in Toronto until his venture into private business in 1980.

In 1982, the Government of Ontario made Michael an offer he could not refuse. He accepted the position of Chief, Environmental Bacteriology for the Ministry of Health. He recently also assumed responsibility for Microbiological Support Services and Animal Unit.

In addition to his position with the Laboratory Services Branch, Michael has developed a short course "Quality Assurance for Microbiology Laboratories" which he teaches under the auspices of AOAC International. Michael continues to take an active role in a number of professional associations and has recently served as President of the Ontario Food Protection Association; Local Arrangements Chair for IAMFES '92; and Chairperson of the Official Methods Board of AOAC International. He is also involved with and chairs many other internal and external scientific advisory committees. Michael has published more than 30 scientific papers, has developed and chaired many scientific seminars and symposia and has given numerous presentations to both the international scientific community and the community-at large.

*Randall Daggs*

Randy Daggs administers the Wisconsin grade A milk certification program which involves 150 dairy plants and almost 24,000 farms. Randy coordinates the field efforts of four full-time milk survey officers. Randy himself keeps a "hands on" approach to the job by maintaining his own certification as both milk survey officer and as a milk sampling surveillance officer.

After receiving his degree in microbiology and public health in 1971, he began his career as a clinical bacteriologist. From 1978 to 1982 he was the milk laboratory evaluation officer for the state of Wisconsin, and responsible for a proficiency test program involving 140 laboratories. He later began working as a sanitarian under C.K. Luchterhand, and Randy attributes much of his professional good fortune to having worked with one of the truly outstanding leaders in the field of dairy sanitation.

Randy's work keeps him very involved with the National Conference on Interstate Milk Shipments (NCIMS). He's been a delegate to the NCIMS since 1985, and has served on various study committees. In 1987 he was appointed to a position on Council II and also to the Methods of Making Sanitation Ratings ("Methods") Committee. In 1990, Randy was appointed chairman of the Methods Committee.

Randy has maintained an active profile in IAMFES. He has been a member of the Applied Laboratory Committee, the Dairy Quality and Safety Committee, and has just completed a 3 year term on the IAMFES Program Advisory Committee. He is a former delegate to the IAMFES Affiliate Council, and has been an invited speaker at past annual meetings. Randy has convened various sessions for the annual meetings, including the full-day symposium on dairy sanitation in 1990 co-sponsored by the National Mastitis Council.

In 1987 and 1988, Randy was president of the IAMFES Wisconsin affiliate. During his term, a revised newsletter was established, membership was expanded, scholarships were enhanced, and Wisconsin was honored with the Shogren Award at the annual meeting in Tampa. Randy continues to serve as secretary for the Wisconsin affiliate.

Randy is 45, and has been married to his wife Patty for 18 years. They and their two young daughters make their home in the quiet countryside east of Madison.

# Affiliate News

## Upcoming IAMFES Affiliate Meetings

**1993**

**MARCH**

•**2-3, Virginia Association of Sanitarians and Dairy Fieldmen** will meet at the Donaldson Brown Center for Con-Ed, Virginia Tech, Blacksburg, VA. For further information, please contact Donna Izac, Dairy Services Branch, VDACS, P. O. Box 1163, Richmond, VA 23209, (804)786-8912.

•**9-11, Basic Pasteurization Course**, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

•**17-18, Michigan Environmental Health Association Annual Educational Conference** will be held at the Holiday Inn Crowne Plaza, Grand Rapids, MI. For more information, please contact John Kowalczyk at (313)761-1294.

•**18-19, Florida Association of Milk, Food and Environmental Sanitarians Annual Meeting** in conjunction with Suppliers Night at the Marriott on International Drive. For more information, please contact Bill Thornhill, 3023 Lake Alfred Road, Winter Haven, FL 33881, (813)299-6555.

•**23-24, 1st Annual Meeting of the Carolina Association of Milk, Food and Environmental Sanitarians** will be held at the Best Western Merchandise Mart in Charlotte, NC. Call (800)424-2756 for the best room rate. For more information, please contact Elizabeth Johnson at (803)935-6201.

**APRIL**

•**8, Nebraska Association of Milk and Food Sanitarians Annual Meeting** will be held at the Douglas County Extension Office, Omaha, NE. For more information, please contact Allen Ackerman at (402)471-0387.

•**7-9, Missouri Milk, Food and Environmental Health Association's Annual Education Conference** will be held at the Ramada Inn, Columbia, MO. For more information, please contact Janet Murray at (816)263-6643.

**JUNE**

•**8-9, Texas Association of Milk, Food and Environmental Sanitarians Annual Meeting** will be held at the Wyndham Hotel, 4140 Governor's Row at Benwhite Exit off IH35, Austin, TX (512)448-2222. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

**JULY**

•**13-15, Basic Pasteurization Course**, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

**AUGUST**

•**1-4, 80th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc.** to be held at the Stouffer Waverly Hotel, Atlanta, GA. For more information please contact Julie Heim at (800)369-6337 (US) or (800)284-6336 (Canada).

•**17-19, Special Problems Course**, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Seven Oaks Hotel, 1400 Austin Hwy, San Antonio, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

**OCTOBER**

•**26-28, Basic Pasteurization Course**, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

## 34th Annual Meeting of the Ontario Food Protection Association

The 34th Annual Meeting of the OFPA was held November 12, 1992, in Toronto, Ontario. Mr. Steve Halstead, Executive Manager of IAMFES, was a welcomed guest. Seven excellent speakers addressed different aspects of the theme: *Perceptions and Realities of Food-Associated Health Risks*.

Dr. Peter Sachenbrecker, Associate Director of the Agri-Food Safety Division, Food Production and Inspection Branch, Agriculture Canada, pointed out that based on the results of 350,000 tests per year for domestically-produced and imported foods, our food supply ranks among the safest in the world. However, to maintain the safety of our foods without incurring exceedingly high costs that accompany extensive testing, Agriculture Canada's testing programs have been placed on a scientific risk assessment basis that permits priorities to be shifted towards detecting the most hazardous agents in the most consumed commodities. This process, referred to as risk management, takes into consideration both the epidemiological evaluations of microbial pathogens and the toxicological evaluations of chemical residues and additives. Dr. Sachenbrecker also noted that in areas where risk can be minimized by food production controls, the use of HACCP principles compliments the priority testing approach.

Risk assessment was further discussed by Dr. Dan Krewski, Chief of Biostatistics in the Environmental Health Centre, Health Protection Branch (HPB) of Health and Welfare Canada. Dr. Krewski explained that health risk determination involves two phases: risk assessment and risk management. In the risk assessment phase, the process is subdivided into risk analysis, during which hazards are identified and their risks estimated, and option evaluation, during which various ways of dealing with the risk are developed and each option's value is analyzed. In the risk management phase, one or more options is (are) decided on and implemented. The decision is then monitored and evaluated. The decision may be changed if a review of the results indicates a need for rethinking and/or if new information becomes available.

Within the HPB framework for risk determination, the epidemiologist plays a key role in the risk analysis process: hazard identification and risk estimation. Dr. Jamie Hockins, Chief of Field Epidemiology for the Laboratory Centres for Disease Control, Health and Welfare Canada, discussed these two aspects of risk analysis in a presentation that was co-authored by his colleague, Dr. Ewen Todd. The epidemiologist draws heavily on data provided by others to perceive risk statistically, through disease or mortality incidence, relative risks to health or population attributable risk. A current issue, cracked eggs as a source of *Salmonella* infection, was used by Dr. Hockins to illustrate the risk assessment process.

Food allergies and sensitivities were the topics presented by Dr. Steve Taylor, Head of the Department of Food Science and Technology, and Director of the Food Processing Center, University of Nebraska. Dr. Taylor explained the differences between these two foodborne diseases and emphasized that true food allergies, which involve abnormal immunological responses to specific substances in the diet, can cause serious, even life-threatening, reactions in some individuals, and that the offending food must be totally avoided. For example, peanut allergy is the most common food allergy in North America and even traces of peanut protein can be fatal to a susceptible individual. With food sensitivities that do not involve immune mechanisms, such as lactose intolerance (a metabolic food disorder) and sulfite-induced asthma (an idiosyncratic reaction), a wide range of symptoms can be involved but the sensitive individual can often tolerate some of the offending substance. Dr. Taylor stressed that the food industry needs to become aware of food allergies and sensitivities and recognize the implications of certain manufacturing decisions upon this segment of the consuming public.

In Canada, steps are already being taken to increase food industry awareness about food allergies. Mr. Duff Steele, Director of QA for Best Foods, described a unique joint industry-government effort aimed at developing and communicating an allergy awareness program for the food industry, and at minimizing adverse health reactions that result from cross-contamination during food processing. Mr. Steele has worked with the Canadian Grocery Products Manufacturer's Association to coordinate this program. The joint effort has resulted in a video aimed at CEOs and senior managers that conveys the serious nature of food allergies in terms of both human health and the cost of food recalls. The video is complimented by booklet outlining responsibilities and control programs, and an audit program, generic in nature, for use internally or externally by regulatory agencies.

Despite risk assessment, risk management and industry awareness programs, things can and do go wrong. Successful crisis management can keep the bad news on page 32 of the papers instead of on Page 1. With these introductory remarks, Dr. Jim Petit, Director of Laboratory and Inspection Services of the Ontario Ministry of Agriculture and Food (OMAF) went on to describe a crisis management strategy that involves three levels of response, depending on the magnitude and urgency of a situation. In the event of an emergency, the OMAF strategy defines the creation of an emergency response team, and all actions to be taken, from establishing sample testing protocols, to communicating with the media, to conducting a "post-mortem" of how the incident was handled.

Speaking from the consumer's perspective, Mrs. Lucienne Bushnell, President of the Consumer's Association of Canada (CAC) reported the results of a survey of consumer attitudes and opinions about food safety in Canada. Of the adults surveyed, 25% worry "a lot" about food safety, and the main fears are pollution, pesticides, and sanitation. Although consumers obtain most of their information about foods from media sources, they actually place limited trust in these sources. Health professionals and consumer groups like the CAC were regarded as highly trustworthy in conveying accurate food safety information; food producers, producer associations and government were not regarded as very trustworthy. In her concluding remarks, Mrs. Bushnell said that the CAC wants to work together with government, industry and professional associations such as the OFPA to provide consumers with the information they need to ensure that the research and evolving technologies work in support of the needs of the consumer, not just those of government or industry. Later, in his closing remarks, OFPA President Michael Brodsky suggested that a role for the OFPA may be to become more active in communicating accurate food safety information to the consumer.

Highlights of the business portion of the OFPA Annual Meeting included: on behalf of IAMFES, Steve Halstead delivered words of appreciation for the "tremendous job" the OFPA did as hosts of the 1992 IAMFES Annual Meeting; Awards of Merit were presented to Coleen Stevens and Sherry Hagino to recognize their outstanding contributions to the OFPA; and the Sanitarian of the Year Award was presented to Judith Dale of Beatrice Foods. Each year, the OFPA provides three scholarships for food science students and the recipients this year were: Susan Anderson, Veronika Jones, and Connie Saunders, from Ryerson College, The University of Guelph and Centennial College, respectively. The following list of officers was nominated and accepted for the incoming year: Michael Brodsky (Past-Pres.), Krista Mountjoy (Pres.), Anna Lammerding (Vice-Pres.), Sandra Noonan (Secr.), Janet Avery (Treas.), and Directors Debbie Frim, Bruce Ciebin, Chris Redden, Andrew Cavasin, Sue Fraser, and Linda Harris.

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# International Life Sciences Institute to Host Symposium at IAMFES Annual Meeting on Foodborne Pathogens

*The International Life Sciences Institute (ILSI) will be sponsoring a Foodborne Microbial Pathogens Symposium which will be comprised of five sessions (*Listeria monocytogenes*: Current Issues and Concerns; International Perspectives on* Escherichia coli *O157:H7;* Campylobacter *Update; Microbial Concerns of the International Community; and Research Update) at the 80th IAMFES Annual Meeting, August 1-4, 1993, Atlanta, Georgia.*

Current research findings on *Listeria monocytogenes, Escherichia coli* O157:H7, and *Campylobacter* and the concerns these foodborne pathogens pose to food producers and consumers worldwide will be the subject of a symposium sponsored by the International Life Sciences Institute (ILSI) held in conjunction with the IAMFES annual meeting this summer. These and other foodborne pathogens are of particular interest to ILSI and its more than 200 member companies.

ILSI is a public, nonprofit scientific foundation based in Washington, DC, that promotes scientific understanding and consensus in food safety, nutrition, toxicology, and environmental health. Through its five institutes and seven worldwide branches, ILSI fosters cooperation among scientists from academia, government, and industry to address and resolve scientific issues of common concern.

Committees of two of ILSI's branch organizations — the ILSI North America Committee on Food Microbiology and the ILSI Europe Scientific Committee on Food Microbiology — are working together to prepare a symposium program that is sure to be of interest to IAMFES members and other scientists with an interest in food safety. The symposium, which will be held August 2-4 and which will be open to all meeting registrants, will focus on current microbiological issues from the viewpoint of scientists from a variety of backgrounds and national perspectives.

An international panel of scientists will examine what is known about *L. monocytogenes, E. coli* O157:H7, and *Campylobacter* and their impact on food safety. There will also be sessions at which international issues concerning these pathogens will be discussed and at which ILSI's work in this area will be featured.

ILSI North America formed its Committee on Food Microbiology in 1987. Consistent with ILSI's mission to support research and disseminate scientific information, the Committee has three primary objectives:

- to promote improved understanding of food-associated pathogens and microbial hazards by supporting research and symposia:
- to share information with the public and promote communication about food-associated pathogens and microbial hazards by sponsoring symposia, promoting publications, and maintaining direct liaison with pertinent government agencies, trade associations, and other organizations and individuals interested in food-associated pathogens; and
- to provide Committee members with current information that will help them understand and control food-associated pathogens.

Prominent among the Committee's interests are issues of the prevalence, virulence, detection, prevention, growth, and destruction of *Listeria monocytogenes*. Five other pathogens of importance to the food industry have been identified as a focus of additional monitoring efforts by the Committee: pathogenic *Escherichia coli, Salmonella, Campylobacter jejuni, Yersinia enterocolitica*, and *Clostridium botulinum*.

To date, the Committee has funded $1.3 million in research. Its initial two-year research program funded 12 projects that explored the virulence of *L. monocytogenes*, rapid and sensitive methods for detecting its presence, and ways to control it in the processing environment. So far, 12 scientific papers and six abstracts have resulted from research supported by the Committee.

Committee-supported scientists have evaluated or developed nucleic acid probes as well as methods that use polymerase chain reaction (PCR) and monoclonal antibodies to increase the sensitivity, specificity, and speed with which *L. monocytogenes* can be detected in foods.

Recognizing the need to improve understanding of the pathogenicity of *L. monocytogenes*, the Committee has supported investigators who are working on techniques to differentiate virulent from avirulent strains, on identifying variations in virulence, and on explaining why these ubiquitous microorganisms are not a more common cause of foodborne illness.

The Committee's interest in improving understanding of the survival and growth of *L. monocytogenes* has led it

to support research on methods to eliminate or reduce *Listeria* populations through the use of antimicrobials in specific food manufacturing scenarios and on the effect of typical sanitizing and packaging procedures on produce.

After evaluating the results from its first round of research studies, the Committee provided additional support in 1990 and 1991 to researchers examining DNA probes and a PCR assay to improve the detection of virulent strains and low numbers of *L. monocytogenes*.

The Committee also decided to support exploratory investigations of *Escherichia coli* O157:H7 and the problems that may confront the food industry as a result of the emergence of this pathogen. Committee-supported investigators are conducting surveys to determine its prevalence in humans, cattle, and retail foods and are working on the development of a fingerprinting method to classify subtypes of the different strains.

To help it establish priorities for its third round of research funding, the Committee met in 1991 with representatives of the Centers for Disease Control and Prevention, the Food and Drug Administration, and the U.S. Department of Agriculture to clarify what these agencies viewed as important research issues pertaining to food pathogens. Using this input, the Committee identified seven more projects on *L. monocytogenes* for funding. Investigators are currently examining the efficacy of secondary barriers in preventing the growth of *L. monocytogenes* in foods, the development of more rapid assays to quantitate its presence in foods, and the development and evaluation of new "fingerprinting" techniques to differentiate otherwise similar strains.

The Committee has sponsored three workshops and colloquia during the past three years to broaden communication and promote consensus about food-associated pathogens and microbial hazards.

The more recently constituted ILSI Europe Scientific Committee on Microbiology is currently addressing a variety of food safety issues, including minimum infective dose criteria, Hazard Analysis Critical Control Point (HACCP), virulence characteristics of *Listeria monocytogenes*, and microbiological challenge testing.

The International Life Sciences Institute, founded in 1978, is recognized as a major contributor to improved public health and safety throughout the world. It is affiliated with the World Health Organization as a nongovernmental organization (NGO) and has specialized consultative status with the Food and Agriculture Organization of the United Nations.

ILSI supports investigators who conduct basic and applied research pertaining to food and environmental safety, toxicology, risk assessment, nutrition, and food allergy. At local workshops, international conferences, and other meetings, ILSI brings together scientists from academic, regulatory, and industrial laboratories to address issues of common concern and to seek scientific consensus on issues with major public health impact. The findings presented at ILSI meetings are made available through ILSI's growing publications program and other publication options.

# Preview of the 80th IAMFES Annual Meeting

*The following is a preview of the papers that will be presented at the 80th IAMFES Annual Meeting, August 1-4, 1993, Atlanta, GA. Some of the titles are subject to change. A more complete program will be printed in the April Issue of Dairy, Food and Environmental Sanitation.*

## Monday Morning — August 2, 1993

### *Listeria monocytogenes*: Current Issues and Concerns Symposium

*Sponsored by the International Life Sciences Institute*

- *Listeria monocytogenes*: State of the Science
- Industry Perspectives on *Listeria monocytogenes* in Foods — American Meat Institute
- Industry Perspectives on *Listeria monocytogenes* in Foods — National Food Processors
- Industry Perspectives on *Listeria monocytogenes* in Foods — Grocery Manufacturers of America
- Regulatory Concerns of the USDA
- Regulatory Concerns of the USFDA
- Epidemiology of Listeriosis in the US
- European Perspectives on *Listeria monocytogenes*
- Status of *Listeria monocytogenes* in the Canadian Food Industry
- *Listeria monocytogenes* and Food: the UK Approach
- Australian Perspectives on *Listeria monocytogenes*

### Technical Session — Analytical Methods

- The value of a DNA probe - HGMF procedure to detect *Shigella*/enteroinvasive *E. coli* and VTEC in food
- Development of a simple RT-PCR method for the detection of enteric viruses in oysters
- Automated ELISA detection of *Listeria* from meat and poultry products using the VIDAS system
- Use of immunomagnetic capture on beads to recover *Listeria* from environmental samples
- Identification of the *Listeria monocytogenes* virulence factors involved in the CAMP reaction
- Enhanced recovery and isolation of *Salmonella* using a novel culture and transfer device
- Enzyme Immunoassay for the Detection of Staphylococcal Thermonuclease in Foods
- Occurrence of false positive tests for Staphylococcal enterotoxin using the TECRA kit
- Time/temperature response of acid phosphatase in cooked broiler breast using a fluorometric assay

### Fumonisin Symposium

- What are Fumonisins and Why are they Important in Foods?
- Toxicity of Fumonisins to Man and Animals
- Analytical Techniques for Analysis of Fumonisins
- Regulation of Fumonisin and other Mycotoxins in Foods
- How Foodborne Toxins became "Political Poisons"

### Scientific Poster Session

Authors Present 10:00 — Noon, Tuesday, August 3, 1993

- Evaluation of different media for recovery of thermally-injured *Escherichia coli* O157:H7
- Fate of Enterohemorrhagic *Escherichia coli* O157:H7 in Unpasteurized Apple Cider With and Without Preservatives
- Storage temperature and heat resistance of *Escherichia coli* O157:H7 in ground beef patties
- Growth of *Escherichia coli* O157:H7 in Ground, Roasted Beef as Affected by pH, Acidulant and Temperature
- Competitive Growth in Biofilm of *L. monocytogenes* with Cultures Isolated from a Meat Plant Environment
- Interactions of diacetate with nitrite, lactate, and pediocin on viability of *Listeria monocytogenes* in turkey slurries
- Microbial inhibition of *Listeria monocytogenes* by other bacteria in a commercial milk and a buffer broth system
- Interaction of Citric Acid Concentration and pH on the Kinetics of *Listeria monocytogenes* inactivation
- Comparative growth rates of *Listeria monocytogenes* on raw and cooked muscle tissues
- Growth of *Listeria monocytogenes* at Fluctuating Temperatures
- Comparison of methods for isolation of *Listeria* from rainbow trout (Oncorhynchus mykiss)
- Enhanced recovery and isolation of *Listeria* using a novel culture and transfer device
- Comparison of Oxygen Scavengers for Their Ability to Enhance Resuscitation of Heat-injured *Listeria monocytogenes*
- Advanced genotypic typing of *Listeria monocytogenes* using clamped homogeneous electric fields (CHEF) electrophoresis
- Determining differences in microbial growth rates using linear regression
- Acid enhancement of *Clostridium perfringens* Sporulation
- Thermal Resistance of Spores of Non-proteolytic Type B and Type E *Clostridium botulinum*
- Effect of Sodium Lactate on Toxigenesis of *Clostridium botulinum* in 'Sous Vide' Products
- Relationship of Vibrio spp. in soft clams and water with *Clostridium perfringens* and fecal indicators
- Control of thermophilic spore activity with pressurized carbon dioxide and egg white lysozyme
- Chemical changes of pre-packaged Sheephead during frozen storage
- Effects of trisodium phosphate and lactic acid on microbiological and physical quality of packaged rainbow trout
- Antimicrobial Containing Edible Films as an Inhibitory System to Control Microbial Growth on Meat Products
- The Effectiveness of the Bacteriolytic Organism, *Bdellovibrio bacteriovorus* 109J, at Reducing the Level of Gram-Negative Foodborne Pathogens
- Inhibition of *Salmonella typhimurium* by the Lactoperoxidase System in a Broth System and on Poultry
- Visualization of bioluminescent *Salmonella enteritidis* in food samples and penetration of *Salmonella enteritidis* to whole-shell eggs
- Effect of NaCl or Water Content on the Survival of *Salmonella typhimurium* on Irradiated Meat
- Attachment of *S. typhimurium* and *C. jejuni* to skins of Chicken Scalded at Various Temperatures
- Evaluation of a Nitrocellulose Membrane Lift Method for the Detection of Campylobacter spp. attached to Chicken Carcasses

- An ELISA Method for the Detection of Campylobacter in Raw and Processed Foods
- Comparison of Tecra VIA Kit with Oxoid and CHO Cell Assay for the Detection of *Bacillus cereus* diarrheal Enterotoxin
- Evaluation of Rapid Test Methods for Direct Detection of *Vibrio cholerae* 01
- Detection of coliforms in food using Colilert — An assessment of the effect of different sugars found in various foods
- Bioluminescent Method for Measuring Total Viable Counts
- Occurrence and Production of Enterotoxin Producing Strains of *Staphylococcus aureus* in Bakery Products
- Yeasts Associated with Fruit Juice Concentrates
- Use of Aerobic Plate Counts Incubated at Elevated Temperatures for Detecting Temperature-Abused Refrigerated Foods: Effectiveness under Transitory Abuse Conditions
- Assessment of previous heat treatment of beef and pork products using a dry chemistry enzyme system
- Fermentation and Sensory Characteristics of Kimchi Containing KCl as a Partial Replacement for NaCl
- Characterization of attached, psychrotropic bacteria isolated from a water distribution system
- Degradation of Ochratoxin A by Acinetobacter calcoaceticus

**Video Theatre**

All day Monday, Tuesday morning and all day Wednesday

## Monday Afternoon — August 2, 1993

**International Perspectives on *Escherichia coli* O157:H7 Symposium**

*Sponsored by the International Life Sciences Institute*

- *E. coli* O157:H7 time Capsule: What Did We Know and When Did We Know It
- *E. coli* O157:H7: and Verotoxigenic *E. coli*
- *E. coli* O157:H7: the British Experience
- *E. coli* O157:H7: the USDA Perspective
- *E. coli* O157:H7: the USFDA Perspective

**Campylobacter Update Symposium**

*Sponsored by the International Life Sciences Institute*

- *Campylobacter jejuni*: State of the Science
- Campylobacter: A European Perspective
- Campylobacter: The Epidemiological Markers
- *Campylobacter jejuni*: the USDA Perspective
- *Campylobacter jejuni*: the USFDA Perspective

**Technical Session — General Food Microbiology**

- Comparison of aflatoxin production in modified Czapek's solution agar, AFPA, and dye media
- Influence of aflatoxin and nutrient concentration on the degradative ability of *Flavobacterium aurantiacum*
- Determination of cytosolic aflatoxin B1-degrading activity of *Flavobacterium aurantiacum*
- Level of Campylobacter spp. on broiler farms and after chicken transport
- Influence of season and storage on Campylobacter spp. contaminating broiler carcasses
- Incidence of *Clostridium botulinum* in Modified Atmosphere Packaged Vegetables
- Prevalence of *Salmonella* in rainbow trout (Oncorhynchus mykiss)
- Rates of adherence to stainless steel by foodborne microorganisms
- Bacteria on beef briskets and ground beef: association with slaughter volume and antemortem condemnation
- *Pseudomonas syringae* from compressed air, *Pseudomonas aeruginosa* from city water, *Bacillus* sp. in dust as contamination sources in an aseptic processing system

**Dairy Symposium**

Topics to be announced.

**Baking Equipment Standards and General Sanitation in Baking Operations Symposium**

- BISSC Overview
- Good Sanitation Through Building Design and Equipment Installation
- OSHA Regulatory Requirements
- Hazard Analysis and Critical Control Points
- Maintaining a High Standard of Sanitation through Equipment Design

## Tuesday Morning — August 3, 1993

**Microbial Concerns of the International Community Symposium**

*Sponsored by the International Life Sciences Institute*

- Microbial Safety of Foods in Europe of the Nineties: What Does That Imply?
- Microbial Concerns of the North and South American Countries and Implications for International Trade
- Food Microbiological Criteria: South American Countries
- Microbial Concerns of the Pacific Rim Countries and Implications for International Trade
- Safety and Quality Management through HACCP and ISO 9000

**Technical Session — Antimicrobials**

- Activities of lactic acid bacteria isolated from ready-to-eat turkey products
- Efficacy of Using Antagonistic Microorganisms to Inhibit Psychrotrophic Pathogens in Refrigerated, Cooked Poultry
- The role of metabolic intermediates in the inhibition of *Salmonella enteritidis* by a Veillonella species
- pH and Inhibition of *Listeria monocytogenes* and other Bacteria by Acetates
- Antimicrobial Effects of Trisodium Phosphate Against Bacteria Attached to Beef Tissue
- Antilisterial Activities of Lactic Acid Salts in Sausage and the Relationship to pH and Water Activity

**Technical Session — Dairy**

- Keeping Quality of Commercially Processed Fluid Milks Held at 7.2°C (45°F) for 10, 12 and 14 days
- Control of Biofilm Bacteria in Dairy Sweet Water (Cooling Water) Systems

- Inhibition of Gram-Positive Pathogens in Cold-Pack Cheese Made from Cheese Containing Nisin
- Antimicrobial Use and Dairy Disease Patterns
- A Rapid Dipstick Biosensor for Beta-Lactams in Milk
- Use of the pig as a model to study colonization of the gastrointestinal tract by bifidobacteria and *Lactobacillus acidophilus*

**Technical Session — Risk Assessment and Education**

- Analysis of Listeria risk management for food processors
- The Impact of Employee Food Sanitation Knowledge and Handling Practices on Supermarket Deli Profitability
- Educating Fifth Graders About Food Safety through the Use of a Video
- Reliability of Pop-up Timers in Turkeys
- Food Sanitation in the Ice Age

**Scientific Poster Session**
Authors Prersent 10:00 — Noon

## Tuesday Afternoon — August 3, 1993

**General Session — Food Safety in the News**

Topics to be announced.

## Wednesday Morning — August 4, 1993

**Research Update**
*Sponsored by the International Life Sciences Institute*

- *Escherichia coli* O157:H7 Diarrhea in the US: A Multi-Center Surveillance Project
- Establishment of Bovine Surveillance Program for *E. coli* O157:H7 in Washington State
- Source of *Escherichia coli* O157:H7 Establishment of a Retail Food Surveillance Project
- Insertion Sequence Fingerprinting: A New Subtyping System for *E. coli* O157:H7 Strains
- Use of In Vitro Primer-directed Enzymatic Amplication of DNA for Rapid Detection of *Listeria monocytogenes*: Studies with Food Samples
- Development of DNA Probes Specific for Virulent *Listeria* by Amplification of Virulence-Related Genes of *Listeria monocytogenes*
- Microbial Ecology of *Listeria monocytogenes* Biofilms Associated with the Food Processing Plant Environment

**Control of Bacteria and Public Health Significance in Foods of Animal Origin Symposium**

- Competitive Exclusion
- Control in Live Animals - Swine
- Control by Processing
- Control by Natural Antimicrobials-Bacteriocins
- Regulatory Concerns
- Overall Aspects and Future Applications

**Viral Foodborne Disease Symposium**

- Viral Foodborne Disease Agents of Concern
- The Epidemiology of Viral Foodborne Disease
- Norwalk Virus Gastroenteritis
- Detection Methods for Viral Agents
- Hepatitis A Foodborne Disease

**FDA Computer Data Base and Reporting Systems Symposium**

- Third Party Data Base for Drug Residue Testing in Milk
- National Drug Residue Milk Monitoring Program
- Feed Contamination and Aflatoxins Data Base Reporting
- Prime Connection
- FDA Electronic Inspection System
- Evaluation of Vitamins in Milk-Inspection and Reporting

## Wednesday Afternoon — August 4, 1993

**Economics of Foodborne Disease Symposium**

- What is Human Life Worth?
- The Costs of Foodborne Parasitic Disease
- The Costs of Foodborne Bacterial Disease
- Cost of Foodborne Disease to Industry
- Cost-Benefit Analysis of Foodborne Prevention

**Selected Topics in Food Safety Symposium**

- The Next Emerging Pathogen: Cryptosporidium
- Food Security in the Olympics
- Eating Safety — A Challenge for the Immunocompromise
- ISO 9000 — Effect on US Food Industry and Regulations
- Food Allergies
- Time Temperature Probes/Sensors for Foods

**Dairy Symposium**

- Dairy Economics/Pricing of Dairy Products/Subsidies
- Marketing Dairy Products — Bifidobacterium and other Health Aspects
- Antibiotic Residues and Extralabel Uses — a Fieldman's Perspective
- Antibiotic Residues and Extralabel Uses — a Regulatory Perspective
- Bacteriocins in Dairy Products — Potential for Improving Dairy Products

**Food Safety Research Networks Symposium**

- The Food Safety Consortium
- The Centers for Disease Control
- The USDA/ARS Group
- The Agriculture Canada network
- The Guelph Group
- Computer Networks

# 80th IAMFES Annual Meeting
# Spouse/Companion Tours and Special Events

### Atlanta — A "Peach" of a Town

*Buckhead* *Martin Luther King, Jr.* *Cyclorama* *Lenox Square*
Monday, August 2, 1993 — 9:00 a.m. - 2:30 p.m.
Cost: $22, Lunch on your own, Lenox Square ($27 on-site)

The results are in and as you probably are aware, Atlanta has been chosen to host the 1996 Olympic games in addition to being the site of the 1994 Super Bowl and the 1993 IAMFES Annual Meeting. What an outstanding opportunity to view some of the sites where the games will be held, in addition to viewing some of Atlanta's most well known attractions.

Your ride through downtown will take you to the location of the new Georgia Dome, the Omni sports complex and the massive World Congress Center. We'll then move on through Georgia State University, the State Capitol and Government complex, and Martin Luther King, Jr.'s Memorial and Birth Home as you ride down "Sweet Auburn." You'll have an opportunity to see the Inman Park area, the first garden suburb developed in the 1880's.

You will relive the Battle of Atlanta as you stop and tour the Cyclorama, an awe inspiring three dimensional diorama depicting the Battle of Atlanta during the Civil War. This is the world's largest panoramic painting measuring 50' high and 400' in circumference.

Next, you'll drive up world famous Peachtree Street where among other sights, you'll see the fabulous Fox Theatre, Colony Square and the majestic Woodruff Arts Center.

As you continue your trip, you will drive through Atlanta's elegant Northwest residential area, noted throughout the country for its breathtaking homes set amid acres of glorious greenery and spectacular landscaping. You will see the Governor's Mansion, the Atlanta History Center's Swan House plus the stunning homes of many influential and famous Atlantans.

Your destination is to the most famous shopping area on Peachtree Street — Lenox Square. 200 shops and restaurants of all varieties, including Ralph Lauren, Doris Vitton and Laura Ashley, make this shopping mall anchored by Rich's, Macy's and Neiman Marcus a favorite of Atlantans. There you can enjoy a dutch treat lunch.

### The Charm of the Old South

*Covington, Georgia*
Tuesday, August 3, 1993 — 9:00 a.m. - 3:30 p.m.
Cost: $37, including lunch ($42 on-site)

Take a trip back in time to the quiet serenity of Covington, Georgia, one of the few areas whose magnificent plantations and town homes were spared by General Sherman on his "march to the sea."

You will be greeted in Covington by a local guide who will take you down historic tree-shaded streets lined with antebellum homes.

Let your imagination soar as you visit the majestic Regency Hall, constructed before the turn of the century with 18 inch thick solid brick walls. This elegant Old South mansion is furnished with an extensive collection of fine American Empire furniture from the 1800-1840 period and Victorian and Empire Revival furniture from the 1870-1885 period. There is a marvelous collection of antiques and fine porcelain.

Sound enchanting? Wait till you see what's next as we move on to Whitehall, a 13,000 square foot antebellum home build in 1830. One of the most outstanding examples of Greek Revival architecture in Georgia, Whitehall has been beautifully renovated and furnished to reflect its original grandeur. In fact, Margaret Mitchell, author of *Gone With the Wind*, personally lobbied MGM to use Whitehall as "Twelve Oaks" in the famous movie.

You'll enjoy a delicious Southern buffet lunch amid the breathtaking splendor of the Blue Willow Inn. This antebellum home converted into a wonderful restaurant is located in Social Circle, Georgia, just five miles from Covington.

You'll be charmed by your visit to the Old South and your glimpse of days that are truly Gone With the Wind!

### Atlanta's Homegrown Hits

*CNN* *Underground Atlanta* *World of Coca-Cola*
Wednesday, August 4, 1993 — 10:00 a.m. - 4:00 p.m.
Cost: $26, Lunch on your own ($31 on-site)

Take a ride on one of Atlanta's longest escalators as you begin to experience the electricity of the world's foremost news service in action. Tour the Atlanta Headquarters of CNN and CNN Headline News, the two 24 hour all news networks that have revolutionized television journalism. You will see Ted Turner's dream blossomed into reality. See how many CNN personalities you recognize as you walk through the studios and production areas. Learn the behind-the-scenes activities that lead to the finished product you see on the air.

Next, your bus will whisk you to Underground Atlanta, the setting which bridges the past to the present for the journey into Atlanta's future. You'll enjoy touring the six city blocks which have been transformed into a spirited urban market place featuring 200,000 square feet of specialty shops, restaurants, entertainment, and push carts. Treat yourself to lunch at one of Underground's many eateries.

After lunch, encounter the past, present and future as you begin your exciting tour of the World of Coca-Cola. You will be greeted at the door by the world's most remarkable Coca-Cola sign, a revolving neon spectacular. Inside, you'll see priceless memorabilia tracing the more than 100-year history of the world's best-known consumer product. Through dazzling exhibits, you'll travel to the more than 160 countries of Coca-Cola. Enjoy a taste of timeless refreshment at a fanciful soda fountain of the future, and you'll shop in a one-of-a-kind Coca-Cola store.

## *MONDAY NIGHT SOCIAL EVENT*

### "GRANITE" — You'll Love the Stone Mountain Plantation Evening

Monday, August 2, 1993 — 6:00 p.m. - 11:30 p.m.
Cost: $35 ($40 on-site)
Children $20 ($25 on-site)

Hop on board your transit buses for your ride to one of the true wonders of the world — breathtaking Stone Mountain. As you arrive at the resort park, you'll truly be in awe at the magnificence of this 3,200 acre site of scenic beauty.

"Granite" you'll love Stone Mountain as you look up at the world's largest granite monolith with the images of Jefferson Davis, Robert E. Lee and "Stonewall" Jackson captured forever in a sculpture larger than an entire football field and carved meticulously over the years.

You will be fascinated by the typical Southern Plantation of the 1800's where your lawn party will be held. Stroll through a completely restored antebellum plantation, including the plantation house, overseer's house, cabins and outbuildings. All are completely and authentically furnished.

Then proceed to the Meadow of the Plantation where dinner will be served under a tent erected especially for our group. Your Old South Barbecue Buffet will include Fried Chicken, BBQ Pork, Brunswick Stew, Cole Slaw, Potato Salad, Baked Beans, Corn on the Cob, Rolls and Butter, Cobbler, and Iced Tea. There will be a cash bar available throughout the evening.

And if that's not enough, experience Stone Mountain's spectacular show of luminous lasers projected on the Mountain's North face. From special reserved seating, you'll delight in seeing comical characters, dramatic stories, and graphic images choreographed to popular music on this one million square foot screen.

You'll treasure the scenic beauty and pure Southern style fun of this night at Georgia's Stone Mountain Park!

### TENTATIVE BASEBALL OUTING

The Atlanta Braves will be in town on Tuesday, August 3, matched against the Philadelphia Phillies. We will try to buy a block of seats, but tickets have not gone on sale yet. Watch for more information in the upcoming issues of IAMFES's journals.

### NEW this Year!
### Children's Supervised Activities

Plans are being made this year to provide supervised activities for the children who accompany their parents to the IAMFES Annual Meeting. They are on vacation after all, right? Right! So let's make it fun for them also.

There will be a 'Get Away Room' on Monday, Tuesday and Wednesday for the children to play video games, pinball machines, watch movies, etc. Also, on Wednesday Evening, there will be a **'Kids Banquet'** for the children while the parents attend the IAMFES Annual Awards Banquet. All children's activities will be properly supervised.

Please watch for more details on these events in the upcoming issues of IAMFES' Journals.

Cost: $10 ($15 on-site)

# Traditional IAMFES Gatherings

**Ivan Parkin Lectureship**
Sunday, August 1, 1993 7:00 p.m.
Dr. Morris Potter, "The Challenge of Epidemiology in Food Protection"
Dr. Potter is the Assistant Director for Bacterial and Mycotic Diseases at the Centers for Disease Control, National Center for Infectious Diseases, Atlanta, GA

Followed by the **Cheese and Wine Reception** for the opening of the Educational Exhibits.
An opportunity to greet old friends, make new ones
and view the excellent technical displays.

**IAMFES Annual Awards Reception and Banquet**
Wednesday, August 4, 1993
Reception 6:00 p.m.
Banquet 7:00 p.m.
Cost: $30 ($35 on-site)

# 80th IAMFES Annual Meeting Registration Form

**Stouffer Waverly Hotel — Atlanta, Georgia — August 1-4, 1993**
**(Use photocopies for extra registrations)**

FOR OFFICE USE
Date Rec'd._____ First initial _____ Last name _____
ID#_____ Registration #_____

***Sign up to become a NEW member**
and take advantage of the member discount.

First Name (will appear on badge) (please print) Last Name

Title Employer

Mailing Address (Please specify: Home Work)

City State Zip

Fax # Area Code & Telephone

**Please check where applicable:**
- ___ IAMFES Member
- ___ Non-Member
- ___ Local Arrangements
- ___ 30 Yr. Member
- ___ 50 Yr. Member
- ___ Past President
- ___ Executive Board
- ___ Speaker
- ___ Honorary Life Member
- ___ Exhibitor

**Credit Card payments may be sent via Fax today! 515-276-8655**

| | | | | Total Amount |
|---|---|---|---|---|
| **Registration** | | | Amount | |
| | IAMFES Member (Banquet included) | | $145 ($180 on-site) | |
| | Non-Member (Banquet included) | | $195 ($230 on-site) | |
| | IAMFES Student Member | | $ 20 ($ 25 on-site) | |
| | IAMFES Member One Day (Circle: Mon/Tues/Wed) | | $ 75 ($ 95 on-site) | |
| | Non-Member One Day (Circle: Mon/Tues/Wed) | | $100 ($125 on-site) | |
| | Spouse/Companion (Name):_____ | | $ 20 ($ 20 on-site) | |
| | Children (14 & Under), Name: _____ | | FREE | |
| ***New Membership Fees:** | Membership (*Dairy, Food & Environmental Sanitation*) | | $ 50 | |
| | Membership *Plus* (*Dairy, Food & Env. Sanitation* & *Journal of Food Protection*) | | $ 80 | |
| | Student Membership ❒ *Dairy, Food & Env. San.* **or** ❒ *Journal of Food Protection* | | $ 25 | |
| | Student Membership *Plus* (*Dairy, Food & Environmental Sanitation* & *Journal of Food Protection*) | | $ 40 | |
| | **POSTAGE CHARGES: OUTSIDE THE U.S. - SURFACE RATE** | | $ 15 per journal | |
| | **AIRMAIL** | | $ 95 per journal | |
| | | | # of tickets | |
| **Other Fees: (Per Person)** | Cheese & Wine Reception (Sun., 8/1) | | FREE | |
| | Stone Mountain Plantation Evening (Mon., 8/2) | Adult | $ 35 ($ 40 on-site) | |
| | | Child | $ 20 ($ 25 on-site) | |
| | IAMFES Awards Banquet (Wed., 8/4) | | $ 30 ($ 35 on-site) | |
| | IAMFES Kids Banquet (Wed., 8/4) | | $ 10 ($ 15 on-site) | |
| **Spouse/Companion Events:** | Atlanta — A "Peach" of a Town (Mon., 8/2) | | $ 22 ($ 27 on-site) | |
| | The Charm of the Old South (Tues., 8/3) | | $ 37 ($ 42 on-site) | |
| | Atlanta's Homegrown Hits (Wed., 8/4) | | $ 26 ($ 31 on-site) | |

❒ Please indicate here if you have a disability requiring special accomodations.

Credit Card Payments: Please Circle: VISA/MASTERCARD/AMERICAN EXPRESS

Card #_____ Exp. Date _____

Name on Card_____ Signature _____

Total Amount Enclosed $_____
**U.S. FUNDS DRAWN ON U.S. BANK**

### Registration Information

Send payment with registration to IAMFES, 200W Merle Hay Centre, 6200 Aurora Avenue, Des Moines, IA 50322. Make checks payable to IAMFES. Pre-registration must be post-marked by July 9, 1993. The pre-registration deadline will be strictly observed. For additional information contact Julie Heim at 1-800-369-6337 (US), 1-800-284-6336 (Canada).

### Refund/Cancellation Policy

The IAMFES policy on meeting cancellation/refunds is as follows: "Registration fees, minus a $15.00 processing fee, will be refunded for written cancellations post-marked at least two (2) weeks prior to the start of the meeting. No refunds will be made for cancellations made less than two (2) weeks prior to the start of the meeting, however, the registration may be transferred to colleague with written notification to IAMFES.

### Exhibitor Information

An exhibition of products and consultant services will be at the Stouffer Waverly Hotel. For more information on exhibiting at the conference, please contact Scott Wells at 1-800-369-6337, 1-800-284-6336 (Canada).

**Guest Room Committment**
**GOOD UNTIL JULY 1, 1993**
**Make Your Reservation Now**

# HOTEL RESERVATIONS
# IAMFES

**80th Annual Meeting**
**August 1-4, 1993**
**Stouffer Waverly Hotel**
**Atlanta, Georgia**

Please check accommodation requested:

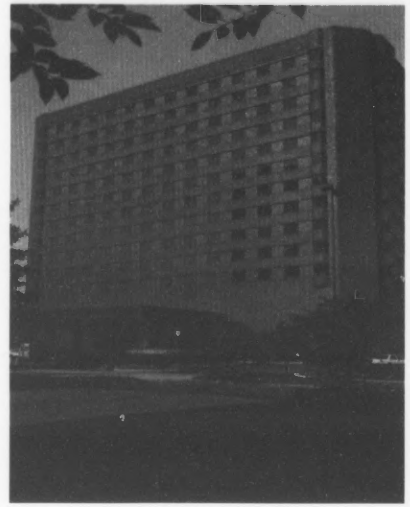
❑ Single (1 person) ❑ Triple (3 persons)
❑ Double (2 persons) ❑ Quad (4 persons)

Bed type:

❑ King Bed
❑ 2 Queen Beds

Special Requests _____

❑ Please indicate here if you have a disability requiring special accomodations.
All room rates are subject to prevailing taxes.
Reservations must be received by hotel prior to arrival.



NAME _____

SHARING WITH (Name) _____

COMPANY NAME _____

ADDRESS _____

_____ CITY _____

STATE/PROVINCE _____ COUNTRY _____ ZIP _____

TELEPHONE _____

ARRIVAL DATE _____ (Check-In Time is after 3 p.m.) DEPARTURE DATE _____ (Check-out Time is 12 p.m.)

SPECIAL REQUESTS _____

After July 1, 1993 reservations will be accepted on a space availability basis only. Reservations will be held until 6:00 p.m. on the date of arrival, unless guaranteed by one night advance deposit, payable by certified check or a Major Credit Card.

CREDIT CARD #_____ CREDIT CARD _____

EXPIRATION DATE _____

CARD HOLDERS SIGNATURE _____

**SPECIAL ROOM RATES** for this convention $89 plus tax . . . single/double occupancy
$109 plus tax . . . triple occupancy
$129 plus tax . . . quad occupancy

For Reservations Call:
(404)953-4500
or FAX (404)953-0740

MAIL DIRECTLY TO:

STOUFFER WAVERLY HOTEL
C/O RESERVATIONS
2450 GALLERIA PARKWAY
ATLANTA, GA 30339

# New IAMFES Members

### *Alaska*

**Nancy Napolilli**
State of Alaska, Dept. of Environmental Conservation, Div. Environmental Health
Fairbanks

### *Arkansas*

**James Denton**
University of Arkansas
Fayetteville

### *California*

**Denise Boesch**
Presto Foods - Jon Donaire Desserts
Santa Fe Springs

**Cathy Guilfoyle**
Fireman's Fund Insurance Company
Novato

**Ed Wilson**
Diversey Corp.
Bakersfield

### *Georgia*

**Llsama M. Abdul-Raouf**
University of Georgia
Griffin

### *Hawaii*

**Harold Matsuura**
State of HI, Dept. of Health
Hilo

### *Illinois*

**Tim Hill**
Kraft
Champaign

**Joan Menke-Schaenzer**
Kraft USA
Glenview

**Teri Troxel**
Dove International
BurrRidge

### *Iowa*

**Ron Majeres**
Tyson Foods, Inc.
Orange City

**Dave Titus**
Clay Equipment Corp.
Cedar Falls

### *Maryland*

**Tuu-Jyi Chai**
University of Maryland
Cambridge

**Joan M. Pinkas**
McCormick & Co., Inc.
Hunt Valley

### *Massachusetts*

**Paul Riendeau**
Sine Pump
Orange

**Wyatt Stevens**
Amicon
Danvers

### *Minnesota*

**Richard C. Anderson**
Chaska Chemical Co., Inc.
Savage

**Judy Fraser**
Pillsbury
Minneapolis

**Joseph Hibberd**
Ramsey Co. Public Health
St. Paul

**Mark E. Lund**
HB Fuller Co., Monarch Div.
Minneapolis

**Craig Sanders**
Green Giant Fresh
Edina

### *New Jersey*

**Laura Dawald**
Nabisco
Parsippany

**Joseph Giannella**
New Jersey Labs
New Brunswick

**Laurie Post**
M&M/Mars, Inc.
Great Meadows

### *New Mexico*

**Linda Ybarra**
Creamland Dairies
Albuquerque

### *North Carolina*

**Gregory W. Halloran**
Planters-LifeSavers, Inc.
Winston-Salem

**K. Cameron Lanier**
Onslow County Health Dept.
Jacksonville

### *Ohio*

**Janice Sanders**
Funke Filters, Inc.
Cincinnati

### *Pennsylvania*

**Larry Averbach**
Fleur DeLait
New Holland

**Margaret Drost**
Heinz USA
Pittsburgh

**Arthur J. Miller**
USDA-ARS, Eastern Reg. Res. Center
Philadelphia

### *Tennessee*

**Alton Lackie**
Klenzade/Ecolab, Inc.
Germantown

### *Texas*

**Charles Bessire**
Pasadena

**Mike Tallmon**
AMPI
Amarillo

### *Virginia*

**Jessica D. Childs**
Virginia Tech University
Blacksburg

### *Washington*

**Jerry F. Blaser**
Darigold
Chehalis

**Michael Boehme**
Beatrice Cheese, Inc.
Sumner

**Guy Jansen**
Lynden Inc.
Lynden

**A. Mickelson**
Darigold
Yakima

**Kirk Stallman**
Bunge Foods
Seattle

**Ronna Winters**
National Food Corp.
Marysville

### *West Virginia*

**Bill Grayzer**
The Ziegen Felder Co.
Wheeling

### *Wisconsin*

**Kurt Heitmann**
Alto Dairy
Neshkoro

### *Belgium*

**Ezzedine H.**
Cliniques Univ. St.
Brussels

### *Canada*

**Allan Campbell**
Thunder Bay District Health Unit
Thunder Bay, Ontario

**Robert Clarke**
Agriculture Canada
Guelph, Ontario

**Alan Edwards**
BDH, Inc.
Toronto, Ontario

**Carole Leonard**
Provigo Distribution Inc.
Laval, Quebec

**Martin Merrette**
Pointe-Claire, Quebec

**Donatila D. Salalila**
Beatrice Foods, Inc.
Brampton, Ontario

### *Denmark*

**Susanne Knoechel**
Rvau Center for Food Research
Frederiksberg

### *Hong Kong*

**Timothy K. T. Wong**
Hong Kong Government,
Environmental Protection Dept.
Hong Kong

### *Mexico*

**Estanislao Martinez-Bravo**
Universidad De Guadalajara
Jiquilpan, Michoacan

### *New Zealand*

**J. M. Mander**
Air New Zealand Catering
Mangere, Auckland

*Dairy, Food and Environmental Sanitation, Vol. 13, No. 2, Pages 114-126 (February 1993)*


# Holders of 3-A Symbol Council Authorization on February 15, 1993

**Questions or statements concerning any of the holders authorizations listed below, or the equipment fabricated, should be addressed to: Walter F. Laun, Administrative Officer 3-A Symbol Council, 4403 First Avenue, Suite 404, Cedar Rapids, IA 52402 (319) 395-9151.**

### 01-07 Storage Tanks for Milk and Milk Products

2 APV Crepaco, Inc. (5/1/56)
100 South CP Ave.
Lake Mills, Wisconsin 53551

28 Cherry-Burrell Corporation (10/3/56)
(A Unit of AMCA Int'l., Inc.)
575 E. Mill St.
Little Falls, New York 13365

117 DCI, Inc. (10/28/59)
P.O. Box 1227, 600 No. 54th Ave.
St. Cloud, Minnesota 56301

76 Damrow Company (10/31/57)
(A Div. of DEC Int'l., Inc.)
196 Western Ave., P.O. Box 750
Fond du Lac, Wisconsin 54935-0750

127 Paul Mueller Co. (6/29/60)
P.O. Box 828
Springfield, Missouri 65801

440 Scherping Systems (3/1/85)
801 Kingsley St.
Winsted, Minnesota 55395

571 Viatec Process/Storage Systems (8/21/89)
500 Reed St.
Belding, Michigan, 48809

31 Walker Stainless Equipment Co., Inc. (10/4/56)
Elroy, Wisconsin 53929

### 02-08 Pumps for Milk and Milk Products

63R APV Crepaco, Inc. (4/29/57)
100 South CP Ave.
Lake Mills, Wisconsin 53551

636 Abel Pumps Corporation (7/10/91)
79 North Industrial Park
503 North Drive
Sewickley, Pennsylvania 15143-2394
(Mfr: Abel Pumps, Buchen, Germany)

214R Ben H. Anderson Manufactures (5/20/70)
Box A
Morrisonville, Wisconsin 53571

212R Babson Brothers Company (2/20/70)
Dairy Systems Division
1400 West Gale
Galesville, Wisconsin 54630

205R Dairy Equipment Co. (5/22/69)
1919 S. Stoughton Rd., P. O. Box 8050
Madison, Wisconsin 53716

462 Enprotech Corporation (12/5/85)
335 Madison Avenue
New York, New York 10017

671 Flowtech, Inc. (4/1/92)
1900 Lake Park Drive
Smyrna, Georgia 30080

466 Fluid Metering Inc. (1/10/86)
29 Orchard St.
Oyster Bay, New York 11771

306 Fristam Pumps, Inc. (5/2/78)
2410 Parview Road
Middleton, Wisconsin 53562

65R G & H Products Corp. (5/22/57)
7600-57th Avenue
P.O. Box 1199
Kenosha, Wisconsin 53141

145R ITT Jabsco Products (11/20/63)
(Mfg. by ITT Jabsco, England)
1485 Dale Way
Costa Mesa, California 92626

314 Len E. Ivarson, Inc. (12/22/78)
3100 W. Green Tree Rd.
Milwaukee, Wisconsin 53209

603 Johnson Pumps (UK) Ltd (8/16/90)
(Not Available in the U.S.A.)
Highfield Industrial Estate
Edison Road, Eastbourne
East Sussex, England BN23 6PT

325 Highfield Industrial Estate (8/16/90)
Edison Road, Eastbourne
East Sussex, England BN23 6PT
U. S. REP: Johnson Pump of America, Inc.
4825 Scott Street, Suit 306
Schiller Park, Illinois 60176

604 Johnson Pumps (UK) Ltd. (8/16/90)
(Not Available in the U.S.A.)
Highfield Industrial Estate
Edison Road, Eastbourne
East Sussex, England BN23 6PT

373 Luwa Corporation (12/27/82)
(Mfg. by MAAG Gear, Switzerland)
P.O. Box 16348
Charlotte, North Carolina 28297-6348

673 MGI Pumps, Inc. (4/16/92)
9201 Wilmot Road
Kenosha, Wisconsin 53141

654 Mono Pumps Ltd., Dresser Pump Division (10/22/91)
Martin Street
Audenshaw, Manchester
England M34 5DQ
U.S. REP: MonoFlo, Dresser Pump Division
Dresser Industries
821 Live Oak Drive
Chesapeake, Virginia 23320-2601

400 Netzsch Incorporated (8/15/83)
119 Pickering Way
Exton, Pennsylvania 19341-139

684 PCM.POMPES (7/9/92)
17 Rue Ernest Laval
B. P. 35 - 92173 Vanves Cedex
France
U.S. Rep: MGI Pumps
9201 Wilmot Road
Kenosha, WI 53141-1426

701 Pierre Guerin SA (10/27/92)
BP. 12 - 79210
Mauze-Sur-Le-Mignon
France
US Rep: Alfa Technical Group, Inc.
601 Thompson Road N.
Syracuse, New York

595 Seepex US, Inc. (3/16/90)
(Formerly Pumpen - und Maschinenbau)
1834 Valley Street
Dayton, Ohio 45405

241 Puriti, S.A. de C.V. (9/12/72)
Alfredo Nobel 39
Industrial Puente de Vigas
Tlalnepantla, Mexico

148R Robbins & Myers, Inc. (4/22/64)
1895 Jefferson St.
Springfield, Ohio 45506

364 Roper Pump Company (7/28/82)
P.O. Box 269
Commerce, Georgia 30529

568 Shanley Pump & Equipment, Inc. (5/15/89)
(Mfg. by Allweiler, West Germany)
2255-1 Lois Dr.
Rolling Meadows, Illinois 60008

678 Shanley Pump & Equipment (5/11/92)
2255-1 Lois Drive
Rolling Meadows, Illinois 60008

507 Sine Pump (7/21/87)
Division of The Kontro Co., Inc.
500 West River Street
Orange, Massachusetts 01364

567 Stainless Products, Inc. (4/4/89)
1649-72nd Ave.
P.O. Box 169
Somers, Wisconsin 53171

72R L.C. Thomsen Inc. (9/14/57)
1303-43rd St.
Kenosha, Wisconsin 53140

26R Tri-Clover, Inc. (9/29/56)
9201 Wilmot Road
Kenosha, Wisconsin 53141

609 Tuthill Corp. (12/12/90)
Tuthill Pump Division
12500 S. Pulaski Road
Alsip, Illinois 60658

175R Universal Dairy (10/25/56)
11100 N. Congress Ave.
Kansas City, Missouri 64153

52R Viking Pump, Inc. (12/31/56)
A Unit of IDEX Corporation
406 State Street
Cedar Falls, Iowa 50613

29R Waukesha Fluid Handling (10/3/76)
(Formerly Cherry-Burrell
Fluid Handling Division)
611 Sugar Creek Road
Delavan, Wisconsin 53115

408 Westfalia Systemat (10/18/83)
(Mfg. by Westfalia, West Germany)
1862 Brummel Drive
Elk Grove Village, Illinois 60007

**04-03 Homogenizers and High Pressure Pumps of the Plunger Type**

37 APV Crepaco, INC. (10/19/56)
100 South CP Ave.
Lake Mills, Wisconsin 53551

75 APV Gaulin, Inc. (6/26/57)
500 Research Dr.
Wilmington, Massachusetts 01887

309 APV Rannie, Inc. (7/19/78)
(Formerly Niro Atomizer Food & Dairy, Inc.)
445 Etna Street
Suite 57
St. Paul, Minnesota 55106

247 Alfa-Laval (4/14/73)
8400 Lake View Parkway
Suite 500
Pleasant Prairie, Wisconsin 53158

390 American Lewa, Inc. (6/9/83)
(Mfg. by Lewa, Germany)
132 Hopping Brook Road
Holliston, Massachusetts 01760

247 Bran & Luebbe, Inc. (4/14/73)
1025 Busch Parkway
Buffalo Grove, Illinois 60015

87 Waukesha Fluid Handling (12/29/57)
(Formerly Cherry-Burrell
Fluid Handling Division)
611 Sugar Creek Road
Delavan, Wisconsin 53115

486 Fowler Products Company (11/18/86)
150 Collins Industrial Blvd.
P.O. Box 80268
Athens, Georgia 30608-0268

657 Microfluidics Corp. (11/4/91)
P. O. Box 9101
90 Oak Street
Newton, Massachusetts 02164-9101

558 Niro Soavi S.p.A. (1/389)
43100 Parma (Italy)
VIA M. Da Erba Edoari, 29/A
Distributed in the U. S. by
Niro Hudson, Inc.
1600 Country Road F
Hudson, Wisconsin 54016

**05-14 Stainless Steel Automotive Milk Transportation Tanks for Bulk Delivery and/or Farm Pick-up Service**

379 Bar-Bel Fabricating Co., Inc. (3/15/83)
N 3760 Hwy 12 & 16
Mauston, Wisconsin 53948

70R Brenner Tank, Inc. (8/5/57)
450 Arlington Ave., P.O. Box 670
Fond du Lac, Wisconsin 54936

40 Hills Stainless Steel & Equipment Co., Inc. (10/20/56)
505 W. Koehn Street
Luverne, Minnesota 56156

66 Kari-Kool Transports, Inc. (5/29/57)
P.O. Box 538
Beaver Dam, Wisconsin 53916

201 Paul Krohnert Mfg. Ltd. (4/1/68)
(not available in USA)
811 Steeles Ave., P.O. Box 126
Milton, Ontario, Canada L9T 2Y3

513 Nova Fabricating Inc. (8/24/87)
404 City Rd.
P.O. Box 231
Avon, Minnesota 56310

85 Polar Tank Trailer, Inc. (12/20/57)

Holdingford, Minnesota 56340

653 Tremar (10/10/91)
(Not available in the U.S.A.)
1, Tougas Street
Iberville, Quebec, Canada J2X 2P7

25 Walker Stainless Equip. Co., Inc. (9/28/68)
618 State Street
New Lisbon, Wisconsin 53950

623 Walker Stainless Eq. Co., Inc. (3/28/91)
560 E. Burleigh Blvd.
P.O. Box 358
Tavares, Florida 32778

437 West-Mark (11/30/84)
2704 Railroad Ave., P.O. Box 418
Ceres, California 95307

**08-17 Rev. Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products**

349 APN, Inc. (12/15/81)
400 W. Lincoln
Caledonia, Minnesota 55921

260 APV Crepaco, Inc. (08-17 A&B) (5/21/75)
100 South CP Avenue
Lake Mills, Wisconsin 53551

470 Advance Stainless Mfg. Corp. (3/30/86)
218 West Centralia Street
Elkhorn, Wisconsin 53121

380 Allegheny Bradford Corp. (3/21/83)
P.O. Box 200 Route 219 South
Bradford, Pennsylvania 16701

79R Alloy Products Corp. (11/23/57)
1045 Perkins Ave., P.O. Box 529
Waukesha, Wisconsin 53187

682 Andron Stainless, Ltd. (6/30/92)
(NOT AVAILABLE IN THE USA)
4610 Burgoyne Street
Mississauga, Ontario
Canada L4W 1G1

621 Bradford Castmetals (2/25/91)
P. O. Box 33
Elm Grove, Wisconsin 53122

688 Cajon Company (8/4/92)
9760 Shepard Road
Macedonia, Ohio 44056

645 Cipriani, Inc. - Tassalini S.P.A. (8/27/91)
23195 LaCadena Drive
Suite #103
Laguna Hills, California 92653

696 Conexiones Inoxidables (10/1/92)
de Puebla S. A. de C. V.
Vicente Guerrero No. 112
Xicotepec de Juarez
Edo. Puebla, Mexico

528 Dayco Products Inc. (3/16/88)
333 West First Street
Dayton, Ohio 45402-3042

677 EXCEL-A-REC, Inc. (5/8/92)
W141 N5984 Kaul Avenue
Menomonee Falls, Wisconsin 53051

455 Flowtech Inc. (9/17/85)
1900 Lake Park Dr. Suite 345
Smyrna, Georgia 30080

271 The Foxboro Company (3/8/76)
33 Commercial Street
Foxboro, Massachusetts 02035

676 HBS Products, Inc. (4/29/92)
181 Elliot Street
Beverly, MA 01915

67R G & H Products Corp. (6/10/57)
7600-57th Avenue
P.O. Box 1199
Kenosha, Wisconsin 53141

369 IMEX, Inc. (11/3/82)
(Mfg. by Lube Corp., Japan)
4040 Del Ray Ave. Unit 9
Marina del Rey, California 90292

454 Jensen Fittings Corp. (9/11/85)
107-111 Goundry St.
North Tonawanda, New York 14120-5998

389 Lee Industries, Inc. (5/31/83)
P.O. Box 688
Philipsburg, Pennsylvania 16866

239 Lumaco, Inc. (6/30/72)
P.O. Box 688
Teaneck, New Jersey 07666

703 Parker Hannifin Corp. (11/6/92)
Instrument. Connectors Div.
9400 South Memorial Pkwy
Huntsville, AL 35803

200R Paul Mueller Co. (3/5/68)
1600 W. Phelps St., Box 828
Springfield, Missouri 65801

242 Puriti, S.A. de C.V. (9/12/72)
Alfredo Nobel 39
Industrial Puente de Vigas
Tlalnepantla, Mexico

424 Robert-James Sales, Inc. (8/31/84)
699 Hertel Ave., Suite 260
Buffalo, New York 14207

699 Rodger Industries, Inc. (10/23/92)
(Not available in the USA)
P. O. Box 186
Blenheim, Ontario
Canada N0P 1A0

334 Stainless Products, Inc. (12/18/80)
1649-72nd Ave., Box 169
Somers, Wisconsin 53171

391 Stork Food Machinery, Inc. (6/9/83)
(Mfg. by Stork Amsterdam, Netherlands)
P.O. Box 1258/Airport Parkway
Gainesville, Georgia 30503

357 Tanaco Products (4/16/82)
3860 Loomis Trail Rd.
Blaine, Washington 98230

449 Tech Controls Enterprise Co., Ltd. (8/2/85)
(Mfg. in Taiwan)
2940 SE 200th Avenue
Issaquah, Washington 98027

73R L.C. Thomsen, Inc. (8/31/57)
1303-43rd. St.
Kenosha, Wisconsin 53140

34R Tri-Clover, Inc. (10/15/56)
9201 Wilmot Rd.
Kenosha, Wisconsin 53141

304 VNE Corporation (3/16/78)
1149 Barberry Drive
Janesville, Wisconsin 53547

82R Waukesha Fluid Handling (12/18/57)
(Formerly Cherry-Burrell
Fluid Handling Division)
611 Sugar Creek Road
Delavan, Wisconsin 53115

### 08-17A Compression Type Valves

533 APV Crepaco, Inc. (5/21/75)
100 S. CP Ave.
Lake Mills, Wisconsin 53551

484 APV, Inc. (10/22/86)
1325 Samuelson Rd.
Rockford, Illinois 61109

552 Alloy Products Corp. (11/23/57)
1045 Perkins Ave.
P.O. Box 529
Waukesha, Wisconsin 53187

245 Babson Brothers Company (2/12/73)
Dairy System Division
1400 West Gale Ave.
Galesville, Wisconsin 54630

443 Badger Meter, Inc. (4/30/85)
6116 East 15th Street
P. O. Box 581390
Tulsa, Oklahoma 74158-1390

686 Bardiani Valvole S.R.L. (8/3/92)
Via G. Vittorio, 53
43045 Fornovo (PR) Italy
U. S. Rep: Sanchelima Int.
1763 Northwest 93rd Ave.
Miami, FL 33172

555 Waukesha Fluid Handling (12/11/57)
(Formerly Cherry-Burrell
Fluid Handling Division)
611 Sugar Creek Road
Delavan, Wisconsin 53115

538 Cipriani, Inc. (7/31/86)
(Mfg. by Fratelli Tassalini, Italy)
23195 La Cadena Drive, Suite 103
Laguna Hills, California 92653

376 Definox Division (1/25/83)
Defontaine, Inc.
17044 W. Victor Road
New Berlin, Wisconsin 53151

530 G & H Products Corp. (6/10/57)
7600-57th Ave.
P.O. Box 1199
Kenosha, Wisconsin 53141

480 GEA Food and Process Systems Inc. (8/8/86)
8940 Route 108
Columbia, Maryland 21045

607 Kammer Valve, Inc. (9/25/90)
510 Parkway View Drive
Pittsburgh, Pennsylvania 15205

570 LUMACO (8/9/89)
9-11 East Broadway
Hackensack, New Jersey 07601

594 Oden Corp. (3/6/90)
255 Great Arrow Ave.
Buffalo, New York 14207

483 On-Line Instrumentation, Inc. (10/15/86)
Rt. 376, P.O. Box 541
Hopewell Junction, New York 12533

652 Pierre Guerin SA (10/4/91)
BP.12 - 79210
Mauze-Sur-Le-Mignon
France
U.S. Rep: Alfa Technical Group, Inc.
601 Thompson Road N.
Syracuse, New York 13211

551 Puriti, S.A. de C.V. (9/12/72)
Alfredo Nobel 39
Fracc. Ind. Puente de Vigas
Tlalnepantla, Mexico

149R Q-Controls (5/18/64)
Subsidiary of Cesco Magnetics
93 Utility Court
Rohnert Park, California 94928

542 L.C. Thomsen Inc. ((8/31/57)
1303-43rd. St.
Kenosha, Wisconsin 53140

34A Tri-Clover, Inc. (10/15/56)
9201 Wilmot Rd.
Kenosha, Wisconsin 53141

467 Tuchenhagen North America Inc. (1/13/86)
(Mfg. by Otto Tuchenhagen, West Germany)
8949 Deerbrook Trail
Milwaukee, Wisconsin 53223

561 VACU-PURG, Inc. (1/26/89)
214 West Main St.
P.O. Box 272
Fredericksburg, Iowa 50630

584 Valvinox Inc. (11/27/89)
654 1ere Rue.
Iberville-QUE-Canada J2X 3B8

86R Waukesha Specialty Co., Inc. (12/20/57)
P.O. Box 160, Hwy 14
Darien, Wisconsin 53144

### 08-17B Diaphragm-Type Valves

565 APV Rosista, Inc. (10/22/86)
(Mfg. by APV Rosista, Inc. W. Germany & Denmark)
1325 Samuelson Rd.
Rockford, Illinois 61109

615 AsepCo (1/4/91)
170 State Street, Suit 200
Los Altos, California 94022

617 Definox Division (2/1/91)
Defontaine, Inc.
17044 W. Victor Road
New Berlin, Wisconsin 53151

637 Gemu Valves, Inc. (7/10/91)
3800 Camp Creek Parkway
Bldg. 2400, Suite 102
Atlanta, Georgia 30331

514 H. D. Bauman Assoc., Ltd. (8/24/87)
35 Mirona Road
Portsmouth, New Hampshire 03801

203R ITT Grinnell Valve Co., Inc. (11/27/68)
Dia-Flo Division
33 Centerville Rd.
Lancaster, Pennsylvania 17603

494 Saunders Valve, Inc. (2/10/87)
15760 W. Hardy, #440
Houston, Texas 77060

### 08-17D Automatic Positive Displacement Sampler

291 Accurate Metering Systems Inc. (6/22/77)
(Mfg. by Diessel, Germany)
1650 Wilkening Ct.
Schaumburg, Illinois 60173

284 Bristol Engineering Co. (11/18/76)
210 Beaver St.
P.O. Box 696
Yorkville, Illinois 60560

693 Micropure Filtration, Inc. (9/17/92)
2323 6th Street, PO Box 7007
Rockford, Illinois 61125

### 08-17E Inlet and Outlet Leak-Protector Plug Valve

556 Waukesha Fluid Handling (12/12/57)
(Formerly Cherry-Burrell
Fluid Handling Division)
611 Sugar Creek Road
Delavan, Wisconsin 53115

34E Tri-Clover, Inc. (10/15/56)
9201 Wilmot Rd.
Kenosha, Wisconsin 53141

### 08-17F Tank Outlet Valve

531 G & H Products Corp. (6/10/57)
7600-57th Ave.
P.O. Box 1199
Kenosha, Wisconsin 53141

534 Lumaco (6/30/72)
9-11 East Broadway
Hackensack, New Jersey 07601

643 Paul Mueller Company (8/22/91)
1600 West Phelps
Springfield, Missouri 65801

### 08-17G Rupture Discs

422 BS & B Safety Systems, Inc. (6/12/84)
7455 E. 46th St.
Tulsa, Oklahoma 74133

407 Continental Disc Corp. (10/14/83)
4103 Riverside NW
Kansas City, Missouri 64150

### 08-17H Thermoplastic Plug Type Valves

577 Ralet-Defay (11/2/89)
(U.S. Agent GENICANAM, Chazy, NY)
66, Blvd. Poincare
1070 Brussels, Belgium

### 08-17I Steam Injected Heaters

560 Pick Heaters, Inc. (1/19/89)
P.O. Box 516
West Bend, Wisconsin 53095

### 08-17L Hose Assemblies

695 Couple-Up, Inc. (9/28/92)
420 Dixon Street
Compton, CA 90222

698 Sanitary Couplers, Inc. (10/23/92)
9151 Normandy Lane, S.
Centerville, OH 45458

700 Titan Industries, Inc. (10/23/92)
11121 Garfield Avenue
South Gate, California 90280

### 08-17M Vacuum Breakers and Check Valves

376 Definox Division (1/25/83)
Defontaine, Inc.
17044 W. Victor Road
New Berlin, Wisconsin 53151

689 VNE Corporation (8/17/92)
1149 Barberry Drive
Janesville, Wisconsin 53547

### 09-08 Instrument Fittings and Connections Used on Milk and Milk Products Equipment

32 ABB Kent-Taylor Inc. (10/4/56)
A Subsidiary of Asea Brown Brveri, Inc.
(Formerly Taylor Instruments)
95 Ames Street
P.O. Box 110
Rochester, New York 14692

428 ARI Industries, Inc. (9/12/84)
381 ARI Court
Addison, Illinois 60101

321 Anderson Instrument Co., Inc. (6/14/79)
RD #1
Fultonville, New York 12072

586 Beta Technology, Inc. (12/14/89)
105 Harvey West Blvd.
Santa Cruz, California 95060

315 Burns Engineering, Inc. (2/5/79)
10201 Bren Rd., East
Minnetonka, Minnesota 55343

206 The Foxboro Company (8/11/69)
33 Commercial Street
Foxboro, Massachusetts 02035

592 Claud S. Gordon Co. (2/27/90)
5710 Kenosha St.
P.O. Box 500
Richmond, Illinois 60071

620 Larad Equipment (2/25/91)
26 Pearl Street
Bellingham, Massachusetts 02019

588 Minco Products, Inc. (12/20/89)
7300 Commerce Lane
Minneapolis, Minnesota 55432

418 Niro Hudson (4/2/84)
(Formerly Niro Atomizer Food & Dairy)
1600 County Road F
Hudson, Wisconsin 54016

487 Pyromation, Incorporated (12/16/86)
5211 Industrial Road
Fort Wayne, Indiana 46825

367 RDF Corporation (10/2/82)
23 Elm Ave.
Hudson, New Hampshire 03051

495 Rosemount Analytical Division (2/13/87)
2400 Barranca Pkwy.
Irvine, California 92714

420 Stork Food Machinery, Inc. (4/17/84)
P.O. Box 1258/Airport Parkway
Gainesville, Georgia 30503

32 Taylor Instrument (10/4/56)
Combustion Engineering, Inc.
400 West Avenue, P.O. Box 110
Rochester, New York 14692

690 Texas Thermowell, Inc. (8/25/92)
PO Box 1535
Hwy. 96 North
Silsbee, Texas 77656

444 Tuchenhagen North America (6/17/85)
8949 Deerbrook Trail
Milwaukee, Wisconsin 53223

612 Viatran Corp & Haenni Druckmittler (12/13/90)
300 Industrial Drive
Grand Island, New York 14072

522 Weed Instrument Company, Inc. (12/28/87)
707 Jeffrey Way
Round Rock, Texas 78664

### 10-03 Milk and Milk Products Filters Using Disposable Filter Media, as Amended

371 Alloy Products Corp. (12/10/82)
1045 Perkins Ave., P.O. Box 529
Waukesha, Wisconsin 53187

593 Filtration Systems (3/2/90)
Div. of Mechanical Mfg. Corp.
10304 NW 50th St.
Sunrise, Florida 33351

704 Pall Trinity Micro Corp. (11/6/92)
3643 State Route 281
Cortland, NY 13045-0930

435 Sermia International (11/27/84)
740-212 Boul. Industriel
Blainville, Quebec
Canada J7C 3V4
U. S. Rep: United Dairy
Machinery Corp.
301 Meyer Road
Buffalo, New York 14224

296 L. C. Thomsen, Inc. (8/25/77)
1303 43rd St.
Kenosha, Wisconsin 53140

35 Tri-Clover, Inc. (10/15/56)
9201 Wilmot Road
Kenosha, Wisconsin 53141

### 11-04 Plate-type Heat Exchangers for Milk and Milk Products

365 APV Baker AS (9/8/82)
(not available in USA)
Platinvej, 8
P.O. Box 329
DK-6000 Kolding
Denmark

20 APV Crepaco, INC. (9/4/56)
395 Fillmore Ave.
Tonawonda, New York 14150

17 Alfa-Laval Food & Dairy Co. (7/28/82)
(Div. of Alfa-Laval Inc.)
8400 Lake View Parkway
Pleasant Prairie, Wisconsin 53158

120 Alfa-Laval, Agri Inc. (12/3/59)
11100 No. Congress Ave.
Kansas City, Missouri 64153

30 Cherry-Burrell Corp. (10/2/56)
Process Equipment Division
P.O. Box 35600
Louisville, Kentucky 40232-5600

14 Chester-Jensen Co., Inc. (8/15/56)
5th & Tilghman Sts., P.O. Box 908
Chester, Pennsylvania 19016

468 GEA Food and Process Systems Inc. (2/2/86)
8940 Route 108
Columbia, Maryland 21045

622 ITT Standard (2/25/91)
175 Standard Parkway
Cheektowaga, New York 14227
P.O. Box 1102
Buffalo, New York 14240-1102

326 Karbate Vicarb Inc. (2/4/80)
(Mfg. by vicarb, France)
21945 Drake Rd.
Strongsville, Ohio 44136

15 Kusel Equipment Co. (8/15/56)
820 West St., P.O. Box 87
Watertown, Wisconsin 53094

360 Laffranchi Wholesale Co. (7/12/82)
P.O. Box 698
Ferndale, California 95536

657 Microfluidics Corp. (11/4/91)
90 Oak Street
P.O. Box 9101
Newton, Massachusetts 02164-9101

491 On-Line Instrumentation, Inc. (1/2/87)
P.O. Box 541
Hopewell Junction, New York 12533

414 Paul Meuller Co. (12/13/83)
P.O. Box 828
Springfield, Missouri 65801

279 The Schlueter Company (8/30/76)
(Mfg. by Samuel Parker, New Zealand)
3410 Bell Street
Janesville, Wisconsin 53545

650 Schmidt-Bretten, Inc. (10/3/91)
20475 Woodingham Drive
Detroit, Michigan 48221

670 Skellerup Engineering, Ltd. (4/1/92)
2 Robert Street
P. O. Box 11-020
Ellerslie, Auckland 5
New Zealand
U. S. Rep: Masport, Inc.
6140 McCormick Drive
Lincoln, Nebraska 68507

658 Thermaline (11/15/91)
180-37th Street
Auburn, Washington 98001

610 Universal Dairy Equipment (12/13/90)
(Mgr. Skellerup Engineering,
Auckland, New Zealand)
11100 N. Congress Avenue
Kansas City, Missouri 64153

### 12-05 Tubular Heat Exchangers for Milk and Milk Products

614 Alfa-Laval Food & Dairy (12/27/90)
(Manufactured by Spiraflo Indus.
Australia)
8400 Lake View Parkway, Suite 500
Pleasant Prairie, Wisconsin 53158

628 Alfa-Laval Food & Dairy Company (5/2/91)
8400 Lakeview Parkway
Suite #500
P.O. Box 500
Pleasant Prairie, WI 53158

438 APV Crepaco, INC. (12/10/84)
395 Fillmore Avenue
Tonawanda, New York 14150

248 Allegheny Bradford Corp. (4/16/73)
P.O. Box 200 Route 219 South
Bradford, Pennsylvania 16701

243 Babson Brothers Company (10/31/72)
Dairy Systems Division
140 West Gale
Galesville, Wisconsin 54630

605 Cherry-Burrell (8/30/90)
Process Equipment Division
P.O. Box 35600
Louisville, Kentucky 40232-5600

103 Chester-Jensen Co., Inc. (6/6/58)

5th & Tilghman Sts., P.O. Box 908
Chester, Pennsylvania 19016

613 Efrex Corp. (12/27/90)
11 Kitty Hawk Drive
Pittsford, NY 14534-1620

298 Feldmeier Equipment, Inc. (1/28/85)
6800 Town Line Road
P.O. Box 474
Syracuse, New York 13211

307 G & H Products Corp. (5/2/78)
7600-57th Avenue
P.O. Box 1199
Kenosha, Wisconsin 53141

217 Girton Manufacturing Co. (1/31/71)
Millville, Pennsylvania 17846

616 ITT Standard
175 Standard Pkwy
P.O. Box 1102
Buffalo, New York 14240-1102

238 Paul Mueller Co. (6/28/72)
P.O. Box 828
Springfield, Missouri 65801

96 C. E. Rogers Co. (3/31/64)
So. Hwy #65, P.O. Box 118
Mora, Minnesota 55051

532 Scherping Systems (6/8/88)
801 Kingsley St.
Winsted, Minnesota 55395

392 Stork Food Machinery, Inc. (6/9/83)
(Mfg. by Stork, Netherlands)
P.O. Box 1258/Airport Parkway
Gainesville, Georgia 30503

591 Thermotech/Div. of Fristam Pumps, Inc. (2/8/90)
2410 Parview Rd.
Middleton, Wisconsin 53562

632 Yula Corporation (6/4/91)
330 Bryant Avenue
Bronx., New York 10474

### 13-08 Farm Milk Cooling and Holding Tanks

240 Babson Brothers Company (9/6/72)
Dairy Systems Division
1400 West Gale
Galesville, Wisconsin 54630

4R Dairy Equipment Co. (6/15/56)
1919 So. Stoughton Rd.
Madison, Wisconsin 53716

179R Heavy Duty Products (Preston) Ltd. (3/8/66)
(Not available in USA)
1261 Industrial Rd.
Cambridge (Preston)
Ontario, Canada N3H 4W3

12R Paul Mueller Co. (7/31/56)
1600 W. Phelps, P.O. Box 828
Springfield, Missouri 65801

611 Universal Dairy Equipment (12/13/90)
11100 N. Congress Avenue
Kansas City, Missouri 64153

### 16-05 Evaporators and Vacuum Pans for Milk and Milk Products

254 APV Crepaco, Inc. (1/7/74)
165 John L. Dietsch Square
Attleboro Fall, Massachusetts 02763

132 APV Crepaco, INC. (10/26/60)
395 Fillmore Ave.
Tonawanda, New York 14150

277 Alfa-Laval, Inc. (8/19/76)
Contherm Division
P.O. Box 352, 111 Parker St.
Newburyport, Massachusetts 01950

639 Niro-Sterner, Inc. (7/10/91)
421-6th Street South
Winsted, Minnesota 55395

500 Dedert Corporation (4/9/87)
20000 Governors Drive
Olympia Fields, Illinois 60461

311 GEA Food and Process Systems Inc. (8/28/79)
8940 Route 108
Columbia, Maryland 21045

273 Niro Evaporators, Inc. (5/20/76)
(Formerly Niro Atomizer
Food and Dairy)
9165 Rumsey Road
Columbia, MD 21045

107R C.E. Rogers Co. (7/31/58)
So. Hwy #65, P.O. Box 118
Mora, Minnesota 55051

186R Marriott Walker Corp. (9/6/66)
925 E. Maple Rd.
Birmingham, Michigan 48011

### 17-07 Formers, Fillers and Sealers of Single Service Containers for Milk and Milk Products

366 Autoprod, Inc. (9/15/82)
(An Alcoa Subsidiary)
5355 115th Avenue N.
Clearwater, Florida 34620

192 Cherry-Burrell Corp. (1/3/67)
(A Unit of AMCA Int'l., Inc.)
2400-6th St. SW, P.O. Box 3000
Cedar Rapids, Iowa 52406

382 Combibloc, Inc. (4/15/83)
(Mfg. by Jagenberg, West Germany)
4800 Roberts Rd.
Columbus, Ohio 43228

324 Erca USA, Inc. (11/29/79)
(Mfrd. by Erca, France
72A Grays Bridge Road
Brookfield, Connecticut 06804

488 Fords Holmatic Inc. (12/22/86)
1750 Corporate Dr.-Suite 700
Norcross, Georgia 30093

619 Hassia Verpackungsmaschinen GmbH (2/22/91)
6479 Ranstadt 1/Hessen Germany
(Hassia USA, Inc. 39 Plymouth St.
Fairfield, New York 07007)

473 International Paper Company (6/12/86)
Extended Shelf Life Division
4020 Stirrup Creek Drive, Bldg. B200
Durham, North Carolina 27703

220 Tetra Rex Packaging Systems (4/24/71)
(formerly TetraPak/EquipUS)
2285 University Avenue
St. Paul, Minnesota 55114

330 Milliken Packaging (8/26/80)
(Mfg. by Chubukkikai, Japan)
White Stone, South Carolina 29353

442 Milliken Packaging (2/21/85)
White Stone, South Carolina 29386

137 Pure-Pak, Inc. (10/17/62)

850 Ladd Road
Walled Lake, Michigan 48088

281 Purity Packaging Corp. (11/8/76)
800 Kaderly Dr.
Columbus, Ohio 43228

511 Remy Division (8/14/87)
(Mfg. by E. P. Remy, France)
2096 Gaither Road, Suite 119
Rockville, Maryland 20850

482 Serac Inc. (8/25/86)
300 Westgate Drive
Carol Stream, Illinois 60188

681 Shikoku Kakoki Co., Ltd. (6/8/92)
No. 10-01 Nishinokawa
Tarohachisu, Kitajima-Cho
Itanogun, Tokushima, Japan
U. S. Rep: Pure-Pak, Inc.
30000 South Hill Road
New Hudson, MI 48165

351 Tetra Pak Inc. (1/7/82)
(Mfg. by A. B. Tetra, Italy)
889 Bridgeport Ave.
P.O. Box 807
Shelton, Connecticut 06484-0807

694 Verpaco AG (9/23/92)
Eggenwattt 12
8995 Weissensberg, B R D
Germany

667 Walker Stainless (3/30/92)
Equipment of Florida, Inc.
560 Burleigh Blvd.
P. O. Box 358
Tavares, Florida 32778

**19-04 Batch Continuous Freezers for Ice Cream, Ices, and Similarly Frozen Dairy Foods, as Amended**

141 APV Crepaco, INC. (4/15/63)
100 South CP Ave.
Lake Mills, Wisconsin 53551

146 Cherry-Burrell Corp. (12/10/63)
P.O. Box 35600
Louisville, KY 40232-5600

286 O. G. Hoyer, Inc. (12/8/76)
(Mfg. by O. G. Hoyer A/S, Denmark)
201 Broad Street
Lake Geneva, Wisconsin 53147

465 Leon's Frozen Custard (12/17/85)
3131 S. 27th Street
Milwaukee, Wisconsin 53151

573 Processing Machinery & Supply Company (9/28/89)
(Mfg. by PMS Italiana, Italy)
1108 Frankford Ave.
Philadelphia, Pennsylvania 19125

412 Sani Mark, Inc. (11/28/83)
2020 Production Drive
Indianapolis, Indiana 46241

355 Emery Thompson Machine & Supply Co. (3/9/82)
1349 Inwood Ave.
Bronx, New York 10452

**22-04 Silo-type Storage Tanks for Milk and Milk Products**

154 APV Crepaco, Inc. (2/10/65)
100 South CP Ave.
Lake Mills, Wisconsin 53551

168 Cherry-Burrell Corp. (6/16/65)
(A Unit of AMCA Int'l, Inc.)
575 E. Mill Street
Little Falls, New York 13365

160 DCI, Inc. (4/5/65)
P.O. Box 1227, 600 No. 54th Ave
St. Cloud, Minnesota 56301

181 Damrow Co. (5/18/66)
(Div. of DEC Int'l., Inc.)
196 Western Ave., P.O. Box 750
Fond du Lac, Wisconsin 54935-0750

312 Feldmeier Equipment, Inc. (9/15/78)
6800 Town Line Road
P.O. Box 474
Syracuse, New York 13211

702 Paul Krohnert Manufacturing, Ltd. (11/6/92)
(Not available in the USA)
P. O. Box 126
811 Steeles Avenue
Milton, Ontario
Canada L9T 2Y3

439 JV Northwest Inc. (1/22/85)
28120 SW Boberg Rd.
Wisonville, Oregon 97070

155 Paul Mueller Co. (2/10/65)
1600 W. Phelps, P.O. Box 828
Springfield, Missouri 65801

503 Ripley Stainless Ltd. (5/1/87)
(Not available in USA)
RR #3, Site 41
Summerland, British Columbia V0H 1Z0

479 Scherping Systems (8/3/86)
801 Kingsley Street
Winsted, Minnesota 55395

675 Stainless Fabrication, Inc. (4/22/92)
620 North Prince Lane
Springfield, Missouri 65802

165 Walker Stainless Equipment Co., Inc. (4/26/65)
Elroy, Wisconsin 53929

**23-01 Equipment for Packaging Frozen Desserts, Cottage Cheese, and Similar Milk Products, as Amended**

174 APV Rockford, Inc. (9/28/65)
Filling & Wrapping Systems Div.
1303 Samuelson Road
Rockford, Illinois 61109

209 Doboy Packaging Machinery Incorp. (7/23/69)
869 S. Knowles Ave.
New Richmond, Wisconsin 54017

499 Fords Holmatic, Inc. (3/19/87)
1750 Corporate Dr., Suite 700
Norcross, Georgra, 30093

674 Hayssen Manufacturing (4/20/92)
5300 Highway 42 North
P. O. Box 571
Sheboygan, Wisconsin 53082-0571

679 Ice Cream Novelties (6/1/92)
Division of Popsicle Inc., Ltd.
5305 Fairview Street
P. O. Box 610
Burlington, Ontario, Canada L7R 3Y5
U. S. Rep: Sunshine Biscuits
100 Woodbridge Center Drive
Woodbridge, New Jersey 07095-1196

635 Interbake Dairy Ingredients Div. (7/10/91)
2220 Edward Holland Drive
Suite 301

Richmond, Virginia 23230

343 O.G. Hoyer, Inc. (7/6/81)
(Mfg. by Alfa Hoyer, Denmark)
201 Broad St.
Lake Geneva, Wisconsin 53147

626 Klockner Bartelt, Inc. (4/2/91)
5501 N. Washington Blvd.
Sarasota, FL 34243-2283

447 Mateer-Burt Co., Inc. (7/22/85)
(Mfg. by Trustpak, England)
436 Devon Park Drive
Wayne, Pennsylvania 19087

537 Osgood Industries, Inc. (7/19/88)
601 Burbank Rd.
Oldsmar, Florida 34677

666 Rapidpak (3/5/92)
1725 West 8th Street
Appleton, Wisconsin 54911

222 Sweetheart Packaging (11/15/71)
10100 Reistertown Road
Owing Mills, Maryland 21117
(Formerly Fort Howard Pkg. Corp.)

**24-01 Non-coil Type Batch Pasteurizers**

158 APV Crepaco, INC. (3/24/65)
100 South CP Ave.
Lake Mills, Wisconsin 53551

161 Cherry-Burrell Corp. (4/5/65)
(A Unit of AMCA Int'l., Inc.)
575 E. Mill St.
Little Falls, New York 13365

187 DCI, Inc. (9/26/66)
P.O. Box 1227, 600 No. 54th Ave.
St. Cloud, Minnesota 56301

519 Feldmeier Equipment, Inc. (10/22/87)
6800 Town Line Road
P.O. Box 474
Syracuse, New York 13211

166 Paul Mueller Co. (4/26/65)
P.O. Box 828
Springfield, Missouri 65801

**25-01 Non-coil Type Batch Processors for Milk and Milk Products**

159 APV Crepaco, INC. (3/24/65)
100 South CP Ave.
Lake Mills, Wisconsin 53551

162 Cherry-Burrell Corp. (4/5/65)
(A Unit of AMCA Int'l., Inc.)
575 E. Mill St.
Little Falls, New York 13365

188 DCI, Inc. (9/26/66)
P.O. Box 1227, 600 No. 54th Ave.
St. Cloud, Minnesota 56301

167 Paul Mueller Co. (4/26/65)
P.O. Box 828
Springfield, Missouri 65801

687 SANIFAB (8/3/92)
528 North Street
Stratford, Wisconsin 54484

448 Scherping Systems (8/1/85)
801 Kingsley Street
Winsted, Minnesota 55395

520 Stainless Fabrication, Inc. (12/8/87)
633 N. Prince Lane
Springfield, Missouri 65802

202 Walker Stainless Equip. Co., Inc. (9/24/68)
618 State St.
New Lisbon, Wisconsin 53950

**26-02 Sifters for Dry Milk and Dry Milk Products**

173 Blaw-Knox Food & Chemical Equip. Co. (9/20/65)
P.O. Box 1041
Buffalo, New York 14240

634 Great Western Mfg. Co. (7/10/91)
2017 South Fourth Street
P.O. Box 149
Leavenworth, Kansas 66048

363 Kason Corp. (7/28/82)
1301 East Linden Ave.
Linden, New Jersey 07036

430 Midwestern Industries, Inc. (10/11/84)
915 Oberlin Rd., P.O. Box 810
Massillon, Ohio 44648-0810

185 Rotex, Inc. (8/10/66)
1230 Knowlton St.
Cincinnati, Ohio 45223

656 Separator Engineering Ltd. (11/4/91)
(Not Available in the U.S.A.)
810 Ellingham Street
Pointe Clair, Quebec, Canada H9R 3S4

172 Sweco, Inc. (9/1/65)
7120 Buffington Rd.
Florence, KY 41042

**27-01 Equipment for Packaging Dry Milk and Dry Milk Products**

353 All-Fill, Inc. (3/2/82)
418 Creamery Way
Exton, Pennsylvania 19341

618 Hayssen Manufacturing Company (2/18/91)
(Manufactured by Yamato Scale Co.
Akasi, 673, Japan)
5300 Highway 42 North
P.O. Box 571
Sheboygan, Wisconsin 53082-0571

625 Ishida Scales Mfg. Co., Inc. (4/2/91)
44, Sanno-Cho, Shogoin
Sakyo-Ku, Kyoto, Japan
US Rep: Heat & Control
225 Shaw Rd.
S. San Francisco, CA 94080

409 Mateer-Burt Co. (10/31/83)
436 Devon Park Dr.
Wayne, Pennsylvania 19087

476 Stone Container Corporation (7/17/86)
1881 West North Temple
Salt Lake City, Utah 84116-2097

497 Triangle Package Machinery Co. (2/26/87)
6655 West Diversey Ave.
Chicago, Illinois 60635

**28-01 Flow Meters for Milk and Milk Products**

272 Accurate Metering Systems, Inc. (4/2/76)
1651 Wilkening Court
Schaumburg, Illinois 60173

253 Badger Meter, Inc. (1/2/74)
4545 W. Brown Deer Rd.
P.O. Box 23099

Milwaukee, Wisconsin 53223

359 Brooks Instruments (6/11/82)
407 West Vine St.
Hatfield, PA 19440

660 Danfoss A/S (11/20/91)
DK-6430
Nordborg, Denmark
US Rep: Danfoss Electronics
2995 Eastrock Drive
Rockford, Illinois 61109

469 Endress & Hauser, Inc. (3/3/86)
2350 Endress Place
Greenwood, Indiana 46142

692 Endress & Hauser Flowtec AG (9/14/92)
Kagenstrasse 7
Ch - 4153 Reinach, Switzerland

599 Euromatic Machine & Oil Co., Ltd (4/26/90)
P.O. Box 297
St. Helier
Jersey C.I. UK

226 Fischer & Porter Co. (12/9/71)
County Line Rd.
Warminster, Pennsylvania 18974

477 Flowdata Inc. (7/31/86)
1784 Firman Drive
Richardson, TX 75081

506 Flow Technology, Inc. (6/17/87)
4250 East Broadway Road
Phoenix, Arizona 85040

224 The Foxboro Company (11/16/71)
33 Commercial Street
Foxboro, Massachusetts 02035

649 Geo Technology (10/2/91)
12312 E. 60th Street
Tulsa, Oklahoma 74146

661 G/H Products Corp. (11/21/91)
7600-57th Avenue
P.O. Box 1199
Kenosha, Wisconsin 53142

562 Great Lakes Instruments, Inc. (2/6/89)
8855 North 55th Street
Milwaukee, Wisconsin 53223

630 Halliburton Services (5/28/91)
Drawer 1431
Duncan, Oklahoma 73536-0602

574 Hersey Measurement Co., Inc. (10/12/89)
150 Venture Blvd.
P.O. Box 4585
Spartanburg, South Carolina 29305

512 Hoffer Flow Controls, Inc. (8/17/87)
107 Kitty Hawk Lane
Elizabeth City, NC 27909

474 Hydril Production (6/30/86)
Technology Division
330 North Belt East
Houston, Texas 77032-3411

535 Invalco, Inc.
P.O. Box 556
Tulsa, Oklahoma 74101

529 Krohne America, Inc. (5/18/88)
(Mfg. by Altometer, Holland)
One Intercontinental Way
Peabody, Massachusetts 01960

378 Micro Motion, Inc. (2/16/83)
7070 Winchester Circle
Boulder, Colorado 80301

490 Rosemount Inc. (1/8/87)
12001 Technology Dr.
Eden Prairie, Minnesota

585 Schlumberger Industries Ltd. (12/7/89)
(Mfg. by Schlumberger, England)
11321 Richmond Ave.
Houston, Texas 77082-2615

587 Schlumberger Ind., Measurement Div. (12/18/89)
(Mfg. by Schlumberger, France)
1310 Emerald Rd.
Greenwood, South Carolina 29646

550 Sparling Instruments Co., Inc. (10/26/88)
4097 N. Temple City Blvd.
P.O. Box 5988
El Monte, California 91731

270 Taylor Instrument (2/9/76)
Combustion Engineering, Inc.
400 West Avenue, P.O. Box 110
Rochester, New York 14692

265 Tokheim Automation (3/10/75)
P.O. Box 38269
Dallas, Texas 75238
(formerly Emerson Elec. Co.)

386 Turbo Instruments, Inc. (5/11/83)
(Mfg. by Turowerk, West Germany)
4 Vashell Way
Orinda, California 94563

664 XO Technologies, Inc. (12/16/91)
28020 Avenue Stanford
Valencia, California 91355

**29-00 Air Eliminators for Milk and Fluid Milk Products**

340 Accurate Metering Systems, Inc. (6/2/81)
1651 Wilkening Court
Schaumburg, Illinois 60173

662 G/H Products Corp. (11/21/91)
7600-57th Avenue
P.O. Box 1199
Kenosha, Wisconsin 53142

436 Scherping Systems (11/27/84)
801 Kingsley Street
Winsted, Minnesota 55395

**30-01 Farm Milk Storage Tanks**

421 Paul Mueller Co. (4/17/84)
P.O. Box 828
Springfield, Missouri 65801

**31-01 Scraped Surface Heat Exchangers, as Amended**

290 APV Crepaco, INC. (6/15/77)
100 South CP Ave.
Lake Mills, Wisconsin 53551

274 Alfa-Laval, Inc. (6/25/76)
Contherm Div.
P.O. Box 352, 111 Parker St.
Newburyport, Massachusetts 01950

323 Cherry-Burrell Corp. (7/26/79)
Process Equipment Division
P.O. Box 35600
Louisville, KY 40232-5600

496 FR Mfg. Corp. (2/23/87)
2807 South Highway 99
Stockton, California 95202

361 N.V. Terlet (7/12/82)
(US Agent Manning & Lewis-NJ)

P.O. Box 62
7200 AB Zutphen
Netherlands .

**32-00 Uninsulated Tanks for Milk and Milk Products**

397 APV Crepaco, INC. (6/21/83)
100 South CP Ave.
Lake Mills, Wisconsin 53551

264 Cherry-Burrell Corp. (1/27/75)
(A Unit of AMCA Int'l., Inc.)
575 E. Mill St.
Little Falls, New York 13365

268 DCI, Inc. (11/21/75)
600 No. 54th Ave., P.O. Box 1227
St. Cloud, Minnesota 56301

354 C.E. Rogers Co. (3/3/82)
S. Hwy #65, P.O. Box 118
Mora, Minnesota 55051

683 SANIFAB (7/9/92)
A Division of A&B Process Systems Corp.
528 North Street
Stratford, WI 54484

441 Scherping Systems (3/1/85)
801 Kingsley St.
Winsted, Minnesota 55395

339 Walker Stainless Equip. Co., Inc. (6/2/81)
618 State St.
New Lisbon, Wisconsin 53950

**33-00 Polished Metal Tubing for Dairy Products**

310 Allegheny Bradford Corp. (7/19/78)
P.O. Box 200 Route 219 South
Bradford, Pennsylvania 16701

413 Azco, Inc. (12/8/83)
P.O. Box 567
Appleton, Wisconsin 54912

308 Rath Manufacturing Co., Inc. (6/20/78)
2505 Foster Ave.
Janesville, Wisconsin 53545

368 Rodger Industries Inc. (10/7/82)
(Not available in USA)
P.O. Box 186, RR1
Blenheim, Ontario
Canada N0P 1A0

335 Stainless Products, Inc. (12/18/80)
1649-72nd Ave., Box 169
Somers, Wisconsin 53171

289 Tri-Clover, Inc. (1/21/77)
9201 Wilmot Road
Kenosha, Wisconsin 53141

331 United Industries, Inc. (10/23/80)
1546 Henry Ave.
Beloit, Wisconsin 53511

**34-01 Portable Bins**

647 Thomas Conveyor Company (9/18/91)
Tote System Division
P.O. Box 2916
Fort Worth, TX 76101

**35-00 Continuous Blenders**

578 ACT Laboratories, Inc. (11/3/89)
P.O. Box 1107
McMurray, Pennsylvania 15317

527 Arde Barinco, Inc. (3/15/88)
500 Walnut Street
Norwood, New Jerey 07648

526 Bepex Corp./Schugi (3/15/88)
(Mfg. by Lelystad, Netherlands)
333 Taft St. NE
Minneapolis, Minnesota 55413

590 Chemineer Inc. (1/23/90)
125 Flagship Dr.
North Andover, Massachusetts 01845

417 Cherry-Burrell (2/7/84)
Process Equipment Division
P.O. Box 35600
Louisville, Kentucky 40232-5600

464 Dairy Service Mfg., Inc. (12/12/85)
4630 W. Florissant Ave.
St. Louis, Missouri 63115

642 Mondomix Holland b.v. (8/7/91)
Reeweg 13
P.O. Box 98
1394 ZH Nederhorst den Berg
The Netherlands
US Rep: Carrier Assoc.
50 Dunnell Lane
Paawtucket, Rhode Island 02860-5828

680 Quadro Engineering, Inc. (6/3/92)
613 Colby Drive
Waterloo, Ontario
Canada N2V 1A1

**36-00 Colloid Mills**

293 Cherry-Burrell (8/25/77)
611 Sugar Creek Road
Delavan, Wisconsin 53115

608 Kinematica (10/17/90)
170 Linden Street
Wellesley, Massachusetts 02181

**37-01 Liquid Pressure and Level Sensing Devices**

576 Ametek/Mansfield & Green Division (10/13/89)
8600 Somerset Dr.
Largo, Florida 34643

318 Anderson Instrument Co., Inc. (4/9/79)
R.D. #1
Fultonville, New York 12072

659 Bindicator Company (11/20/91)
1915 Dove Street
Port Huron, Michigan 48060

525 Caldwell Systems Corporation (3/4/88)
2450 Armstrong Street
Livermore, CA 94550
(Formerly Zantel Instruments)

672 Computer Instruments Corp. (4/3/92)
1000 Shames Drive
Westbury, New York 11590

640 Dresser Industries (7/16/91)
Instrument Division
250 East Main Street
Stratford, Connecticut 06497

663 Dresser Industries (12/4/91)
Instrument Division
210 Old Gate Lane
Milford, Connecticut 06460

405 Drexelbrook Engineering Co. (9/27/83)
205 Keith Valley Rd.

Horsham, Pennsylvania 19044

423 Dynisco (6/15/84)
Ten Oceana Way
Norwood, Massachusetts 02062

459 Endress + Hauser, Inc. (10/17/85)
2350 Endress Place
Greenwood, Indiana 46142

524 Flow Technology, Inc. (1/14/88)
4250 E. Broadway Road
Phoenix, Arizona 85040

463 The Foxboro Company (12/6/85)
33 Commercial Street
Foxboro, Massachusetts 02035

668 GP: 50 New York, Ltd. (3/30/92)
2770 Long Road
P. O. Box 297
Grand Island, New York 14072

651 Granzow, Inc. (10/3/91)
2300 CrownPoint Executive Drive
Charlotte, North Carolina 28227
(Mfr: Kubler AG
Baar, Switzerland)

633 Griffith Industrial Products Company (6/21/91)
P.O. Box 111
Putnam, CT 06260

557 Honeywell, Inc. (12/21/88)
Industrial Controls Div.
1100 Virginia Drive
Fort Washington, Pennsylvania 19034

629 Intrinsic Safety Equipment of Texas (5/20/91)
907 Bay Star
Webster, TX 77598-1531

598 Invalco, Inc. (3/22/90)
P.O. Box 556
Tulsa, Oklahoma 74101

572 ITT Conoflow (9/25/89)
P.O. Box 768
Rt 78
St. George, South Carolina 29477

396 King Engineering Corp. (6/13/83)
P.O. Box 1228
Ann Arbor, Michigan 48106

501 Lumenite Electronic Company (4/27/87)
2331 N. 17th Avenue
Franklin Park, Illinois 60131

596 Magnetrol International (3/20/90)
5300 Belmont Rd.
Downers Grove, Illinois 60515

627 Milltronics Process Measurements (4/12/91)
709 E. Stadium Drive
Arlington, TX 76011

419 Niro Hudson (4/2/84)
(Formerly Niro Atomizer Food & Dairy)
1600 County Road F
Hudson, Wisconsin 54016

597 NUOVA FIMA S.p.A. (3/20/90)
(not available in USA)
Via C. Battisti 59
28045 - INVORIO (N0) Italy

523 Paper Machine Components, Inc. (1/3/88)
Miry Brook Road
Danbury, Connecticut 06810

554 Par Sonics, Inc. (11/30/88)
P.O. Box 1127
State College, Pennsylvania 16804

563 PI Components Corp. (2/13/89)
10825 Barely Lane, Suite H
Houston, Texas 77070

644 Princo Instruments, Inc. (8/22/91)
1020 Industrial Highway
Southampton, Pennsylvania 18966-4095

328 Rosemount Inc. (5/22/80)
12001 Technology Dr.
Eden Prairie, Minnesota

515 Setra Systems, Inc. (9/14/87)
45 Nagag Park
Acton, Massachusetts 01720

583 S.J. Controls, Inc. (11/11/89)
2248 Obispo Ave. #203
Long Beach, California 90806

638 Span Instruments (7/10/91)
1497 Avenue "K"
Plano, Texas 75074

498 Statham Division of Solartron Transducers (3/5/87)
2230 Statham Blvd.
Oxnard, California 93033

285 Tank Mate Div/Monitor Mfg. Co. (12/7/76)
P.O. Box AL
Elburn, Illinois 60119

641 Tempress A/S (7/16/91)
Engtoften 6, DK-8260
Viby J, Denmark

410 Viatran Corporation (11/1/83)
300 Industrial Drive
Grand Island, New York 14072

569 WEISS Instruments, Inc. (5/24/89)
(Mfg. by Nuova-Fima, Italy)
85 Bell St.
West Babylon, New York 11704

600 Weksler Instruments Corporation
800 Mill Rd
Freeport, NY 11520-0808

646 WIKA Instrument Corp. (9/10/91)
1000 Wiegand Blvd.
Lawrenceville, Georgia 30243

685 Winter's Thermogauges, Ltd. (8/3/92)
2220-3 Midland Avenue
Scarborough, Ontario
Canada M1P 3E6
U.S. Rep: Winter's Thermogauges, Inc.
100 Sonwil Drive
Buffalo, New York 14225

**38-00 Cottage Cheese Vats**

541 Kusel Equipment Company (9/16/88)
820 West St.
Watertown, Wisconsin 53094

385 Stoelting, Inc. (5/5/83)
P.O. Box 127
Kiel, Wisconsin 53042-0127

**40-01 Bag Collectors for Dry Milk and Dry Milk Products**

504 General Resource Corporation (5/15/87)
201 3rd Street South
Hopkins, Minnesota 55343

381 Marriott Walker Corp. (4/12/83)
925 E. Maple Rd.
Birmingham, Michigan 48011

453 MikroPul Corporation (9/4/85)
10 Chatham Road

Summit, New Jersey 07901

456 C. E. Rogers Company (9/25/85)
P.O. Box 118
Mora, Minnesota 55051

### 41-00 Mechanical Conveyors

631 Flexicon Corporation (5/28/91)
1375 Stryker's Road
Phillipsburg, NJ 08865

### 42-00 In-Line Strainers

606 Cherry-Burrell/Superior Stainless (9/18/90)
Fluid Handling Division
611 Sugar Creek Road
Delavan, Wisconsin 53115

655 Tri-Clover, Inc. (10/23/91)
9201 Wilmot Drive
Kenosha, Wisconsin 53141

### 44-00 Air Driven Diaphragm Pumps

624 Granzow, Inc. (4/1/91)
Manufactured by KWW-DEPA in Germany
2300 Crown Point
Executive Drive
Charolette, NC 28227

669 Skellerup Engineering, Ltd. (3/30/92)
2 Robert Street
P. O. Box 11-020
Ellerslie, Auckland 5
New Zealand
U. S. Rep: Masport, Inc.
6140 McCormick Drive
Lincoln, Nebraska 68507

### 46-00 Refractometers and Optical Sensors

697 Liquid Solids Control, Inc. (10/21/92)
P. O. Box 259
Farm Street
Upton, MA 01568

*Dairy, Food and Environmental Sanitation, Vol. 13, No. 2, Pages 127-138 (February 1993)*


# 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-17

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

It is the purpose of the IAMFES, 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. Multiple-use plastic materials used as product contact surfaces for dairy equipment heretofore or after developed which so differ in specifications or otherwise as not to conform with the following standards, but which, in fabricator's opinion are equivalent or better, may be submitted for the joint consideration of the IAMEES, USPHS and DIC at any time.

A

## SCOPE

These sanitary standards cover the material requirements of plastics for multiple-use as product contact and/or cleaning solution contact surfaces in equipment for production, processing and handling of milk and milk product(s). Test criteria are provided for plastics as a means of determining their acceptance as to their ability to be cleaned and to receive effective bactericidal treatment and to maintain their essential functional properties and surface finish in accelerated use-simulating tests.*[1] These standards do not apply to plastics for single service application nor plastics which are of rubber or rubber-like origin resulting from chemical or thermal vulcanization or curing. These standards are also not meant to cover design and fabrication criteria for individual plastic components, because such criteria are provided for in other 3-A Sanitary Standards and 3-A Accepted Practices. In order to conform with these 3-A Sanitary Standards, multiple-use plastics shall comply with the following material, fabrication of test specimens as described in Section D.3 herein, and cleanability standards.

B

## DEFINITIONS

B.1

*Product*: Shall mean milk and milk products.

B.2

*Product Contact Surfaces*: Shall mean all surfaces that are exposed to the product, and surfaces from which liquids may drain, drop or be drawn into the product or into the container, and surfaces that touch product contact surfaces of the container.

B.3

*Cleaning Solution Contact Surfaces*: Shall mean the interior surfaces which are used exclusively for supply and recirculation of cleaning and/or sanitizing solutions, except those surfaces used to supply concentrated cleaning and/or sanitizing materials to the point of use.

B.4

*NonProduct Contact Surfaces:* Shall mean all other exposed surfaces.

B.5

*Plastic*: Shall mean materials as defined in Sections B.5, B.6 and B.7 herein, except those materials included under the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-like Materials Used as Product Contact Surfaces on Dairy Equipment, Number 18-00. The following in Sections B.5.1 to B.5.9 are from ASTM D 883-9lL, Standard Definitions of Terms Relating to Plastics:*[2]

B.5.1

*Plastic(s), n*: A material that contains as an essential ingredient one or more organic polymeric substances of large molecular weight, is solid in its finished state, and, at some stage in its manufacture or processing into finished articles, can be shaped by flow.

B.5.2

*Polymer, n.*: A substance consisting of molecules characterized by the repetition (neglecting ends, branch junctions and other minor irregularities) of one or more types of monomeric units.

B.5.3

*Thermoplastic, n*: A plastic that repeatedly can be softened by heating and hardened by cooling through a temperature range characteristic of the plastic, and that in the softened state can be shaped by flow into articles by molding or extrusion.

B.5.4

*Thermoplastic, adj.*: Capable of being repeatedly softened by heating and hardened by cooling through a temperature range characteristic of the plastic, and that in the softened state can be shaped by flow into articles

*[1] Procedures in Sections F and G are not normal cleaning and bactericidal treatment tests but are accelerated use-simulating tests.*

*[2] Available from ASTM, 1916 Race St., Philadelphia, PA 19103-1187 (215-299-5400).*

by molding or extrusion for example.

Note - Thermoplastic applies to those materials whose change upon heating is substantially physical.

B.5.5

*Thermoset, n*: A plastic that, after having been cured by heat or other means, is substantially infusible and insoluble.

B.5.6

*Thermoset, adj.*: Pertaining to the state of a plastic in which it is substantially infusible.

B.5.7

*Thermosetting, adj.*: Capable of being changed into a substantially infusible or insoluble product when cured by heat or other means.

B.5.8

*Plasticizer, n*: A substance incorporated in a material to increase its workability, flexibility, or distensibility.

B.5.9

*Elastomer, n*: A macromolecular material that at room temperature returns rapidly to approximately its initial dimensions and shape after substantial deformation by a weak stress and release of the stress.

B.6

*Plastic Additive, n*: Any material that is added to a plastic or polymer to enhance or modify the original physical and/or chemical properties.

B.7

*Plastic, adj.*: The adjective "plastic" indicates that the noun modified is made of, consists of, or pertains to plastic.

B.8

**Definitions Of Terms Relating To Testing**

B.8.1

*Standard Laboratory Atmosphere (SLA)*: A relative humidity of 50 ± 5% at a temperature of 23 ± 1 degrees C or 73.4 ± 1.8 degrees F as defined in ASTM E 41-86 - Definitions of Terms Relating to Conditioning.[*2]

B.8.2

*Hot Water*: From 100 to 115 degrees F (38 to 46 degrees C).

B.8.3

*Cold Water*: From 45 to 65 degrees F (7 to 18 degrees C). All water used shall be deionized or distilled.

B.8.4

*Rinse*: Shall mean to totally immerse in 2 L of water to remove all residue of cleaning and/or test solution. The water temperature shall be determined by referring to D.8.2 for hot water or D.8.3 for cold water. Immersion time shall be determined by the instructions for carrying out the applicable procedure, or if no time is given, rinse by six repeated 1 min immersions. All water used shall be deionized or distilled.

B.8.5

*Dry or Dried*: Shall mean to allow the samples to reach an equilibrium moisture content in a SLA, utilizing the times specified in the procedure to be followed. Specimens should be suspended or placed on edge on a screen to facilitate draining and drying.

C

**MATERIALS**

Plastic materials used as product contact and/or cleaning solution contact surfaces shall be nontoxic, shall comply with FDA regulations of the Food, Drug and Cosmetic Act and shall comply with Section H - Standards for Acceptability. Plastic materials complying with Section H shall be considered to be relatively unaffected when subjected to normal cleaning and bactericidal treatment.[*1] Only virgin, unadulterated or clean in-process and/or properly stored re-grind plastic materials shall be used. Plasticizers, and plastic additives, if used, shall be used at the minimum levels required for the desired functionality and also be used in accordance with the conditions prescribed by current Federal regulations or the FD&C Act as amended.

D

**PREPARATION FOR CLEANABILITY RESPONSE, PRODUCT TREATMENT AND CLEANABILITY COMPARISONS PROCEDURES.**

D.1

**Apparatus**

Appropriate glassware, oven, hot plate, analytical balance, wide field microscope or magnifying lens, of 7 to 10 power, sample of AISI 300 Series[*3] stainless, having a surface finish equivalent to 150 grit or better finish as obtained with silicon carbide properly applied on stainless steel sheets. (Also see Section G.2.)

D.2

**Test Solutions** (Simulated Reagents): (See Appendix, Section L for suggested material/chemical supplier list.)

(a) Test Solution A (Acid Cleaner)

Acid Solution: 2% Orthophosphoric Acid (20.18 g Acid/L soln.) 28.1 mL of 85% orthophosphoric acid volumetrically diluted to 2 L with distilled water.

(b) Test Solution B (Alkaline Cleaner equivalent to 63% sodium oxide)

| | |
|---|---|
| Sodium tripolyphosphate, | 3.85 g |
| Sodium hydroxide, | 20.51 g |
| Trisodium phosphate, | 0.77 g |

Synthetic detergent, anionic type (Aerosol® O.T.), 0.51 g

Dilute volumetrically to 1 L with distilled water to produce a 25% solution by weight.

(c) Test Solution C (Alkaline Chlorine Sanitizer) Hypochlorite solution:

10.00 mL of a 4 to 6% sodium hypochlorite solution is made up to 1 L with distilled water in a volumetric flask to yield 400 ppm available chlorine in water, adjusted to pH 8.0 ± 0.5 with sodium bicarbonate.

(d) Test Solution D (Acid Chlorine Sanitizer)

| | |
|---|---|
| Dichloroisocyanurate, sodium salt (ACL 60 Monsanto) | 15.00 g |
| Monosodium phosphate, anhydrous | 29.00 g |
| Sodium sulfate, anhydrous | 25.00 g |

---

[*3] *The data for this series are contained in the AISI Steel Products Manual, Stainless & Heat Resisting Steels, November 1990, Table 2-1, pp. 17-20. Available from the Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086 (412-776-9460).*

Dissolve in distilled water up to 1 L in a volumetric flask.

Dilute 44.74 mL of above solution with distilled water to 1 L in a volumetric flask to give a test solution containing 400 ppm of available chlorine.

(e) Test Solution E (Quaternary Ammonium Sanitizer)
Alkyl dimethylbenzyl ammonium chloride, 400 ppm in water (0.40 g/L)

(f) Test Solution F (Iodophor Sanitizer)

| | |
|---|---|
| Nonylphenol ethylene oxide condensate, 9 1/2 to 10 moles ethylene oxide | 15.00 g |
| Iodine to provide 1.75% available iodine | 2.45 g |
| Orthophosphoric acid-100% basis (12.26 mL of 85% acid) | 17.60 g |
| Water | 64.95 g |

Dilute 2.86 g of above solution with distilled water up to 1 L in a volumetric flask to give a test solution of 50 ppm of available iodine.

(g) Test Solution G (Acid Anionic Sanitizer)
Orthophosphoric acid - 100% basis 24.70 g (17.20 mL of 85% acid)

| | |
|---|---|
| Dodecylbenzene sulfonic acid, sodium salt | 2.75 g |
| Nonionic wetting agent | 1.00 g |
| Water | 71.55 g |

Dilute 14.80 g of above solution with distilled water up to 1 L in a volumetric flask to give a test solution of 400 ppm of active anionic.

(h) Test Solution H (Simulated Dairy-Soil Solution)

| | |
|---|---|
| Cream (36% milkfat) | 583.30 g |
| Nonfat dry milk | 140.00 g |
| Sucrose | 210.00 g |
| Water | 466.70 g |

To give a composition of:
15.0% Fat
12.0% Milk-solids-not-fat
15.0% Sucrose
58.0% Water

(i) Test Solution I (Dairy Product, High Fat Medium): Pasteurized heavy cream, minimum 36.0% milkfat.

(j) Test Solution J (Dairy Product, Acid Medium): Lactic acid, 3.0% in aqueous solution (70.60 g or 59.00 mL of 85% lactic acid or 60.00 g of anhydrous lactic acid) diluted with distilled water to 2 L in a volumetric flask.

D.3

**Test Specimens**

(a) Test specimens, when prepared for testing shall have a surface at least as smooth as a sample of AISI 300 Series stainless steel having a surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets[*2] and shall have a total exposed surface area of 7.00 ± 0.10 sq in. (45.20 ± 0.65 sq cm) for each test specimen. Test specimens shall have one of the following configurations.

(aa) Molded test specimens shall be in the form of a disk 2.00 in. (50.80 mm) in diameter and 1/8 in. (3.20 mm) in thickness. Permissible variations in thickness are plus or minus 0.0070 in. (0.18 mm) for hot molded and plus or minus 0.012 in. (0.30 mm) for cold molded or cast materials. The disk mold prescribed in Section 3 of ASTM D-647-88a - Recommended Practice for Design of Molds for Test Specimens of Plastic Molding Materials - is suitable for molding disk specimens of thermosetting materials, and Section 5 of ASTM D 647-88a is suitable for injection molding of thermoplastic materials.

(bb) Sheet test specimens shall be in the form of a bar 3.00 in. (7.6 cm 76.20 mm) in length and 1.00 in. (25.40 mm) in width, which for comparison, shall be 1/8 ± 0.008 in. (3.18 ± 0.20 mm) thick (Surface area, 7.00 ± 0.10 sq in. or 45.20 ± 0.65 sq cm).

(cc) Rod test specimens shall be of normal diameter as received, and cut to proper length to produce the required surface area of 7.00 ± 0.10 sq in. (45.2 ± 0.65 sq cm). The diameter of the specimen shall be the diameter of the rod.

(dd) Tube test specimens of less than 3.00 in. (76.20 mm) in diameter shall be the full section of the tube cut to proper length to produce the required surface area of 7.00 ± 0.10 sq in. (45.20 ± 6.5 sq mm) including as the exposed surface area the outside, inside, and ends of the tube. For a tube having an inside diameter of 3.00 in. (76.20 mm) or more, a rectangular specimen shall be cut 3.00 in. (76.20 mm) in length laterally to the tube or cut to proper length and width to produce the required surface area of 7.00 ± 0.10 sq in. (45.20 ± 6.5 sq mm) including as the exposed area the outside, inside, and ends of the cut section.

(b) Test specimens from sheets, rods, and tubes shall be machined, punched, sawed or sheared from the sample and so treated on such surfaces as to have edges free from cracks, rough surfaces and loose material. All test specimens shall be free of grease, dirt or other extraneous material.

(c) Additional guidelines for the handling of specimens, suspension of specimens in reagents, stirring of reagents, etc. can be found in ASTM Test Methods D-543-87 and D-471-79 (Re-approved 1991).

D.4

**Conditioning of Test Specimens**

All test specimens pre-conditioned to equilibrium for water content in a Standard Laboratory Atmosphere (see B.8.1), shall be cleaned using Test Solution B (Alkali Solution) at 165 to 170 degree F (74 to 77 degree C), with six repeated 1 min immersions, followed by six repeated 1 min immersions in 2 L of cold distilled or deionized water to thoroughly rinse and then dry at Standard Laboratory Atmosphere for 24 h.

D.5

**NUMBER OF TEST SPECIMENS**: Two sets (Set M and Set M') of eight specimens each and two sets (Set L and Set L' ) of eight specimens each shall be identified and treated as:

| Set M and M' | Set L and L' | For Tests in: |
|---|---|---|
| M-0: M'-0 | L-0: L'-0 | Controls, distilled water |
| M-l: M'-l | L-l: L'-l | Solutions A-B |
| M-2: M'-2 | L-2: L'-2 | Solutions A-B-H-A-B |
| M-3: M'-3 | L-3: L'-3 | Solutions A-B-C-H-A-B-C |
| M-4: M'-4 | L-4: L'-4 | Solutions A-B-D-H-A-B-D |
| M-5: M'-5 | L-5: L'-5 | Solutions A-B-E-H-A-B-E |
| M-6: M'-6 | L-6: L'-6 | Solutions A-B-F-H-A-B-F |
| M-7: M'-7 | L-7: L'-7 | Solutions A-B-G-H-A-B-G |

An extra molded test specimen or a piece of the sheet, rod or tube shall be available for the comparisons required in E.10 (b) 1 and F.3 (b) (1).

E

**PROCEDURE - CLEANABILITY RESPONSE[1]**

E.1

After conditioning the test specimens according to Section D.4 above, all samples are to be weighed ($W_1$) on an analytical balance to 0.0001g. Specimens shall be handled with clean tongs or forceps and latex gloves worn when required. After ($W_1$) has been determined treat specimens as follows:

E.2

Specimens M-0, M'-0 and L-0, L'-0 are:

(a) Immerse in distilled water, 165 to 170 degrees F (74 to 77 degrees C), 60 min.
(b) Rinse, hot water.
(c) Dry, SLA, 20 h.
(d) Re-weigh ($W_2$).

E.3

Specimens M-l, M'-l and L-l, L'-l are:

(a) Immerse in Solution A, 165 to 170 degrees F (74 to 77 degrees C), 30 min.
(b) Rinse, hot water.
(c) Immerse in Solution B, 165 to 170 degrees (74 to 77 degrees C), 30 min.
(d) Rinse, hot water.
(e) Dry, SLA, 20 h.
(f) Re-weigh ($W_2$).

E.4

Specimens M-2, M'-2 and L-2, L'-2 are:

(a) Immerse in Solution A, 165 to 170 degrees F (74 to 77 degrees C ), 15 min.
(b) Rinse, hot water.
(c) Immerse in Solution B, 165 to 170 degrees F (74 to 77 degrees C), 15 min.
(d) Rinse, hot water.
(e) Immerse in Solution H, SLA, 20 h.
(f) Rinse, hot water.
(g) Immerse in Solution A, 165 to 170 degrees F (74 to 77 degrees C), 15 min.
(h) Rinse, hot water
(i) Immerse in Solution B, 165 to 170 degrees F (74 to 77 degrees C), 15 min.
(j) Rinse, hot water
(k) Dry, SLA, 20 h.
(l) Re-weigh ($W_2$).

E.5

Specimens M-3, M'-3 and L-3, L'-3 are:

(a) Immerse in Solution A, 165 to 170 degrees F (74 to 77 degrees C ), 15 min.
(b) Rinse, hot water.
(c) Immerse in Solution B, 165 to 170 degrees F (74 to 77 degrees C), 15 min.
(d) Rinse, cold water.
(e) Immerse in Solution C, SLA, 60 min.
(f) Rinse, hot water.
(g) Immerse in Solution H, SLA, 20 h.
(h) Rinse, cold water.
(i) Immerse in Solution A, 165 to 170 degrees F, (74 to 77 degrees C), 15 min.
(j) Rinse, hot water.
(k) Immerse in Solution B, 165 to 170 degrees F (74 to 77 degrees C), 15 min.
(l) Rinse, cold water.
(m) Immerse in Solution C, SLA, 60 min.
(n) Rinse, hot water.
(o) Dry, SLA, 20 h.
(p) Re-weigh ($W_2$).

E.6

Specimens M-4, M'-4 and L-4, L'-4 are:
Identical to regimen stated in Section E.5 for M-3, M'-3 and L-3, L'-3 except: Use Solution D in place of Solution C.

E.7

Specimens M-5, M'-5 and L-5, L'-5 are:
Identical to regimen stated in Section E.5 for M-3, M'-3 and L-3, L'-3 except: Use Solution E in place of Solution C.

E.8

Specimens M-6, M'-6 and L-6, L'-6 are:
Identical to regimen stated in Section E.5 for M-3, M'-3 and L-3, L'-3 except: Use Solution F in place of Solution C.

E.9

Specimens M-7, M'-7 and L-7, L'-7 are:
Identical to regimen stated in Section E.5 for M-3, M'-3 and L-3, L'-3 except: Use Solution G in place of Solution C.

E.10

Report the following for each specimen tested: (For Report Form, see Appendix, Section M.)

(a) Calculated per cent weight loss or gain -

$$\text{Loss} = \frac{W_1 - W_2}{W_1} \times 100$$

$$\text{Gain} = \frac{W_2 - W_1}{W_1} \times 100$$

Note: Averages of specimens are not permitted. A weight gain is not to be used to offset a weight loss.

(b) Surface comparisons made visually with the aid of magnification:

(1) The test specimen is compared with the original as to change in surface smoothness as: NO CHANGE, SLIGHT CHANGE, or MARKED CHANGE.
(2) The rating as to the smoothness of the test specimen compared to a surface finish equivalent to a 150 grit or better finish as obtained with silicon carbide, properly applied on stainless steel sheets: SMOOTHER, EQUAL or ROUGHER.

(3) Report under the "Remarks" column other observable (temporary or permanent) changes to the specimen's surface and appearance, such as surface tack, exudation, surface cracks, color, transparency, surface wettability, delamination, shape distortion or any other appearance changes.

F

**PROCEDURE - PRODUCT TREATMENT**: The test specimens which were treated in section E - "Cleanability Response", are to be further tested as follows:

F.1

Immerse Set M and M' (Specimens M-0 to M-7 and M'-0 to M'-7 inclusive), in Test Solution I, at room temperature for a total time of 168 h, renewing the Test Solution I every 24 h. Test specimens shall be rinsed with cold distilled or deionized water to remove old solution prior to re-immersing in renewed solution. At the conclusion of the 168 h immersion, the specimens shall be removed and cleaned, using Test Solution B at 165 to 170 degrees F (74 to 77 degree C), with six repeated 1 min immersions, followed by a thorough hot water rinse, dry at SLA, for 20 h. Reweigh ($W_3$).

F.2

Immerse Set L (Specimens L-0 to L-7 and L'-0 to L'-7 inclusive) in Test Solution J, at 155 to 160 degrees F (68 to 71 degrees C) for a total time of 168 h, renewing the Test Solution J every 24 h. Test specimens shall be rinsed with cold distilled or deionized water to remove old solution prior to re-immersing in renewed solution. At the conclusion of the 168 h immersion, the specimens shall be removed and cleaned, using Test Solution B at 165 to 170 degrees F (74 to 77 degrees C), with six repeated 1 min immersions, followed by a thorough hot water rinse, dry at SLA for 20 h. Re-weigh ($W_3$).

F.3

Report the following for each specimen tested: (For Report Form see Appendix N)

(a) Calculated per cent weight loss or gain -

$$\% \text{ Loss} = \frac{W_2 - W_3}{W_2} \times 100$$

$$\% \text{ Gain} = \frac{W_3 - W_2}{W_2} \times 100$$

Note: Averages are not permitted. A weight gain is not to be used to offset a weight loss.

(b) Surface comparisons made visually with the aid of magnification:

(1) The test specimen is compared with the original as to change in surface smoothness as: NO CHANGE, SLIGHT CHANGE, or MARKED CHANGE.

(2) The rating as to the smoothness of the test specimen compared to a surface finish equivalent to a 150 grit or better finish as obtained with silicon carbide, properly applied on stainless steel sheets: SMOOTHER, EQUAL, or ROUGHER.

(3) Report under the "Remarks" column other observable (temporary or permanent) changes to the specimen's surface and appearance, such as surface tack, exudation, surface cracks, color, transparency, surface wettability, delamination, shape distortion or any other appearance changes.

G

**PROCEDURE - CLEANABILITY COMPARISON**

G.1

All of the test specimens after exposure to the regimens set forth in Sections E and F are to be immersed in Test Solution H, at SLA for 20 h, cleaned using Test Solution B at 165 to 170 degrees F (74 to 77 degrees C), with six repeated 1 min immersions followed by a thorough hot water rinsing and drying at SLA for 20 h.

G.2

The sample of AISI 300 Series*2 stainless steel having a surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, or a piece of it approximately 3.00 in. (76.20 mm) in length and 1.00 in. (25.40 mm) in width, is to be cleaned as set forth in D.4. This sample of stainless steel is then to be exposed to the regimen set forth in G.1.

G.3

With the aid of magnification, visually judge the cleanability of the test specimens by comparing them with the sample of AISI 300 Series*2 stainless steel sheet after exposure to the regimen set forth in G.1. Rate the cleanability of the test specimens as: BETTER, EQUAL, or POORER. (For Report Form, see Appendix O.)

H

**STANDARDS FOR ACCEPTABILITY**

Acceptable plastic materials shall comply with the following:

H.1

Test specimens, after exposure to the regimens set forth in Sections E and F, shall not have a loss in weight greater than 0.05% except as provided in Section H.6 concerning data analysis.

H.2

Test specimens, after exposure to the regimen set forth in Sections E and F, shall not have a gain in weight greater than that given for the generic class shown in Table-l except as provided in Section H.6 concerning data analysis.

H.3

When compared to the original all of the test specimens, after exposure to the regimen set forth in Sections E and F, shall have NO CHANGE in surface smoothness and relatively little change in color, transparency, translucency, shape, flexibility, dimension or other similar functional properties affecting the appearance or surface characteristics of the sample.

H.4

All of the test specimens, after exposure to the regimen set forth in Sections E, F and G, shall be at least as smooth and cleanable as a sample of AISI 300 Series*2 stainless steel having a surface finish equivalent to 150 grit or better as obtained with silicon carbide properly applied to stainless steel sheets. To conform with this,

all of the test specimens shall be judged to be SMOOTHER or EQUAL in the comparisons made in accordance to E.10 (b) (2) and F.3 (b) (2) and BETTER or EQUAL in the comparisons made in accordance to G.3.

H.5

Certification of compliance with FDA regulations and/or FD&C Act requirements and compliance with the criteria herein are to be forwarded to the 3-A Secretary. (See Appendix, Section P for suggested form.) Test results are to be kept by the supplier of the plastic material.

H.6

Data values beyond the permitted maximum weight loss or weight gain limits may be challenged as outlying observations as described in ASTM E 178.*2 Physical reasons may be known or discovered which could reject a data value. Procedures or calibrations of equipment, for example, may be causes. Statistical tests may be used to determine if the values are outlying observations. Documented outlying observations may be rejected.

Table 1

| Generic Classes of Plastics | Maximum Percent Weight Gain | | |
|---|---|---|---|
| | Cleanability Response (Section E Regimen) | Product Treatment (Section F Regimen) Solution I | Solution J |
| Acrylics | 0.20 | 0.50 | 1.50 |
| Acrylonitrile butadiene styrene | 0.30 | 0.45 | 0.90 |
| Chlorinated polyether | 0.05 | 0.05 | 0.05 |
| Cross-linked polyester resins (vinyl ester-styrene copolymer) | 0.20 | 0.02 | 0.20 |
| Epoxy Resin as coating*4 - | | | |
| (a) Isopropylidenediphenol Hardener-TETA Triethylenetetramine | 0.10 | 0.15 | 0.25 |
| (b) Phenol-Formaldehyde Polymer, glycidyl ether (silica filled) Hardener - DETA Adduct | 0.15 | 0.15 | 2.0 |
| Ethylene-vinyl acetate copolymers | 0.25 | 0.55 | 0.10 |
| Fluorocarbons - | | | |
| CTFE, PTFE and FEP types | 0.05 | 0.05 | 0.05 |
| Vinylidene fluoride types | 0.05 | 0.05 | 0.15 |
| Nylon - | | | |
| Nylon Type 66 | 2.00 | 3.00 | 8.00 |
| Nylon Type 610 | 1.00 | 2.00 | 4.00 |
| Nylon Type 6 | 2.00 | 3.00 | 8.00 |
| Plasticized polyvinyl chloride - | | | |
| (a) For contact with high-water, low-fat products (≤8% milk fat) | 0.25 | 0.55 | 0.90 |
| (b) For contact with high-fat products (>8% milk fat) | 0.10 | 0.20 | 0.55 |
| Polycarbonates | 0.10 | 0.15 | 0.25 |
| Polyetherimide*5 | 0.20 | 0.25 | 0.25 |
| Polyethylene - | | | |
| ASTM Type I | 0.20 | 0.50 | 0.20 |
| ASTM Type II | 0.20 | 0.20 | 0.20 |
| ASTM Type III | 0.20 | 0.20 | 0.20 |
| Polyethylene phthalate polymers*6 | 0.10 | 0.15 | 0.25 |
| Polymethylpentene*7 | 0.10 | 0.20 | 0.20 |
| Polyoxymethylene copolymer | 0.25 | 0.60 | 1.00 |
| Polyphenylene oxide*8 | 0.10 | 0.15 | 0.25 |
| Polyphenylene sulfide | 0.06 | 0.08 | 0.08 |
| Polypropylene - (unmodified and modified for impact resistance) | 0.10 | 0.20 | 0.20 |
| Polystyrene - Normal (unmodified) Type 3 of ASTM D703-78 | 0.10 | 0.10 | 0.10 |
| Polystyrene - Modified (impact), Type III, Grade 6, of ASTM D1892-78 | 0.10 | 0.10 | 0.10 |
| Polysulfone resin | 0.05 | 0.1 | 0.1 |
| Polyurethane*9 | 1.22 | 1.59 | 1.29 |
| Propoxylated bisphenol-A fumarate polyester-styrene copolymer | 0.20 | 0.20 | 0.20 |
| Reinforced epoxy, molded, natural (no color added), and black | 0.20 | 0.25 | 0.35 |
| Styrene-acrylonitrile | 0.20 | 0.50 | 0.50 |

*4 *as covered by 21 CFR 175.300*
*5 *as covered by 21 CFR 177.1595*
*6 *as covered by 21 CFR 177.1630*
*7 *as covered by 21 CFR 177.1520*
*8 *as covered by 21 CFR 177.2460*
*9 *as covered by 21 CFR 177.1680 for contact with dry food*

## APPENDIX

I

**Fabrication**

Components and devices manufactured from plastic materials should be designed and fabricated as provided in the other appropriate 3-A Sanitary Standards. Good manufacturing practices shall be used in the manufacture of plastic components to assure the utmost in quality and cleanliness.

J

**Selected References**


(1) E.6, Definitions of Terms Relating to Methods of Mechanical Testing, Annual Book of ASTM Standards, Vols. 03.01 and 08.03 (latest edition).

(2) Dictionary of Scientific and Technical Terms. McGraw-Hill, Inc., New York, NY, 1975.

(3) SPI Plastic Engineering Handbook, 4th ed. Society of Plastic Industry Inc., Book Division, New York, NY 1960.

(4) Whittington. L.R. Whittington's Dictionary of Plastics, 2nd ed. Technomic Publishing Co., Westport, CT, 1978.

(5) Handbook of Chemistry and Physics. The Chemical Rubber Publishing Co., Cleveland, OH.

(6) The Condensed Chemical Dictionary. Reinhold Publishing Co., New York, NY.

(7) Modern Plastics Encyclopedia. McGraw-Hill, Inc. New York, NY. (Published annually in October.)

(8) Terms Relating to Plastics, ASTM D-883-91. ASTM, 1916 Race St., Philadelphia, PA 19103-1180.

(9) Code of Federal Regulations, Title 21, Parts 170 to 199.

(10) E 178 Dealing with Outlying Observations, Annual Book of ASTM Standards, Vol. 14.02, ASTM. ASTM, 1916 Race St., Philadelphia, PA 19103-1180.


K

**Re-testing of Plastic Materials**

K.1

Re-testing (re-qualification) of plastic materials will be mandatory when the formulation of the product has been changed by any one, or combination of, the following means:

K.1.1

A significant change was made to the polymer;

K.1.2

Plastic additives or plasticizers were deleted or added;

K.1.3

Two or more listed plastics are alloyed or blended together. Furthermore, a change such as this would necessitate the generation of a new generic class of plastics for which new maximum percent weight gain values would have to be assigned to the Cleanability Response and Product Treatment Values found in Table-1 herein. (See Appendix, Section P for Certification Form.)

K.1.3.1

**Alloys and Blends of Polymers**

K.1.3.1.1

The combining of two or more polymers in a formulation is known as an alloy or blend of polymers. Many of these new types of plastics comply with appropriate FDA regulations for milk and milk product contact surfaces.

K.1.3.1.2

These standards should be amended to include these types of new plastics. A new generic class should be created for each type of specific alloy with appropriate maximum weight gain percentage values. This is necessary because the alloy may respond differently to product, cleaning and bactericidal treatments than do the individual polymers.

K.2

**Listing of plastic materials under multiple tradenames or product names in The List of Plastics**

K.2.1

Plastics materials which already meet the 3-A criteria included in The List of Plastics may be listed under other trade names and/or product designations. A company manufacturing the final plastic product from a plastic material already meeting 3-A criteria and listed on the "List of Plastics ..." may have its type or grade, trademark, company name and address and typical applications added to The List of Plastics Certified by the Manufacturers Thereof to Comply with the Criteria in the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-17 without re-qualification provided:

K.2.2

The plastic material was tested according to procedures in and meets or exceeds the Standards for Acceptability in the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-17 (or latest edition) and meets FD&C Act requirements and;

K.2.3

The formulation of the final fabricated plastic material was not changed by the addition of additives (See Section K.1 herein) and;

K.2.4

The manufacturer of the final fabricated plastic material certifies, in writing, K.2.2 to K.2.3 to the 3-A Secretary. (See Appendix P for Certification Form.)

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*These Standards shall become effective May 22, 1993.*

**APPENDIX P**

# CERTIFICATION FORM

Part-1 Must be completed.
Please type in all information except signature.

_____ has been evaluated under the terms of the test regimen contained in 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-17 as amended, and complies with the limitations set forth under Section H of that standard as well as the other criteria in the standard. This plastic complies with Part _____ of Title 21, Code of Federal Regulations. Samples of the material [were/were not] submitted to testing by the company listed below. (choose one)

Name _____

Company Name _____

Address _____

_____

_____

Signature _____

Date _____

Part-2 Must be completed as provided in K.2 if the plastic material to be listed was not submitted for testing by the company listed above.

The name of the plastic material originally tested, and currently listed is _____ and:

1. is the same formulation as that originally tested. (Yes/No)
2. is not an alloy or blend. (Yes/No)
3. Attach a copy of the Certification Form used for the initial certification of this material.

Signature _____

Date _____

Return to:

Dr. Thomas M. Gilmore
Dairy & Food Industries Supply Association, Inc.
3-A Sanitary Standards Committees
6245 Executive Boulevard
Rockville, MD 20852-3938
Phone (301) 984-1444
Fax (301) 881-7832

## APPENDIX L - MATERIAL/CHEMICAL LIST FOR TEST SOLUTIONS (SIMULATED REAGENTS)

| MATERIAL OR CHEMICAL | CHEMICAL FORMULA | CONCENTRATION OR GRADE | SUGGESTED SUPPLIER |
|---|---|---|---|
| Acetic acid, glacial | $CH_3COOH$ | ACS or reagent | Laboratory supply companies |
| ACL-60(dichlorisocyanurate, sodium salt) | ------ | 62% available $Cl_2$ | Monsanto Chemical Co., St. Louis, MO 1-800-325-4330 Ext. 346 |
| Aerosol® O.T.(Dioctyl sodium sulfosuccinate) (anionic detergent) | ------ | 100% dry solid | Sigma Chemical |
| Benzalkonium chloride (alkyl dimethyl benzyl ammonium chloride) | ------ | NF | ICM Biochemicals Co., Cleveland, OH 1-800-321-6842 |
| Iodine, crystals | $I_2$ | ACS or reagent | Laboratory supply companies |
| Lactic acid | $CH_3CHOHCOOH$ | 85%, ACS or reagent | Laboratory supply companies |
| Nacconol 40g (granular) or 40f (flake) (sodium dodecylbenzene sulfonate) | ------ | 40% | Stepan Co., Northfield, IL 60093 1-800-457-7673 |
| Non-fat dry milk | ------ | ----- | Dairy products store/Food store |
| Orthophosphoric acid, concentrated | $H_3PO_4$ | ACS or reagent | Laboratory supply companies |
| Sodium hydroxide, pellets | NaOH | ACS or reagent | Laboratory supply companies |
| Sodium hypochlorite | NaOCI | 4-6% available $Cl_2$, purified | Laboratory supply companies |
| Sodium phosphate, monobasic anyhydrous | $NaH_2PO_4$ | ACS or reagent | Laboratory supply companies |
| Sodium phosphate, tripoly | $Na_5P_3O_{10}$ | Purified | Laboratory supply companies |
| Sodium sulfate, anhyrous | $Na_2SO_4$ | ACS or reagent | Laboratory supply companies |
| Sterox N.J. (Nonyl phenol ethylene oxide condensate) (nonionic wetting agent) | ----- | 9.5-10 moles ethylene oxide | Monsanto Chemical Co., St. Louis, MO 1-800-325-4330 Ext. 346 |
| Sugar (sucrose) | $C_{12}H_{22}O_{11}$ | Common table sugar | Food store |
| Trisodium phosphate (Sodium phosphate, tribasic) | $Na_3PO_4 12H_2O$ | ACS or reagent | Laboratory supply companies |
| Heavy whipping cream | ------- | 36% milkfat | Dairy Products/Food store |

**********

## APPENDIX M

### Cleanability Response

| Sample No. | WEIGHT | | SURFACE COMPARISON | | | | | | REMARKS*9 |
|---|---|---|---|---|---|---|---|---|---|
| | | | TO ORIGINAL SAMPLE Sec. E (10) (b) (1) | | | TO STAINLESS WITH 150 GRIT FINISH Sec. E.10 (b) (2) | | | |
| | % Loss | % Gain | NO CHANGE | SLIGHT CHANGE | MARKED CHANGE | SMOOTHER | EQUAL | ROUGHER | |
| M-0 | | | | | | | | | |
| M'-0 | | | | | | | | | |
| M-1 | | | | | | | | | |
| M'-1 | | | | | | | | | |
| M-2 | | | | | | | | | |
| M'-2 | | | | | | | | | |
| M-3 | | | | | | | | | |
| M'-3 | | | | | | | | | |
| M-4 | | | | | | | | | |
| M'-4 | | | | | | | | | |
| M-5 | | | | | | | | | |
| M'-5 | | | | | | | | | |
| M-6 | | | | | | | | | |
| M'-6 | | | | | | | | | |
| M-7 | | | | | | | | | |
| M'-7 | | | | | | | | | |
| L-0 | | | | | | | | | |
| L'-0 | | | | | | | | | |
| L-1 | | | | | | | | | |
| L'-1 | | | | | | | | | |
| L-2 | | | | | | | | | |
| L'-2 | | | | | | | | | |
| L-3 | | | | | | | | | |
| L'-3 | | | | | | | | | |
| L-4 | | | | | | | | | |
| L'-4 | | | | | | | | | |
| L-5 | | | | | | | | | |
| L'-5 | | | | | | | | | |
| L-6 | | | | | | | | | |
| L'-6 | | | | | | | | | |
| L-7 | | | | | | | | | |
| L'-7 | | | | | | | | | |

*To receive information on membership with IAMFES Circle 360 on this card*

IAMFES

International Association of Milk, Food and Environmental Sanitarians Inc

DFS
2/93

Reader requests for information are sent to the appropriate company. Follow-up on reader requests are the responsibility of the company advertising.

The Advertisements included herein are not necessarily endorsed by the International Association of Milk, Food and Environmental Sanitarians, Inc.

Name _____ Title _____

Company _____

Address _____

City _____ State/Prov. _____

Country _____ Zip _____

Phone Number _____

**Please send information on items circled below: Deadline 60 days from issue date**

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101 | 114 | 127 | 140 | 153 | 166 | 179 | 192 | 205 | 218 | 231 | 244 | 257 | 270 | 283 | 296 | 309 | 322 | 335 | 348 |
| 102 | 115 | 128 | 141 | 154 | 167 | 180 | 193 | 206 | 219 | 232 | 245 | 258 | 271 | 284 | 297 | 310 | 323 | 336 | 349 |
| 103 | 116 | 129 | 142 | 155 | 168 | 181 | 194 | 207 | 220 | 233 | 246 | 259 | 272 | 285 | 298 | 311 | 324 | 337 | 350 |
| 104 | 117 | 130 | 143 | 156 | 169 | 182 | 195 | 208 | 221 | 234 | 247 | 260 | 273 | 286 | 299 | 312 | 325 | 338 | 351 |
| 105 | 118 | 131 | 144 | 157 | 170 | 183 | 196 | 209 | 222 | 235 | 248 | 261 | 274 | 287 | 300 | 313 | 326 | 339 | 352 |
| 106 | 119 | 132 | 145 | 158 | 171 | 184 | 197 | 210 | 223 | 236 | 249 | 262 | 275 | 288 | 301 | 314 | 327 | 340 | 353 |
| 107 | 120 | 133 | 146 | 159 | 172 | 185 | 198 | 211 | 224 | 237 | 250 | 263 | 276 | 289 | 302 | 315 | 328 | 341 | 354 |
| 108 | 121 | 134 | 147 | 160 | 173 | 186 | 199 | 212 | 225 | 238 | 251 | 264 | 277 | 290 | 303 | 316 | 329 | 342 | 355 |
| 109 | 122 | 135 | 148 | 161 | 174 | 187 | 200 | 213 | 226 | 239 | 252 | 265 | 278 | 291 | 304 | 317 | 330 | 343 | 356 |
| 110 | 123 | 136 | 149 | 162 | 175 | 188 | 201 | 214 | 227 | 240 | 253 | 266 | 279 | 292 | 305 | 318 | 331 | 344 | 357 |
| 111 | 124 | 137 | 150 | 163 | 176 | 189 | 202 | 215 | 228 | 241 | 254 | 267 | 280 | 293 | 306 | 319 | 332 | 345 | 358 |
| 112 | 125 | 138 | 151 | 164 | 177 | 190 | 203 | 216 | 229 | 242 | 255 | 268 | 281 | 294 | 307 | 320 | 333 | 346 | 359 |
| 113 | 126 | 139 | 152 | 165 | 178 | 191 | 204 | 217 | 230 | 243 | 256 | 269 | 282 | 295 | 308 | 321 | 334 | 347 | 360 |

*This second Reader Service Card is provided to allow co-workers to also respond to companies of interest.*

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The Advertisements included herein are not necessarily endorsed by the International Association of Milk, Food and Environmental Sanitarians, Inc.

Name _____ Title _____

Company _____

Address _____

City _____ State/Prov. _____

Country _____ Zip _____

Phone Number _____

**Please send information on items circled below: Deadline 60 days from issue date**

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101 | 114 | 127 | 140 | 153 | 166 | 179 | 192 | 205 | 218 | 231 | 244 | 257 | 270 | 283 | 296 | 309 | 322 | 335 | 348 |
| 102 | 115 | 128 | 141 | 154 | 167 | 180 | 193 | 206 | 219 | 232 | 245 | 258 | 271 | 284 | 297 | 310 | 323 | 336 | 349 |
| 103 | 116 | 129 | 142 | 155 | 168 | 181 | 194 | 207 | 220 | 233 | 246 | 259 | 272 | 285 | 298 | 311 | 324 | 337 | 350 |
| 104 | 117 | 130 | 143 | 156 | 169 | 182 | 195 | 208 | 221 | 234 | 247 | 260 | 273 | 286 | 299 | 312 | 325 | 338 | 351 |
| 105 | 118 | 131 | 144 | 157 | 170 | 183 | 196 | 209 | 222 | 235 | 248 | 261 | 274 | 287 | 300 | 313 | 326 | 339 | 352 |
| 106 | 119 | 132 | 145 | 158 | 171 | 184 | 197 | 210 | 223 | 236 | 249 | 262 | 275 | 288 | 301 | 314 | 327 | 340 | 353 |
| 107 | 120 | 133 | 146 | 159 | 172 | 185 | 198 | 211 | 224 | 237 | 250 | 263 | 276 | 289 | 302 | 315 | 328 | 341 | 354 |
| 108 | 121 | 134 | 147 | 160 | 173 | 186 | 199 | 212 | 225 | 238 | 251 | 264 | 277 | 290 | 303 | 316 | 329 | 342 | 355 |
| 109 | 122 | 135 | 148 | 161 | 174 | 187 | 200 | 213 | 226 | 239 | 252 | 265 | 278 | 291 | 304 | 317 | 330 | 343 | 356 |
| 110 | 123 | 136 | 149 | 162 | 175 | 188 | 201 | 214 | 227 | 240 | 253 | 266 | 279 | 292 | 305 | 318 | 331 | 344 | 357 |
| 111 | 124 | 137 | 150 | 163 | 176 | 189 | 202 | 215 | 228 | 241 | 254 | 267 | 280 | 293 | 306 | 319 | 332 | 345 | 358 |
| 112 | 125 | 138 | 151 | 164 | 177 | 190 | 203 | 216 | 229 | 242 | 255 | 268 | 281 | 294 | 307 | 320 | 333 | 346 | 359 |
| 113 | 126 | 139 | 152 | 165 | 178 | 191 | 204 | 217 | 230 | 243 | 256 | 269 | 282 | 295 | 308 | 321 | 334 | 347 | 360 |

Place
Stamp
Here

IAMFES

200W Merle Hay Centre
6200 Aurora Ave.
Des Moines, Iowa 50322

Place
Stamp
Here

IAMFES

200W Merle Hay Centre
6200 Aurora Ave.
Des Moines, Iowa 50322

## APPENDIX N

### Product Treatment

| Sample No. | WEIGHT | | SURFACE COMPARISON | | | | | | REMARKS*9 |
|---|---|---|---|---|---|---|---|---|---|
| | | | TO ORIGINAL SAMPLE Sec.F.3 (b) (1) | | | TO STAINLESS WITH 150 GRIT FINISH Sec. F.3 (b) (2) | | | |
| | % Loss | % Gain | NO CHANGE | SLIGHT CHANGE | MARKED CHANGE | SMOOTHER | EQUAL | ROUGHER | |
| M-0 | | | | | | | | | |
| M'-0 | | | | | | | | | |
| M-1 | | | | | | | | | |
| M'-1 | | | | | | | | | |
| M-2 | | | | | | | | | |
| M'-2 | | | | | | | | | |
| M-3 | | | | | | | | | |
| M'-3 | | | | | | | | | |
| M-4 | | | | | | | | | |
| M'-4 | | | | | | | | | |
| M-5 | | | | | | | | | |
| M'-5 | | | | | | | | | |
| M-6 | | | | | | | | | |
| M'-6 | | | | | | | | | |
| M-7 | | | | | | | | | |
| M'-7 | | | | | | | | | |
| L-0 | | | | | | | | | |
| L'-0 | | | | | | | | | |
| L-1 | | | | | | | | | |
| L'-1 | | | | | | | | | |
| L-2 | | | | | | | | | |
| L'-2 | | | | | | | | | |
| L-3 | | | | | | | | | |
| L'-3 | | | | | | | | | |
| L-4 | | | | | | | | | |
| L'-4 | | | | | | | | | |
| L-5 | | | | | | | | | |
| L'-5 | | | | | | | | | |
| L-6 | | | | | | | | | |
| L'-6 | | | | | | | | | |
| L-7 | | | | | | | | | |
| L'-7 | | | | | | | | | |

## APPENDIX O
## Cleanability Comparison

| Sample No. | CLEANABILITY COMPARISON Sec. G.3 BETTER | EQUAL | POORER | REMARKS*9 |
|---|---|---|---|---|
| M-0 | | | | |
| M'-0 | | | | |
| M-1 | | | | |
| M'-1 | | | | |
| M-2 | | | | |
| M'-2 | | | | |
| M-3 | | | | |
| M'-3 | | | | |
| M-4 | | | | |
| M'-4 | | | | |
| M-5 | | | | |
| M'-5 | | | | |
| M-6 | | | | |
| M'-6 | | | | |
| M-7 | | | | |
| M'-7 | | | | |
| L-0 | | | | |
| L'-0 | | | | |
| L-1 | | | | |
| L'-1 | | | | |
| L-2 | | | | |
| L'-2 | | | | |
| L-3 | | | | |
| L'-3 | | | | |
| L-4 | | | | |
| L'-4 | | | | |
| L-5 | | | | |
| L'-5 | | | | |
| L-6 | | | | |
| L'-6 | | | | |
| L-7 | | | | |
| L'-7 | | | | |

*9 The purpose of the "Remarks" in this section is to provide a means to record unusual changes in physical properties of the test specimens after exposure to test regimens in Sections E & F. These recorded observations are not to be used as part of the standards for acceptability. It is beyond the scope of these Standards to set limits of acceptable changes in physical properties except surface smoothness. However, plastic materials should retain or return to their original physical properties such as color, transparency, translucency, flexibility, form or shape after test regimens E & F. Users should consider these observations when judging whether a plastic material will maintain essential properties in the intended application.

*Dairy, Food and Environmental Sanitation, Vol. 13, No. 2, Page 139 (February 1993)*


# Amendments to 3-A Sanitary Standards for Equipment for Packaging Dry Milk and Dry Milk Products, Number 27-01

27-02

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

It is the purpose of the IAMFES, 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. Dry milk and dry milk packaging products, specifications heretofore and hereafter developed which so differ in design, material, fabrication, or otherwise as not too conform with the following standards, but which, in the fabricator's opinion are equivalent or better, may be submitted for joint consideration of the IAMFES, USPHS, and DIC, at any time.

B.8

*Scale Pans*: Shall mean removable filling equipment components used for holding or transporting product.

D.10.1.1

Where smaller radii are required for essential functional reasons, such as those in filler nozzles, scale pans, and screw conveyors, the radii shall be not less than 1/32 in. (1 mm).

---

*These amendments shall become effective May 22, 1993.*

# Business Exchange "Classifieds"

## Services / Products



## Equipment For Sale



**Your Message Could Be Here!**

# Coming Events

1993

## March

•2-3, **Virginia Association of Sanitarians and Dairy Fieldmen** will meet at the Donaldson Brown Center for Con-Ed, Virginia Tech, Blacksburg, VA. For further information, please contact Donna Izac, Dairy Services Branch, VDACS, P. O. Box 1163, Richmond, VA 23209, (804)786-8912.

•5-9, **Statistical Quality Control** to be held at the University of California-Davis, Davis, CA. For more information or to enroll, call (800)752-0881. From outside California, call (916)757-8777.

•9-11, **Basic Pasteurization Course**, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

•15-17, **Food Product Development/Ingredient Technology** to be held at the University of California-Davis, Davis, CA. For more information or to enroll, call (800)752-0881. From outside California, call (916)757-8777.

•15-17, **Microbiology and Engineerting of Sterilization Processes** to be held at the St. Paul Campus of the University of Minnesota. For further information, contact Dr. William Schafer, course coordinator, Department of Food Science and Nutrition, 1334 Eckles Avenue, St. Paul, MN 55108, (612)624-4793.

•15-18, **Better Process Control School** to be held at the University of California-Davis, Davis, CA. For more information or to enroll, call (800)752-0881. From outside California, call (916)757-8777.

•16-17, **Rapid Methods for Detection and Identification of Foodborne Pathogens**, Raleigh, NC. For more information, contact Dr. Pat Curtis, NCSU Department of Food Science, Box 7624, Raleigh, NC 27695; tel., (919)515-2956; fax, (919)515-7124.

•17, **Indiana Dairy Industry Conference** to be held at Purdue University. For more information contact James V. Chambers, Food Science Department, Smith Hall, Purdue University, West Lafayette, IN 47907, (317)494-8279.

•17-19, **Michigan Environmental Health Association Annual Educational Conference** will be held at the Holiday Inn Crowne Plaza, Grand Rapids, MI. For more information, please contact John Kowalczyk at (313)761-1294.

•18-19, **Florida Association of Milk, Food and Environmental Sanitarians Annual Meeting** in conjunction with Suppliers Night at the Marriott on International Drive. For more information, please contact Bill Thornhill, 3023 Lake Alfred Road, Winter Haven, FL 33881, (813)299-6555.

•22-24, **Introduction to Statistical Methods for Sensory Evaluation of Foods** to be held at the University of California-Davis, Davis, CA. For more information or to enroll, call (800)752-0881. From outside California, call (916)757-8777.

.•22-26, **Midwest Workshop on Milk, Food and Environmental Sanitation** to be held at Ohio State University, Columbus, OH. For more information contact Dr. Matrid Ndife, Department of Food Science and Technology, 2121 Fyffe Road, Ohio State University, Columbus, OH 43210-1097 or call (614)292-3069; FAX (614)292-0218.

•22-26, **Molds and Mycotoxins in Foods,** offered by the American Association of Cereal Chemists, will be held in Lincoln, NE. For more information, contact Marie McHenry, AACC Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121-2097, USA. Telephone (612)454-7250; FAX (612)454-0766.

•23-25, **Food Extrusion,** offered by the American Association of Cereal Chemists, will be held in Kansas City, MO. For more information, contact Marie McHenry, AACC Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121-2097, USA. Telephone (612)454-7250; FAX (612)454-0766.

•24-26, **1st Annual Meeting of the Carolina Association of Milk, Food and Environmental Sanitarians** will be held in Charlotte, NC. For more information, please contact Elizabeth Johnson at (803)937-6201.

•26-28, **Sensory Evaluation: Overview and Update** to be held at the University of California-Davis, Davis, CA. For more information or to enroll, call (800)752-0881. From outside California, call (916)757-8777.

•29--31, **Toxics Release Inventory Data Use Conference**, sponsored by the U.S. EPA, will be held at the Stouffer Riviere Hotel, Chicago, IL. For more information, please contact Kim Mitchell, Abt Associates Inc. at (617)349-2785.

## April

•7-9, **Missouri Milk, Food and Environmental Health Association's Annual Education Conference** will be held at the Ramada Inn, Columbia, MO. For more information contact Janet Murray at (816)263-6643.

•8, **Current Changes in Food Policy and Regulations: Their Impact on the Food and Dairy Industry,** sponsored by the Nebraska Association of Milk and Food Sanitarians, will be held at the Douglas County Extension Office, Omaha, NE. For more information, please contact Fred Cook at (402)595-7822.

•14-15, **Food Micro '93**, sponsored by the Food Processors Institute (FPI), will be held at the Hyatt Regency-Crystal City, Arlington, VA. For more information contact Rita Fullem, FIP's executive director, at (202)639-5944.

•19-22, **Purdue Better Process Control School** to be held at Purdue University. For more information contact James V. Chambers, Food Science Department, Smith Hall, Purdue University, West Lafayette, IN 47907, (317)494-8279.

•20-22, **NIR Spectroscopy,** offered by the American Association of Cereal Chemists, will be held in Chicago, IL. For more information, contact Marie McHenry, AACC Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN

## May

•**2-7, National Conference on Interstate Milk Shipments 1993 Meeting** will be held at the Sheraton Central Park Hotel, Arlington, TX. For more information contact Leon Townsend, Executive Secretary/Treasurer, National Conference on Interstate Milk Shipments, 110 Tecumseh Trail, Frankfort, KY 40601, telephone and/or FAX (502)695-0253.

•**6-12, INTERPACK 93, 13th International Trade Fair for Packaging Machinery, Packaging Materials and Confectionery Machinery**, will be held at the fairgrounds in Dusseldorf, Germany. For further information on exhibiting at or attending INTERPACK 93, contact Dusseldorf Trade Shows, Inc., 150 North Michigan Avenue, Suite 2920, Chicago, IL 60601,(312)781-5180; FAX (312)781-5188.

•**10-13, Purdue Aseptic Processing and Packaging Workshop** to be held at Purdue University. For more information contact James V. Chambers, Food Science Department, Smith Hall, Purdue University, West Lafayette, IN 47907, (317)494-8279.

## June

•**8-9, Texas Association of Milk, Food and Environmental Sanitarians Annual Meeting** will be held at the Wyndham Hotel, 4140 Governor's Row at Benwhite Exit off IH35, Austin, TX (512)448-2222. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

•**15-17, Low Calorie Food Product Development (with IFT & CFDRA),** offered by the American Association of Cereal Chemists, will be held in Chipping, Campden, England. For more information, contact Marie McHenry, AACC Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121-2097, USA. Telephone (612)454-7250; FAX (612)454-0766.

•**20-23,** Joint International Summer Meeting of **The American Society of Agricultural Engineers and The Canadian Society of Agricultural Engineering** to be held in Spokane, WA. For more information contact The American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MI 49085-9659, (616)429-0300; FAX (616)429-3852.

## July

•**13-15, Basic Pasteurization Course,** sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

•**16-23, Rapid Methods and Automation in Microbiology: International Workshop XIII** to be held at the Kansas State University, Manhattan, KS. For more information contact Dr. Daniel Y. C. Fung, Workshop Director, telephone (913)532-5654, FAX (913)532-5681. A mini--symposium will occur on July 16-17.

## August

•**1-4, 80th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc.** to be held at the Stouffer Waverly Hotel, Atlanta, GA. For more information please contact Julie Heim at (800)369-6337 (US) or (800)284-6336 (Canada).

•**17-19, Special Problems Course**, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Seven Oaks Hotel, 1400 Austin Hwy, San Antonio, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

## October

•**19-21, Food Preservation 2000 - Integrating Processing, Packaging, and Consumer Research** is sponsored by and held at U. S. Army Natick Research, Development and Engineering Center, Natick, MA, USA. For additional information, please contact Lisa McCormick or Sonya Herrin, Science and Technology Corporation, (804)865-7604.

•**26-28, Basic Pasteurization Course**, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

**To insure that your meeting time is published, send announcements at least 90 days in advance to: IAMFES, 200W Merle Hay Centre, 6200 Aurora Avenue, Des Moines, IA 50322.**

### Advertising Index



### Business Exchange "Classifieds"

# IAMFES

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

## IAMFES Booklets

| Qty. | | Total $ |
|---|---|---|
| _____ | Procedures to Investigate Waterborne Illness<br>$5.00/member; $7.50/non-member | _____ |
| _____ | Procedures to Investigate Foodborne Illness - new 4th Edition<br>$5.00/member; $7.50/non-member | _____ |
| _____ | Procedures to Investigate Arthropod-borne and Rodent-borne Illness<br>$5.00/member; $7.50/non-member | _____ |
| _____ | Procedures to Implement the Hazard Analysis Critical Control Point System<br>$5.00/member; $7.50/non-member | _____ |
| _____ | Pocket Guide To Dairy Sanitation<br>$.50/member; $.75/non-member (minimum order of 10) ($2.50 shipping for each order of 10) | _____ |

**Multiple copies available at reduced prices.**

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|---|---|---|
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| _____ | Complete set 3-A Dairy & Egg Standards<br>$48 member; $72 non-member | _____ |
| _____ | 3-A Egg Standards<br>$28 member; $42 non-member | _____ |
| _____ | Five-year Service on 3-A Sanitary Standards<br>3-A Dairy & Egg Standards<br>$44 member; $66 non-member | _____ |

Subtotal _____
U.S. Shipping _____
Add $3.25 for each item
Shipping
Outside U.S. _____
Add $8.25
3-A Sanitary Standards Total _____

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Job Title _____ Office Phone # _____
Address _____
City _____ State/Province _____ Country _____ Zip _____

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____ MASTER CARD
____ VISA
____ AMERICAN EXPRESS

**U. S. FUNDS on U. S. BANK**

CARD # _____
EXP. DATE _____
YOUR SIGNATURE _____

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**6200 AURORA AVENUE**
**DES MOINES, IA 50322**

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**1-800-284-6336 (Canada)**
**515-276-3344 FAX 515-276-8655**

# IAMFES

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

## MEMBERSHIP APPLICATION

### MEMBERSHIP

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❑ **Membership with *Dairy, Food and Environmental Sanitation* $50**

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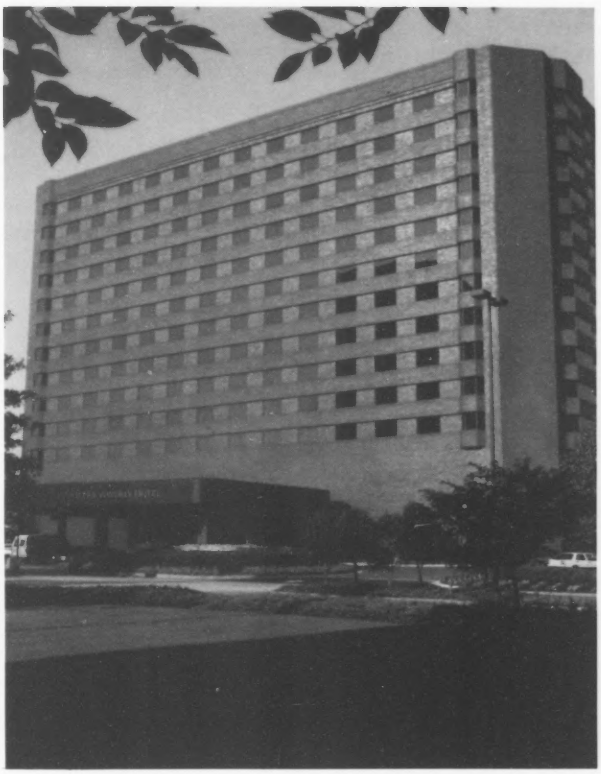
# STOUFFER WAVERLY HOTEL

## *Atlanta's Most Exciting Luxury Hotel*

### *Site of the 80th IAMFES Annual Meeting*



The **Stouffer Waverly Hotel** is Atlanta's most exciting luxury hotel, rising 14 stories as the cornerstone and focal point of the $150 million Galleria office and shopping complex. Let your mood dictate your pace. With seven restaurants and lounges featured in the hotel, a host of invigorating recreational pastimes, and over 90 fine shops, movie theaters and restaurants in the adjoining Galleria Mall, there's never a dull moment. At you're discretion, however, you'll find total privacy, comfort and relaxation in any of the sumptuous and handsomely appointed guest rooms and suites.

Whether you visit the Atlanta area for business or pleasure, the **Stouffer Waverly Hotel** is sure to satisfy. Come for the excitement, or come for the pleasure — but come to the **Stouffer Waverly Hotel** for an experience to remember.

### LOCATION:

Conveniently located at the intersection of Highways 75 and 285, just off route 41, in an area that is the dynamic focal point of Atlanta's bustling and affluent Northwest/Cobb County corridor, the **Stouffer Waverly Hotel** is easily accessible from any point in the metropolitan area.

### TRANSPORTATION:

The **Stouffer Waverly Hotel** can be quickly reached via expressways from the airport, downtown and around town. Atlanta's central business district is only 11 miles from the hotel, while Hartsfield International Airport is a short 25 minutes away via I-285. Our Concierge Desk staff will assist you with airline, taxi, and rental car services for your convenience.

### PERSONAL COMFORT & CONVENIENCE:

Although distinctive in many ways, the **Stouffer Waverly Hotel** is unsurpassed in providing personal comfort. Handsomely appointed, the sumptuous, over-sized guest rooms or "demi-suites" feature comfortable sitting areas. The four comers of each floor offer uncompromising suites with roomy conference areas and wet bars, and can be joined to one or two demi-suites as well. Our ***Club Level*** on the top floor provides extraordinary amenities and services for discriminating travelers. Other Stouffer services and amenities to make your stay enjoyable, include: complimentary shoe shine, complimentary coffee and newspaper delivered to your door with your wake-up call, 24-hour food and beverage service, professional valet service, free parking, safety deposit boxes, evening turn-down service, and a library.

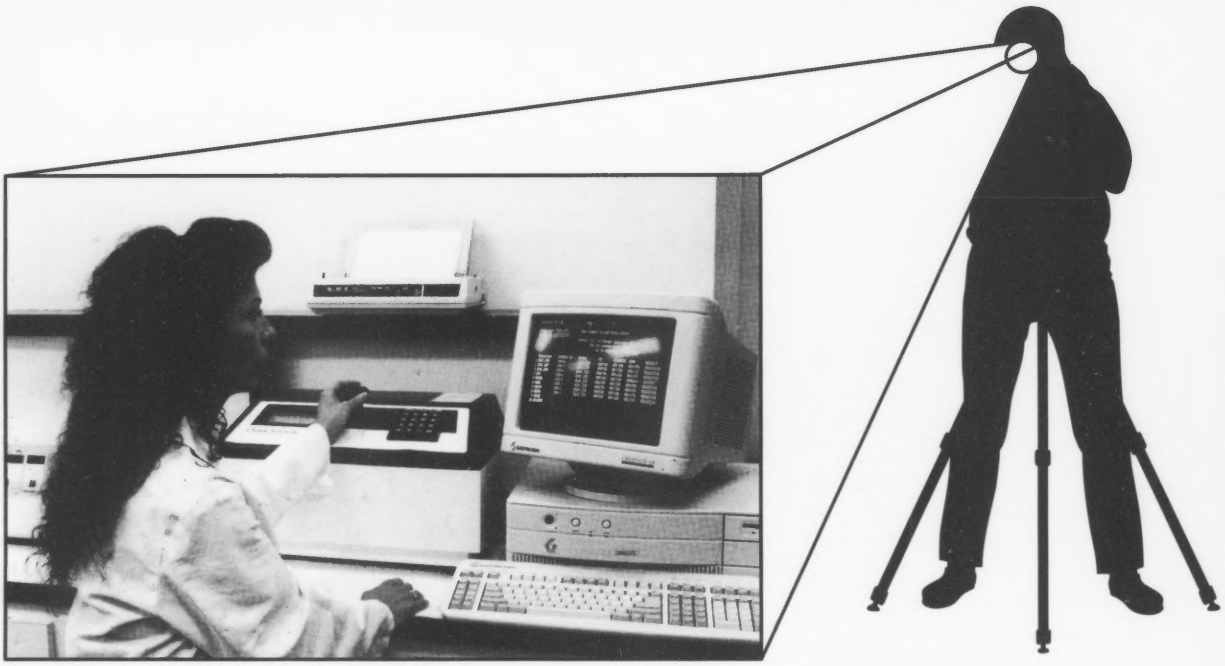
### RESTAURANTS and LOUNGES:

The superb variety of dining and entertainment experiences at the **Stouffer Waverly Hotel** is extraordinary. Enjoy outstanding cuisine served in elegant fashion at the ***Cinnabar***, or take in the casual atmosphere of the ***Brasserie*** for all-day dining with a flair. On the Mezzanine Level, ***Petals of Jade*** offers expertly prepared delicacies in an atmosphere enhanced by Oriental antiques and works of art. Also on the Mezzanine, the ***Garden Court Bar*** is a good place to enjoy your favorite cocktail under the natural lighting of a glass skylight. ***Alfresco*** offers New York style light food service 24-hours a day in the atrium lobby. For a change of pace, meet with friends in the intimacy of the ***Lobby Bar***, also conveniently located in the lobby. In addition, the adjacent Galleria Mall and the nearby Cumberland Mall offer a variety of dining adventures as well.

### LEISURE ACTIVITIES:

For the active sports minded visitor, the **Stouffer Waverly Hotel** has a host of things to do. Refresh yourself in our indoor pool, or soak up some sun in the outdoor pool area. Relax in the soothing heat of the sauna or whirlpool, or get physical on one of two indoor racquetball courts or in our fully equipped exercise room. For light diversion, stop in our card room. In addition, the **Stouffer Waverly Hotel** provides a full schedule of changing monthly events. For shopping, the adjoining Galleria specialty mall features over 90 fine shops, theaters and restaurants, and the Cumberland Mall, directly across the street, offers more than 1 million square feet of retail selections.

# Picture This Bonus.



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