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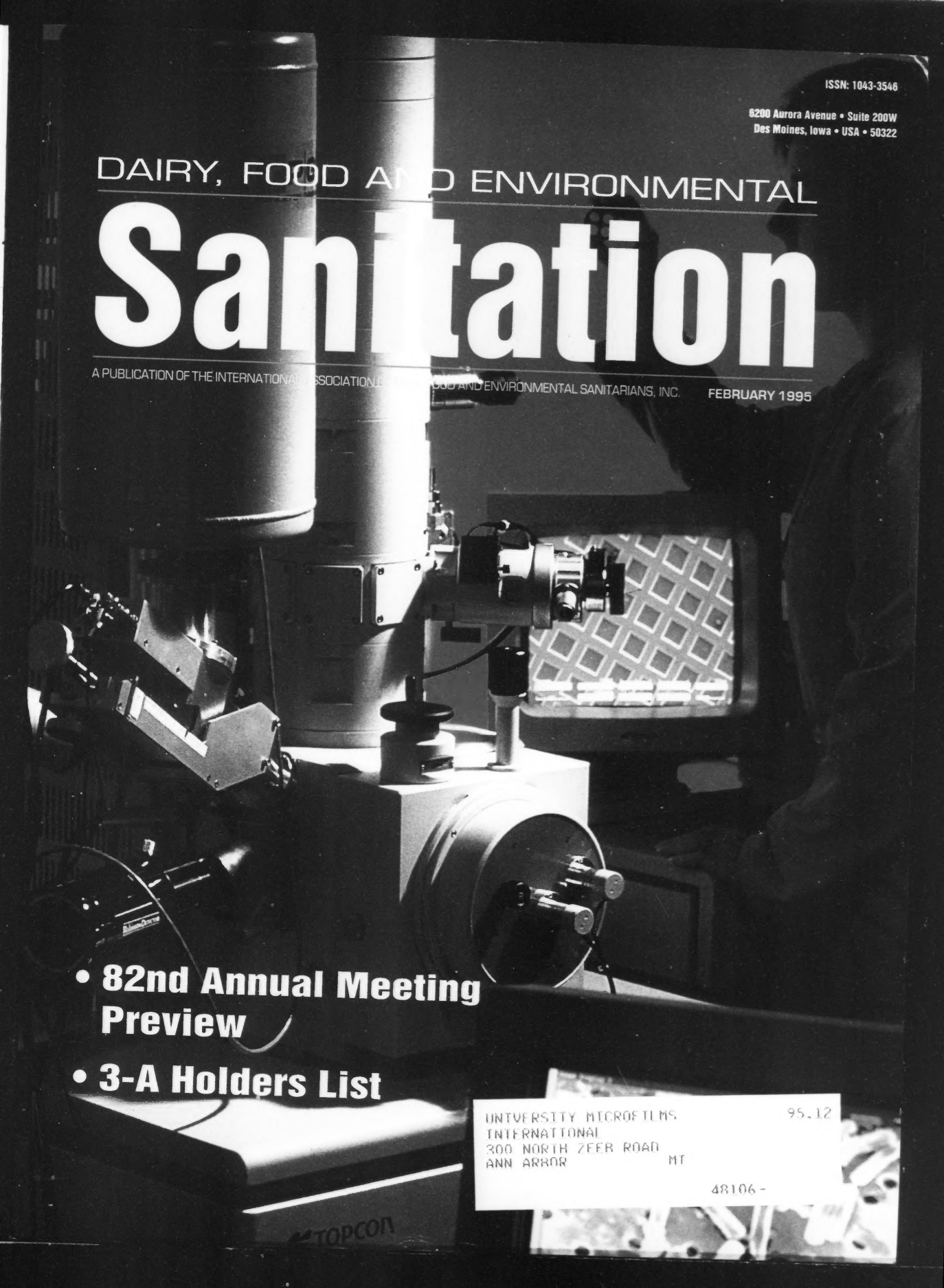
DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC. FEBRUARY 1995



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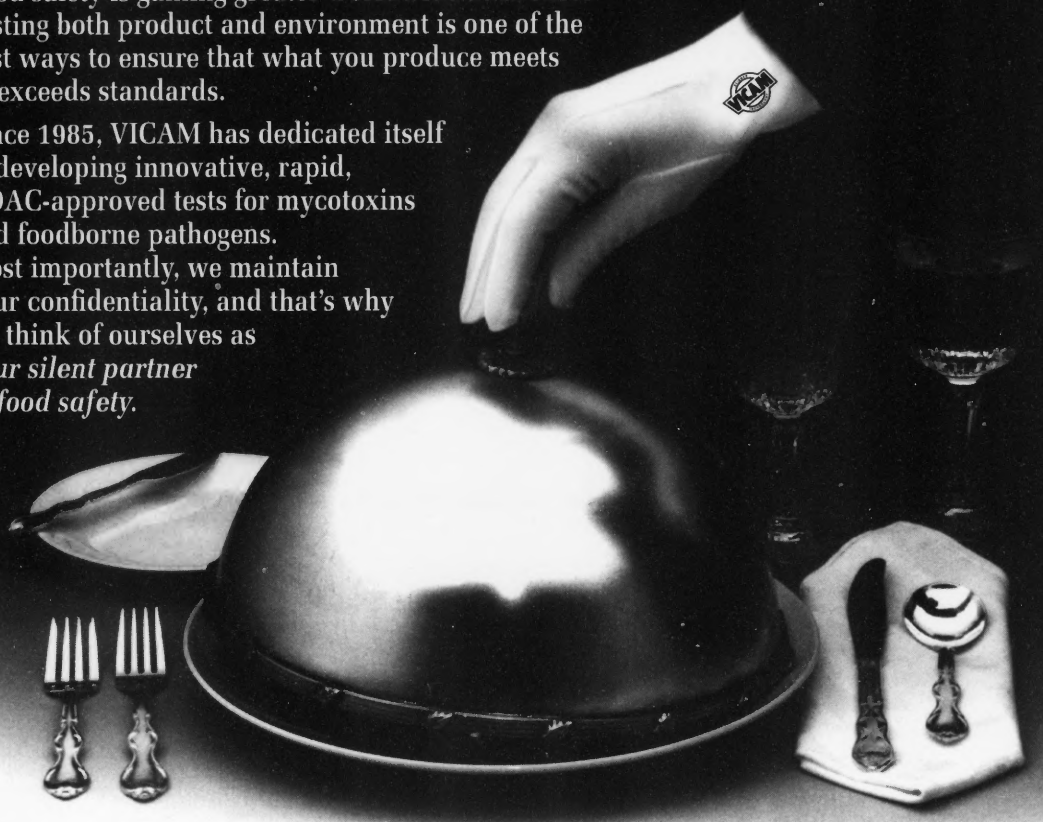

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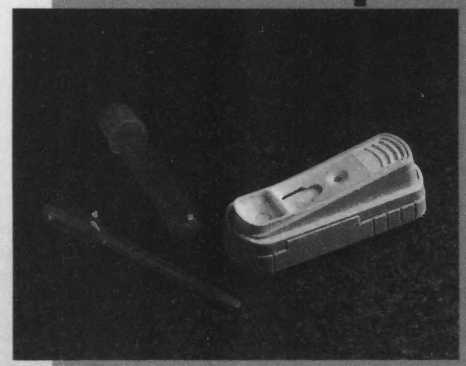

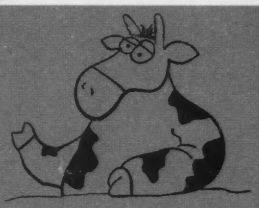

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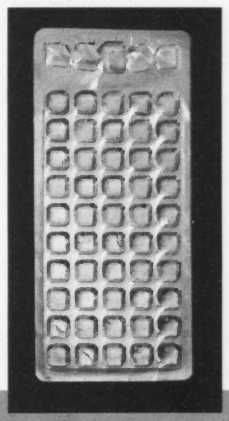

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THOUGHTS

FROM THE PRESIDENT

By C. DEE CLINGMAN,
IAMFES President

"Black Raspberries are Red When They're Green"

Now how would you like to explain that to the new immigrants arriving in U.S. harbors? Communications in today's world will make or break an organization. Good communication skills are not just essential - they are **critical** to success.

But communication is a major problem. I don't care what kind of an industry you talk to, it's a major problem! It's in every activity. Communication is a problem whether it's vertical, within your own organization, or whether it's horizontal, between the sanitarian and the foodservice operator, the customer and the supplier, industry and government, the manager and the worker. And that is due to the complications of the English language. Now in order to make a point, I won't even attempt to explain the meanings of such polysyllabic words as triskaidekaphobia, monomaniacal, herpetology or diaphanous. The etymology of which is so penetrating and dimensionable, that any connotation of didactic perspicuity becomes entirely too involved for this exercise. So let's get into some very simple words like run. The word "run" has 90 different connotations. Think about it - a run in your hose, to run on a bank, to run fast...

Today's challenges in communications are even more frustrating and complicated with the transmission of information equal to the speed of light. However, we have failed through our systems of education to transfer **understanding** along with that information.

Professional Associations are also plagued with the challenges of communications, both vertically among and between members, exhibitors, and advertisers, and horizontally between similar professional organizations. A case in point: recently, IAMFES learned that the National Environmental Health Association (NEHA) was going to hold its 1996 Annual Conference in Chicago on the **exact** dates of the 1996 IAMFES meeting in Seattle. Since both organizations share some of the same members, exhibitors, and advertisers it will not only be a disappointment for some that they will need to sacrifice one of the meetings, it will impact both organizations' meeting revenues since members and exhibitors cannot be at the same place at the same time. When both IAMFES and NEHA learned of the problem it was too late to back out of signed hotel contracts without penalties in excess of $30,000. Lack of communications? I think so, especially since both organizations had their hotel contracts executed approximately 2 years ago. This wasn't the result of the complications of the English language as noted earlier, but lack of dialogues between both organizations.

Now for the good news! In December I hosted what is hoped to be a beginning of open communications with NEHA. We had a joint conference call between NEHA's Executive Director Nelson Fabin and President Diane Evans, along with our Executive Manager Steve Halstead and me as IAMFES President. We had a preliminary agenda and filled our 45 minutes with 1 1/2 hours of discussion. We learned from just simple dialogue we were both planning to hold our 1998 meeting in the same city known for dealers, decks and dice, but on **different** dates that summer. This would have been another planning error since it would be difficult to get approvals and interest to go to the same "high roller" city just weeks apart. But through communications we helped one another avert a problem.

Our joint NEHA-IAMFES telephone conference call produced other results as well - discussions of mutual state affiliates, participation in joint projects like disaster relief as we did last year, similar annual meeting problems and solutions, and – most importantly - **we talked**.

Communications is a great thing. It is amazing what we learn by **listening**. As each of us forge ahead we need to remember that "light speed" of information is not the important part; it is the understanding we gain through listening that is the most valuable ingredient. People tend to dislike what they do not understand. Shouldn't the reverse also be true? I would hope so!

The International Association of Milk, Food and Environmental Sanitarians

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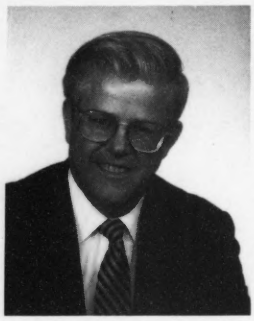

By STEVEN K. HALSTEAD, CAE
IAMFES Executive Manager

"In the Status of Science"

Just when I thought it was safe for scientists to come out of the closet and proudly proclaim to the world that they were scientists, along comes Halloween Weekend.

I was away from home that weekend, so I found the television turned on more than usual. There were 32 channels and a remote control which allowed me to scan channel after channel to see what was on. Nearly all channels – at least the movie channels – featured a horror movie in honor of Halloween.

More often than not, the movies had a science fiction cast to them – I really can't say if the Freddy Krueger series has a science fiction bend or not – I've never watched enough of any one of them to form an opinion. Most of the sci-fis involved a "good guy" scientist and a "bad guy" scientist (and an exceedingly attractive female lab assistant, of course). It seemed to me, that while the good guy scientist usually prevailed, it was the acts of the bad guy scientist that I remembered. He (and they were always males) was consistently "badder" than the good guy was good, no matter what the final outcome.

I grew up in a period of time which was for the layperson, exceedingly exciting scientifically. While the golden age for physicists may have been the first twenty years of this century; for the layperson, the late forties, fifties, and sixties would be hard to beat. World War II fostered a boom in science and technology – not all of it good – that left the person on the street reeling. Just as I marvel at young peoples' ability to grasp computer technology today, the adults of my youth must have felt the same way about the exploding science and technology they saw around them. And it was scary.

For awhile, we had the idea that science could solve all society's problems. Surely some of you are old enough to remember the wonderful promises of the "power of the atom" and when we talked about "conquering space" for our own needs. But always in the back of our minds was the nagging fear of the potential for bad things from science and technology.

The sacrificial death of the Super Collider in some ways seemed to give birth to a new tolerance of science and technology, and the people who did them. Oh, to be sure, every once in awhile a fearmonger would fire a shot – BST and genetically engineered tomatoes come quickly to mind. But for the most part, it was live and let live and if scientists weren't respected, at least they were no longer publicly feared.

In my mind, that all came crashing down on Halloween weekend.

We know our greatest fear is the fear of the unknown. A society that doesn't know and understand science is going to fear it. One has only to look around the schools in this country to see that students are staying away from the science and math classrooms in droves. I don't think that I am going too far out on a limb to conclude this current generation does not know science and perhaps the same could be said for the previous one.

Science and technology are too big a part of our gross national product to ever see their practitioners relegated to the alchemist's dungeon of old. That doesn't mean, however, that scientists are going to be wholeheartedly welcomed in this scientifically illiterate society.

If we are not satisfied with this status, we have but two choices – 1) grin and bear it or 2) do something about it.

Dairy, Food and Environmental Sanitation, Vol. 15, No. 2, Pages 64-69

Hazard Analyses of Street Foods and Considerations for Food Safety

Frank L. Bryan, Food Safety Consultation and Training
8233 Pleasant Hill Road, Lithonia, Georgia, 30058

Hazard Analyses of Street Foods

Street foods vary considerably in composition and methods of preparation, but they are exposed to the same sources of contamination as other foods served in a community. Whether pathogens reach them depends on raw ingredients and handling and preparation procedures. Whether pathogens survive, if present, depends on the types (e.g., vegetative cells or sporeformers) and quantity of contaminants and on the extent of heating or acidification. Whether survivors or newly acquired contaminants propagate depends on (a) time-temperature exposures, (b) atmosphere (E_h) surrounding the food, (c) characteristics of the pathogen, (d) ratio of total microbial flora to pathogen, and (e) characteristics (e.g., nutrients, pH, a_w, E_h, and natural or added inhibitory substances) of the food. Hazards will have to be assessed in reference to the severity of the risks that they pose.

A hazard is unacceptable contamination of a microbiological, chemical, or physical nature, and/or unacceptable survival or persistence, and/or unacceptable growth or increase. Severity is the extent to which a hazard has progressed or can be expected to do so. Outcomes listed in decreasing orders of magnitude are: (a) life-threatening, (b) severe or chronic illness, (c) moderate or mild illnesses, or of lesser consequence such as (d) spoilage or (e) other quality defects or situations that offend aesthetic values. A risk is the probability that a hazard will occur; it may be high, moderate, low or negotiable.

Although risks of acquiring food-borne illness from foods prepared and/or vended on streets appear to be high, there are only scant epidemiological data to support this hypothesis. Nevertheless, certain epidemiological data from other sources can give information on which to base estimates of risk. Of particular value among these are data on vehicles and factors that contribute to the causation of food-borne disease outbreaks.

Data on foods that are commonly implicated as vehicles of food-borne pathogens elsewhere, if such data are unavailable locally or in the region, and from related operations (e.g., food-service establishments) imply risks when the same types of foods are prepared by street vendors. For example, Mexican-style (particularly beans and ground or shredded meats) and Chinese (particularly fried rice) foods are common vehicles of outbreaks of food-borne diseases in the United States (Bryan, 1988a). These or similar foods are commonly sold by street vendors throughout the world; hence, risks are implied. Other foods (e.g., gyros) that are vended on streets in some countries are implicated occasionally. Many other foods because of their composition and preparation practices are potential, if not actual, but up to the present undetected, vehicles of food-borne illness. Yet others are quite shelf stable and present a low to negligible risk. See Bryan (1982) for further explanation and classification of risks.

Preparation and storage practices that have contributed to outbreaks of food-borne diseases indicate high risks and direct attention to these street vending operations that are apt to be designated as critical control points. A critical control point is an operation for which preventive or control measures can be taken that will either eliminate, prevent, reduce, minimize, or delay a hazard or several hazards. For example, contributory factors in the United States (Bryan, 1978, 1988) and in England and Wales (Roberts, 1982, 1986) are divided into vital and trivial categories (Table 1). The factors occurring in each country are remarkably similar. The same factors occur elsewhere even though epidemiological data may be sparse and has not been collected or tabulated in such detail. Differences in incidence of food-borne diseases between cultures will primarily be affected by agents present and food handling and storage practices. In all situations (and countries), there must be contamination, then survival or contamination after heat processing, and often situations that allow proliferation of pathogens for typical food-borne illnesses to occur.

Hazard analyses done at the places street foods are prepared and vended can detect on-site hazards and assess related risks where food-borne disease surveillance is either underdeveloped or underutilized. Such evaluations are part of the hazard analysis critical control point (HACCP) ap-

Table 1. Factors that contributed to the occurrence of 1,918 outbreaks of food-borne disease, United States, 1961–1982, and 1,479 outbreaks of food-borne diseases in England and Wales, 1970–1982 (Bryan, 1988b; Roberts, 1982, 1986).

Contributory Factor	United States Number	United States Percent[1]	England/Wales Number	England/Wales Percent	Total Number	Total Percent
VITAL FACTOR						
Improper cooling	839	43.7	1034	69.9	1873	55.1
Storage at ambient temperature	405	21.1	566	38.3	971	28.6
Inadequate cooling	378	19.7	468	31.6	846	24.9
Lapse of 12 or more hours between preparation and serving	434	22.6	844	57.1	1278	37.6
Inadequate reheating	203	10.6	391	26.4	594	17.5
Inadequate cooking/canning/heat processing	298	15.5	223	15.8	521	15.3
Colonized person handled implicated food	348	18.1	65	4.4	413	12.2
Incorporating contaminated raw food/ingredient into foods that received no further cooking	303	15.8	93	6.3	396	11.7
Improper hot holding	255	13.3	77	5.2	332	9.8
Contaminated processed food (source unidentified)	246	16.6			246	7.2
Cross contamination	104	5.4	94	6.4	198	5.8
Obtaining food from unsafe source	192	10.0			192	5.7
INTERMEDIATE FACTORS						
Use of leftovers[2]	66	3.3	62	4.2	128	3.8
Improper cleaning of equipment/utensils	103	5.4			103	3.0
Inadequate/improper thawing	7	0.4	95	6.4	102	3.0
Toxic containers/pipelines	61	3.2			61	1.8
Extra large quantities prepared			48	3.2	48	1.4
Intentional additives	46	2.4			46	1.4
Mistaken for edible varieties	33	1.7			33	1.0
Improper fermentation	25	1.3			25	0.7
Incidental additives	24	1.3			24	0.7
TRIVIAL FACTORS						
Inadequate acidification	5	0.3			5	0.1
Poor dry-storage practices	5	0.3			5	0.1
Contaminated water	4	0.2			4	0.1
Postprocessing contamination	3	0.2			3	0.1
Slow/inadequate drying	2	0.1			2	0.06
Misbranding	2	0.1			2	0.06
Faulty sealing	1	0.05			1	0.03
Soaking time too short	1	0.05			1	0.03
Growth during seed germination	1	0.05			1	0.03
Improper preservation	1	0.05			1	0.03
Inadequate dish washing (contamination afterwards)	1	0.05			1	0.03
Contamination by fertilizer or soil	1	0.05			1	0.03
Flies on foods	1	0.05			1	0.03

[1]Percentage exceeds 100 because multiple factors contribute to single outbreaks.
[2]Also lapse of 12 or more hours.

proach to food safety. This approach consists of the following successive, interrelated actions: (a) analyze hazards, assess severity of outcomes if hazards are not prevented or controlled, and estimate risks of occurrences of the hazards; (b) determine critical control points; (c) select effective preventive or control measures and set appropriate criteria (or critical limits); (d) monitor critical control points; (e) take prompt corrective actions when results of monitoring show that a hazard exists or that control either has been or is being lost, and (f) verify that monitoring is being done effectively and the HACCP system is in place and maintained (ICMSF, 1988; Bryan et al., 1991a). Although the HACCP concept was initially developed for use in food-processing plants, it, or at least part of it, is applicable for preparing, holding, and vending street foods.

Hazard Analyses of Street Vending Operations

Hazard analyses of street foods include (a) determining the extent of contamination of raw foods and ingredients; (b) watching preparation, handling and holding practices; (c) measuring, as appropriate, time-temperature exposures during heating and holding, and pH and/or water activity of certain foods, (d) sampling and testing foods at appropriate stages of preparation for contaminants of concern, as applicable to confirm hypotheses about sources of contamination, survival and growth/concentration/attenuation; and (e) conduct challenge studies, if necessary, to provide further confirmation of hazards (Bryan et al., 1991; Bryan, 1992). Such studies have demonstrated that hazards are readily detectable and risk-predictable at street vending operations. Most of the cited examples come from hazard analyses of street vending operations in the Dominican Republic (Bryan et al., 1988), Egypt (El Sherbeeny et al., 1985a,b; Saddik et al.,

1985), Indonesia (Hartog, 1992), Taiwan (Bryan, unpublished observations and measurements), and Pakistan (Bryan et al., 1992a,b,c, Teufel et al., 1992). Despite variation in foods vended in these places, hazards observed or otherwise identified were remarkably similar.

Any one or a combination of the following contribute to high populations of microorganisms on or in raw foods that are purchased by vendors: (a) poor hygienic practices on farms and at sites of harvesting, (b) washing or freshening produce with polluted waters, (c) insanitary practices, spreading of contaminants and survival of contaminants during processing, and (d) long durations of storage at temperatures that are conducive to microbial growth. For example, at street vending stands in a mountain town in Pakistan, salmonellae were isolated from raw ground meat, raw chicken flesh, egg shells, and raw buffalo milk (Bryan et al., 1992a,b). Greater than 10^5 coliform bacteria were isolated from raw milk, ice cream mixes and products, and pulse patty mixes. Raw foods were further contaminated by the bare hands of persons cutting, chopping, mixing, or otherwise handling them, and by unclean or improperly cleaned utensils and equipment surfaces, and by being subjected to time-temperature conditions conducive to bacterial growth.

Hazard analyses, with few exceptions, revealed that foods were thoroughly cooked (e.g., Bryan and Bartleson, 1985; Bryan et al., 1982a,b,c,d; 1988). Hence, vegetative forms of pathogenic bacteria ought to have been killed at least on surfaces if not in the interior during cooking. Bacterial spores, however, would survive and germinate later as temperatures became conducive to bacterial growth. During cooking of Greek or Middle-Eastern *gyros* (*shawarma, dona kebabs*), temperatures are lethal to vegetative pathogenic bacteria on the surface of meat and in the thin layer just below the surface, but nowhere else (Bryan et al., 1980). Only meat sliced from the surface, however, is normally put in *pita* bread or otherwise served.

The major hazards for cooked foods commence after cooking. They are fourfold: (a) handling cooked foods with bare hands, (b) preparing cooked foods on cutting boards, on tables and/or with utensils previously used for raw foods (i.e., resulting in cross contamination); (c) holding foods at outdoor or, in some cases, at indoor ambient temperatures for many hours (sometimes with the aid of charcoal or heating devices); and (d) insufficient reheating if indeed the foods are reheated. All of these situations have led to either contamination, survival, or growth of foodborne pathogens during and storage (Bryan, 1978, 1988b; Bryan et al., 1991; Davey 1985, Roberts, 1982; Todd, 1983). Examples of each situation are illustrated observations.

Street foods are frequently handled after heating and the hours on display. In Pakistan, for example, staphylococci reached cooked potatoes during peeling, cutting, and other handling (Bryan et al., 1992c). These and other bacteria were also transferred to products on display during shaping and garnishing. Staphylococci increased (by up to 10^5) and elaborated enterotoxins while the contaminated foods were held for several hours on display. Large numbers (usually $>10^5$) of coliform bacteria and aerobic mesophilic colonies ($10^6 - 10^9$) were isolated from all foods after handling and then holding for several hours. Furthermore, salmonellae were isolated from wooden (often heavily soiled) cutting boards used often for both raw and cooked foods by street vendors (Bryan et al., 1992b). Cooked ducks and *char siu* were subjected to cross contamination during cutting and other handling after cooking (Bryan et al., 1982b,d).

Confectioneries are often vended on streets or in small shops. In Pakistan, for example, several confectioneries are made from milk products, e.g., *khoa* (a concentrated milk having a water activity of approximately 0.97) and a cheese made by a renin process (Teufel et al., 1992). The *khoa* as received by the candy maker was contaminated with *Staphylococcus aureus* and contained enterotoxin. The *khoa*-based confectionery was subsequently cooked to temperatures that would be lethal to staphylococci but not staphylococcal enterotoxins. Nevertheless, high populations of staphylococci were often found in the finished products because additional contamination occurred during handling after heating. Furthermore, *Khoa*-filled confectionery and confectionery made from cheese were contaminated by salmonellae. These bacteria reached the products either during cooling in water or while handled after cooking. Multiplication occurred in the warm environment at the place of manufacture and could continue in products having sufficiently high water activity during transport and while at vending sites and within retail outlets.

Allowing foods to remain at either room or outdoor temperatures for several hours is the most frequently occurring factor that contributes to food-borne illness (Bryan 1978, 1988b; Davey, 1985; Roberts, 1982; Todd, 1983). Rice, chick peas, and beans are often held at ambient outdoor temperatures while on display on vendors' stands in many parts of the world. In Egypt, for example, foods held in hotels, restaurants, and small food shops and by street vendors had lower mesophilic aerobic colony counts and lower prevalence of *Bacillus cereus* when held at temperatures above 54.4°C than when held below this temperature. Food temperatures after cooking decreased with increased storage time until they reached the ambient temperature with accompanying large bacterial populations (El Sherbeeny 1985a,b; Saddik et al., 1985). *Bento* (Japanese-style) box lunches are kept at room temperature while on display by vendors or in shops; microorganisms multiply as time passes (Bryan, 1992). In street vending operations in Pakistan, large populations ($10^4 - 10^7$) of *Clostridium perfringens* were isolated from samples of cooked pulses, ground meat dishes, and chick peas collected during display, 8 to 10 hours after cooking (Bryan et al., 1992a,b,c). Populations of up to 10^5 *B. cereus* were isolated from cooked foods after a 6-hour or longer holding period. Holding stacks of pulse patties on a

griddle for several hours would have allowed germination and growth of bacterial spores. Aerobic colony counts were also high in these and other foods that were held for several hours, unless kept hot at temperatures > 55°C throughout the holding. period or unless periodic reheating was practiced (which was done by only a few vendors). In the Dominican Republic, large populations of aerobic mesophilic organisms, but not always associated with pathogens, were found in fried foods (e.g., pork, fish, chicken, *yuca*) held at vending operations for several hours (Bryan et al., 1988). Many of these were prepared early in the morning and displayed throughout the day until sold. Those not sold were held unrefrigerated overnight and often not reheated the next day. If foods are refrigerated, they may not cool rapidly (e.g., data illustrated by Bryan et al., 1981; Bryan and Bartleson, 1985).

Other foods (e.g., Chinese, Dominican, Egyptian, Greek, Japanese, Mexican, Pakistani, Peruvian, and Thai) that are commonly prepared by street vendors, but for which the hazard analyses were done in either small food shops or restaurants rather than done at vending sites, also have been shown to have high risks (Bryan, 1988c). Hazards often do not differ greatly from those of food cooked in homes or in food-service establishments or by street vendors in any of the cultures. Variation depends on (a) microorganisms that are likely to reach the foods, (b) preparation and holding practices, and (c) understanding of the person who prepares the foods about ways to handle them that reduces contamination, kills pathogens, and prevents or slows bacterial growth. Risks are evaluated on the bases of operations that contributed to contamination, survival, and growth of etiologic agents based on observations and measurements made at vending sites.

Critical Control Points and Their Monitoring at Street Vending Operations

Critical control points must be determined from the hazard analyses, and they become the focus of preventive actions for the vendor, official inspections, and educational efforts. Practical monitoring procedures must be devised by health authorities, applied by researchers, and used by preparers and vendors of street foods. Health personnel must verify that foods are indeed handled in a safe manner and that monitoring is being done and done effectively. Critical control points for many street vended foods include: (a) source of ingredients, (b) formulation, (c) cooking, (d) manipulation of foods after cooking, (e) holding cooked foods, (f) reheating and (g) cooling. Simple, but effective, monitoring procedures must be taught to vendors and those who verify their application.

Obtaining and receiving incoming foods may be a theoretical critical control point, but for practical reasons, monitoring is often limited to obtaining foods from as safe sources as practicable or observing signs of decomposition or a state of being frozen, if applicable. Quality may be suspect for many foods purchased by street vendors. Foods are usually accepted as is at the time of purchase, and the contaminants that they harbor must be dealt with during subsequent preparation and holding.

Formulation of foods in which a sufficient quantity of high-acid ingredients are added can be a critical control point for acidified foods when there is adequate mixing and time for marinating. Formulation can also be a critical control point for heavily salted foods (e.g., salted fish), highly sugared foods (e.g., confectioneries) or dried foods (e.g., certain dried seafoods). Although pathogenic bacteria may not multiply in low-moisture foods, they can survive for long durations. The amount of high-acid ingredients, thorough mixing, time of marinating, characteristic sourness, amount of moisture, percentage salt and/or sugar can be monitored by vendors, and "verification" can be done with pH and water-activity meters by public health personnel. Such a critical control point is limited in application by knowledge of the characteristics of the food in question and applicable monitoring and verification procedures and equipment.

Cooking is a critical control point for most cooked foods. To be effective in attaining microbiologic goals – to kill parasites, viruses, and vegetative forms of pathogenic bacteria that are initially present in raw foods or ingredients or that reach foods during preparation – temperatures must be sufficiently high for a sufficiently long interval to result in the death of pathogens. For moist foods, a temperature of 74°C will inactivate large numbers of these microorganisms in a few seconds. Temperatures of, or greater than, 55°C, however, can produce lethal effects if exposure at these temperatures is long enough (i.e., up to 2 hours at 55°C). Cooking, however, is not a critical control point for spore- laden foods. Subjective monitoring may be done by observing change of the color of, interior portions or juices or feeling changes in texture. Effective (objective) monitoring, however, can only be done with a thermometer, thermocouple, or similar temperature-measuring devices; verification by health authorities must be done with such instruments.

Manipulation of foods after cooking is a critical control point. Touching cooked foods is a commonly identified practice that leads to outbreaks of staphylococcal food poisoning, typhoid fever, shigellosis, septic sore throat, hepatitis A, and Norwalk gastroenteritis. This is particularly so if the contaminants are bacteria and the foods are to be held subsequently within a temperature range that is conducive to bacterial growth. Handling must be such that pathogens are not acquired from the bare hands of vendors (e.g., use of clean utensils rather than bare hands) to minimize chances of contamination. Surfaces of equipment that have previously contacted raw foods of animal origin are usually contaminated with pathogens, so they must be cleaned between such uses. Monitoring and verification are by observation. For this to be accomplished, vendors must be aware of food safety hazards and practice self discipline.

Holding foods after cooking is the greatest hazard and calls for a critical control point. Street foods

that are not held hot (i.e., above maximum temperature for multiplication of pathogenic bacteria) are often near optimal temperatures for microbial growth. Hence, to remain safe, foods must be held either for only a short time or at temperatures at or above which spores cannot germinate and resulting cells and newly acquired vegetative pathogens cannot multiply. A temperature higher than 55°C should suffice, but the regulatory criteron is often 60°C. Monitoring can only be done with a temperature-measuring device and/or a time piece.

Reheating of either leftovers or previously cooked and held foods can be a critical control point when this operation is done. It is often the last line of defense. As with cooking, time-temperature exposures need to be sufficient to inactivate large numbers of infectious microorganisms or heat-liable toxins; monitoring and verification must be done with temperature-measuring devices. If there has been time-temperature abuse during storage, larger quantities of pathogens will often have to be killed than will be during the initial cooking. Heat-stable toxins, however, will not be inactivated, and prevention of associated illnesses rests with preventing their formation by (a) eating foods before toxins can be elaborated, (b) cooling foods rapidly or (c) holding foods at temperatures above or below which toxins are formed. Periodic reheating (e.g., every 4 - 6 hours) could eliminate cells germinating from spores during intervening intervals in which bacterial growth could occur.

Cooling is a critical control point when it is done. The easiest solution is to eat foods promptly after cooking so that foods are not held long, but this is not the way most street vending operations function. If foods are left over or prepared several hours ahead of serving, they should be put into shallow containers and cooled rapidly in refrigerators or by ice. This is only applicable, however, if cooling facilities are available and within the economic resources of the preparer or purchaser of the foods.

Management of Food Safety of Street Foods

The Pareto Principle states that a few problem situations (e.g., hazards) occur commonly (and hence, are referred to as the vital few), but many others occur either less frequently or rarely (and hence, are referred to as the trivial many). Priorities for attention should address the vital few hazards which may represent the 10% to 20% that cause 80% to 90% percent of the harm. For example, situations related to aesthetics (e.g., dust blowing or settling on foods) fall into the trivial or low-priority category, but certain operations which foods undergo (such as cooked foods being handled with bare hands and held within a temperature range conductive to growth of bacterial food-borne pathogens) fall into the vital or high-priority category. Data on which to make such classifications come from either epidemiological studies or on-site observations and measurements with rational interpretations based on scientific information about the microbial ecology of food-borne pathogens in foodstuffs.

The Pareto Principle must be kept in the forefront of decision making so that attention is focused on high-risk operations (i.e., critical control points) and not on matters of either only minor public health consequences or aesthetics. Hence, holding of cooked foods at outdoor ambient or warm temperatures for several hours is a matter of major concern (one of the vital few or a critical control point) that must be given high priority by health agencies.

Health-agency personnel in developing countries, vendors, and consumers of street foods need to become aware of the hazards (described in foregoing paragraphs) and appropriate preventive measures. Control actions, training agenda, and educational campaigns ought to be focused on the forementioned 12 critical control points.

Management of public health activities for protection of consumers of street foods should be based on the HACCP approach rather than on traditional inspection, prepared-product (end-product) sampling, or nothing at all because the situation may seem overwhelming. This will require (a) a change of attitudes of many persons associated with food protection; (b) equipment to assess hazards, monitor, and verify; and (c) skills in making hazard analyses and applying the HACCP concept to preparation and vending of street foods. Food-safety activities must concentrate on informing those who handle, prepare, process, and store street foods about specific hazards and means by which control can be applied at critical control points.

A strategy to implement these actions is to first alert and train public-health officials (e.g., epidemiologists, food microbiologists, sanitarians, and nutritionists) so that they can focus attention on street-food preparation practices that are hazardous. As hazards are identified by either epidemiologic investigations, hazard analyses or scientific studies (or hypotheses of likely hazards confirmed by on-site observations and measurements or challenge studies) and probability of occurrence determined, preventive measures that are practical under prevailing circumstances must be chosen, if available, or, if not, devised. These measures should be demonstrated to vendors and action taken to get them implemented by the vendors. Health officials must verify that appropriate preventive and control measures are implemented and maintained by vendors.

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General Guidelines for the Safe Handling of Foods

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Introduction

Every year, approximately 10,000 cases of food-borne disease are reported in Canada. Health authorities believe that for every reported case there are at least 100 unreported cases. There are many reasons for this underreporting – for one, the symptoms of food poisoning are similar to and commonly confused with those of viral infections of the intestinal tract, commonly referred to as stomach flu.

Raw foods such as meats and poultry, fish, and eggs may contain bacteria that are pathogenic, capable of causing human disease. Because contaminated raw foods may look, smell, and taste normal, and because bacteria can spread from raw foods by cross-contamination to prepared foods, it is important to remember that proper handling and cooking of foods can significantly reduce the risk of disease in humans.

Symptoms of Food Poisoning

Not everyone who consumes food contaminated with harmful bacteria will develop food poisoning. The most common symptoms of food poisoning include stomach cramps, nausea, vomiting, and diarrhea, any of which can be mistaken for indigestion or stomach flu. Severe cases may require hospitalization. For immunocompromised individuals, infants, the chronically ill,or the very old, food poisoning can result in death. In addition, with some food-borne illnesses such as salmonellosis or yersiniosis, arthritis can occur as a complication following the initial infection. Publications describing the characteristics of most of the food-borne pathogenic microorganisms, along with their associated diseases, are available *(1, 2, 3)*.

Potentially Hazardous Foods

The term "potentially hazardous" is used in a microbiological, not in a chemical or toxicological, sense. A potentially hazardous food can be defined as follows:

Any food that consists in whole or in part of milk or milk products, eggs, meat, poultry, fish, shellfish, vegetables, or other ingredients, in a form capable of supporting growth of infectious and/or toxigenic microorganisms; but usually not included are foods which have a pH level of 4.6 or below and foods which have a water activity level of 0.85 or less. Foods which also fall into the "potentially hazardous" category include certain baked goods (e.g., with cream filling) and some types of vegetables, e.g., fresh packaged mushrooms; minimally processed, refrigerated vegetable products.

It must be understood that the term "potentially hazardous" refers largely to foods that are prone to temperature abuse, that is, they are left at temperatures greater than 4°C/39°F when they are supposed to be refrigerated, or stored at temperatures below 60°C/140°F when they are supposed to be kept hot. Temperature abuse could occur during preparation by the food processor (or food-service operator), during transportation, marketing, or handling by the consumer.

The majority of food mishandling occurs in the home and in the food-service industry and can be minimized mainly through the use of educational programs. Across Canada there are many educators at all levels of government who could provide these programs. What is lacking, however, is a coordinated effort by all levels of government, to make sure that replication of local, provincial, and federal programs does not occur and that all areas of food safety are covered in a manner which Canadians will understand. The establishment of a national food-safety educational advisory group may help in this regard. Currently, the federal government distributes to health-care workers and/or anyone else interested in the food safety area food safety pamphlets entitled "Issues," "Dispatch", and "Safety Watch." In addition, Health Canada now has a hypertext information service linking much of Health Canada's information resources pertaining to health. This information can be assessed through the Health Canada "Home Page" on Internet. The basic problem with most of the literature on food safety is that, because it is directed to health-care workers, only a very small segment of the general population actually understands it. The material must be target tested so that the people it is trying to reach can comprehend and assimilate the information. Another

area of concern is that a large percentage of the population does not read, but spends a substantial proportion of time watching nondocumentary television. Thus, it may be more effective to run a series of television ads on food safety, rather than distributing pamphlets. In 1988, the Health Protection Branch sponsored a workshop on microbiological food safety, which resulted in a series of recommendations from both the general workshop and those put forth by the Consumers' Association of Canada (see Appendix A).

The following guidelines on food safety can serve as basic material for educational programs, general introductory courses on food safety, textbooks, or television advertisements.

A. Guidelines for Buying Safe Food

1. Pack raw foods separately and especially ensure that raw fresh meat, poultry, or fish are well wrapped to prevent or minimize contamination of other foods, especially those that will be eaten without further cooking. If the above raw foods are not well wrapped, fluid containing contaminating bacteria may drip onto other foods in your shopping cart. As an example, use plastic produce bags for fresh fruits and vegetables.
2. Take refrigerated or frozen food home as quickly as possible and place it in the refrigerator or freezer. In the wintertime, place food bags in the trunk of a car to keep foods as cold as possible. However, beware of very cold days where foods such as bananas may freeze and suffer quality loss. In the summertime, place food bags preferably in the air-conditioned passenger compartment of the car rather than in the trunk, where very high temperatures are often reached. Even for a short time, the warm environment of a car or office can allow bacteria to multiply to dangerous levels. Refrigerated fresh meat, poultry, or fish should be kept for a maximum of two to three days in the refrigerator. If it is not intended for use in that period of time, it should be placed in the freezer.
3. Refrigerate promptly all products with "keep refrigerated" labels. Do <u>not</u> buy products labeled – "keep refrigerated" if they are not stored properly in a refrigerated compartment.
4. Do <u>not</u> buy any packaged cooked ready-to-eat food product if a tear exists in the packaging material.
5. Do <u>not</u> buy swollen canned foods. (See Appendix B for advice on home-canning of foods.)
6. Shop for perishable goods such as fresh fish, meat, or poultry last. Try to prevent these fresh foods from dripping onto other products by placing them in bags.
7. Report any problems with packaging, product, storage, or sanitation to store management or local health authorities.
8. Do <u>not</u> buy perishable foods if their "best before" date has expired. Only products with a shelf life of less than 90 days require a best-before-date. The best-before date is determined by the manufacturer.
9. Do <u>not</u> buy frozen goods if they do not feel frozen when you touch them, or if there are other visible signs of thawing.
10. Upon arriving home, immediately place the perishable goods in the refrigerator or freezer.
11. Do <u>not</u> buy dirty or cracked eggs. Occasionally cracked eggs may be sold at the farm level. These eggs should only be used for those egg-containing dishes that will be thoroughly cooked. See Appendix C for general guidelines on handling eggs.
12. If any doubts exist about the microbiological safety of your water supply, boil the water for 5 to 10 minutes before drinking, before adding it to ready-to-eat foods, or before making ice for drinks. Be especially careful with any water served or used to prepare foods for the very young, elderly, institutionalized, or immunocompromised individual (see definition for immunocompromised in Appendix D).

B. Guidelines for Safe Food Handling and Preparation

1. Wash hands thoroughly for at least 20 seconds just before handling food and after every interruption, especially after going to the washroom, changing diapers, playing with household pets (including turtles), or changing dog and cat litters, smoking, sneezing, coughing, and nose blowing. When washing hands, use hot water with soap and try to repeat the process of soaping and rinsing. If you are handling raw foods such as fish, shellfish, meat, or poultry, make sure to wash your hands again before handling other foods, because these foods may contain infectious organisms.
2. If you have cuts or abrasions on your hands or arms make sure to cover or bandage them and to wear rubber gloves if practical before preparing food.
3. If at all possible, avoid handling food when ill. Cover your mouth during a cough or sneeze and wash hands afterwards.
4. Keep all household pets such as dogs, cats, birds, and turtles away from the food preparation area. All pets, including cats, can spread parasites and bacteria through saliva, hair coats, and feces to food or work surfaces.
5. Keep the food preparation area free of flies and other insects that might spread bacteria on foods.

6. Keep food contact surfaces such as counter tops, chopping boards, and utensils clean with hot soapy water. After initial cleaning, wipe surfaces, especially those that have been in contact with raw meats, fish, and poultry, with diluted bleach (30 to 45 ml of household bleach in 4 liters of water) to kill *Salmonella* and other food poisoning bacteria which might remain on the surface. Initially dry all surfaces and utensils well with a disposable paper towel, and then let air dry. Remember that sponges and wet rags can harbor dangerous bacteria and permit their growth, and may be a source of contamination.

7. Preferably use single-use disposable hand towels to dry hands or as a minimum, regularly replace hand towels with clean ones. It is also recommended that touching the face and hair be avoided when handling food. Consideration should be given to the use of skin cream, containing a bactericide, with frequent hand washing, for obvious reasons.

8. Do not use the same knife or cutting board for raw animal products, cooked food, and fresh vegetables or fruits without washing and sanitizing with diluted bleach. Ideally, one should have a separate cutting board for raw animal products and another for other foods. Change or resurface wooden cutting boards if pitting of the surface has taken place. To kill bacteria that collect on cutting boards, give them a good scrubbing at least once a week with 30 to 45 ml of household bleach in 4 liters of water, leave for 20 to 30 minutes and then rinse with warm water and allow to dry.

9. Keep your dish cloths clean. These can harbor large numbers of microorganisms and should ideally be changed every day. However, if dish rags are to be used for wiping utensils, pots and pans after soaping and hot-water rinsing, they can be changed after a few days for practical reasons. Make sure to hang them away from the kitchen garbage pail (which should be automatically self-closing with a lid), often kept underneath the sink. Dish cloths can be washed first and then soaked in dilute bleach (30 to 45 ml of household bleach in 4 liters of water), or simply cleaned in automatic laundry machines (with appropriate soaps/detergents) and dryers.

10. Just before use, wash all home-grown or store-bought fruits and vegetables thoroughly under hot running luke-warm water, and scrub produce such as carrots and potatoes with a brush.

11. Marinate raw products only in the refrigerator, not at room temperature.

12. It is an undesirable practice to taste any food to determine if it is safe to eat. If tasting cannot be avoided, clean and sanitize the utensils used after each tasting operation.

13. After washing raw meat, fish, or poultry, rinse the sink with hot soapy water.

14. Generally it is wise to follow package instructions carefully for prepared, refrigerated, or frozen foods. However, package instructions may not always be reliable to ensure adequate cooking. It is best to thaw frozen foods (meat/fish: 5 hours/pound) completely in the refrigerator in its original wrap on a plate to prevent juices from dripping onto other foods. Alternatively, thawing in the microwave can be done using the "defrost" setting to prevent outer portions from cooking. If thawing cannot be done as above, thaw food in its original wrap under cold water changed every 30 minutes. If thawing is to be done at room temperature, place food in a paper bag and enclose so that the outer portions do not thaw much faster than the center.

15. Any mixture of a vegetable or food prepared in oil, including homemade mixtures of garlic and oil, should optimally be made fresh and used immediately. Garlic-and-oil products are mixtures of vegetable oil and whole, chopped, or minced garlic. For safety, these products should have a short shelf life and must be continuously refrigerated from the time of preparation until use. Unrefrigerated storage of these products can result in the growth of the bacterium *Clostridium botulinum* and production of its toxins. This can occur without any evidence of spoilage such as "off" odor, taste, or appearance. A refrigerated commercially prepared food such as this should contain a secondary barrier (e.g., pH less than 4.6) to inhibit the growth of food pathogens.

16. Fish to be eaten raw, marinated, or partially cooked should be frozen to an internal temperature of 20°C/5°F for at least 24 hours, in order to kill any parasites which may be present.

17. It is recommended that bottled water not be used to reconstitute powdered or liquid infant formula unless the water has been sterilized or the reconstituted food is sterilized immediately after preparation.

C. Recipe for Safe Food Cooking

1. Raw foods may contain disease-causing pathogens. Thorough cooking will inactivate these microorganisms, but not some toxins, the poisons produced by the bacteria. For meat or poultry, if juices do not appear clear,

or if meat is still pink in the center or raw near the bone, place the product back into the oven until it is done all the way through. Pay special attention to the thorough cooking of ground meats and rolled roasts in particular.

2. For precooked, ready-to-eat foods follow the manufacturers' instructions for serving.

3. Use a meat thermometer to judge safe internal temperatures of whole beef (74°C/165°F) and pork (71°C/160°F). For poultry, when the thermometer is placed directly into the thigh, temperature should read 85°C/185°F. Those not using meat thermometers should ensure that oven temperatures reach a minimum of 163°C/325°F, with times varying with the nature and thickness of the product being baked.

4. An internal temperature of at least 70°C/160°F is recommended at the present time for cooking ground meat products. At this temperature there is very little or no pink coloration and the temperature is high enough to inactivate *E. coli* 0157:H7, which can cause serious food-borne illness when present in these or other products.

5. Avoid interrupted cooking and never refrigerate partially cooked products to finish cooking them later, since both of these practices could lead to microbial growth between cooking intervals and to an inadequately heated product.

6. Fill a slow cooker no more than two-thirds full so that heat can penetrate to all parts of the food. Keeping the lid in place will prevent the escape of large amounts of heat. Slow cookers are not advised for large pieces of meat, or frozen or stuffed products, because the temperature may stay too long in the danger zone or may not get high enough during the cooking time to kill bacteria.

7. It is recommended that poultry stuffing should be cooked separately, preferably in an oven dish or on top of the stove, because stuffing insulates the body cavity from the oven heat and *Salmonella* may survive. If poultry is to be stuffed, stuff it just before roasting and take it out immediately after cooking to allow for more rapid cooling. Stuffing whether cooked separately or within a bird should achieve a minimum temperature of 75°C/167°F.

8. When reheating leftovers, cover and reheat all foods to at least 74°C/165°F before serving. Sauces, soups, gravies, and other liquid foods should be brought to a rolling boil. Remember, proper refrigeration does not kill the microorganisms but will only slow down their growth.

9. Follow a proper procedure when canning or preserving food at home. (See Appendix B for further details.)

C (I). Barbecuing

1. Precook large cuts in the oven or microwave, and then finish cooking on the barbecue. Larger cuts of poultry and/or beef don't always barbecue well, because the outside tends to burn before the inside is really cooked.

2. Do not carry raw and cooked meats to and from the barbecue on the same platter.

3. Do not use utensils that were used to handle raw foods for handling cooked products. The cooking brush used for spreading the BBQ sauce on the raw cuts should not be used again as the last step for glazing the ready-to-eat food.

4. Cut large pieces of meat or poultry to check that the interior is properly cooked. Do not taste meat to determine if it is properly cooked and then put it back on the barbecue.

5. Do not let drippings from platters holding raw meat, poultry, or fish fall onto foods on the barbecue.

C (II). Microwaving

1. If your microwave has a temperature probe, use it to cook foods to uniform internal temperatures ranging from 75 to 85°C (see below), while the internal temperatures for reheated foods should reach over 74°C/165°F in all areas immediately after cooking. Several measurements (at least three) should be taken throughout the center region or the thickest portion of the largest piece (the coldest spot). If the food is a mixture of solids and liquids, such as a stew, the temperature of the largest solid piece should be determined. The probe should not contact bone, metal, glass, or any of the packaging material.

2. Frozen foods should be completely defrosted before cooking in a microwave oven, since the presence of frozen and thawed portions in the same food will lead to uneven heating.

3. Observe all standing times for microwaved foods after cooking. This may be important to allow an even heat distribution throughout the product after microwaving. Oven manufacturer's instructions or other reliable cookbooks should be consulted.

4. During the microwave cooking of whole poultry, the internal temperature should reach a uniform temperature of 85°C/185°F immediately after cooking. It is best to cover raw meat and poultry when microwaving and to check internal product temperatures in at least three different spots. In addition, check that there is no blood, the juices run clear, and that the flesh separates easily from the bones. Stuffing for chicken or turkey should be cooked separately and not in the bird.

5. It is recommended that foods such as ground or chopped meat, deboned rolled roasts, and egg-containing bakery products be cooked to a uniform internal temperature of at least 74°C/165°F. Foods that also require thorough cooking include raw pork and fish, because of the possible presence of parasites. To eliminate pathogens from these foods, they must be cooked so that a uniform internal temperature higher than 74°C/165°F is reached immediately after cooking.

6. Canning should not be done in microwave ovens because heating may be uneven, resulting in an underprocessed product and possible survival of botulinum spores.

7. Food can be microwaved in metal foil containers provided that the foil container is positioned in the center of the microwave oven at least one inch away from the sidewalls, and the container is not touching other metal or foil. Prior to microwaving, be sure to remove any metal lid or aluminum wrap which may be covering the food.

8. Use a rotating microwave pad or rotate foods manually several times during microwaving.

9. Place thicker portions of meat and/or poultry to the outside of the dish, cover, and turn pieces at least once.

10. If you find that microwave cooking instructions for a given product results in a food which is inadequately cooked, (i.e., juices don't run clear, presence of blood, uncooked appearance), follow the above guidelines to ensure adequate and safe cooking of food by microwaves. Microwave cooking instructions presented by food processors on the label of prepackaged foods may not guarantee appropriate cooking for every make and model of microwave oven.

11. When cooking or reheating foods in the microwave, use a lid or vented plastic wrap that doesn't touch the food. This is done to keep the steam generated in contact with the food and thus aid in thorough cooking.

Guideline for Safe Food Serving

1. In general, food should not be reheated more than once. Reheated food should be heated until it is piping hot (over 74°C/165°F) throughout before it is served.

2. Do not serve any raw foods of animal origin, particularly to high-risk persons (see Appendix D). This includes raw eggs, shellfish, and sushi.

3. Hold or keep hot foods hot (above 60°C/140°F) and cold foods refrigerator cold (at or below 4°C/39°F). This keeps food out of the "Danger Zone" for growth of microorganisms.

4. Any utensils that have come into previous contact with raw foods of animal origin should be thoroughly washed before being subsequently used to touch cooked or ready-to-eat foods.

5. Never put cooked meats, poultry, or fish on unwashed plates that previously contained raw foods of animal origin.

6. Throw away any food if you have doubts about its safety, i.e., <u>when in doubt, throw it out.</u> Unsafe food does not always look bad, taste unpleasant, or give off a bad odor.

7. Organize preparation times so that all foods to be served at a meal are finished cooking at the same time; this avoids holding foods at room temperature.

Guidelines for Safe Food Storage

1. Bacteria can grow in the "Danger Zone," which is at temperatures between 4°C/40°F and 60°C/140°F. So refrigerate within the hour after buying, preparing, or cooking. After four hours in the Danger Zone, prepared foods should definitely be thrown out. Remember, <u>when in doubt, throw it out!</u>

2. Cool bulk quantities of cooked leftovers in a refrigerator in several small, covered, <u>shallow</u> containers. Leave an air-space around and underneath (on kitchen grids) the containers to help ensure rapid, even cooling. Containers seven to eight centimeters (three inches) deep or less are recommended. Fast cooling lessens the time a food spends in the critical temperature, or Danger Zone and hence reduces the risk of bacterial growth.

3. When there is a power failure, food will usually stay frozen <u>for two days</u> in a nonfunctioning freezer filled to capacity. If the freezer is less than half full, food will keep frozen for only about <u>24 hours</u>. Open freezer as little as possible to check on food's coldness. Food can also be kept frozen for three or four days by using dry ice placed on cardboard that has been laid on top of the food. Generally, food that has some ice crystals and no obvious signs of deterioration, or that is known to have thawed and remained cold, can be cooked and eaten or refrozen. It is best to discard "potentially unsafe" foods that are thawed and held at room temperature or at an unknown temperature for an unknown period of time.

4. Before placing foods in the freezer, mark the date placed in the freezer and then use either a freezer wrap, freezer-quality plastic bags, or aluminum foil <u>over</u> the commercial wrap which is already covering the food. Commercial wraps may not always be of freezer quality and

may allow excess oxygen into the pack. This will hasten the deterioration of the food product from a quality standpoint.

5. Follow directions for storage when provided on food package labels. "Keep refrigerated" means that the product must be refrigerated continuously, not only after opening the container. Make sure your refrigerator is adjusted to a temperature of 4°C/39°F or lower and check it periodically with a thermometer. Many fridges have areas in them that exceed 10°C. Do not overload the refrigerator with food as this will reduce its efficiency.

6. Store potentially hazardous foods at proper refrigeration temperatures (at or below 4°C/39°F) or in the freezer (at or below -18°C/-4°F). For safe temperature control, install thermometers in the refrigerator and freezer. Maintain a clean refrigerator and freezer.

7. Ensure that raw foods do not contaminate cooked foods, either directly by contact or indirectly, e.g., by letting meat juices drip on other foods on a lower shelf in the refrigerator.

8. Use up refrigerated leftovers as soon as possible, preferably within two to three days. Frozen foods may be kept frozen for months; bacteria will remain alive but will not grow. Check your appliance guide for storage times or use Agriculture Canada's "Food Storage in the Home" chart of storage times (see Appendix E).

9. Date canned goods at purchase and use them up within a year or within their "use by" date, if given.

10. Keep pesticides and other harmful chemicals out of the kitchen, where they might contaminate foods.

11. Large cooked birds such as turkey, if not to be consumed immediately should be deboned or cut up and the meat placed in small packages in the refrigerator for more rapid and uniform cooling. For large cuts of cooked meat that might not be cut before refrigeration, it is very important to get the internal temperature of the meat to below 4°C in less than 4 hours.

12. If raw meat, poultry, or fish is not going to be used in the next two to three days, it should be frozen.

13. Store dry foods in tightly sealed containers to protect them from insects, rodents and other animals, all of which may carry pathogenic microorganisms.

14. Lunches should be kept in insulated containers with a cold pack. Children, especially, should be taught not to expose lunches to direct sunlight or warm radiators.

15. When going on picnic lunches, use ice packs in your cooler and place the cooler in the shade. Keep the lid on as much as possible.

16. In general, moldy foods should be discarded because toxins formed by the molds can diffuse to areas under the surface of a food. However, occasionally, firm foods such as hard cheese and salamis can be salvaged by cutting out a large area around the mold.

Conclusion

By following the procedures outlined, the risks of acquiring foodborne disease will be greatly reduced. Coordinating national food-safety programs, and choosing the right avenue of communication to reach our target audience, is a challenge and must include food-service workers and the average consumer.

Protecting the public is largely a job of consumer education. Consumers should be aware of the dangers of eating contaminated foods and of the safe handling and cooking practices that will help them avoid illness.

APPENDIX A

1988 HPB Food-Poisoning Workshop Recommendations

A. General Recommendations

It is recommended that:

1. Processing Sector Session HACCP - Promotion of Implementation

   In consultation with other federal departments and trade associations, the Health Protection Branch (HPB) seek means of further promoting implementation of HACCP by the food processing sector, with particular emphasis on small or new processors.

2. Food-Service Sector Session HACCP- Promotion of Implementation

(a) In cooperation with the Canadian Restaurant and Foodservice Association (CRFA) and provincial governments, HPB draft a HACCP program for consideration and implementation by the food-service industry.

(b) When the HACCP program is being implemented among CRFA members, HPB seek assistance from provincial governments to promote implementation of the HACCP program by the rest of the food-service sector across Canada. In this regard, a HACCP video on "Safe Food Handling Technique" has already been produced with financial support from Health Canada.

3. Consumer Session - Education in Safe Food Handling

(a) HPB seeks means of establishing a Consumer/Federal Provincial Gov't./Food Industry Educational Committee on Safe Food Handling. This Committee would review educational materials available across Canada and coordinate plans for development of future educational materials. A publicity agent should be assigned to the Committee. Specific areas to be examined by

the Committee would be (i) development of educational packages for schools at both primary and secondary levels, community colleges, medical and nursing schools; (ii) development of educational packages to educate farm families, farm workers, and visitors to farms; (iii) providing impetus to industry and government measures to promote and publicize the use and value of irradiation as a control measure against bacterial pathogens in raw poultry and other raw meats.

4. Consumer Session - Assorted Recommendations

(a) HPB seek means of helping the public report suspected illnesses from contaminated food, e.g. set up a 1-800 number and listing the 24-h phone number for the health unit in the front pages of the phone book beside that for the poison control centre.

(b) A summary of the proceedings of the workshop be made available to the public at large through a government publication.

(c) Workshop recommendations be sent to all participants, Provincial Ministers of Health and the Federal Minister of Health and Welfare.

5. Provincial Regional Health Unit
HPB establish a national electronic bulletin board describing information regarding decisions related to recalled foods.

B. Consumers' Association of Canada Recommendations

It is recommended that:

1. Food and Drug Regulations be introduced requiring that:

(I) No person shall sell cheese, including cheese curd, that is not made from a pasteurized source unless the cheese is to be heat-processed so as to pasteurize it, or the cheese is made from milk, skim milk, cream, reconstituted milk powder or any combination thereof, that has been heated to a temperature of not less than 63°C for at least 16 seconds. (In process of becoming a regulation under the Canadian Food and Drug Regulations.)

(II) Fish used in sushi foods be previously frozen for sufficient time to kill parasites.

(III) Constant read-out temperature gauges be used for transportation of chilled foods and in display cabinets for chilled foods.

2. The Department of Health undertake the role of coordinating the production and dissemination of consumer education material regarding "food poisoning" by monitoring what is being done by provinces and others, identifying the gaps, preparing prototype information, and encouraging others to use this information.

APPENDIX B

Recommended procedures for avoiding potential dangers from home-processed foods.*

1. Ensure that pressure canner used for canning low-acid foods is functioning properly. Low-acid foods include all meats, poultry, milk, seafood, vegetables, and soups. Perform regular inspections on the seal and pressure gauge.

2. The boiling water bath or open kettle method should only be used for acidic foods such as fruits, fruit juices and fruit purees, tomatoes, and jams and jellies containing sugar.

3. When canning foods that contain "mixed ingredients "such as meat and tomatoes, treat the product on the basis of the ingredient that is the least acidic, i.e., treat as a low-acid food.

4. Do not can overripe fruits and vegetables, especially tomatoes, as these become less acidic with time.

5. To ensure a proper headspace, do not overpack jars with food or water. This will allow the noncondensable gases to accumulate in the space between the top of the brine and the top lid of the can. If no "head space" is allowed these gases will be applying pressure on the seams of the can.

6. Do not re-use the sealing ring or gasket or cracked, chipped jars, because improper sealing may result.

7. Only use jars that are designed for canning.

8. Do not taste food from any can that looks swollen, rusted or dented, or if the food inside the can smells or looks different than it should – putrid odors, cloudy brine, etc. Tasting even a small portion of food from these cans can be extremely dangerous. If the food is not home-canned, report the finding to your local public health office.

9. Check jars for a good seal after cooling and also just before consuming. Lids should curve inward and not move when pressure is applied with a finger.

10. For added safety, if possible, boil home-canned foods for a minimum of 10 to 15 minutes before serving. This heating step will destroy any botulinum toxin which may have formed in your food.

**Adapted from the Scientific Status Summary "Home Canning" of the IFT Expert Panel on Food Safety and Nutrition and the Committee on Public Information.*

APPENDIX C
Safe Egg Handling

1. Refrigerate eggs at home in their original carton as soon as possible at 4°C/39°F.

2. Avoid the use of dirty eggs or eggs with cracked shells as even clean-looking cracked eggs may be contaminated with *Salmonella.*

3. Cook eggs thoroughly until both the yolk and white are firm, not runny, so as to kill any bacteria

that may be present. Cooking times recommended for eggs are as follows:

Sunny-side up: 7 minutes at 121°C/250°F or cook covered for 4 minutes at 121°C/250°F.

Scrambled: 1 minute at 121°C/250°F.

Poached: 5 minutes in boiling water.

Boiled: 7 minutes in boiling water.

Fried, over easy: 3 minutes at 121°C/250°F on one side, turn egg and fry for 1 more minute on the other side.

There may be some risk in eating eggs lightly cooked (soft cooked, soft scrambled, or sunny side up), especially for persons in high-risk groups.

4. Avoid the consumption of raw eggs and products which may contain raw eggs such as mousses, ice cream, raw eggs mixed with drinks, and homemade Caesar salad, Hollandaise sauce, egg nog, and mayonnaise. Commercial forms of the latter four products are safe since they are made with pasteurized eggs. Commercial pasteurization destroys *Salmonella* bacteria.
5. Do not wash eggs before storing, as wetness or high humidity encourages bacterial penetration through the egg shell.
6. Do not place hot hard-boiled eggs in cold water. Eggs can be cooled in the water in which they have been boiled.
7. Avoid keeping raw or hard-boiled eggs out of the refrigerator for more than two hours.
8. Do not store raw eggs for more than five weeks at 4°C/39°F or hard-cooked eggs (in the shell or peeled) more than a week at 4°C /39°F. Leftover yolks and whites should be refrigerated and used within 3 to 4 days. Serve cooked eggs and egg-rich foods immediately after cooking, or refrigerate and serve within 3 to 4 days.
9. Wash hands, utensils, and equipment that come in contact with uncooked egg or egg products with hot, soapy water.

Appendix D

Additional Advice for Pregnant Women and High-Risk People Who May be Particularly Susceptible to Infection.*

1. Reheat all meats, including, whenever feasible, precooked meats until piping hot. Thorough reheating means that all parts of the food must reach at least 74°C/165°F.
2. Avoid consumption of all raw animal products. This would include raw meat, poultry, game, fish, milk and eggs, and any food products containing these raw ingredients such as sushi, Caesar salad, and raw eggs mixed with drink.
3. Wash all raw fruits and vegetables extremely well. Do not store home prepared or store bought salads longer than 1 to 2 days in the refrigerator.
4. Do not store opened or unopened packages of cooked meat or poultry products for longer than 1 to 2 days in the refrigerator.
5. Avoid consumption of pâté and certain soft cheeses such as brie, camembert and blue vein types which may contain high numbers of the bacterium *Listeria monocytogenes.*
6. Any eggs used as an added food ingredient should be thoroughly cooked until the white and yolk are solid. Eating lightly cooked egg-containing foods such as soft custards, French toast or meringues may be hazardous.

Dining out:
To protect yourself against food poisoning when eating out:

1) Take into consideration the general appearance of the food outlet.
2) Ensure that hot foods are hot and cold foods are cold when served.
3) Send back meat and poultry if it is not well cooked.

**This would include immunocompromised people, alcoholics, diabetics, transplant recipients, AIDS and cancer patients; very young infants; steroid users; and patients with chronic renal disease and iron storage disorders. However, this is not necessarily an exhaustive list.*

Immunocompromized people are those whose immune systems are deficient either because of an immunodeficiency disorder or because of treatment with immunosuppressive drugs.

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9. Health Protection Branch. 1993. Food safety. It's all in your hands. Minister of National Health and Welfare Educational Services, Health Protection Branch, Minister of Supply and Services Canada.
10. United States Dept. of Agriculture, 1989. A margin of safety: The HACCP approach to food safety education: summary report. Food Safety and Inspection Service, Information and Legislative Affairs.
11. Health Protection Branch. 1991. Handling Eggs-Safety at Home. Issues Document. Health Canada, Publications, Ottawa, Ontario.
12. Health Protection Branch. 1992. Reducing the risk of *Listeria* contamination. Issues – Document. Health Canada, Publications, Ottawa, Ontario.
13. United States Department of Agriculture. 1989. FSIS FACTS: Preventable Food-borne Illness FSIS-34.

The information presented in this document does not necessarily represent the views or policies of Health Canada. Rather, it is a compilation of general food safety advice by the authors.

Federal Register

Department of Health and Human Services
Food and Drug Administration
21 CFR Ch. 1
(Docket No. 93N-0178)
RIN 0905-AD90

Regulation of Dietary Supplements; Withdrawal of Advance Notice of Proposed Rulemaking

Agency: Food and Drug Administration, HHS.

Action: Advance notice of proposed rulemaking; withdrawal.

Summary: The Food and Drug Administration (FDA) is announcing that it is withdrawing an advance notice of proposed rulemaking (ANPRM) on the regulation of dietary supplements that is published in the **Federal Register** on June 18, 1993 (58 FR 33690) (hereinafter referred to as the June 18, 1993, ANPRM). This action is necessary because of recently enacted legislation and terminates the rulemaking initiated by the ANPRM.

For Further Information Contact: Judith S. Kraus, Center for Food Safety and Applied Nutrition (HFS-456), Food and Drug Administration 200 C St. SW. Washington, DC 20204 202-205-5372.

Supplementary Information: In the June 18, 1993, ANPRM, FDA requested public comment on approaches, consistent with the requirements of the Federal Food, Drug, and Cosmetic Act, for assuring the safety of products offered for sale as dietary supplements. In particular, the ANPRM requested information on the safety and use of amino acids, or combinations of amino acids, as ingredients in dietary supplements. Additionally, FDA announced the availability of a report entitled "Task Force on Dietary Supplements Final Report" and requested comments on the recommendations made in the report. FDA received over 6,000 comments to the ANPRM. While some of these comments expressed concern about the safety of dietary supplement products, and most strongly objected to many of the possible courses in the ANPRM. On October 25, 1994, President Clinton signed into law the Dietary Supplement Health and Education Act of 1994 (Pub. L. 103-417). Section 11 of this act declares the June 18, 1993, ANPRM to be null and void and of no force and effect. It also directs the Secretary (and by delegation, FDA) to publish notice to this effect in the Federal Register.

After consideration of the comments received, and in light of section 11 of the new law, FDA has decided to withdraw the June 18, 1993, ANPRM. Therefore, under the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 *et seq*), the agency hereby withdraws the ANPRM that is published in the Federal Register of June 18, 1993 (58 FR 33690), on the regulation of dietary supplements.

Dated: November 30, 1994. William K. Hubbard, Interim Deputy Commissioner for Policy {FR Doc. 94-29988. Filed 12-5-94; 8:45 am}.

Conference for Food Protection

As a follow up to the 1994 Conference for Food Protection, several actions have been taken by the Executive Board to complete the Issues recommendations passed by the Conference delegates. Many letters required by the Issues passed have been or are presently being completed as required by the recommendations.

Additionally, four Food Code Committees have been formed to review and make recommendations to the Executive Board on "Concerns" submitted during the 1994 Conference. Details of this work is as follows:

FDA FOOD CODE COMMITTEE

As the FDA Food Code was released just prior to the 1994 Conference it was reviewed via "Gernic Issues" submitted. Due to the lack of time to thoroughly review the document, delegates were reluctant to take an official action on the Code. Attendees were asked to submit "Concerns" during the Conference to be dealt with following the Conference. Some 40 "Concerns" were submitted. (See Appendix I of the Proceeding for titles of "Concerns".)

Issue 94-01-01 – Review of the Model Food Code – recommended CFP establish Committees to address Food Code Issues.

Based on this Issue, four Food Code Committees have been established by the Executive Board. The 40 "Concerns" mentioned above have been distributed according to general topics area to one of the four committees.

The committees are as follows:

Personnel Committee:
John Benko, Chair
Penny Brockie, Vice Chair

Food, Food Preparation and Processing:
Richard Waskiewicz, Chair
Gary Dixon, Vice Chair

Equipment and Facilities (Plan Review):
Sandra Lancaster, Chair
Steven Grover, Vice Chair

Administration and Enforcement:
Jerry Rowland, Chair
Chuck Stoffers, Vice Chair

Each Commitee is composed of one regulatory representative from each of the five FDA regions, plus industry members, consumers, academia and a representative of AFDO, APHA, IFT, Military, plus a FDA consultant.

The CFP Executive Board has appropriated $2,000 to each Committee to defray telephone and miscellaneous expenses.

Committees will review and evaluate the "Concerns" assigned to them and make recommendations to the Executive Board for the submission of issues to the 1996 Conference.

NRA, EDUCATIONAL FOUNDATION PUBLISHES 1994 CFP PROCEEDINGS

Dialogue between the CFP Executive Board and the Educational Foundation of the National Restaurant Association has resulted in the publishing of the Proceedings from the 1994 Conference. The Proceedings include:

1. CFP mission, history, objectives, current organization registration and affiliation procedures, etc.
2. Section on "Issues" submitted and dealt with by each of the three Councils and recommendation accepted by the delegates. These "Issues" also included committee reports acted upon.
3. Appendices which include;

Appendix A – Constitution and Bylaws.
- a) Preamble
- b) Constitution and Bylaws
- c) Addendum to Constitution and Bylaws:
  - *Map of FDA Regions used in the allocation of members of the Executive Board.
  - *CFP Organizational Chair.
  - *Organizational Structure Composition.
  - *Timeline for Conference Activities.
  - *Index of Appendix A.

Appendix B – List of Participants for '94 Conference.
Appendix C – Executive Board 1994-96.
Appendix D – Memorandum of Understanding.
Appendix E – Council Members for 1994 Conference.
Appendix F – Committess to be formed.
Appendix G – Conference Issues Submission Form.
Appendix H – Conference Membership Application.
Appendix I – Concerns Assigned to Food Code Committee.
Appendix J – Relationship to Committees to Executive Board and Councils.
Appendix K – Committees and Committee Members.

Copies of the "Proceedings" may be purchased from The National Restaurant Association, Educational Foundation, 250 S. Wacker Drive, Chicago, IL 60606 for $19.95 plus $3.50 shipping and handling. Telephone 800-756-2122.

Dairy, Food and Environmental Sanitation, Vol. 15, No. 2, Pages 80-94

Holders of 3-A Symbol Council Authorization on February 1995

Questions or statements concerning any of the holders authorizations listed below, or the equipment fabricated, should be addressed to: Administrative Officer, 3-A Symbol Council, 3020 Bluff Rd., Columbia, SC 29209; Phone (803) 783-9258; Fax (803) 783-9265.

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 United Dominion Company)
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
511 North Avenue
Sewickley, Pennsylvania 15143-2339
(Mfr: Abel Pumps, Buchen, Germany)

793 Ampco Pumps Co. (9/14/94)
4000 W. Burnham St.
Milwaukee, WI 53215

214R Ben H. Anderson Manufacturers (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 Boumatic (5/22/69)
1919 S. Stoughton Rd.,
P.O. Box 8050
Madison, Wisconsin 53716

739 CSF Inox S.P.A. (6/25/93)
Strada per Bibbiano
7 - Montecchio E. (RE)
Italy
(U.S. Rep: Sanchelima Intl.
1781-83 N.W. 93rd Avenue
Miami, Florida 33172)

709 Conexiones Inoxidables (1/18/93)
de Puebla S.A. de C.V.
Vicente Guerrero No. 211
Xicotepec de Juarez
Edo, Puebla, Mexico
(U.S. Rep: Ben Dolphin Consulting,
4735 Lansing Drive
North Olmsted, Ohio 44070)

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

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

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

502 Inoxpa, s.a. (9/16/92)
C/. Telers, 54
17820 Banyoles
Gerona, Spain

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

603 Johnson Pumps (U.K.) Ltd. (8/16/90)
Highfield Industrial Estate
Edison Road, Eastbourne
East Sussex, England BN23 6PT
(U. S. Rep: Johnson Pump of America
4825 Scott St.
Schiller Park, IL 60176)

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

792 KSB. Inc. (9/14/94)
4415 Sarellen Road
Richmond, VA 23231
(Mfg. by: KSB AK Tiengesellschaft
Frankenthal, Germany

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

654 Mono Pumps Ltd., Dresser Pump Div. (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
(U.S. Rep: Alfa Technical Group, Inc.
601 Thompson Road N.
Syracuse, New York)

241 Puriti, S.A. de C.V. (9/12/72)
Alfredo Nobel 39
Industrial Puente de Vigas
Tlalnepantla, Mexico
(U.S. Rep: Top Line Corporation)

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

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

568 Shanley Pump & Equipment, Inc. (5/15/89)
2525 S. Clearbrook Dr.
Arlington Heights, Illinois 60005
(Mfg. by Allweiler, West Germany)

678 Shanley Pump & Equipment, Inc. (5/11/92)
2525 S. Clearbrook Dr.
Arlington Heights, Illinois 60005
(Mfg. by Allweiler, West Germany)

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

52R Viking Pump, Inc. (12/31/56)
A Unit of IDEXX Corporation
406 State St., P.O. Box 8
Cedar Falls, Iowa 50613
(Manufactured by: Johnson Pump
Highfield Ind. Estate, Edison Road
Eastbourne, E. Sussex
UK BN 23 6PT)

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

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 Homogenizer, Div., Rannie Prod. (7/19/78)
(Formerly APV Rannie, Inc.)
445 Etna Street, Suite 57
St. Paul, Minnesota 55106

722 APV Rannie AS (03/23/93)
Roholmsvej 8, DK-2620
Albertslund, DENMARK
(Not Available in U.S.A.)

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

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

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
30 Ossipee Road
Newton, Massachusetts 02164-9101

558 Niro Soavi S.p.A. (1/3/89)
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

770 Tetra Pak Processing Systems (6/13/94)
8400 Lakeview Parkway, Ste. 500
Pleasant Prairie, Wisconsin 53158
(Manufactured by: Tetra Pak-Stainless Equipment AB
Lund, Sweden)

714 Union Homogenizer (02/25/93)
4600 W. Dickman Road
Battle Creek, MI 49015

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

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

756 Beall Trailers of California (2/21/94)
9801 Moffat Blvd.
Manteca, California 95336

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

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

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 Tremcar (10/10/91)
1, Tougas Street
Iberville, Quebec, Canada J2X 2P7
(U. S. Rep: Bay State Tr. & Tr.
527 Winthrop
Rehobeth, MA 02769)

25 Walker Stainless Equip. Co., Inc. (9/28/68)
625 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

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

32 ABB Kent-Taylor, Inc. (10/4/56)
(Formerly Taylor Instruments)
P.O. Box 20550
Rochester, New York 14602-0550

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

747 Alloy Engineering Co., Inc. (1/11/94)
304 Seaview Avenue
Bridgeport, CT 06607

321 Anderson Instrument Co., Inc. (6/14/79)
156 Auriesville Road
Fultonville, New York 12072

586 Diversey Equipment Tech. (12/14/89)
151 Harvey West Blvd.
Santa Cruz, California 95060

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

763 EG & G Berthold Laboritorium Prof. (4/21/94)
Berthold GmbH & Co. KGCalmbacher Str. 22
D-7547 Bad Wildbad 1, Germany
(U.S. Representative:Berthold Systems, Inc.
101 Corporation Drive
Aliquippa, Pennsylvania 15001-4863)

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

794 Leeds and Northrup Co. (9/14/94)
351 Sumneytown Pike
P. O. Box 2000
North Wales, PA 19454

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

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

732 SensorTec, Inc. (5/18/93)
16335-7 Lima Road
Huntertown, Indiana 46748

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

32 ABB Kent-Taylor (10/4/56)
1175 John Street
P. O. Box 20550
Rochester, New York 14602-0550

690 Texas Thermowell, Inc. (8/25/92)
P.O. 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

779 Wahl Inst., Inc. (8/10/94)
5750 Hannum Ave.
Culver City, CA 90231

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 N.W. 50th St.
Sunrise, Florida 33351

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

720 R-P Products (3/19/93)
Box 388, 407 Jefferson Street
Three Rivers, Michigan 49093

435 Sermia International (11/27/84)
740-212 Boul. Industrial
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

11-05 Plate-type Heat Exchangers for Milk and Milk Products

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

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

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

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

718 Babson Bros. Co. (3/8/93)
Dairy Systems Div.
1400 West Gale Avenue
Galesville, Wisconsin 54630

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

791 The Coburn Co., Inc. (9/14/94)
834 E. Milwaukee St., Box 147
Whitewater, WI 53190
(Mfg. by: Elmega S./L.
Apartado De Cerros, 1
Camino Vrejo De Mourelle, S/N
15840 (Santa Comba) La Coruna
Spain

468 Niro, Inc. Evaporator Division (2/2/86)
9165 Rumsey Road
Columbia, MD 21045-1991

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

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 1273
Ferndale, California 95536

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

491 On-Line Instrumention (1/12/94)
P.O. Box 541
Route 376
Hopewell Junction

279 The Schlueter Company (8/30/76)
3410 Bell Street, P.O. Box 548
Janesville, Wisconsin 53547-0548
(Mfg. by Samuel Parker, New Zealand)

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)
Auckland, New Zealand
11100 N. Congress Avenue
Kansas City, Missouri 64153
(Mgr. Skellerup Engineering,
Ellersie, Auckland 5,
New Zealand)

12-05 Tubular Heat Exchangers for Milk and Milk Products

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

734 Berdell Industries (5/19/93)
62 Scott Avenue
Brooklyn, New York 11237

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

712 Enerquip, Inc. (2/24/93)
611 North Road
P.O. Box 368
Medford, WI 54451

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

711 Kusel Equipment Co. (2/24/93)
820 West Street
Watertown, WI 53094

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

614 Tetra Pak Processing Systems (12/27/90)
P.O. Box 179
8400 Lake View Parkway, Suite 500
Pleasant Prairie, Wisconsin 53158
(Mfg. by Tetra Pak Stainless Equipment AB,
P.O. Box 64
Bruggaregatan 23, S-221 00
Lund, Sweden)

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

13-09 Farm Milk Cooling and Holding Tanks

802 Agroequcpos Heker, S.A. (11/10/94)
De C.V.
Ind. Torreon, Coah, MEXICO
(U.S. Rep: James Read
M. E. Stainless
601 High Plain Dr.
Bel Air, MD 21014)

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

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

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

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

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

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

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

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

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

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

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

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

192 Evergreen Packaging (1/3/67)
2400-6th St. S.W., P.O. Box 3000
Cedar Rapids, Iowa 52406

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

619 Hassia Verpackungsmaschinen GmbH (2/22/91)
63691 Ranstadt 1/Hessen Germany
(Hassia U.S.A., 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

735 Kvalitetsproduktion AB (6/11/93)
S-693 29 Degerfors, Sweden
(U.S. Rep: Flowtech, Inc.
1900 Lake Park Drive, Ste. 345
Smyrna, Georgia 30080)

731 LIEDER-Maschinenbau Gmbh & Co. KG (5/18/93)
Postfach 1252/Im Laab 3
3033 Schwarmstedt, Germany

743 Liqui-Box Corporation (11/16/93)
6950 Worthington-Galena Road
Worthington, Ohio 43085

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

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

137 Elo Pak, Inc. (10/17/62)
30000 South Hill Road
New Hudson, MI 48165

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

723 James River Corporation (3/26/93)
One Better Way Road
Milford, Ohio 45150
(Mfg. by Thimonnier, France)

746 Septipack, Inc. (1/11/94)
2313 Benson Mill Rd.
Sparks, Maryland 21152
(Mfg. by Remy Equipment, Druex, France)

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, Michigan 48165)

351 Tetra Pak, Inc. (1/7/82)
909 Asbury Drive
Buffalo Grove, IL 60089
(Mfg. by A. B. Tetra, Italy)

220 Tetra Rex Packaging Systems (4/24/71)
(formerly TetraPak/EquipUS)
909 Asbury Drive
Buffalo Grove, Illinois 60090

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

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

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

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

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

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

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

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

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

23-02 Equipment for Packaging Frozen Desserts, Cottage Cheese and Similar Milk Products

174 APV Crepaco, Inc. (9/28/65)
Filling & Wrapping Systems Div.
100 South CP Avenue
Lake Mills, WI 53551

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

674 Hayssen Manufacturing (4/20/92)
5300 Highway 42 North
P.O. Box 571
Sheboygan, Wisconsin 53082-0571

343 O.G. Hoyer, Inc. (7/6/81)
201 Broad St.
Lake Geneva, Wisconsin 53147
(Mfg. by Alfa Hoyer, Denmark)

679 Ice Cream Novelties (6/1/92)
Division of Popsicle Inc., Ltd.
5305 Harvester Road
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

760 Jordan Manufacturing, Inc. (2/23/94)
Rt. 1, Box 42 A 1
Crossville, Alabama 35962

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

740 Raque Food Systems, Inc. (6/25/93)
11002 Decimal Drive
Louisville, Kentucky 40299

222 Sweetheart Packaging (11/15/71)
(Formerly Fort Howard Pkg. Corp.)
10100 Reistertown Road
Owing Mills, Maryland 21117

24-02 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 56302

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

25-02 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

725 Inox-Tech, Inc. (4/14/93)
6705 Route 132
Ville Ste-Catherine
Quebec, Canada J0L 1E0
(U.S. Rep: Michael Ripka, Pres., Bionex
12615 E. Meridian Avenue
Payallup, Washington 98373)

710 Lee Industries, Inc. (2/10/93)
P.O. Box 687
514 West Pine Street
Phillipsburg, Pennsylvania 16866

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)
4455 W. Kearney
Springfield, Missouri 65801

202 Walker Stainless Equip. Co., Inc. (9/24/68)
625 State St., P.O. Box 202
New Lisbon, Wisconsin 53950-0202

26-03 Sifters for Dry Milk and Dry Milk Products

752 Andritz Sprout-Bauer (1/28/94)
Sherman Street
Muncy, Pennsylvania 17756

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)
810 Ellingham Street
Pointe Clair, Quebec, Canada H9R 3S4
(U.S. Rep: Kason Corp.
1301 E. Linden Avenue
Linden, NJ 07036)

172 Sweco, Inc. (9/1/65)
7120 Buffington Rd.
Florence, KY 41042

27-02 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)
5300 Highway 42 North
P.O. Box 571
Sheboygan, Wisconsin 53082-0571
(Manufactured by Yamato Scale Co.
Akasi, 673, Japan)

625 Ishida Scales Mfg. Co., Inc. (4/2/91)
44, Sanno-Cho, Shogoin
Sakyo-Ku, Kyoto, Japan
(U.S. 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

497 Triangle Package Machinery Co. (2/26/87)
6655 West Diversey Ave.
Chicago, Illinois 60635

28-02 Flow Meters for Milk and Milk Products

270 ABB Kent-Taylor, Inc. (2/9/76)
(Formerly Taylor Instruments)
P.O. Box 20550
Rochester, New York 14602-0550

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 Road
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
(U.S. 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

226 Fischer & Porter Co. (12/9/71)
125 E. 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

717 Gemu Valves, Inc. (3/4/93)
3800 Camp Creek Parkway
Ste. 102, Bldg. 2400
Atlanta, Georgia 30331

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

744 Honeywell (11/16/93)
Industrial Controls Div.
1100 Virgina Drive
Fort Washington, Pennsylvania 19034

733 Honeywell, Inc. (5/18/93)
14841 Black Canyon Highway
Phoenix, Arizona 85023

265 GH Flow Automation (3/10/75)
(formerly Tokheim Automation)
9303 Sam Houston Parkway
Houston, Texas 77099-5298

535 Invalco, Inc.
(A subsidiary of Smith Meter, Inc.)
P.O. Box 1183
Hutchinson, KS 67504

764 Johnson Yokogawa
4 Dart Road
Newnan, Georgia 30265-1040
(Mfg. by Yokogawa Electric Corp.
2-9-32 Nakacho
Musashino-shi, Tokyo,
180 Japan

529 Krohne America, Inc (5/18/88)
7 Dearborn Road
Peabody, Massachusetts 01960
(Mfg. by Altometer, Holland)

755 Liquid Controls Corporation (2/21/94)
105 Albrecht Drive
Lake Bluff, Illinois 60044
(Mfg. by Processautomatic
Box 117,
61070 Vagnharad, Sweden)

778 Magnetrol Intl., Inc. (7/27/94)
5300 Belmont Road
Downers Grover, Il 60515

378 Micro Motion, Inc (2/16/83)
7070 Winchester Circle
Boulder, Colorado 80301

729 Peek Measurement, Ltd. (4/14/93)
Kings Worthy, Winchester
Hampshire, England S023 7QA
(U.S. Rep: Peek Measurement
10335 Landsbury, Ste. 300
Houston, Texas 77099-3407)

490 Rosemount, Inc. (1/8/87)
12001 Technology Dr.
Eden Prairie, Minnesota

585 Schlumberger Industries, Ltd. (12/7/89)
11321 Richmond Ave.
Houston, Texas 77082-2615
(Mfg. by Schlumberger, England)

587 Schlumberger Ind., Measurement Div. (12/18/89)
1310 Emerald Rd.
Greenwood, South Carolina 29646
(Mfg. by Schlumberger, France)

550 Sparling Instruments Co., Inc. (10/26/88)
4097 N. Temple City Blvd.
P.O. Box 5988
El Monte, California 91731

715 Thermal Instrument Co. (2/25/93)
217 Sterner Mill Road
Trevose, Pennsylvania 19053

386 Turbo Instruments, Inc. (5/11/83)
4 Vashell Way
Orinda, California 94563
(Mfg. by Turowerk, West Germany)

803 Turck, Inc. (11/18/94)
3000 Campus Dr.
Plymouth, MN 55441-2656
(Mfg. by: EGE - Eletronik
Ravensberg 34
D-24214 Gehorf
Germany

664 Schutte & Koerting (12/16/91)
(A division of Ketema, Inc.)
XO Technologies Products
2233 State Road
Bensalem, PA 19020

29-01 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

31-02 Scraped Surface Heat Exchangers

290 APV Crepaco, Inc. (6/15/77)
100 South CP Ave.
Lake Mills, Wisconsin 53551

323 Cherry-Burrell Corp. (7/26/79)
Process Equipment Division
P.O. Box 35600
Louisville, KY 40232-5600

274 Contherm, Inc. (6/25/76)
P.O. Box 352, 111 Parker St.
Newburyport, Massachusetts 01950

496 FR Mfg. Corp. (2/23/87)
2807 South Highway 99
Stockton, California 95202

361 N.V. Terlet (7/12/82)
P.O. Box 62
7200 AB Zutphen
Netherlands
(U.S. Agent Manning & Lewis-NJ)

32-01 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

708 Lee Industries, Inc. (1/12/93)
P.O. Box 688
Phillipsburg, PA 16866

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

736 Kvalitetsproduktion AB (6/11/93)
S-693 29 Degerfors, Sweden
(U.S. Rep: Flowtech, Inc.
1900 Lake Park Drive, Ste. 345
Smyrna, Georgia 30080)

308 Rath Manufacturing Co., Inc. (6/20/78)
2505 Foster Ave.
Janesville, Wisconsin 53545

368 Rodger Industries Inc. (10/7/82)
P.O. Box 186, R.R. 1
Blenheim, Ontario
Canada N0P 1A0
(Not available in U.S.A.)

776 Siam Stainless (7/18/94)
Fittings & Tubulars
Bangkok, Thailand
(U.S. Rep: Kurt Orban Partners
Kurt Orban
450 Kings Road
Brisbane, CA 94005)

775 Trent Tube (7/18/94)
P. O. Box 77
East Troy, WI 53120

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

34-02 Portable Bins

647 Thomas Conveyor Company (9/18/91)
Tote System Division
555 I-35 South
Burleson, Texas 76028

35-00 Continuous Blenders

527 Arde Barinco, Inc. (3/15/88)
500 Walnut Street
Norwood, New Jersey 07648

526 Bepex Corp./Hosokawa (3/15/88)
333 Taft St. N.E.
Minneapolis, Minnesota 55413
(Mfg. by Lelystad, Netherlands)

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

642 Mondomix Howden B.V. (8/7/91)
Reeweg 13
P.O. Box 98
1394 ZH Nederhorst den Berg
The Netherlands
(U.S. Rep: Donster and Co.
HCR-3, Box 128
Johnsburg, N.Y. 12843)

680 Quadro Engineering, Inc. (6/3/92)
613 Colby Drive
Waterloo, Ontario
Canada N2V 1A1
(Not available in U.S.A.)

766 Semi-Bulk Systems (4/28/94)
1812 Walton Road
St. Louis, Missouri 63114

724 Silverson Machines, Inc. (4/14/93)
P.O. Box 589
355 Chestnut Street
East Longmeadow, Massachusetts 01028
(Mfg. by Silverson Machines,
Chesham, England)

36-00 Colloid Mills

808 Boston Shearpump, Inc. (12/16/94)
P.O. Box 390161
Cambridge, MA 02139-9998

608 Kinematica (10/17/90)
170 Linden Street
Wellesley, Massachusetts 02181
(Mfg. by: Kinematica AG,
CH-6014 Littau/Lucerne, Switzerland)

293 Waukesha Fluid Handling (8/25/77)
611 Sugar Creek Road
Delavan, Wisconsin 53115

37-01 Liquid Pressure and Level Sensing Devices

738 ABB Kent-Taylor, Inc. (6/25/93)
1175 John Street
Rochester, New York 14602-0550

576 Ametek/Mansfield & Green Division (10/13/89)
8600 Somerset Dr.
Largo, Florida 34643

318 Anderson Instrument Co., Inc. (4/9/79)
156 Auriesville Road
Fultonville, New York 12072

659 Bindicator Company (11/20/91)
1915 Dove Street
Port Huron, Michigan 48060

525 Caldwell Systems Corporation (3/4/88)
(Formerly Zantel Instruments)
1323 Sherman Drive
Longmont, Colorado 80501

672 Computer Instruments Corp. (4/3/92)
1000 Shames Drive
Westbury, New York 11590

706 CTI Celtek Electronics (12/29/92)
136 Merizzi Street
St. Laurent, Quebec, Canada H4T 1S4
(U.S. Rep: CTI Celtek Electronics, Inc.
1000 Leonidas Street
New Orleans, Louisiana 70118)

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

459 Endress + Hauser, Inc. (10/17/85)
2350 Endress Place
Greenwood, Indiana 46142
(Mfg. by Endress + Hauser GmbH,
Hauptstrasse 1,
D-79689 Maulburg, Germany)

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 805
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

749 Haenni Cie & AG (1/17/94)
CH-3303
Jegenstorf, Switzerland
(U.S. Representative: Viatran Corporation
300 Industrial Drive
Grand Island, NY 14072)

771 Hawk America (6/13/94)
1741 W. Rose Garden Lane
Phoenix, Arizona 85027

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 1183
Hutchinson, Kansas 67504-1183

572 ITT Conoflow (9/25/89)
P.O. Box 768, Rt. 78
St. George, South Carolina 29477

798 Kay-Ray/Sensall, Inc. (10/14/94)
1400 Business Center Dr.
Mount Prospect, Il 60056

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

768 MTS Sensors Division (6/6/94)
3001 Sheldon Drive
Cary, North Carolina 27513

596 Magnetrol International (3/20/90)
5300 Belmont Rd.
Downers Grove, Illinois 60515

627 Milltronics, Inc. (4/12/91)
730 The Kingsway
Peterborough, Ontario
Canada K9J 7B1
(U.S. Rep: Milltronics, Inc.
709 E. Stadium Drive
Arlington, Texas 76011)

597 NUOVA FIMA S.p.A. (3/20/90)
Via C. Battisti 59
28045 - INVORIO (N0) Italy
(Not Available in U.S.A.)

523 Paper Machine Components, Inc. (1/3/88)
Miry Brook Road
Danbury, Connecticut 06810

554 Par Sonics, Inc. (11/30/88)
R.D. #1 - Box 505
Centre Hall, Pennsylvania 16828

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

784 Sensotec, Inc. (8/31/94)
1200 Cheseapeake Ave.
Columbus, OH 43212-2288

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)
1947 Avenue "K"
Plano, Texas 75074

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

765 Tri-Clover, Inc. (4/27/94)
9201 Wilmot Road
Kenosha, Wisconsin 53141

754 Valmet Automation (2/15/94)
30 Thomas Drive
Westbrook, Maine 04092
(Mfg. by Valmet-Finland
P. O. Box 237 SF-33101
Tampere, Finland)

410 Viatran Corporation (11/1/83)
300 Industrial Drive
Grand Island, New York 14072

569 WEISS Instruments, Inc. (5/24/89)
85 Bell St.
West Babylon, New York 11704
(Mfg. by Nuova-Fima, Italy)

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

453 Hosokawa MikroPul E. Systems (9/4/85)
102 American Road
Morris Plains, New Jersey 07950

381 Marriott Walker Corp. (4/12/83)
925 E. Maple Rd.
Birmingham, Michigan 48011

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 Waukesha Fluid Handling (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

44-01 Air Driven Diaphragm Pumps

624 Granzow, Inc. (4/1/91)
Mfg. by KWW-DEPA in Germany
2300 Crown Point
Executive Drive
Charlotte, NC 28227

713 Warren Rupp, Inc. (2/5/93)
800 North Main Street
P.O. Box 1568
Mansfield, Ohio 44905

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)

805 Tri-Clover (11/18/94)
9201 Wilmont Road
Kenosha, WI 53141
(Mfg. by: KWW
Dusseldorf, Germany

45-00 Cross Flow Membrane Modules

807 CeraMem Separations (11/30/94)
12 Clematis Ave.
Waltham, MA 02154

786 North Carolina SRT, Inc. (8/31/94)
1018 Morrisville Parkway
Morrisville, NC 27560
(Mfg. by: Tohshin Seiko Co., Ltd.
42-2 Aza Shinmei Tazawa Ohkuma
Watari-Cho, Watari-Gun
Miyagi 889-23 Japan

46-00 Refractometers and Optical Sensors

785 Bran & Lubbe, Inc. (8/31/94)
1025 Busch Parkway
Buffalo Grove, IL 60089
(Mfg. by: Bran & Lubbe
Norderstdt
GMbH (Germany)

800 Epsilon Industrial Inc. (10/24/94)
2215 Grand Ave. Parkway
Austin, TX 78728

783 James C. Camp (8/31/94)
dba Advantec Process Systems
95 Wyngate Dr.
Newnan, GA 30265
(Mfg. by: BTG Inc.
2364 Park Central Blvd.
Decatur, GA 30035-3987)

737 Katrina, Inc. (6/17/93)
91 Western Maryland Pkwy
Hagerstown, Maryland 21740

697 Liquid Solids Control, Inc. (10/21/92)
P.O. Box 259
Farm Street
Upton, MA 01568

751 Maselli Misure S.p.A. (1/20/94)
Via Baganza, 4/3
43100 Parma, Italy
(U.S. Representative:Maselli Measurements, Inc.
P. O. Box 7571
7746 Lorraine Avenue
Stockton, California 95267)

767 NIRSystems/Perstorp (6/6/94)
12101 Tech Road
Silver Spring, Maryland 20904

750 PT Papertech, Inc. (1/20/94)
4850 The Dale
West Vancouver
B. C. Canada V7W 1K3
(U.S. Representative: BD Services Corporation
300 North Commercial Street
Bellingham, Washington 98227)

742 Reflectronics, Inc. (9/15/93)
3009 Montavesta Road
Lexington, Kentucky 40502

50-00 Level Sensing Devices

705 CTI Celtek Electronics (12/29/92)
136 Merizzi Street
St. Laurent, Quebec, Canada H4T 1S4
(U.S. Rep: CTI Celtek Electronics, Inc.
1000 Leonidas Street
New Orleans, Louisiana 70118)

51-00 Plug-Type Valves (Formerly 08-17R)

801 Alloy Products Corp. (11/10/94)
P. O. Box 529
Waukesha, WI 53187

787 Cipriani, Inc. (8/31/94)
Tassalini S.P.A.
23195 LaCadena Dr., Suite 103
Laguna Hills, CA 92653

772 G & H Products (6/13/94)
7600 - 57th Avenue
Kenosha, Wisconsin 53141

780 L. C. Thomsen, Inc. (8/31/94)
1303 - 43rd St.
Kenosha, WI 53140

788 Puriti, S.A. De C. V. (8/31/94)
Alfredo Nobel No. 39
Fracc. Ind. Pte. de Vigas
Tlalnepantha, Mexico
(U.S. Rep: Waukesha Fluid Handling
611 Sugar Creek Road
Delavan, WI 53115)

781 Robert James Sales, Inc. (8/31/94)
699 Hertel Ave., Suite 260
Buffalo, NY 14207

777 Tech Control Ent. (7/18/94)
3725 N. Murray Road
Otis Orchard, WA 98027

790 Tri-Clover, Inc. (9/14/94)
9201 Wilmont Road
Kenosha, WI 53141-1413

759 VNE Corporation (3/16/94)
1149 Barberry Drive
Janesville, Wisconsin 53545

761 Waukesha Fluid Handling (12/17/93)
611 Sugar Creek Rd.
Delavan, Wisconsin 53115

52-00 (Formerly 08-17H) Thermoplastic Plug Type Valves

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

53-00 (Formerly 08-17A) Compression Type Valves

484 APV Crepaco, Inc. (10/22/86)
100 South CP Avenue
Lake Mills, Wisconsin 53551

730 APV Rockford, Inc. (4/21/93)
1303 Samuelson Road
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, Florida 33172)

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

716 Conexiones Inoxidables (3/4/93)
de Puebla S.A. de C.V.
Vicente Guerrero No. 211
Xicotepec de Juarez
Edo, Puebla MEXICO
(U.S. Rep: Ben Dolphin Consulting,
4735 Lansing Drive
North Olmsted, Ohio 44070)

376 Definox Division (9/13/93)
Defontaine, Inc.
16720 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
(Mfg. by: Kammer Ventile GmbH
Manderscheidtstr. 19
45141 Essen 1, Germany)

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
(U.S. Rep: Waukesha Fluid Handling
611 Sugar Creek Road
Delavan, WI 53115)

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

748 Richards Industries (1/11/94)
3170 Wasson Road
Cincinnati, Ohio 45209-2381

762 Stainless Products, Inc. (12/18/80)
P.O. Box 169
1649 - 72nd Avenue
Somers, Wisconsin 53171-0169

806 Steri Technologies, Inc. (11/23/94)
857 Lincoln Ave.
Bohemia, NY 11716
(Mfg. by: Aseptomag AG
Bachweg 3, Postfach 415
CH-3401 Burgdorf
Switzerland)

804 Sudmo North America (11/18/94)
4740 E. 2nd St., Suite C-20
Benicia, CA 94510
(Mfg. by: Sudmo Schleicher AG
Industriester 7.D-73469
Reisburg, Germany)

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)
650 1ere Rue.
Iberville-QUE-Canada J2X 3B8

796 VNE Corp. (10/11/94)
1149 Barberry Dr.
Janesville, WI 53547

(Mfg. by: EGMO LTD.
1 Hayotsrim, P. O. 266
Nahariya, Israel)

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

54-00 (Formerly 08-17B) Diaphragm-Type Valves

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

615 AsepCo (1/4/91)
1101 San Antonio
Mountain View, California 94043

745 Cashco, Inc. (12/9/93)
P.O. Box 6, Hwy. 140 West
Ellsworth, Kansas 67439-0006

617 Definox Division (2/1/91)
Defontaine, Inc.
16720 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

56-00 (Formerly 08-17E) Inlet and Outlet Leak-Protector Plug Valve

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

556 Waukesha Fluid Handling (12/12/57)
611 Sugar Creek Road
Delavan, Wisconsin 53115

57-00 (Formerly 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

58-00 (Formerly 08-17M) Vacuum Breakers and Check Valves

691 Definox Division (1/25/83)
Defontaine, Inc.
16720 W. Victor Road
New Berlin, Wisconsin 53151

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

59-00 (Formerly 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, P.O. Box 7007
Rockford, Illinois 61125
(Mfg. by:Olper Maschinen & Armaturen
Olpe, Germany)

60-00 (Formerly 08-17G) Rupture Discs

422 BS & B Safety Systems, Inc. (6/12/84)
7455 E. 46th St.
Tulsa, Oklahoma 74145

407 Continental Disc Corp. (10/14/83)
3160 W. Heartland Dr.
Liberty, Missouri 64068

61-00 (Formerly 08-17I) Steam Injected Heaters

728 APV Crepaco, Inc. (4/14/93)
395 Fillmore Avenue
Tonawanda, New York 14150

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

62-00 (Formerly 08-17L) Hose Assemblies

795 Able Hose & Rubber, Inc. (9/14/94)
2307 E. Hennepin Ave.
Minneapolis, MN 55413

758 Crouch Supply Co. (2/22/94)
P.O. Box 163829
902 S. Jennings
Ft. Worth, TX 76161

721 Dixon Valve & Coupling Co. (3/23/93)
800 High Street
Chestertown, Maryland 21620

774 The Briggs Co. (7/18/94)
3 Bellecor Dr.
New Castle, DE 19720

757 Nelson-Jameson, Inc. (2/21/94)
P.O. Box 647
2400 East 5th Street
Marshfield, Wisconsin 54449

727 Pure Fit, Inc. (4/14/93)
924 Marcon Blvd.
Allentown, Pennsylvania 18103

799 Rubber World (10/21/94)
936 Links Ave.
Landisville, PA 17538

698 Sanitary Couplers, Inc. (10/23/92)
696-698 Pleasant Valley Dr.
Springsboro, Ohio 45066

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

63-00 Sanitary Fittings

349 APN, Inc. (12/15/81)
921 Industry Rd.
Caledonia, Minnesota 55921

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

773 Herrli AG (7/15/94)
3210 Kerzers
Switzerland
(U.S. Rep.: VNE Corp.
P. O. Box 1698
Janesville, WI 53547)

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

63-00 Sanitary Fittings (Formerly 08-17R)

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)
6170 Tomken Road
Mississauga, Ontario
Canada L5T 1X7
(U.S. Rep: Andron Stainless Corp.
8901 Farrow Road, #101
Columbia, South Carolina 29223)

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-TEC, 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

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

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)
9-11 East Broadway
Hackensack, NJ 07601

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

726 Pure Fit, Inc. (4/14/93)
924 Marcon Blvd.
Allentown, Pennsylvania 18103

242 Puriti, S.A. de C.V. (9/12/72)
Alfredo Nobel 39
Industrial Puente de Vigas
Tlalnepantla, Mexico
(U.S. Rep:Waukesha Fluid Handling
611 Sugar Creek Road
Delavan, WI 53115)

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

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

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

741 Steel & O'Brien Mfg., Inc. (8/26/93)
545 South Route 219
Springville, New York 14141

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

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

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

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

707 Valvinox, Inc., SGRM Div. (1/5/93)
650 - 1st Street
Iberville, Quebec, Canada J2X 3B8
(Not available in U.S.A.)

82R Waukesha Fluid Handling (12/17/93)
611 Sugar Creek Road
Delavan, Wisconsin 53115

64-00 Pressure Reducing and Back Pressure Regulating Valve (Formerly 08-17N)

782 CASHCO, Inc. (8/31/94)
P. O. Box 6
Ellsworth, KS 67439-0006

753 G & H Products (2/1/94)
7600 - 57th Avenue
P.O. Box 1199
Kenosha, WI 53141

769 Richards Industries Valve Group (6/6/94)
3170 Wasson Road
Cincinnati, Ohio 45209

Dairy, Food and Environmental Sanitation, Vol. 15, No. 2, Pages 95-98

3-A Sanitary Standards for Sight and/or Light Windows and Sight Indicators in Contact with Milk and Milk Products

Number 65-00

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. Sight and/or light windows and sight indicators specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. **NOTE:** Use current revisions or editions of all referenced documents cited herein.

A **SCOPE**

A1 These standards cover the sanitary aspects of sight and/or light windows and sight indicators. These standards do not cover external direct-reading gauges for tanks.

A2 In order to conform with these 3-A Sanitary Standards, sight and/or light windows and sight indicators shall comply with the following in design, material and fabrication criteria.

B **DEFINITIONS**

B1 *Product:* Shall mean milk and milk products.

B2 *Sight and/or Light Windows:* Shall mean port-hole assemblies through which light is admitted into dairy equipment or through which the product may be observed.

B3 *Sight Indicators:* Shall mean in-line assemblies for installation in product pipelines through which product may be observed.

B4 **Surfaces**

B4.1 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop, diffuse or be drawn into the product.

B4.2 *Flushing Nozzle:* A device utilized to direct flushing media or air to the light transmitting product contact surface.

B4.3 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

B5 **Cleaning**

B5.1 *Mechanical Cleaning or Mechanically Cleaned:* Shall mean soil removal by impingement, circulation or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned by mechanical means in equipment or systems specifically designed for this purpose.

B6 *Light Transmitting Product Contact Surface Flushing:* Shall mean the flushing of the optical surfaces with a flushing media so as to provide an obstruction-free interface.

B7 *Flushing Media:* Shall mean a safe and product-compatible media such as safe water, culinary steam, clean air, or product.

B7.1 *Safe Water:* Shall mean water from a supply properly located, protected and operated and shall be of a safe, sanitary quality. The water shall meet the standards prescribed in the National Primary Drinking Water Regulation of the Environmental Protection Agency (EPA) as referenced

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[1]*For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 783-3238.*

in The Code of Federal Regulations[1] (CFR), Title 40, Parts 141, 142 and 143. (Information also available from the Environmental Protection Agency (EPA) Drinking Water Hot Line - 800-426-4791.)

B7.2 *Culinary Steam:* Shall mean steam produced used a system meeting criteria in the 3-A Accepted Practices for a Method of Producing Steam of Culinary Quality, Number 609-.

B7.3 *Clean Air:* Shall mean air produced using a system meeting the criteria in the current 3-A Accepted Practices Supplying Air Under Pressure in Contact with Milk, Milk Products and Product Contact Surfaces, Number 604-.

C **MATERIALS**

C1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[2] or corresponding Alloy Cast Institute[3] (ACI) types (See Appendix, Section E.), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

C1.1 Rubber and rubber-like materials may be used for gaskets, O-rings, seals and parts having the same functional purposes.

C1.1.1 Rubber and rubber-like materials when used for the above specified application(s) shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C1.2 Plastic materials may be used for sight and/or light windows and sight indicators, gaskets, seals, O-rings and parts having the same functional purposes.

C1.2.1 Plastic materials when used for the above specified application(s) shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C1.3 Plastic may be used in sight and/or light windows and when used, shall be of a transparent, heat-resistant type.

C1.4 Glass may be used for sight and/or light windows and when used, shall be of a clear, heat-resistant type.

C1.5 Rubber and rubber-like materials, glass materials and plastic materials having product contact surfaces shall be of such composition as to retain their surface characteristics, conformational characteristics and be thermally stable when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment of sterilization.

C1.6 In a processing system to be sterilized by heat and operated at a temperature of 250°F (121°C) or higher, all materials having product contact surface(s) used in the construction of sight and/or light windows and sight indicators and nonmetallic component parts shall be such that they can be (1) sterilized by saturated steam or water under pressure (at least 15.3 psig or 106 kPa) at a temperature of at least 250°F (121°C) and (2) at 10°F (5.5°C) above minimum operational temperature and pressure standards set by the appropriate regulatory agency, and operated at the temperature required for processing.

C2 Nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. Nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

D **FABRICATION**

D1 **Surface Texture**

D1.1 All product contact surfaces shall have a finish at least as smooth as a Nº 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds and crevices in the final fabricated form. (See Appendix, Section F.)

D2 **Permanent Joints**

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded. Welded areas on product contact surfaces shall be at least as smooth as a Nº 4 ground finish on stainless steel sheets, and be free of imperfections such as pits, folds, and crevices when in the final fabricated form except that:

D2.2 Fusion bonding between glass and stainless steel when used, shall be continuous, without crevices and shall not allow liquid penetration under the conditions encountered in the environment of intended use, and in cleaning and bactericidal treatment or sterilization.

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[2]*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 American Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086 (412) 776-1535.*

[3]*Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.*

D3 **Cleaning and Inspectibility**

D3.1 Sight and/or light windows and sight indicators that are to be mechanically cleaned shall be designed so that the product contact surfaces of the sight and/or light windows and sight indicators all nonremoved appurtenances thereto can be mechanically cleaned and are easily accessible and readily removable for inspection employing simple hand tools, if necessary, available to operating or cleaning personnel.

D3.2 Product contact surfaces not designed to be mechanically cleaned shall be accessible for cleaning and inspection when in an assembled position or when removed. Demountable parts shall be readily removable using simple hand tools, if necessary, available to operating or cleaning personnel.

D4 **Draining**

D4.1 All product contact surfaces to be mechanically cleaned shall be self-draining except for normal clingage when properly installed.

D5 **Flushing Systems**

D5.1 The flushing system designed to flush the optical surface during processing shall be designed to meet the following criteria:

D5.1.1 The flushing system nozzle shall be designed to minimize the quantity of flushing media required to adequately flush the optical surface, and shall not adulterate the product with added water.

D5.1.2 When flushing media is introduced into the product optical surface flushing, an isolation valve shall be installed as close as practical to the point of flushing media application, and a spring loaded check valve of sanitary design shall be installed between the valve and the point of flushing media application.

D5.1.3 Culinary steam or safe water, when used as a flushing media, shall comply with Sections B7.1 or B7.2 herein.

D5.1.4 Air under pressure, when used as the flushing media, shall comply with Section B7.3 herein.

D6 **Fittings and Connections**

D6.1 All sanitary fittings and connections shall conform with the applicable provisions of 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-.

D7 **Sanitary Tubing**

D7.1 All tubing shall conform with the applicable provisions for welded sanitary product pipelines found in the 3-A Accepted Practices for Permanently Installed Sanitary Product Pipelines and Cleaning Systems, Number 605-and with the 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33-.

D8 **Gaskets**

D8.1 Gaskets having a product contact surface shall be removable or bonded.

D8.2 Gasket grooves or gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm), and those provided for in Section D6.

D9 **Radii**

D9.1 All internal angles of 135 degrees or less on product contact surfaces, shall have radii of not less than 1/8 in. (3.18 mm)} except that:

D9.1.1 Smaller radii may be used when they are required for essential functional reasons. In no case shall such radii be less than 1/32 in. (0.794 mm).

D9.2 The radii in gasket grooves, gasket retaining grooves, or grooves in gaskets, shall be not less than 1/8 in. (3.18 mm) except for those standard, 1/4 in. (6.35 mm) and smaller O-rings, and those provided for in Section D6.

D9.2.1 The radii in grooves for standard 1/4 in. (6.35 mm) O-rings shall not be less than 3/32 in. (2.38 mm) and for standard 1/8 in. (3.18) O-rings shall not be less than 1/32 in. (0.794 mm).

D10 **Threads**

D10.1 There shall be no threads in contact with the product.

Dl1 **Sterilization Systems**

D11.1 Sight and/or light windows and sight indicators used in a processing system to be sterilized by heat and operated at a temperature of 250°F (121°C) or higher shall comply with the following additional criteria:

D11.1.1 The construction shall be such that all product contact surfaces can be (1) sterilized by saturated steam or water under pressure 10°F (5.5°C) above minimum operational temperatures and pressure standards set by the appropriate regulatory agency and operate at the temperature required for processing.

D12 **Nonproduct Contact Surfaces**

D12.1 Nonproduct contact surfaces shall have a smooth finish, free of pockets and crevices, and be readily cleanable and those surfaces to be coated shall be effectively prepared for coating.

APPENDIX

E **STAINLESS STEEL MATERIALS**

Stainless steel conforming to the applicable composition ranges established by AISI for wrought products, or by ACI for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08%. The first reference cited in C1 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 302, 303, 304, and 316 are designated CF-20,CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM specifications[4] A351/A351M, A743/A743M and A744/A744M. Duplex stainless steel, corresponding to ASTM specification A240 is also an acceptable grade of stainless steel when used with fused glass-metal construction.

F **PRODUCT CONTACT SURFACE FINISH**

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum Ra of 32μ in. (0.80μm), when measured according to the recommendations in ANSI/ASME B46.1 -Surface Texture[5], is considered to be equivalent to a Nº 4 finish.

G **INSTALLATION OF SIGHT AND/OR LIGHT WINDOWS AND SIGHT INDICATORS**

G1 Sight and/or light windows and sight indicator openings, when properly installed, should be of such design and construction that the inner surfaces drain inwardly, and if the sight and/or light windows and sight indicator is designed for mechanical cleaning, the inner surface should be relatively flush with the inner surface of the sight and/or light windows and light indicator openings. The exterior flare should be pitched so that liquids cannot accumulate. The window or indicator should be readily removable. The inside diameter of the opening should be at least 3 3/4 in. (95mm) except that:

G1.1 For instrument fittings to glass, the diameter may be less.

These Sanitary Standards shall be effective November 20, 1994.

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[4]*Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187 (212) 299-5400.*

[5]*Available from American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392 (212) 705-7722.*

IAMFES Secretary Candidates

Robert E. Brackett

Robert E. Brackett is Professor of Food Safety at the University of Georgia's Center for Food Safety and Quality Enhancement. He has been on faculty there since 1984. Prior to that, he spent three years as Assistant Professor/ Extension Food Safety Specialist at North Carolina State University. Bob did his academic preparation at the University of Wisconsin (Madison) where he received his B.S. in Bacteriology and his M.S. and Ph.D. in Food Microbiology.

Bob is an active researcher in the general area of food microbiology, specializing in the microbial safety of foods. His research focuses on the effects of processing and packaging on the growth and survival of foodborne pathogens, development of methods for the enumeration of foodborne pathogens, behavior of psychrotrophic pathogens, the microbiology of fruits and vegetables, and the microbial detoxification of aflatoxin. Bob has researched a number of foodborne pathogens including *Listeria monocytogenes, Yersinia entercolitica, Salmonella, Clostridium botulinum,* and *Escherichia coli O157:H7.*

Bob first became a member of IAMFES in 1976 and is a founding member of the Georgia Association of Food and Environmental Sanitarians. He served as president of GAFES as well as chaired several committees. He has served on the IAMFES Program Advisory Committee and was Co-chairperson of the Local Arrangements Committee for the 1993 IAMFES Annual Meeting in Atlanta.

Bob is also a member of numerous other professional organizations and honorary societies including the Institute of Food Technologists, American Society for Microbiology, Sigma Xi and Phi Tau Sigma and the Dixie Chapter of IFT. He has served as a Councilor for the Food Microbiology Division of IFT as well as chairing or serving on various other committees in IFT and ASM. Bob also currently serves as Chair of the Mycotoxin Group and as a member of the Microbiological Safety of Raw, Pasteurized Milk and Milk Products Group, of the United States National Committee Groups of Experts of the International Milk Federation. He is a member of the Editorial Boards of the *Journal of Food Protection* and *Applied and Environmental Microbiology* and routinely reviews manuscripts for several other food safety and food science related journals including *Journal of Food Science, Food Microbiology, Journal of the Science of Food and Agriculture,* and *Journal of Agriculture and Food Chemistry.*

Bob has authored or co-authored 11 book chapters, 62 peer-reviewed papers and over 100 other scientific or extension publications. In addition, he has given numerous presentations at both national and international scientific conferences and meetings.

Bruce E. Langlois

Bruce E. Langlois is Professor of Food Microbiology and Coordinator & Food Science Program in the Department of Animal Sciences at the University of Kentucky where he has been a faculty member since 1964. His research interests include microbial safety of meats and dairy foods, bovine mastitis, antibiotic drug resistance in bacteria, and the use of natural volatile compounds for extending the shelf life of small fruits. He has received an award for outstanding research in the College of Agriculture at the University of Kentucky.

Bruce is a graduate of the University of New Hampshire where he received his B.S. degree in Dairy Technology and of Purdue University where he received his Ph.D. degree in Dairy Microbiology. He also was a Post Doctoral scholar for two years at Purdue University.

He has been active in the International Association of Milk, Food and Environmental Sanitarians since becoming a member in 1970. He has served on the Editorial Board of the *Journal of Food Protection* since 1985. He has been a member of the Program Advisory Committee since 1990 and is presently serving as program chair for the 1995 annual meeting. He was co-chair of the local arrangement committee for the 1982 annual meeting and committee member for the 1991 meeting. He is a member of the Long Range Planning Task Force and has served on the Educator Award Subcommittee, Subcommittee on Antibiotics, Pesticides and Adulterants in Milk and Milk Products as well as chaired several sessions at annual meetings. He received IAMFES's Certificate of Merit Award in 1982. He has been an active member in the Kentucky Association of Milk, Food and Environmental Sanitarians. He has served two terms as president, seven years on the executive board and as a member of various committees.

Bruce is a member of the American Society of Microbiology, Institute of Food Technologists, Bluegrass Section of IFT (presently serving as secretary), and Gamma Sigma Delta (served as president of Kentucky Chapter, 1993-1994). He has served on the credit committee, board of directors and as treasurer of the University of Kentucky Federal Credit Union.

He has published over 100 scientific papers and given over 100 presentations at various scientific and non-scientific meetings, workshops, and seminars.

NewMembers

ALABAMA

G. M. Gallaspy, Jr.
State of Alambama, Montgomery

ARKANSAS

Patsy McKinney
Gerber Products Co., Fort Smith

CALIFORNIA

Dr. Maria Kalamaki, D.V.M.
Davis

Paul Miller
Dairyman's Coop Creamery Assoc.
Tulare

Daniel B. Reed
Gilroy Foods Inc., Gilroy

CANADA

Laura Cowan
National Meats, Etobicoke

Robert Gibbard
Thomas J. Lipton, Ontario

Louis Laleye
Ault Foods Ltd., Ontario

Bella Leong
Dairy World Foods, Alberta

Michael MacFarland
Thomas J. Lipton Inc., Guelph

Dr. S.S. Malik
Bureau Vet Drugs, Ottawa

Glen Robinson
Robin Hood Multifoods Inc.
Etobicoke

COLORADO

Michael W. Carter
Consumer Protection/Food Safety
Denver

CONNECTICUT

Dr. Edberg
Yale New Haven Hospital
New Haven

ENGLAND

Malvern Barnett
Central Scientific Laboratories
London

FLORIDA

Richard Gallahue
Bactrol Laboratories, Naples

FRANCE

Catherine Duong
Danone, Le Plessis-Robinson

IDAHO

Mary L. Valentine
So. Central Dist. Health Dept.
Twin Falls

ILLINOIS

Richard D. Childress
The HVR Company, Wheeling

Jacqueline Kane
Hidden Valley Ranch/Clorox,
Wheeling

Dr. Raj Nauth
Kraft General Foods, Glenview

KANSAS

Richard Ziesenis
Lawrence Dg. C. Health Dept.,
Lawrence

KOREA

Se Chan Song
Intl. Professional Assn., Seoul

MINNESOTA

Sophia Czechowicz
University of Minnesota, St. Paul

MISSISSIPPI

Gary Phillips
McCarty Farms, Jackson

MISSOURI

Mark Pratt
USDA Food Safety Inspect. Service
St. Louis

Allan Webb
Ralson Purina Co., St. Louis

NORTH CAROLINA

Natalie M. Dyenson
Harris Teeter Inc., Matthews

OHIO

Harold R. Howell, Jr.
SSOE, Inc., Toledo

SPAIN

MaJose Peris Andres
Dpto. Informacion Y Documentacio
Paterna, Valencia

TEXAS

Gina Lundell
Agri-West Laboratory, San Antonio

Steve Stoops
FIS – USDA, College Station

THAILAND

Mr. Boonkiat Tang
General Mills Holland
Pomprab Bangkok

WISCONSIN

Blaine R. Lind
Wisconsin Whey Intl. Inc., Juda

Updates

Management Changes Announced by Tri-Clover, Alfa Laval

Top management changes have been announced by Tri-Clover, Inc. and its parent organization, the Alfa Laval Flow Group. The changes included the appointment of Verner Norby as Divisional Manager of the Sanitary Divison for Alfa Laval's Business Area Flow organization. The division includes the operations of LKM and Tri-Clover, both leading manufacturers of pumps, valves, and fittings for process industries worldwide. It will be headquartered in Lausanne, Switzerland.

Ole B. Andersen, former President of Alfa Laval Food and Tetra Pak Processing in the USA, was named President of Tri-Clover, succeeding Harold Mayer who was named Chairman of Alfa Laval Flow Companies in the United States and Canada.

The appointments, which became effective January 1, 1995, were announced by Giuseppe Falciola, President of the Alfa Laval Flow Group. He explained the steps represent a logical progression of corporate moves taken earlier this year with the formation of Pump, Valve and Sanitary Divisions.

"The appointment of Verner Norby as Divisional Manager is a decisive step in capitalizing on the common resources of LKM and Tri-Clover in areas of research and development, sourcing and manufacturing, information systems and general administration. The combined resources of these organizations make us by far the largest world manufacturer in our field," Falciola said.

The marketing manufacturing operations and distribution of the company's products would be unaffected by the changes.

Forsberg to Head Production at Elgin Dairy Foods Plant

Elgin Dairy Foods, a worldwide manufacturer of dairy and nondairy products, has tapped 21-year veteran Ken Forsberg for the post of Production Superintendent.

Elgin makes and distributes frozen yogurt and soft serve mixes, toppings, sour cream and sour dressing for food service and food processing.

Since joining Elgin as a line worker in 1972, Forsberg has been employed in a number of capacities, including line operations, receiving, and laboratory supervision.

His new responsibilities involve nearly every aspect of Elgin's 135-thousand square foot operation; production schedules, raw ingredients and sugars, product inventory and regulatory compliance.

AFFI Elects Officers, Directors

The membership of the American Frozen Food Institute (AFFI) elected new industry officers and eight directors to AFFI's board of directors at its Annual Meeting on October 9, 1994, at the Walt Disney World Dolphin Hotel in Orlando, Florida. The Annual Meeting was held in conjunction with the National Frozen Food Convention.

Sen. Gordon H. Smith, president and chief executive officer of Smith Frozen Foods, Inc., Pendleton, Oregon, was elected AFFI chairman of the board.

R. Michelle Beale, senior vice president, human resources and public affairs at Coca-Cola Foods, Houston, Texas, was elected AFFI first vice chairman of the board.

William S. Smittcamp, president of Wawona Frozen Foods, Clovis, California, was elected AFFI second vice chairman of the board.

Stephen J. McCaffray, president and chairman of National Frozen Foods Corporation, Seattle, Washington, becomes immediate past chairman of the board.

Eight members of AFFI's board of directors were also elected at the Annual Meeting. These include: **Robert P. Crozer**, vice chairman of the board, Flowers Industries, Inc., Thomasville, Georgia; **Bill R. Daniels**, president, J.R. Simplot Company-Food Group, Boise, Idaho; **Richard F. Hamm**, Jr., vice president and general counsel, Tropicana Products, Inc., Bradenton, Florida; **Paul Lustig**, president and chief executive officer, Sara Lee Bakery Worldwide; vice president, Sara Lee Corporation, Chicago, Illinois; **Charles F. Martin**, III, group vice president, frozen foods, Pet Incorporated, St. Louis, Missouri; **Marvin F. Moes**, vice president of frozen foods, Hormel Foods Corporation, Austin, Minnesota; **Ken Noyes**, division director, Schwan's Sales Enterprises, Inc., Marshall, Minnesota; and **James E. Seiple, Jr.**, vice

president, marketing services, ConAgra Frozen Foods, Omaha, Nebraska.

AFFI is the national trade association that has represented the interests of the frozen food industry for over 50 years. Its 550 member companies account for approximately 90 percent of the total U.S. production of frozen food.

Gerald R. Conner Named Vice President, International Sales & Marketing at Capital Controls Company, Inc.

Gerald R. Conner has been appointed to the newly created position of Vice President, International Sales & Marketing, at Capital Controls Company, Inc. in Colmar, Pennsylvania. Capital Controls produces disinfection equipment and instrumentation for municipal and industrial water and wastewater treatment. The company has operations in the U.S., Europe, and in Southeast Asia and Hong Kong. Capital Controls is a wholly owned subsidiary of Severn Trent, Plc located in Birmingham, U.K.

Mr. Conner brings to Capital Controls over 17 years of management experience in international sales and product marketing. Most recently, Mr. Conner was Director of International Sales & Marketing at Drexelbrook Controls, Inc. located in Horsham, PA.

Prior to Drexelbrook, Mr. Conner held the position of International Sales Manager at Leybold Inficon Inc., where he was heavily involved in the development of their Chinese and Far East markets.

Mr. Conner holds a B.S. in Chemistry from the University of Florida and an M.S. in Analytical Chemistry from Virginia Commonwealth University.

He assumed his responsibilities at Capital Controls on November 16, 1994.

American Butter Institute Honors Doug Johnson with President's Award

Doug Johnson, Vice President of Dairy Foods Operations, Land O'Lakes, Inc., was honored October 5 as the sixth recipient of the American Butter Institute's (ABI) annual President's Award in recognition of his major contributions and exemplary service to the organization. Johnson has served as a member of the Board of Directors and as past President of the ABI.

"Doug's advice and counsel... to the Institute through the many transitions of recent years," stated ABI President Gary Steinhauer, who presented the award to Johnson. "We all owe our gratitude to Doug not only for his effective leadership, but also for his friendship."

Past recipients of the award included Larry Claypool, 1989; Mike Fronk, 1990; John Whetten, 1991; Bob Digges, 1992; and Joe Kirk, 1993.

Custom Control Products Adds Baugrud, Borchardt and Tupy to the Staff

Custom Control Products, Inc. recently announced the addition of Jackie Baugrud to the staff. As Sales & Marketing Manager, Baugrud will be responsible for expanding and developing existing and new markets for CCPI's products and services.

CCPI also recently announced the addition of two project engineers to the engineering team. As Project Engineers, David Borchardt and Russell Tupy will be involved in all phases of automated control system projects. They will quote on control systems, design the hardware and software, assist with the installation and train and service the customer.

Custom Control Products tailors each system to the particular needs of the customer, paying close attention to incorporating growth potential. CCPI uses only system components that are commercially available anywhere, therby avoiding the home-grown single source liability.

Custom Control Products, Inc. provides exceptional quality control systems and auxiliary products, backed by personalized professional service to the dairy, food, beverage and pharmaceutical industries. CCPI is "Setting New Standards in Control Design, Customer Commitment and Product Performance."

If you have an announcement you would like to have published, please submit it to:

Editor
Dairy Food and Environmental Sanitation
6200 Aurora Ave.
Suite 200W
Des Moines, IA
50322-2838

Animal Behavior and the Design of Livestock and Poultry Systems: An International Conference

A unique international conference, "Animal Behavior and the Design of Livestock and Poultry Systems," will be held April 19-21, 1995 in Indianapolis, Indiana at the Ramada Plaza Hotel. The conference features thirty experts from around the world, who will come together to help close the gap between current animal behavioral knowledge and design approaches for equipment and facilities.

When animal behavior is considered during planning and design, production and handling systems can become more profitable and efficient. Beef cattle, swine, dairy cows, and poultry are less likely to suffer disease, injury, or death. "Animal Behavior and the Design of Livestock and Poultry Systems" will cover specific behavioral traits that can be advantageous in livestock and poultry systems design. Speakers will emphasize the importance of analysis at both the component and system levels in designing efficient equipment and facilities.

The conference is divided into six sections: The Design Process, The Behavior of Animals, Behavior-Based Design, Behavioral Considerations in Design, Looking at the Big Picture, and Behavioral-Based Problem Solving in Practice. Topics to be covered include interpreting behavior, behavioral needs and motivations, the economic impact of disease and injury, environmental enrichment, and design assessments. The conference will conclude with discussions of how animal behavior can be used to identify and solve problems in existing systems.

Brochures containing a complete conference agenda, a map to the Ramada Plaza Hotel, and registration information are available. To order a free brochure, contact NRAES, Cooperative Extension, 152 Riley-Robb Hall, Ithaca, NY 14853-5701, phone (607) 255-7654, fax (607) 255-4080, or e-mail nraes@cornell.edu.

Mushroom Industry Scientist Donates Papers to Penn State

A man who could easily be described as "the Henry Ford of mushroom science" has donated part of his personal library to Penn State's Mushroom Spawn Laboratory, giving the College of Agricultural Sciences an invaluable historical resource for students.

James W. Sinden, 92, was a professor of botany at Penn State from 1930 until he resigned in 1952 to work for the Hauser Champignon Laboratorium in Zurich, Switzerland. In 1932, Sinden developed and patented a grain spawn – simply put, a seeding system to grow mushrooms – that revolutionized the industry.

Previously, farmers had grown mushrooms using a manure spawn that was shaped into a brick and dried. Farmers broke off bits of the brick and planted tham. The Sinden grain spawn, which used rye grain that had been colonized by mushroom fungus, could be sown like seed and covered a much wider area for growth. Sinden used rye because that grain worked better as a vehicle for the mushroom spawn.

"The grain spawn improved productivity and it didn't take as long for the crop to grow. It also was much less costly than previous products," explains Dr. Paul Wuest, professor of plant pathology.

Sinden's patent brought in $150,000 in royalties to the university. The money earned during the 17-year life of the patent was used to help for the Pennsylvania Research Corporation, which handled patents for Penn State faculty members.

"It was probably the most successful patent ever issued from Penn State," Wuest says.

Sinden also developed a synthetic compost in 1948 to replace the horse manure compost then in use and has identified fungicides to treat mushroom diseases.

The material Sinden donated to the university generally dates from 1923 to 1952. Such documents as research reports, written lectures, reprints of Sinden's articles from scholarly journals, photographs and even telegrams are included. A large percentage of the material is correspondence.

"Although he was working in the mushroom industry, he always took a scholarly approach to research, and this correspondence to other scientist and mushroom growers is invaluable to get a historical perspective on the mushroom industry," Wuest says.

Although the information is accessible through Pattee Library at University Park, Sinden asked that the collection be stored in the mushroom spawn lab in 117 Buckhout Laboratory.

The monetary value of Sinden's gift is unknown, but the collection is a rich source of information for mushroom researchers, Wuest says. "There are references to mushroom pests, mushroom composts, and

other related topics that open the science of another era of today's researchers," Wuest adds.

The Sinden material helps document the modernization of the mushroom industry, illuminates the history of mycology, and records Penn State's ties to commercial agriculture. Sinden's gift, coupled with the papers of Leon Kneebone, Sinden's successor, gives the university a detailed record of Penn State's contributions to mushroom research.

"Sinden's work covers the whole range of mycology," Wuest says. "This is sort of his legacy as he moved through the decades of mushroom science."

Dean Foods Company to Expand Its Presence in Rockford with Purchase of Barber-Colman's No Longer Used Corporate Headquarters Building

Dean Foods Company will expand its presence in Rockford when it moves its technical support divisions into the Barber-Colman Building, located near U.S. Business 20 and I-90, in Spring 1995. The company has signed a contract to purchase the three-story, 68,500-square foot facility for an undisclosed sum.

The announcement was made by Howard M. Dean, Chairman and Chief Executive Officer of Dean Foods Company, who said: "Dean Foods has a long-standing commitment to Rockford, Illinois, that started in the 1930's when Dean purchased Rockford Dairy, Inc. Since that time, we have built on this commitment by locating our corporate production and quality assurance headquarters in Rockford, rather than Chicago from a total of three technical employees in the early 1940's to more than 70 today, Dean Foods believes that the growth of our technical staff in Rockford mirrors our own corporate growth."

Mr. Dean said that Dean Foods will move its corporate divisions to the new facility. Currently they are housed at the Dean Foods Rockford plant at 1126 Kilburn Avenue. Included in the move are: the Research & Development; Quality Assurance; Engineering; Production Management; Environment; Regulatory and Farm Relations Divisions. The company's plant facility will continue to house Dean Foods production of cottage cheese, powdered non-dairy coffee creamers; Dean Party Dips and Dean Veggie Dips.

"The new facility will be named the Dean Foods Technical Center, while the present facility will become identified as the Rockford Dean Foods Manufacturing Plant.

Dean Foods is a diversified food processor and distributor, producing a full line of dairy and other food products, including fluid milk, cottage cheese, ice cream and frozen novelties, frozen yogurt and specialty food. It is also an industry leader in canned and frozen vegetables, dips, pickles, relishes, powdered coffee creamers, syrups and aseptic products. Products are sold to supermarkets, specialty food stores, food-service facilities, other food processors and internationally. Dean Foods Company sales are approximately $2.5 billion annually.

AFFI Teams Up with WTDT to Produce "Food Trends" Program on National Television

The American Frozen Food Institute (AFFI) has begun production of a five-minute segment for the national television series *The Best of Food Trends*, narrated by Robin Leach. AFFI's segment will air on The Discovery Channel and CNBC in June 1995 in all 211 U.S. markets, reaching 141 million households.

Food Trends, produced by Worldwide Target Demographic Television(WTDT), addresses the topics unique to the food and beverage industry in a news-magazine style format.

"Our main objective with this program is to communicate to consumers that the frozen food aisles offer a variety of wholesome, nutritious and creative products that can help them bring balance to their hectic lifestyles," said Steven C. Anderson, AFFI president and chief executive officer. "We also hope to encourage consumers to eat five servings of fruits and vegetables a day by emphasizing the convenience and ease in preparation that comes with frozen food products."

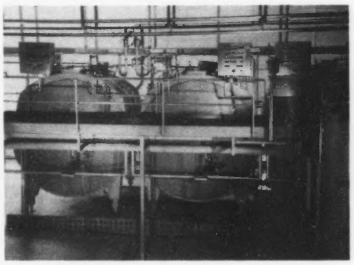
"We are very excited about the AFFI segment on our special episode, *The Best of Food Trends – The Frozen Food Industry*," said Stan Wasser, senior producer. "The AFFI feature will round-out the full program which will highlight many aspects of the frozen food industry, from profiles of processors and associated industry suppliers to food-service and retail buyers at top retail and wholesale grocer organizations."

The television program is one aspect of a comprehensive public relations effort planned by AFFI for 1995 to promote the entire frozen food category. Another aspect of AFFI's communication activities this year is the launching of an aggressive effort to educate consumers on the benefits of frozen food products through the *5 A Day – for Better Health* promotional campaign.

The *5 A Day* campaign, sponsored by the National Cancer Institute and the Produce for Better Health Foundation, encourages Americans to consume at least five servings of fruits and vegetables a day. AFFI has been involved with the program since 1993.

The *Food Trends* segment will allow AFFI to reach millions of Americans with the frozen food industry's key messages.

The AFFI-sponsored segment will be part of a half-hour program that will also profile several processing and distribution companies in the frozen food industry.



Merging Dairy Products' Companies Demand Higher Equipment Efficiency

Due to stiffer competition, the trend for large conglomerates within dairy products industries continues with the result that there is a parallel growth in the size of production units.

Cheese making is no exception.

According to the Dutch cheese-line manufacturer Tebel-MKT, founded more than 100 years ago, the market demand for quality and maximum yield at low costs leads to new challenges for the equipment manufacturer.

Tebel-MKT is keeping pace with the change towards larger and highly-automated production lines. An example of the trend is the company's new cheese vat OST-IV which has a capacity for 30,000 litres. Three of the "giants" were recently delivered to a German cheese maker.

Demands for quality, safety, health, and environmental awareness require close cooperation between cheese makers and manufacturers of cheese-making equipment. Since 1991, the company has therefore assessed its organization and drawn up a new system for quality control to meet the demands of the quality standard ISO 9001.

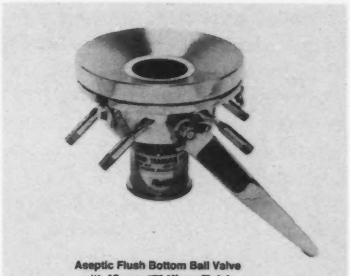
Tebel-MKT is a member of the Finland-based Hackman Group, one of Europe's foremost producers of machinery and equipment for the food and dairy sectors. The company's products and services are marketed globally by Tetra Pak, a leading supplier to the world-wide food processing industry.
Tebel-MKT – Leeuwarden, Holland

Reader Service No. 331

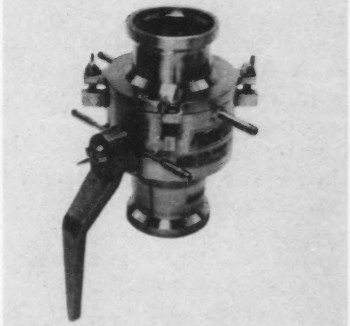
Charm 4000 Luminometer

Charm Sciences introduces the Charm 4000 Luminometer which uses convenient and stable Charm Tablet Reagents to perform multiple tests in the plant and in the field. Charm Test Kits are available to test your plant and equipment for sanitation, test for alkaline phosphatase in milk to ensure pasteurization, test ground meat, eggs, and shrimp for proper cooking, predict the shelf life of milk, and detect organophosphate and n-methylcarbamate insecticides and metabolites in fruit, grain, juices, water, and more. Designed as a lightweight portable system with laboratory accuracy, the Charm 4000 features simple pushbutton operation. Everything you need, including the printer, is mounted in a rugged travel case with space for all your supplies. No other luminometer is more versatile, more cost effective, or more accurate.
Charm Sciences, Inc. – Malden, MA

Reader Service No. 330



Aseptic Flush Bottom Ball Valve with "Super #7" Mirror Finish



Aseptic Two-Way Ball Valve with Optional #4 Finish O.D. and I-Line Connections

Sanitary Fluid Flow Aseptic Ball Valves

Fluid Transfer sanitary two-way, three-way, and flush bottom aseptic ball valves are designed for the processing of a wide variety of products in the food, beverage, pharmaceutical, and cosmetics industries. They feature steam tracing around the steam seal assembly, inlet flange seal, tank or vessel flange seal, and optional steam traced end connections to assure contamination-free product flow through the valve.

Like all Fluid-Flow Sanitary Ball Valves, these valves are precision made of Type 316 stainless steel. They are U.S.D.A. approved and specifically designed for corrosion-resistant highly-sanitary aseptic applications. The double O-ring

design steam barrier on all possible contamination points prevents contamination of product flow. The solid construction of Fluid-Flow Sanitary Valves provides maximum reliability and failure-free performance under extreme conditions. Cleanup and maintenance costs are substantially reduced due to a unique, simple design that allows fast breakdown by hand. No special tools are required. Fluid-Flow Sanitary Valves can also be used in C.I.P. (Clean In Place) systems.

Standard, full-encapsulating, Mica-Filled Teflon seals provide the maximum reduction in product entrapment while full ports also standard, eliminate product flow restrictions. This is particularly important when processing "chunky" or "fibrous" products. Another standard feature is a sanitary #4 I.D. finish (3-A standard). A polished #4 O.D. is offered as an option. Other finishes including electropolish are available.

Sizes range from 1-1/2" through 4" with a working pressure to 300 PSIG and maximum temperature of 450 degrees F. (Depending on the product, steam tracing pressure is up to 15 PSIG at 250 degrees F.) Sanitary Fluid-Flow Aseptic Ball Valves are available with standard sanitary quick-clamp connections, or offered as an option, steam traced Cherry-Burrell No-BAC, or other specified end connections. Several types of pneumatic air-to - air, spring-return, or electric actuators are also available.
Lee Productions, Inc.
Philipsburg, PA

Reader Service No. 332

Clarke — Delco Introduces Concrete Surface Celaners

Clarke-Delco now manufactures CONCRETE SURFACE CLEANERS. The units are designed to be used in hot or cold water from 3 to 6 GPM up to 3000 psi. They are available in 24 inch and 30 inch models. The Concrete Cleaner attaches to any pressure washer manufactured and enhances cleaning efficiency by as much as five (5) times over the traditional handheld cleaning method. The concrete cleaners are equipped with tube type rear tires and 360 degree front caster wheels making them easy to push and maneuver.
Clarke Delco – Springdale, AK

Reader Service No. 342

More AL-6XN® Fittings and Components Offered by Tri-Clover

Tri-Clover has expanded its line of fittings and system components, featuring the exclusive AL-6XN® alloy for superior corrosion resistance in critical process environments.

Featuring increased chromium, nickel and molybdenum content over 304, 316 or 316L stainless steels, AL-6XN® specifically addresses the problems of pitting, crevice attack and stress corrosion cracking. It meets ASME and ASTM specifications and is approved by the USDA for use as a food contact surface.

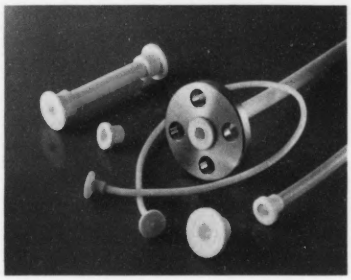
Indicative of AL-6XN®'s corrosion resistant and long service life characteristics, the alloy proved superior to 316/316L stainless steel in crevice corrosion tests conducted in accordance with ASTM G 48B.

Tri-Clover's AL-6XN® fittings and tubing are available in sizes ranging from 1/2 to four inches. Fittings are available in polished or unpolished finishes.

Among the applications where AL-6XN® offers superior performance are systems and components such as holding tubes where liquids are processed at elevated temperatures approaching and exceeding 200 degrees F.

In addition to the process efficiencies afforded through the use of AL-6XN® fittings and components, the alloy can also help reduce pipeline component replacement and installation costs. Additional savings are possible through reduced product loss and downtime achieved throughout AL-6XN®'s prolonged and superior service life.
Tri-Clover, Inc. – Kenosha, WI

Reader Service No. 333



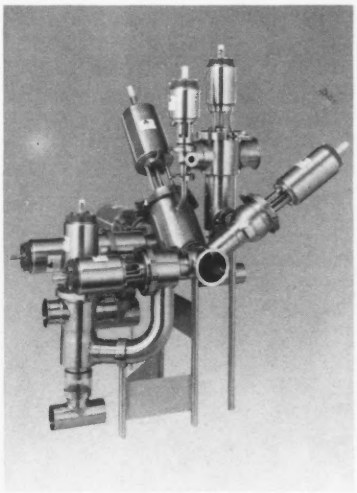
Sanitary Teflon Chemical Transfer Lines

Chemical transfer lines in an all pure-Teflon® PTFE fluoropolymer construction, are available for ultrapure, sanitary applications for the pharmaceutical, food & beverage processing and the skin contact materials industry.

Bare, thick-walled tubing or piping provides significantly better permeation properties than more expensive, reinforced Teflon lined hoses. Flowing liquid experiences no diametrical variations in flow, and dead spots are eliminated due to the completely swept flow path. The unique high temperature, purity, non-stick, chemical inertness and autoclavability features of the fluoropolymer are preserved in this product construction. Teflon PTFE complies with USDA regulation 21 CFR 177.1550.

Standard sizes range form 1/8" to 1" and are available in a variety of sanitary stainless steel fitting, including tri-clamp ferrules and flanges.
Fluorotherm Polymers, Inc.
East Hanover, NJ

Reader Service No. 341



Tri-Flo® Mix-Proof Valve System Customized for Cheese Vat Application

A customized mix-proof valve system for use specifically in the cheese industry has been unveiled by Tri-Clover Inc.

The new patented valve system meets both Pasteurized Milk Ordinance and 3-A requirements. It features multiple actuator stems, each with full stroke capability, which permit positive position verificaton for each valve stem. Because of the full stroke stem design, the valve can be fully cleaned in place, a necessity for mix-proof systems in the dairy industry.

Each of three valves in the compact system regulates the flow of a separate substance. A milk fill valve introduces milk into the vat. After curd has formed, it is removed from the tank via a curd discharge valve. Finally, CIP is introduced into the vat through a separate valve and the third Mix-Proof valve routes CIP solution to all wetted system parts.

As with all Tri-Flo® Mix-Proof valves, the Tri-Flo® Cheese Vat System incorporates full-sized leak detector ports (equal in diameter to the largest seat diameter in the valve) with clear plastic junctions to the recirculation/drain pipe. This configuration offers immediate confirmation of seal integrity. The overall design eliminates both product loss and pockets of standing product in which bacteria can breed.

Another advantage of the Tri-Flo Mix-Proof® valve is its ability to accommodate automated bottom filling, eliminating the time and manpower needed to disconnect and reconnect elbows.

Also, to speed and simplify servicing, the valves feature a limited number of seals and O-rings. They share a number of common parts with other valves in Tri-Clover's popular 761 series of Tri-Flo® air actuated valves. Optional color-coded identification rings are available to simplify tracing of fluid flows through processing plants. The different colored rings can be placed over the top of each actuator to identify pasteurized, unpasteurized, water, CIP and other process fluid lines.
Tri-Clover Inc. - Kenosha, WI

Reader Service No. 343

CITRANOX®-Brand Detergent Cleans Filters to Help Maintain Protein Levels in Milk-Replacer Products for Young Animals

Piglets, calves, foals and other young farm animals often require ingestion of milk replacers to maintain proper nutrition, and thus, healthy growth. CITRANOX®-brand detergent from Alconox, Inc. helps to ensure proper protein levels in milk-replacement products by effectively cleaning the costly metal filters used in the nitrogen analyzers which monitor their content.

These nitrogen analyzers use a combustion process to produce nitrogen, then convert nitrogen-level data to percent-of-protein information. Gases produced from the combustion process pass through a set of chemical filters which require regular removal of solid debris to ensure measurement accuracy.

CITRANOX® aqueous detergent not only effectively cleans such debris, but helps prolong filter-membrane life. In fact, one milk-replacer producer claims to have used the original-equipment filters inside their nitrogen analyzers for a full three years as a result of the effective detergency of CITRANOX® brand.

CITRANOX®-brand critical-cleaning detergent is available from laboratory and industrial suppliers in one-gallon containers, four gallons to the case, and in 15- and 55-gallon drums.
James Morris-Lee Rosemont, NJ

Reader Service No. 334

WhereToFindIt

BusinessExchange

Coming Events

MARCH

• **2-3, Food Technology, Regulatory Compliance for the Food Industry,** East Brunswick, NJ. For more information, contact: Registry, The Center for Professional Advancement, P. O. Box 1052, East Brunswick, NJ 08816; phone (908) 613-4500; FAX (908) 238-9113.

• **2-3, Pharmaceutical Technology, Writing Standard Operating Procedures to Meet cGMP Requirements,** East Brunswick, NJ. Acquire a better understanding of what the FDA is looking for, methods used for compiling information, assignment of responsibility for departmental procedures, instruction on technical writing, new plant start-up, and plant revision, or companies experiencing rapid growth or expansion. To enroll or request more information, call toll-free in California (800) 752-0881. Outside of California, call (916) 757-8777.

• **2-4, Introduction to Statistical Methods for Sensory Evaluation of Foods,** a course to be offered at the UC-Davis campus. The fee is $575.00 and includes one dinner, two lunches and the course text or manual. For more information or to enroll, call toll-free in California (800) 752-0881. Outside California, call (916) 757-8777.

• **3, The Baking Industry Sanitation Standards Committee 1995 Annual Membership Meeting,** at the Chicago Marriott Hotel. For more information contact the BISSC headquarters, 401 N. Michigan Ave., Chicago, IL 60611; phone (312) 644-6610.

• **6-7, Pharmaceutical Technology, Preparing Clinical Protocols and Managing Clinical Investigations,** East Brunswick, NJ. The purpose of this course is to give participants guidance and workshop experience, along with an understanding of government regulations pertaining to clinical protocols. To enroll or request more information, call toll-free in California (800) 752-0881. Outside of California, call (916) 757-8777.

• **6-8, Principles of Cereal Science,** a short course sponsored by American Association of Cereal Chemists will be held in Los Angeles, CA. For more information, contact Marie McHenry, AACC Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121; phone (612) 454-7250; FAX (612) 454-0766.

• **6-8, Sensory Evaluation: Overview and Update,** an additional course offered at the UC-Davis campus. The fee is $55.00, or $1,000 to attend both this and the "Introduction to Statistical Methods for Sensory Evaluation of Foods." For more information or to enroll, call toll-free in California (800) 752-0881. Outside California, call (916) 757-8777.

• **8-10, Pharmaceutical Technology, Practical Considerations in Preparing Investigational New Drug and New Drug Applications (IND/NDA'S),** East Brunswick, NJ. This continually updated course meets the need for advanced information on preparing IND applications and NDAs in compliance with the most recent regulations. To enroll or request more information, call toll-free in California (800) 752-0881. Outside of California, call (916) 757-8777.

• **13-15, Pharmaceutical Technology, Drug Product Stability and Shelf-Life,** East Brunswick, NJ. The objective of this course is to explore fundamentals of current principles and practice concerning the stability of pharmaceutical and cosmetic products. To enroll or request more information, call toll-free in California (800) 752-0881. Outside of California, call (916) 757-8777.

• **13-15, Food Technology, Confectionery and Chocolate Production,** East Brunswick, NJ. For more information, contact: Registry, The Center for Professional Advancement, P. O. Box 1052, East Brunswick, NJ, 08816; phone (908) 613-4500; FAX (908) 238-9113.

• **13-15, Food Technology, Microwave and RF Technology,** East Brunswick, NJ. For more information, contact: Registry, The Center for Professional Advancement, P. O. Box 1052, East Brunswick, NJ 08816; phone (908) 613-4500; FAX (908) 238-9113.

• **15-17, Pharmaceutical Technology, Stabilization of Protein Drugs, Biologics and Devices,** East Brunswick, NJ. The objective of this course is to present current data relevant to the successful development of stable protein drugs, biologics, and devices. To enroll or request more information, call toll-free in California (800) 752-0881. Outside of California, call (916) 757-8777.

• **20-22, Food Technology, Food Irradiation Technology,** Fort Lauderdale, The Center for Professional Advancement, P. O. Box 1052, East Brunswick, NJ 08816; phone (908) 613-4500; FAX (908) 238-9113.

• **21-23, AFFI's Spring Convocation of Committees,** For more information, contact AFFI's Convention Office at (703) 821-0770.

• **23-24, Pharmaceutical Technology, The FDA Investigator Cometh,** East Brunswick, NJ. Recommended actions to be taken before, and after an investigation are outlined in this course. To enroll or request more information, call toll-free in California (800) 752-0881. Outside of California, call (916) 757-8777.

·25-26, **Getting Started in the Specialty Food Business,** a course to be offered at the UC-Davis campus. The fee is $345.00 and includes two lunches, social and the course text. For more information or to enroll, call toll-free in California (800) 752-0881. Outside California, call (916) 757-8777.

·27-29, **Food Technology, Food Hydrocolloids,** East Brunswick, NJ. For more information, contact: Registry, The Center for Professional Advancement, P. O. Box 1052, East Brunswick, NJ 08816; phone (908) 613-4500; FAX (908) 238-9113.

·27-29, **Maintaining Quality and Safety of Fresh Cut Produce,** a course focuses on the physiological, biochemical and microbiological factors that influence quality and safety of fresh-cut (lightly processed) fruits and vegetables. For time and free information, call (800) 752-0881. Out-side California, call (916) 757-8777.

APRIL

·3-5, **Food Technology, Good Manufacturing Practice (GMP) for the Food Industry,** This is an introductory course in the laws and regulations enforced by the U.S. Food and Drug Administration as they relate to the processing of foods. For more information, contact Registrar, The Center for Professional Advancement, P. O. Box 1052, East Brunswick, NJ 08816; phone (908) 613-4500; FAX (908) 238-9113.

·3-5, **Pharmaceutical Technology, Current Good Manufacturing Practice (cGMP) for the Pharmaceutical and Allied Industries;** San Francisco Bay Area, CA. Topics covered will include not only the legal requirements for cGMP in the Federal Food, Drug, and Cosmetic Act but primarily the practical "how to" of purchasing, manufacturing, packaging, labeling and QA/QC, as well as training production personnel in cGMP. To enroll or request more information, call toll-free in California (800) 752-0881. Outside of California, call (916) 757-8777.

·3-5, **Pflug's Microbiology and Engineering of Sterilization Processes;** this intensive lecture problem course is for degreed scientists and technical managers involved in the research, development and manufacture of sterilized food, pharmaceutical products and medical devices. For more information, contact Dr. William Schafer, course coordinator, Department of Food Science and Nutrition, 1334 Eckles Ave., St. Paul, MN 55108; phone (612) 624-4793.

·6-7, **Pharmaceutical Technology, Writing Standard Operating Procedures to Meet cGMP Requirements,** East Brunswick, NJ. Acquire a better understanding of what the FDA is looking for, methods used for compiling information, assignment of responsibility for departmental procedures, instruction on technical writing, new plant start-up, and plant revision, or companies experiencing rapid growth or expansion. To enroll or request more information, call toll-free in California (800) 752-0881. Outside of California, call (916) 757-8777.

·6-7, **Pharmaceutical Technology, The FDA Investigator Cometh,** East Brunswick, NJ. Recommended actions to be taken before, and after an investigation are outlined in this course. To enroll or request more information, call toll-free in California (800) 752-0881. Outside of California, call (916) 757-8777.

·10-12, **Food Technology, Food Extrusion Technology,** This course is designed to provide a thorough background in extrusion principles and practice. For more information, contact Registrar, The Center for Professional Advancement, P. O. Box 1052, East Brunswick, NJ 08816; phone (908) 613-4500; FAX (908) 238-9113.

·23-25, **AFFI's Mid-Year Board of Directors Meeting,** For more information, contact AFFI's Convention Office at (703) 821-0770.

Advertising Index

Preview

of the 82nd IAMFES Annual Meeting

Monday Morning — July 31, 1995

Practical Approach to Quality Milk

- NCIMS Update and Structure of NCIMS
- 3-A Standards Now and in the Future
- Laying the Groundwork for HACCP and ISO 9000
- Quantitative Dairy Product Shelf Life Tests Research & Development
- Feedback from Third Party Data Base
- Practical Solutions to Pathogens from Milk or Meat
- Design, Installation, and Maintenance of Plate Heat Exchangers

Technical Session — Control of Food-borne Microorganisms

- Shelf Life Extension & Safety of Fresh Pork Treated with High Hydrostatic Pressue
- Microbial Monitoring of Irradiated, Commercially-Prepared, Chub-Packed Ground Beef
- Reduction of *Salmonella typhimurium* on Chicken Carcasses Using Pulsed Electricity
- Isolation and Characterization of Gram-negative Bacteria, Isolated from Ground Beef, that Exhibited Inhibition of *Escherichia coli* 0157:H7
- Inhibition of a Psychrotrophic *Clostridium* Species by Sodium Diacetate and Sodium Lactate in a Cook-in-the-Bag, Refrigerated Turkey Breast Product
- Inhibitory Effects of Sucrose Fatty Acid Esters, Alone and in Combination with EDIA and Organic Acids, on *Listeria monocytogenes* and *Staphylococcus aureus*
- Evaluation of Colicins for Inhibition Against Diarrheagenic Verotoxigenic *Escherichia Coli* Strains
- Inhibition of *L. monocytogenes* and *A. hydrophila* on Cooked Beef by Plant Extracts Combined with Dried Whey Preparations of Antagonistic Bacteria
- Control of *Listeria monocytogenes* on Catfish Fillets (Ictalurus punctatus) Using Food Grade Antimicrobials
- Microbial Decontamination of Fecally Contaminated Carcasses as Affected by Various Temperature Water Sprays and Steam
- Disinfection of Cutting Boards by Microwave Energy

International Approaches to Meat Safety and Quality

- Why Should a Food Producer/Processor Become ISO 9000 Certified
- Integrated Quality Control in the Pig Sector
- General Principles of ISA 9000 and ISO 45000: HACCP, TQM and ISO Links
- An Integrated System of ISO 9000 and ISO 45000 Certificates in the Control of Food Hygiene
- Quality Systems in a Canadian Meat Processing Operation
- Application of HACCP Principles and Beyond: Beef Slaughter and Fabrication

An Introduction to Molecular Typing Methods for the Food Microbiologist (Sponsored by ILSI)

- A General Introduction to the Hows and Whys of Molecular Typing
- Riboprint – A Novel Automated Ribotyping Method for Molecular Typing of Food-borne Microorganisms
- RAPD Typing of Food-borne Pathogens – An Overview
- The Use of PFGE for the Molecular Typing of Food-borne Pathogens
- Methods for Data Capture, Analysis, and Interpretation of Electrophoretic Gels

Posters — Growth/Behavior of Food-borne Microorganisms

- Growth of *Listeria monocytogenes* and Listeriolysin O Secretion in Broth Containing Salts of Organic Acids
- Heat-resistance of *Listeria monocytogenes* Increases when Production of Osmoprotectants is Induced
- The Incidence of Pathogenic Microorganisms in Aquacultured Rainbow Trout (*Oncorhynchus mykiss*)
- A Comparision of Quantitative Levels of *Escherichia coli* 0157:H7, *Klebsiella pneumoniae*, *Campylobacter*, and *Salmonella* in Fresh Blue Crab (*Callinectes sapidus*)

- Survival and Growth of *Escherichia coli* 0157:H7 on Produce
- Thermal Resistance of *Aeromonas hydrophila* in Liquid Whole Egg
- The Incidence of Pathogens in Aquaculture Recirculation Water Systems and a Comparision of Their Presence to Fish Size and Stocking Densities
- Growth and Survival of *Listeria monocytogenes* in Minimally Processed Green Beans as Influenced by Modified Atmosphere Packaging, NaCl Treatment and Storage Temperature
- Radiosensitivity of *Listeria monocytogenes* Following Split-Dose Application of Gamma Radiation
- Growth of *Yersinia enterocolitica* on Osmotically Dehydrated Broccoli Packaged in Modified Atmospheres and Stored at 10°C
- Survival/Growth of Gram Positive Bacteria in Reconditioned, Potable, and Non-chlorinated Water
- Presence of *Listeria* Species in Market Beef
- Susceptibility of Pre-evisceration Washed Carcasses to Contamination by *Escherichia coli* 0157:H7 and Salmonellae
- Production of Botulinum Toxin in Packaged Fresh Produce
- The Potential of Danish Market Cheeses to Support Growth of Food-borne Pathogens
- Influence of Temperature Abuse on Growth of *Clostridium perfringens* from Spores in Cooked Turkey
- Effect of High pH on the Survival of *Salmonella typhimurium, Salmonella newport* and *Campylobacter jejuni* in Poultry Scald Water at 55°C
- Growth of *Salmonella* & *Vibrio cholerae* in Reconditioned Water

Monday Afternoon — July 31, 1995

Practical Approach to Quality Milk — Plant Session

- Technical Challenge in Progressing from Conventional Milk Processing to Aseptic Processing
- Issues of Using Reclaimed Water
- Emergency and Recall Coordination
- Innovations in Plant Design and Processing
- Developments in Pasteurization Control

Practical Approach to Quality Milk — Farm Session

- Environmental Issues – University Viewpoint
- Environmental Issues – Farm Viewpoint
- Design Challenges in Modern Equipment
- Current Cleaning Chemical Technology & Recommendations for Maximum Cleaning Effectiveness
- Futuristic Dairy Farm Design

Technical Session — Detection and Enumeration Methods

- Rapid Multianalyte Immunoassay to Screen for Antibiotic Residues in Milk
- The Rapid Charm Phosphatase Test Conforms with USDA Requirements for Cooked Meat and Gauges Microbial Log Reduction
- Specificity of Four Monoclonal Antibodies Produced Against *Salmonella typhimurium*
- Antigenicity of 35 and 24 kDa Outer Membrane Proteins of *Salmonella*
- A New Petrifilm™ Method for *Enterobacteriaceae* Testing
- Ontario's Inspection Protocol for Undrawn Dressed Poultry (UDP): A Model for Standards Development for Ethnic Markets
- Re-engineering of Licensing Audit for Ontario Abattoirs
- The Application of Risk Assessment and Standard Audit Principles for Compliance Verification in Ontario Inspected Abattoirs
- A Computer Program for Managing a Food-borne Disease Surveillance Network & Compiling Surveillance Data
- International Trends in HACCP

Posters — Control of Food-borne Microorganisms

- Modeling the Effect of Temperature on Growth Rate and Lag Time of *Bacillus Stearothermophilus* Using Variance Stabilizing Transformations
- Antimicrobial Action of a Nisin-Based Treatment Against *Salmonella typhimurium* in Fresh Pork Loin
- Effect of Trisodium Phosphate on *Listeria monocytogenes* Attached to Rainbow Trout
- *Nannocystis exedens* as a Potential Biocompetitive Agent Against Toxigenic *Aspergillus flavus* and *Aspergillus parasiticus*
- Reduction of Food-borne Pathogens on Beef Carcass Tissue Using Sodium Bicarbonate and Hydrogen Peroxide
- Efficacy of Trisodium Phosphate for Killing *Salmonella* on Tomatoes
- Expanded Models for Predicting the Non-Thermal Inactivation of *Listeria monocytogenes*
- Effect of Chlorine Dioxide Spray Washes for Reducing Fecal Contamination on Beef
- Antimicrobial Properties of Volatile Horseradish Distillates
- Effect of Processing Protocols on the Quality of Aquacultured Fresh Catfish Fillets

- A Model for the Effects of Temperature, pH and Lactate on the Survival of *E. coli* 0157:H7
- Intervention Through the Use of Hand-trimming, Chemical Sanitizers and Hot Water Spray-Washing to Remove Fecal and Microbiological Contamination from Beef Adipose Tissue
- Influence of Fat Content in Pork Liver Sausage on Growth of *Listeria monocytogenes* and Its Inhibition by Lactate and Sorbate
- Destruction of *Listeria monocytogenes* on Catfish Fillets Using Lactic Acid and Monolaurin
- Sensitization of *Escherichia coli* to Nisin and Lysozyme by High Hydrostatic Pressure, EDTA and Chitosan
- Effects of Lactate, Spice Oil, and pH Levels on the Growth and Survival of *E. coli* 0157:H7 at 35 and 4°C
- Comparison of Mathematical Models to Estimate Growth Rate of *Escherichia coli* 0157:H7 at Fluctuation Temperatures
- A Survey of College Students' Knowledge of Food Safety & Home Food Preparation Practices
- Feasibility of Using Food Grade Food Additives to Control the Growth of *Clostridium perfringens*
- Effect of Time of Exposure of Beef Fat Fascia to *Escherichia coli* ATCC 11370 on Its Removal by Spray-Washing with Chemical Solutions and 35° or 74° Water
- Sensitivity of Six Strains of *Listeria monocytogenes* to Nisin in Broth at pH 5, 6 and 7
- Ecology and Control of Bread Spoilage by Rope

Tuesday Morning — August 1, 1995

Hurdles to Improve Safety and Quality of Ready-To-Eat (RTE) Meats

- Approved Food-Grade Ingredients and Antagonists to Reduce Contamination and Increase Safety of Meat: Pretreatment in the Slaughter Process
- Approved Food-Grade Ingredients and Antagonists to Reduce Contamination and Increase Safety of Meat: Direct Additions to Meat Formulations
- Packaging and Storage Conditions to Enhance Meat Safety
- Irradiation: A Solution for Meat Safety Problems – North American and International Prespective
- Novel Approaches in Hurdles Technology
- Hurdles in Getting Hurdle Approval

Technical Session — Growth/Behavior of Food-borne Microorganisms

- Influence of pH and Incubation Temperature on Virulence and Fatty Acids of *Yersinia enterocolitica*
- Growth of *Listeria monocytogenes* and *Yersinia enterocolitica* on Cooked Poultry Stored Under Modified Atmosphere at 3.5, 6.5 and 10°C
- Natural Occurrence of *L. monocytogenes* in Fresh Blue Crab (*callinectes sapidus*) Meat & Its Growth Characteristics at Refrigeration Temperatures
- The Effect of Iron Levels on Growth, Toxicity and Adherence of Enterohemorrhagic *Escherichia coli*
- Acid Adaptation in *Listeria monocytogenes* Scott A
- Stress Protein and Fatty Acid Composition Effects on Heat Resistance of *Escherichia coli* 0157:H7
- Survival Characteristics & Injury of *Escherichia coli* 0157:H7 During Conventional & Microwave Heating at Constant Temperatures
- Comparison of D_{55C} Values of Antibiotic-resistant and Antibiotic-sensitive Strains of *Salmonella*
- Biological Characterization of *Enterobacter sakazakii*
- Spoilage Ecology of Vacuum-Packaged Vienna Sausages

Emerging Issues in Microbiological Food Safety (Sponsored by ILSI)

- Bovine Spongiaform Encephalopathy – Potential Risk from Foods
- Survival of *Cryptosporidium oocystes* in Beverages
- Growing Concerns and Recent Outbreaks of Enterohemorraghic *E. coli* - non-0157:H7 Serotypes
- *Staphylococci* – Are There Coagulase Negative Toxigenic Strains on the Horizon?
- *Arcobacter* and *Helicobacter* - Risks for Foods and Beverages
- Dealing with an Expanding, Global Food Supply

Poster Session — Detection and Enumeration Methods

- Genomic Fingerprinting of *Bifidobacterium* spp. from an Infant
- Evaluation of Universal Preenrichment Versus Lactose Broth Plus Various Plating Media for Isolating Salmonellae from Naturally Contaminated Fresh Chicken and Pork Sausage
- Evaluation of an Automated Assay for the Detection of *L. monocytogenes* in Food Products
- Optimization of Polymerase Chain Reaction Parameters Utilizing an Experimental Design Approach
- Antibiotics and Sulfonamides in Meat Samples Destined to Human Consumption
- Biodegradation of Aflatoxins by *Flavobacterium aurantiacum* in Culture Media
- Lightning™: Introduction of a Machine-Side Rapid Hygiene Monitoring System

- Evaluation of Microbial Swabs for Releasing HCMC and Their Viability on Ice Using 3M™ Petrifilm™
- A New Rapid Method for the Detection of *E. coli* 0157 in Raw Meat
- Detection of *Escherichia coli* 0157:H7 in Foods by Multiplex PCR
- Determination of Trace Elements in Muscle, Liver & Kidney from Pork Produced in Sonora, Mexico
- Chemical and Mineral Analysis of Surimibased Seafood Products
- Comparison of ISO-Grid™, DRBC, Petrifilm™, and PDA Pour Plate Methods for Enumerating Yeasts and Molds on Shredded Cheese
- Use of Blue Lake as an Indicator of Bacterial Penetration into Eggs
- Rapid Estimation of Raw Milk Quality
- Evaluation of a Miniaturized Microbial Inhibition Assay for Screening of Antimicrobial Residues in Animal Tissues
- Comparison of Five Media for Enumeration of *Escherichia coli* 0157:H7
- The Charm Alkaline Phosphatase Test: Rapid Bioluminescence Method for the Determination of Alkaline Phosphatase in Pasteurized Milk and Other Dairy Products – Collaborative Study
- Charm Cloxacillin Antibody Performance Validated for Bulk Tank Milk
- A New Rapid Method for Detection & Enumeration of *Listeria monocytogenes* in Food Samples
- Validation of Predictive Mathematical Models to Demonstrate Applicability to Foods
- Detection by PCR of *Campylobacter jejuni* in Contaminated Chicken Products
- E*Colite, The New Standard in Monitoring Coliforms & *E. Coli* Contamination in Water

Tuesday, August 1, 1995 — Afternoon

General Session — Equivalency of Inspection — Impact of NAFTA and GATT

- Equivalency of Inspection – Practical Realities in the Real World
- Economics of Equilibrating Meat and Poultry Inspection Systems
- The European Perspective on Equilibrating International Meat and Poultry Inspection Systems

Wednesday, August 2, 1995 — Morning

Current Issues in Food Services A Practical Symposium — Part 1

- Food Code – A Practical Approach
- Plan Review – Standardization for Efficiency
- Pest Control
- Cleaning of Equipment: Effectiveness of Cleaning Compounds and Sanitization
- HACCP – The Basics

Minimally-Processed Packaged Vegetables

- Fresh Produce Processing – A Global Industry Perspective
- The Effect of Farm Management Practices on the Microbial Condition of Fresh Minimally-Processed Vegetables
- Fresh Produce Processing – Retail Industry Perspective
- Factors Important in Determining Shelf Life of Minimally-Processed Vegetables
- What's New in Modified-Atmosphere Packaging of Fresh Cut Packaged Vegetables
- Presence and Public Health Implications of Food-borne Pathogens on Minimally Processed Packaged Vegetables
- Present and Emerging Control Measures for Minimally-Processed Packaged Vegetables

Alternative Processing Strategies for Pasteurization of Foods

- Radurization – The Pasteurization of Foods by Ionizing Radiation
- High Pressure Processing as an Intervention Strategy for Food Safety
- Chemical Treatments for Decontamination of Poultry
- Electrical Properties of Foods and the Application of High Voltage Pulsed Electric Fields Technology
- Oscillating Magnetic Field Stabilization of Foods
- Product Development Considerations for Ohmic Processing

New Emerging Food-borne Disease Agents — are They for Real?

- The *Campylobacter* Family *(Arcobacter, Campylobacter, and Helicobacter)*
- The Mycobacteria Group (*Mycobacterium Avium, Paratuberculosis and Tuberculosis*)
- New Issues in Food and Environmental Virology

- An Update on Parasites in Food, Water and the Environment
- Interesting Incidents of Food-borne Disease, Including Those from Bluegreen Algae

Wednesday, August 2, 1995 — Afternoon

Current Issues in Food Services
A Practical Symposium — Part 2

- Current Food-borne Pathogen: *E. coli* 0157:H7
- Current Food-borne Pathogen: *V. vulnificus*
- Communicable Diseases: Legonaires' Disease
- Vacuum Packaging
- OSHA in the Workplace

Seafood Symposium

- Update on Seafood HACCP and Current Regulations
- HACCP Training for Seafood Processors
- Microbiological Seafood Safety: What's New
- The Seafood Hotline: What Questions Do Consumers Ask?
- The Safety of Mail Order Seafood

ILSI N.A. — Sponsored Research Update

- Use of Carrot Extract to Control *Listeria monocytogenes*
- Development of a Simple, Sensitive, Quantitative Procedure for Enumerating *Listeria monocytogenes*
- Use of *in vitro* Primer-Directed Enzymatic Amplification of DNA for Rapid Detection of *Listeria monocytogenes:* Studies with Food Samples
- Establishment of a Bovine Surveillance Program for *E. coli* 0157:H7 in Washington State
- Lipid Compounds as Novel Barriers for Control of *Listeria monocytogenes*
- Application of Novel Bacteriocins as Biocontrol Agents Towards *Listeria monocytogenes* in Foods: Properties and Inhibitory Effectiveness
- Evaluation of Penicillin Binding Proteins for Subtyping *Listeria monocytogenes*
- Insertion Sequence Finger-Printing: a New Subtyping System for *E. coli* 0157:H7 Strains

82nd IAMFES Annual Meeting
Spouse/Companion

Tours and Special Events

A Day of Discovery
Monday, July 31 - 9:00 a.m. — 3:00 p.m.
Cost: $30 ($35 on-site) Lunch on your own

Our tour begins atop Mt. Washington, where the spectacular view of the whole Pittsburgh scene unfolds, a view that prompted Frank Lloyd Wright to call this the world's most beautiful setting for a city. Tourgoers may ride down the hill in an incline, a veritable museum on wheels, and be picked up by the coach at the base.

The Strip, center of the wholesale produce market in Pittsburgh, offers a true potpourri of scents, sights, and sounds. The Society for Art in Crafts, recently moved to The Strip, exhibits an international array of crafts in clay, fiber, metal, wood and a variety of other materials, all created since 1985.

The North Side of Pittsburgh was originally platted as Depreciation Land Grant settlement. Later, in 1848, a group of streets was laid out and named to commemorate battles and personalities of the Mexican War of 1846...Taylor, Resaca, Palo Alto, Buena Vista, Monterey, Sherman and the like. Known as the MEXICAN WAR STREETS, the area was a pleasant, middle-class, residential area with distinctive row-like homes reflecting Italienate, Second Empire, Queen Anne, Richardsonian Romanesque and other Victorian architectural styles. A major decline within the area was reversed in the 1960s to the point that this intriguing neighborhood was placed on the National Register of Historic Places by 1975.

Before returning to the Hilton, one further stop is made: at THE AVIARY, the world's largest birdhouse, where free flying feathered friends in brilliant hues present a dazzling display. Now, whoever said Pittsburgh was for the birds is proven to be correct!

Amish Country
Tuesday, August 1 - 9:00 a.m. - 5:00 p.m.
Cost: $30 ($35 on-site) Lunch on your own

The Amish is one of the most distinctive societies in America today. In 1693 Jacob Amman, their founder, brought these gentle people to this country from Switzerland. By the mid-18th century, hundreds had settled in Pennsylvania. The rolling countryside of this area of the state attracted the Amish with its fertile land. They befriended the Lenape Indians who had long ago settled here, and today you can witness their still-thriving existence.

This visit among the Amish includes shopping at an Amish home where quilts made by the Amish from as far away as Wisconsin are displayed to tempt the discriminating buyer. In nearby Volant, a 19th Century mill now serves as a country store containing toys, gifts, Amish quilts and furniture sharing space with old mill machinery. In addition to the mill there are over 80 shops and small restaurants that will meet anyone's needs.

Five miles south, the holidays come early at the Country House Christmas Shop, a restored Victorian home brimming with enough ornaments, gifts and decorations to make one forget December is several months away. A cool drink is served on the return trip to Pittsburgh.

A Day at the Carnegie & Station Square
Wednesday, August 2 - 9:00 a.m. - 3:00 p.m.
Cost: $30 ($35 on-site) Lunch on your own

Andrew Carnegie's gift to the people of Pittsburgh, THE CARNEGIE, houses four cultural centers under one roof. The MUSEUM OF ART is highly regarded for its permanent collection ranging from the old masters to the contemporary, with a fine representation of The Impressionists. A specially-arranged one hour tour, conducted by a trained museum docent, gives insight and enhancement to the fabulous works of renowned artistic masters. With time to explore on one's own (one-half hour) following the tour, a wealth of treasures await at The Carnegie. The Hillman Hall of Minerals and Gems displays over 2000 dazzling specimens and the world famous dinosaur collection is but a short walk away.

Then it's All Aboard for STATION SQUARE, the lively riverfront restoration of the former P. & L.E. Railroad, now a complex of exciting shops, boutiques, historic memorabilia and fine restaurants.

Following this delightful respite, guests will enjoy shopping on their own in the Freight House Shops before returning to the Hilton.

Children's Activity Room
July 31 - August 2 - 8:30 a.m. - 4:00 p.m.
Cost: Free

A children's activity room will be available for children ages 4 - 12. The children's room will consist of adult supervision and structured activities.

Monday Night Social Event
An Ethnic Evening on the Three Rivers
July 31 - 6:00 p.m. - Cruise until 10:30 p.m.
Cost: $45 ($50 on-site)

The ethnic variety of Pittsburgh's people contributes to its cultural richness. Influenced by the more than seventy distinct nationality groups that have claimed Pittsburgh as their home, an unforgettable dinner cruise has been created to combine the music and food representing a selection of the countries that have so enhanced this area.

At the Hilton, we will escort you through Point State park to board the magnificent sternwheeler, the Gateway Clipper Fleet's Party Liner. Pittsburgh's three rivers set the stage for an unforgettable event, as the evening sun, glistening on the waters and reflecting on the majestic buildings of this vital city, creates a rare backdrop for this festive evening.

Following dinner, guests will be entertained by Don Brockett's Company, an action packed frolicking family variety show that everyone is sure to enjoy!

The evening draws to a close as guests view the spectacular evening lights of the city and are returned to Point State Park for the guided walk back to the Hilton.

Traditional IAMFES Gatherings
Ivan Parkin Lectureship
Sunday, July 30 - 7:00 p.m.

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

IAMFES Annual Awards Reception and Banquet Wednesday, August 2
Reception: 6:00 p.m. Banquet: 7:00 p.m.
Cost: $30 ($35 on-site)

IAMFES Kids Pizza Banquet
Wednesday, August 2 - 6:30 p.m. - 9:30 p.m.
Cost: $15 ($20 on-site)

Adult supervised for children ages 4 and up. Pizza, pop and activities will be provided.

82nd IAMFES Annual Meeting Registration Form

Hilton Hotel & Towers — Pittsburgh, PA — July 30 - August 2, 1995
(Use photocopies for extra registrations)

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

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

Title Employer

Mailing Address (Please specify: Home or Work)

City State Country Postal/Zip Code

( ) ( )

Telephone # Fax #

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
___ IAMFES Sustaining Member
___ IAMFES Program Advisory Committee

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

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

REGISTRATION:	MEMBERS	NON-MEMBERS	AMOUNT
Registration (Banquet included)	$170 ($205 on-site)	$250 ($285 on-site)	
Student Member	$ 20 ($ 25 on-site)	Not Available	
One Day Registration (Circle: Mon/Tues/Wed)	$ 90 ($110 on-site)	$120 ($140 on-site)	
Spouse/Companion (Name): _____	$ 25 ($ 25 on-site)	$ 25 ($ 25 on-site)	
Children (14 & Under), Name: _____	FREE	FREE	

NEW MEMBERSHIP FEES:		
Membership with *Dairy, Food & Environmental Sanitation*	$ 60	
Membership with *Dairy, Food & Env. Sanitation & Journal of Food Protection*	$ 90	
•Student Membership ❒ *Dairy, Food & Env. San.* or ❒ *Journal of Food Protection*	$ 30	
•Student Membership with *Dairy, Food & Env. San. & Journal of Food Protection*	$ 45	
•Full-time student verification required.		
SHIPPING CHARGES: OUTSIDE THE U.S. - SURFACE RATE	$ 22.50 per journal	
AIRMAIL	$ 95.00 per journal	

OTHER FEES:	PER PERSON		
Cheese and Wine Reception (Sun., 7/30)	FREE	_____	
An Ethnic Evening on the Three Rivers (Mon., 7/31)	$ 45 ($ 50 on-site)	_____	
IAMFES Awards Banquet (Wed., 8/2)	$ 30 ($ 35 on-site)	_____	
Children's Banquet (Wed., 8/2)	$ 15 ($ 20 on-site)	_____	

SPOUSE/COMPANION EVENTS:	PER PERSON		
A Day of Discovery (Mon., 7/31)	$ 30 ($ 35 on-site)	_____	
Amish Country (Tues., 8/1)	$ 30 ($ 35 on-site)	_____	
A Day at the Carnegie & Station Square (Tues., 8/2)	$ 30 ($ 35 on-site)	_____	

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

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Registration Information

Send payment with registration to IAMFES, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2838. Make checks payable to IAMFES. Pre-registration must be post-marked by June 30, 1995. The pre-registration deadline will be strictly observed. For additional information contact Julie Heim at 1-800-369-6337.

Refund/Cancellation Policy

The IAMFES policy on refunds and/or cancellations is as follows: Registration fees, minus a $35 processing fee, will be refunded for written cancellations post-marked by July 15, 1995. No refunds will be made for cancellations post-marked after July 15, 1995, however, the registration may be transferred to a colleague with written notification to IAMFES.

Exhibitor Information

An exhibition of products and consulting services will be at Hilton Hotel & Towers. For more information on exhibiting the conference, please contact Rick McAtee at 1-800-369-63

Guest Room Committment
GOOD UNTIL JUNE 30, 1995
Make Your Reservation Now

HOTEL RESERVATIONS
IAMFES

82nd Annual Meeting
July 30-August 2, 1995
Hilton Hotel & Towers
Pittsburgh, PA

Please check accommodation requested:

❑ Single (1 person)
❑ Double (2 persons)
❑ Triple (3 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 June 30, 1995 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 _____

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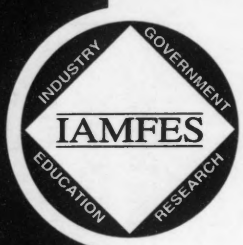

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(12 issues of the *Journal of Food Protection* and *Dairy, Food and Environmental Sanitation*)

◀ BEST VALUE

☐ Membership with DFES $60
(12 issues of *Dairy, Food and Environmental Sanitation*)

☐ Check here if you are interested in information on joining your state/province chapter of IAMFES

SUSTAINING MEMBERSHIP

☐ Membership with BOTH journals $450
(Includes exhibit discount, July advertising discount, company monthly listing in both journals and more)

STUDENT MEMBERSHIP

☐ Membership PLUS including both journals $45

☐ Membership with *Journal of Food Protection* $30

☐ Membership with *Dairy, Food and Environmental Sanitation* $30

*FULL-TIME STUDENT VERIFICATION MUST ACCOMPANY THIS FORM

Shipping Charges: Outside U.S. _____ Surface ($22.50 per journal) _____ AIRMAIL ($95.00 per journal)

PRINT OR TYPE...ALL AREAS MUST BE COMPLETED IN ORDER TO BE PROCESSED

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Job Title_____ Office Phone #_____

Address_____ FAX #_____

City_____ State/Province _____ Country_____ Postal Code_____

Membership: ___ New ___ Renewal

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Expires: April 30, 1995 (International expiration: June 30, 1995)

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Company _____

Address _____

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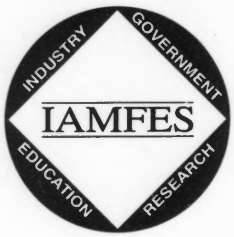

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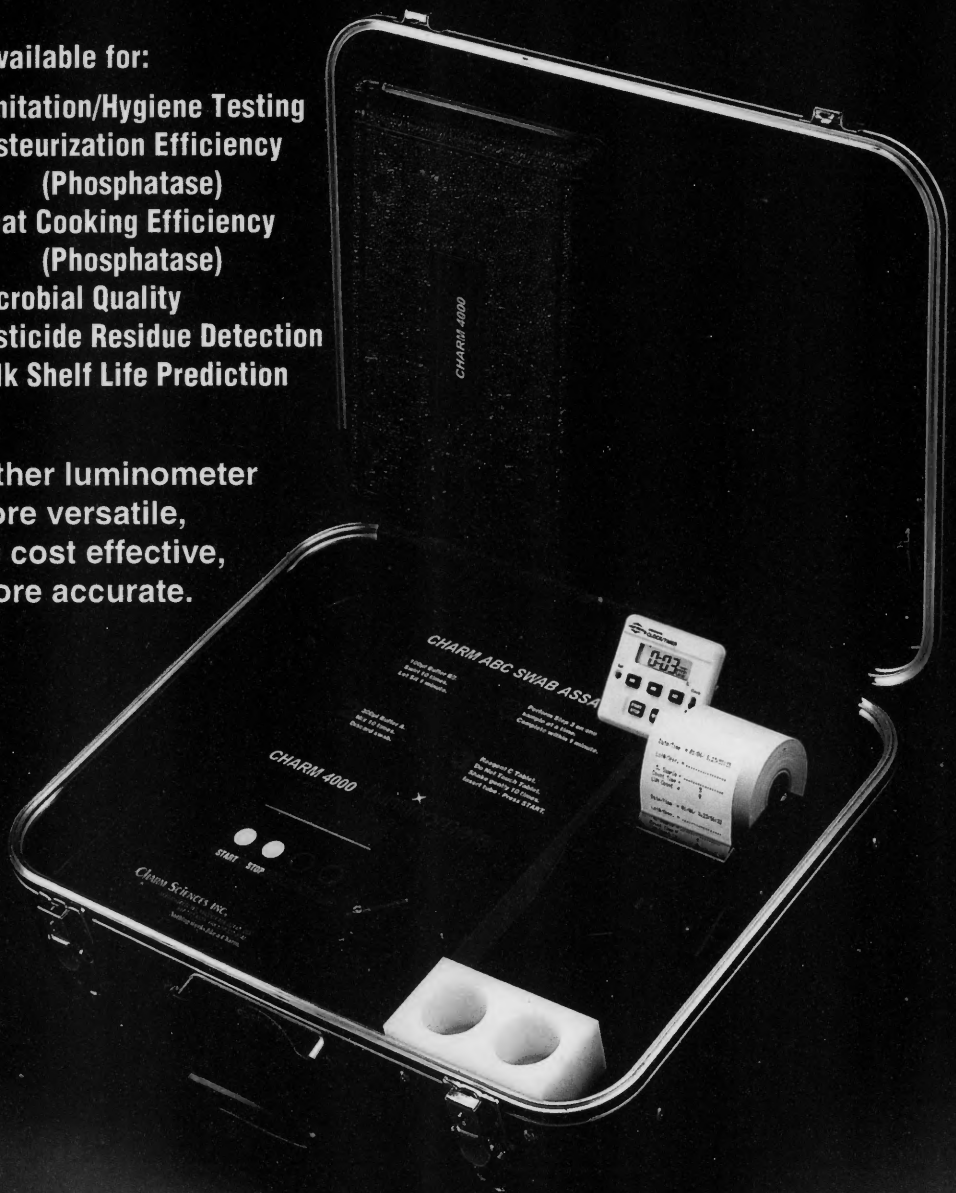

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