In February 2005, a Texas food plant recalled 353,533 pounds of frozen food product when customer complaints of glass fragments were reported. In 1990, a disgruntled employee placed smashed fluorescent lamp glass splinters into dog food to blackmail the company. A couple years before that, a well-known baby food company conducted a major recall after consumers discovered glass shavings in the product. Whether intentional or accidental, glass and brittle plastic contamination is a very serious violation. HACCP programs help control the occurrence, but it is also necessary to develop an effective glass and brittle plastics control program.

A quick search of the FDA Enforcement Reports and press releases shows that at least seven Class II recalls have been initiated for glass contamination since May 2001. Not all of the products were packaged in glass containers. Any uncontrolled glass in a food plant environment represents a significant compromise to product integrity. As responsible food manufacturers, we must develop glass control policies to meet the legal and moral obligations to our consumers.

WHAT ARE BRITTLE PLASTICS? Brittle plastics are plastics made from acrylic resins. Acrylic is considered brittle since it breaks into pieces when subjected to blows beyond its impact resistance. These materials are marketed under brand names such as Plexiglass®, Lucite®, Exelite® and Acrylite.® Polycarbonate plastics marketed under brand names such as Lexan®, Tuffak®, Zelux®, Cyrolon® and Cyroflex® are not considered to be brittle since they have high-impact resistance.

PROGRAM GOALS. The purpose of a glass and brittle plastics policy is to control any risks associated with the use of glass and brittle plastics that cannot be effectively protected or replaced with alternative materials, and are therefore required in the plant environment. Such items include thermometers, site glasses, windows, skylights, gauge covers, glassware used for chemical testing, light covers, packaging containers, ingredient containers, equipment guards, signal lights, equipment lights, etc.

An effective glass and brittle plastics control policy includes the following elements:
1. Identification of glass and brittle plastic materials in the plant.
2. Elimination or adequate protection of materials.
3. Inventory and inspection of materials that cannot be protected.
4. A contingency plan to handle any breakage that may occur.
5. Prevention of employees bringing materials into the plant.
6. Defined authority for reporting glass breakage incidents.
7. Defined responsibility for managing the program.
8. Audit and review of the program for effectiveness.

The first step in establishing this policy is to do a detailed inventory of the facility and list all places where glass and brittle plastics are located. If an alternate material can be used or if the glass or plastic can be effectively protected against breakage you should take measures to do so. If the material cannot be replaced or protected, then the risk to product integrity must be managed by the glass and brittle plastics policy.

Light bulbs can be protected and contained to control the risk of breakage. Several alternatives exist to accomplish this task. Fluorescent light tubes can be shielded within a covered light fixture. A plastic sleeve and end caps can be used to completely contain the bulbs. Several light bulb manufacturers produce fluorescent light bulbs that are coated with plastic that adheres to the surface of the bulb and contains all glass fragments when the bulb is broken. This type of plastic coating is also available for incandescent bulbs and floodlight bulbs.

Once light bulbs are protected from breakage, they are managed by prerequisite programs to ensure that the effectiveness of the protection is maintained. Over time, even protected light bulbs and light covers may become a hazard. Light covers may become loose from cleaning operations. Cleaning activities may loosen end caps on the...
tube sleeves and expose the glass bulb. The plastic coating may peel if the life of the bulb exceeds the predicted life and the ultraviolet light inhibitor included in the plastic is depleted before the bulb burns out. Any of these conditions negate the protection that was originally provided and put the food processing operation at risk for a foreign material contamination. Self-inspections and preventive maintenance will ensure that the protection provided remains intact.

Glass windows and skylights can be replaced with polycarbonate plastic or covered with a protective film that contains fragments created during breakage. Acrylic equipment guards can be replaced with polycarbonate guards. Glass thermometers can be replaced, contained or protected to manage the potential for breakage. Items that cannot be replaced or effectively protected must be added to an inventory list to identify where glass and brittle plastics are located within the facility. This list is used to verify that these items remain intact and have posed no threat to the integrity of the product since the last check. The appropriate frequency for verification is determined by the likelihood of breakage and the associated risk to the product. An employee should be trained to conduct the glass inventory verification inspections. Documentation of the inspections should be maintained as a record of the conditions observed.

Glass used for ingredients and packaging also should be included in the plant’s glass program. Each facility should develop, implement and verify procedures for handling breakage due to receipt, storage, filling, capping, etc. They should be specific to each area and should be based on the risk to the product.

In order to minimize the impact breakage might have, glass containers should not be stored near raw materials or other packaging materials. If segregation is not possible, the cleanup procedure should include a thorough inspection of the cleaned area and affected materials to ensure that all fragments of glass have been effectively removed. Glass containers are usually passed through an inverted cleaning system that will remove foreign material prior to filling. If this is not part of the operation, additional steps to ensure proper cleanup for breakage during receiving and storage may be needed.

NEXT STEPS. Any breakage that occurs during the filling process should be covered by a policy that identifies how many containers must be removed to ensure that all glass fragments that may have been dropped into open containers are removed from the process. Additionally, framework and structures that capture glass fragments need to be cleaned to remove the glass. A glass breakage incident report and inspection should be completed after the cleanup to record that all fragments were removed, rendering it safe to resume the filling operation. Utensils used for cleanup should be designated for this use only and cleaned on a frequent basis to ensure that glass fragments are not transferred to other parts of the operation.

Some ingredients, such as flavors and liquors, may only be available in glass containers. A program for handling these ingredients during receipt, storage, measuring, and scaling should focus on preventing breakage. There should be procedures to address cleanup if breakage should occur.

A cleanup procedure for all other types of glass breakage in the facility is also needed. Unprotected light bulbs may be broken during replacement. Procedures to address proper removal of glass fragments from affected surfaces should be developed and implemented. The best practices include notifying a supervisor of any breakage incident, accounting for all glass by reassembling or weighing the recovered pieces, and cleaning the broom and dustpan after each use. All breakage should be recorded on an incident report that states what was broken, when and where the incident occurred, what products (if any) were affected, and who removed the glass. An authorized person should sign this form validating that the cleaning was effective and the area is safe to resume normal operation. These forms should be maintained on file for future reference.

It is important to prohibit employees from introducing glass into the plant environment. This policy should be communicated during orientation training, as well as ongoing GMP training.

As with any written program, all personnel assigned to various responsibilities included in the program, should be trained. Employees who are working in areas where glass breakage is likely should be trained on cleanup and inspection procedures. These individuals should be given a written test to verify that they understand the elements of the program.

AUDITING THE PROGRAM. The glass and brittle plastics policy procedures should be audited in the plant on a predetermined basis to ensure that the procedures are performed as written. Someone who is not responsible for the supervision of the program should conduct the audit. It should be documented and any deficiencies should be reported to the person(s) responsible for supervising the procedures. Written corrective actions and follow-up inspections should also be implemented and documented.

Management should review the overall effectiveness of this program on a routine basis. Glass breakage incident reports, customer complaints relating to glass, and any recalls resulting from a program failure should be used to measure the program’s success. Quick solutions are needed to correct failures.

Failure to manage glass in a plant-processing environment can be a costly oversight. If glass contamination is noticed while the product is still in the plant, the affected product is discarded and the associated cost includes materials and labor. But, if contaminated product goes undetected and leaves the plant, the cost of a consumer injury, a recall, product destruction, negative publicity, and declining customer confidence may be immeasurable. As manufacturers of food meant for human consumption, we can control the environment in which our product is manufactured. Glass and brittle plastic procedures are designed to control one aspect of that environment to ensure that the integrity of the product we offer to our consumers is not compromised. Our customers expect nothing less from us.

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