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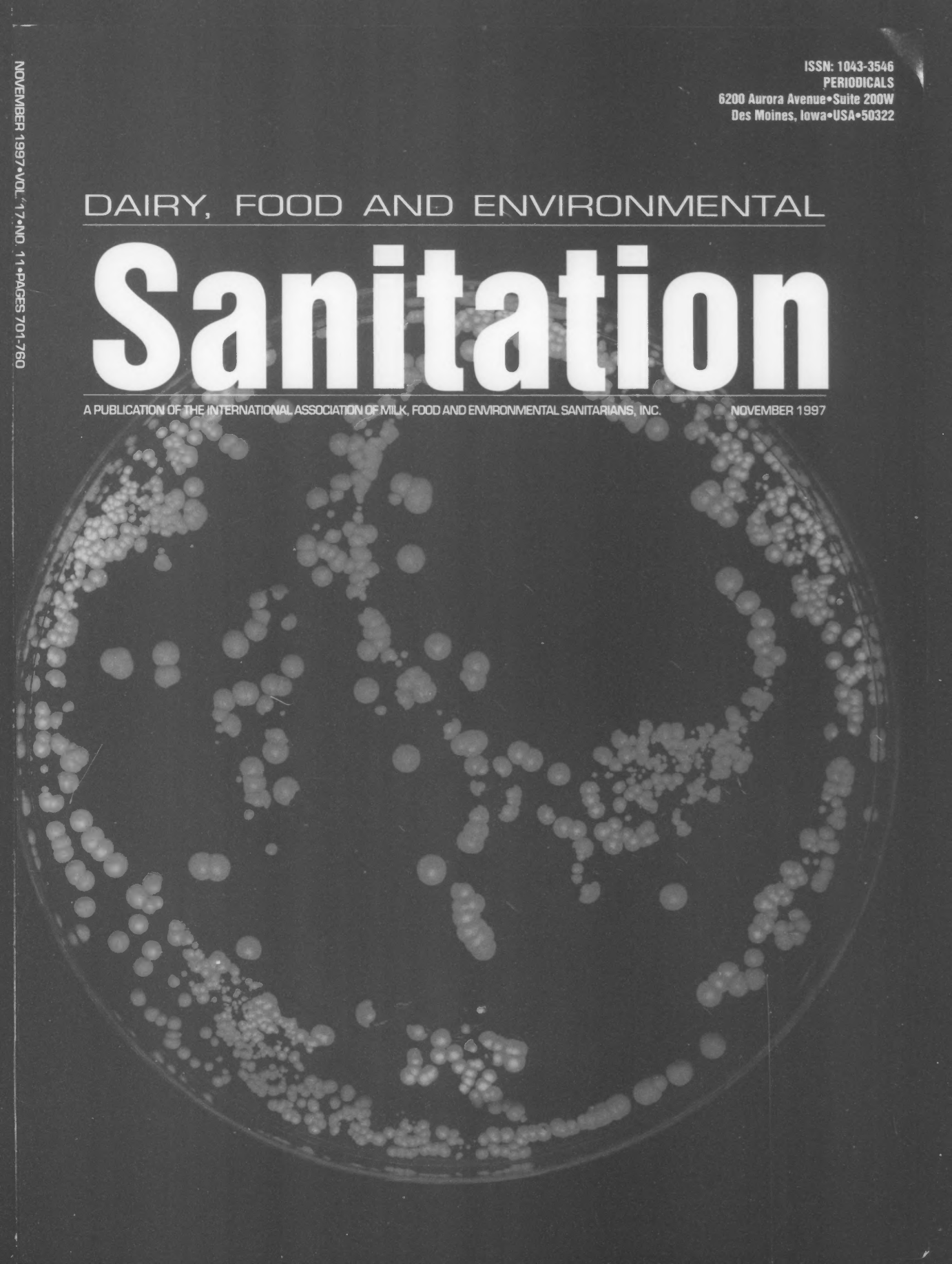
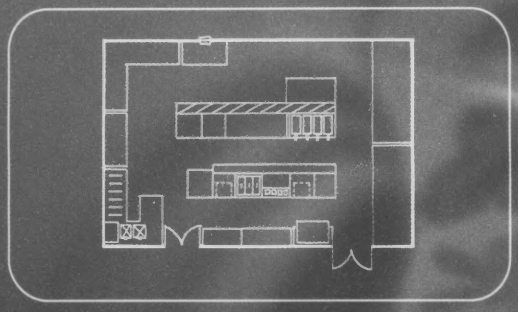
DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC. NOVEMBER 1997





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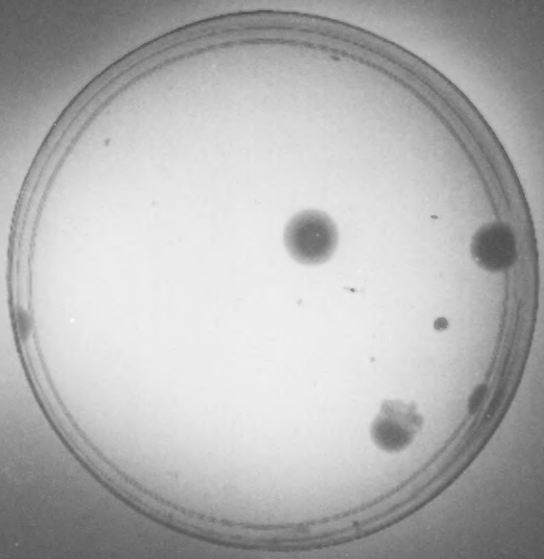

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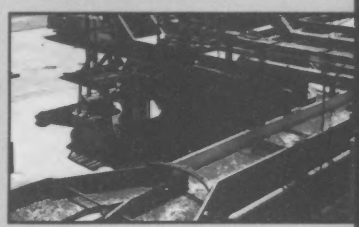

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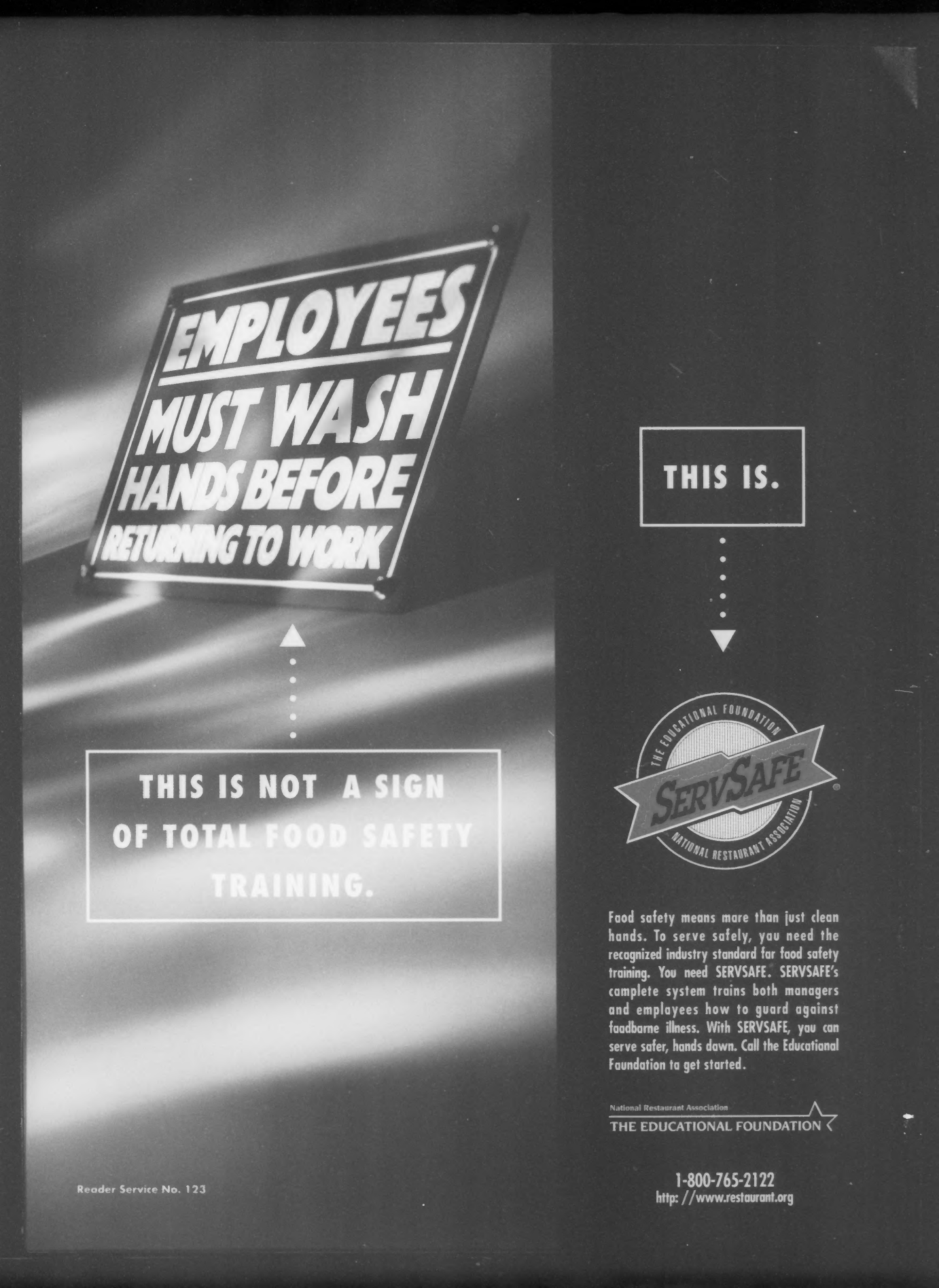
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COMMENTS

FROM YOUR PRESIDENT

By GALE PRINCE
IAMFES President

"Change is a constant"

Every day we encounter variations of change. Maybe today on the way to work you noticed a new building going up, or someone you know bought a new car. Maybe you're trying out a new computer or new software on your existing computer. Whatever the case may be, you are continually experiencing change.

Some of us struggle against change, viewing it as a detriment to our stability. IAMFES has chosen to embrace change. We have chosen to extract the very best of the benefits it can bring to enhance the services we provide our Members. Unless you're one of those people blessed with extrasensory perception (ESP), you and I cannot predict the future of this organization with any real degree of certainty. IAMFES is strong as an organization when measuring Member loyalty, and it will be our Members who will truly determine what is to come.

Though I am not blessed with the elusive ESP, I am going to make a few predictions for the direction of IAMFES. IAMFES will continue to grow. We have ventured into 51 countries across the globe; how about 60 by the year 2000? We achieved an attendance level exceeding 1,000 at this year's Annual Meeting in Orlando; how about pushing that mark to exceed 1,300 within the next ten years? The world is becoming more and more aware of the need for food safety. This increased awareness brings focus to the work of Members in playing a leading role in meeting the food safety challenges of not only today and tomorrow but for years to come.

To meet these predictions, each of us as Members must make a change in the manner in which we contribute to our Association. Word-of-mouth is the strongest marketing element an organization possesses, and it can also be the most damaging element. As Members, we must remember to mention IAMFES to colleagues who have an interest in food safety. The IAMFES office is always happy to send Membership information to food safety professionals curious to learn more about us. In many cases, we, as Members, are the only access potential Members have to insight into the operations of IAMFES. Though the *Journal of Food Protection* is widely recognized throughout the scientific community and considered the leading food safety journal in the world, many people are not aware it is a publication of IAMFES. As Members, we must let everyone else who might benefit from Membership in IAMFES know what it is and encourage them to become a Member.

One Membership benefit many of us enjoy is the opportunity to exchange information with others in our field at the Annual Meeting or an Affiliate meeting. This year's Meeting in Orlando brought about discussion on the need to change the name of IAMFES to more closely reflect the Membership. In talks with many Committees and Members in Orlando, the IAMFES Executive Board and staff heard comments on this issue. The majority of the opinions expressed were favorable towards a name change. Many of those offering input were Members of IAMFES long enough to remember previous name changes. The majority felt the time has come to again consider changing our name. I welcome comments from all Members on this issue. The Membership of IAMFES has a lot to gain by implementing a more truly international perspective through its name. *Journal of Food Protection* is recognizable across the globe; should we not capitalize on the impact it has had on international food safety? Any name change would have to be one that would take place over time; we would never want to do something of this magnitude without the input from all Members.

The IAMFES site on the World Wide Web, located at www.iamfes.org provides access to general information about the Association and an opportunity to contact the office for more details, such as samples of the journals. This represents another change IAMFES can look forward to.

Don't be left behind. Change with your Association–make it bigger, make it better, make it the leader for years to come. With the help of the leading food safety professionals in the world (the core of IAMFES), how could we help but be the best of the world's associations of food safety experts meeting consumer expectations!

THANK YOU!

IAMFES THANKS THE FOLLOWING INDIVIDUALS FOR THEIR SUPPORT OF THE IAMFES FOUNDATION

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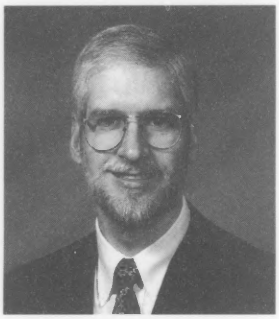
COMMENTARY

FROM THE EXECUTIVE DIRECTOR



By DAVID W. THARP
IAMFES Executive Director

"We are asking for your help to assist us in building the IAMFES Web site"

Have you visited the IAMFES Web site? It's now up and running. We designed the site to be a "commercial" for IAMFES. As an IAMFES Member, you probably will recognize the material presented. We cover Membership benefits such as the Lending Library, our Journals, *Dairy, Food and Environmental Sanitation* and *Journal of Food Protection*, and the IAMFES Annual Meeting. We also describe our Procedures Manuals and the 3-A Sanitary Standards. Our purpose, to begin with, is to establish a presence on the Internet and enable users to learn about IAMFES. We realize that growth possibilities are endless and this is where you can help.

Please take time to view the information presented on the Web site, then take time to give us your input. What can we add to increase the value of your Membership? There have been many ideas suggested by the Executive Board, IAMFES Members, and our staff but now it is your turn. I'm truly interested in what you would like to see! You have the opportunity to shape future development of this project; all you have to do is get your message to me (try E-mail: dtharp@iamfes.org).

Here are some ideas to stimulate your thoughts. Should we post the Table of Contents of upcoming Journals? Would it benefit you if we had abstracts of the articles of past and present issues of our Journals? Down the road would you like to see full versions of Journal articles? Would you use a "Listserv" where Members could ask questions and other Members could provide their expertise? Do you want the ability to purchase booklets and register for the Annual Meeting through the Internet? These are just a few possibilities of future directions for the Web site.

Are you involved with an Affiliate of IAMFES? Does your Affiliate have a Web site? We would like to provide a link to your Web page and would also like to have a link from your site to ours. Does your employer have a Web page that provides information that would be beneficial to other IAMFES Members? We want to become aware of such sites to be able to add more links and provide information our Members need and want. Again, we are asking for your help to assist us in building the IAMFES Web site into a usable, beneficial site for IAMFES Members.

We know the possibilities are endless. We also know that we have to spend our Members' funds cautiously! If money were of no concern, we would have had a Web page two years ago and today it would have full issues of both Journals available for our Members. That is not the path we chose to take. We have proceeded cautiously. Now we would like to build on the foundation; to convert the IAMFES Web site from a commercial to a superior Member benefit! I look forward to your input.

HAVE YOU JOINED THE IAMFES FOOD PROTECTION REGISTER?

We invite you to become a part of the IAMFES Food Protection Register. Registry Members may be called upon to answer questions received through the IAMFES office and other sources. If you are willing to serve the Association in this manner, please fill out the information below and return to:

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Dairy, Food and Environmental Sanitation, Vol. 17, No. 11, Pages 714-717

Pathogenic Microorganisms of Concern to the Dairy Industry

Kathryn J. Boor

SUMMARY

Although milk and milk products are currently considered to be some of the safest foods consumed by Americans, disease-causing bacteria that can be transmitted by dairy products are of significant concern to the dairy industry. Even a single human disease outbreak linked to milk or milk products can have a significant negative impact. This article reviews the microorganisms that can be associated with milk and milk products. Changes in dairy processing conditions (e.g., production of extended shelf-life products) and the potential for transmission of emerging pathogens (e.g., *Mycobacterium paratuberculosis*) are also discussed. Selected case histories of human disease outbreaks linked to dairy foods are presented to highlight situations that can lead to contamination of these products with pathogenic microorganisms. Guidelines to help prevent contamination are also described.

INTRODUCTION

Despite the fact that fluid milk and milk-based products are more closely regulated at the state and federal levels than many other food products, occasional outbreaks of foodborne illness resulting from the consumption of contaminated dairy products do occur. The worst salmonellosis outbreak in U.S. history – over 23,000 culture-confirmed cases from March to April of 1985 – resulted from consumption of *Salmonella*-contaminated whole and 2% milk that had been produced by a suburban Chicago processor *(9)*. A few months later, in June of 1985, an outbreak of listeriosis resulting in 145 cases and 46 deaths was linked to the consumption of Mexican-style white cheese produced in California *(2)*. The economic, medical, and emotional consequences of large-scale food-related illnesses can be devastating. For example, in both cases mentioned above, the factories involved ceased operations following the outbreaks, and both are reportedly still closed.

From a health perspective, foodborne illnesses are sometimes thought to be "nuisance" diseases that cause temporary discomfort but have no long-term ill effects. However, recent evidence suggests that some food-related illnesses may cause lingering health problems, ranging from reactive arthritis as a consequence of salmonellosis to miscarriage resulting from listeriosis *(2)*. One recent estimate suggests that between 6.5 and 33 million food-related illnesses and up to 9,000 deaths may occur in the U.S. annually. Medical expenses and lost work productivity may approach $5 to 6 billion annually *(12)*.

On an emotional level, the 1985 outbreaks caused many consumers to question the safety of U.S. dairy products. Consumer confidence in a product's safety plays an important role in food purchasing decisions. Consumers may avoid product types or specific labels following widely publicized episodes of product contamination and food-related illnesses. Reduced sales can compound the economic distress a company faces following a product recall.

TABLE 1. Pathogens associated with raw milk (adapted from reference 6)

Organism	Disease
Enterobacteriaceae	
Escherichia coli	Gastroenteritis
Salmonella	Gastroenteritis, typhoid fever
Shigella	Dysentery
Yersinia enterocolitica	Gastroenteritis
Vibrionaceae and Campylobacters	
Campylobacter jejuni	Gastroenteritis
Aeromonas hydrophila	Gastroenteritis
Vibrio cholera	Cholera
Other Gram-negatives	
Pseudomonas aeruginosa	Gastroenteritis
Brucella spp.	Brucellosis (Bang's Disease)
Gram-positive sporeformers	
Bacillus cereus	Gastroenteritis
Bacillus anthracis	Anthrax
Clostridium perfringens	Gastroenteritis
Clostridium botulinum	Botulism
Gram-positive cocci	
Staphylococcus aureus	Emetic intoxication
Streptococcus agalactiae	Sore throat
Streptococcus pyogenes	Scarlet fever/sore throat
Streptococcus zooepidemicus	Pharyngitis, nephritic sequelae
Miscellaneous Gram-positives	
Listeria monocytogenes	Listeriosis
Corynebacterium spp.	Diphtheria
Mycobacterium bovis	Tuberculosis
Mycobacterium tuberculosis	Tuberculosis
Mycobacterium paratuberculosis	Johne's disease (ruminants), Crohn's disease (?) (humans)
Rickettsia	
Coxiella burnetii	Q fever
Viral	
Enterovirus, including polioviruses, rotaviruses, Coxsackie virus	Enteric infection
FMD virus	Foot-and-mouth disease
Hepatitis viruses	Infectious hepatitis
Fungi	
Molds	Mycotoxicoses
Protozoa	
Entamoeba histolytica	Amebiasis
Giardia lamblia	Giardiasis
Toxoplasma gondii	Toxoplasmosis

The 1985 dairy-related outbreaks also caught the attention of the U.S. Food and Drug Administration, leading to the creation of the Dairy Safety Initiatives Program *(7)*. The goal of this program was to establish whether the outbreaks were isolated incidences or part of a set of universal problems haunting the U.S. dairy industry. Ratings were checked on all Grade A dairy processing plants in the country and finished dairy products were randomly sampled and microbiologically examined. While there is general consensus among FDA officials that dairy products are among the safest foods consumed by Americans *(9)*, there certainly is room for improvement. For example, products produced by over 7% of the plants inspected by this program were found to be contaminated with the bacterial pathogens *Yersinia enterocolitica* and *Listeria monocytogenes (2)*.

HOW DO PATHOGENS GET INTO PROCESSED DAIRY PRODUCTS?

Contaminants can find their way into the processing plant in the incoming raw milk. Factors in farm environments – the cows, the fecal and bedding materials, and moisture – provide nearly ideal conditions for the presence and growth of microorganisms. Among the wide variety of organisms that may be present in raw milk, it is reasonable to expect that some may cause illness if consumed by humans (Table 1). Ingestion of disease-producing (pathogenic) organisms by people who are at greater risk of becoming ill following exposure to foodborne hazards – infants and children, the elderly, and people with impaired immune systems – may result in life-threatening health problems. Since refrigerated storage will not prevent the growth of some pathogenic microbes (e.g., *Yersinia enterocolitica*, *Listeria monocytogenes*, *Aeromonas hydrophila*), not only must the pathogenic organisms initially present in the raw product be destroyed, but, in addition, the processed product must also be

protected from re-contamination by microbes, especially potential pathogens, that may be present in the processing environment.

MILK PASTEURIZATION: AN IMPORTANT SAFETY MEASURE

Currently, the most common method for destroying pathogenic organisms and for reducing or eliminating spoilage organisms in U.S. dairy products is through pasteurization by the High Temperature Short Time (HTST) method. Minimum pasteurization conditions for milk are achieved by heating at 145°F (62.8°C) for 30 minutes or at 161°F (71.7°C) for 15 seconds (HTST). These treatments are designed to destroy the most heat-resistant of the nonspore-forming pathogens, namely *Mycobacterium tuberculosis* and *Coxiella burnetii*. Some microbes can survive pasteurization *(4)*. Sporeforming bacteria, including those of the *Bacillus* and *Clostridium* genera (e.g., *Bacillus cereus*, *Clostridium botulinum*, *Clostridium perfringens*), are among the most heat resistant organisms. There are also indications that *Mycobacterium paratuberculosis*, a bacterium that causes Johne's disease in cattle and that may be linked to Crohn's disease in humans, can survive pasteurization *(11)*. In addition, minimal pasteurization conditions do not inactivate the causative agent of bovine spongiform encephalitis (BSE), also known as mad cow disease. The agent responsible for this disease, an infectious protein, shows little loss of infectivity, even after prolonged exposure to temperatures up to 176°F (80°C) *(1)*. Nevertheless, there is no evidence that milk from cows with BSE can transmit this disease. Mice injected with milk from BSE-infected cattle did not show signs of disease transmission, nor have epidemiological analyses so far produced evidence for transmission of BSE to calves via milk *(5)*.

Although some pathogens can survive pasteurization, the presence of most common pathogenic microbes, such as *Salmonella* or *L. monocytogenes*, in processed dairy products implies either failure of the pasteurization process or post-pasteurization contamination. The latter refers to the re-entry of microorganisms into the pasteurized product as a consequence of product contact with contaminated processing equipment or workers. In general, post-pasteurization contamination contributes most of the microorganisms that contaminate and spoil pasteurized milk *(3)*.

POST-PASTEURIZATION CONTAMINATION

Pathogenic microorganisms can be introduced into a dairy processing environment along with the raw milk. Once in the processing plant, however, the presence of abundant nutrients and moisture can allow for survival and multiplication of undesirable organisms. For example, *Listeria innocua*, *Listeria monocytogenes*, and *Yersinia enterocolitica* are commonly found in dairy processing plant locations that involve "wet traffic," including the floors of coolers, freezers, and processing rooms; cases and case washers; floor mats and foot baths; and beds of paper fillers *(2)*. Many microbes, including *L. monocytogenes*, can attach firmly to such surfaces and microbes attached to surfaces can be more resistant to destruction by heat *(10)* and disinfectants *(8)* than unattached bacteria. Cleaning compounds, in general, are more effective than sanitizing compounds at reducing the number of viable microbes attached to various surfaces *(8)*. The effective combination of cleaning and sanitizing procedures is therefore essential for the reduction of microbial contamination in dairy processing environments.

CASE HISTORIES: EXAMPLES OF DAIRY INDUSTRY FOOD-BORNE ILLNESS OUTBREAKS

The following case histories, summarized from reference 6, provide concrete examples of processing or handling errors that led to distribution of dangerously contaminated dairy products.

Case history: *Salmonella*

- Year: 1976
- Cheese: 7 lots of pasteurized Cheddar
- Location: Kansas
- Organism: *S. heidelberg* (0.36-1.8/100g)
- Extent: 339 cases
- Comments: No environmental or employee contamination found.
  - pH of contaminated cheese: 5.6; of uncontaminated cheese: 5.4.
  - Raw milk held unrefrigerated 1 to 3 days prior to processing. No bacterial counts done.
  - Attributed to poor manufacturing practices, inadequate controls.

Case history: *Salmonella*

- Year: 1984
- Cheese: pasteurized or heat-treated Cheddar
- Location: Prince Edward Island, Canada
- Organism: *S. typhimurium* (0.39-9.3/100g) 8 months after manufacturing
- Extent: Over 2,700 people infected
- Comments: One employee tested positive; trim bucket positive (manual curd transfer); two cows shedding *Salmonella.*
  - pH of contaminated cheese: 5.1 to 5.4
  - Manual override of pasteurizer controls probably allowed unpasteurized milk to mingle with pasteurized milk.

Case history: *Campylobacter jejuni*

- Year: 1979
- Food: "Pasteurized" milk
- Location: Great Britain
- Extent: More than 3,000 people infected
- Comments: Likely the result of inadequate milk pasteurization.

Case history: *Campylobacter jejuni*

- Year: 1984
- Food: Certified raw milk
- Location: California
- Extent: 9 children, 3 adults
- Comments: Raw milk consumed during kindergarten visit to dairy.

Case history: *Yersinia enterocolitica*

- Year: 1976
- Food: Pasteurized chocolate milk
- Location: New York State
- Extent: 222 ill school children
- Comments: Inadequate pasteurization or post-pasteurization contamination.

Case history: *Yersinia enterocolitica*

- Year: 1981
- Food: Reconstituted dry milk
- Location: New York State
- Extent: 239 illnesses
- Comments: Infected food handler operated malfunctioning milk dispenser.

Case history: *Yersinia enterocolitica*

- Year: 1982
- Food: Milk
- Location: Arkansas
- Extent: Several thousand people ill
- Comments: Outdated milk sent to hog farm. Organism isolated from crates that had been stored on farm, then returned to dairy.

Case history: *Escherichia coli*

- Year: 1971
- Food: Camembert
- Location: Cheese produced in France, consumed in U.S.
- Extent: 387 people ill (94% attack rate)
- Comments: Post-pasteurization contamination likely.

Case history: *Listeria monocytogenes*

- Year: 1983
- Food: Pasteurized milk
- Location: Massachusetts
- Extent: 49 ill (7 infants/fetuses, 42 immunosuppressed adults) 14 deaths
- Comments: Organism isolated from raw milk; evidence of outbreak in cows. Milk was properly pasteurized. Post-pasteurization contamination likely.

Case history: *Listeria monocytogenes*

- Year: 1985
- Cheese: Mexican-style white
- Location: Los Angeles County, CA
- Organism: *Listeria monocytogenes* serotype 4b
- Extent: 145 cases; 46 deaths
- Comments: Environment and equipment grossly contaminated, even after cleanup.
- Raw milk deliveries allegedly exceeded pasteurization capacity of the plant.

Prevention of foodborne illness

The following are practical approaches for preventing the contamination of milk and dairy products with human pathogens.

- Monitor raw product quality; use high-quality raw materials.
- Know your product! Build in safety through controlled processes by keeping records of time-temperature histories and closely monitoring product pH and formulations.
- When remodeling, give top priority to "ease of cleaning and sanitizing" in choosing equipment and in subsequent plant design.
- Identify and eliminate potential sources of post-processing contamination.
- Use effective cleaning and sanitizing chemicals and procedures.
- Use proper packaging and labeling materials; code your product to allow rapid identification of contaminated lots.
- Most important, communicate to employees the importance of producing safe, wholesome food.

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Cleaning Stainless Steel Surfaces Prior to Sanitary Service

Arthur H. Tuthill,[1] Richard E. Avery,[2] and Roger A. Covert[3]

SUMMARY

This article describes practical procedures for cleaning stainless steel surfaces for use in the dairy, other food and beverage, pharmaceutical, and similar industries. Types of surface contamination that might occur, along with their prevention and removal are included. Also mentioned are various steps to be taken to obtain clean surfaces initially.

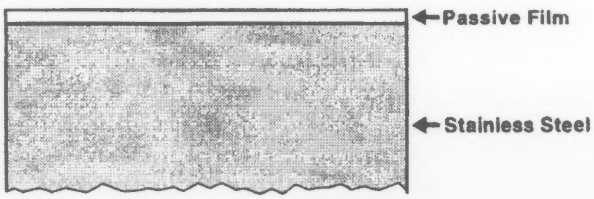
INTRODUCTION

Because industries such as the dairy, other food and beverage, pharmaceutical, and biotechnology are always concerned with product purity, austenitic chromium/nickel stainless steels are often the materials of choice for process equipment, especially for surfaces in contact with products. However, to take full advantage of the excellent properties of stainless steel, the surface must be free of foreign and contaminating deposits and defects *(11, 12)*. These can be eliminated by recognizing their sources and by following good removal and cleaning procedures.

SURFACE CLEANLINESS

The producers of stainless steel mill products, i.e., plate, sheet, strip, bars, and castings, make a concerted effort to deliver their products in a clean surface condition with the surface finish ordered. However, during shipment or as the material is fabricated into process equipment and during service use, surfaces may become fouled with many types of damage and foreign matter *(11, 12)*. For stainless steel to perform well, all of this contamination must be removed. Table1 summarizes the defects discussed in this paper and means for their removal.

Figure 1. Cross-section of stainless steel surface.



THE NATURE OF THE SURFACE OF STAINLESS STEEL

Before going into cleaning details, we need to consider the surface of stainless steel. When stainless steel is removed from the acid pickling bath and rinsed in water at the steel mill, a thin, adherent oxide film is formed instantaneously (Fig. 1). This film, typically 8 to 10 Angstroms (3 to 4×10^{-8} inches) thick is a transparent chromium oxide also containing iron and nickel. It is the surface that we see and that the environment contacts. When properly formed and clean, it is quite inert under most conditions. In this state, the stainless steel is often said to be passive *(5, 6, 7)*. Subsequent "passivation" treatments *(8)* are mainly cleaning procedures that do not induce passivity but may repair defects in the film and remove substances that could lead to damage of the protective film.

TABLE 1. Surface defects and their removal

Defect	Removal techniques
Dust and dirt	Wash with water and/ar detergent. If necessary, scaur with high pressure water ar steam.
Laase iran particles and embedded iran	Immerse surface in 20% nitric acid solutian. Rinse with clean water. Canfirm remaval with ferraxyl test. If iran is still present, immerse in 10% nitric-2% hydrafluaric acid salutian. Rinse with clean water. Canfirm remaval with ferraxyl test. Remave all traces af ferraxyl test with clean water ar dilute nitric ar acetic acid.
Scratches heat tint and ather axidatian	Smaath surface by fine grit grinding. Pickle surface with 10% nitric-2% hydrofluaric acid salutian until all traces are gane. Rinse with clean water ar remave with pickling paste. Wash with clean water ar electrapalish. Rinse with clean water.
Rust areas	Immerse surface in 20% nitric acid salutian. Rinse with clean water. Canfirm remaval af rust and any under lying iran with ferraxyl test. Rinse with clean water ar dilute nitric ar acetic acid.
Raugh grinding ar raugh machining	Remave by fine grit grinding.
Welding arc strike marks	Remave by fine grit grinding ar weld aver if in line af weld.
Weld spatter	Prevent fram adhering with anti-spatter campaund ar remave by fine grit grinding.
Welding flux	Remave by fine grit grinding.
Weld defects	If unacceptable, remave by grinding and re-welding.
Oil and grease	Remave with salvent ar alkaline cleaners.
Residual adhesives	Remave with salvent cleaner ar remave with fine grit grinding.
Paint, chalk, and crayan	Scrub with clean water and/or an alkaline cleaner.
Sulfide inclusians	Pickle surface with 10% nitric-2% hydrofluaric acid salutian ar use a law sulfur stainless steel. Da na use S30300 (Type 303).
Pracess praducts	Scrub with clean water ar steam ar dissalve in suitable salvent.
"Rauge" depasits	Dissalve with maderate strength nitric, phaspharic, citric ar acetic acid. Rinse with clean water.

This film, though thin, is extremely durable and continuously maintained in air or other oxidizing environments such as aerated water or nitric acid. When damaged in these types of media, the film immediately reforms. There is little difference in the composition and properties of the film on different grades of stainless steel, although certain alloying additions such as molybdenum can further stabilize the oxide and improve corrosion resistance.

SURFACE DAMAGE AND FOREIGN MATTER INTRODUCED DURING FABRICATION

Surface damage, defects, and interfering substances such as dust and dirt, loose iron particles, embedded iron, heat tint and other oxidation, rust spots, grinding burrs, welding strike marks, weld spatter, welding flux, weld defects, oil and grease, residual adhesives, and paint, chalk and crayon marks may arise during fabrication of equipment *(1)*. Some of these are depicted pictorially in Fig. 2. Most are unintentional or done through ignorance of their deleterious effects; nonetheless, they are potentially harmful to the protective oxide film. Once the film is damaged, weakened or otherwise altered, the substrate stainless steel may start to corrode. Corrosion will usually not occur over the entire surface, but at or adjacent to the defect. Such localized attack is usually pitting or crevice corrosion, both of which can be very deep and/or extensive where they occur, while the bulk of the surface remains unaffected (Fig. 3 and 4). A discussion of each of these problem-causing occurrences is given.

Dust and dirt. Fabricating is often done in dusty, dirty places where small airborne particles are common. These frequently settle on equipment surfaces. They can usually be removed by a water or alkaline chemical wash. However, tenacious deposits of dirt and grime may require high pressure water or steam cleaning.

Figure 2. Types of surface defects arising during fabrication.

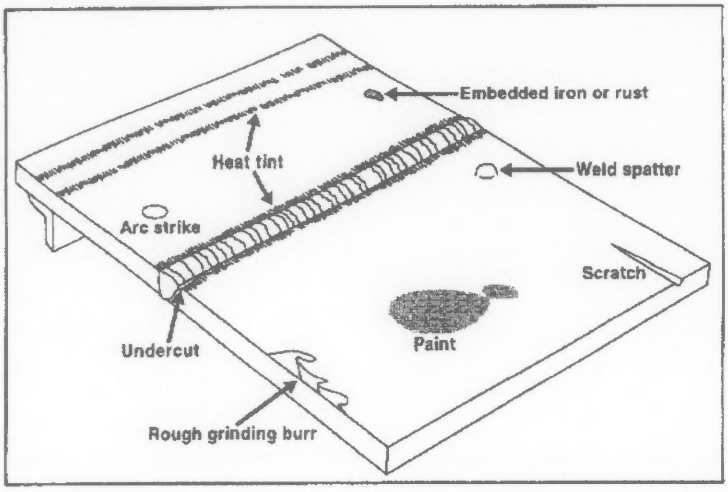


Figure 3. Pitting corrosion.

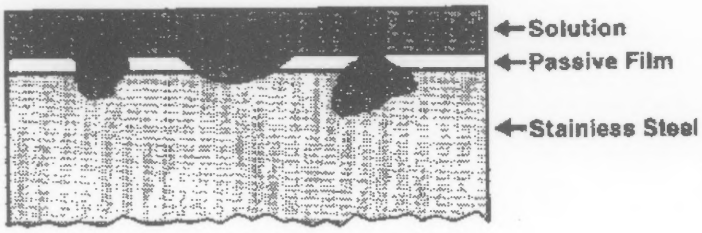
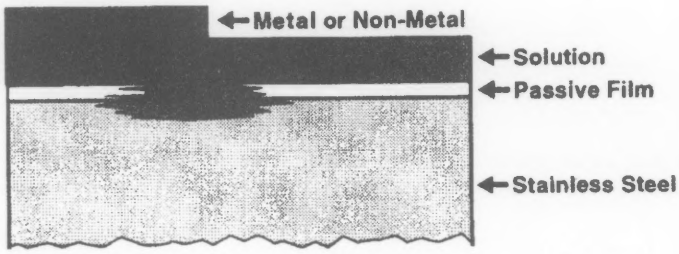


Figure 4. Crevice corrosion.

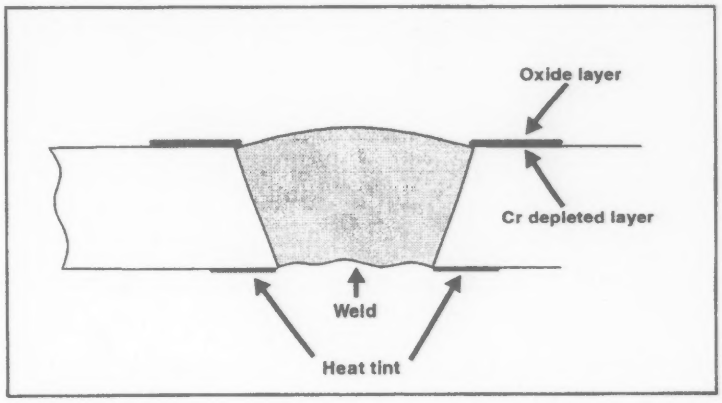


Loose iron particles and embedded iron. On any surface, free iron can rust and act to initiate corrosion of stainless steel. Therefore, it must be eliminated. Loose iron particles are usually removed with dust and dirt. However, some particles are more tightly adherent and must be considered as a form of embedded iron. Aside from dust, surface iron can arise from numerous sources. Among these are wire brushing with a plain carbon steel brush, blasting with sand, glass beads or other grit that has previously been used on plain carbon or low alloy steels or cast iron, or grinding these latter materials in the proximity of stainless steel parts and equipment. Iron is also easily embedded or smeared on surfaces during layout and handling unless stainless steel is protected from contact with steel wires, straps, slings, clamps, and table tops.

Procurement specifications and post-fabrication inspection can prevent and detect the presence of free iron. ASTM Standard Practice A 380 *(3)* describes the ferroxyl test for finding iron or steel particles on stainless steel surfaces. It should be used when maximum insurance against the presence of iron is required. If a positive test result is observed, surfaces should be thoroughly scrubbed with clean, pure water or nitric acid until the intense blue color is no longer apparent. As noted in A 380 *(3)*, the test is not recommended for process surfaces of equipment that will be used for products for human consumption unless all traces of the ferroxyl test solution can be completely removed. A simpler test consists of exposure to water for 12 to 24 hours to see if rust spots appear. This test is less sensitive and, of course, more time consuming. It should be remembered that these are detection tests and not cleaning methods. Cleaning by the chemical and electrochemical techniques described later is necessary when iron is found.

Scratches. Scratches and other rough spots should be mechanically removed to prevent entrapment of process reactants or products and/or contaminants. For details, see

Figure 5. Cross-section of stainless steel weld.



the section on mechanical cleaning methods.

Heat tint and other oxidation. If stainless steel surfaces are heated to moderately high temperatures in air during welding or grinding, a chromium oxide heat tint develops on each side and on the under surface of welds and ground areas (Fig. 5). Heat tints are thicker than the protective oxide film and very visible. Their color depends on their thickness and varies from iridescent reds, blues, and violets to straw colors and browns. Thicker oxides are usually black. These result from higher temperatures or from moderate temperatures for prolonged times. When any of this oxidation occurs, the chromium content of the metal surface is reduced, resulting in areas of lower corrosion resistance. Thus, not only the heat tint and other oxidation should be removed, but also that portion of the underlying metal surface with reduced chromium.

Rust areas. Areas of rust are sometimes seen on stainless steel products and equipment before and during fabrication. This is usually an indication of a badly contaminated surface. Rust must be removed before putting the equipment into service. The ferroxyl and or water tests should be used to confirm that surfaces have been thoroughly cleaned.

Rough grinding and rough machining. Both operations leave a rough surface that can include ruts, overlaps and burrs. Each can also deform the metal to a depth such that the damaged metal may not be removed by pickling, electropolishing or blasting. The roughened surface can act as a site for corrosion initiation and entrapment of products. Grinding with coarse abrasives should be limited to such operations as the removal of weld defects prior to rewelding or removal of excessive weld reinforcements. In the latter case, subsequent fine grinding is suggested.

Welding arc strike marks. When a welder strikes an arc on a metal surface, a rough defect is made. The protective film has been damaged and a potential corrosion site exists. The welder should strike the arc on the previous weld bead or on the side of the joint ahead of the weld and then weld over the strike mark.

Weld spatter. The tendency for weld spatter varies with the welding process. For example, gas tungsten arc welding (GTAW) or tungsten inert gas (TIG) processes are quite free of spatter. However, incorrect welding parameters with gas metal arc welding (GMAW) and flux cored arc welding (FCAW) can cause excessive spatter. When this occurs, adjustments are necessary. If there is concern over weld spatter, adherence of spatter can be eliminated by painting each side of the joint with an anti-spatter compound prior to welding. This paint, with any weld spatter, is easily removed after welding with little or no damage to the surface.

Welding flux. Welding processes that employ a flux such as shielded metal arc, flux cored arc, and submerged arc may leave small particles of flux that are not removed in normal clean-up. These particles create sites for the initiation of crevice corrosion. Mechanical cleaning techniques are necessary for removal of residual flux.

Weld defects. Weld defects such as undercut, incomplete penetration, porosity, and cracks not only reduce the integrity of the joint but also act as locations for crevice corrosion. During product changeover cleaning operations, they also present problems by entrapping solids. Usually, these defects are repaired by re-welding or by a combination of grinding and rewelding.

Oil and grease. Organic materials such as oil, grease, and even fingerprints produce places where localized corrosion can start. Also, because such substances can act as shields, they interfere with chemical and electrochemical cleaning and must be completely removed. ASTM A380 has a simple waterbreak test to detect organic contamination. In it, water that is poured at the top of a vertical surface tends to "break" around areas of organic substances as it flows downward. Solvent and/or alkaline chemical washes will eliminate oils and greases.

Residual adhesives. Residual adhesives from tape and protective paper often remain on surfaces when they are stripped. If the adhesive particles are still soft, organic solvents will usually remove them. However, when exposed to light and/or air, adhesive particles harden and form sites for crevice corrosion. Fine-grit mechanical cleaning is then needed.

Paint, chalk, and crayon marks. The effects of these contaminants are similar to the effects of oil and grease. Scrubbing with a clean brush and either clean water or an alkaline chemical

cleaner is suggested. High pressure water or steam can also be used.

SURFACE DEFECTS CAUSED BY THE METAL STRUCTURE

The surface imperfections discussed above have been caused by events that are due to outside sources, not to the stainless steel. Other defects can be attributed to the metal structure. Because of the ways metals are melted, poured, and cast before forging and/or rolling to shape, most alloys, including the stainless steels, contain solid, non-metallic inclusions. Other substances can also be forced into surfaces during forming operations. When exposed on the surface, some of these particles, especially sulfides, provide places where pitting corrosion can start. Normally these inclusions are removed during acid pickling, but in some cases when sulfur has been added for machinability, a sufficient number of particles remain to cause problems.

To minimize the occurrence of mill-related surface defects on finished equipment, the equipment manufacturer should visually inspect the as-received material and finished product surfaces for defects. The equipment purchaser should make a similar inspection. Minor or occasional defects can usually be removed by grinding with a fine grit abrasive. Sulfur-related defects are most often encountered with S30300 (Type 303), a free-machining grade of stainless steel commonly supplied as bar stock. To eliminate sulfide inclusions and stringers, a good choice is to use S30400/S30403 (Type 304/304L) or S31600/S31603 (Type 316/316L).

SURFACE DEFECTS AND "ROUGING" FROM PROCESS CONDITIONS OR OTHER SOURCES

Dried process product deposits are examples of in-process surface contamination. In the food, beverage, and pharmaceutical industries, process equipment commonly has multiple uses. This necessitates frequent cleaning between production of different products. Sometimes cleaning is incomplete and deposits of former products are left behind. These can act as locations for pitting and crevice corrosion. Thorough removal by scrubbing and/or dissolution is necessary on all surfaces.

Under certain incompletely understood conditions, but usually in high-purity, high-temperature water and steam environments, deposits known as "rouge" appear *(9, 10)*. Much of the time, where they come from and why they form where they do is not clear. Some are loose and powdery, others tightly adherent to the surface. Even the name is a misnomer, for their colors vary widely; usually red or reddish-brown to orange, they have also been reported as gray, black, purple, blue, and even yellowish-green. Double layer "rouges" have also been found, with the layer next to the metal surface being black and the outer one reddish-orange. White particles are sometimes present. About the only agreement is that the "rouge" is primarily ferric oxide or a hydrated form of this substance. At least this is reasonably consistent with some of the observed colors, since iron oxides are usually rust colored (Fe_2O_3) or black (Fe_3O_4).

The source of the material for the "rouge" deposits is usually unknown *(9,10)*. The "rouge" is not apparent on startup but can appear at any time from a few days to years after equipment is put in use. Sometimes it appears on all surfaces and at other times only in specific places. Corrosion at the site of the deposit apparently is not responsible. If in situ corrosion of embedded or particulate iron is the cause, then deposits should appear initially, not weeks or even years later. Some observers think that "rouge" originates from corrosion of steel or low chromium stainless steel in equipment such as steam generators and piping prior to the location of the deposit. Others think it comes from grinding and weld debris, heat tint, and other improperly cleaned areas. Impure make-up and in-take water have also been suggested. Whatever the source, it appears that iron-containing material dissolves and is then transported as ions or colloids to an appropriate location where conditions are conducive to precipitation.

Regardless of the reasons for the various forms of "rouge," they are contaminants that can not be tolerated in clean, sanitary systems *(9, 10)*. Particles can break away from surfaces and introduce impurities into products. These same particles can clog filters and strainers. Localized pitting corrosion can initiate under "rouge". When found, it must be removed. Thin "rouge"deposits can sometimes be detected by wiping a clean white cloth or glove over the surface. A dark smudge will appear on the cloth. Acid cleaning techniques are usually required to remove "rouge". Moderate strength solutions of nitric, phosphoric, citric and oxalic acids have been used satisfactorily. Inhibited hydrochloric acid with and without ferric chloride has been tried, but there is always a risk of stainless steel corrosion in these media. Since "rouge" formation can be a recurring phenomenon, repeated acid cleaning is required each time deposits are found.

REMOVAL OF SURFACE CONTAMINATION: MECHANICAL CLEANING

Mechanical cleaning techniques such as abrasive particle blasting, wire brushing and grinding are commonly used in fabricating shops. However, care must be used when employing these methods. When blasting, a clean abrasive, free of carbon or low-alloy steel or cast iron particles must be used. Clean glass beads are effective as are pieces of walnut shells. These latter types of media have the added advantages of not excessively roughening or deforming the surface as sand or other harder-grit particles may.

Wire brushing should be done only with brushes made with

stainless steel bristles. These brushes should not have been used previously on carbon or low-alloy steels, cast iron, or any materials other than a stainless steel alloy.

Clean abrasive disk and clean flapper wheel grinding are common methods used to remove heat tint and minor surface contamination and imperfections. Care must be taken, for, as in many grinding operations, these treatments can alter surfaces and affect corrosion resistance.

Grinding with hard grinding wheels deforms and changes surfaces to a greater degree than the techniques already discussed. Heavy grinding should be limited to grinding surfaces for welding and removing weld defects prior to re-welding. The high amount of deformation resulting from grinding can alter microstructure at the metal surface. Although this does not always affect corrosion performance, high stresses and possible surface cracking may lead to serious problems. Where practical, grinding should be limited to abrasive discs and flapper wheels instead of grinding wheels. Heavily worked surfaces should be removed by the chemical and electrochemical methods described in the next section.

REMOVAL OF SURFACE CONTAMINATION: CHEMICAL AND ELECTROCHEMICAL CLEANING

Embedded iron, heat tint, the chromium-depleted layer under heat tint and oxides, the smeared/altered layer left by mechanical cleaning operations, and sulfide inclusions can be removed by acid pickling, electrochemical dissolution or polishing. These processes remove, in a controlled manner, the affected areas, the thin oxide film, and a thin layer of metal under it. A thoroughly clean, defect-free surface results. The protective film reforms after exposure to air, aerated water or nitric acid.

ASTM Standard Practice A380 *(3)* gives a number of solutions for chemical cleaning and pickling. The most common ones are those containing nitric acid. The plain acid, at around 20% concentration, is very good for removing smeared and particulate iron. However, for removing heat tint and oxidation, a solution of about 10% nitric acid and 2% hydrofluoric (HF) acid is suggested. The HF addition is essential; without it, the stainless steel will not corrode and any chromium-depleted areas will not be removed. Pickling is usually done by immersion or by flushing piping systems with the appropriate acid solution. When equipment will not fit into tanks or is not amenable to flushing, commercial products known as pickle pastes can be used. These are applied to surfaces with a paint roller or brush. The coating is then removed by water after its active agents have reacted sufficiently. Since pickling solutions and pastes roughen surfaces if exposures are too long, the processes should be carefully controlled. Obviously, these techniques change surface appearance, but usually not in an unacceptable way.

In electrochemical cleaning or electropolishing, the stainless steel surface is removed through the application of a direct electrical current in a suitable electrolyte. Depth of metal removal can be controlled very closely. Unlike pickling, which roughens the surface, electrochemical processes tend to smooth or "polish" surface irregularities and dissolve many forms of defects. Sometimes, to achieve the required surface smoothness, a combination of mechanical polishing followed by electropolishing is needed. In the grinding step, metal particles can be embedded or entrapped in the surface. Controlled electropolishing will remove them and prevent future problems. There are many claims that the superior surface smoothness produced by electropolishing enhances corrosion resistance, but experience usually shows that cleanliness is a more important factor than surface roughness. The fact that electropolished surfaces are often easier to clean may account for the beneficial effects of electropolishing on corrosion resistance. Electrochemical cleaning and polishing are usually done by immersion, which is not always possible with large, complicated equipment. If that is the case, hand-held devices such as that shown in Fig. 6 are available for use on local areas.

PASSIVATION

Passivation treatments for stainless steel have been mentioned before. ASTM A380 *(3)* describes a number of passivating solutions and methods. These are generally accepted as no more than moderate cleaning techniques. Whether they greatly improve corrosion resistance is open to question. They may help repair, but they do not significantly change, the protective oxide film, nor do they remove any substantial amount of surface defects, depleted zones or other metal. They will often remove metallic and other soluble material adhering to machined or dirty stainless steel surfaces.

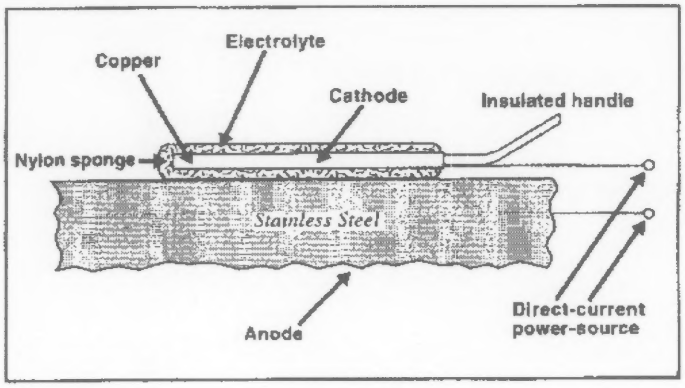
PROCUREMENT OF CLEAN STAINLESS STEEL EQUIPMENT

As mentioned before, many surface defects are introduced during fabrication and handling of materials and equipment. Through insistence on proper procedures and inspection in procurement documents, many problems associated with manufacturing errors and carelessness can be avoided. Where possible, "off-the-shelf" products should be subjected to the same stringent requirements as custom fabricated equipment.

Purchasing specification suggestions are as follows:

1. All surfaces to be in contact with process products must be free of oil, grease, fingerprints, crayon, ink marks, paint, tape and other substances containing organic matter. The water break test from ASTM A380 *(3)* should be required.
2. All surfaces must be free of iron contamination. The ferroxyl and/or water tests

Figure 6. Hand-held electropolishing tool.



from A380 *(3)* should be required.

3. All welds must be free of heat tint, other oxidation, weld spatter, welding strike marks, welding flux, and smeared layers from brushing and grinding. If visual inspection reveals these defects, appropriate mechanical, chemical and/or electrochemical treatments should be required.
4. All weld defects such as incomplete joint penetration, incomplete fusion, and cracks should be repaired by grinding and re-welding. Undercut and porosity, in excess of agreed-upon limits, should be repaired by grinding or by grinding and re-welding.
5. Closure of all openings after cleanliness has been achieved should be required. Require closures to remain in-place after final assembly and during shipment.
6. Equipment should be inspected at the supplier's site, prior to shipment, for compliance with 1, 2, 3, 4, and 5.

SPECIAL CONSIDERATIONS FOR PLATE, PIPE AND TUBING, BAR, AND CAST PRODUCTS

These products present special problems when surface quality is important. Comments on each are as follows:

1. **Plate.** Plate is considered to be material over 5 mm (3/16 in) in thickness. Although plate usually is supplied in the hot rolled and pickled condition, ASTM Specification A480/A480M *(4)* describes five finishes for plate products. The ground and polished No. 4 finish, which is produced by grinding with size 150 grit, is suitable for sanitary service. The others are normally too rough. They may also contain slivers and other defects which can be corrosion-initiation sites. Sometimes stainless steel mills can provide acceptable surfaces on plate without polishing, but special arrangements must be made.
2. **Tubing and Pipe.** Welded tubular products with a wall thickness of 5 mm (3/16 in) or less are made from sheet or strip. The original surface quality of this product form is usually quite bright and smooth. ASTM Specification A270 *(1)* is widely used where ease of cleanability is a requirement. Tubing made to A270 *(1)* is available with ground, polished or electropolished surfaces. Tubular products made to other ASTM specifications such as A312/A312M *(2)* most often have a pickled surface.

   Heavier walled tubular products are made from plate and have the same surface finishes as above. Again, the No. 4 finish should be specified when needed for sanitary service.

   When tubular products and other components are joined by welding, it is essential that the inside surface be free of heat tint before equipment is put in service. Carefully controlled pickling can be used to remove this oxide. Some manufacturers produce tubing with interior surfaces electropolished after welding. Automatic orbital welding is an excellent technique that produces a smooth weld essentially free of heat tint.
3. **Bar.** For improved machinability, many stainless steel bar products are made from special high-sulfur alloys such as S30300 (Type 303). This leads to an increased number of normally globular sulfide inclusions that are elongated as the bars are formed. Because of their length, the inclusions may not be completely removed by pickling, especially on the ends. Also, machined parts are often not pickled as a standard procedure. This can lead to major problems, because exposed sulfides can act as sites for pitting to begin. The best practice is probably to use only the standard, low-sulfur alloys and accept higher machining costs.
4. **Castings.** Most of the common grades of stainless steels have cast counterparts. The composition of these may be slightly altered to ensure good castability, but their corrosion resistance is comparable. The major concern in using castings is that they usually have rougher and more

porous surfaces than wrought products. Also, there has often been considerable grinding and weld repair. It is important that users of stainless steel castings insist on good quality castings and demand the same cleaning procedures as those used on equipment fabricated from wrought products.

CLEANING OF EQUIPMENT AFTER INSTALLATION AND OPERATION

Equipment often becomes dirty and contaminated during installation and operation. Precipitates, product deposits, dust and dirt, and other matter adhering to surfaces must be removed. Usual in-service cleaning procedures include all or some of the following:

1. Draining and rinsing with clean water.
2. Lancing with high pressure clean water.
3. Injection of low-and/or high-pressure steam.
4. Flushing with solvents or alkalis to remove oils, greases, and other organic substances. If alkalis or alkaline cleaners are used, a clean water rinse must follow.
5. Flushing with acids, followed by rinsing with clean water. If hydrochloric acid is used, extreme care must be taken, because residual chloride ions can promote pitting, crevice corrosion, and/or stress corrosion cracking.

SUMMARY

1. Stainless steel forms a stable, self-protecting oxide film on exposure to air and/or aerated water. It is not necessary to use passivating treatments to obtain maximum corrosion resistance.
2. Common fabricating operations frequently damage and contaminate stainless steel surfaces. When this occurs, the surface must be cleaned by mechanical, chemical, and/or electrochemical techniques. After cleaning by these methods, the oxide film will reform spontaneously.
3. Machining and rough grinding often leave a layer of smeared metal on stainless steel surfaces. This should be removed by chemical or electrochemical processes.
4. Heat tints and thicker oxides from welding must be prevented or removed mechanically, chemically, and/or electrochemically.
5. Weld defects must be repaired by grinding and rewelding.
6. Surfaces after acid pickling are rougher than those after electrocleaning.
7. Acid pickling and electropolishing are usually done by immersion. However, commercial pickle pastes and hand-held electrocleaning tools may be used.
8. To ensure good surfaces, special attention is necessary during the procurement of plate and pipe products.
9. Because of the inherent roughness of castings, special care and procedures are necessary when cleaning them.
10. To ensure satisfactory surface cleanliness, cleaning procedures and specifications must be included in procurement documents. On-site inspection before shipment is recommended.

ACKNOWLEDGMENT

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HARMONIZATION — WHAT, WHY & HOW?

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WHAT?

Dictionary Definitions

Harmony, n.–from French, *harmonie*; Latin, *harmonia*, or Greek, *harmonia*: A fitting together, agreement, from *harmos*, a fitting or joining.

1. A combination of parts into an orderly or proportionate whole; congruity as in the harmony of the universe.
2. Concord or agreement in feeling, action, ideas, interests.
3. In the arts, an agreement in proportion, color, poetry, prose, and music.
4. In science, harmonics is applied to quantum mechanics, wave mechanics, to the order of the universe.
5. In standards writing within the European Community is one that meets the European Union (EU) Machinery Directive or is developed by the European Committee on Standardization (CEN) or the European Committee for Electrotechnical Standardization (CENELEC) and published in the *J. of the European Community*.

Harmonize, v.–to make harmonics; to cause to agree; to show the harmony or agreement of; to reconcile.

Harmonizer, n.–one who harmonizes.

Harmonometer, n.–an instrument used to measure harmonic relations in music.

In standards writing, meeting most of the dictionary definitions for harmony may not be possible. However, "technical agreement" is the operative phrase. Agreement in principle and desired outcomes is not only possible but necessary in a world economy and to best protect public health.

According to the International Organization for Standardization (ISO), harmonized standards on the same subject are those approved by different standardizing bodies. The standards then establish interchangeability of products, processes, and services, or mutual understanding of test results or information provided.

Harmonization, according to Engineering and Information Processing Standards Council of the U.S. National Institute of Standards and Technology, is "the process whereby two or more nations (or standards bodies) agree on the content and application of a standard. Harmonization is accomplished by modification of a national standard (or agreement on a common document by two or more standards bodies) so that it is consistent with the harmonized standard *or* by countries agreeing to accept products and services that are in conformance with the harmonized standard, even if they do not conform to the requirements of their national standard. Furthermore, a standard may be said to be harmonized if its text is technically equivalent to another standard (e.g., a national standard which is technically equivalent to an international standard)."

Agreement does not mean word-for-word equivalency but rather achieving documents, that when applied, achieve technically equivalent results. It also means developing documents with empathy for the users. That is to say, the standards must be easily applied requiring little interpretation–provide user-friendly standards. With this in mind, the standards should ensure the broadest, noninhibiting use but the presentation has to be clear and cover all the necessary information. The scope must be clear and concise yet the user should be able to quickly ascertain whether the standards will meet their needs. The organization and presentation of the technical material should be arranged so that the meaning is clear. Definitions and classifications are particularly difficult should be dictionary equivalent in harmonized standards.

WHY?

1. Why standards? From Antiquity: the Bible–Noah's ark; Moses Ark of the Covenant; Solomon building code for the Temple in Jerusalem or the Hammurabic code of governing the middle eastern kingdom of its time to Scotland and traces of Roman engineering are all examples of prescriptive standards. Today standards are written:
   - to provide for measurement unity,
   - to allow for engineering and technology advancement, and

- War and disaster are often parents of standards; which have led to standards relating to interchangability, safety, and hygiene.

2. Standards are the prescription of successful trade and technical equivalency. Standards began their existence the minute there were two or more overlapping products or services available.
3. Why harmonized international standards?
   - To facilitate international exchanges of goods and services.
   - To promote cooperation in the sphere of intellectual, scientific, technological, and economic activities.
   - To ensure mutual trust.
   - To remove national or regional standards as nontariff barriers to trade.
   - To allow for the best use of human and economic resources.
   - To level the playing field!

HOW?

This is the most difficult question. In the United States there are over 400 standardizing bodies. Internationally ISO has published over 7000 standards. In the U.S. and Europe there are four groups developing standards in the same general area—hygiene. On the other hand, trade agreements such as General Agreement on Tariff and Trade (GATT), the European Community (EC), and the North American Free Trade Agreement (NAFTA) demand harmonized standards and will ultimately cause harmonization to happen.

But standards developers, including those members of the 3-A Sanitary Standards Committees, can be the nucleus for this new approach if we:

- Cooperate and commit to that goal.
- Exchange information.
- Develop mutual trust and respect.
- Be open to new ideas and approaches.
- Place standards on a strong scientific and technical basis; state-of-the-art.
- Use open, consensus procedures.
- Coordinate activities through one or two groups worldwide.
- Be cured of the "Not invented here syndrome."

Food safety is not a national or regional concern, but is an international concern. International harmonized standards for the hygienic design of food equipment is a road we must travel in our journey to ensure worldwide food safety.

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Report on the Activities of ISO-TC199-WG2 Safety of Machinery-Hygiene and Their Meeting Held at the British Standards Institute, London, England on April 18, 1997

Submitted by: Norris A. Robertson, Jr.

We have observed in recent years great strides in the international trade of machinery used in the manufacture of food products. In the future it is likely that international agreements will obligate nations to accept machinery used in the manufacture of food products, when the design and fabrication of the machinery are equivalent to national standards or complies with international standards. International Organization for Standardization (ISO)-Committee Draft (CD) 14159 is an initial effort in developing an international standard that may govern the sanitary design and fabrication of machinery for the purpose of international trade.

Under the ISO classification of standard documents, documents may be classified as "A", "B", or "C" standards. "C" standards are equipment and/or product specific standards that provide guidance for specific types of equipment and/or a specific industry. ISO-CD 14159 is intended as a "B" standard applicable to all machines and associated equipment in applications where hygiene or public health risks to the consumer of the product can occur (e.g., food, pharmaceuticals, biotechnology, cosmetics). For this reason the Document does not contain certain specific sanitary design requirements such as, "splash areas" important to the dairy and other food industries.

United States' interests have been represented in this international forum, ISO-Technical Committee (TC) 199 Working Group Two (WG2), for writing standards by a U.S. Delegation strongly influenced by the International Association of Milk, Food and Environmental Sanitarians' (IAMFES)/Committee on Sanitary Procedures. The U.S. Delegation has focused on 3-A type construction standards that promote our persuasion of prevention of public health issues with product produced on such equipment as the appropriate means of protecting public health. The U.S. Delegation has been committed to a leadership role in the development of ISO-CD 14159 from the inception of WG2.

BACKGROUND

At a January 1995 meeting of WG2, the U.S. Delegation submitted a Document that had been prepared during several previous meetings of the U.S. Delegation. This Document was accepted as a working template by WG2 and became the bases of ISO-CD 14159. This Document was written in a manner similar to, but much more general than, the Model 3-A Sanitary Standard and other 3-A Sanitary Standards. The Document was further refined at subsequent WG2 meetings in April 1995, London; November 1995, Chicago; May 1996, London; and at meetings of the U.S. Technical Advisory Group (TAG) to ISO-TC 199-WG2 that were held in the Washington, D.C. area. Delegations from other nations provided comment including recommended additions, deletions, and corrections developed during their own meetings.

Following the Chicago meeting in November, 1995, the Revised Draft Document was submitted to TC-199 and subsequently circulated as a Committee Draft by TC-199 on July 30, 1996, with a three month period for comment and voting. The results of the voting and all comments made by each nation were circulated to all WG2 nations with the announcement for the April 1997, meeting in London. Ten nations were in agreement with no comment, four nations were in agreement with comment, two nations (France and Italy) were not in agreement with comment, and one nation abstained. The U.S. Delegation to WG2 met

twice in March 1997, to address all comments that had been made and to make any changes or modifications to the Document deemed appropriate to present to WG2 at the April, 1997, meeting in London.

APRIL 18, 1997 MEETING

The United States Delegation to ISO-TC 199 WG2 attended a meeting of WG2 on April 18, 1997, in London. The purpose of this meeting was to resolve the technical comments made by delegations from the member nations of ISO-TC 199 during the first balloting on ISO-CD 14159, "Safety of Machinery – Hygiene Requirements for the Design of Machinery" and to determine if the Document would move forward to the TC-199 as a Draft International Standard (DIS) for circulation and comment by all member nations of TC-199.

The meeting was attended by Delegates from the member nations of WG2 as follows:

Alain Lundahl	France (AFCP)
Gerard Poumeyrol	France (CNEVA)
Rolf Buschman	Germany (CLUA Stuttgart)
Eckhard Huthloff	Germany (VDMA/NAM)
George Schrader	Germany (BGN - Manheim)
Teneka Mostert	Netherlands (Unilever)
Ake Moberg	Sweden (Tetra Pak)
Stephen Davies	UK (APV)
John Holah	UK (CCFRA) (Chairman of WG2 and Convener of the meeting)
Stephen Rooke	UK (Department of Health)
John Bloodgood	USA (JFB Enterprises) (Chairman of USA Delegation)
Thomas Gilmore	USA (IAFIS) (Secretariat 3-A Sanitary Standards)
Robert Maller	USA (Unilever-Lipton)
Vincent Mills	USA (International Paper)
Norris Robertson, Jr.	USA (Committee on Sanitary Procedures, and FDA)

Only two Delegates missed the meeting: Stuart North and Andy Timperley from the United Kingdom.

The WG2 reached a decision at the meeting to further develop ISO-CD 14159 for circulation as a DIS. Mr. Holah noted the comments of France and Italy and the "no agreement" votes. He further stated "that WG2 should try as hard as possible to ensure that the proposed DIS had the support of all nations". The WG2 then divided into two groups to consider: (a) Scope, Risk Assessment and Categories, Verification, Figures, and (b) Definitions and Hygienic Requirements. Following these meetings, each group presented conclusions to the WG2 and changes to ISO-CD 14159 were debated and accepted. With some reservations, the U.S. Delegation agreed with the changes agreed to by all involved. It remains to be seen if final agreement can be reached on all provisions with all nations following circulation as a DIS.

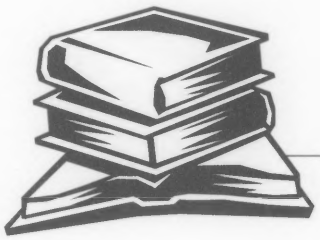
THE FUTURE

The Revised Document agreed upon at the end of the April, 1997, meeting was submitted to TC-199 on September 23, 1997, for circulation as a DIS. A period of time was set aside for comment. If there are comments, an attempt to reconcile will be made by correspondence. If Mr. Holah is not successful by correspondence, he will schedule a meeting of WG2 in spring or early summer, 1998, to seek final agreement. When WG2 finishes and agreement is reached the fate of ISO-CD 14159 will rest in the hands of TC-199.

Dairy, Food and Environmental Sanitation, Vol. 17, No. 11, Page 730

Book reviewed by: Catherine H. Strohbehn, Ph.D., R.D., Iowa State University, Ames, IA

Book Review



Essentials of Food Sanitation

Edited by:
Norman G. Marriott
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Consulting Editor: Gill Robertson, MS, R.D.

With increased attention on food safety issues at all stages of food preparation (the farm to fork concept), this book is very timely in its approach to presenting sanitation information to those involved in food production, processing, preparation, or service.

The first three chapters of the book focus on an overview of sanitation and regulations, growth and detection of foodborne illness, and how to prevent contamination of food as it moves from point of origin to point of consumption. The impact of personal hygiene and food handling is discussed with specific information given reservoirs and hosts of microorganisms and how pathogens can be transmitted from a food handler to the food. The middle section of the book describes cleaning compounds as well as cleaning and sanitizing methods and equipment. Much of the equipment and systems described are applicable to a food processing facility. The next section of the book describes sanitation practices at various types of food processing plants: dairy, meat and poultry, seafood, fruit and vegetable, and beverage. The final three chapters are devoted to sanitation in foodservices and the role of management.

The strength of this text is its broad-based approach to sanitation and factors necessary to establish and maintain sanitary environments for food production and service. The book is likely to prove most useful to those with responsibilities for supervision or regulation of foods in the processing stage. For those with responsibilities in managing and operating foodservices, this book can serve as a supporting reference.

For copies of *Essentials of Food Sanitation*:
Mail requests to: Chapman & Hall, 115 Fifth Avenue, New York, NY 10003

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James R. Ball
Food Lion, Salisbury

PENNSYLVANIA

Connie E. Briggs
USDA, Wyndmoor

TEXAS

Michael W. Carr
Army & Air Force Exchange Service
Dallas

Michael E. Hume
USDA-ARS-FAPRL
College Station

Amy K. King
Texas A & M University
College Station

VERMONT

Mona H. Abd El Gawad
University of Vermont
Burlington

WASHINGTON

Larry W. Dutton
Trident SFDS
Anacortes

UpDates

HFM Industry Advisory Council & Executive Committee Appointments Made

Robert Lewandoski, new President of the National Society for Healthcare Foodservice Management (HFM), announced his appointment of Jim Green, Director of Marketing at Rich Products Corporation in Buffalo, NY as the 1997-98 HFM Industry Advisory Council Chair.

Lewandoski, who is Director of Food Service at The Englewood Medical Center in Englewood, New Jersey also announced the appointment of Greg Flack, General Manager for Little Charlies Entrees and Brian Graff, Manager of Promotions and Segment Marketing at General Mills in Minneapolis, MN to three year terms on the HFM Industry Advisory Council. Loren Kimura, Vice President for Sales at Basic American Foods in Walnut Creek, CA was named as the Advisory Council alternate.

In addition, Dan Mastronardi, Vice President for MedFare of Boca Raton, FL and Phillip Horowitz, Regional Manager for Ross Laboratories in Suffern, NY were also named to the HFM Advisory Council to fill out unexpired terms.

Penton Foodservice Group Announces Management Reorganization

In a move to strengthen its customer-support network and more-fully utilize its combined experience and abilities, the Penton Foodservice Group (PFG) has reorganized its management team and selected sales territories.

After 14 years with Penton (seven of those with PFG) Jim Maddox, who originally came to Penton's Cleveland office from the East Coast, has elected to return to that region. He took on sales and marketing responsibilities for PFG's Mid-Atlantic region effective September 1, 1997, working as an independent representative for PFG.

Group Publisher and *Restaurant Hospitality* Publisher Rob Dorfmeyer takes on additional responsibilities as Publisher of *The Foodservice Distributor* and *LitXpress*, roles formerly held by Maddox.

National Sales Manager John Zimmerman succeeds Maddox as Publisher of *Food Management* magazine and of the *Restaurant and Equipment Show Dailies*.

Succeeding Zimmerman as National Sales Managers are David Brodowski and Mike Keefe. Both will maintain their sales territories while expanding into their new roles. Brodowski becomes the National Sales Manager for *Food Management* and the *Restaurant and Equipment Show Dailies*; Keefe becomes National Sales Manager for *Restaurant Hospitality*, *The Foodservice Distributor* and *LitXpress*.

PFG's West Coast territory has been reorganized, as Regional Marketing Manager Gayle Massey assumes responsibility for the entire state of California while remaining involved with Oregon accounts and agencies. Massey has represented PFG on the West Coast for three years. Paul Moos becomes Regional Marketing Manager for the rest of the western territory. Moos brings solid foodservice knowledge to the position, gained while serving as an Inside Sales Representative for PFG.

Smith Named to Head ADPI Cheese Division

Richard K. Smith has been selected to direct the Cheese Division of the American Dairy Products Institute. The announcement was made jointly by Kevin J. Ruda, Cheese Division Chairman and Larry L. Claypool, President, American Dairy Products Institute, at the Institute's Board of Director's meeting held on September 5.

Smith, who has extensive industry experience in cheese operations, began his duties on October 15. Previously, he was employed by Kraft, Inc. and served as an Industry Consultant both domestically and internationally. Smith currently serves as Chairman of the 3-A Sanitary Standards Committees and, in recognition of his long-time service and contributions to 3-A programs, was awarded the 3-A Bronze Plaque in 1996.

Process Engineer Joins A & B Process Systems

Troy W. Weik joined A & B Process Systems Corp. as a Process Engineer. Weik has a background in industrial and process engineering, having recently held positions at other companies as Plant Manager and Quality Control Director. He has a bachelor's degree in industrial engineering from the University of Wisconsin-Madison. He will put his process engineering talents to work in support of the company's sanitary process flow system capabilities.

Videojet Announces Retirement of Hank Bode; Craig Bauer Promoted to President and CEO

Videojet Systems International, Inc., has announced the resignation and retirement of Hank Bode as President and CEO. Mr. Bode spent his 25 year career with Videojet as its highest ranking officer, directing the company as it developed an emerging technology into a global application used in virtually every packaging, processing, and manufacturing process.

A graduate of Swarthmore College with a BS in mechanical engineering and a graduate certificate in nuclear engineering from the U.S. Navy, Mr. Bode will remain associated with Videojet in the role of Consultant to ongoing projects and acquisitions. He will divide his time between the Midwest and the East Coast.

Craig E. Bauer assumed his new roles as President and CEO on October 1, 1997. A highly recognized and well-respected leader in the marking, coding and imaging industries, Mr. Bauer joined Videojet in 1978 as a Sales Engineer, and progressed through a variety of positions, including Vice President of Marketing and Sales, and, most recently, Executive Vice President.

IDEXX Announces New Director of Food Safety NET™ Services

IDEXX Laboratories, Inc. announced that H. Russell Cross, Ph.D., will join IDEXX as the Director of IDEXX Food Safety Net™ Services. Dr. Cross is presently the Director of the Institute of Food Science and Engineering and the Center for Food Safety at Texas A & M University. He is also Executive Director of the International Meat and Poultry HACCP Alliance and Chairman of the International Stockmen's Educational Foundation. From 1992 to 1994, Dr. Cross served as Administrator of USDA's Food Safety and Inspection Service (FSIS).

According to Lou Pollock, President of the Food and Environmental Division of IDEXX, "Dr. Cross brings a wealth of scientific knowledge and a unique understanding of customer needs in the food safety arena. His skills are a strong complement to our team of people, products, and services focusing on providing a safer food and water supply worldwide."

Charlie Felix Wins Mangold Award

This award, *National Environmental Health Association's* most prestigious, is named for the late Walter S. Mangold, Professor of Public Health at the University of California School of Public Health, an outstanding Sanitarian and Educator, and first Editor of NEHA's Journal. The Mangold Award recognizes superior achievement and attainment of the highest standards in the profession.

For 30 years, in the course of editing three publications on environmental health and public health, Educator and Communicator Charles (Charlie) W. Felix focused everyone's attention on the achievements of others. Now, after succumbing to the lure of retirement, Charlie is finding that the spotlight is relentlessly focused on him, first by the Past President's Award and then by the highest honor that NEHA can bestow, the Walter S. Mangold Award.

Charlie's exemplary career began in 1966, when he accepted the position of Associate Editor for the monthly *Health Officer's News Digest*, published by what is now known as the Foodservice & Packaging Institute, Inc. (FPI). Charlie's keen ability to communicate ideas and values to his colleagues, combined with his genuine interest in contributing to the worthy field of environmental health, inspired him to pursue a Master's degree in public health—which he received from Yale University in 1969.

He went on to become Vice President and Director of Environmental Health, Public Affairs and Communications at FPI, and also became the Editor of *Environment News Digest, Food Talk,* and *Food Protection Report*.

In 1985, Charlie established a new career as a Public Health Consultant opening Charles Felix Associates. His consulting services were retained by clients such as FPI, the Packaged Ice Association, NSF International, and the National Humane Education Society. During this time, he continued to serve as Editor of the three publications previously listed.

Perhaps one of the finest examples of Charlie's genuine interest in encouraging others through the recognition of performance is the Samuel J. Crumbine Consumer Protection Award, which was previously awarded by FPI but is now cosponsored by nine organizations, including NEHA and IAMFES.

Over the years, NEHA's 1997 Mangold Award recipient has held leadership positions in a number of organizations, including the American Public Health Association, the National Capital Area Environmental Health Association and the International Association of Milk, Food and Environmental Sanitarians. From these and other groups he has received numerous awards for his extraordinary contributions to the environmental health profession, with the Mangold representing just the icing on a very large cake.

Fung Presented 1997 International Award

Daniel Y.C. Fung, Professor of Animal Sciences and Industry at Kansas State University, Manhattan, KS is the winner of the 1997 International Award. The award, consisting of $3,000 and an engraved plaque, honors an International Food Technologist member or organization for the promotion of an international exchange of ideas in the field of food technology or in a practical successful transfer of food technology to a developing national or to an economically depressed area in a developed nation.

Fung is well known by his tireless efforts in promoting rapid methods and automation in microbiology throughout the world to upgrade techniques and procedures to isolate, identify, characterize, and enumerate microorganisms from food, water, clinical samples, and environmental specimens. He has directed and conducted an annual international workshop on rapid methods and automation in microbiology for more than 16 years and trained more than 1,400 scientists around the world. Futhermore, he has taken the workshop to numerous countries outside of the United States during the past ten years, training numerous scientists in host countries. Because of his pioneering work and continuous endeavor, the awareness and adoption of these new microbiological procedures have been greatly heightened. This has helped to promote better health and safer food for citizens worldwide.

Fung has been very active in international affairs at IFT. He helped form the IFT International Division, and was serving as Chair when the Division was officially approved in 1994. Concurrently, he was appointed Chair of the International Relations Committee (now the Committee on Global Interests). All these activities helped to encourage IFT leaders and members to look at globalization of IFT activities in the near and far future. Through his interaction with domestic and international scientists, Daniel Fung has demonstrated that he has made the world a better place in his sphere of influence. He was named an IFT Fellow in 1995. He is also an active Member of the International Association of Milk, Food and Environmental Sanitarians.

University of Missouri Scientists Find *E. coli* Weapon

University of Missouri scientists explained at the Society of Industrial Microbiology meeting in Reno, NV recently that they have developed a lactic acid spray that destroys the bacteria that contaminates meat.

Microbiologist Gene Iannotti was cited as saying the spray, which is heated and must be applied at a certain point in the meat-handling process, is not a "silver bullet" but does represent a significant improvement in food safety. The technique is being patented.

The University of Missouri researchers found by heating lactic acid, they enhanced its ability to kill *E. coli*, *Salmonella* and other microorganisms. The heated substance, made from corn, also took longer to break down, so its effects lasted longer. Scientist Andrew Clarke was quoted as telling the *St. Louis Post Dispatch*, "It's got promise, but this is not a substitute for good hygiene or proper manufacturing processes."

Study Published Links BSE to CJD

Two studies published in *Nature* Vol. 389, on pages 448 and 498, show that the strain of prion disease that causes the new variant of brain-wasting Creutzfeldt-Jacob disease (vCJD) is identical to bovine spongiform encephalopathy (BSE) in cattle. This makes it highly likely that humans with vCJD contracted it by consuming meat from cattle infected with BSE. In experiments that have run for more than a year, Moira Bruce of the Institute of Animal Health in Edinburgh, Scotland, and her colleagues injected several different breeds of laboratory mice with infectious brain samples from cows, patients with vCJD, patients with sporadic CJD and farmers who died of CJD after working with animals with BSE. The researchers looked critically at the incubation time (the time it took for the injected mice to fall ill), the type of brain damage caused, and the areas of brain damaged. The research shows that the histological presentation, symptoms and course of vCJD in mice is identical to that of BSE in mice, and distinct from other forms of CJD. The strain of CJD that killed the farmers by CJD was not the same as BSE, confirming earlier results this year published elsewhere (*The Lancet* 350, 188; 1997).

In a second series of experiments, John Collinge of the Prion Disease Group, Imperial College School of Medicine at St Mary's, London, UK, and his colleagues describe a completely different approach that led to the same conclusion that vCJD is caused by the same agent as BSE. Using a biochemical assay, Collinge and colleagues show that the BSE and vCJD agents are the same, and are distinct from other forms of CJD in humans. Collinge and colleagues show that the disease agent that causes BSE is able to 'convert' human prion protein into the highly resilient, pathogenic form of the protein, when tested in mice. Genetically engineered or 'transgenic' mice which have had their native mouse prion protein gene replaced with a human prion protein gene do, eventually, contract spongiform encephalopathy after injection with BSE contaminated material. Collinge and colleagues reported in *Nature* in 1995 that these mice do not become ill even 200 days after inoculation. The researchers waited longer, and now report that mice succumb after 500 days.

Cyclosporiasis Review

At the 37th Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC) in Toronto, Canada, Dr. David Relman presented a review and update of current knowledge of cyclosporiasis as an emerging infectious disease. He reminded listeners that, variably acid-fast organisms with an approximate diameter of 8 to 10 microns resembling large forms of *Cryptosporidium* have been identified in fecal samples from patients exhibiting episodes of watery diarrhea since the 1980s. It was in 1993 that Ortega and Sterling published a report identifying the organism as a *Cyclospora* sp. in the *New England Journal of Medicine*. Relman himself has generated data for the sequence of ribosomal RNA genes for this organism, and confirmed its identity as a *Cyclospora* sp. Dr. Relman described a typical clinical course for infected patients as intermittent watery diarrhea after a 7-day incubation period. Untreated disease can lead to anorexia, fatigue and weight loss lasting for weeks in immunocompetent hosts, and even longer in immunocompromised hosts. The infection can be successfully treated with trimethoprim/sulfamethoxazole. Relapses are not uncommon in treated patients. No suitable alternative therapy has been identified for sulfa-allergic persons. There are no data for the efficacy of trimethoprim alone.

Dr. Relman offered additional insight into the epidemiology of cyclosporiasis. Infection or colonization of asymptomatic persons is common (endemic) in Asia (especially in Nepal), Peru and Haiti, but uncommon in Tanzania (the latter based on comments offered during the question and answer session). In the U.S. approximately 0.5% of fecal samples from symptomatic persons will contain *Cyclospora*. This low incidence suggests that there are many naive hosts in North America, and Relman suggests that this may in part explain the relatively recent emergence of this disease in North America. Last year's documented outbreaks involved Guatamalen raspberries, while in 1997, mesclun lettuce and basil from other sources as well as Guatamalen raspberries have been implicated. Between 1,600 and 1,700 cases have been reported in the U.S. and Canada this year. *Provided by ProMed.*

Editors and Public Address Food Safety Concerns

Consumers are becoming increasingly concerned about the safety of the food, with their level of concern driven largely by food safety scares, a recent survey by CMF&Z Public Relations shows. The nationwide survey of consumers and editors who cover food and food safety issues was the fourth in as many years by CMF&Z, a Young and Rubicam affiliate. The 1997 survey was co-sponsored by the Industry Council on Food Safety, a restaurant and foodservice industry coalition.

Two-thirds, 67 percent, of editors who cover food safety and more than one-half, 52 percent, of consumers believe food safety is a more important consumer issue than it was a year ago. The rising importance consumers are placing on food safety issues was cited as a major factor in the Clinton Administration's $43 million plan to enhance food safety from the farm to the table.

The survey showed 79 percent of consumers had recently seen or heard media accounts of food safety issues including stories related to tainted strawberries, *E. coli* bacteria, *Salmonella*, food handling and preparation and others. Mad cow disease was cited by only 3 percent in the 1997 study, compared with 33 percent in the 1996 survey when the disease and its perceived link to the food supply received considerable media publicity.

While 32 percent of consumers believe less than one-half of media stories on food safety issues, more than three-fourths of the consumers surveyed said they would take action in response to negative stories concerning safe drinking water, bacteria in food, and food preparation. More than 60 percent would act on the basis of negative stories about pesticide residue, food handling, food processing, and mad cow disease. However, the study showed sharp differences between consumers and editors on why food safety is becoming more important. While 43 percent of the editors said food safety's rising importance is a result of increased media information, only 18 percent of consumers cited media information as the reason food safety has become more important to them. Thirty-seven percent of editors cited continued food safety problems as a chief cause of the rising importance of the issue, compared with 19 percent of consumers who cited problems as responsible for their heightened concern about food safety. One-third of the consumers surveyed, 33 percent, compared with 21 percent of editors, cited increased public awareness as the leading cause for food safety's rise in importance.

The survey, conducted in April and May of 1997, questioned editors and the general public about a range of food safety issues. The survey was conducted via telephone interviews with 150 editors who represented newspapers from across the United States, with circulations from under 25,000 to over 100,000. In addition, the survey contacted a random sample of 150 members of the general public.

Mid-Term Grades are in for Pathogen Reduction and HACCP

It is regarded as the most extensive set of changes to affect the meat and poultry industry in decades, and according to the U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS), food producers and processors have been more than up to the challenges of "The Rule" – USDA regulations for food sanitation and microbiological testing, known collectively as the Pathogen Reduction and Hazard Analysis and Critical Control Point (HACCP) Rule. FSIS indicates that nearly all of the 6,200 plants requir-ing sanitation standard operating procedures (SSOPs) have successfully implemented them. This requirement was only the first phase of the rule, which became effective on January 27, 1997.

However, experts agree that compliance by smaller plants may prove difficult. While larger plants have the resources to meet the new guidelines, smaller companies may struggle to meet requirements. Personnel in organizations may lack resources to comply to the Rule and the budgetary demands of new procedures, testing, and practices make some smaller processors approach the Mega Reg with trepidation.

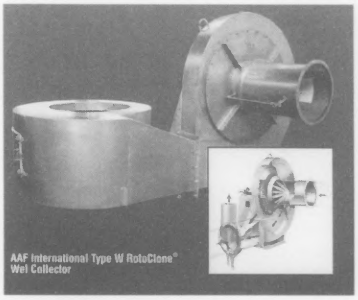
But according to Dr. Payton Pruett, Technical Director of Microbiology for Silliker Labs of Grand Prairie, smaller plants should be able to comply with the new rule, provided they plan ahead and understand the requirements.

Among other things, Pruett recommends small processing plants can do the following:

- Send a key company employee to a HACCP course to learn about developing and implementing HACCP
- Use outside testing services for *E. coli* and *Salmonella* testing, especially baseline testing
- Make use of government resources, some of which are free or available at a very low cost, including generic HACCP models and guidebooks

To get the word out, Silliker Laboratories is also conducting a direct mail campaign to 3,000 meat processing plants, providing information and updates on Mega Reg. Currently, Illinois-based Silliker Laboratories is distributing its free 16-page booklet, *Pathogen Reduction and HACCP Question and Answer Guide,* addressing provisions of the rule and how to develop a HACCP plan.

IndustryProducts



AAF International

AAF Dust Collectors Featured at 1997 IEFP

AAF International had a food-quality Type W RotoClone® in Booth 3428 at the International Exposition for Food Processors. A dust control favorite of food processors, the RotoClone is used to collect dust generated during the processing of cereal, rice, flour products, salty snacks, candy, or sugar products.

Ideal for collecting light, sticky dusts that would normally clog fabric type dust collectors, the RotoClone is the most cost-effective, high efficiency wet collector available. Developed over 50 years ago, the basic operating principle remains unchanged although there have been many refinements and improvements. The Type W RotoClone combines the principle of dynamic precipitation with water sprays. The spray maintains a flowing film of water on all collecting surfaces which minimizes water requirements, traps even the lightest and finest dust particles, and delivers collected dust in slurry form for easy disposal.

Engineered to provide years of trouble-free service, the RotoClone is factory-assembled, tested, and shipped in sub-assemblies that are convenient to handle and easy to install. Everything you need except duct connections, arrives in one packaged system. Water consumption is limited to just a small amount required to maintain a flowing film or approximately one-half gallon of water per 1,000 CFM of air cleaned. The Type W RotoClone is available in sizes ranging from 1,000 to 50,000 CFM of air.

AAF International, Louisville, KY

Reader Service No. 329

The United States Environmental Protection Agency (EPA) Certifies Performance of Labconco Fume Hoods

Labconco Corporation is pleased to announce that several Protector® Fume Hood models have been certified by the United States Environmental Protection Agency (EPA). This certification procedure is in place to ensure that fume hoods used in EPA laboratories meet the performance criteria established by the EPA to provide a safe and healthful workplace for employees and contractors.

The EPA has established a testing procedure based on the American National Standards Institute/American Society of Heating Refrigerating and Air Conditioning Engineers (ANSI/ASHRAE) Standard 110-1995, Method of Testing Performance of Laboratory Fume Hoods. The hoods selected by the EPA were tested at the factory by an EPA team. Having passed the performance criteria testing, the certified hoods are pre-approved by the EPA and can be placed in EPA facilities with no further testing being required.

Labconco Corporation, Kansas City, MO

Reader Service No. 330

Orkin Commercial Pest Control Offers Free Sanitation Training Video

A twist on the old adage about the worth of prevention: An ounce of sanitation is invaluable when trying to keep insects out of a food-related business. Orkin Commercial Pest Control now offers a free video for restaurant owners and kitchen managers that addresses hospitality and food-service sanitation training issues.

The video, titled "The Kitchen Uncovered," gives practical tips for maintaining a cleaner work environment and helping to control cockroaches, flies, and other kitchen invaders. Restaurant managers can use this entertaining video to help their employees learn the specifics of kitchen sanitation.

Sanitation is an important part of any Integrated Pest Management (IPM) pest control regimen. IPM is the partnership between a restau-

rant owner and a pest control technician that solves insect problems by utilizing nonchemical tactics before determining if pesticides are necessary. The 10-minute video takes viewers on a virtual kitchen tour to demonstrate sanitation practices that in conjunction with a professional IPM pest elimination program, will help control kitchen invaders.

Orkin Pest Control, Atlanta, GA

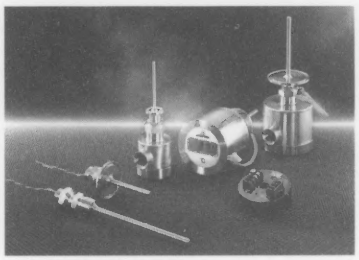
Reader Service No. 331

Single Source Responsibility for CIP Systems

Custom Control Products provides one-stop shopping for Clean-In-Place (CIP) systems. We will design, engineer, supervise fabrication and provide any start-up services for a complete CIP system, meeting current 3-A Sanitary Standards. From a single-tank stand alone CIP system to several tanks multiple CIP systems, we design the CIP system to meet the customers' needs. Our CIP control systems are fully automated, designed to conserve energy and reduce water and chemical usage. The control system that we design will control and monitor all pre-rinses, wash cycles and final post-rinses. Advanced data acquisition and report generation packages are available. Custom Control Products has no affiliation with any chemical company, thus providing you with complete autonomy over your CIP system. Custom Control Products is an official Allen Bradley System Integrator and Rockwell Software Strategic Provider.

Custom Control Products, Inc., Racine, WI

Reader Service No. 332



Anderson Instrument Co., Inc.

New Line of Sanitary RTD's

Anderson Instrument Co. announced the release of a new line of sanitary RTD's and temperature transmitters. The modular design allows customers to specify the most appropriate sensor, wiring head, and output configuration for any application. Each model features all-stainless steel construction and a unique assembly design which eliminates exposed threads and provides a compact, low profile. Signal options include single or dual element, 3-wire, 100 ohm RTD, as well as a 4-20mA transmitter module with .1% accuracy. The transmitter head is available with a factory or field installable loop-powered display in temperature, mA, or % output units. A HART/4-20mA module is due out this fall.

Anderson Instrument Co., Inc., Fultonville, NY

Reader Service No. 333

Advanced Instruments Introduces Fluorophos® ACP Test for Meat to Confirm End-Point Temperature

When Advanced Instruments, Inc. introduced the Fluorophos Test System and the ALP (alkaline phosphatase) Test for completeness of pasteurization, quality control for the dairy lab was revolutionized. Now the Fluorophos ACP (acid phosphatase) Test for Meat brings this same reliable, instrument-based technology to the meat processing industry.

By combining fluorescence technology and microprocessor-control, the Fluorophos Test System benchtop fluorometer provides results that are accurate, reliable and extremely sensitive. Of even more importance, test results are quantitative and do not rely upon operator interpretation as colorimetric tests do. The federally-mandated standard used to assure pathogen destruction in cooked meat products is end-point temperature. Because the ACP Test provides quantitative results, a direct correlation between ACP levels and endpoint temperature can be established, ensuring that tested product is fully and properly cooked.

The ACP Test is ideally-suited for quality control because testing can be performed even after product has cooled allowing processors to verify quality long after the product has exited the oven. In addition, customers can check incoming shipments to verify quality from their suppliers.

The assay is easy to perform. Simply add the sample to the substrate, press start and the instrument reports results in only three minutes. Test results are recorded by the instrument's built-in printer or can be collected for computer analysis or reporting through the instrument's standard computer interface.

The Fluorophos ACP Test for Meat has been submitted for AOAC Peer-Verified Method Status. Once approved, it will be the only test of its type to attain this level of acceptance. Advanced Instruments is an ISO 9001-certified manufacturer.

Advanced Instruments, Inc., Norwood, MA

Reader Service No. 334

The Smith & Loveless INTELLISIEVE™

The INTELLISIEVE rotary fine screen filter, first introduced in Europe, solved the difficult problem of treating wastewater from slaughterhouse and meat processing facilities. Now, Smith & Loveless, Inc., has brought the unique, efficient drum screen design to the United States for use in a variety of industrial and municipal applications.

The treatment of wastewater from industries such as meat processing and slaughterhouses is difficult because most treatments do not effectively remove narrow fibers, such as hair, feathers and skin. The slotted drum or wedge wire-type screen designs used in other filters can allow these particles to slip through or clog the screen.

The INTELLISIEVE eliminates this problem with its revolutionary drum screen design, which uses circular holes that easily exclude problematic fibers and other solids 0.5 microns and larger. Meanwhile, a counter-rotating nylon brush and an intermittent water spray system inside the drum continuously clean the apertures to prevent clogging by fats, oils and grease.

Unlike other screening equipment that requires seals or doctor blades, the INTELLISIEVE uses an internal feed system. This lower-maintenance, more efficient design retains solids longer, allowing more water to escape as the solids flow perpendicular to the filter's holes. The inclined, performated drum also contributes to the efficiency of the INTELLISIEVE. As it rotates, gravity forces the water to drain as solids are moved out of the drum into a discharge chute without spillover.

Smith & Loveless, Inc., Lenexa, KS

Reader Service No. 335

BusinessExchange

Services/Products

ADVERTISING INDEX

Dairy, Food and Environmental Sanitation, Vol. 17, No. 11, Pages 741-747

IAMFES Lending Library

DAIRY

- **The Bulk Milk Hauler: Protocol & Procedures**—(8 minute videotape). Teaches bulk milk haulers how they contribute to quality milk production. Special emphasis is given to the hauler's role in proper milk sampling, sample care procedures, and understanding test results. (Iowa State University Extension–1990)
- Causes of Milkfat Test Variations and Depressions—(30 minute–140 slides–tape–script). This set illustrates the many factors involved in causing milkfat test variations or depressions in your herd, including feeding, management, stage of lactation, age of samples, handling of samples, and testing procedures. The script was reviewed by field staff, nutritionists, laboratory personnel and county extension staff. It is directed to farmers, youth and allied industry. (Penn State–1982)
- Cold Hard Facts—This video is recommended for training personnel associated with processing, transporting, warehousing, wholesaling and retailing frozen foods. It contains pertinent information related to good management practices necessary to ensure high quality frozen foods. (National Frozen Food Association–1993)
- Ether Extraction Method for Determination of Raw Milk—(26 minute videotape). Describes the ether extraction procedure to measure milkfat in dairy products. Included is an explanation of the chemical reagents used in each step of the process. (CA–1988)
- The Farm Bulk Milk Hauler—(30 minute–135 slides–tape–script). This set covers the complete procedure for sampling and collecting milk from farms. Each step is shown as it starts with the hauler entering the farm lane and ends when he leaves the milk house. Emphasis is on universal sampling and automated testing. Funds to develop this set were provided by The Federal Order #36 Milk Market Administrator. (Penn State–1982)
- Frozen Dairy Products—(27 minute videotape). Developed by the California Department of Food and Agriculture. Although it mentions the importance of frozen desserts, safety and checking ingredients; emphasis is on what to look for in a plant inspection. Everything from receiving, through processing and cleaning and sanitizing is outlined, concluded with a quality control program. Directed to plant workers and supervisors, it shows you what should be done. (CA–1987) — Reviewed 1997.
- The Gerber Butterfat Test—(7 minute videotape). Describes the Gerber milkfat test procedure for dairy products and compares it to the Babcock test procedure. (CA–1990)
- High-Temperature, Short-Time Pasteurizer—(59 minute videotape). Provided by the Dairy Division of Borden, Inc. It was developed to train pasteurizer operators and is well done. There are seven sections with the first covering the twelve components of a pasteurizer and the purpose and operation of each. The tape provides the opportunity for discussion after each section or continuous running of the videotape. Flow diagrams, processing and cleaning are covered. (Borden, Inc.–1986) — Reviewed 1997.
- The How and Why of Dairy Farm Inspections—(15 minute–110 slides–tape–script). This was developed at the request of seven northeast dairy cooperatives and with their financial support. Emphasis is on clean cows, facilities and equipment and following proper procedures. Regulatory agencies cooperated in reviewing the script and taking pictures. This was developed for farmers, youth and allied industry. (Penn State–1984)
- Mastitis Prevention and Control—(2-45 minute videotapes). This video is ideal for one-on-one or small group presentations. Section titles include: Mastitis Pathogens, Host Defense, Monitoring Mastitis, Mastitis Therapy, Recommended Milking Procedures, Postmilking Teat Dip Protocols, Milk Quality, Milking Systems. (Nasco–1993)
- Milk Plant Sanitation: Chemical Solution—(13 minute videotape). This explains the proper procedure required of laboratory or plant personnel when performing chemical titration in a dairy plant. Five major titrations are reviewed... alkaline wash, presence of chlorine and iodophor, and caustic wash and an acid wash in a HTST system. Emphasis is also placed on record keeping and employee safety. (1989)
- Milk Processing Plant Inspection Procedures—(15 minute videotape). Developed by the California Department of Food and Agriculture. It covers pre- and post-inspection meeting with management, but emphasis is on inspection of all manual and cleaned in place equipment in the receiving, processing and filling rooms. CIP systems are checked along with recording charts and employee locker and restrooms. Recommended for showing to plant workers and supervisors. (CA–1986)
- Pasteurizer: Design and Regulation—(16 minute videotape). This tape provides a summary of the public health reasons for pasteurization and a nonlegal definition of pasteurization. The components of an HTST pasteurizer, elements of design, flow-through diagram and legal controls are discussed. (Kraft General Foods–1990)

- Pasteurizer Operation—(11 minute videotape). This tape provides a summary of the operation of an HTST pasteurizer from start-up with hot water sanitization to product pasteurization and shut-down. There is an emphasis on the legal documentation required. (Kraft General Foods–1990)
- Processing Fluid Milk—(30 minute–140 slides–script–tape). It was developed to train processing plant personnel on preventing food poisoning and spoilage bacteria in fluid dairy products. Emphasis is on processing procedures to meet federal regulations and standards. Processing procedures, pasteurization times and temperatures, purposes of equipment, composition standards, and cleaning and sanitizing are covered. Primary emphasis is on facilities such as drains and floors, and filling equipment to prevent post-pasteurization contamination with spoilage or food poisoning bacteria. It was reviewed by many industry plant operators and regulatory agents and is directed to plant workers and management. (Penn State–1987)
- Safe Milk Hauling–You're the Key—(34 minute videotape). Recommended for anyone who samples, measures and collects milk from dairy farms. The purpose of this tape is to acquaint milk handlers with the proper procedures for sampling and picking up milk at the farm and delivering it safely to the handling plant. This tape provides an excellent review for experienced milk haulers and shows step-by-step procedures for novice milk haulers. (Cornell University)
- 3-A Symbol Council—(8 minute videotape). A video which was developed to make people in the dairy and food industries aware of the 3-A program and its objectives.
- 10 Points to Dairy Quality—(10 minute videotape). Provides in-depth explanation of a critical control point in the residue prevention protocol. Illustrated with on-farm, packing plant, and milk-receiving plant scenes as well as interviews of producers, practicing veterinarians, regulatory officials and others. (Dairy Quality Assurance–1992)

FOOD

- Close Encounters of the Bird Kind—(18 minute videotape). A humorous but in-depth look at *Salmonella* bacteria, their sources, and their role in foodborne disease. A modern poultry processing plant is visited, and the primary processing steps and equipment are examined. Potential sources of *Salmonella* contamination are identified at the different stages of production along with the control techniques that are employed to insure safe poultry products. (Topek Products, Inc.)
- Food Irradiation—(30 minute videotape). Introduces viewers to food irradiation as a new preservation technique. Illustrates how food irradiation can be used to prevent spoilage by microorganisms, destruction by insects, overripening, and to reduce the need for chemical food additives. The food irradiation process is explained and benefits of the process are highlighted. (Turnelle Productions, Inc.)
- Food Safe–Food Smart–HACCP and Its Application to the Food Industry—(2-16 minute videotapes). (1)–Introduces the seven principles of HACCP and their application to the food industry. Viewers will learn about the HACCP system and how it is used in the food industry to provide a safe food supply. (2)–Provides guidance on how to design and implement a HACCP system. It is intended for individuals with the responsibility of setting up a HACCP system. (Alberta Agriculture, Food and Rural Development)
- Food Safe–Series I—(4-10 minute videotapes). (1) "Receiving & Storing Food Safely," details for food-service workers the procedures for performing sight inspections for the general conditions of food, including a discussion of food labeling and government approval stamps. (2) "Food-service Facilities and Equipment," outlines the requirements for the proper cleaning and sanitizing of equipment used in food preparation areas. Describes the type of materials, design, and proper maintenance of this equipment. (3) "Microbiology for Food-service Workers," provides a basic understanding of the microorganisms which cause food spoilage and foodborne illness. This program describes bacteria, viruses, protozoa, and parasites and the conditions which support their growth. (4) "Food-service Housekeeping and Pest Control," emphasizes cleanliness as the basis for all pest control. Viewers learn the habits and life cycles of flies, cockroaches, rats, and mice. (Perennial Education–1991)
- Food Safe—Series II—(4-10 minute videotapes). Presents case histories of foodborne disease involving (1) *Staphylococcus aureus,* (sauces) (2) *Salmonella,* (eggs) (3) *Campylobacter,* and (4) *Clostridium botulinum.* Each tape demonstrates errors in preparation, holding or serving food; describes the consequences of those actions; reviews the procedures to reveal the cause of the illness; and illustrates the correct practices in a step-by-step demonstration. These are excellent tapes to use in conjunction with hazard analysis critical control point training programs. (Perennial Education–1991)
- Food Safe—Series III—(4-10 minute videotapes). More case histories of foodborne disease. This set includes (1) Hepatitis "A", (2) *Staphylococcus aureus* (meats), (3) *Bacillus cereus*, and (4) *Salmonella* (meat). Viewers will learn typical errors in the preparation, holding and serving of food. Also included are examples of correct procedures which will reduce the risk of food contamination. (Perennial Education–1991)
- Food Safety is No Mystery—(34 minute videotape). This is an excellent training visual for food-service workers. It shows the proper ways to prepare, handle, serve and store food in actual restaurant, school and hospital situations. A policeman sick from food poisoning, a health department sanitarian, and a food-service worker with all the bad habits are featured. The latest recommendations on personal hygiene, temperatures, cross-contamination, and storage of foods are included. (USDA–1987). Also available in Spanish.

- Food Safety: For Goodness Sake, Keep Food Safe—(15 minute videotape). Teaches foodhandlers the fundamentals of safe food handling. The tape features the key elements of cleanliness and sanitation, including: good personal hygiene, maintaining proper food product temperature, preventing time abuse, and potential sources of food contamination. (Iowa State University Extension–1990)
- Food Safety: You Make the Difference—(28 minute videotape). Through five food workers from differing backgrounds, this engaging and inspirational documentary style video illustrates the four basic food safety concepts: handwashing, preventing cross-contamination, moving foods quickly through the danger zone, and hot/cold holding (Seattle-King County Health Department–1995)
- GMP: Personal Hygiene and Practices in Food Manufacturing—(14 minute videotape). This video focuses on the personal hygiene of food-manufacturing workers, and explores how poor hygiene habits can be responsible for the contamination of food in the manufacturing process. This is an instructional tool for new food-manufacturing line employees and supervisors. It was produced with "real" people in actual plant situations, with only one line of text included in the videotape. (Penn State–1993)–(Available in Spanish and Vietnamese)
- GMP: Sources and Control of Contamination during Processing—(20 minute videotape). This program, designed as an instructional tool for new employees and for refresher training for current or reassigned workers, focuses on the sources and control of contamination in the food-manufacturing process. It was produced in actual food plant situations. A concise description of microbial contamination and growth and cross-contamination, a demonstration of food storage, and a review of aerosol contaminants are also included. (Penn State–1995)
- HACCP: Safe Food Handling Techniques—(22 minute videotape). The video highlights the primary causes of food poisoning and emphasizes the importance of self-inspection. An explanation of potentially hazardous foods, cross-contamination, and temperature control is provided. The main focus is a detailed description of how to implement a Hazard Analysis Critical Control Point (HACCP) program in a food-service operation. A leader's guide is provided as an adjunct to the tape. (The Canadian Restaurant & Foodservices Association–1990)
- Is What You Order What You Get? Seafood Integrity—(18 minute videotape). Teaches seafood department employees about seafood safety and how they can help insure the integrity of seafood sold by retail food markets. Key points of interest are cross-contamination control, methods and criteria for receiving seafood and determining product quality, and knowing how to identify fish and seafood when unapproved substitutions have been made. (The Food Marketing Institute)
- Northern Delight—From Canada to the World—(13 minute videotape). A promotional video that explores the wide variety of foods and beverages produced by the Canadian food industry. General in nature, this tape presents an overview of Canada's food industry and its contribution to the world's food supply. (Ternelle Production, Ltd.)
- Proper Handling of Peracidic Acid—(15 minute videotape). Introduces paracidic acid as a chemical sanitizer and features the various precautions needed to use the product safely in the food industry.
- Purely Coincidental—(20 minute videotape). A parody that shows how foodborne illness can adversely affect the lives of families that are involved. The movie compares improper handling of dog food in a manufacturing plant that causes the death of a family pet with improper handling of human food in a manufacturing plant that causes a child to become ill. Both cases illustrate how handling errors in food production can produce devastating outcomes. (The Quaker Oats Company–1993.) Also available in Spanish.
- On the Front Line—(18 minute videotape). A training video pertaining to sanitation fundamentals for vending service personnel. Standard cleaning and serving procedures for cold food, hot beverage and cup drink vending machines are presented. The video emphasizes specific cleaning and serving practices which are important to food and beverage vending operations. (National Automatic Merchandising Association–1993)
- On the Line—(30 minute videotape). This was developed by the Food Processors Institute for training food processing plant employees. It creates an awareness of quality control and regulations. Emphasis is on personal hygiene, equipment cleanliness and good housekeeping in a food plant. It is recommended for showing to both new and experienced workers. (Available in Spanish)
- 100 Degrees of Doom... The Time and Temperature Caper—(14 minute videotape). Video portraying a private eye tracking down the cause of a *Salmonella* poisoning. Temperature control is emphasized as a key factor in preventing foodborne illness. (Educational Communications, Inc.–1987)
- Pest Control in Seafood Processing Plants—(26 minute videotape). Videotape which covers procedures to control flies, roaches, mice, rats and other common pests associated with food processing operations. The tape will familiarize plant personnel with the basic characteristics of these pests and the potential hazards associated with their presence in food operations
- Principles of Warehouse Sanitation—(33 minute videotape). This videotape gives a clear, concise and complete illustration of the principles set down in the Food, Drug and Cosmetic Act and in the Good Manufacturing Practices, as well as supporting legislation by individual states. (American Institute of Baking–1993)

- **Product Safety and Shelf Life**—(40 minute videotape). Developed by Borden Inc., this videotape was done in three sections with opportunity for review. Emphasis is on providing consumers with good products. One section covers off-flavors, another product problems caused by plant conditions, and a third the need to keep products cold and fresh. Procedures to assure this are outlined, as shown in a plant. Well done and directed to plant workers and supervisors. (Borden–1987) — Reviewed 1997.

- **Safe Food: You Can Make a Difference**—(25 minute videotape). A training video for food-service workers which covers the fundamentals of food safety. An explanation of proper food temperature, food storage, cross-contamination control, cleaning and sanitizing, and handwashing as methods of foodborne illness control is provided. The video provides an orientation to food safety for professional foodhandlers. (Tacoma–Pierce County Health Department–1990)

- **Safe Handwashing**—(15 minute videotape). Twenty-five percent of all foodborne illnesses are traced to improper handwashing. The problem is not just that handwashing is not done, the problem is that it's not done properly. This training video demonstrates the "double wash" technique developed by Dr. O. Peter Snyder of the Hospitality Institute for Technology and Management. Dr. Snyder demonstrates the procedure while reinforcing the microbiological reasons for keeping hands clean. (Hospitality Institute for Technology and Management–1991)

- **Sanitation for Seafood Processing Personnel**—(20 minute videotape). A training video suited for professional foodhandlers working in any type of food manufacturing plant. The film highlights Good Manufacturing Practices and their role in assuring food safety. The professional foodhandler is introduced to a variety of sanitation topics including: 1) foodhandlers as a source of food contamination, 2) personal hygiene as a means of preventing food contamination, 3) approved food storage techniques including safe storage temperatures, 4) sources of cross-contamination, 5) contamination of food by insects and rodents, 6) garbage handling and pest control, and 7) design and location of equipment and physical facilities to facilitate cleaning.

- **Sanitizing for Safety**—(17 minute videotape). Provides an introduction to basic food safety for professional foodhandlers. A training pamphlet and quiz accompany the tape. Although produced by a chemical supplier, the tape contains minimal commercialism and may be a valuable tool for training new employees in the food industry. (Indiana–1990)

- **Seafood Q & A**—(20 minute videotape). Anyone who handles seafood, from processor to distributor to retail and food service, must be prepared to answer questions posed by customers. This tape features a renowned nutritionist and experts from the Food & Drug Administration, the National Marine Fisheries Service, and the National Fisheries Institute who answer a full range of questions about seafood safety. Excellent to educate and train employees about seafood safety & nutrition. (National Fisheries Institute)

- **SERVSAFE® Serving Safe Food**—(4-20 minute videotapes). This video series illustrates and reinforces important food safety practices in an informative and entertaining manner. The material is presented in an easy to understand format, making it simpler for employees to learn and remember this essential information. Each video includes a leader's guide that provides all the information managers need to direct a productive training session. (Educational Foundation of the National Restaurant Association–1993)

- **SERVSAFE® Serving Safe Food Second Edition**—(6-10 minute videotapes). The program still covers all the major areas of food safety training, but there is an added emphasis on training employees to follow HACCP procedures. The second edition program includes an Employee Guide, Leader's Guide and six instructional videos. (Educational Foundation of the National Restaurant Association–1993)

- **Supermarket Sanitation Program–"Cleaning and Sanitizing"**—(13 minute videotape). Contains a full range of cleaning and sanitizing information with minimal emphasis on product. Designed as a basic training program for supermarket managers and employees. (1989)

- **Supermarket Sanitation Program–"Food Safety"**—(11 minute videotape). Contains a full range of basic sanitation information with minimal emphasis on product. Filmed in a supermarket, the video is designed as a basic program for manager training and a program to be used by managers to train employees. (1989)

- **Take Aim at Sanitation**—(8 minute videotape). This video features tips on food safety and proper disposal of single service items. Also presented is an emphasis on food contact surfaces as well as the manufacture, storage and proper handling of these items. (Foodservice and Packaging Institute, Inc.–1995)

- **Wide World of Food-Service Brushes**—(18 minute videotape). Discusses the importance of cleaning and sanitizing as a means to prevent and control foodborne illness. Special emphasis is given to proper cleaning and sanitizing procedures and the importance of having properly designed and constructed equipment (brushes) for food preparation and equipment cleaning operations. (1989)

- **Your Health in Our Hands–Our Health in Yours**—(8 minute videotape). For professional foodhandlers, the tape covers the do's and don'ts of foodhandling as they relate to personal hygiene, temperature control, safe storage and proper sanitation. (Jupiter Video Production–1993)

ENVIRONMENTAL

- The ABC's of Clean–A Handwashing & Cleanliness Program for Early Childhood Programs—For early childhood program employees. This tape illustrates how proper handwashing and clean hands can contribute to the infection control program in daycare centers and other early childhood programs. (The Soap & Detergent Association–1991)
- Acceptable Risks?—(16 minute videotape). Accidents, deliberate misinformation, and the rapid proliferation of nuclear power plants have created increased fears of improper nuclear waste disposal, accidents during the transportation of waste, and the release of radioactive effluents from plants. The program shows the occurrence of statistically anomalous leukemia clusters; governmental testing of marine organisms and how they absorb radiation; charts the kinds and amounts of natural and man-made radiation to which man is subject; and suggests there is no easy solution to balancing our fears to nuclear power and our need for it. (Films for the Humanities & Sciences, Inc.–1993)
- Air Pollution: Indoor—(26 minute videotape). Indoor air pollution is in many ways a self-induced problem... which makes it no easier to solve. Painting and other home improvements have introduced pollutants, thermal insulation and other energy-saving and water-proofing devices have trapped the pollutants inside. The result is that air pollution inside a modern home can be worse than inside a chemical plant. (Films for the Humanities & Sciences, Inc.)
- Asbestos Awareness—(20 minute videotape). This videotape discusses the major types of asbestos and their current and past uses. Emphasis is given to the health risks associated with asbestos exposure and approved asbestos removal abatement techniques. (Industrial Training, Inc.–1988)
- Down in the Dumps—(26 minute videotape). Garbage is no laughing matter. The fact is that we are running out of space to dump the vast amounts of waste we create each day. Since many of the former methods of disposal are environmentally unacceptable, what are we to do? The program examines the technological approaches to the garbage dilemma, including composting, resource recovery, and high-tech incinerators, and public reaction to the creation of new waste treatment facilities. (Films for the Humanities & Sciences, Inc.)
- EPA Test Methods for Freshwater Effluent Toxicity Tests (using Ceriodaphnia)—(22 minute videotape). Demonstrates the Ceriodaphnia 7-Day Survival and Reproduction Toxicity Test and how it is used to monitor and evaluate effluents for their toxicity to biota and their impact on receiving waters and the establishment of NPDES permit limitations for toxicity. The tape covers the general procedures for the test including how it is set up, started, monitored, renewed and terminated. (1989)
- EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Fathead Minnow Larva)—(15 minute videotape). A training tape that teaches environmental professionals about the Fathead Minnow Larval Survival and Growth Toxicity Test. The method described is found in an EPA document entitled, "Short Term Methods for Estimating the Chronic Toxicity of Effluents & Receiving Waters to Freshwater Organisms." The tape demonstrates how fathead minnow toxicity tests can be used to monitor and evaluate effluents for their toxicity to biota and their impact on receiving waters and the establishment of NPDES permit limitations for toxicity. (1989)
- Fit to Drink—(20 minute videotape). This program traces the water cycle, beginning with the collection of rain-water in rivers and lakes, in great detail through a water treatment plant, to some of the places where water is used, and finally back into the atmosphere. Treatment of the water begins with the use of chlorine to destroy organisms; the water is then filtered through various sedimentation tanks to remove solid matter. Other treatments employ ozone, which oxidizes contaminants and makes them easier to remove; hydrated lime, which reduces the acidity of the water; sulfur dioxide, which removes any excess chlorine; and floculation, a process in which aluminum sulfate causes small particles to clump together and precipitate out. Throughout various stages of purification, the water is continuously tested for smell, taste, titration, and by fish. The treatment plant also monitors less common contaminants with the use of up-to-date techniques like flame spectrometers and gas liquefaction. (Films for the Humanities & Sciences, Inc.–1987)
- Food-Service Disposables: Should I Feel Guilty?—(12 minute videotape). The video, produced by the Foodservice & Packaging Institute, Inc., national trade association of manufacturers and suppliers of single service articles for food service and packaging, examines such issues as litter, solid waste, recycling, composting and protection of the earth's ozone layer, makes for an excellent discussion opener on the theme of conservation of natural resources (trees, fresh water and energy) and the environmental trade-offs (convenience, sanitation and family health) that source reduction necessarily entails. (Foodservice & Packaging Institute, Inc.–1991)
- Garbage: The Movie—(25 minute videotape). A fascinating look at the solid waste problem and its impact on the environment. Viewers are introduced to landfills, incinerators, recycling plants and composting operations as solid waste management solutions. Problems associated with modern landfills are identified and low-impact alternatives such as recycling, reuse, and source reduction are examined. (Churchill Films)
- Global Warming: Hot Times Ahead?—(23 minute videotape). An informative video tape program that explores the global warming phenomenon and some of the devastating changes it may cause. This program identifies greenhouse gases and how they are produced by human

activities. Considered are: energy use in transportation, industry and home; effects of deforestation, planting of trees and recycling as means of slowing the build-up of greenhouse gases. (Churchill Films–1995)

- Kentucky Public Swimming Pool and Bathing Facilities—(38 minute videotape). Developed by the Lincoln Trail District Health Department in Kentucky and includes all of their state regulations which may be different from other states, provinces and countries. This tape can be used to train those responsible for operating pools and waterfront bath facilities. All aspects are included of which we are aware, including checking water conditions and filtration methods. (1987)
- Putting Aside Pesticides—(26 minute videotape). This program probes the long-term effects of pesticides and explores alternative pest-control efforts; biological pesticides, genetically-engineered microbes that kill objectionable insects, the use of natural insect predators, and the cross-breeding and genetic engineering of new plant strains that produce their own anti-pest toxins. (Films for the Humanities & Sciences, Inc.)
- Radon—(26 minute videotape). This program looks at the possible health implications of radon pollution, methods homeowners can use to detect radon gas in their homes, and what can be done to minimize hazards once they are found.
- RCRA–Hazardous Waste—(19 minute videotape). This videotape explains the dangers associated with hazardous chemical handling and discusses the major hazardous waste handling requirements presented in the Resource Conservation and Recovery Act. (Industrial Training, Inc.)
- The New Superfund: What It is & How It Works—A six-hour national video conference sponsored by the EPA. Target audiences include the general public, private industry, emergency responders and public interest groups. The series features six videotapes that review and highlight the following issues:
  - Tape 1–Changes in the Remedial Process: Clean-up Standards and State Involvement Requirements—(62 minute videotape). A general overview of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and the challenge of its implementation. The remedy process–long-term and permanent clean-up–is illustrated step-by-step, with emphasis on the new mandatory clean-up schedules, preliminary site assessment, petition procedures and the hazard ranking system/National Priority List revisions. The major role of state and local government involvement and responsibility is stressed.
  - Tape 2–Changes in the Removal Process: Removal and Additional Program Requirments—(48 minute videotape). The removal process is a short-term action and usually an immediate response to accidents, fires and illegall dumped hazardous substances. This program explains the changes that expand removal authority and require procedures consistent with the goals of remedial action.
  - Tape 3–Enforcement and Federal Facilities—(52 minute videotape). Who is responsible for SARA clean-up costs? Principles of responsible party liability; the difference between strict, joint and several liability; and the issue of the innocent landowner are discussed. Superfund enforcement tools-mixed funding, De Minimis settlements and the new nonbinding preliminary allocations of responsibility (NBARs) are explained.
  - Tape 4–Emergency Preparedness and Community Right-to-Know—(48 minute videotape). A major part of SARA is a free-standing act known as Title III: The Emergency Planning and Community Right-to-Know Act of 1986, requiring federal, state, and local governments and industry to work together in developing local emergency preparedness/response plans. This program discusses local emergency planning committee requirements, emergency notification procedures, and specifications on community right-to-know reporting requirements, such as using OSHA Material Safety Data Sheets, the emergency & hazardous chemical inventory and the toxic chemical release inventory.
  - Tape 5–Underground Storage Tank Trust Fund and Response Program—(21 minute videotape). Another addition to SARA is the Leaking Underground Storage Tank (LUST) Trust Fund. One half of the U.S. population depends on ground water for drinking–and EPA estimates that as many as 200,000 underground storage tanks are corroding and leaking into our ground water. This program discusses how the LUST Trust Fund will be used by EPA and the states in responding quickly to contain and clean-up LUST releases. Also covered is state enforcement and action requirements, and owner/operator responsibility.
  - Tape 6–Research and Development/Closing Remarks—(33 minute videotape). An important new mandate of the new Superfund is the technical provisions for research and development to create more permanent methods in handling and disposing of hazardous wastes and managing hazardous substances. This segment discusses the SITE (Superfund Innovative Technology Evaluation) program, the University Hazardous Substance Research Centers, hazardous substance health research and the DOD research, development and demonstration management of DOD wastes.
- Sink A Germ—(10 minute videotape). A presentation on the rationale and techniques for effective hand-washing in health care institutions. Uses strong imagery to edu-

cate hospital personnel that handwashing is the single most important means of preventing the spread of infection. (The Brevis Corp.–1986)

- ❑ **Waste Not: Reducing Hazardous Waste**—(35 minute videotape). This tape looks at the progress and promise of efforts to reduce the generation of hazardous waste at the source. In a series of company profiles, it shows activities and programs within industry to minimize hazardous waste in the production process. Waste Not also looks at the obstacles to waste reduction, both within and outside of industry, and considers how society might further encourage the adoption of pollution prevention, rather than pollution control, as the primary approach to the problems posed by hazardous waste. (Umbrella films)

OTHER

- ❑ Diet, Nutrition and Cancer—(20 minute videotape). Investigates the relationship between a person's diet and the risk of developing cancer. The film describes the cancer development process and identifies various types of food believed to promote and/or inhibit cancer. The film also provides recommended dietary guidelines to prevent or greatly reduce the risk of certain types of cancer.
- ❑ Eating Defensively: Food Safety Advice for Persons with Aids—(15 minute videotape). While HIV infection and AIDS are not acquired by eating foods or drinking liquids, persons infected with the AIDS virus need to be concerned about what they eat. Foods can transmit bacteria and viruses capable of causing life-threatening illness to persons infected with AIDS. This video provides information for persons with AIDS on what foods to avoid and how to better handle and prepare foods. (FDA/CDC–1989)
- ❑ Ice: The Forgotten Food—(14 minute videotape). This training video describes how ice is made and where the critical control points are in its manufacture, both in ice plants and in on-premises locations (convenience stores, etc.); it documents the potential for illness from contaminated ice and calls on government to enforce good manufacturing practices, especially in on-premises operations where sanitation deficiencies are common. (Packaged Ice Association–1993)
- ❑ Legal Aspects of the Tampering Case—(25 minute videotape). This was presented by Mr. James T. O'Reilly, University of Cincinnati School of Law at the fall 1986 Central States Association of Food and Drug Officials Conference. He emphasizes three factors from his police and legal experience–know your case, nail your case on the perpetrator, and spread the word. He outlines specifics under each factor. This should be of the greatest interest to regulatory sanitarians, in federal, state and local agencies. (1987)
- ❑ Personal Hygiene & Sanitation for Food Processing Employees—(15 minute videotape). Illustrates and describes the importance of good personal hygiene and sanitary practices for people working in a food processing plant. (Iowa State–1993)
- ❑ Psychiatric Aspects of Product Tampering—(25 minute videotape). This was presented by Emanuel Tanay, M.D. from Detroit, at the fall 1986 conference of CSAFDA. He reviewed a few cases and then indicated that abnormal behavior is like a contagious disease. Media stories lead to up to 1,000 similar alleged cases, nearly all of which are false. Tamper-proof packaging and recalls are essential. Tampering and poisoning are characterized by variable motivation, fraud and greed. Law enforcement agencies have the final responsibilities. Tamper proof containers are not the ultimate answer. (1987)
- ❑ Tampering: The Issue Examined—(37 minute videotape). Developed by Culbro Machine Systems, this videotape is well done. It is directed to food processors and not regulatory sanitarians or consumers. A number of industry and regulatory agency management explain why food and drug containers should be made tamper evident. (Culbro–1987)

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Dairy, Food and Environmental Sanitation, Vol. 17, No. 11, Pages 748-754

3-A Sanitary Standards for Italian-Type Pasta Filata Style Moulded Cheese Chillers Number 72-00

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

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Italian-type pasta filata style moulded cheese chiller specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. **NOTE:** Use current revisions or editions of all referenced documents cited herein.

A **SCOPE**

A1 These standards cover the sanitary aspects of Italian-type pasta filata style moulded cheese chillers including but not limited to mozzarella and provolone cheese. The equipment described in these standards is used to cool the moulded cheese. The equipment shall begin at the point where the warm moulded cheese enters, and terminates where the formed-chilled cheese exits the mould. The equipment may include individual or combined components such as cheese moulds, conveyors, direct cooling media systems, and cheese demoulding apparatus. These standards include methods for direct cooling of the cheese and may include one or more of the following uses of the cheese cooling media: immersion, spray, cascade, circulation or recirculation. With regard to the use of steam, water, or cooling media, the equipment shall begin and end at the manufacturer's supplied fittings.

A2 In order to conform with these 3-A Sanitary Standards, Italian-type pasta filata style moulded cheese chillers shall comply with the following design, material, and fabrication criteria.

B **DEFINITIONS**

B1 *Product:* Shall mean cheese derived from milk and milk products.

B2 *Italian-Type Pasta Filata Style Cheese Chiller (referred to hereafter as a moulded cheese chiller):* Shall mean a process unit or vessel in which heated Italian type pasta filata style cheese is chilled within a mould to impart dimensional characteristics to the product.

B3 *Solutions:* Shall mean water and/or those homogeneous mixtures of cleaning agents and/or sanitizers and water used for flushing, cleaning, rinsing, and sanitizing.

B4 *Direct Cooling Media:* Shall mean any safe and sanitary media used to cool the cheese involving contact with product or product contact surfaces.

B5 **Surfaces**

B5.1 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop, diffuse or be drawn into the product. Direct cooling media contact surfaces shall be considered product contact surfaces.

B5.2 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

B6 **Cleaning**

B6.1 *Mechanical Cleaning or Mechanically Cleaned:* Shall mean soil removal by impingement, circulation or flowing chemical detergent solutions and water rinses onto and over

the surfaces to be cleaned by mechanical means in equipment or systems specifically designed for this purpose.

B6.2 *Manual (COP) Cleaning:* Shall mean soil removal when the equipment is partially or totally disassembled. Soil removal is effected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and scrapers, high or low pressure hoses and tank(s) which may be fitted with recirculating pump(s), and with all cleaning aids manipulated by hand.

B7 **Surface Modification**[1]

B7.1 *Surface Treatments:* Shall mean a process whereby chemical compositions or mechanical properties of the existing surface are altered. There is no appreciable, typically less than 1 µm, build-up of new material or removal of existing material.

B7.1.1 Surface treatments include:

1. Mechanical (shot peening[2] glass beading, polishing)
2. Thermal (surface hardening laser, electron beam)
3. Diffusion (carburizing, nitriding)
4. Chemical (etching, oxidation)
5. Electropolishing

B7.2 *Coatings:* Shall mean the results of a process where a different material is deposited to create a new surface. There is appreciable, typically more than 1 µm, build-up of new material.

B7.2.1 Coating processes include:

1. Chemical (conversion coatings)
2. Electrodeposition[3]
3. Spraying (pneumatic, flame, plasma, arc spray)

B8 *Soil:* Shall mean the presence of unwanted organic residue or inorganic matter, with or without microorganisms, including food residue, in or on the equipment.

B9 *Sanitizing or Sanitization:* Shall mean a process applied to a cleaned surface which is capable of reducing the numbers of the most resistant human pathogens by at least 5 log cycles (99.999%) by applying hot water or steam or by applying an EPA registered sanitizer according to label directions. Sanitizing may be effected by mechanical or manual methods.

B10 *Easily or Readily Removable:* Shall mean quickly separated from the equipment with the use of simple hand tools if necessary.

B11 *Easily or Readily Accessible:* Shall mean a location which can be safely reached by an employee from the floor, platform, or other permanent work area.

B12 *Inspectable:* Shall mean all product contact surfaces can be made available for close visual observation.

B13 *Simple Hand Tools:* Shall mean implements normally used by operating and cleaning personnel such as a screwdriver, wrench or hammer.

B14 *Nontoxic Materials:* Shall mean those substances which under the conditions of their use are in compliance with applicable requirements of the Food, Drug and Cosmetic Act of 1938, as amended.

B15 *Corrosion Resistant:* Shall mean the surface has the property to maintain its original surface characteristics for its predicted service period when exposed to the conditions encountered in the environment of intended use including expected contact with product and cleaning or sanitizing compounds or solutions.

C **MATERIALS**

C1 **Metals**

C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[4] or corresponding Alloy Cast Institute[5] (ACI) types (See Appendix, Section E), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

C1.1.1 Moulds made of the materials provided for in C1.1 may have their product contact surfaces modified by surface treatment or coating(s).

C1.1.2 Drive shafts and knives may also be made of stainless steel of the AISI 400 Series that is made as corrosion resistant as AISI 300 Series by surface treatment or coating(s) or made of nontoxic, nonabsorbent metal that is as corrosion resistant, under the conditions of intended use, as stainless steel of the AISI 300 Series.

C2 **Nonmetals**

C2.1 Rubber and rubber-like materials may be used for gaskets, curtains, seals, plungers, plunger coatings, hoses, pneumatic discharge components, and parts having the same functional purposes.

C2.1.1 Rubber and rubber-like materials when used for the above specified application(s) shall conform with the applicable provisions of the 3-A

Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C2.2 Plastic materials may be used for gaskets, curtains, sight and light openings, bearings, bushings, conveyors, sprockets, cut-off devices, seals, plungers, hoses, pneumatic discharge components, guide rails, spray devices and spray device components, slip sheets, moulds and mould components and parts having the same functional purposes.

C2.2.1 Plastic materials may also be used as coatings for moulds, mould components, and cut-off devices and parts having the same functional purposes.

C2.2.2 Plastic materials when used for the above specified application(s) shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C2.3 Rubber and rubber-like materials and plastic materials having product contact surfaces shall be of such composition as to retain their surface and conformational characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C2.4 The final bond and residual adhesive, if used, on bonded rubber and rubber-like materials and bonded plastic materials shall be nontoxic[6].

C2.5 Where materials having certain inherent functional purposes are required for specific applications, such as shaft seals, carbon, and/or ceramic materials may be used. Carbon and/or ceramic materials shall be inert, nonporous, nontoxic, nonabsorbent, insoluble and shall be resistant to scratching, scoring and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C3 **Nonproduct Contact Surfaces**

C3.1 All nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. All nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

D **FABRICATION**

D1 **Surface Texture**

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

D2 **Permanent Joints**

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded, except that:

D2.1.1 In such cases where welding is impractical, press-fitting or shrink-fitting may be employed where necessary for essential functional reasons such as bearings. (See Appendix, Section G.)

D2.2 Product contact surfaces joined by welding, press-fitting and shrink-fitting shall have product contact surface texture which is in compliance with D1.1.

D3 **Coatings**

D3.1 Coatings, if used, shall be free from surface delamination, pitting, flaking, spalling, blistering and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

D3.2 The minimum thickness of electrodeposited coatings shall not be less than 0.0002 in. (0.005 mm) for all product contact surfaces when used on stainless steel. When these surfaces are other than stainless steel, the minimum thickness of electrodeposited coatings shall not be less than 0.002 in. (0.05 mm).

D3.3 Plastic materials, when used as a coating, shall be at least 0.0005 in. (0.0127 mm) thick.

D4 **Cleaning and Inspectability**

D4.1 A moulded cheese chiller that is to be mechanically cleaned shall be designed so that the product contact surfaces of the moulded cheese chiller and all nonremoved appurtenances thereto can be mechanically cleaned and are readily accessible and inspectable. Demountable parts shall be readily removable.

D4.2 Product contact surfaces not designed to be mechanically cleaned shall be easily accessible and inspectable either when in an installed position or when removed. Demountable parts shall be readily removable. When parts having product contact surfaces are too large or heavy for manual handling, an appropriate mechanical means for handling shall be provided.

D5 **Draining**

D5.1 All product contact surfaces shall be self-draining or drainable except for normal clingage.

D6 **Sanitary Fittings, Valves, Connections and Tubing**

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

D6.2 All sanitary valves shall conform with the 3-A Sanitary Standards for Plug-Type Valves for Milk and Milk Products, Number 51-; 3-A Sanitary Standards for Compression-Type Valves for Milk and Milk Products, Number 53-; 3-A Sanitary Standards for Diaphragm-Type Valves for Milk and Milk Products, Number 55-; and 3-A Sanitary Standards for Vacuum Breakers and Check Valves for Milk and Milk Products, Number 58-.

D6.3 All instrument connections having product contact surfaces shall conform with the 3-A Sanitary Standards for Sensors and Sensor Fittings and Connections Used on Fluid Milk and Milk Products Equipment, Number 74-.

D6.4 All metal tubing shall conform with the applicable provisions for welded sanitary product pipelines found in the 3-A Accepted Practices for Permanently Installed Product and Solution Pipelines and Cleaning Systems Used in Milk and Milk Product Processing Plants, Number 605- and with the 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33-.

D6.5 All flexible connections which constitute a hose assembly shall conform with the 3-A Sanitary Standards for Hose Assemblies for Milk and Milk Products, Number 62-.

D7 **Pumps For Circulated Direct Cooling Media**

D7.1 Pumps, if provided, shall conform with the 3-A Sanitary Standards for Centrifugal and Positive Rotary Pumps for Milk and Milk Products, Number 02-.

D8 **Heat Exchangers For Circulated Direct Cooling Media**

D8.1 Tubular heat exchangers, if provided, shall conform with the 3-A Sanitary Standards for Tubular Heat Exchangers for Milk and Milk Products, Number 12-.

D8.2 Plate heat exchangers, if provided, shall conform with the 3-A Sanitary Standards for Plate-Type Heat Exchangers for Milk and Milk Products, Number 11-.

D9 **Gaskets**

D9.1 Gaskets having a product contact surface shall be removable or bonded.

D9.2 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be bonded in a manner that the bond is continuous and mechanically sound so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treat ment, the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D9.3 Grooves in gaskets shall be no deeper than their width unless the gasket is readily removable and reversible for cleaning.

D9.4 Gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm), and those provided for in Section D6.1.

D10 **Radii**

D10.1 All internal angles of less than 135° on product contact surfaces, shall have radii of not less than 1/4 in. (6.35 mm), except that:

D10.1.1 Smaller radii may be used when they are required for essential functional reasons, such as those in shaft seals. In no case shall such radii be less than 1/32 in. (0.794 mm).

D10.1.2 The radii in grooves in gaskets or gasket retaining grooves shall be not less than 1/8 in. (3.18 mm) except those for standard 1/4 in. (6.35 mm) and smaller O-rings, and those provided for in Section D6.

D10.1.3 Radii in standard O-ring grooves shall be as specified in Appendix, Section J.

D10.1.4 The minimum radii for fillets of welds in product contact surfaces shall be not less than 1/4 in. (6.35 mm) except that the minimum radii for such welds may be 1/8 in. (3.18 mm) when the thickness of one or both parts joined is less than 3/16 in. (4.76 mm).

D11 **Threads**

D11.1 There shall be no threads on product contact surfaces, except where necessary for attaching shuttle base mounting, and for weight, fill or chute adjusting.

D11.1.1 In such cases, the threads shall be ACME type as specified in the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63- or the American Standard Stub Acme Thread. These threads shall conform to Figure (1), the American Stub Acme Thread. (See Appendix Section I.) The threaded angles shall not be less than 60° and not more than 8 threads to the inch, nor less than 5/8 in. (15.88 mm) major basic diameter. The length of the nut shall not exceed three quarters of the thread's basic major diameter and the nut shall be of the open type. Equipment components with exposed threads as described above shall be designed for manual cleaning.

D12 **Springs**

D12.1 Any coil spring having product contact surfaces shall have at least 3/32 in. (2.38 mm) openings between coils, including the ends, when the spring is in the free position.

D13 **Shafts and Bearings**

D13.1 Shaft seals, when provided, shall be of a packless type and sanitary in design, and shall be readily accessible for cleaning and inspection.

D13.2 Bearings having a product contact surface shall be of a nonlubricated type.

D13.3 Lubricated bearings, including the permanent sealed type, shall be located outside the product contact surface with at least 1 in. (25.4 mm) clearance open for inspection between the bearing and any product contact surface.

D13.4 Where a shaft passes through a product contact surface without a shaft seal, the portion of the opening surrounding the shaft shall be protected to prevent the entrance of contaminants.

D14 **Openings and Covers**

D14.1 Sight and light openings provided shall conform with the applicable provisions of the 3-A Sanitary Standards for Sight and/or Light Windows and Sight Indicators in Contact with Milk and Milk Products, Number 65-.

D14.2 The access port cover shall be the inside or outside swing type. If the cover swings inside, it shall also swing outside away from the opening for disassembly and cleaning. No threads or ball joints shall be employed within the product zone to attach the access port cover and its appendages. The access port cover and its appendages shall be removable without tools. The access port cover for a top-entering access port opening shall be of the outside swing type.

D14.3 Openings through a fixed bridge and either hinged or removable covers, to which connections are not permanently attached, shall be flanged upward at least 3/8 in. (9.52 mm). All sanitary pipelines and other appurtenances entering through the cover shall be fitted with a sanitary umbrella deflector that overlaps the edges of the opening. Other openings, with the exception of agitator openings, shall have a removable cover, which shall be downwardly flanged to make close contact with the upper edges of the upwardly flanged opening in the cover surface. When the removable cover is located in the main cover, it shall remain in position when the main cover is raised.

D14.4 Covers and bridges shall pitch to an outside edge(s).

D14.4.1 Permanent covers and bridges shall be integral with or continuously welded to the liner.

D15 **Fines Basket**

D15.1 Where a perforated basket is required for the collection of cheese fines, the basket shall be constructed so that perforations in product contact surfaces shall be readily accessible and inspectable. Perforations shall not be less than 1/32 in. (0.794 mm) in diameter. Slots shall be at least 1/32 in. (0.794 mm) wide. All perforations shall be free of burrs.

D16 **Supports**

D16.1 The means of supporting a moulded cheese chiller shall be one of the following:

D16.1.1 If legs are used they shall be smooth with rounded ends or with flat, load bearing feet suitable for sealing to the floor, and have no exposed threads. Legs made of hollow stock shall be sealed. Legs shall provide a minimum clearance between the lowest part of the base and the floor of not less than 6 in. (152.4 mm).

D16.1.2 If casters are used they shall be of sufficient size to provide a clearance between the lowest part of the base and the floor of not less than 6 in. (152.4 mm). Casters, if provided, shall be easily cleanable, durable and of a size that will permit easy movement of the Italian moulded cheese chiller.

D17 **Guards**

D17.1 Guards required by a safety standard that will not permit accessibility for cleaning and inspection shall be designed so that they can be removed with the use of simple hand tools.

D18 **Nonproduct Contact Surfaces**

D18.1 Nonproduct contact surfaces shall have a smooth finish, free of pockets and crevices, be readily cleanable and those surfaces to be coated shall be effectively prepared for coating.

D19 **Information Plate**

D19.1 Moulded cheese chillers which have temperature limitations for operation or cleaning shall have appropriate cautionary wording on the machine name plate or on an information plate in juxtaposition to the name plate. (See Appendix H.)

D19.2 Moulded cheese chillers which have plastic coated product contact surfaces shall display appropriate cautionary wording about

cleaning materials or procedures on the machine name plate or on an information plate in juxtaposition to the name plate. (See Appendix H.)

D19.3 All identification or information shall be attached to the exterior of the moulded cheese chiller in such a way as to be effectively sealed.

APPENDIX

E **STAINLESS STEEL MATERIALS**

Stainless steel conforming to the applicable composition ranges established by AISI for wrought products, or by ACI for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08%. The first reference cited in C1 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM specifications[7] A351/A351M, A743/A743M and A744/A744M.

F **PRODUCT CONTACT SURFACE FINISH**

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum R_a of 32 µin. (0.80 µm), when measured according to the recommendations in American National Standards Institute (ANSI) / American Society of Mechanical Engineers (ASME)[8] B46.1 - *Surface Texture*, is considered to be equivalent to a No. 4 finish.

G **PRESS-FITS AND SHRINK-FITS**

Press-fits or shrink-fits may be used to produce crevice free permanent joints in metallic product contact surfaces when welding is not practical. Joints of this type may only be used to assemble parts having circular cross sections, free of shoulders or relieved areas. For example: they may be used to assemble round pins or round bushings into round holes. In both types of fits, the outside diameter of the part being inserted is greater than the inside diameter of the hole. In the case of the press-fit the parts are forced together by applying pressure. The pressure required is primarily dependent upon the diameter of the parts, the amount of interference and the distance the inner member is forced into the outer member.

In shrink-fits, the diameter of the inner member is reduced by chilling it to a low temperature. Dry ice is commonly used to shrink the inner member. Heat may also be applied to the outer member of the press-fit. Less assembly force is required for this type of fit.

The design of these fits depends on a variety of factors. The designer should follow recommended practices to assure that a crevice-free joint is produced. A recognized authoritative reference is *Machinery's Handbook* published by Industrial Press Inc., 200 Madison Avenue, New York, NY 10157.

H **INFORMATION PLATE(S)**

Manufacturers should provide an information plate in juxtaposition to the name plate giving the following information or cautionary statement which may be required on some moulded cheese chillers as outlined in Section D19. The specific information displayed on the information plate will vary among manufacturers. The following examples are for illustration purposes only and are not intended to specify precise wording of the statements:

H1 **CAUTION**

Do not operate or clean this machine at temperatures above {__°F (__°C)}. Exceeding this temperature may cause serious damage.

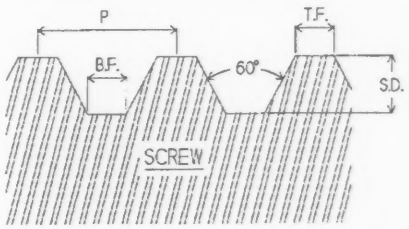
H2 **CAUTION**

During handling or cleaning of this machine, avoid abrasion or rubbing of the plastic coated surfaces. Do not use metal scrapers, brushes, or any abrasive scouring pads. Follow recommended cleaning instructions in your operators manual.

I **THREADS**

I1 Figure 1 – American Standard Stub Acme Thread Specifications

AMERICAN STUB ACME THREAD



S.D. = SINGLE DEPTH	S.D = 0.433 x P
T.F. = TOP FLAT	T.F. = 0.250 x P
B.F. = BOTTOM FLAT	B.F. = 0.227 x P
T.P.I. = THREADS PER INCH	

J O-RING GROOVE RADII

TABLE 1 - Groove Radii Dimensions for Standard O-Rings

O-Ring Cross Section, Nominal (AS 568[9])	O-Ring Cross Section, Actual (AS 568)	O-Ring Cross Section, Actual (ISO 3601-1[10])	Minimum Groove Radius
1/16 in.	0.070 in.	1.80 mm	0.016 in. (0.406 mm)
3/32 in.	0.103 in.	2.65 mm	0.031 in. (0.787 mm)
1/8 in.	0.139 in.	3.55 mm	0.031 in. (0.787 mm)
3/16 in.	0.210 in.	5.30 mm	0.062 in. (1.575 mm)
1/4 in.	0.275 in.	7.00 mm	0.094 in. (2.388 mm)

These standards are effective November 23, 1997.

[1]Additional information on surface modification is contained in *Advance Materials and Processes,* Volume 137(1), January 1990;*Coatings and Coating Practices* by H. Herman, p. 59; *Surface Modification* by F. A. Smidt, p. 61. ASM International, Materials Park, OH 44073; 216.338.5151.

[2]MIL-5-13165C-7, June 1989, Military Specification: *Shot Peening of Metal Parts*. Available from Standardization, Document Order Desk (Department of Navy), 700 Robbins Avenue, Building 4, Section D, Philadelphia, PA 19111-5094; 215.697.2167.

[3]Federal Specification #QQ-C-320B for Chromium Plating (Electrodeposited), June 17, 1994 with Amendment 4 on April 10, 1987. Federal Specification #QQ-N-290A for Nickel Plating (Electrodeposited), November 12, 1971. Available from the General Services Administration, Federal Supply Services Bureau, Specification Section, 470 East L'Enfant Plaza, Suite 8100, Washington, D.C. 20407; 202.755.0325.

[4]The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, November 1990, Table 2-1, pp. 17-20. Available from the Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086; 412.776.1535.

[5]Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016; 708.299.9160.

[6]21 CFR 175 – Indirect Food Additives: Adhesives and Components of Coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402; 202.783.3238.

[7]Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959; 610.832.9500.

[8]Available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392; 212.705.7722.

[9]The document establishing these standard dimensions is Aerospace Standard (AS) 568, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15086; 412.776.4970.

[10]The document establishing these standard dimensions is ISO 3601-1: 1988 (E), published by the International Organization for Standardization (ISO), 1 Rue de Varembe, Case Postale 58, CH 1 1211, Geneva, Switzerland (41-22-734-1240).

ComingEvents

DECEMBER

·**3-5, 3rd Annual SERDP Symposium,** at the Washington Hilton Hotel, Washington, D.C. For the first time, it will sponsored in cooperation with the Environmental Security Technology Certification Program (ESTCP). For further information, contact SERDP Program Office, 901 N. Stuart St., Suite 303, Arlington, VA 22203; Phone: 703.696.2117; Fax 703.696.2114.

·**3-5, Good Clinical Practices,** San Francisco Bay Area, CA. This course will emphasize the specific responsibilities of those involved in clinical research along with the requirements by the federal agency to approve research developed for an NDA submission. For further information, contact Registrar, The Center for Professional Advancement, P.O. Box 1052, East Brunswick, NJ 08816; Phone: 908.613.4500; Fax: 908.238.9113.

·**8-10, Current Good Manufacturing Practice (cGMP) for the Pharmaceutical and Allied Industries,** Boca Raton, FL. For further information, contact Registrar, The Center for Professional Advancement, P.O. Box 1052, East Brunswick, NJ 08816; Phone: 908.613.4500; Fax: 908.238.9113.

·**9-10, Practical Microbiology II: Sanitation,** Guelph, Ontario. A workshop that focuses on the principles of cleaning, sanitizing, and microbial contamination, including biofilms. For further information, contact Marlene Inglis at 519.767.5028; Fax: 519.836.1281; E-mail: gftc@uoguelph.ca.

·**9-10, Food Service HACCP,** New Brunswick, NJ. This two-day Hazard Analysis Critical Control Point (HACCP) approach is a unique management and inspection program based on the most frequent causes of foodborne disease outbreaks. For more information, contact Keith Wilson, Sr. Program Coordinator, Phone: 732.923.9271; Fax: 732.932.1187; E-mail: ocpe@aesop.rutgers.edu OR hill@aesop.rutgers.edu.

·**11-12, HACCP: Train the Trainer,** Guelph, Ontario. This program will provide HACCP team members and coordinators with techniques to train plant floor personnel effectively. Learn to make training effective and relevant to line personnel, to deliver content and use materials effectively, to use demonstrations and feedback for maximum effect and to develop your own HACCP training plan. For further information, contact Marlene Inglis at 519.767.5028; Fax: 519.836.1281; E-mail: gftc@uoguelph.ca.

JANUARY 1998

·**5-9, Ice Cream Makers' Short Course,** Madison, WI. Offered by the University of Wisconsin-Madison. This 5-day short course is for those involved in or interested in the manufacture of frozen desserts or frozen novelties. Program Coordinator: Dr. Bob Bradley, 608.263.2007. For additional information, contact the Program Coordinators or Department of Food Science, University of Wisconsin-Madison, Phone: 608.262.3046 or Fax: 608.262.6872.

·**12-15, Milk Pasteurization and Process Control School,** Madison, WI. Offered by the University of Wisconsin-Madison. This 4-day short course provides in-depth training for those dairy industry personnel involved with thermal processing of milk and milk programs. Program Coordinator: Dr. Bob Bradley, 608.263.2007. For additional information, contact the Program Coordinator or Department of Food Science, University of Wisconsin-Madison, Phone: 608.262.3046 or Fax: 608.262.6872.

·**19-21, ASI Food Safety Consultants Lead Auditor Training Seminar,** at the Holiday Inn Downtown-Riverfront, St. Louis, MO. Learn how to perform your own food safety GMP inspections. For more information, contact Vicki Bodrow, ASI Food Safety Consultants, Inc., 7625 Page Blvd., St. Louis, MO 63133; Phone: 800.477.0778.

·**27-28, Emerging Issues in Food Science, Nutrition and Technology,** sponsored by Southern California Chapter-Institute of Food Technologists. For more information, contact Mindy Reeves, Phone: 909.869.2200; Fax: 909.896.4454; E-mail: msreeves@csupomona.edu.

·**29, Feb. 2, INDPACK '98 International,** International Exhibition & Conference for the Packaging Industry, in Mumbai (Bombay), India. For further information, contact Dusseldorf Trade Shows, New York, 70 West 36th St., Suite 605, New York, NY 10018; Phone: 212.356.0400; Fax: 212.356.0404; Website: http://www.dtsusa.com/dts/.

FEBRUARY

·**3-4, Key Principles of Food Microbiology,** Brunswick, NJ. This course will introduce the principles of food microbiology and how to apply them to solve practical food microbiological problems. Participants will become familiar with environmental factors that influence the growth of bacteria in foods, genera of bacteria commonly associated with foodborne disease, HACCP tools and concepts and rapids in food microbi-

ology. For further information, contact Keith Wilson, Phone: 732.932.9271; Fax: 732.932.1187; E-mail: ocpe@aesop.rutgers.edu.

• **19-20, Concentrated & Dried Milk and Whey Products,** San Francisco Airport Hilton, San Francisco, CA. Review and update on science and technology of concentrated milk and whey products. Topics include the latest information on manufacture, performance and marketing trends including food applications and specifications of concentrated dairy ingredients such as concentrated milks, nonfat dry milk, whole milk powders and concentrates. For more information, contact Phil Tong, Phone: 805.756.6102; E-mail: ptong@calpoly.edu.

MARCH

• **23-27, PanAmerican Congress on Mastitis Control and Milk Quality,** Co-sponsored by IAMFES. Merida, Yucatan, Mexico. For more information contact: Dr. W. Nelson Philpot, P.O. Box 120, Homer, LA 71040, Phone: 318.927.2388; Fax: 318.927.3133.

APRIL

• **2-4, Introduction to Statistical Methods for Sensory Evaluation of Foods,** University of California-Davis, Davis, CA. This course introduces statistical analysis to the beginning sensory scientist with little or no statistical background and demonstrates how to perform the tests and provides a solid basis of understanding for sensory analysis. To register call 800.752.0881; after November 1, 1997, call 530.757.8777. For program information, contact Michael O'Mahony, at 916.752.6389; E-mail: maomhony@ucdavis.edu.

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	Procedures to Implement the Hazard Analysis Critical Control Point System	6.00	12.00	
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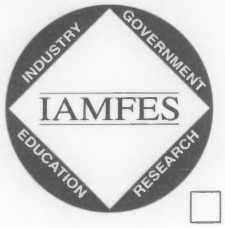

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