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DAIRY, FOOD AND ENVIRONMENTAL

SANITATION

AUGUST 1994

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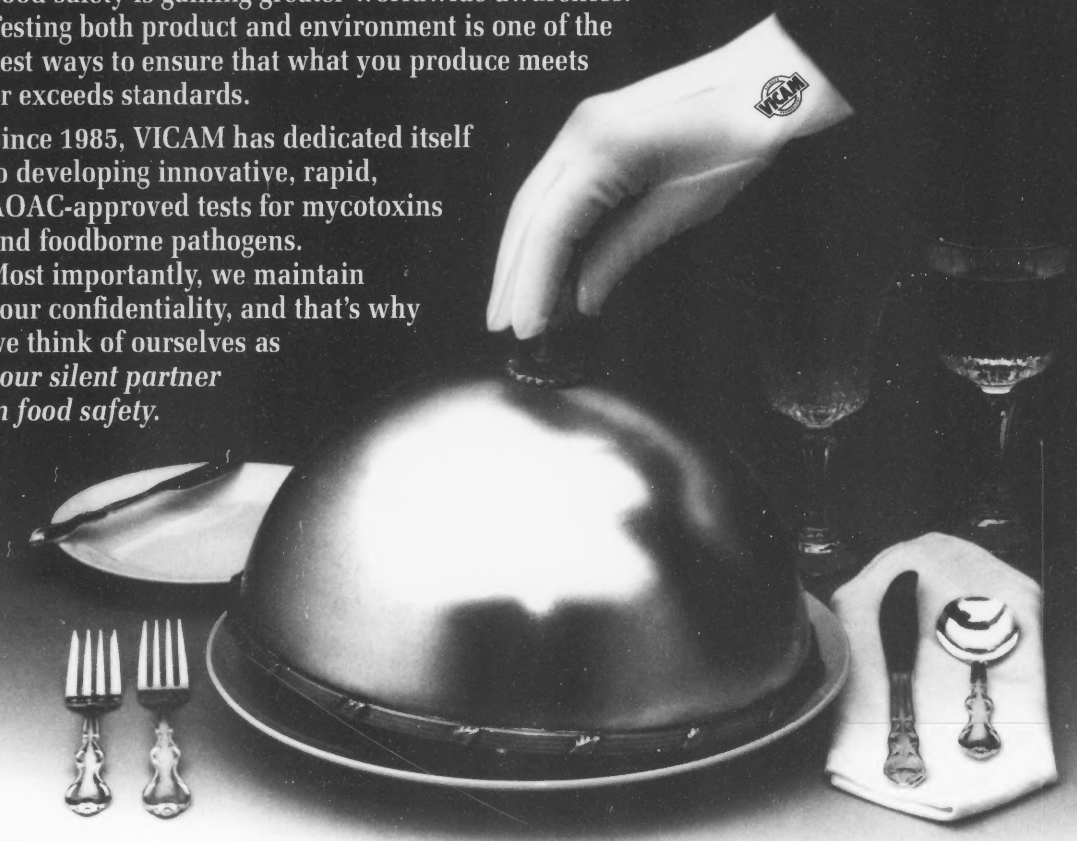

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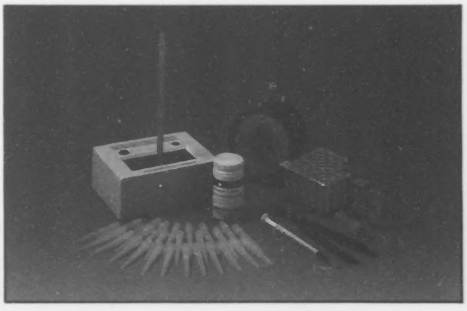

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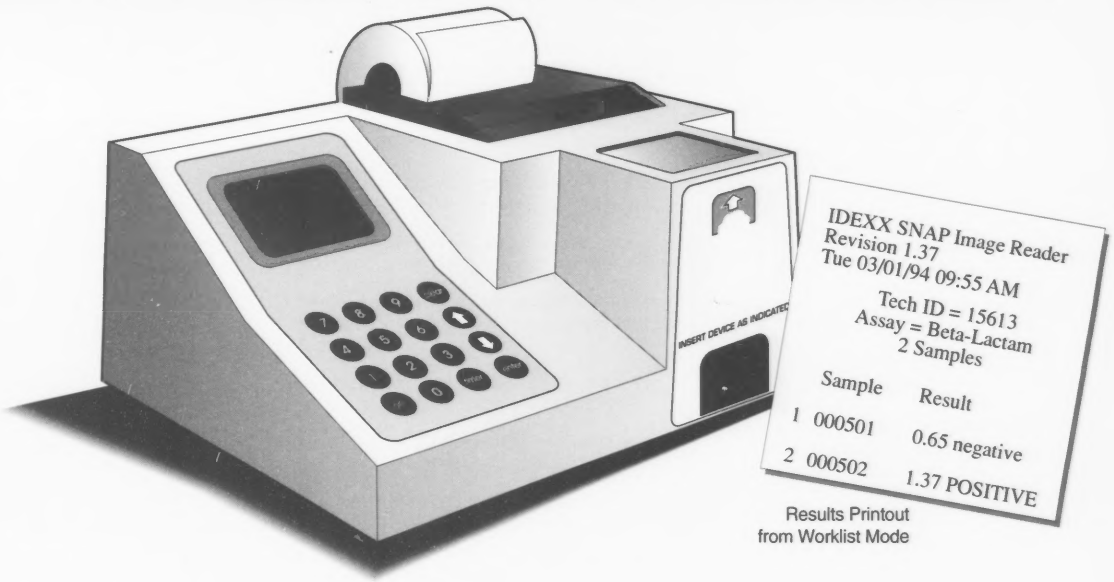

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ABOUT THE COVER . . . *Stainless jacketed and mild steel painted silo storage tanks. Photo courtesy of Walker Stainless Equipment Company, New Lisbon, WI.*

ERRATA FOR JULY COVER . . . *Temperature test for shrimp. Photo courtesy of General Mills Restaurants, Orlando, FL.*

ERRATA FOR AUGUST COVER . . . *Page numbers on this issue should read: 457-512.*

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Thoughts From the President . . .

By
C. Dee Clingman
IAMFES President

"To Be or Not To Be — Is That The Question?"

About four years ago the IAMFES Nominating Committee Chair, Mr. Charlie Felix, asked me, "Dee, would you consider running for the office of Secretary of our Association and ultimately become the President in 1994?" Well, that day is here, even though at that time I saw this day far, far away.

When asked to run for office of our great Association I pondered the decision for a few days. It was not a quick immediate response. I thought to myself ... Do you want to commit five years to this job, especially one that has no financial incentive? Do you want to spend five years of your time in a leadership position of an international organization with minimal appreciation from your professional colleagues? Do you want to spend five years ...

At that point I realized we do these things all the time without realizing them. My focus, as many candidates before me, was the **five-year commitment**. Throughout our lives we make time commitments. When we tell the bank we will make timely monthly payments on that new car for the next five years, we are committing. When we take on a house payment for 20 or 30 years we are really committing. How about a commitment to a sweetheart, telling your future spouse it will be a commitment for life? All in all we survive somehow.

I have enjoyed my first three-fifths of my commitment to you, my colleagues. I have renewed vigor each time I see and hear of the accomplishments of our Association and its members. This year will be especially rewarding as I serve as your President.

But an organization such as ours depends not on the few who are elected to guide it, but the members and staff who make it work each day and provide support for its goals and objectives. That is you! I ask all members to rethink your commitment to IAMFES. Take a few minutes or hours each month to take the time to provide input into your profession. Commit to serving on a committee, task force or professional development group. Commit to writing an article for *DFES*. Commit to ... Well, you get the picture. When someone calls you for input and help, they recognize your professional ability and need your help. At that point you will ask yourself, "To be or not to be?" That should not be the question. Accept the challenge with enthusiasm and vitality. Charge ahead, it may not be a lifetime commitment, but you might really enjoy it and want it to be.

Presidents come and Presidents go and even my time will pass. But until it does, I am committed to your service and hope you will join me in making IAMFES the best it can be in reaching out to attain the next higher level of professionalism in the food and environmental arenas. I hope to see you at the game.

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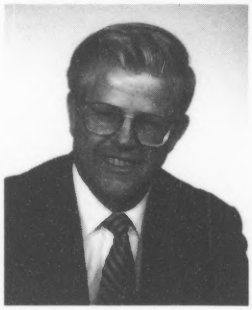

By
Steven K. Halstead, CAE
IAMFES
Executive Manager

is uniqueness ...

It has been said that to be unique is to be different ... that each of us is unique and that we should strive to maintain our uniqueness. I heard many conversations and discussions while at our Annual Meeting that made me realize and appreciate even more just how unique our association members really are.

Most associations are built around their commonalities. For example, only dentists can join the American Dental Association. Only nurses can join the American Nurses Association. Only funeral directors can join the National Funeral Directors Association. In each of these cases, the individual member may do different things in their day to day work life, but all members of the association are linked by a common occupational title.

This diversity is our strength and we should celebrate it.

In the case of IAMFES, no such common occupational title exists. We recently had our computer print out a list of our members' job titles and the frequency with which those job titles appear. The report was over 8 pages long and contained some 367 job titles.

Granted, some of these reflected how the data were entered into the data base. For example, the computer listed quality assurance supervisor, quality assurance manager, quality control supervisor, quality control manager, QA supervisor, QA manager, QC supervisor and QC manager as different job titles, when in reality, they probably represent the same thing. But even allowing for that, you see that our members represent a wide and diverse group of interests.

The thing that does unite us is our interest in food quality and safety. The beautiful thing is that we come at it from such varying viewpoints and interests.

If you encounter a problem involving food safety, it might be easier to talk about it with someone who has basically the same interest in the problem as you. But, I submit, better and more creative solutions can be found in discussing such problems with someone having a totally different perspective.

I saw this over and over at our meeting in San Antonio. People of varying backgrounds getting together in small circles to discuss the paper they had just heard. I saw heads shaking in both directions in the early stages of the discussions, but in agreement at the end. I had to believe that I was watching problem solving in action

Surely, this is what we are about.

ATTENTION

Dairy, Food and Environmental Sanitation encourages readers to submit four-color photographs for consideration to be used on the cover of the journal.

Send photographs and/or negatives to:

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It's never too early to start!

Planning for the 1995 IAMFES Annual Meeting has already begun!
Make your plans early as well, and mark your calendar for
July 30 - August 2, 1995.
Watch *Dairy, Food and Environmental Sanitation* for program information.
See you in Pittsburgh!

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Food Microbiological Criteria in South American Countries

Silvia Mendoza, Professor, Simón Bolívar University,
Department of Biological and Biochemical Process Technology, Box 89.000, Caracas 1080-A
As presented at the 80th IAMFES Annual Meeting, Atlanta, Georgia, August 3, 1993, in the symposium "Microbial Concerns of the International Community Symposium" sponsored by the International Life Sciences Institute

Microbiological criteria for food are important for public health and the consumers as well as to facilitate the international trade. Their establishment requires uniform systems for food analysis and a consensus on the methodology to be applied internationally. Several agencies such as ISO, FAO-WHO and ICMSF have greatly contributed by providing useful methodology to be applied by developing countries and refining a set of principles and definitions accepted by the Codex Alimentarius. Most of the South American countries are members of the Codex Alimentarius. Others are affiliated to ISO. Each country has its own National Commission for Standardization of food and several Ministries are usually involved in the establishment of these microbiological criteria. The number of approved standards ranges from 10 to 80 and includes meat, meat products, dairy products, seafood, as well as chewing gums and candies, among others (*3*). In all the countries the number of analyses to be performed is practically the same (SPC, coliforms, yeast and molds, *Clostridium perfringens, Bacillus cereus, Salmonella aureus* and *Salmonella*); however, there is no harmonization concerning the sampling plans and the expression of results. On this respect, there are three groups among the 12 Latin American countries: 1) those who apply the ICMSF sampling plans; 2) those who are beginning the implementation of sampling plans; and 3) those that do not apply sampling plans yet (*2*). Due to the fact that most of the South American countries are food exporters, they must also comply with all the international specifications required by the importing countries. Because of their increasing importance in the international trade and their significance to public health, special attention has been given to meat and meat products, seafood, dairy products, fruits and vegetables. All of these commodities constitute important sources of currency for Latin American countries. The detention or rejection of a shipment causes a significant loss for the exporting countries (*4*).

Meat, poultry and eggs are the most frequent vehicles of *Salmonella*. For this reason, the health agencies in each country have improved and increased their control and surveillance over foodstuffs, especially those entering international trade. Still, a new concern related to emergent pathogens has arisen (*1*).

Appropriate steps should be taken to implement rapid methods of detection for these microorganisms in developing countries. The requirements of the importers in order to accept a product are increasing. This fact involves high costs that the governmental agencies cannot afford alone. Thus, several countries have overcome this difficulty, obtaining the quality certificate from private laboratories approved and controlled by an official agency. It is necessary that Latin American countries receive more assistance from international agencies in order to improve food quality, harmonize food requirements and apply adequate food controls.

The emergent concept of Hazard Analysis and Critical Control Points (HACCP) — a preventive control system that is rational and systematic, with a better cost-benefit — is of prime importance for developing countries. HACCP seems to be the best strategy to make the food supply safer (*5*).

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Microbial Concerns of the Pacific Rim Countries and Implications for Harmonizing Free Trade

Michael J. Eyles, Ph.D., Project Manager, CSIRO Division of Food Science and Technology, and Director, Dairy Industry Quality Centre, P.O. Box 52, North Ryde NSW 2113, Australia
As presented at the 80th IAMFES Annual Meeting, Atlanta, Georgia, August 3, 1993, in the "Microbial Concerns of the International Community Symposium" sponsored by the International Life Sciences Institute

International harmonization of microbiological requirements is of considerable importance to the food industries of Australia and New Zealand. These countries export substantial amounts of food; however, international differences of opinion over microbiological quality have caused difficulties for their exporters on a number of occasions (*2*).

Salmonella is a good example of a pathogen that has caused problems in international trade. In the 1970s and 1980s the presence of salmonellae disrupted trade in a variety of products, including raw meat, dried milk and mung beans. Microbiological requirements introduced by importing countries in response to some of these problems were considered unreasonable by exporters — and this opinion appears to have been correct —with the benefit of hindsight. For example, most microbiologists now accept that *Salmonella* cannot be completely excluded from most raw meats with present technology; however, standards that demanded absence of salmonellae from raw meat were not uncommon 20 years ago (*2*).

Various mechanisms have been used to reach agreement on the microbiological quality of foods in international trade. For example, Australia has had Memoranda of Understanding with the United States covering dried milks and shellfish (*2*). Many people in industry and regulatory agencies believe that systems based on Hazard Analysis Critical Control Point (HACCP) and the ISO 9000 standards will provide the basis for more uniform and robust approaches.

This paper focuses on the experience of the food industry and regulatory agencies in the use of HACCP and ISO 9000 systems to assure the safety of foods. These systems are important concerns for food microbiologists in Australia and New Zealand, who are working through the practical difficulties involved in implementing these systems at the moment. The discussion will be concerned with the dairy industry and to a lesser extent the seafood industry, particularly in Australia and New Zealand.

Adoption of ISO 9000 and HACCP systems in industry.

The ISO 9000 series of standards was originally designed to aid the development of contracts between customers and suppliers and generally to facilitate international trade. As in other countries, the standards have become the basis for third-party auditing and certification of quality systems in Australia and New Zealand, with a variety of organizations offering certification to the standards. This certification demonstrates that a company has a documented quality system that has been audited by an independent body and recognized as complying with a model that is understood and accepted worldwide (*9*).

The governments of Australia and New Zealand have set up the Joint Accreditation System of Australia and New Zealand, which is a formal mechanism for accrediting these certification agencies (*5*). The accreditation system examines the procedures and policies of the certification agencies and audits their operations.

Until recently, the Australian food industry showed relatively little interest in the ISO 9000 standards or in obtaining independent certification that quality systems complied with them. However, the industry's interest in this kind of certification has increased substantially in recent years, particularly in the dairy industry. Several dairy companies have already achieved certification to ISO 9001 or 9002 and the majority of the milk produced in Australia will be processed by companies that have this certification within a year.

Food processors have begun seeking ISO 9000 certification for a variety of reasons. Commercial attractiveness has been created by domestic and international customers who are showing increasing interest in certification. It is also hoped that the certification will reduce the number of factory audits by governments and customers. Internally, companies wish to create the infrastructure and discipline associated with a comprehensive quality system. Among other things, they value the formal basis for corrective

action and review of processes and procedures, which leads to continuous incremental improvements.

While the ISO 9000 standards are an agreed model for a quality system that ensures that a company can meet customer requirements, HACCP provides a framework for the development of a quality system that ensures that products are microbiologically safe — an important distinction (*4*). In this sense, HACCP is complementary to the ISO 9000 standards. HACCP is also being widely used in Australia. Taking the dairy industry as an example again, a substantial number of companies are using HACCP, sometimes as part of an ISO 9000 quality system. Companies that have introduced one or both systems believe that they have received substantial benefits.

ISO 9000 and HACCP in the regulatory infrastructure.

While many companies have had their own reasons for adopting ISO 9000 or HACCP systems, their introduction in Australia has also been driven to some extent by changes in the way government authorities are regulating the microbiological quality of foods.

Deregulation of several sectors of the Australian food industry that were once highly regulated, including the dairy industry, has been taking place during the last 5 years, with more emphasis being placed on self-regulation. Regulatory systems based on HACCP or ISO 9000 have been adopted and testing of end-products by government authorities has been substantially reduced or eliminated. The government agencies have been responding to pressure to find more efficient and effective methods of operation and to reduce the cost burdens imposed on industry.

The agency that has made most progress towards the integration of HACCP and ISO 9000 into the regulatory infrastructure is the Australian Quarantine and Inspection Service, or AQIS (*3*). One of the important functions of AQIS is to provide independent assurance that Australian food exports are microbiologically safe and meet the requirements of importing countries.

The procedures that it has used in the past have been based on traditional inspection of facilities, together with monitoring of end-products; however, for some years now AQIS has been promoting an alternative to these traditional techniques, whereby exporters develop and document quality assurance systems that are audited and approved by AQIS.

Two of these systems are the Approved Quality Assurance (AQA) system and the Food Processing Accreditation (FPA) system. Companies exporting dairy products must have one of these systems in place before export certification can be issued. The AQA system has been in place for several years and is under review at present. It is being developed to be more in line with the requirements of ISO 9002, containing 15 of the 18 elements of that standard. It has acted as a stepping-stone to an ISO 9000 system for some companies. Once a company has obtained AQA approval, AQIS will not usually monitor its end-products unless required to do so by an importing country.

The Food Processing Accreditation system is a more recent development. It is a HACCP-based system which is more simple than the AQA system; it focuses on health risks and truth in labeling.

Australian Quarantine and Inspection Service is also responsible for the inspection of foods imported into Australia, to ensure that they comply with the Australian Food Standards Code. At the moment, imported foods are inspected at a frequency that is determined by a risk assessment process. The importer must bear the full cost of the inspection. As an alternative to inspection of imported foods, AQIS is able to enter into quality assurance agreements with manufacturers overseas. The company must have a quality system based on the ISO 9000 standards, which is capable of delivering food that complies with the Australian Food Standards Code. No company has made use of this facility so far.

Australian Quarantine and Inspection Service is not the only Australian regulatory agency to have adopted a regulatory system based on HACCP. A few agencies responsible for the microbiological safety of foods in the domestic market have formally adopted HACCP-based regulatory systems, while other agencies have begun developing them.

Some important problems have been encountered as Australian government agencies have adopted regulatory systems based on ISO 9000 standards or HACCP (*3*). First is the relationship between regulatory authorities and certification agencies. Australian dairy companies that have quality systems that are certified to ISO 9000 are still subject to audit by government agencies to ensure that all regulatory and product safety requirements have been covered by the quality system. Many companies consider this to be an unnecessary duplication of effort and waste of resources.

The regulators are not prepared to rely on the certification agencies at this stage in their development because while the audit teams used by the certification agencies are experts in quality management systems, they do not necessarily have specialist technical expertise in all of the processes used in an establishment. Certification to ISO 9000 means that the quality management system in place complies with a defined model. It does not guarantee that the quality management system deals adequately with all of the regulatory and safety requirements for the product. An example is a milk processing plant with certification to ISO 9002 that had not included monitoring for antibiotics in its quality system.

A possible solution to this problem is for regulatory agencies to become involved in the ISO 9000 certification process in some way, but a number of technical problems must be overcome before this can occur. Some people in the food industry believe that third party certification agencies should have nothing to do with regulatory authorities.

Other major problems encountered in the introduction of these systems for exported foods include the reluctance of governments in many important markets to accept regulatory systems based on quality assurance. Other interested parties, such as insurance companies, have also caused difficulties. Some companies are also reluctant to accept responsibility for the quality of their products, preferring to rely on a government stamp of approval to guarantee the microbiological quality of their products. The cost and

technical expertise required for implementation are a particular problem for small companies.

ISO 9000, HACCP and International Harmonization.

Australian companies and regulatory authorities that are using ISO 9000 and HACCP systems appear to have little doubt that they are a good basis for harmonization of the techniques that the food industry uses to ensure that its products are safe. They provide an agreed framework for processors to develop effective systems that meet the highly individual needs of their plants and processes.

These systems, however, form only part of a framework for international harmonization. Greater harmonization will require substantial progress in mechanisms for achieving international scientific consensus on microbiological hazards. We need better defined protocols for assessing hazards, more effective mechanisms for attaining international agreement on risk assessments, and research to provide the information on which more objective risk assessments can be based.

There is no universal agreement on what constitutes a hazard (*6*). Quality management systems based on HACCP and ISO 9000 provide excellent mechanisms for ensuring that the desired quality is attained, but what is the desired quality? These systems do not provide the means to determine what the desired quality is. It is the definition of desired quality that is one of the major impediments to international harmonization. The introduction to ISO 9000 states that these quality system standards "complement relevant product or service requirements given in the technical specifications". It is the technical specifications for foods that cause much of the trouble in international forums.

The technical requirements are defined when a HACCP system is developed; however, protocols for HACCP define a hazard in very subjective terms. For example, one common definition of a hazard is "a property that may cause an unacceptable consumer health risk". The definition of unacceptable is very clear in some circumstances, but very unclear in many others. The protocols also indicate that analysis of hazards must be quantitative, with both risk and severity assessed; but what degree of hazard is acceptable? There is a need for better, internationally-agreed protocols for assessing microbiological hazards and reaching agreement on the microbiological quality that these systems seek to assure.

The efforts of the International Commission on Microbiological Specifications for Foods have been extremely valuable in this context (*7*). They have given us an excellent basis for the assessment of hazards and development of microbiological criteria for foods; however, the ICMSF warns that subjective judgment is still unavoidable in these areas because the data available are usually not sufficient to allow fully objective decisions to be made. ICMSF has also pointed out that individual judgments can vary widely. In my experience, individual judgments do vary widely, causing disputes between regulatory agencies and industry, between companies and between countries.

Examples of current interest include approaches to *Listeria*. When setting standards for foods which support growth of *Listeria* and have a history of causing listeriosis, some authorities believe that up to 100 *Listeria monocytogenes* per gram is not a hazard in products aimed at the normal population. Other authorities believe that a hazard exists unless *L. monocytogenes* is absent from a substantial sample. The differences between these decisions are the result of different assessments of essentially the same evidence. So when a HACCP system is developed, is the hazard the presence of *L. monocytogenes* in 5 × 25 g samples of product or the presence of >100 *L. monocytogenes* per gram? The answer to this question will have a big influence on the choice of critical control points and the criteria that are applied to them.

Mechanisms for achieving international consensus on these issues more effectively are needed. Various national and international bodies have made significant progress but more is needed. One solution might be a microbiological equivalent of the Food and Agricultural Organization/World Health Organization (FAO/WHO) Joint Expert Committee on Food Additives (JECFA), the body which has been so successful in evaluating hazards associated with food additives and chemical contaminants and achieving international consensus on this issue (*8*).

One of the reasons for the success of JECFA has been the existence of reasonably well agreed and documented mechanisms for assessing the toxicological hazards associated with chemicals. Scientists interested in the microbiological safety of foods do not have clearly established and accepted protocols for objective risk assessment.

In many cases we have also been lacking many of the pieces of information that are necessary if an objective and valid risk assessment is to be performed. Sometimes it is not possible to obtain that information readily. For example, we do not have good quantitative information on the infective dose of many foodborne pathogens, nor the host factors that influence it.

Preventative quality assurance and fishery products.

The emphasis so far in this discussion has been principally on the dairy industry, where ISO 9000 and HACCP have been used extensively. It is important to recognize that these approaches have not been as relevant or successful in some other parts of the food industry. For example, these quality assurance tools have not made much contribution to the control of some important hazards associated with fish and shellfish at the time of harvest.

The hazards of particular concern in the Pacific area include viruses and vibrios in shellfish and toxins in various fishery products. At present, control of many of these hazards is based only on monitoring of the environment or the end-product, and there are substantial technical problems associated with the monitoring programs (*1*).

Oysters harvested on the East coast of mainland Australia have caused several outbreaks of Norwalk virus gastroenteritis during the last 15 years. Some of the outbreaks have been very large and have extended overseas due to export of shellfish (*2*). The most troublesome vibrio in recent times has been *Vibrio vulnificus*, which has caused occasional fatalities among shellfish consumers who have been susceptible to this infection because of their health status.

Controls over shellfish harvesting and the use of post-harvest processes have both been employed with limited success to control these hazards (*1*). Control programs that prevent shellfish from being harvested at times when pathogens are believed to be present must still rely heavily on bacteriological tests, which are known to have serious deficiencies as indicators of viral contamination. After harvest, there are no practicable processes that can eliminate viruses or vibrios from many shellfish that are traditionally eaten raw or partly cooked. Depuration of oysters is compulsory in one State of Australia, but although the depuration plants are required to comply with a HACCP-based quality assurance system, it is clear that depuration in its present form cannot eliminate the risk of disease caused by viruses or vibrios.

The implementation of monitoring programs for toxins of biological origin in fishery products is difficult, expensive, and sometimes impossible. Ciguatera is just one of the illnesses caused by seafood toxins in the Pacific area. It is a widespread problem, but there is no effective preventative measure available.

CONCLUSION

We have made a lot of progress in developing more sophisticated and effective mechanisms for assuring the microbiological safety of foods, but we still have a long way to go before true international harmonization is achieved and all microbiological hazards associated with foods are controlled adequately.

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Microbial Concerns of the North and South American Countries and Scientific Implications for Harmonizing Free Trade

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INTRODUCTION

The concerns of North and South American countries with respect to food safety and the ability to trade freely with international partners are summarized simply. Keep the playing field level. Don't hold us to a standard you are not willing to impose upon yourself. Control your own problems and we will control ours.

Internationally, our focus in food manufacturing and inspection is shifting from inspection and testing to a systems control approach where critical problems are prevented before they are manufactured. Concurrent with this control system is sufficient documentation to support that you are doing what you say you are doing. These principles are the foundation of Hazard Analysis and Critical Control Point (HACCP) programs and quality management systems like ISO 9000. Both HACCP and ISO 9000 will have important implications on international trade because both programs convey valuable and verifiable information to trading partners. By adopting a uniform standard for describing HACCP and ISO 9000 systems, we can make the playing field level and provide assurance that we will not be delivering food safety problems on the door steps of our trading partners.

By using systems, we also avoid international debates on specific microbial concerns, like *Salmonella, Listeria, Campylobacter* or *Escherichia coli* O157:H7. We can focus on preventing microbial contamination taking into account its source and mechanisms for control. We can fix the system and not argue about the "microbe of the month".

History of the development of HACCP as an international regulatory tool.

Four years ago, in an effort to provide a common system of food safety assurance, Codex Alimentarius Commission's Food Hygiene Committee initiated the process of adopting HACCP as the basis for all Codex codes of practice. In a very short span of time for the Codex process, the Principles of HACCP were defined by the Food Hygiene Committee and were adopted by the Commission this past month. This rapid progress is profound testimony to the international acceptance of HACCP and the common sense of urgency among officials in different countries for acceptance of better tools to control food safety. The Meat Hygiene Committee has already successfully adopted HACCP as the basis for three codes of practice, for inspection and judgement, fresh meat and game.

In the United States, the implementation of HACCP as a regulatory tool began with the National Marine Fisheries Service (NMFS) in 1987 when they began a long-term pilot project to develop HACCP plans for over 25 seafood products and processes. Shortly after, in 1988, the U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS) initiated a 2-year pilot project to assess the impact and potential for HACCP's use in regulatory programs to control and document food safety for meat and poultry products. The 2-year program was designed to gain widespread acceptance of HACCP by the food industry, consumer organizations, Congress, and importantly, FSIS employees including organized labor. HACCP programs were designed cooperatively and publicly with the food industry and regulatory officials participating. Eventually, plans were developed and implemented in nine plants representing three processes: refrigerated ready-to-eat products, poultry slaughter and cooked sausage. Plants were selected based on their willingness to participate and their categorization according to volume of sales representing small, medium and large operations. Quantitative information was collected regarding economic impact and food safety criteria from microbial testing. Qualitative information was collected regarding individuals' perceptions about the success of implementation and the overall change in the work environment through the transition from a traditional operation to a HACCP system. The data from this study will be available from USDA this Fall.

Hazard Analysis and Critical Control Points have taken on a truly global perspective. Not only has the Codex defined and adopted HACCP, but other international groups including ILSI, the International Commission on Microbiological Specifications for Foods (ICMSF), and the World Health Organization (WHO), have adopted and are using similar documents. I have had the opportunity to participate in many of these developmental exercises and suggest that each time we go through the process we get a better product. The most recent document to be developed is the one resulting from a WHO consultation this past March. We have learned from our experiences and have refined the description of HACCP principles in the WHO document to be the most communicative and useful of the HACCP documents available to date. It is WHO's design to use the HACCP as the basis for their food safety training programs. Although the Codex HACCP document was adopted by the Commission in July, the Food Hygiene Committee was instructed to review the WHO document at our next Committee meeting in order to improve our existing Codex document.

It is important to remember that the source of the document is not necessarily important. There is virtually no difference in the content of the HACCP documents of Codex, WHO, ILSI, Campden Food and Drink Research Association, the U.S. National Advisory Committee on Microbiological Criteria or ICMSF. The distinction is in the manner that the HACCP principles are presented and in the reference of terms or glossary. Some point to the differences between the documents and suggest that we need international harmonization of the HACCP definition. I suggest, however, that HACCP is the most uniformly understood issue since the Ten Commandments.

In order for HACCP to be used successfully as an international tool for regulatory food safety control, some issues will need to be decided. Critical issues include access to records as part of HACCP inspections and regulatory agencies' ability to properly train inspection officials to work with HACCP systems. The training issue will be important to the ultimate success of HACCP as an international inspection tool. Properly trained inspectors will understand the dynamics of a HACCP system and the culture change which will have occurred in a HACCP operation. "Police" inspectors will not be welcome in this environment. The paradigm shift, which must occur in operations implementing HACCP, will also occur in inspection agencies. This will be no small task.

ISO 9000 quality systems.

I want to spend a few minutes talking about the relationship of ISO 9000 quality systems in relation to international trade. However, I want everyone to understand that ISO 9000 has nothing to do with microbial issues. The 20 standards of ISO 9001 or the 18 standards of ISO 9002 do not deal with food safety in any way, **unless** food safety is clearly designated in the scope of your specific ISO 9000 program. Let me repeat, ISO 9000 certification per se says nothing about food safety. Having said that, if HACCP is part of a company's quality system as the mechanism to control and document food safety, it can be integrated with an ISO certification program. More is stated about this in the article "Safety and Quality Management Through HACCP and ISO 9000" by Dr. Mike Stringer, which appears elsewhere in this issue of *Dairy, Food and Environmental Sanitation*. This issue is important and international confusion on the relationship between ISO and HACCP is easily prevented.

I believe that ISO 9000 will be a useful tool for international harmonization. The issues will not deal with microbial concerns, but ISO 9000 quality systems will convey that certain procedures are controlled and information collected, such that we can all speak the same language and understand that no matter where the ISO 9000-certificated product was manufactured, a quality system with specific recognized elements was used.

CONCLUSION

Trade between international partners is not always easy. However, some tools are coming into play which make the activity a little easier. These tools are HACCP for food safety control and ISO 9000 for other quality attributes. International consensus and adoption of HACCP is critical to our mutual success as trading partners. Regulatory agencies in the United States, including USDA and FDA, are moving ahead with implementation of HACCP as a regulatory tool. This is good, but only if HACCP is used as it was intended without prescriptive standards or forced installations. Industry must own and be held accountable for HACCP's success. Inspectors become partners and not police.

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Microbiological Safety of Foods in the Europe of the Nineties. What Does That Imply?

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ABSTRACT

The influence of changes in population, in legislation and in consumer demands on the safety of the food supply should be anticipated. Everyone concerned — the food producers, processors, retailers, all people who handle food, governments and consumers must thoroughly understand the problems. Pathogens can neither be completely eliminated from our environment, nor from primary agricultural or fishery products, and we have to deal with them. A "zero tolerance" policy is probably not a realistic approach; therefore, risk assessment and risk management techniques need to be developed. A special problem to solve is how to protect an increasing number of highly susceptible individuals. According to the EEC Hygiene Directive, food processors are responsible for assuring the safety of their products by applying the Hazard Analysis Critical Control Points (HACCP) principles. However, "safety" needs to be clearly defined in order to be manageable. Moreover, the suppliers, retailers and users also have a role to play when the HACCP concept is correctly applied.

CHANGING EUROPE

The microbiological safety of foods is influenced by many factors, one of which is the changing face of Europe. The countries belonging to the EEC have to work in the framework of the "single market". Many of their new trading partners are not accustomed to operating under a free market system and have very different production, distribution and consumption habits.

The economic climate is also changing, provoking stiffer competition between food processors. At the same time, the influence of the retail trade is increasing. If, as a result, manufacturers are forced to put cost reduction programs into place, this could adversely affect food safety. However, if retailers make food safety a top priority, companies will be more likely to compete on this basis.

Legislation is being modified in response to the emerging single market. The responsibility for ensuring product safety is now clearly being laid in the hands of the various "operators" in the food chain. Article 3.2 of the "Hygiene Directive" states that: "Food business operators shall identify any process undertaken, which is critical to ensuring food safety and ensure that adequate safety procedures are identified, implemented, maintained and reviewed on the basis of the principles used to develop the system of HACCP" (*4*). This policy will be discussed in more detail further on.

At the same time, there are situations in which responsibility is not clear. Similar to the "Hygiene Directive," the "Product Liability Directive" puts the responsibility for product safety in the hands of the producer: "The producer shall be liable for damage caused by a defect in his product" (Article 1) (*3*). However, Article 2, states that "product" means all movables, with the exception of primary agricultural products and game. Even if Member States may derogate from this exception (Article 15), it may still lead to some confusion (*24*). Moreover, within the HACCP concept, foodhandlers in every stage in the food chain, including the farm, should take responsibility for their part in assuring the safety of foods.

Article 7 of this Directive also merits attention: "The producer shall not be liable if he proves that the state of scientific and technical knowledge at the time when he put the product into circulation did not allow the existence of the defect to be discovered." This, however, requires the producer to prove a negative proposition, a nearly impossible task, especially because "defects" (e.g., "hazards") are not yet clearly defined.

Obviously, the food industry and the legislative agencies will have to come to an agreement on what protocols and procedures should be followed to demonstrate that the product development stage includes an adequate hazard analysis. To achieve this goal, ILSI Europe has started developing protocols for "challenge tests"; other documents will follow.

CHANGING CONSUMER

As Europe changes, so do its people. The population is aging. Immigrants are arriving from the "new" European countries as well as from countries with very diverse cultures. Many predictions indicate that the percentage of

the population with an altered immune status will increase.

The free market system and democracy allow consumers to have considerable influence on what should be available; thus they are becoming more demanding. This provides the food industry with a whole new set of challenges.

For example, the food industry has been forced to find new processes and treatments to meet the demand for fresh, natural, healthy foods without jeopardizing the safety of the products. Also, consumers are becoming increasingly conscious of the environment, and they want industry to share their concern. They also want convenience, long shelf-life, variety and originality.

Above all, the consumers in Europe in the nineties will continue to ask for quality goods at a reasonable price (e.g., value for money). Unquestionably, safety is an important aspect of food quality, but safety has its price (*7*). The consumer should be made aware of the difficulty of producing food which is safe, while at the same time meeting all of his other demands.

As long as food production follows traditional concepts, the safety of foods is well under control. However, experience has shown that changes in consumption habits may lead to problems (*22,23*). For example, the habit of drinking raw milk has caused salmonellosis and campylobacteriosis (*18,25*). The preference for undercooked or rare hamburgers has caused foodborne disease outbreaks due to *Salmonella* and *Escherichia coli* O157:H7 (*15,19*). Eating raw herring or sushi has caused anisakiasis (*6*); eating raw oysters has lead to hepatitis and many other viral and bacterial diseases (*17*). The reduction of calories, and thus sugar, in a brand of hazelnut yogurt led to cases of botulism (*14*).

Recognizing that changes in consumption habits, for instance from fully processed or cooked to rare or undercooked foods, may introduce "hazards" is important in consumer protection. For instance, in the hazelnut case, the producer of the purée should have realized that reduction in sugar content must be accompanied by an increased heating treatment. The consequences of changes should be assessed and adequate control measures should be instituted.

CHANGING VIEWS OF FOOD SAFETY

In the face of these changes, it is also necessary to reexamine traditional notions of "safety" for food. In Europe, most governments have applied the following simple rules: all foods should be safe; the ingestion of one pathogen can be harmful and foods should not contain pathogens. No one will contest the advantages of a food safety policy based on these principles. No risks are taken, so by definition, the consumer is fully protected.

Unfortunately, these rules bear little relation to reality. First, in all foods which are not processed for safety, pathogens, opportunistic pathogens or potential pathogenic microorganisms can be present (*20*). This is not necessarily a problem. The ingestion of one or small numbers of an organism is harmful only under exceptional circumstances. For example, many experts believe that foods containing low numbers of *Listeria monocytogenes* can be safely eaten by "normal" consumers. At the same time, they may pose a risk to the very young, the very old, the diseased and the immunosuppressed (*5,16*).

Second, we have to ask how the consumer defines "food safety". Does it mean to him that the food is safe at the moment of consumption after correct preparation and use, or that it does not contain pathogens at the moment of purchase? Should a mandatory treatment of all raw foods which may contain pathogens be foreseen (heat treatment of milk for direct consumption is already mandatory in many European countries) or should properly informed consumers continue to have free choice of food?

Can we (and should we) continue to apply the basic rule of "total absence" or "zero tolerance"? The number of foodborne disease outbreaks and cases is certainly not diminishing, despite the application of these rules. Maybe we need to question their validity if we are to provide better protection to our customers in the future.

RISK MANAGEMENT

Assuring food safety in the nineties is an immensely complex task. Given the demands placed on food producers and the fact that an ever increasing number of "pathogens" is being found in unprocessed foods and ingredients, it becomes more and more unrealistic to speak of "zero tolerance." Rather, we must accept the existence of hazards and their risks and think in terms of managing it.

General considerations.

Risk, as used in the HACCP concept, is defined as: an estimate of the likely occurrence of a hazard (*26*). One aspect of risk is the probability that a certain food is contaminated; another is the likelihood that this causes an infection or intoxication.

Although certain products are particularly likely to contain pathogens, there are other factors which have to be taken into account. Moreover, the distribution throughout a lot or consignment is generally extremely heterogeneous. Still, contamination risk or the risk of exposure can be very roughly estimated when sufficient background knowledge of production conditions are known.

Unfortunately, estimating the likelihood of illness as a consequence of the microbiological contamination of foods is more complicated. Many of the factors determining this aspect of risk have not been studied systematically. At present we cannot define Minimal Infective Doses or Dose-Response relationships in regard to foodborne diseases (see further). We have good evidence, however, that certain people are more susceptible than others. The very young, the very old, the diseased and the immunocompromised require fewer pathogenic organisms to get a foodborne illness than do "normal" members of the population. These individuals are also more prone to become ill after ingestion of opportunistic or potential pathogens, such as *L. monocytogenes, Vibrio vulnificus* and *Aeromonas hydrophila.*

Whether we like it or not, we will have to face the following questions. Should all foods be safe for all groups of a population, or should specific "high-risk" groups

receive special attention? How much safety can and should be built in for whom and at which price (*21*)? How much risk are well-informed consumers belonging to the various groups willing to accept (*8*)?

For example, it may not be possible to set realistic "acceptable" levels of microbiological contaminants in certain foods for highly susceptible individuals. We could, however, designate certain foods as being inappropriate for individuals in a "high-risk" category, much as we recommend already that pregnant women avoid eating foods that could contain *L. monocytogenes*. We may also need to design foods with specially designed and built-in safety for people at risk, as is already being done with foods for infants.

At the same time, even the "normal" part of the population should be better informed about how to assure the safety of the foods they want to eat, and about the risks associated with improper foodhandling and preparation. The safe handling instructions for meat and poultry which are currently being discussed in the United States are a very good example of what should be done.

Hazard analysis critical control points.

The food industry has developed the HACCP system to manage hazards and their risks during processing. The mandatory application and implementation of the HACCP principles by all food business operators in the EEC will certainly have a positive effect on food safety in Europe. HACCP has proven to be an effective means to design and build safety into processed food products. HACCP recognizes, however, that the success of the control of certain hazards depends on efforts made by others in the food chain. Specifically, if the raw material is a Critical Control Point (CCP), and if the processor cannot render it safe himself, then he has to rely either on the supplier or on the consumer to take the necessary measures.

In order to assure that HACCP is a useful tool for food law enforcement, however, several aspects have to be clarified. First, it is necessary to decide which document out of the body of literature on HACCP will be used as a reference. Since HACCP was developed as a quality and safety assurance management tool, and not as a basis for regulatory actions, most texts, such as those published by ILSI Europe (*10*) and the IAMFES (*9*) are of an advisory nature.

The Codex Alimentarius "Guidelines for the application of the HACCP system" (*1*) will probably be applied, but it is not free from ambiguity. The Codex text was discussed by a number of experts during a World Health Organization consultation on training in HACCP. The document resulting from this meeting (*26*) clarifies some aspects of the Codex text and indicates the roles that governmental officials can play. This document (which also includes the Codex text) may serve as a background document in the training of both inspectors and foodhandlers.

Assuming that the Codex text will become the reference, there are several problems that should be addressed. For instance, "hazard" is defined as "the potential to cause harm". Does "potential" mean "possible", "probable" or "likely"? A "CCP" is "a point ... (where) a food safety hazard can be prevented, eliminated or reduced to acceptable levels". How should "acceptable levels" be established in order to prevent differences in interpretation?

The ICMSF (*10*), IAMFES and ILSI Europe include in their definitions of hazard: "The unacceptable contamination with and the unacceptable growth and/or survival of microorganisms of concern to safety". This is already more precise than the Codex definition, but it still leaves open the question of what is acceptable and what is not. This question has to be addressed also when the Codex text is used, e.g., in relation to "Critical Limit: a value separating acceptability from unacceptability".

This quantitative approach to hazards is nothing new. However, we are gradually becoming aware of the problems posed by statements, such as: "When tested by appropriate methods of sampling and examination, the products should be free from pathogenic microorganisms in levels which may represent a hazard to health," which can be found in many Codex documents. Clearly, we need to get away from the "zero tolerance" principle and develop guidelines to establish "acceptable" levels of pathogens or potential pathogens.

The "MID" concept.

This project was started a few years ago by ILSI Europe. The idea underlying the Minimal Infective Dose concept is that foodborne disease is dose related, e.g., that the human response depends on the numbers of microorganisms ingested. It is recognized that these numbers may vary according to factors, such as the species and pathogenicity of the microorganism, the type of food consumed and the susceptibility of the consumer. The goal of the project is to establish, for individual foods, the levels of specific microorganisms that can be tolerated when consumed by the various categories of consumers. Thus, acceptable levels for different cases can be established.

Until now, this subject has been addressed from the other side. For example, "bot cooks" are routinely applied to canned, low-acid foods that will be stored at an ambient temperature. Apparently, the number of spores of *Clostridium botulinum* that remain in a batch after retorting is considered to be acceptable. Another example: whenever we examine a consignment of food using a "statistically designed sampling plan" (or just one sample), we accept the lot when no pathogens were detected. This means that we accept those which may still be present. Apparently these "unknown" levels have found acceptance, while accepting levels based on scientific data and risk assessment techniques is more difficult.

Although quantitative risk assessment has been applied successfully to chemical hazards in foods, few attempts have been made to apply similar techniques to the risks posed by microorganism (*12,13*). One obvious, yet crucial, consideration is that chemicals neither grow nor die; their levels remain more or less the same during storage, distribution and preparation. In contrast, the number of microorganisms present in a product at the time of analysis may have little relation to the number present at the time of consumption. Consequently, when a foodborne disease is detected, it is usually impossible to determine the number of microorganisms which caused it. Another problem is

that we do not have meaningful models for determining the dose-response curves in humans. According to the experts participating in the ILSI Europe workshop, animal experiments have very limited value. It is clearly difficult to obtain the necessary quantitative data to determine "acceptable" levels, but this should not mean that no efforts in this direction should be made.

CONCLUSION

The population of Europe is continuously evolving. Peoples' consumption habits are changing, the percentage of the population at risk is increasing, and there is a growing need for information and education on food hygiene and food safety for all consumers.

It is unrealistic to assume that all microbiological hazards can be eliminated; therefore, we have to develop strategies to reduce their occurrence as far as possible. Food business operators, governments and consumers should work together to anticipate potential problems and take measures to prevent them.

We may have to reconsider the basic rules for consumer protection. The "zero tolerance" policy cannot be used as a basis for a realistic strategy. We have to think in terms of limiting the growth, survival and spread of potential pathogenic microorganisms and, as a function of the food and the susceptibility of the consumer, arrive at an agreement on what levels of these microorganisms are acceptable in which foods.

In certain foods, "acceptable levels" may mean acceptance of a few per gram, in other foods it may mean less than one per kilogram or ton of product. Naturally, we must insure that all foods are safe when eaten by "normal" consumers. However, official policies often fail to recognize that the consumers themselves may need to render a product safe prior to consumption. Moreover, it may not be useful or realistic to insist that all foods be safe when eaten by everyone. We already accept the premise that consumers with intolerances towards certain proteins, gluten, etc. should avoid certain foods; is this principle not equally applicable to microorganisms?

In short, the no-risk policy of the past should be changed to a policy of risk management using the best available knowledge and risk assessment techniques. In this way we will be better equipped to protect in a more realistic way all consumers in Europe in the nineties.

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Safety and Quality Management Through HACCP and ISO 9000

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Harmonization of European legislation presents enormous challenges for the future. In many areas of food and drink legislative control there is a requirement to harmonize national approaches to trade and commercial requirements on a European-wide basis. Food manufacturers and retailers have established systems for product and process management according to agreements in trading specifications to ensure the production of safe, high quality foods.

ISO 9000, or EN 29000 as it is known in Europe, is derived from BS 5750 and is recognized throughout the world as a standard for Quality Management Systems. This enables the documentation and implementation of a Quality System which is available for certification by a Third Party. In a number of countries, this Third Party is itself accredited for the specific purpose by a National Body. It is widely believed that customers and potential customers of a supplier know the elements of the standard and accept them as a measure of commitment to a system of quality measurement.

By far and away the most popular choice for certification is ISO 9002 (Quality Systems. Specification for production and installation) which contains 18 of the 20 paragraphs found in ISO 9001 (Quality Systems. Specification for design/development, production, installation and servicing [Table 1]). ISO 9003 refers only to specification for final inspection and test and there are only a small number of certifications to this Standard. Indeed, there is widespread speculation that ISO 9003 may disappear as an option for certification. Dealing with a company certificated to an ISO 9000 Standard means that the company will have considered each paragraph of the Standard and how they deliver its requirements within their particular operation. However, while the Standard requires that all legal obligations are met, it does not set standards. The output of the company will therefore reflect the standards that have been set within that company. There is frequent confusion in the respect that some customers believe that ISO 9000 guarantees 100% First Quality Goods. This is certainly not the case, provided that the company matches the standards it has documented and can consistently demonstrate this in process and by records, then ISO 9000 requirements are met. ISO 9000 then is a valuable starting point for a dialogue on product attributes and it is certainly likely that a certificated company who has a documented quality system will be better organized to meet your needs than one who has not. ISO 9000 defines a quality framework within which a certified company operates as a minimum. Personnel will be appropriately trained, management responsibilities will be clearly defined, as will the quality related responsibilities for all employees.

All this means that a relationship between a customer and a supplier can concentrate on the product. This saves valuable time (and therefore money) and means that dialogue can take place in the knowledge that the supplier has the necessary organizational quality attributes.

HACCP is the acronym for Hazard Analysis Critical Control Point, a system of food safety control based on a systematic approach to the identification and assessment of hazards associated within a food operation and the definition of means for this control. The identification of steps in an operation which must be controlled to eliminate or reduce a hazard to an acceptable level (e.g. Critical Control Points) enables resources to be focused on CCPs.

The adoption and use of HACCP in the food and drink industry has increased significantly over the past six years. It is widely recognized that the first application of HACCP to food safety was that of the Pillsbury Company in 1971 when developing safe foods for the American space program. Increasingly, national governments have endorsed the HACCP concept and sought to make reference to it in guidance and legislation to the food industry. Recently, the European Community has embraced the concept with its inclusion in the "Hygiene of Foodstuffs" Directive (93/93/EEC). On a wider International basis, Codex Alimentarius is designing "Guidelines for the Application of the Hazard Analysis Critical Control Point (HACCP) System". The HACCP system consists of the seven principles listed in Table 2. The application of these principles requires a series of tasks undertaken in a logical sequence as recommended by Codex Alimentarius which are listed in Table 3.

In order to identify whether a particular process step is a critical control point (CCP) for an identified hazard, use can be made of a series of four questions known as a "decision tree" (Fig. 1).

Table 1. The ISO 9000 Series of Standards

ISO 9000	Quality management and quality assurance standards. Guidelines for selection and use
ISO 9001	Quality systems Model for quality assurance in design/development, production, installation and servicing
ISO 9002	Quality systems. Model for quality assurance in production and installation
ISO 9003	Quality systems. Model for quality assurance in final inspection and test
ISO 9004	Quality management and quality system elements - guidelines

Table 2. The Seven Principles of a HACCP Program*

1. Identify potential hazard(s) associated with food production at all stages, from growth, processing, manufacture and distribution until the point of consumption. Assess the likelihood of occurrence of the hazard(s) and identify the preventative measures for their control.
2. Determine the points/procedures/operation steps that can be controlled to eliminate the hazard(s) or minimize its/their likelihood of occurrence — the critical control points (CCPs).
3. Establish critical limit(s) that must be met to ensure each CCP is under control.
4. Establish a system to monitor control of the CCPs by scheduled testing or observations.
5. Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.
6. Establish procedures for verification that include supplementary tests and procedures to confirm that the HACCP system is working effectively.
7. Establish documentation concerning all procedures and records appropriate to these principles and their application.

*Taken from Mayes (1993)

From Table I it can be seen that ISO 9001 is the most comprehensive of the ISO 9000 series of standards for which a company can seek certification. It is the Quality Systems Specification for design/development, production, installation and servicing and includes all that can be found in ISO 9002 and ISO 9003. Table 4 lists the paragraph headings which are contained in the 9001 standard and all of these must be addressed. Assessors look critically at what is written in the quality system and ensure that this is actually being carried out in practice and that there are appropriate record systems to verify and trace actions.

In summary, there are a number of conflicting views on the merits of certification to ISO 9000 and these are often fuelled by various misconceptions about what ISO 9000 actually seeks to achieve. In Table 5 are some key features of what ISO 9000 is, and, equally important, what it is not.

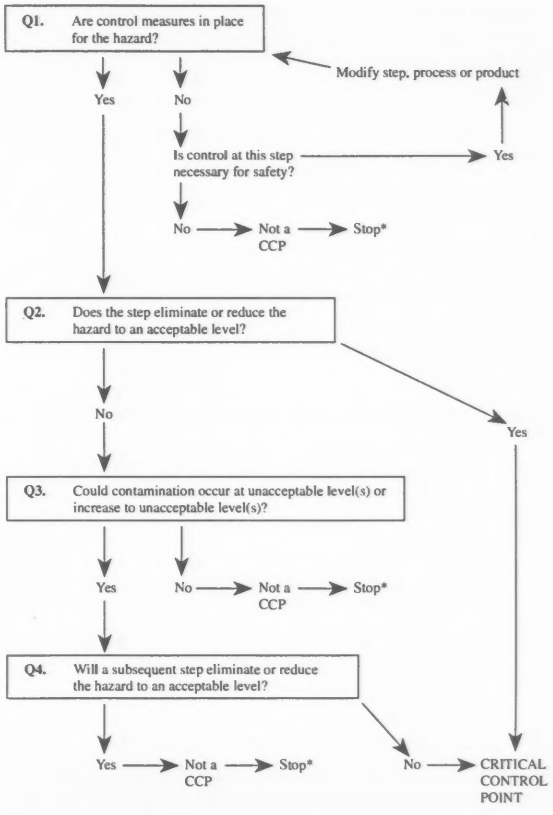
Table 3. HACCP Logic Sequence*

1. Assemble HACCP team.
2. Describe product.
3. Identify intended use.
4. Construct flow diagram.
5. On site verification of flow diagram.
6. List all identified hazards associated with each step and consider any preventative measure to control hazards.
7. Apply decision tree to each step.
8. Establish critical limits for each C.C.P.
9. Establish a monitoring system for each C.C.P.
10. Establish corrective actions.
11. Verification.
12. Establish record keeping and documentation.

* = Based on Reference 2

Figure 1. Critical Control Point Decision Tree[a]

Answer each question in sequence at each step for each identified hazard



* Proceed to next in the described process
a From "HACCP: A Practical Guide", 1992

Table 4. ISO 9001 — Areas Which Must be Addressed

1.	Management responsibility
2.	Quality system
3.	Contract review
4.	Design control
5.	Document control
6.	Purchasing
7.	Purchaser supplied product
8.	Product identification and traceability
9.	Process control
10.	Inspection and testing
11.	Inspection, measuring and test equipment
12.	Inspection and test status
13.	Control of non-conforming product
14.	Corrective action
15.	Handling, storage, packaging and delivery
16.	Quality records
17.	Internal quality audits
18.	Training
19.	Servicing
20.	Statistical techniques

Table 5. What Does ISO 9000 Seek to Achieve?

IT IS:

- A series of standards describing the requirements for a quality system within the industry
- A way of operating a quality system to a standard which can be externally (third party) audited and certified
- A way of making sure that the quality system never stands still. Continuous management review is a requirement of a certified system
- A way of formally considering deviation from the system and therefore creating continuous improvement
- A valuable competitive edge as market boundaries extend
- A foundation stone for TQM

IT IS NOT:

- Industry specific
- Designed to standardize quality systems implemented by organizations
- A method of setting standards. Providing that legal requirements and safety standards are met, the producer owns the quality standards
- A guarantee of 100% superior quality goods. The quality levels will reflect the standards set
- A one-off journey to certification. Surveillance visits are required to maintain certification status

With respect to HACCP, a number of organizations in various countries have adopted the concept in relation to food safety. Increasingly, there has been harmonization in approach, terminology and application of HACCP. Documentation from government agencies, the National Food Processors Association and the National Advisory Committee on Microbiological Criteria for Foods in the United States and Codex Alimentarius and the European community has embraced HACCP in essentially the same manner. HACCP can be incorporated into an ISO 9000 system and certificated as part of the system. Indeed, Mayes (1993) comments that it may be possible to consider the formal incorporation of the HACCP concepts into ISO 9000, possibly as part of future ISO updates. Nicholson (1993) also believes that there is scope for an International Standard for HACCP available for certification. Currently in the U.K. there is discussion on the possibility of a standard form of HACCP and the recognition or certification of HACCP training approaches to such a standard.

Much emphasis is currently being given to the training requirements for HACCP as demonstrated by the publication of the WHO document in 1993, with its declared objective to "develop a common understanding of the application of the principal activities of HACCP to food processing and manufacturing to ensure the production of safe food". The training goals of the WHO program include: a common approach for the identification of hazards, critical control points and critical limits, to agree on terminology and basic understanding of HACCP principal activities, to share knowledge and practical experience in applying HACCP principal activities, to promote understanding and awareness of food safety practices through education and to impart the skills necessary to allow both the public and private sectors to use HACCP appropriately to promote food safety.

In Europe, a major collaborative study has been underway for some time, funded through the FLAIR program and entitled: "Food Quality and Safety based on the Application of Combined Processes and Hazard Analysis Critical Control Point (HACCP) Systems". This has encouraged the introduction of the HACCP approach to a wide range of countries within the European Community, including a growing number of Eastern European countries.

To further develop training opportunities, Campden Food and Drink Research Association has recently introduced software for use as a HACCP documentation tool, which may be used as part of a training program. The key features of the software include the following:

- Guides the user through a study in a logical and systematic manner, and is complementary to Campden's Technical Manual No. 38, HACCP: A Practical Guide.
- Prompts the team on points that need to be considered at each stage of the study by providing context-sensitive help relevant to each particular part of the study.
- Generates a process flow diagram to show the relationship between process steps.

- Applies a decision tree to each hazard at each process step to determine the critical control points (CCPs) for the study.
- Offers an audit facility as one method of verifying the study.
- Automatically logs changes to a completed study to provide an audit trail.
- Provides a notebook facility to record detailed decisions taken by the team, which can be printed out and kept as part of the study documentation.
- Allows a variety of reports to be produced, with full documentation control headers.

Perhaps the most significant recognition of the importance of HACCP and ISO 9000 is the reference made to them in the European Community Hygiene of Foodstuffs Directive (93/43/EEC) published in July 1993. Specific mention to HACCP is included in Article 3 — "Food business operators shall identify any step in their activities which is critical to ensuring food safety and ensure that adequate safety procedures are identified, implemented, maintained and reviewed on the basis of the following principles used to develop the system of HACCP". Likewise, reference is made to EN 29000 (the European equivalent of ISO 9000) in Article 6 —"Member states shall, if they consider it appropriate, recommend food business operators to apply the European Standards of the EN 29000 series in order to implement the general rules of hygiene and the guides to good hygiene practice".

It will be of considerable interest to see how member states handle the issue of ISO 9000. Currently, the driving force for certification is perceived commercial advantages. Many companies who have this standard claim significant and demonstrable benefits and can show a commitment to quality improvement which did not exist before. What is clear is that as trade continues and expands over a wider international market and ingredients and products are sourced from a more extensive network of suppliers, particularly in terms of size of company and country of origin, there will be a growing requirement for objective measures of safety and quality control.

In summary, HACCP is well established as a significant approach to ensuring the safe production of food and drink. Both HACCP and ISO 9000 can be viewed as important steps towards the development of a Total Quality Management System - a continual and sustained improvement process for addressing quality performance throughout all aspects of a business.

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Foodborne Illness (Part 10)

Listeria Monocytogenes

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Listeria monocytogenes is termed an "emerging" pathogen (bacterium) e.g., an agent identified years ago, but only recognized recently to be a cause of foodborne illness. It is widely distributed in water, soils/mud, animal species (more than 40) including humans, fish, shellfish and birds (fowl), silage and vegetables. The agent has the ability to survive for long periods under adverse situations (such as dry conditions and in high salt concentrations) and to grow at low temperatures (psychrotrophic), an important factor in its significance in the food chain.

This bacterium is a small, gram-positive, non-spore forming short rod that grows in the wide pH range of 5-9 (has survived in a pH 5 environment in ripening cheddar cheese and cottage cheese). Carbohydrates are essential for growth. It can grow at temperatures between 35°F (1.7°C) and 113°F (45°C), but growth is slow at refrigeration temperatures. The organism is aerobic to microaerophilic (grows better at about 5% oxygen and 5 to 10 % carbon dioxide).

Listeria monocytogenes causes listeriosis, a disease of both humans and animals. As a foodborne illness, it seems to have a variable incubation period, with outbreak cases having occurred 3 to 70 days following exposure to or ingestion of a food item. In humans the illness can range from a mild, flu-like sickness (patients developing transitory symptoms of malaise, diarrhea and fever, sometimes leading to a carrier state) to severe manifestations; the severe form occurs as virulent forms multiply in macrophages and produce septicemia, which can affect the nervous system, heart, other vital organs and in pregnant women, the fetus, resulting in abortion, stillbirth or neonatal sepsis. Listeriosis is more likely to accompany immunocompromised states, whether natural, pregnancy/elderly or induced by a medical treatment. Therefore, groups at highest risk are the unborn, the newborn and the immunocompromised. Death is rare in healthy adults, but can be as high as 30% in persons at highest risk.

Other transmission patterns can occur by direct contact of skin (arms/hands) with fecally contaminated materials/soil; inhalation and venereal contact are also possible transmission modes.

Regarding infected domestic animals, silage/water/mud seem to be principal reservoirs. Asymptomatic fecal carriage can occur in animals and in humans; asymptomatic vaginal carriage can occur in humans. Human carrier rates of about 4% have been reported.

Listeria monocytogenes has been isolated from a variety of foods, including poultry, meat and chopped beef, cheese, milk and vegetables. Because of the potential severity of listeriosis, USDA developed a test for monitoring of the agent in raw and processed, ready-to-eat foods; the finding of the bacteria in ready-to-eat products would warrant a recall. Three well publicized food-associated outbreaks of listeriosis occurred in the 1980s:

- In 1981 in Nova Scotia, cole slaw (no heat processing) was implicated in an outbreak of 41 identified cases (34 perinatal and 7 adult), with contamination traced to fields fertilized with sheep manure.
- In 1983 in Massachusetts, a specific brand of pasteurized milk was implicated in 49 cases (42 immunocompromised persons and 7 infants/fetuses), with no plant operating deficiencies identified and no *L. monocytogenes* isolated from milk samples, but with raw milk samples positive for the bacteria.
- In 1985 in California, Mexican-style soft cheese was implicated in over 100 cases (more than 90 were in infants, with 42 having onset of disease within 24 h of birth, and with at least 40 deaths), and the probable cause was post-pasteurization contamination and/or a mixture of raw with pasteurized milk.

PREVENTION/CONTROL

- The control of *Listeria* begins at the raw product source. Persons at the low end of the processing chain need to be aware of possible contamination sources, especially for those foods to be eaten without cooking or for those to be used as an ingredient in a product to be consumed cold.
- Thorough cooking of foods will kill the organism; therefore, procedures to avoid cross-contamination need to be evaluated and observed.

- Thoroughly reheat frozen/refrigerated foods, such as leftovers and food prepared ahead for later service.
- Avoid raw milk and soft (unripened) cheese made from unpasteurized milk.
- The physical plant of a facility needs to be kept clean and dry; wet floors, drains and condensates can promote *Listeria* growth. Keep cleaning cloths in sanitizing solutions (sponges are prohibited in Massachusetts); use sanitizing solutions routinely in floor drains.
- The high-risk groups should carefully observe "keep refrigerated", "sell-by" and "use-by" dates on processed foods, especially those "ready-to-eat".

Remember, this agent grows (slowly) at refrigeration temperatures down to 35°F (1.7°C), making it a threat in refrigerated food products. Avoid time-temperature abuse.

News

FOOD SAFETY AND PRODUCT AVAILABILITY ARE HIGH PRIORITIES FOR NEW CVM DIRECTOR

With a focus on protecting consumers and ensuring that veterinarians and producers have the tools necessary to keep animals healthy, Stephen Sundlof stepped into his new position as director of the Center of Veterinary Medicine (CVM) on June 13. CVM, a division of the Food and Drug Administration (FDA), is the federal agency that evaluates the safety and effectiveness of animal drugs, feed additives and medicated feeds, and makes sure that the food from treated animals is safe to eat. It is also an agency that recently has been in the spotlight. The approval last year of a breakthrough biotechnology product used in milk production sparked worldwide media attention. Add to that ongoing consumer interest in the use of antibiotics in veterinary medicine, pressures from various media groups to increase product availability, intensive scrutiny from legislators and the media, and movements toward altering long-time regulatory policies — and it would seem that the new director has his work cut out for him.

Sundlof, a veterinarian with a doctorate in toxicology, is familiar with the workings of both the FDA and CVM. He served since 1991 as chairman of the FDA's Veterinary Medicine Advisory Committee, which meets biannually to review and advise CVM on its policies, and as a member of an external team responsible for reviewing the functions of FDA and CVM back in the 1980s.

As one of about 75 board-certified veterinary toxicologists nationwide, Sundlof is an expert on how drugs and plants affect animals and in turn, the human food chain. He has served as delegate to World Health Organization committees on residues of veterinary drugs in foods. He has also served as president-elect of the American Association of Veterinary Pharmacology and Therapeutics, which specializes in drug effects in animals.

His vocal statements advocating the need for improvements in the animal drug review process have bolstered U.S. livestock producers, who are in great need of additional safe and effective animal health products to treat animal disease.

Consumers can be confident in Sundlof's stance on food safety. In numerous speeches and in interviews with the media, he has reiterated his primary commitment to maintaining the highest standards of food safety.

FRISTAM PUMPS, INC. WELCOMES NEW EMPLOYEES

Fristam Pumps is pleased to announce that Michael Young has joined the company as the Western Regional Sales Manager. Michael will have responsibility for all distributor and OEM sales in western United States, western Canada and Mexico.

Michael previously worked for Anderson Instrument Company, a process controls instrument company. He has also held several management and sales positions at Milpark, Inc. Michael brings to Fristam a B.A. degree in Spanish from Southeast Missouri State University.

Michael will be managing the western region from his home office in Sacramento, CA.

Fristam Pumps also announces that Bill Davis has joined the company as the Southeastern Regional Sales Manager. Bill will have responsibility for all distributor and OEM sales in the southeastern United States.

Bill previously held several sales and management positions for Oakes and Burger, including the presidency. Bill brings over eighteen years of experience to Fristam, along with a B.S. degree in Food Science from Penn State University.

Bill will be managing the western region from his new home office in the Southeastern region.

Fristam Pumps of Middleton, WI, manufactures sanitary centrifugal and positive displacements pumps for the food, dairy, pharmaceutical and biotechnology industries.

AFFI LEADS INDUSTRY IN NUTRIENT DATABASES — PROJECT IS FIRST TO GAIN FDA APPROVAL

The American Frozen Food Institute's (AFFI) Nutrient Database Program is gaining momentum as the frozen food industry is looking to AFFI to ensure its compliance with the Nutrition Labeling and Education Act of 1990 (NLEA), Robert L. Garfield, AFFI's vice president of regulatory and technical affairs, said in a recent speech in Atlanta, GA.

Speaking to the Annual Convention of the Institute of Food Technologists, Garfield said, "With the passage of NLEA, AFFI has taken the lead in expanding the scope of its database program to meet the needs of today's consumers, while providing a cost-effective way for frozen food processors to comply with these regulations."

AFFI's leadership in nutrient database development is unique because it is the only industry database that has received approval of the Food and Drug Administration (FDA). Garfield outlined the important issues AFFI faced as it prepared its database. To date, AFFI has developed 26 database proposals designed for frozen fruits and vegetables and has submitted them to the FDA for approval.

"AFFI's database on frozen broccoli is the only database which has been given 2-year interim approval by FDA," said Garfield. "We are currently working with the agency to secure the expected approval of the rest."

Although the AFFI board of directors authorized development of the database program in 1991, the Institute has a long history in database maintenance.

"AFFI prepared the original database for frozen vegetables in the 1970s," said Garfield. "This first program has served as the foundation for the nutrition labeling of frozen vegetables ever since."

The AFFI Nutrient Database Program currently consists of companies which represent a large portion of the frozen vegetable processing industry. Current efforts will span over the next ten years and will encompass laboratory analyses of 26 frozen fruit and vegetable products from processing plants in the U.S., Mexico and Central America.

AFFI is currently contracting with Technical Assessment Systems, Inc. of Washington, D.C., to maintain the database during the course of the next two years of the study and will utilize a nationally recognized food laboratory to undertake the nutrient analyses. The lab will analyze more than 700 frozen fruit and vegetable samples per year that will be submitted by participating companies as a means of continually verifying and updating the data.

"By outsourcing the database maintenance and lab analyses, AFFI will be able to keep the cost of this program low for participating companies, without creating a large bureaucracy," Garfield said.

For more information on AFFI's Nutrient Database Program, contact Robert Garfield at (703) 821-0770.

AFFI is the national trade association that has represented the interests of the frozen food industry for over 50 years. Its over 530 member companies account for more than 90% of the total U.S. production of frozen food.

PROJECT SALES STAFF EXPANDS FOR TRI-CLOVER

The addition of three engineers to its project sales staff has been announced by Tri-Clover, Inc., a major manufacturer of process equipment and systems.

David Ubert was named an electrical engineer for the company's Project Sales Group. Kenneth Seehafer and Khurram Qureshi join the company as project engineers.

Ubert joins Tri-Clover with 6 years experience in process control systems design with Allen-Bradley, Elm Grove, WI. He is a graduate of the University of Wisconsin-Milwaukee where he majored in computer engineering and applied science, with a minor in electrical engineering.

Seehafer previously served as an engineering technician in the Dairy Foods Engineering Group of Land O' Lakes in Minneapolis, MN. Qureshi is a 1994 graduate of the University of Minnesota where he earned his B.S. degree in mechanical engineering. While earning his degree, he served in project engineering capacities with Land O' Lakes and in field service for Niro.

Scott Geyer, vice president of sales and marketing for Tri-Clover said the appointments expand and strengthen the company's staff of project sales specialists who provide systems consultation and technical service support for complex processing systems.

Tri-Clover, Inc. is a leading manufacturer of sanitary stainless steel valves, pumps and fittings, as well as flow control, batch/weigh and Clean-In-Place systems. Tri-Clover Inc., an Alfa Laval Flow Company, is celebrating its 75th Anniversary in 1994.

PENNSYLVANIA RESTAURANT ASSOCIATION OFFICERS ACHIEVE FMP CERTIFICATION

The Educational Foundation of the National Restaurant Association recently recognized the officers of the Pennsylvania Restaurant Association for achieving the highest level of certification in the foodservice industry.

The Pennsylvania Restaurant Association officers were recently certified in The Educational Foundation's Foodservice Management Professional (FMP) program. This certification distinguishes managers in the foodservice industry who have attained a high level of professionalism and excellence and have demonstrated a combination of management experience, leadership and professional knowledge.

"The accomplishment of these officers is the latest example of the Pennsylvania Restaurant Association's efforts to distinguish itself as one of the most ardent supporters of our industry," said Michael L. McGovern, CAE, executive vice president of the Pennsylvania Restaurant Association. "We undertook the Foodservice Management Professional training course and test in a show of support for the efforts of the Educational Foundation and its commitment to professional excellence."

"The Pennsylvania Restaurant Association's efforts set an exemplary achievement level for others to replicate," said Daniel A. Gescheidle, FMP, president of The Educational Foundation. "We are appreciative of the leadership demonstrated by the Pennsylvania Restaurant Association in enhancing the professionalism of the industry."

The FMP program was established in 1991. It is the highest credential awarded by The Educational Foundation to industry professionals. For more information on FMP certification and requirements, call (800) 765-2122.

The Educational Foundation of the National Restaurant Association, a non-profit organization founded in 1987, is the leading source of education, training, and career development for the foodservice industry.

NELSON-JAMESON AWARDED 3-A® CERTIFICATE FOR HOSE ASSEMBLIES

Nelson-Jameson, Inc. has been authorized too display the 3-A® Symbol on hose assemblies produced at its facilities in Marshfield, WI, and Turlock, CA. With specialized experience in manufacturing hose and coupler assemblies, the Company has been supplying these units to the dairy and food industry since 1988.

"We are pleased to receive this authorization, which covers both our permanent and our new, reusable coupler technology," said Diane Sutton, the Company's product manager. Experienced Nelson-Jameson personnel, trained in assembly and inspection procedures, use high-powered equipment to assure that each hose assembly produced offers a completely sanitary processing environment for products. Individual assemblies are given serial numbers for tracking and quality control purposes, before being shipped to processors, OEM's and resellers throughout North America.

According to the Company, hose assemblies displaying the respected 3-A® Symbol can be made-to-order from a variety of hose and coupler types. Most configurations are shipped within two working days. Food-grade hoses include clear PPVC, standard rubber or "crush-proof" rubber suction hose, as well as soft-wall rubber discharge hose. Coupler connections offered include Tri-Clamp®, reusable couplers are available. The Company provides toll-free phone assistance to customers in selecting components suitable to their dairy of food processing application.

The 3-A Sanitary Standards were originally developed voluntarily through the joint efforts of three industry groups: MIF (Milk Industry Foundation), representing dairy processors; DFISA (Dairy & Food Industries Supply Assn.), representing

equipment manufacturers; and IAMFES (International Assn. of Milk, Food & Environmental Sanitarians), representing sanitarians. Today, the 3-A Sanitary Standards Committee set standards and accepted practices for equipment and systems used to handle, process and package milk, milk products and other foods or consumable products where a high degree of sanitation is required. Nelson-Jameson's 3-A certificate is issued for standard *62-00 Hose Assemblies*.

Nelson-Jameson is a national leader in providing products and services for dairy and food processors. For further information, contact Diane Sutton, Nelson-Jameson, Inc., 2400 E. Fifth St., P.O. Box 647, Marshfield, WI 54449; telephone: (715) 387-1151, or toll free: (800) 826-8302.

LABCONCO CORPORATION EARNS ISO 9002 CERTIFICATION

Labconco Corporation, Kansas City, MO, has received ISO 9002 Certification for its three manufacturing facilities located in Kansas City, MO; Lenexa, KS; and Fort Scott, KS. ISO 9002 is a quality system model established by the International Organization of Standardization in Geneva, Switzerland. ISO 9002 applies to companies performing manufacturing and assembly and established criteria and documentation for the implementation and auditing of management standards governing quality assurance.

Labconco becomes one of the first U.S. manufacturers of laboratory safety ventilation products to receive ISO 9002 Certification. The ISO 9002 Certification positions Labconco throughout its worldwide distribution network as a manufacturer of high quality laboratory equipment and apparatus committed to continuous improvement and with measurable systems in place for the production of reliable and consistent products. The ISO Standard is recognized in over 100 countries.

Labconco is a 69-year-old manufacturer of laboratory equipment and apparatus headquartered in Kansas City, MO. The product lines include safety ventilation products, such as Chemical Fume Hoods, Biohazard Safety Cabinets and Glove Boxes, as well as Freeze Dry Systems, Evaporation Products, Glassware Washers, Water Purification Systems, Nitrogen Determination Apparatus and Carts.

DFISA FOUNDATION AWARDS TWO SCHOLARSHIPS

The DFISA Foundation, which was established by the Dairy and Food Industries Supply Association (DFISA) in 1983 to award scholarships, fund industry education activities and assist in the development of industry-wide research, has announced the selection of recipients for two food engineering scholarships.

Kathleen Stiefermann, a junior at the University of Missouri-Columbia, was selected by a seven person jury as the recipient of the Gordon Houran Food Engineering Scholarship.

Betsy F. Gerhold, a sophomore attending Purdue University, was selected by the same jury as the recipient of the Paul Girton Food Engineering Scholarship.

DFISA's Food Engineering Scholarships were established in 1983 as a memorial to food industry leaders Paul K. Girton and Gordon A. Houran, who, in their lifetimes as industry members, made substantial contributions to developments and applications within the dairy and food processing industries.

Both Scholarship recipients will graduate with degrees in Agricultural Engineering or Agricultural/Food Engineering and will receive $1,500, not including a travel grant of $500 for the purpose of attending Food & Dairy EXPO's combined show with the International Exposition for Food Processors (IEFP): MegaShow, which is to be held November 4-8, 1995. The purpose of the program is to attract and retain qualified personnel for the food industry, and to encourage deserving and outstanding undergraduate students in food engineering.

The general eligibility requirement for scholarship applicants is that the individual must be a sophomore or junior in food engineering, scholastically outstanding and have well-rounded interests.

The DFISA Foundation also sponsors the Food MegaTrends Conference, a free conference for the industries' processors, held in conjunction with Food & Dairy EXPO. Since the establishment of the Foundation, it has contributed more than $1 million to the industry.

DFISA is an international trade association of more than 800 equipment, ingredient, service and supply companies serving the dairy, food, beverage, pharmaceutical and related sanitary processing industries.

NEW BOOK INVESTIGATES STRUCTURE AND DEVELOPMENT OF MEAT ANIMALS AND POULTRY

New advances in the production and processing of meat and poultry are resulting in increasingly appealing products that satisfy changing consumer tastes.

Now published, *Structure and Development of Meat Animals and Poultry* provides a new, updated edition of a major test on this important topic.

Written by H. J. Swatland, Ph.D., Department of Food Science and Department of Animal and Poultry Science, University of Guelph, Canada, this new book is a comprehensive presentation of the structural and developmental aspects of meat science, production and processing.

The text presents basics of meat and poultry science as they relate to commercial meat production and product development. Well illustrated with over 250 drawings and photos, this new book serves the information needs of meat science and animal production professionals, meat industry personnel and students.

Chapters in the book include: Body Structure and Abattoir Technology, Connective Tissues of the Carcass, Commercial Structure of the Carcass, Anatomical Distribution of Carcass Muscles, Structure and Properties of Meat, Early Development of Skeletal Muscles, Cellular Basis of Postnatal Muscle Growth, Animal Growth and Development, and Conversion of Muscles to Meat.

This new book is now available from: Technomic Publishing Co., Inc., 851 New Holland Ave., Box 3535, Lancaster, PA 17604; telephone: (717) 291-5609 (Toll free in the U.S./territories and Canada: (800) 233-9936); FAX (717) 295-4538.

Federal Register

Department of Health and Human Services

Food and Drug Administration

21 CFR Part 131

[Docket No. 91P-0090]

Evaporated Milk; Amendment of the Standard of Identity; Confirmation of Affective Date

Agency: Food and Drug Administration, HHS.

Action: Final rule; confirmation of effective date.

Summary: The Food and Drug Administration (FDA) is confirming the effective date of June 13, 1994, for the final rule that amended the standard of identity for evaporated milk by revising the minimum milkfat and total milk solids content requirements and establishing a minimum milk solids-not-fat content requirement.

Dates: Effective date confirmed: June 13, 1994.

For Further Information Contact: Nannie H. Rainey, Center for Food Safety and Applied Nutrition (HFS-158), Food and Drug Administration, 200 C St., S.W., Washington, DC 20204; (202) 205-5099.

Supplementary Information: In the Federal Register of April 14, 1994 (59 FR 17689), FDA published a final rule that amended the standard of identity for evaporated milk (21 CFR 131.130) to: (1) reduce the minimum milkfat content requirement from 7.5% to 6.5% by weight; (2) reduce the minimum total milk solids content requirement from 25% to 23% by weight; and (3) add a minimum milk solids-not-fat content requirement of 16.5% by weight. This action was based on a petition from the American Dairy Products Institute, 130 North Franklin St., Chicago, IL 60606.

FDA gave interested persons until May 16, 1994, to file objections or requests for a hearing. The agency received no objections or requests for a hearing on the final rule. Therefore, FDA finds that the final rule published in the Federal Register of April 14, 1994, should be confirmed.

List of Subjects in 21 CFR Part 131: Cream, food grades and standards, milk and yogurt. Therefore, under the Federal Food, Drug and Cosmetic Act (secs. 201, 401, 403, 409, 701, 721 [(21 U.S.C 321, 341, 343, 348, 371, 379e)] and under authority delegated to the Commissioner of Food and Drugs (21 CFR 5.10) and redelegated to the Director, Center for Food Safety and Applied Nutrition (21 CFR 5.62), notice is given that the amendments of 21 CFR part 131 that were set forth in the **Federal Register** of April 14, 1994, final rule became effective June 13, 1994.

Dated: June 15, 1994.

Fred R. Shank, Director, Center for Food Safety and Applied Nutrition.

[FR Doc. 94-15186 Filed 6-21-94; 8:45 a.m.]

Teepak, Inc.; Petition for Affirmation of GRAS Status; Reopening of Comment Period

[Docket No. 93G-0359]

Agency: Food and Drug Administration, HHS.

Action: Notice; reopening of comment period.

Summary: The Food and Drug Administration (FDA) is reopening to August 1, 1994, the comment period for interested persons on the petition filed by Teepak, Inc., (GRASP 3G0397) entitled, "GRAS Affirmation Petition for Collagen Fiber". FDA is taking this action in response to a request to allow additional time for public comment.

Dates: Written comments by August 1, 1994.

Addresses: Submit written comments to the Dockets Management Branch (HFA-305), Food and Drug Administration, rm. 1-23, 12420 Parklawn Dr., Rockville, MD 20857.

For Further Information Contact: Mary E. LaVecchia, Center for Food Safety and Applied Nutrition (HFS-217), Food and Drug Administration, 200 C St., S.W., Washington, DC 20204; (202) 254-9519.

Supplementary Information: In the Federal Register of December 3, 1993 (58 FR 63996), FDA published a notice of filing stating that Teepak, Inc., had filed a petition (GRASP 3G0397) proposing that collagen fiber be affirmed as generally recognized as safe (GRAS) as an ingredient in human food. Interested persons were given until February 1, 1994, to comment on this notice of filing.

FDA received a request, dated January 24, 1994, to extend the comment period for public response. The comment stated that an extension was needed because there was a delay in receiving a copy of the petition through the Freedom of Information process. After careful consideration, the agency is now requesting all comments by August 1, 1994.

Interested persons may, on or before August 1, 1994, submit to the Dockets Management Branch (address above) written comments regarding this petition. Two copies of any comments are to be submitted, except that individuals may submit one copy. Comments are to be identified with the docket number found in brackets in the heading of this document. Received comments may be seen in the office above between 9 a.m. and 4 p.m., Monday through Friday.

Dated: June 24, 1992.

Michael R. Taylor, Deputy Commissioner for Policy.

[FR Doc. 94-15830 Filed 6-29-94; 8:45 a.m.]

New IAMFES Members

AUSTRALIA

Jill Gebbler
Murray Goulburn Co-op Co. Ltd., Victoria, Australia

Paul Horton
Analabs, Perth, W.A., Australia

CALIFORNIA

Lori Behm
Nestlé Ice Cream, Bakersfield, CA

Diane L. Evans
Santa Cruz County Health Services, Santa Cruz, CA

Dervilla Mekitarian
Nestlé Ice Cream Company, Bakersfield, CA

Jerel Steckling
Hillmar Cheese Co., Hillmar, CA

CANADA

Reem Barakat
University of Guelph, Guelph, Ontario

Jan Kolar
Health of Animals Lab, Guelph, Ontario

Jeffrey A. Pett
Mother Jackson's Open Kitchen, Port Perry, Ontario

Klaus Seeger
Huron Co. Health Unit, Auburn, Ontario

CONNECTICUT

David R. Fortuna
City of Bridgeport, Bridgeport, CT

DISTRICT OF COLUMBIA

Catherine H. DeRoever
Food & Drug Administration, Washington, DC

Donald A. Kautter, Jr.
National Food Processors Association, Washington, DC

FINLAND

Pekka Pakkala
National Food Administr., Helsinki, Finland

FLORIDA

Laly Rodriguez
ARBY's Inc., Ft. Lauderdale, FL

GEORGIA

Stan Bailey
USDA/ARS, Athens, GA

Mike M. Cate
Publix Super Markets, Inc., Suwanee, GA

Ron Crawford
Food and Drug Administration, Atlanta, GA

Ed Hays
Coca-Cola Company, Atlanta, GA

Liping He
University of Georgia, Athens, GA

Rob Vess
Bunge Foods, Atlanta, GA

ILLINOIS

Dennis Busch
Dean Foods, Rockford, IL

Michelle Clark
Dean Foods, Rockford, IL

Dawn Keith
Dean Foods, Rockford, IL

Lynn Petersen
Dean Foods, Rockford, IL

Tina Scapillato
M&M/Mars, Burr Ridge, IL

Isabel D. Wolf
National Center for Food Safety and Technology, Summit Argo, IL

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Mahipal Reddy Kunduru
Iowa State University, Ames, IA

Wanda Lyon
Iowa State University, Ames, IA

KENTUCKY

Kyle Newman
Alltech, Nicholasville, KY

KOREA

Chong-Hae Hong
Dept. Veterinary Medicine, Chunchon, Kangwon-do

Young-Su Ko
Hanyang University, Seoul, Korea

MARYLAND

Katey Kennedy
Food & Drug Administration, Rockville, MD

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R. Victor Lachica
U.S. Army/DOD, Natick, MA

MINNESOTA

John Linneman
Separation Technology, St. Paul, MN

Karen Mullory
3M Microbiology Products, St. Paul, MN

Todd T. Smith
Gold'n Plump, Cold Springs, MN

Larry Thiesen
3M Microbiology Products, St. Paul, MN

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University of Nebraska, Lincoln, NE

Celestin Munimbazi
University of Nebraska, Lincoln, NE

Dojin Ryu
University of Nebraska-Lincoln, Lincoln, NE

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Super Natural Foods, New York, NY

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Dynal, Inc., Lake Succes, NY

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Kraft General Foods, White Plains, NY

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Consultant, Delmar, NY

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Food Ingredient Specialties, Inc., Cleveland, OH

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Food Quality Magazine, Langhorne, PA

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Edith Mazurek
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Glynn McGee
Southwest Dairy, Tyler, TX

Steve Rowe
Southwest Dairy, Tyler, TX

Al Wagner
Texas A & M University, College Station, TX

Leslie Wisniewski
Select Concepts, Dallas, TX

Gene Wright
Texas Dept. of Health, Austin, TX

VIRGINIA

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National Milk Prod. Fed., Arlington, VA

WASHINGTON

Paul Horton
Analabs, Perth, WA

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Brian Curtis
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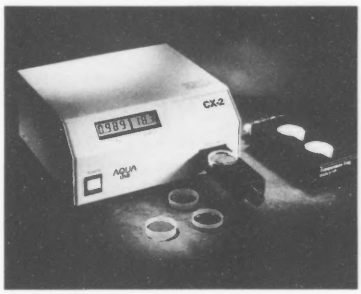
A free copy of the brochure may be obtained by contacting your nearest YORK Applied Systems sales or service office.

Please direct inquiries to: Mr. Michael S. Duguid, Industrial Process Refrigeration Services, Applied Systems Division, York International Corporation, Mail Stop 36BA, P.O. Box 1592, York, PA 17405-1592.



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DRESSER COMMITMENT TO QUALITY IS RECOGNIZED WITH ISO 9001 CERTIFICATION

The company-wide commitment to world class quality standards at Dresser Industries Instrument Division has been recognized by the International Standard ISO 9000 system audit procedure. The following Dresser operations have received ISO 9001 certification for their procedures.

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- Manometros Willy Division, Brazil — pressure gauges, thermometers, pressure and temperature switches, pressure and temperature transmitters, test equipment, accessories, seals and special products.
- Dresser Canada (ISO 9002), England and Saudi Arabia — transducers, gauges, pressure and temperature instrumentation, thermometers and transmitters.

These worldwide manufacturing operations have made the ISO Standard their guideline for doing business.

For more information, contact Susanne E. Schaefer at (203) 385-0381.

A & B OFFERS ECOMATE TECHNOLOGY IN U.S.

A & B Process systems Corp. is now introducing Ecomate cleaning solution regeneration technology to the United States market. The exciting new Ecomate process — a trademark of Ecochimie Limited of Canada — combines both physical and chemical treatment of cleaning solutions used in food plants, dairies, breweries and bottling plants.

Ecomate saves on chemical, water and energy usage; decreases or entirely eliminates wastewater treatment needs; and reduces cleaning time. Spent cleaning solution is metered through a series of reactors and mixing chambers, which chemically and physically remove undesirable soils and residues to regenerate the solution. With the Dynamic Cleaning™ option, the spent solutions are captured and replaced DURING the wash cycle.

The Ecomate process has been widely used for more than 10 years in Europe, and more recently in Canada. Demand is increasing in the United States as the costs of chemicals, water and water treatment continue to rise, and increasingly stringent limitations are placed on waste effluent disposal.

"Ecochimie Ltd. is pleased to have a U.S. partner with the scope of A & B's specialized experience and full turnkey capabilities in process flow systems," said Gilles M. Tastayre of Ecochimie Ltd. Brian Gehrke, vice president of marketing for A & B, said the addition of the Ecomate Process broadens his company's ability to serve clients nationwide. Gehrke noted that Clean-in-Place (CIP) circulating systems from A & B provide automatic and thorough cleaning of vessels and pipelines for leading national companies in the food, dairy and beverage industries. Ecomate and Dynamic Cleaning™ offers even better cleaning, shorter CIP cycles and greatly reduced effluent flow. In many cases, Dynamic Cleaning eliminates the initial rinse cycle and the need for acid washes.

Ecochimie and A & B are working together to integrate the Ecomate system into new and existing CIP systems, bottle washers, pasteurizers, evaporators, dryers and other process systems.

More information is available by contacting A & B Process Systems Corp., 528 North Street, P.O. Box 86, Stratford, WI 54484-0086; phone (715) 687-4332 FAX (715) 687-3225. In Canada, contact Ecochimie, Ltd., 125B Saint Joseph, Lachine, PQ H8S 2L2; phone (514) 634-1049; FAX (514) 634-1825.

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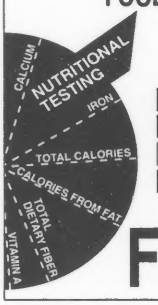

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Where To Find It

Dairy, Food and Environmental Sanitation, Vol. 14, No. 8, Pages 492-506

Holders of 3-A Symbol Council Authorization on February 15, 1994

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 Unit of AMCA Int'l., Inc.)
575 E. Mill St.
Little Falls, New York 13365

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

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

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

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

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

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

02-08 Pumps for Milk and Milk Products

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

636 Abel Pumps Corporation (7/10/91)
79 North Industrial Park
511 North Avenue
Sewickley, Pennsylvania 15143-2339
(Mfr: Abel Pumps, Buchen, Germany)

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

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 (01/18/93)
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)

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

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

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

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

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

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

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
(Not Available in the U.S.A.)

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

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

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.)

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

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

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

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

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

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

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

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

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

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 Products (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.)

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

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

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

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

657 Microfluidics Corp. (11/4/91)
P.O. Box 9101
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

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

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)

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

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

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

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

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

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

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

08-17R Fittings and Plug-Type Valves is being separated into two distinct Standards and will be shown on *future* Lists of Holders as: 51-00 Plug-Type Valves (formerly 08-17R); and 63-00 Sanitary Fittings (formerly 08-17R)

260 APV Crepaco, Inc. (5/21/75)
100 South CP Avenue
Lake Mills, Wisconsin 53551

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

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

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

682 Andron Stainless, Ltd. (6/30/92)
4610 Burgoyne Street
Mississauga, Ontario
Canada L4W 1G1
(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

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

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

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

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

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

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

726 Pure Fit, Inc. (04/14/93)
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

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. (01/05/93)
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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

732 SensorTec, Inc. (05/18/93)
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 Taylor Instrument (10/4/56)
Combustion Engineering, Inc.
400 West Avenue, P.O. Box 110
Rochester, New York 14692

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

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

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

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

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 (03/19/93)
Box 388, 407 Jefferson Street
Three Rivers, Michigan 49093

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

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

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

11-05 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

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

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

718 Babson Bros. Co. (03/08/93)
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

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

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

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

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

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

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)

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

12-05 Tubular Heat Exchangers for Milk and Milk Products

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)

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 (05/19/93)
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. (02/24/93)
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. (02/24/93)
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

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

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

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

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

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

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

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

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

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

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

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

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 (05/18/93)
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 Pure-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 (03/26/93)
One Better Way Road
Milford, Ohio 45150
(Mfg. by Thimonnier, 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

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

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 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 Company (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

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.)

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

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

503 Ripley Stainless, Ltd. (5/1/87)
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 Rockford, Inc. (9/28/65)
Filling & Wrapping Systems Div.
1303 Samuelson Road
Rockford, Illinois 61109

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

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

679 Ice Cream Novelties (6/1/92)
Division of Popsicle Inc., Ltd.
5305 Fairview Street
P.O. Box 610
Burlington, Ontario, Canada L7R 3Y5
(U.S. Rep: Sunshine Biscuits
100 Woodbridge Center Drive
Woodbridge, New Jersey 07095-1196)

635 Interbake Dairy Ingredients Div. (7/10/91)
2220 Edward Holland Drive
Suite 301
Richmond, Virginia 23230

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

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

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

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. (04/14/93)
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. (02/10/93)
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

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

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

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

476 Stone Container Corporation (7/17/86)
1881 West North Temple
Salt Lake City, Utah 84116-2097

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

28-02 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)
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. (03/04/93)
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. (05/18/93)
14841 Black Canyon Highway
Phoenix, Arizona 85023

474 Hydril Production (6/30/86)
Technology Division
330 North Belt East
Houston, Texas 77032-3411

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

535 Invalco, Inc.
P.O. Box 556
Tulsa, Oklahoma 74101

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

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

729 Peek Measurement, Ltd. (04/14/93)
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. (02/25/93)
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)

664 XO Technologies, Inc. (12/16/91)
28020 Avenue Stanford
Valencia, California 91355

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

764 Johnson Yokogawa (4/22/94)
4 Dart Road
Newnan, Georgia 30265-1040
(Manufactured by: Yokogawa Electric Corp.
2-9-32 Nakacho, Musashino-shi
Tokyo, 180 Japan)

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

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

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

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

361 N.V. Terlet (7/12/82)
P.O. Box 62
7200 AB Zutphen
Netherlands
(US 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

354 C.E. Rogers Co. (3/3/82)
S. Hwy. #65, P.O. Box 118
Mora, Minnesota 55051

708 Lee Industries, Inc. (01/12/93)
P.O. Box 688
Phillipsburg, PA 16866

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.)

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

289 Tri-Clover, Inc. (1/21/77)
9201 Wilmot Road
Kenosha, Wisconsin 53141

331 United Industries, Inc. (10/23/80)
1546 Henry Ave.
Beloit, Wisconsin 53511

34-02 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./Schugi (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 Holland b.v. (8/7/91)
Reeweg 13
P.O. Box 98
1394 ZH Nederhorst den Berg
The Netherlands
(U.S. Rep: Carrier Assoc.
50 Dunnell Lane
Pawtucket, Rhode Island 02860-5828)

680 Quadro Engineering, Inc. (6/3/92)
613 Colby Drive
Waterloo, Ontario
Canada N2V 1A1

724 Silverson Machines, Inc. (04/14/93)
P.O. Box 589
355 Chestnut Street
East Longmeadow, Massachusetts 01028
(Mfg. by Silverson Machines,
Chesham, England)

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

36-00 Colloid Mills

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

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

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

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

396 King Engineering Corp. (6/13/83)
P.O. Box 1228
Ann Arbor, Michigan 48106

501 Lumenite Electronic Company (4/27/87)
2331 N. 17th Avenue
Franklin Park, Illinois 60131

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

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

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

597 NUOVA FIMA S.p.A. (3/20/90)
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

515 Setra Systems, Inc. (9/14/87)
45 Nagag Park
Acton, Massachusetts 01720

583 S.J. Controls, Inc. (11/11/89)
2248 Obispo Ave. #203
Long Beach, California 90806

638 Span Instruments (7/10/91)
1497 Avenue "K"
Plano, Texas 75074

285 Tank Mate Div./Monitor Mfg. Co. (12/7/76)
P.O. Box AL
Elburn, Illinois 60119

641 Tempress A/S (7/16/91)
Engtoften 6, DK-8260
Viby J, Denmark

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

569 WEISS Instruments, Inc. (5/24/89)
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)

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

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

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

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

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

38-00 Cottage Cheese Vats

541 Kusel Equipment Company (9/16/88)
820 West St.
Watertown, Wisconsin 53094

385 Stoelting, Inc. (5/5/83)
P.O. Box 127
Kiel, Wisconsin 53042-0127

40-01 Bag Collectors for Dry Milk and Dry Milk Products

504 General Resource Corporation (5/15/87)
201 3rd Street South
Hopkins, Minnesota 55343

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

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

456 C. E. Rogers Company (9/25/85)
P.O. Box 118
Mora, Minnesota 55051

41-00 Mechanical Conveyors

631 Flexicon Corporation (5/28/91)
1375 Stryker's Road
Phillipsburg, NJ 08865

42-00 In-Line Strainers

606 Cherry-Burrell/Superior Stainless (9/18/90)
Fluid Handling Division
611 Sugar Creek Road
Delavan, Wisconsin 53115

655 Tri-Clover, Inc. (10/23/91)
9201 Wilmot Drive
Kenosha, Wisconsin 53141

44-01 Air Driven Diaphragm Pumps

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

713 Warren Rupp, Inc. (02/05/93)
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)

46-00 Refractometers and Optical Sensors

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

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

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)

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

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)

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

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

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

730 APV Rockford, Inc. (04/21/93)
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)

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

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

716 Conexiones Inoxidables (03/04/93)
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)

691 Definox Division (9/13/93)
Defontaine, Inc.
17044 W. Victor Road
New Berlin, Wisconsin 53151

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

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

607 Kammer Valve, Inc. (9/25/90)
510 Parkway View Drive
Pittsburgh, Pennsylvania 15205
(Mfg. by: Kammer Ventile GmbH
Manderscheidtstr. 19
4300 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

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

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

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

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

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

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

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

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

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.
17044 W. Victor Road
New Berlin, Wisconsin 53151

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

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

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

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

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

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

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

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

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

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

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 74133

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. (04/14/93)
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

721 Dixon Valve & Coupling Co. (03/23/93)
800 High Street
Chestertown, Maryland 21620

727 Pure Fit, Inc. (04/14/93)
924 Marcon Blvd.
Allentown, Pennsylvania 18103

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

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

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

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

63-00 Sanitary Fittings

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

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

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

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

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CIRCLE READER SERVICE NO. 339

Employment Opportunities

ENVIRONMENTAL SANITARIAN

The Missouri Department of Health is seeking applicants for an Environmental Sanitarian V position in the Bureau of Community Environmental Health. The position is located in Jefferson City and responsibilities include coordinating the On-Site Sewage and Private Water Programs and overseeing the development and implementation of new statewide on-site legislation. Requires Bachelor's degree with 20 semester hours in biology, chemistry, bacteriology or sanitary science or closely related physical or natural science and five years of professional experience in environmental health, including one year involving significant diversification and two years in a supervisory, administrative or consultative capacity. Merit system position with liberal fringe benefits. Salary Range: $27,744 to $37,164. Starting salary commensurate with qualifications. For additional information, contact Roger Gibson at (314) 751-6090 or Pat Reagan, Office of Personnel Training, Department of Health, P.O. Box 570, Jefferson City, MO 65102 or (314) 751-6059. Fax (314) 526-5521.

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SANITARIAN/ MICROBIOLOGIST

With a B.S. Degree and 20 years experience in Quality Assurance and Inspection seeks position as a **Quality Assurance/Field Specialist**

Qualifications Include:

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- Vendor and Sanitation Audits
- Some HACCP Enforcement & Implementation
- Laboratory Equipment Experience
- Electron Microscopy Experience
- Pathogen Isolation Identification

Prefer Northeast Area (But Would be Willing to Relocate)

CIRCLE READER SERVICE NO. 305

TECHNICAL SERVICES MANAGEMENT

Versatile QA, product development, process engineer manager with 20+ years experience with Fortune 500 Food Company. B.A. Microbiology, M.B.A. Proven track record in cost reduction, consumer complaint reduction, new product introduction, TQM, HACCP, SPC, vendor and co-packer operations. Available for relocation. **For information or resume, call Mike: (412) 443-0129.**

CIRCLE READER SERVICE NO. 306

Research Associate

Research Associate to (1) study the efficacy of using plant extracts and *antagonistic microorganisms* to inhibit pathogens, *E. coli O157:H7*, *Listeria*, and *Aeromonas*, on cooked beef and poultry, (2) evaluate sensory quality of cooked beef and poultry treated with plant extracts and antagonistic microorganisms, (3) investigate the production of botulinum toxin in vegetables packaged under modified atmosphere (including toxicity test using animal bioassay) and shelf life of these products , and (4) study mechanisms of bacterial detoxification of aflatoxins. Ph.D. in Food Science and Technology with emphasis in food microbiology and experience working with *foodborne pathogens* (*E. coli*, *Listeria*, and *Aeromonas*), bacterial toxins, aflatoxins, vegetable spoilage organisms, modified atmosphere techniques, sensory evaluation, and with HPLC, CG JR, UV/VIS spectrophotometry, and data management and statistical analysis is essential. Annual Salary is $26,000. Send resume to: **Georgia Department of Labor, 1514 Highway 16 West, P.O. Box 736, Griffin GA 30224-0736, or to the nearest Georgia Job Service Center. Job Order #GA 5746429.**

An employer paid ad.

CIRCLE READER SERVICE NO. 301

Coming Events

1994

August

•**9-10, Producing Safe Dairy Foods,** a two-day course sponsored by the Center for Dairy Research in Madison, WI. For further information, contact the CDS Conference Office at (608) 263-1672.

•**9-12, Fermentation Microbiology,** a continuing education workshop sponsored by the American Type Culture Collection, will be held in Rockville, MD. For more information, contact the ATCC Workshop Manager at (301) 231-5566.

•**15-17, Downstream Processing, Recovery and Purification of Proteins,** a continuing education workshop sponsored by the American Type Culture Collection, will be held in Rockville, MD. For more information, contact the ATCC Workshop Manager at (301) 231-5566.

•**16-18, 11th Biennial Cheese Conference,** sponsored by the Department of Nutrition and Food Sciences, Western Center for Dairy Protein Research and Technology, Cooperative Extension Service, Utah State University. For more information, contact Gayla Johnson (801) 797-2379.

•**20-25, 41st International Congress of Meat Science and Technology,** hosted by the American Meat Science Association, to be held in San Antonio, TX. For more information, contact Ken Johnson, ICoMST Secretariat at (312) 467-5520.

•**23-24, Microbiological Concerns in Food Plant Sanitation & Hygiene,** a two-day interactive lecture course, sponsored by Silliker Laboratories Group, Inc., will be held in Chicago, IL. For further information, contact Silliker Laboratories, Education Services Department at (800) 829-7879.

•**25, Dairy and Food Industries Supply Association (DFISA) Seminar,** a full-day seminar entitled "Road to Exporting" sponsored by the International Trade Committee of DFISA, will be held at the Hyatt Regency O'Hare in Chicago, IL. For further information, contact Jennifer Brown, Director of Marketing Information, at (301) 984-1444.

September

•**8-9, Anaerobic Bacteriology,** a continuing education workshop sponsored by the American Type Culture Collection, will be held in Rockville, MD. For more information, contact the Workshop Manager at (301) 231-5566.

•**14-16, International Dairy Federation Annual Sessions** to be held in Adelaide, Australia.

•**14-16, Growth and Preservation of Animal Viruses,** a continuing education workshop sponsored by the American Type Culture Collection, will be held in Rockville, MD. For more information, contact the ATCC Workshop Manager at (301) 231-5566.

•**18-21, 1995 National Educational Conference, sponsored by the Canadian Institute of Public Health Inspectors, "Approaching the 21st Century — Challenges in Health Protection,"** to be held in Victoria, British Columbia, Canada. For more information, contact Mr. R. W. Bradbury (604) 478-0523; FAX (604) 478-9363.

18-22, International Dairy Congress to be held in Melbourne, Australia. For more information, contact IDF, 1601 Malvern Road, Glen Iris 3146, Victoria, Australia; Telephone (03) 885-9781; FAX (03) 885-0017.

•**18-23, Second Asian Conference on Food Safety,** sponsored by the International Life Sciences Institute, will be held in Bangkok, Thailand. For more information, contact Lili Merritt (202) 659-0074.

•**19-21, Indiana Environmental Health Association Fall Annual Educational Conference** will be held in Muncie, IN. For additional information, contact Tami Barrett at (317) 633-8400.

•**19-23, Second International Activated Carbon Conference** hosted by the Professional Analytical and Consulting Services, Inc., will be held at Plaza Hotel in Pittsburgh, PA. For more information, contact Henry Nowicki (412) 457-6576.

•**20-22, New York State Association of Milk and Food Sanitarians Annual Conference,** Sheraton Inn-Buffalo Airport, Buffalo, NY. For more information, contact Janene Gargiulo (607) 255-2892.

•**21-23, Microscopy/Photomicrography,** sponsored by the American Type Culture Collection, will be held in Rockville, MD. For more information, contact the ATCC Workshop Manager at (301) 231-5566.

•**21-24, National Society for Healthcare Foodservice Management (HFM) 1994 National Training Conference** will be held at the Breakers in Palm Beach, FL. For more information, contact HFM at (202) 546-7236.

•**26-28, Conventional and Molecular Cytogenetic Techniques,** a continuing education workshop sponsored by the American Type Culture Collection, will be held in Rockville, MD. For more information, contact the ATCC Workshop Manager at (301) 231-5566.

October

•**5-7, New York State Registry of Sanitarians 1994 Educational Conference** will be held at the Villa Roma Resort Hotel, Callicoon, NY. For more information, contact Susan Jones (516) 727-8947 or Michele Hecht (516) 349-5816.

•**5-8, 1994 International Dairy Show,** sponsored by the International Dairy Foods Association, Milk Industry Foundation, National Cheese Institute and International Ice Cream Association, co-sponsored by the American Butter Institute, will be held at the Minneapolis Convention Center, Minneapolis, MN. For more information, contact International Dairy Show Convention Management at (703) 876-0900.

•**12-13, Iowa Association of Milk, Food and Environmental Sanitarians Annual Meeting** will be held at the Best Western Starlite Village (formerly the Ramada Hotel), Waterloo, IA. For more information, call Dale Cooper at (319) 927-3212.

•**12-13, Seafood Quality Evaluation Workshop for Analytical Laboratories and the Seafood Industry,** co-sponsored by the University of California Cooperative Extension, Sea Grant Extension Program; U.S. Food and Drug

Administration; U.S. Department of Commerce; and National Food Processors Association, will be held at the Doubletree Hotel and Marina in San Pedro, CA. For further information, con-tact Bob Price (916) 752-2194 or Pamela Tom (916) 752-3837.

•**19-20, North Central Cheese Industries Association Annual Conference** to be held at the Holiday Inn, Brookings, South Dakota. For further information, contact E. A. Zottola, Executive Secretary, NCCIA, Box 8113, St. Paul, MN 55113.

•**21-22, Breakfast Cereal Technology**, sponsored by the American Association of Cereal Chemists, will be held in Minneapolis, MN. 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.

•**24-November 25, Dairy Technology Module I - Technology of Fluid Milk Production and Processing**. The technology of milk production from the farm through plant processing of fluid milk products. Includes handling, distribution and marketing; aspects of quality control, basic chemistry and microbiology, sanitation and product testing associated with the fluid milk industry. Cost: $873.00. For more information, contact Mr. A. W. Hydamaka at (204) 474-9621; FAX (204) 261-1488.

•**25-26, HACCP for Meat and Poultry Processors,** a two-day interactive workshop designed for those responsible for implementing a HACCP plan in a processing plant, will be held in Dallas, TX. Sponsored by Silliker Laboratories Group, Inc., more information is available by calling Silliker's Education Services Dept. at (800) 829-7879.

•**25-26, Illinois Environmental Health Association's Annual Education Conference** will be held at the Hotel Pere Marquette in Peoria, IL. For more information, call (708) 682-7979, ext. 7196.

November

•**2-3, North Dakota Environmental Health Assn. Annual Educational Conference** will be held at the International Inn, Williston, ND. For more information, contact Deb Larson at (701) 221-6147.

•**2-7, Fifth Panamerican Dairy Congress, the International Fair of the Dairy Industry and Dairy Cattle Exhibition,** co-sponsored by the Panamerican Dairy Federation, FEPALE and the COLANTA Dairy Cooperative, will be held in Medllín, Colombia, South America.

•**7-10, Second Saudi Symposium and Exhibition on Food and Nutrition** will be held at King Saud University campus in Riyadh, Saudi Arabia. For more information, contact the Food Science Department at (966) 467-8407; FAX (966) 467-8394.

•**9-10, Separations Technologies: Markets and Applications.** Location: Royal Sonesta Hotel, Cambridge, MA. For more information, contact Program Division, Techomic Publishing Company, Inc., 851 New Holland, Ave., Box 3535, Lancaster, PA 17604; phone (717) 291-5609; FAX (717) 295-4538. Toll-free U.S. and Canada: (800) 223-9936.

December

•**12 and 13, Thermal Processing of Foods I; Operation of Pasteurizer Equipment.** Fee to be established. For more information, contact Mr. A. W. Hydamaka at (204) 474-9621; FAX (204) 261-1488.

•**14 and 15, Thermal Processing of Foods II: Testing of Pasteurizer Equipment and Controls**. Fee to be established. For more information, contact Mr. A. W. Hydamaka, at (204) 474-9621; FAX (204) 261-1488.

Advertising Index

To insure that your meeting time is published, send announcements at least 90 days in advance to: IAMFES, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2838.

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

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112	125	138	151	164	177	190	203	216	229	242	255	268	281	294	307	320	333	346	359
113	126	139	152	165	178	191	204	217	230	243	256	269	282	295	308	321	334	347	360

This second Reader Service Card is provided to allow co-workers to also respond to companies of interest.

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102	115	128	141	154	167	180	193	206	219	232	245	258	271	284	297	310	323	336	349
103	116	129	142	155	168	181	194	207	220	233	246	259	272	285	298	311	324	337	350
104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338	351
105	118	131	144	157	170	183	196	209	222	235	248	261	274	287	300	313	326	339	352
106	119	132	145	158	171	184	197	210	223	236	249	262	275	288	301	314	327	340	353
107	120	133	146	159	172	185	198	211	224	237	250	263	276	289	302	315	328	341	354
108	121	134	147	160	173	186	199	212	225	238	251	264	277	290	303	316	329	342	355
109	122	135	148	161	174	187	200	213	226	239	252	265	278	291	304	317	330	343	356
110	123	136	149	162	175	188	201	214	227	240	253	266	279	292	305	318	331	344	357
111	124	137	150	163	176	189	202	215	228	241	254	267	280	293	306	319	332	345	358
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This is Your Personal Invitation to Join

The International Association of Milk, Food and Environmental Sanitarians, founded in 1911, is a non-profit educational association of food protection professionals. The IAMFES is dedicated to the education and service of its members, specifically, as a well as industry personnel in general. Through membership in the Association, IAMFES members are able to keep informed of the latest scientific, technical and practical developments in food protection. IAMFES provides its members with an information network and forum for professional improvement through its two scientific journals, educational annual meeting and interaction with other food safety professionals.

Who are IAMFES Members?

The Association is comprised of a diverse membership of over 3,500 from 38 nations. IAMFES members belong to all facets of the food protection arena. The main groups of Association members fall into three categories: Industry Personnel, Government Officials and Academia.

Why are They IAMFES Members?

The diversity of its membership indicates that IAMFES has something to offer everyone involved in food protection and public health. INFORMATION is that offering.

Your Benefits as an IAMFES Member

Dairy, Food and Environmental Sanitation — Published monthly, this is the official journal of IAMFES. Its purpose is the disseminating of current information of interest to the general IAMFES membership. Each issue contains three to five informational applied research or general interest articles, industry news and events, association news, columns on food safety and environmental hazards to health, a food and dairy industry related products section, and a calendar of upcoming meetings, seminars and workshops. All regular IAMFES members receive this publication as part of their membership.

Journal of Food Protection — A refereed monthly publication of scientific research and authoritative review articles. Each issue contains 12 to 15 technical research manuscripts and one to five articles reporting a wide variety of microbiological research pertaining to food safety and quality. The *Journal of Food Protection* is internationally recognized as one of the leading publications in the food and dairy microbiology fields. This journal is available to all individuals with the Member *Plus* option.

The IAMFES Annual Meeting — Held in a different city each year, the IAMFES Annual Meeting is a unique educational event. Three days of technical sessions, scientific symposia and commercial exhibits provide members and other industry personnel with over 100 presentations on the most current topics in food protection. It offers the opportunity to discuss new technologies and innovations with leading authorities in various fields concerned with food safety. IAMFES members receive a substantially reduced registration fee.

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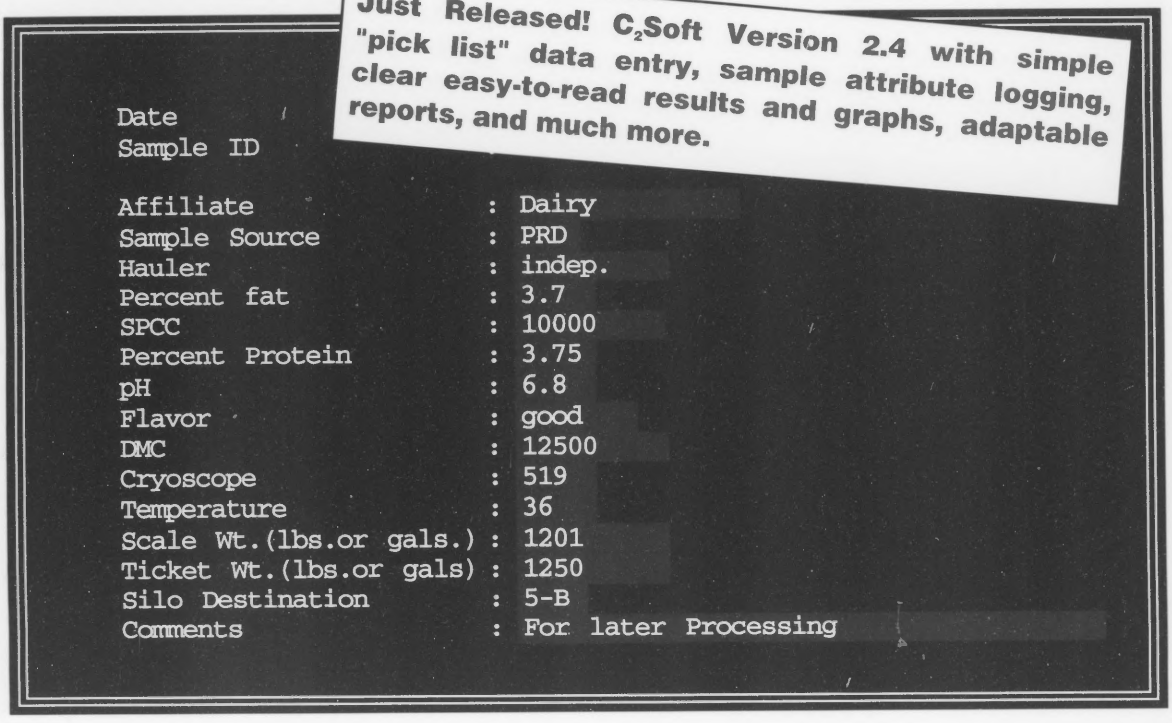

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