Carson City Health & Human Services
Environmental Health Division

Food Service Training Manual
OBJECTIVE OF THIS MANUAL:

--To recognize the factors contributing to the outbreak of food borne illness and how to reduce the risk of food borne illness.

Public concern for food safety is becoming greater and greater each day. Even though our food supply is becoming safer each day, media coverage of food borne illness outbreaks places doubts in our minds of how safe our food really is.

It is estimated that there are more than 30 million cases of food borne illness every year. The annual cost of food borne illness is estimated to be between $7.7 and $23 billion. The unfortunate side is that most of these cases could have been prevented with proper food handling methods.

Food service workers are the most important step in the prevention of food borne illness. Each time a plate of food is served, there is a potential for food borne illness. If one person or several people contract food borne illness in a food establishment, there could be loss of customers and sales, loss of prestige and reputation, law suits, lowered employee morale and embarrassment. Food service workers must be informed and have the ability to make decisions regarding the quality of food they will serve.

It has been tested and proven that trained food service employees enhance the quality of their particular food facility. People will call their local health departments to determine if a particular facility has trained employees and will usually return to those establishments that do.

For many victims, food borne illness results only in discomfort or lost time from the job. For some, especially preschool age children, the elderly in health care facilities, and those with impaired immune systems, food borne illness is more serious and may be life threatening.

It is our sincere hope that the information presented in the following pages will inform and educate the professionals in Carson City’s food service industry and will enhance the established relationship with the Carson City Health Department.

Carson City Health and Human Services
# CARSON CITY HEALTH DEPARTMENT
## FOOD HANDLERS STUDY GUIDE

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WASHING YOUR HANDS IS NOT HARD TO DO!
The Safe Food Service Worker

Good personal hygiene is a critical protective measure against food borne illness. In addition, customers frequently judge a food service operation by observing the personnel serving them. By establishing a systematic approach to hiring, training, and supervising employees, the responsible food service worker will help protect the safety of the food served to customers, as well as enhance the quality of the dining experience.

It is ironic that people are the cause and the victims in food borne illness incidents. At every step in the flow of foods, through the operation from receiving through final service, employees can contaminate the food. When they contact their environment with their hands, perspiration, or breath, they spread bacteria and other microorganisms. Every unguarded cough or sneeze transmits a wave of invisible microorganisms capable of causing disease. Human excrement is also a significant factor in the spread of pathogens that can potentially contaminate food. Poor personal hygiene is one of the most frequent factors that contribute to food borne outbreaks.

The food service worker who wants to provide safe and wholesome food is confronted with a paradox; somehow he or she must build a sanitary barrier between the product and the people who prepare, serve, and consume it. To do this requires a trained staff of food service workers who possess the knowledge, skills, and attitudes necessary to operate the safe food system. The food service worker must:

- Determine the specific sanitation and food safety requirements for every job description.
- Hire employees who meet the job requirements.
- Orient new and present personnel in personal hygiene and safe food handling practices.
- Establish employee commitment to the safe food system.
- Conduct continuous supervision of sanitary practices.
- Enforce all rules equally.
- Revise all employee and sanitation rules as the job needs, the laws, and the science of food safety changes.
THE DANGER IN AND AROUND US

An apparently healthy individual may harbor sizable numbers of microorganisms. Staphylococci are found on the hair and skin and in a person's mouth, throat, and nose. The lower intestinal tract is a common habitat for _Shigella_ and _Clostridium perfringens_. According to one estimate, up to 50 percent of healthy food service workers are carriers of disease agents transmitted by food.

With some diseases, such as Hepatitis A, an individual is at the most infectious stage before the symptoms appear. For other diseases, once the individual becomes visibly ill, the risk of contamination is dramatically increased. A sore throat, a nagging cough, sinus pains, and other symptoms of the common cold are signs of infection with potentially dangerous consequences for the food service operation. The same can be said of symptoms of gastro-intestinal disorders, such as diarrhea or an upset stomach.

Even when the illness passes, some of the organisms that caused it may remain in an individual, making that person a carrier and a potential source of re-contamination. Salmonella may remain in a person's system for months after recovery, and Hepatitis A has been found in the intestinal tract up to five years after the disappearance of disease symptoms.

Respiratory-tract infections are especially difficult to control because they can be spread so easily to large groups. An uncontrolled sneeze expels numerous droplets, each of which may contain bacteria or viruses.

The temperature of a person's skin is ideal for bacterial growth, and skin secretions provide nutrients for this growth. Staphylococci abound in and around boils, pimples, carbuncles, inflamed cuts, burns, and infected eyes and ears. Because of these factors, food service workers hands are the most potentially dangerous serving equipment in the operation. Simple acts that in another setting would at worst be considered rude behavior—picking the nose, rubbing the ear, scratching the scalp, touching a pimple or open sore, or running fingers through the hair—are potential transportation for microorganisms to foods.
BUILDING AN EFFECTIVE PERSONAL HYGIENE SYSTEM

Establishing good personal hygiene practices requires you to:

- Set up and enforce standards, policies, and procedures for personal cleanliness among employees and management.
- Provide facilities and equipment that encourage personal cleanliness and sanitary practices.
- Supervise practices to ensure only healthy employees are allowed to work with food.

The truly safe food service worker is a product of continuing observation on the part of both trained employees and management. Every workday the manager must conscientiously observe workers and be on the lookout for disease symptoms and unsafe personal habits. Above all, it is not only the responsibility of management to stress the regular and constant practice of good personal hygiene, but to be an example for the employees to follow.

Personal Hygiene Standards and Policies

After hiring an applicant, an explanation of personal hygiene policies should be a part of the new employee’s orientation. The rules that are established should be easily understood and uniformly enforced. Employees should learn the rules either from the manager personally or from a highly dependable supervisor. Policies should be written in simple language, verbally explained to all staff, and made available for all employees to read in employee manuals. Post signs in employee restrooms, over hand washing stations, and on bulletin boards to reinforce the rules.

The employee rules and wording may vary, depending on the size and complexity of the food service operation, but they should cover these areas: personal cleanliness; proper working uniform; and prohibited actions and habits. After an employee reads and understands these rules, they should agree in writing to follow these standards of conduct.

Personal Cleanliness

Emphasis on personal hygiene is a fundamental responsibility of the food service worker. At least 25% of all food borne illness is caused by poor personal hygiene. Although it can be an awkward and embarrassing task for the manager to talk to mature people about personal cleanliness, those with poor hygienic practices and appearances are poor advertisements for the establishment and will offend customers. Rules for personal cleanliness follow:

Hand washing The most critical aspect of personal cleanliness is frequent and thorough hand washing. Body odor offends, and lack of bathing accelerates bacterial growth, but most often dirty hands and fingernails create a hazardous condition by contaminating the food product. Hand washing must follow any act that offers a possibility that the hands have picked up contaminants. One of the most notorious outbreaks of food borne illness on record involved a single food service worker who scratched a facial infection and then handled a large amount of sliced meats.
The following activities should always be followed by thorough hand washing:

- Using the restroom.
- Using a handkerchief or tissue.
- Handling raw food—particularly meat and poultry.
- Touching areas of the body, such as ears, mouth, nose, or hair, or scratching anywhere on the body.
- Touching infected or otherwise unsanitary areas of the body.
- Touching unclean equipment and work surfaces, soiled clothing, or wash rags.
- Smoking or using chewing tobacco.
- Clearing away and scraping used dishes and utensils, performing scullery operations.
- Eating food or drinking beverages.

Every one of these everyday actions and numerous others contaminate the food service workers hands. It may seem elementary, but clean hands are so critically important, that all employees must be instructed in proper hand washing procedures. A hand washing reminder can be added at certain points in preparation and operations manuals. Proper hand washing is more complicated than just running water and soap over the hands. All employees need to use the following techniques when washing their hands:

1. Turn the water on and let it run to a temperature as hot as the hands can comfortably stand.

2. Moisten the hands under the water and apply soap to them (antibacterial soap is recommended, and dispenser soap is preferred over bar soap), lathering well beyond the wrists and up the arms to the elbows, if short-sleeves are worn, to remove soil and dirt.

3. Pay particular attention to the areas between the fingers and around the nails. Use a brush for cleaning under the nails. Rinse the brush clean and store it in a sanitizing solution between and after every use.

4. Rub one hand against the other in a rotating motion using friction for 20 seconds.

5. Rinse thoroughly under the running water, allowing the water to flow from the elbows down to the fingertips. This action will rinse away contaminants. Turn water faucet off with a sanitary, single service towel, or your elbow.

6. Dry hands thoroughly with a hot air dryer or with a new sanitary, single service towel.

7. Do not touch anything that may re-contaminate the hands before returning to work. Use a sanitary paper towel to open the door to the restroom. Just because you carefully wash your hands does not mean the person leaving the restroom before you did. Drying hands on aprons or using a handkerchief will undo the process.

8. Repeat this procedure as often as necessary to keep hands clean at all times.
It is important that even though you have followed all proper hand washing guidelines, you should avoid as much as possible direct hand contact with ready-to-eat foods and foods that have been cooked. Do not put hand lotion on freshly washed hands, because lotion provides moisture that encourages bacteria on the skin to multiply.

**Hand Sanitizers** - Recently, the use of hand sanitizers, a liquid used to lower the number of microorganisms on the surface of the skin has become more common in the food service industry. **Hand sanitizers should not be used as a substitute for hand washing.** Instead, hand sanitizers must be used along with hand washing. Hands must be washed before the use of any sanitizer. In addition, hand sanitizers must be stored and dispensed under supplier-recommended conditions that must not result in the contamination of food, utensils, equipment, or food-contact surfaces.

**Gloves** - Proper use of various types of plastic gloves can provide an additional sanitary barrier between the food service worker and the food in some settings. Frequently, gloves are regarded by food service workers as more sanitary than bare hands. Because of this **false sense of security**, the food service worker’s hands may be contaminated and they just put on gloves thinking this is acceptable (this only contaminates the gloves). Hands must be washed prior to putting on gloves. Or the worker might not change the gloves after handling an item or product that might be contaminated, resulting in the cross contamination of other food products, or the food service worker. For example, after cutting raw chicken, the food service worker must not handle a cooked product with the same gloves.

It is important for the food service worker to realize that gloves are just as susceptible to contamination as bare hands and must be viewed as an extension of the hands. Gloves should not be used to avoid hand washing. After any action with gloves that would require hand washing, food service workers must throw away the gloves, wash their hands, and then put on new gloves. In addition, plastic or rubber gloves are not appropriate for use near heat.

**Fingernails** - Fingernails should be trimmed and clean. Ragged nails harbor bacteria and are very difficult to keep sanitary. Long fingernails, false fingernails, and acrylic nails can break off into food and have the same disadvantages as ragged nails because food can get caught in them. Fingernails should not be polished because polish can chip and contaminate a food product. Hangnails should be clipped, treated, and covered with a clean bandage.

In maintaining a staff policy on hand care, as with other hygienic routines, it is not enough to merely set up clear rules. A manager needs to explain all rules and set an example that will help enforce the rules. Rather than warning employees to keep their fingernails trimmed (or else), the manager should tell them: fingernails that are long or ragged are difficult to keep clean, and they carry a tremendous number of bacteria.
**Cuts and Abrasions** - Unprotected wounds are sources of disease causing bacteria and expose the employee to infection. Wounds and open sores in general must be antiseptically bandaged. Bandages on the hand must be covered with waterproof, disposable, plastic gloves that will protect the food as well as the food service worker. In addition, care must be exercised so the bandages do not fall off in food when gloves are removed. In some cases until the injury heals, the employee may need to move to another job station, where food or clean utensils are not handled.

**Hair Washing** - Keep hair clean. Oily, dirty hair can carry and hold huge numbers of disease causing bacteria. Since hair and dandruff can fall into food, good grooming habits and hair restraints are necessary to reduce the potential for contaminating food and food-contact surfaces.

**Bathing** - The manager should require that employees bathe daily or more often depending on the type of job they do. The written rules should state the acceptable standards in this regard and the rules should be monitored consistently.

**Proper Working Uniform** - The clothing of food service employees plays an important role in the prevention of food contamination, making it essential that employees observe strict standards of personal attire. Employee rules should cover the items of work clothing, hair coverings, and jewelry.

**Work Clothes** - Soiled work clothes are unacceptable for two reasons. First, dirty clothing carries disease causing microorganisms. One contact with soiled clothing is enough to start the contamination cycle: from the clothing, to the hands, to the food. The food service worker must insist on clean uniforms and encourage changes as often as they are necessary. Second, dirty clothes give a bad impression to patrons, who may wonder if the food being served is as unsanitary as the clothes of the person serving it. Employees must also refrain from wiping their hands on their clothing, using clothing as hand protection to move hot food vessels, or from wearing clothing that needs constant adjustment, such as an apron with shoulder straps or shoes with loose or untied laces. Uniforms should be simple to avoid contact with food and equipment, for example, billowy sleeves should be avoided.

Ideally, work clothes should be put on in the food service establishment and not worn while commuting to work. An area away from food preparation should be set up for changing clothes with lockers provided to safely store the clothing and belongings of the employees. If a food service establishment is too small to have a changing room, then employees should be trained in procedures for wearing their work clothes to the establishment. They should be instructed that when they are wearing their work clothes, no stops should be made on the way to work. Street clothes should not be worn in food preparation or serving areas.
Employees' shoes should not have platforms, high heels, or absorbent soles. Work shoes must also have a closed toe so the foot is completely covered. This design reduces the possibility of slips and falls. A shoe cleaning device, such as a rough surfaced door mat or a special brush for that purpose, should be provided, so shoes can be cleaned before entering the building.

**Hair Restraints** - To comply with federal, state, and local health codes, employees, crew, and managers are required to wear hairnets, headbands, barrettes, hats, or caps to keep hair from contaminating food. Hair restraints serve a double purpose in that they also discourage employees from running their fingers through their hair, scratching their scalps, or otherwise contaminating their hands by touching their hair. For those employees who have beards, a beard restraint should be worn for the same reasons as a regular hair restraint.

**Jewelry** - Items of jewelry, such as rings, bracelets, and watches, collect soil and are difficult to keep clean. Jewelry can also become caught in machinery or catch on sharp or hot objects. It should not be worn by food service workers while on duty.

**Prohibited Habits and Actions** - Unfortunately, even if employees are aware of safe food handling practices and the reasons behind them, and follow these practices, they may not always stop to think of sanitation when they seek more convenient ways of doing their job. The manager must monitor employee practices and include in the rules a specific list of the personal habits that are not allowed. The following practices are typical of the habits that must be eliminated:

- Failing to wash hands after handling raw food or after using the toilet.
- Using wiping cloths to remove perspiration from the face.
- Stacking plates of food in order to carry more at one time.
- Washing hands in sinks used to prepare foods.
- Spitting on the floor or into sinks.
- Unguarded coughing or sneezing in a food-preparation area.
- Picking up bread, rolls, butter pats, or ice with bare hands instead of with tongs.
- Handling place settings or food after wiping tables or bussing soiled dishes. Touching the food-contact surface of glassware and tableware with bare hands (for example, touching the tines of a fork instead of the handle or picking up a water glass with fingers inside the glass).

When forming your own list, remember one simple and easy rule: Hands that have touched contamination must never touch food without prior hand washing and avoid hand contact as much as possible with ready-to-eat foods and cooked food, even after hands have been washed properly. The employee rules should paint a picture of a model food service worker who:

- Is in good health.
- Has clean personal habits.
- Handles food safely.
- Appreciates the need for sanitary practices.
In addition, smoking, chewing gum or tobacco, and tasting food require special rules.

**Tobacco Use and Gum-Chewing** - Employees must not smoke or use tobacco in any form while preparing or serving food, or while in areas used for equipment and utensil washing, or food preparation. Employees should only be permitted to smoke or chew tobacco in designated areas where the use of tobacco will not result in food contamination, such as in employee break areas.

Smoking can endanger the health of both the employee and the customer. It is impossible to smoke without exposing the fingers to droplets of saliva. Small and unnoticed, these droplets can contain thousands of bacteria, which can contaminate anything the fingers touch. Exhaled smoke sends saliva droplets and other contaminants into the air. Contamination can also operate in reverse: microorganisms may pass from a soiled object to the hands, to the cigarette, to the lips and mouth. It is absolutely essential that food service workers who have been smoking wash their hands thoroughly before returning to work.

Gum-chewing is also a potential food contaminating action. Blowing bubbles, stretching the gum with the fingers, and parking gum under counter or on the floor are among gum-chewing habits that must be forbidden around food handling. Gum is also a potential physical hazard. On occasion it has been found in food.

**Eating or Tasting Food** - Eating and drinking in the food preparation area must be prohibited. Food tasting, however, is necessary in many kitchens. The key here is to avoid any possible contamination of the food being prepared. The commonly pictured practice of the chef tasting from the stockpot using the stirring spoon must be stopped. A recommended procedure is to ladle a small amount of the food into a small dish, tasting from that dish with a separate spoon, then removing the dish and spoon to be washed.

**Management's Responsibility** - Per Carson City Municipal Code 9.05.040 at least one Certified Food Handler must be on the premises at all times. It is management’s responsibility to make sure their staff is trained and a Certified Food Handler is on premises at all times. Setting up the rules necessary for safe food handling is a beginning, not an end. Management must also make it possible for sanitation rules to be observed. In order to do this, management must provide adequate facilities and assign jobs in a way that ensures the practice of good sanitation rules.

**Adequate Facilities** - Even if you have strict sanitation rules and a complete training program in place, employees will still find it difficult to practice good personal hygiene if proper facilities are unavailable. Small establishments should have adequate washing facilities and an area to hang coats and store personal belongings safely. Larger establishments should also include a changing area. A dressing room, where employees can change into work clothes and clean up, with lockers for safekeeping clothing and personal objects would be the best way to instill good personal hygiene. Because jewelry should not be worn, a secure place needs to be provided for individuals to leave these items during working hours. Facilities should be conveniently located, clean, well-lighted, and uncluttered, otherwise, they can become reservoirs for potential contaminants and employees will avoid using them.
A break room or lounge area separate from the food handling areas is also desirable and is required under ordinances in some locations. This area should be in a place where employees can smoke and eat without endangering food, equipment, or utensils. Facilities that do not have break areas should instruct their employees to eat or smoke in a designated section of the dining area.

Employee restrooms, preferably separate from those for customers, must be provided and equipped with self-closing doors. Remind employees never to wear their aprons into the restroom. If employees need to shower at the beginning or end of the day, adequate shower facilities and supplies should be provided for them.

Hand-washing stations for employees must be located in the restrooms and in other convenient locations throughout the kitchen or food-preparation area. If the lavatory is too hard to reach or blocked by boxes or trash cans, employees might wash their hands in a sink which food or utensils are cleaned or not wash their hands at all. Ideally, the hand-washing station needs to have faucets that are foot, knee, or elbow operated, or that have automatic sensors to avoid possible recontamination of the hands by touching faucet handles. Self closing, hand-operated faucets may also be acceptable. The hand-washing station must be supplied with hot and cold water through a mixing faucet, at a temperature between 110° and 120°F (43.3° and 48.9°C). If the water is uncomfortably hot or cold, employees will avoid necessary hand washing.

Soap dispensing equipment should be provided in sufficient quantity at, or near, the wash stations. Sensor or remote operated liquid soap dispensers are strongly recommended for use in a food service. Many local health departments do not accept hand-operated soap dispensers and bars of soap because they believe these soaps and dispensers can be a means of transferring microorganisms. The soap selected should not be too harsh on the employees' hands because it might discourage frequent hand washing.

For hand drying, management must supply disposable paper towels or forced air blowers. There are too many possibilities for contamination with retractable cloth dispensers. Some authorities consider air blowers the most sanitary drying method, but employees may be inclined to consider them too slow and might resort to the unsanitary practice of wiping their hands on their clothes and aprons. If disposable paper towels are available, waste receptacles that do not require touching the unit and that can be easily cleaned must be provided.

Hand-drying facilities may also be available at food-preparation and utensil sinks to be used by employees performing tasks at these sinks to discourage using aprons or wiping cloths to dry hands. Employees should wash hands at a regular hand washing station after food preparation or any type of scullery operations. Check hand wash facilities periodically to make sure that hot
water, soap, and towels are available and that equipment or boxes are not blocking the sinks. **Job Assignments** - When food service managers develop job descriptions and assign job responsibilities, they need to look at raw/cooked meat preparation, dirty/clean dish handling, and clearing/setting tables with the risk for cross contamination in mind. By planning tasks to prevent cross contamination, the manager re-emphasizes sanitary practices and minimizes the amount of time needed for supervision. A continuous assignment to one given area may help employees follow staff sanitation rules. For example, an employee who is expected to cook and wrap food, clear off tables, and then return to the food-preparation area, will have a harder time avoiding contaminating foods than an employee who is assigned to one specific function or area.

**Summary**

Microorganisms found on the skin, in cuts and burns, on hair, in the respiratory system, in the intestinal tract, or in other areas are transmitted from the body to the food through poor personal habits, such as unclean hands, as well as by uncovered coughing and sneezing. Stressing good personal hygiene is essential.

The manager is responsible for building a sanitary barrier, which involves many steps to protect customers from contaminated food. The manager must carefully interview job applicants. Each job description should be developed with the necessary sanitation requirements outlined. Clearly written rules that state safe food handling practices and prohibit unsafe personal habits must be established. It is the manager's responsibility to provide adequate facilities and equipment for the employees to follow the established employee rules. The manager must also provide continuous training of employees, using supervision to correct deviations from the rules. Finally, the managers and supervisors have to set good personal examples by always following the employee rules themselves.
BACTERIA: HOW TO SPOIL THEIR FUN

When Potato Salad Goes Bad
The Relationship Between Potentially Hazardous Foods and Food Borne Illness

Many factors can contribute to food borne illness. They range from the food itself, to food service worker mistakes, to improper temperature and storage. The key to having safe food begins when the product arrives at the food establishment, and continues until that product is served to the customer. In this chapter we will discuss the many factors that contribute to a safe and wholesome menu.

**Potentially Hazardous Foods**

Potentially hazardous foods may cause a consumer health risk if not handled properly. These foods are commonly used in our food services. Meats, cheeses, sauces, dairy products, eggs, beans, pasta, rice, and potatoes can be found in most commercial food establishments.

"Potentially Hazardous Foods" means any natural or synthetic food or food ingredient that supports the rapid growth of infectious or toxigenic microorganisms or the slower growth of C. Botulinum.

A food is potentially hazardous if it is: (A) of animal sources such as meat, milk, fish, shellfish, edible crustaceans, poultry, or contains any of these products; (B) of plant origin and has been heat treated; (C) raw seed sprouts.

The following is a partial list of specific food products that have been classified to be potentially hazardous.

<table>
<thead>
<tr>
<th>BACON (partially cooked)</th>
<th>GARLIC (in oil)</th>
<th>RICE (cooked)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEANS</td>
<td>ONIONS</td>
<td>SAUCES (diary based)</td>
</tr>
<tr>
<td>WHIPPED BUTTER</td>
<td>PASTA</td>
<td>SOUR CREAM</td>
</tr>
<tr>
<td>CHEESE (soft)</td>
<td>PASTRIES</td>
<td>SOY PROTEIN</td>
</tr>
<tr>
<td>COFFEE CREAMING</td>
<td>PIES</td>
<td>SEED SPROUTS</td>
</tr>
<tr>
<td>AGENTS (non UHT)</td>
<td>(custard, meat)</td>
<td></td>
</tr>
<tr>
<td>EGGS (not boiled)</td>
<td>POTATOES (cooked)</td>
<td>FRUITS (cut)</td>
</tr>
</tbody>
</table>
Food Borne Illness

A good understanding of basic microbiology is important to food safety. To properly assess the points in a food preparation flow, you must be able to make some decisions about product contamination and more importantly, the potential for bacterial growth.

Not all food hazards are bacterial in nature. However, reports to the Center for Disease Control indicate that bacterial agents are the leading cause of food borne illness in the United States today.

Most food borne illnesses infect the tissues of the digestive tract, resulting in gastric distress, nausea, vomiting, cramps, and diarrhea. Probably the best known of the infectious intestinal organisms is Salmonella. Salmonella produces fever, vomiting, diarrhea and abdominal pain. The illness usually lasts several days, unless the bacteria burrow through the intestinal wall and cause more serious effects. Severe diarrhea can lead to dehydration or other secondary conditions, some of which can be fatal.

Infected human carriers may have mild illnesses or no symptoms at all and still shed Salmonella in their stools. That is why personal hygiene is such an important control for this and other organisms. Obviously, any employee with diarrhea should not be allowed to handle foods or clean utensils, and you may wish to request medical clearance before an ill employee returns to work.

<table>
<thead>
<tr>
<th>Common Sources of Bacterial Contamination</th>
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<tbody>
<tr>
<td><strong>Source</strong></td>
</tr>
<tr>
<td>Dirt, Soil</td>
</tr>
<tr>
<td>Raw meats, poultry, seafood</td>
</tr>
<tr>
<td>Vermin (insects and rodents)</td>
</tr>
<tr>
<td>Workers infected</td>
</tr>
<tr>
<td>Healthy &quot;carriers&quot;</td>
</tr>
</tbody>
</table>
Bacteria require certain conditions in order to multiply rapidly. It is rapid bacteria multiplication that often causes problems with regard to the safety of a food product. Under ideal conditions rapid growth can mean that an organism has a generation time as little as 20 minutes. The example below assumes that a certain food initially contains 1000 organisms per gram.

### GROWTH PATTERNS

<table>
<thead>
<tr>
<th>TIME</th>
<th>NUMBER OF ORGANISMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Hour later</td>
<td>4,000</td>
</tr>
<tr>
<td>2 Hours</td>
<td>16,000</td>
</tr>
<tr>
<td>3 Hours</td>
<td>64,000</td>
</tr>
<tr>
<td>4 Hours</td>
<td>256,000</td>
</tr>
<tr>
<td>5 Hours</td>
<td>1,024,000</td>
</tr>
</tbody>
</table>

### Bacteria Which Cause Food Borne Illness

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Source</th>
<th>Disease</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmonella</td>
<td>Eggs, Meat, Chicken, Bones</td>
<td>Salmonellosis</td>
<td>Poultry 165°F, Eggs 140°F</td>
</tr>
<tr>
<td>(infection)</td>
<td></td>
<td>(12-24 hrs)</td>
<td>Pasteurized eggs</td>
</tr>
<tr>
<td>(13%)</td>
<td></td>
<td></td>
<td>Hand washing</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>Skin, Hair, Hair Nose Open Sores</td>
<td>Staphylococcus</td>
<td>Hand washing, Avoid touching nose, face hair, open sores etc. Time/Temp</td>
</tr>
<tr>
<td>(toxins)</td>
<td></td>
<td>(1-8 hrs)</td>
<td></td>
</tr>
<tr>
<td>(26%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clostridium perfringens</td>
<td>Soil, Dust, Raw Fruit/Veg Intestines</td>
<td>Perfringens</td>
<td>Hand washing</td>
</tr>
<tr>
<td>(produces heat-resistant spore)</td>
<td></td>
<td>(10 hrs)</td>
<td>Wash produce</td>
</tr>
<tr>
<td>(16%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clostridium botulinum</td>
<td>Improperly canned foods</td>
<td>Botulism</td>
<td>Hand washing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8-36 hrs)</td>
<td>Time/Temp</td>
</tr>
<tr>
<td>Shigella</td>
<td>Fecally contaminated food or water</td>
<td>Shigellosis</td>
<td>Hand washing, refrigeration Proper sewage disposal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1-7 days)</td>
<td></td>
</tr>
<tr>
<td>Hepatitis A virus</td>
<td>Fecally contaminated food or water</td>
<td>Hepatitis</td>
<td>Hand washing, pure water Adequate cooking of foods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3-5 weeks)</td>
<td></td>
</tr>
</tbody>
</table>
TEMPERATURE

Temperature is one of the factors that can be used to "manage" the number of organisms that may be present in a food product. Temperature is a well known management tool to keep bacteria levels low.

The failure to adequately control food temperature is the one factor most commonly implicated in outbreaks of food borne illness. Disease causing bacteria are capable of rapidly multiplying at temperatures from 40° to 140° F, this is known as the temperature danger zone. All potentially hazardous food must be rapidly cooled and kept at an internal temperature below 40° F or above 140° F during transport, storage, handling, preparation, display, and service. The total accumulated time potentially hazardous foods are exposed to the temperature danger zone must not exceed four hours.

When potentially hazardous foods are heated or cooled they should pass through the temperature danger zone quickly. Exposure time adds up with each stage of handling and serving. It starts with receiving and storing, and continues through preparation, holding, serving, and reusing. Although it is vital to minimize the time food spends in the temperature danger zone, it is especially important to remember that bacteria grow more rapidly at temperatures in the middle of the danger zone, 70° to 120° F, than at the extremes. Food becomes dangerous faster at 98° F than at 45° F.

pH

The pH of a food product is the measure of its acidity or alkalinity. The pH scale begins at 0 and ends at 14. A solution with a pH of 7.0 is considered neutral, neither acidic or alkaline. Pure distilled water would give a pH of 7.0.

Microorganisms of food safety concern like to grow in surroundings that are near a pH of 7. As a product of pH moves below or above whatever is the ideal level for a particular organism the microbe takes longer to adjust to its surroundings and grows more slowly.

Many foods are naturally acidic, such as vinegar, mayonnaise, fruits, pickles and yogurt and have a pH below 4.6. At or below 4.6, disease causing organisms do not grow or grow so slowly that they are not a food safety problem. Spoilage organisms may grow at these low pH values and can slowly change a foods taste or appearance.

The pH of a food has a great deal of effect on its suitability as a medium for bacterial growth. Knowing the pH of a food item can aid in determining the controls needed to maintain food safety.
The following charts show the approximate range of pH values at which organisms grow and the ranges of some foods.

**MICROORGANISMS and pH**

<table>
<thead>
<tr>
<th>ORGANISMS</th>
<th>OPTIMUM pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALMONELLA SP.</td>
<td>6.0 - 7.5</td>
</tr>
<tr>
<td>STAPH SP.</td>
<td>6.8 - 7.5</td>
</tr>
<tr>
<td>E. COLI</td>
<td>6.0 - 8.0</td>
</tr>
<tr>
<td>MOST BACTERIA</td>
<td>5.5 - 8.0</td>
</tr>
<tr>
<td>YEAST (SPOILAGE ORGANISMS)</td>
<td>4.0 - 6.5</td>
</tr>
<tr>
<td>MOLDS (SPOILAGE ORGANISMS)</td>
<td>4.5 - 6.8</td>
</tr>
</tbody>
</table>

**pH VALUES OF SOME FOODS**

*Note: values will vary by source*

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Beef</td>
<td>5.1 - 6.3</td>
</tr>
<tr>
<td>Ham</td>
<td>5.9 - 6.1</td>
</tr>
<tr>
<td>Chicken</td>
<td>6.2 - 6.7</td>
</tr>
<tr>
<td>Fish</td>
<td>6.6 - 6.8</td>
</tr>
<tr>
<td>Clams</td>
<td>6.5</td>
</tr>
<tr>
<td>Crabs</td>
<td>7.0</td>
</tr>
<tr>
<td>Oysters</td>
<td>4.8 - 6.3</td>
</tr>
<tr>
<td>Butter</td>
<td>6.1 - 6.4</td>
</tr>
<tr>
<td>Buttermilk</td>
<td>4.5</td>
</tr>
<tr>
<td>Cheese</td>
<td>4.9 - 5.9</td>
</tr>
<tr>
<td>Milk</td>
<td>6.6 - 7.0</td>
</tr>
<tr>
<td>Yogurt</td>
<td>3.8 - 4.2</td>
</tr>
<tr>
<td>Vegetables</td>
<td>4.2 - 6.5</td>
</tr>
<tr>
<td>Onion’s</td>
<td>4.8</td>
</tr>
<tr>
<td>Fruits</td>
<td>2.0 - 6.7</td>
</tr>
<tr>
<td>Orange Juice</td>
<td>4.0</td>
</tr>
<tr>
<td>Mayonnaise</td>
<td>3.0 - 4.1</td>
</tr>
<tr>
<td>Salad Dressing</td>
<td>3.2 - 4.0</td>
</tr>
</tbody>
</table>
Water Activity (Aw)

Bacteria need water in an available form for growth and development. Since bacteria cannot take their food in a solid form, they must receive their nutrients in some kind of water solution. This solution is described as "water activity" (Aw) which means the amount of water available for favorable growth. Solutes (salts and sugars) as well as drying, decrease the available water and can reduce microbial growth rates.

Aw is the ratio of vapor pressure of food to that of pure water. Water, then, would have a value of 1.0. Typical water activity limits microbiological growth and values for some foods are presented in the following tables. No disease causing organisms will grow below a Aw of .86, except for some spoilage organisms may grow below this value.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>MINIMAL Aw VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most Bacteria</td>
<td>0.91</td>
</tr>
<tr>
<td>Most Yeast</td>
<td>0.88</td>
</tr>
<tr>
<td>Molds</td>
<td>0.82</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FOOD</th>
<th>WATER ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Fruits</td>
<td>.91 -1.00</td>
</tr>
<tr>
<td>Pudding</td>
<td>.91 -.99</td>
</tr>
<tr>
<td>Bread</td>
<td>.96-.97</td>
</tr>
<tr>
<td>Cheese</td>
<td>.95 - 1.00</td>
</tr>
<tr>
<td>Fresh Meat</td>
<td>.95 - 1.00</td>
</tr>
<tr>
<td>Cakes</td>
<td>.90 -.94</td>
</tr>
<tr>
<td>Cured Meat</td>
<td>.87 -.95</td>
</tr>
<tr>
<td>Jam</td>
<td>.75 -.80</td>
</tr>
<tr>
<td>Honey</td>
<td>.54 -.75</td>
</tr>
<tr>
<td>Dried Fruit</td>
<td>.55 -.80</td>
</tr>
<tr>
<td>Chocolate Candy</td>
<td>.55 -.80</td>
</tr>
<tr>
<td>Caramels</td>
<td>.60 -.65</td>
</tr>
<tr>
<td>Dried Milk</td>
<td>.20</td>
</tr>
<tr>
<td>Dried Vegetables</td>
<td>.20</td>
</tr>
<tr>
<td>Crackers</td>
<td>.10</td>
</tr>
</tbody>
</table>
Knowledge of these values and their effects on microbial growth, can help the operator make judgments about the hazards of certain procedures. Information about pH and Aw helps to understand which steps are critical.

**DISEASE CYCLES AND INFECTIVE DOSE**

Food contamination and food borne illness occurs when pathogenic microorganisms multiply. Infective dose is defined as the number or organisms which will make a person sick. With Salmonella a large number of organisms are needed for an infective dose. With Shigella, very few organisms are needed for an infective dose.

Some organisms require growth after contamination in the food in order to reach infective doses, while others simply need to be carried on the food in small numbers. Some organisms, Staph. aures, for example, almost always must have the conditions and time for rapid growth in a food before the dose (cells and toxin) reaches a level which will produce illness in healthy adults. Other organisms, Hepatitis A virus, for example, need only be present and use food as a carrier from one host to another. Knowing these differences and the sources of organisms can help in making sound decisions about food flow and risk.

**Types of food hazards other then biological are chemical and physical hazards.** Public concern over chemicals in our food supply has grown in response to a well publicized controversy concerning the use of pesticides on food. A chemical hazard is the danger posed by chemical substances contaminating food all along the food supply chain. Four kinds of chemical hazards are of special concern to the food service manager besides pesticides: (1) contamination of food with food service chemicals, such as detergents and sanitizers; (2) use of excessive quantities of additives, preservative, and spices; (3) acidic action of food with metal lined containers; and (4) contamination of food with toxic metals.

A physical hazard is the danger posed by the presence of particle or item that are not supposed to be part of a food product. Physical contaminants, such as chips of glass from broken light bulbs or glasses, and metal fragments from enamelware dishes and tableware, are obvious dangers. A worn can opener, for example, can shower metal curls on the food if the can is being opened. Other metal objects, such as magnets, packing staples, tack, and pins, can accidentally fall into food. The accidental swallowing of un-frilled and frilled toothpicks has occurred. The practice of scooping up ice with a glass is definitely hazardous, since glass chips can become a part of beverage servings. Good facilities planning and the training of personnel in safe operating procedures can reduce these physical hazards.
Health Effects

The unpleasant symptoms of a "simple" case of food borne illness may require absences from work, school, or leisure activities while the illness runs its course. However, health consequences can be more severe. Diarrhea and resulting dehydration may require hospitalization, and diarrhea can lead to temporary or permanent arthritic conditions in some people. Bacteria can invade the blood (septicemia) or the membranes of the brain and spinal cord (meningitis). At worst, the human costs include death and grief.

Some people are more vulnerable than others. The very young and the very old are generally most at risk. Others at high risk include those with underlying health problems and the malnourished. Genetic differences may make some persons more susceptible than others. For certain types of infections, chronic antibiotic use or pregnancy may be a risk factor.

A strong immune system plays an important role in limiting the progression of illness. Infants have incompletely developed immune systems. AIDS, cancer and kidney patients are among those with suppressed immune systems. The number of Americans in these high-risk categories is increasing, and preventing "preventable" food borne illness has become imperative.

As mentioned above, food borne illness can drastically affect your business and customers. The following, are some of the proper procedures for handling and preparing food in the work place and at home.

Thawing Food

Frozen foods must be thawed carefully to prevent contamination and spoilage.

NEVER THAW FOOD AT ROOM TEMPERATURE. Thaw food: Gradually under refrigeration. The temperature of the food should remain below 40°F.

- Use the product as soon as possible after the product thaws.
- By cooking frozen food on the stove or in an oven as a continuous (freezer to stove or oven) process.
- In a microwave oven. Either to thaw and move to conventional cooking stove/oven or to completely cook in the microwave.
- Under potable running water for no more than two hours. The temperature of the water should be 70°F to 75°F.
Cooking Food

Always cook foods using the proper equipment. Recipes specify cooking at a certain temperature for a certain amount of time. To be sure all harmful bacteria are killed; foods must be brought to the required temperatures inside as well as outside. Using a thermometer, check internal cooking and serving temperatures of the foods.

- Check internal temperatures in more than one place when heating foods. An acceptable temperature in one spot does not mean that every part of the dish is ready to be served. Stir the food frequently, to distribute the heat evenly.
- For food that is being chilled, check temperatures in the same way as for cooked food.
- Measure temperatures in the center or the thickest part of the food and in other places as well.
- **Use only sanitized thermometers with stainless steel stems.** Glass and mercury-filled thermometers can break easily and contaminate foods.
- Use thermometers that are easy to read, with a numerical scale, and accurate within plus or minus 2°F. Check the accuracy of thermometers regularly, in either a pan of boiling water or a cup of slushy ice and water.
- Take readings only after the indicator stops moving.
- Clean and sanitize the thermometer with alcohol or sanitizer between uses and let it return to room temperature before using it again.

Cooking Temperatures for Meats

The lowest temperatures that can be used to cook many foods are regulated by law, especially for meat. The best way to kill bacteria in potentially hazardous food is by heating the food to an internal temperature of 165°F and holding it at 140°F.

- Poultry and meat which contains stuffing should be cooked to an internal temperature of 165°F.

- Pork and pork products must be cooked until heated to an internal temperature of at least 155°F. For microwave cooking, the recommended safe internal temperature is 170°F, the temperature at which pork turns gray. Check with local authorities on whether microwave cooking of pork is allowed.

- Beef must be cooked to a minimum internal temperature of 130°F. Cooking time and methods must be figured so that even a large roast, to be served rare, will reach that
temperature throughout. This minimum temperature should allow steaks to be served rare. The recommended temperature for ground beef is 155°F. Steak tartar, which is served raw, is an exception. For this dish, use only fresh beef, minimize handling, and keep it chilled at or below 40°F until serving.

- Always measure internal temperatures of the food, in more than one place to determine if meat is cooked to the desired point.

- Breaded or battered meats must be cooked thoroughly. Check temperatures of deep fryer oil and monitor the time allowed for cooking. Discard unused batter and breading mixtures do not hold over for the next day. Raw product contamination and spores in breading prevent re-use of batters and breading.

**Holding Heated Food**

During the time between cooking and serving, hot foods should be stored in equipment that keeps them at the required temperature at all times. Holding equipment includes steam trays or tables, steam kettles, heat lamps, and insulated food transport carriers. All holding equipment must be able to maintain a temperature above 140°F.

*Never use holding equipment for heating foods.* Holding equipment heats too slowly to be effective, and leaves potentially hazardous foods in the danger zone too long, allowing bacteria to multiply.

Because holding devices provide irregular heat, a food thermometer must be used to check that the food stays at the proper temperature. Each holding device should be equipped with an easy-to-read, numerically scaled thermometer, which is accurate to within 2°F either way (or a metal stemmed thermometer must be available).

Avoid holding heated food for long periods of time; it may lose its freshness and flavor. The longer the food is held the greater the chance of it becoming contaminated.
Customer Self-Service

Self-service operations such as cafeterias, salad bars, smorgasbords, and buffets are popular. Foods in these establishments are handled by many people, making it difficult to maintain proper holding and serving conditions. Foods should always be served in a way that minimizes contamination.

- Keep foods wrapped or covered when possible. Condiments are more hygienic when served in individual packages.
- Reduce contamination to exposed foods by placing an easy to clean, properly constructed "sneeze guard" (food guard) between the customer and the foods.
- Position serving dishes in such a way that it reduces handling by customers.
- Provide enough serving utensils for the foods presented. To avoid cross-contamination, each utensil should be used for only one food item.
- Store utensils so that food contact surfaces are not touched by the customers. Also make sure that surfaces touched by hands do not contact food. Utensils should be exchanged frequently for fresh, sanitized ones.
- Monitor temperatures of foods: cold foods cold, hot foods hot.
- Assign employees to monitor and maintain the buffet at all times.

Self-service customers who return to the service area for additional food should not reuse soiled tableware or utensils. Provide them with fresh dishes. Cups and glasses for drinks may be refilled. Sugar, condiments, seasonings, or dressings used in self service should be in individual packages or covered dispensers that protect their contents.
Temperatures for Potentially Hazardous Foods (PHF)

Reheat all leftover foods to 165° F.

165° Cook all poultry to 165° F. (internal product temperature)

155° Cook ground beef, pork & pork products to 155° F.

130° Internal temperature for rare roast beef (holding and reheating).

140° Hold all hot PHF at 140° F. or above.

Cool Quickly
1) Shallow containers 2" deep in refrigerator or freezer within 4 hours.
2) Quick chilling in ice & stirring.
3) Check with probe thermometer. Record on food temperature log.

40° Hold all cold PHF at 40° F. or below.

Potentially Hazardous Foods (PHF) include: cooked rice, beans, baked or boiled potatoes, meat, poultry, fish, shellfish, milk, milk products and eggs.
Note: Best refrigerator temperature is 37°F.
Cooling Food

When cooked foods are to be refrigerated and stored for future use, **they must be chilled as quickly as possible or within 4 hours, to an internal temperature of 40°F or below.** If they are left at room temperature to cool, bacterial growth is likely.

- Divide large quantities of food into smaller portions.
- Place foods in shallow containers, of 2" deep or less, and stir to speed the cooling process.
- Use refrigerator units that are specially designed to chill food quickly.
- Use an ice water bath: place pans of food into larger containers filled with ice to pre-cool, if special refrigerator units are not available. Add ice periodically and stir the food in the pan to make sure the entire contents chill rapidly.
- Move quick-chilled foods to normal refrigeration within three to four hours.
- Do not try to cool too much cooked food at one time; it will strain the capacity of a refrigerator. You could endanger other foods by raising temperatures in the refrigerator.

Storing Leftover Food

Select storage containers carefully, especially for highly acidic foods, to avoid the dangers of chemical contamination.

- Pack all leftovers in well-covered, well-sealed containers.
- Shallow containers are recommended for storage because they cool faster.
- Store cooked and processed foods above and away from raw foods to minimize the dangers of cross-contamination.
- Never store cooked foods below raw foods. Raw foods could drip contaminants into the stored foods. Some stored foods do not require reheating.
- Cool hot food to 40°F, then cover.
- Label containers clearly to indicate what they contain and when the food was prepared.
- **Use FIFO (First In First Out) for storage placement.**

Using Leftovers

Foods that have been exposed to contamination should never be used again. Individual unwrapped portions of food that have been served to customers may not be used again. You may use some cooked foods that were not served to customers if they were prepared safely and held under sanitary conditions. They must be carefully processed for storage. Individually wrapped items with undamaged packaging may be reused.

If food is not used and is safe to eat, check with local food pantries or soup kitchens before discarding. More than twenty percent (20%) of usable food in the United States is thrown out and food establishments can help the hungry through donations to food charities.
It is not always possible to identify food spoilage by appearance, smell, or taste. Food may appear to be safe even when they contain large numbers of harmful microorganisms or toxins. It is necessary to observe good food protection and sanitation practices in all phases of preparing and serving food. The main point to remember in choosing to serve previously prepared food is **IF IN DOUBT, THROW IT OUT.**

**Reheating Food**

When reheating leftovers, bring them quickly to a temperature of 165°F throughout. If using a microwave oven, allow to stand for a few minutes to distribute heat. Use food preparation equipment to reheat leftovers. Do not use steam tables, heat lamps, or other food holding equipment to heat food. They are not designed for this use.

**Thermometers**

Thermometers must be used to check the temperatures of incoming shipments of food products, final cooking temperatures, food temperatures in refrigerators, freezers, and hot holding units. They are also used to monitor the temperatures of solutions used for cleaning and sanitizing. The thermometer can be the single most important item in the protection of food.

- Never use glass or mercury-filled thermometers; they could break and contaminate food. Use only sanitized bi-metallic stemmed thermometers for checking food temperatures.
- Use thermometers that are at least five inches long. Insert the lower two inches into food to take reading.
- Do not leave the thermometer with the plastic lens cover on the gauge in food being cooked; it could melt and contaminate the food.
- Digital thermometers are also available in a variety of styles and are calibrated according to manufacturer’s directions.
- Use thermometers that can measure food temperatures ranging from 0°F to 220°F without freezing or breaking. They must be accurate to within plus or minus 2°F.
- Check the accuracy of thermometers regularly. Use water and ice slush in a cup and adjust to a 32°F reading, or place in pan of boiling water and adjust when indicator stops rising to 212°F. Calibrate thermometers routinely and see manufacturer’s directions, if necessary.
- Clean and sanitize thermometers after each use. Use a sanitizer approved for food contact surfaces. Clean and sanitize thermometer cases on a regular basis.
- Monitor temperatures using thermometers mounted in equipment, but check their accuracy using the bi-metallic stemmed thermometer on a routine basis.
**USING A THERMOMETER**

Choosing the Right Thermometer
A number of thermometers are used in the food service facility. Some are used to measure temperatures of equipment and storage areas. Others are used to measure the temperatures of food. Built-in or hang-type thermometers are usually required in refrigerator and freezer units. Thermometers are also built into hot-holding equipment and machine dishwashers. Since temperature control is an integral part of food sanitation, choosing the appropriate food thermometer and using it properly are of critical importance.

The most versatile type of thermometer for measuring food temperature is the bi-metallic stemmed thermometer. These thermometers must be numerically scaled, easily readable, and accurate to +/-2°F (+/-1°C).

The metal stem should be at least five inches long with the lower two inches being the sensing area for immersion into foods. Be sure the dimple on the stem of the thermometer is completely immersed or surrounded by the food product for an accurate reading. Also, make sure that you buy the kind of bimetallic stemmed thermometer that has a calibration nut so the device can be adjusted to maintain maximum accuracy.

Thermometers with a scale ranging from 0° to 220°F (-17.7° to 104.4°C) can be used to measure the temperatures of incoming shipments of frozen and refrigerated food temperatures in refrigerators, freezers, and hot-holding equipment; and the temperatures of sanitizing solutions. Due to the risk of physical contaminants to the food and damage to the thermometer, a bi-metallic stemmed thermometer with a plastic lens cover should not be left in food during cooking in an oven, microwave, or on a stove top range. Mercury-filled or other glass thermometers should never be used to measure food temperatures because they can break. In addition, only National Sanitation Foundation (NSF) food service approved thermometers should be used.

**Other Food Thermometers**

The Time Temperature Indicator (TTI) is frequently used to monitor temperatures during the transportation or storage of sous vice, modified atmosphere packaged or cook-chill foods. This thermometer has liquid crystals that give a special label on the food package an irreversible color change when the item reaches an unsafe temperature. Other thermometers are designed specifically to measure certain food items. These include candy, meat, and deep-fry thermometers.
Summary

Food, especially potentially hazardous foods can cause an individual some discomfort if not cooked properly. The key points to remember are the ranges of the temperature danger zone and using the right thermometer. By understanding the many factors involved in the preparation of food, you as a food service worker can help protect your product and the customer.
KEEP IT CLEAN!

IT ISN’T HARD TO DO!

“Clean it up? Clean it up? Criminy, it’s supposed to be a Rathole!”
Cross-contamination

With the scientific advances of recent decades, one might think that the biological, chemical, and physical hazards that contaminate our food and compromise our health would long since have been conquered. While it is true that advances have resulted in safer food, better methods of preservation, and improved storage practices, it is still necessary to guard against the practices that can increase the likelihood of contamination, or add to the growth of microorganisms that are already present in the product. Preventing contamination of safe food needs to be a prime objective of every food service worker.

Cross-contamination can be controlled by following safe food handling practices such as:

- Employees following proper hand washing practices.
- Employees with flu-like symptoms are restricted from working.
- Use of utensils or disposable gloves when handling food that will no longer be cooked.
- Follow proper use and disposal of gloves.
- Avoid preparing raw and cooked foods in same work area.
- Storing raw and cooked foods in separate areas.
- Store raw meats below cooked foods or foods which will no longer be cooked.
- Following proper use and concentration of sanitizers in work area and wiping cloths.
- Follow proper washing and sanitizing rules for equipment, utensils, knives, and dishes.

CROSS CONTAMINATION

FOOD TO FOOD

EQUIPMENT TO FOOD

PEOPLE TO FOOD
Some work areas require special attention to prevent cross-contamination. In these work areas, the food service worker is required to handle many different products at once. The grill or broiler station and prep stations are examples of such areas. In these work areas, the chef or cook is handling raw meat products, raw eggs, and foods that will no longer be cooked such as breads and buns, garnishes, cheeses or other cold condiments. The following is a list of solutions for preventing cross-contamination:

**Solutions**

- Eliminate cross-contamination opportunities by frequently cleaning and sanitizing equipment, utensils, and work surfaces during production.
- The use of sanitizing solutions, hand washing, and sound personal hygiene habits must be followed during all steps of line prep-at-service. Ensure that buckets with proper level of sanitizer are provided and used.
- Tongs designated for each raw food and stored with handles out of the food for safe use.
- Pay special attention to the last step of Prep-at-Service where toppings are placed on plated foods. Tongs are to be used at all times with items such as shredded cheese, garnishes and foods which will not be further heat treated after handling.
- When stocking line drawers or refrigerators, keep in mind food stored behind one another creates a cross-contamination concern due to dripping of juices. It is a good standard of practice to keep raw food in the front of the lower drawers.
- Ensure that all employees can identify raw and cooked foods and they understand where they should be stored. Verify storage practices during each meal check.
- Cooked and raw foods should never be stored in the same container. Utilize food containers to hold food and change containers each time the foods change to prevent cross-contamination.
- Build in operational systems that will allow foods (i.e. raw chicken and veal) to be handled at the end of the production day to minimize the opportunity for cross-contamination.

**Safe Handling of Cold Foods, Preventing Cross Contamination**

When working with cold foods or foods that will not be further heat treated, follow these general guidelines:

- Wash hands with soap and warm water and dry with single use towel, before starting prep.
- Wash all fresh fruit and vegetables before using; this removes germs, soil, and chemicals.
- Prep sinks are not to be used as hand sinks. This contaminates the sinks.
- Prep sinks should not be used for meat items, however, if there is no other option, wash and sanitize after each use and before preparing items.
- Ideally, raw vegetable preparation shall be in a separate area from raw meat preparation.
Use separate, sanitized cutting boards for raw, uncooked items.

Use of colored cutting boards can help to identify the cutting boards used for raw products and prevents cross-contamination.

Pre-chilling salad ingredients can help control hazards. Store your tuna and mayonnaise in the refrigerator and cool down cooked chicken, pasta, potatoes, and other ingredients before mixing.

To quickly chill salad ingredients:
- Cut into smaller pieces, place in thin layer on pan in coldest part of refrigerator.
- Place ice on pasta or surround ingredients with bagged ice.

When mixing ingredients, avoid hand contact. Use clean sanitized utensils or fresh pair of disposable gloves.

Transfer ingredients to clean sanitized dishes or clean storage containers.

Store and display at 40°F or colder.

Protect ready to eat and raw fruits and vegetables, and cooked meats during storage from raw meat juices.

When coughing, sneezing, touching face or hair, wash your hands before handling food or utensils.

Cleaning and Sanitizing

Proper cleaning and sanitizing help protect all who eat or work in a food service establishment. A safe environment is maintained by keeping utensils, equipment, and work areas free of dirt, contamination, and pests. Safe food service is only possible with a clean and sanitary environment in which to store, process, and serve foods. Keeping equipment, utensils, and work areas cleaned and sanitized is an important part of preparing safe food. Proper housekeeping practices reduce the risks of both chemical and physical contamination. Cleaning and sanitizing procedures reduce the risks of biological contamination.

Cleaning alone is not enough to maintain a healthy food service establishment. Even when dirt and food particles have been removed from food-contact surfaces, they are not ready to use. You must sanitize to kill the bacteria that could contaminate foods you prepare and serve. Washing with detergent and hot water helps destroy some bacteria, but sanitizing with heat or chemical agents after cleaning does much more. You can reduce bacteria to safe levels using proper cleaning and sanitizing techniques.

Equipment and food surfaces come into contact with bacteria and dirt all day long. Wash, rinse, and sanitize equipment and surfaces thoroughly and often, usually every time they are used. Organize your work space to make the task easier. The knowledge of correct procedures will help a food service manager keep the equipment clean and sanitary.
Cleaning and Sanitizing Procedures

Manual Cleaning and Sanitizing

Equipment and utensils that cannot be cleaned in automatic dishwashers may be cleaned and sanitized by hand. Large sinks with at least three compartments and attached drain boards are recommended. Each compartment should have hot and cold potable water. You must clean the sinks after each use.

- Washing, rinsing, sanitizing, and air-drying must be done in separate steps. Drain boards or movable dish tables should be used to separate dirty utensils from clean utensils before washing.
- Scrape or soak equipment and utensils to remove large food particles and dirt.
- For washing, use hot water (100°-120°F) and enough detergent to get the equipment and utensils clean. Change the water as often as necessary to keep it hot and clean.
- Rinse utensils in clean, hot water until they are free of all detergents and abrasives.
- To sanitize utensils, immerse them in an approved chemical and water solution at a temperature of at least 75°F for one minute or more. Follow the product instructions to get the correct amount and strength, equivalent to 50 ppm (parts per million) of chlorine, 12.5 ppm of iodine, or 200 ppm of quaternary ammonium. Use a test kit to monitor the proper strength of solutions. Sanitizing solutions should not be used after the strength goes below minimum requirements.

-OR-

- Use a dish basket to immerse (dip) the utensils in clean, very hot water (170°F) for 30 seconds.
- Equipment too large for the sink compartment should first be washed and rinsed, then sprayed or wiped by hand, using chlorine, iodine, or quaternary ammonium solutions.
- Following the sanitizing process, air-dry utensils and tableware; never dry them with a towel.
- Use cleaned and sanitized drain boards or movable dish tables to stack and transport sanitized utensils.

Mechanical Cleaning and Sanitizing

Machines are generally better than manual washing for cleaning and sanitizing utensils and equipment. Machines can easily handle large amounts of items and high water temperatures. They can regulate temperatures automatically and spray water at and over dirty tableware, utensils, and equipment. Machines also distribute cleaning and sanitizing agents evenly during the process in the right strengths.
Operating Dishwashing and Sanitizing Machines

Procedures vary a lot from model to model, and manufacturer's operating and maintenance instructions must be followed carefully to get the best results. Certain basic rules are the same for operating all types of machines.

Dishwashing machines are made to handle a large volume of items at one time. Organize your work space so that dirty dishes and equipment are safely held while waiting to be washed. Do not let them contact and contaminate food that is being prepared or equipment that has already been cleaned. Use drain boards or movable dish tables for this purpose.

- Always scrape dishes by hand before loading the machine. Presoaking or scrubbing may also be necessary to remove stubborn food particles.
- When loading the machine, place dishes and utensils in the racks, trays, or baskets. In this way the rinse water reaches all dirty surfaces and can drain properly.
- Always use the right amounts of detergent and chemicals for washing and sanitizing. Load the machine according to operating instructions.
- Machines that sanitize with very hot water and no chemicals may be used, provided the wash water and pumped rinse water are kept clean and maintained at the approved temperatures.
- After sanitization, all equipment and utensils must be air dried.

Regulating Water Temperature and Pressure

Water temperature and pressure of the machines should be set correctly and checked often. Always operate the equipment at manufacturer's recommendations. Check to make sure that the following conditions are met:

High Temperature Dish Machines

- Wash water should generally be between 140°F and 160°F.
- Final rinse water should be 180°F – 200°F at the rinse manifold. The minimum final rinse water temperature for a single tank, stationary rack, and single temperature machines is 165°F.
- Machine or waterline-mounted thermometers, accurate to within 3°F, must indicate the temperature of the water in each tank of the machine and the temperature of the final rinse water as it enters the manifold.
- Rinse water tanks should be separated by baffles, curtains, or other ways to separate wash water from rinse water.
- Timers on all machines, especially those that regulate conveyor belts, should be accurate. Check timers to be sure that wash loads are given the proper exposure times in wash and rinse cycles.
Low Temperature Dish Machines

- Machines can be of the single tank, stationary rack, door type, and spray type glass washer varieties that use chemicals for sanitization, provided that:
  - The temperature of the wash water is not less than 120°F.
  - Chemicals added for sanitization purposes are automatically dispensed in the proper strength.
  - Approved chemical sanitizers are used.
  - Utensils and equipment go through the final chemical sanitizing rinse for the proper time.
  - The chemical sanitizing rinse water temperature is not less than 75°F or less than the temperature specified by the machine's manufacturer. Rinse water temperature should not be above 120°F in chemical sanitizing machines.
  - A test kit or other device that accurately measures the parts per million concentration of the solution is used.
  - If suggested by the manufacturer, you may clean the interior of some equipment which pump or circulate liquids, by circulating cleaning and sanitizing solutions. Do not allow chemical solutions and rinses to flow into other parts of the machine. It is always best to follow the manufacturer’s instructions.
  - Some equipment can also be cleaned and sanitized with the use of power spray equipment. Spray the object for two or three minutes with the sanitizing solution. You may also use live steam if it is clean.
  - The food-contact surfaces of stationary equipment must be covered or otherwise protected when not in use.

Cleaning Products

Detergent compounds are usually added to aid the removal of soil. They make the process of cleaning easier and faster by reducing the physical effort of scrubbing and attacking stubborn types of soil. Detergents are designed to loosen grease and oil, deposits of minerals, protein based stains caused by eggs or meat, and dirt that has been baked onto food-contact surfaces. The amount of detergent to use per quantity of water must be measured carefully according to the manufacturer's instructions. The detergent aids in loosening the food particles, but you still have to brush the surfaces either by machine or by hand.

- After scrubbing and washing, everything has to be thoroughly rinsed. The surfaces must be clean before sanitizing. Any residue of detergent left on surfaces can interfere with proper sanitizing.
- Use the right cleaning agent for each job and use the product correctly. Choose a product that will do the job thoroughly, economically, and safely in the recommended concentrations.
There are three main groups of cleaning products used for loosening and removing dirt:

Detergents, Acid cleaners, Abrasive cleaners

**Detergents**

Synthetic detergents are used with water to break down dirt. All detergents contain agents called surfactants that dissolve in water and spread by means of suds. They work by loosening the dirt, making it easier to remove. Detergents are usually not very expensive. They are also among the most effective all-purpose cleaning products. Detergents, if rinsed properly, do not leave a soapy residue and make it easier to clean a surface. They also work well with chemical sanitizers. Detergents can be used to clean food-contact surfaces.

**Acid Cleaners**

Acid cleaners work by loosening the heavier dirt that alkaline-based detergents cannot remove. The product labels will say which jobs and surfaces these acid cleaners are designed for and what strength the concentration should be. *Follow the instructions for these products carefully.* Acid cleaning agents, even when used in low concentrations, may damage surfaces and cause chemical burns on the employee's skin.

**Abrasive Cleansers**

Be cautious when using abrasive cleansers. The scrubbing power is provided by finely ground minerals that scour the surface to remove encrusted soil. Food-contact surfaces made of soft plastics can scratch easily and become less resistant to bacteria. When abrasive cleansers are used, care must be taken to rinse away the entire scouring agent after the scrubbing.

**Sanitizing Products**

Sanitizing is a most important step in protecting the food service establishment. Equipment, utensils, and surfaces are sanitized, after cleaning and rinsing, to kill bacteria that may still be present on food-contact surfaces. Equipment and surfaces may be sanitized either by using hot water or chemical compounds.

**Hot Water Sanitizing**

When using hot water as a sanitizer, the water must stay at a temperature of at least 170°F, which will probably require a booster heater. The water temperature must be checked often. To prevent burns, a dish basket must be used for dipping. All equipment and utensils should be completely held under the water for at least 30 seconds to sanitize.
Chemical Sanitizing

Sanitizers are chemicals designed to destroy microorganisms. Chemical sanitizers are more frequently used for sanitizing than hot water. Sanitizing solutions contain bacteria-killing chemicals and are used after the equipment has been cleaned and rinsed.

Approved chemical sanitizers include chlorine, iodine, and quaternary ammonium. Read the directions and follow all instructions.

Chlorine Compounds

Chlorine compounds usually work well in soft or hard water. They are relatively non-irritating when used in the proper concentrations, but they can cause damage to metal equipment. Thorough rinsing before using chlorine compounds is important because their effectiveness is reduced by alkaline left behind by detergents. Water temperature should be 75°F.

Iodine Compounds

Iodine compounds work well in hard water, do not irritate the user's skin, and are useful for metal or rubber surfaces because they are less corrosive than chlorine. Iodine has an amber color, the stronger the concentration the darker the color. Some facilities prefer using iodine for this reason. Water temperature should be between 75°F – 120°F.

Quaternary Ammonium Compounds

These compounds, also called quats, are usually safe for skin contact and generally do not damage equipment. Some do not work well when used with very hard water or after using certain detergents, but they usually work well in both acid and alkaline solutions. Water temperature should be 75°F.

Combination detergent-sanitizers, which contain both types of agents, are available. If these products are used to treat food service equipment, they must be used twice (once to clean and a second time to sanitize) with the proper concentrations, times, and temperatures for both tasks.
Concentration of Sanitizers

Product directions give the amount of sanitizer to add to water. You must have a test kit to measure the strength of sanitizing solutions during use. Chemical sanitizing can be done by complete immersion (dipping) of utensils and equipment for at least one minute in a clean sanitizing solution. A sanitizing solution must contain one of the following:

- A minimum of fifty parts per million (50 ppm) of chlorine mixed with water. The water temperature must be at least 75°F.
- A minimum of twelve and one-half parts per million (12.5 ppm) of iodine mixed with water. The pH must not be higher than five (5.0). The water temperature must not be higher than 126°F.
- A minimum of two hundred parts per million (200 ppm) of quaternary ammonium compounds mixed with water. The water temperature must be at least 75°F. Some particular types of quats use different concentrations; mix according to the label.

It is important to keep the required water temperatures when using chemical sanitizers. If the temperatures are too high, the chemical is not effective. Check the strength of sanitizer with test strips and monitor temperatures. Do not go over the maximum recommended strengths for sanitizers. Increasing the strength does not make the product work better. Quaternary ammonium compounds are not recommended at percentages above 200 ppm. You waste money and risk leaving an unpleasant taste or odor, or even a toxic residue, if the solution is too strong. Follow the manufacturer's instructions on how to mix proper concentrations. **Do not rinse after sanitizing.** Sanitizing is the final stage of the wash-rinse-sanitize cycle.

Wiping Supplies

Cloths and sponges used for wiping certain equipment, utensils, and food-contact surfaces should not be used for any other purposes. These cloths should be kept separate from other wiping cloths.

- Use only clean, dry cloths for wiping food spills on tableware, such as plates or bowls being served to the customer. These cloths must be used for no other purpose.
- Wipe food spills on kitchenware and food-contact surfaces of equipment with moist cloths. They must be rinsed frequently in a sanitizing solution during use. These cloths must be used for no other purpose, and shall be stored in the sanitizing solution between uses.
- Wash and rinse cloths that are used on non-food contact surfaces of equipment such as counters, dining table tops, and then rinse them in a sanitizing solution. These cloths must be used for no other purpose and are stored in the sanitizing solution between uses. Discard cloths as soon as they show signs of wear.
- If disposable towels are used in place of wiping cloths or sponges, the towels should be thrown out at least on a daily basis.
**Frequency of Cleaning and Sanitizing**

All equipment, utensils, and preparation surfaces should be cleaned and sanitized after each use. Microorganisms can survive on unclean tableware and utensils as well as in food. Washing, rinsing, and sanitizing utensils after use is the first step. Equipment must be protected from contamination when in storage and in use.

**General**

Establish and follow regular, evenly spaced cleaning schedules.

- Teach employees why, how, and when cleaning will take place. Tell them what their responsibilities are. Create a cleaning schedule.
- Do not allow dirt and food particles to accumulate on any part or surface of standing equipment.
- Clean and sanitize warm work areas, where bacteria grow faster, as soon as you notice spills or splash.

**After Each Use**

Clean and sanitize utensils after every use.

- Clean and sanitize all large stationary equipment and surfaces that come into contact with food after each use.
- Clean and sanitize utensils, equipment, and food preparation surfaces after contact with each potentially hazardous food item. This includes raw meat, dairy products, poultry, and eggs.
- Clean and sanitize food contact surfaces between use with raw and prepared products.
- Clean and sanitize all food-contact surfaces regularly. When you wipe areas clean, sanitize them manually.

**Several Times a Day**

- Clean and sanitize equipment that is used all day long at periodic intervals during the work day when using for the same product. If the product is changed, sanitize after each change.
- Clean most cooking equipment several times a day to remove grease and food particles. Especially remove food matter from grills and other food-contact surfaces.
- Clean the areas around ovens or hot oil cookers several times a day even when in use.
Once a Day

- Clean knobs, handles, oven doors, and areas around burners at least once a day.
- Food contact surfaces of grills, griddles, and microwave ovens must be cleaned at least once a day.

Maintaining Sanitary Facilities

Cleaning Procedures

Floors and Walls

You must have a clean and orderly food service establishment for sanitary food preparation and service. Cleaning prevents the contamination of food and equipment, discourages the presence of insects and rodents, and keeps work and dining areas safe.

Facilities must be cleaned regularly. Set up cleaning schedules for all parts of your food service establishment and make sure everyone knows when to clean and how to do it.

Facilities must be cleaned in the right way. Cleaning methods such as sweeping or pressure spraying may raise dust, scatter debris, or create mists that could contaminate food. Your responsibility as a manager includes knowing the correct method for cleaning.

- Floors, mats, walls, ceilings, attached equipment, and decorative materials all need regular cleaning.
- Clean floors and walls when the least amount of food is out in the open, such as after closing or between meal times.
- Use only dustless methods of cleaning floors and walls, such as vacuum cleaning, wet cleaning, or sweeping compounds used with push brooms.
- Use detergent, scrubbing, and rinsing to remove dirt and grease.
- Post warning signs if floors must be wet during the operation of the food service.
- Wipe up spills immediately to avoid contamination and accidents.
Cleaning Equipment

Maintain and store cleaning tools such as brooms, mops, vacuum cleaners, and similar equipment in a way that does not contaminate food, utensils, equipment, or linens. Keep them neatly stored in an easy to reach area.

- Provide a storage area for cleaning equipment and supplies that is located away from food preparation, storage, and serving areas.
- Launder cleaning equipment such as mops and washcloths regularly, but separately from linens.
- Store mops with mop heads off floor for proper air drying.

Reserve one utility sink or curbed cleaning facility with a floor drain, which is used only for cleaning mops and similar tools. This sink is used for throwing away mop water and liquid wastes. Do not use sinks where dishes, utensils, or equipment are cleaned and sanitized. Do not pour mop water on the ground. Mop water is sewage and must be handled in the same way as sewage waste.

Summary

By following a rigorous cleaning and sanitizing schedule you as a food service worker can help prevent cross-contamination of your food product. In preventing cross-contamination you greatly reduce the chance of spreading a food borne illness onto your customer. Also with proper cleaning and sanitizing of the food establishment, you will maintain a clean facility.
“Think about it, Ed… The class Insecta contains 26 orders, almost 1,000 families, and over 750,000 described species – but I can’t shake the feeling we’re all just a bunch of bugs.”
Pest Control

Animals and pests can cause illnesses to people by contaminating food and food-contact surfaces. The best way to keep pests out is by making sure they cannot get in. Make sure that walls and floors have no holes. Doors must close automatically, open to the outside, and should have a tight fit. All windows, doors, skylights, intake and exhaust air ducts and other openings to the outside must have screens. The mesh of screens should be at least small enough to prevent entry of pests and they should not have holes or tears in them.

Store food supplies properly, clean and sanitize regularly, and dispose of trash frequently. This will reduce the food supply for pests.

Even with good sanitation and housekeeping, rodents and insects may still be present in a food establishment. Insects may come, from deliveries of packaged goods or from improperly stored trash outside the establishment. You need to know how to prevent pests from coming into areas where food is stored, prepared and served, and where garbage is stored. You must also know about methods of killing any pests that do get in.

Pests

The best way to prevent pest infestation is to keep them out of the establishment. However, since insects and pests have many ways of getting into food establishments, the best approach to insect and pest control is to hire a professional. A reliable, licensed PCO (Pest Control Operator) will work with you to develop an ongoing pest control program, which should include: Prevention, Repairs, Chemicals, Traps, etc.

Roaches

Roaches contaminate food from the dirt and bacteria they carry. Roaches can be found in places where food and water are available. Signs of droppings and empty egg shells are indications of the presence of roaches. In the case of roaches it is especially important to keep the establishment clean and neat.

Ants

Ants may live outside or inside walls, traveling from their nests through cracks, electrical conduits, or plumbing. Ants may contaminate any food.
House Flies and Other Flying Insects
Flies land on all surfaces. They transmit bacteria by leaving dirt from their feet, their own excrement and their own vomit. Flies vomit on food to dissolve the solid and then suck up the liquid leaving behind the bacteria from the vomit. In this way they pass on all kinds of diseases. Flies must be kept out of food areas. It is important to eliminate all breeding sites, to have good screens, and self-closing doors or air curtains or fans.

Pantry Pests
A variety of insects enter your establishment. Bran beetles are found in packages of flour and dry mixes. Several other tiny beetles deposit small, light-colored eggs in grain products. Weevils hide in dried beans and peas. The rice weevil gets into whole grains, macaroni, noodles, and spaghetti. Hide and larder beetles like cheese, smoked and cured meats, and organic debris. They are sometimes found around incinerators. The cereal mite is often found in cereals and cereal products. It is hardly visible, but large numbers of the mites can leave a mass of gray powder from dropped skins. Their presence can mean that the product in which they are hiding has a higher than normal moisture content.

Rats and Mice
Rats are good climbers, and can squeeze through small openings. Both rats and mice can gnaw through wood. Rats and mice will eat a variety of food. They like to take the food into hiding but eat large items in place. You can tell they are around by signs of gnawing and burrowing, droppings, tracks, and signs of grease and dirt that show the paths they take to their nests.

Birds
Birds and their droppings can easily contaminate food, especially in the open air around the food establishment. Birds can also pass on dangerous diseases.

Summary
Aggressive pest control will help contribute to your ability to serve safe food. Protecting food from pests is a total commitment that must be made in order to lower the number of food borne illness outbreaks. The ultimate responsibility for pest control is yours. Your establishment must be regularly inspected and treated. After insect spraying and/or fumigating all food contact items and surfaces must be cleaned and sanitized in order to protect the people.
"Well, I just feel like I’m living under a microscope."
FOOD SAFETY VS SANITATION

Test your food safety IQ.

1. Do you pay more attention to your facility cleanliness than to food temperatures?
2. Do you rapidly cool foods to 40° within 4 hours and rapidly reheat foods to 165° within 2 hours?
3. Do you have a procedure for recording time and food temperatures at cool down, reheat and hot holding?
4. Do you know at which critical control points (steps) in your food preparation system you are at highest risk for cross contamination?
5. Do you check to see if your refrigerator adequately cools foods to 40° in 4 hours?
6. Do you have a system to test and check that sanitizers are at proper concentration and are being properly used?
7. Do you have an enforced policy and procedure to ensure proper handwashing?
8. Do you have an enforced policy to determine when employees are sick or have flu-like symptoms?
9. Have you written control procedures into your recipes for temperature, handling, reheating, and use of leftovers to ensure food safety standards are known and followed?
10. Are you aware of the changes in our commercial food growing and processing systems that have food safety implications?

If you answered NO to:

1-2 questions you are knowledgeable and incorporating most current food safety standards.

2-4 questions, it is suggested you update your food safety knowledge.

5 or more questions, it is highly recommended you update your knowledge of current food safety standards?

If you answered NO to 3 or more questions, it is likely that you are thinking SANITATION and the 44 point inspection system that has been our way of doing things since the 1940's when it was first developed.
WHAT IS HACCP?

History of HACCP

Hazard Analysis and Critical Control Points is a process of assuring food safety. It was developed in the 1960's, when the National Aeronautics and Space Administration (NASA) began to send people into space. The agency was not comfortable with standard quality control techniques.

Traditional food safety systems were seen as inadequate for the high quality that would need to be assured. Can you imagine an astronaut in space with vomiting or diarrhea? NASA needed a preventive system. The old procedures, then in use, were mostly reactive ones.

The traditional spot check inspection has its roots in the earliest days of public health. The food codes and inspection lists were largely developed in the 1930's and 1940's. Since that time there have been revisions and refinements but no real fundamental changes. The old system of spot checks has done a great deal to improve sanitation and upgrade food facilities in the United States. However, this strategy does not always reflect our present knowledge of the cycles of foodborne illness.

The new way of thinking is FOOD SAFETY; it includes the integrity of food processing systems, which includes sanitation as a part of the system. However, Food Safety looks more critically at the factors known to cause food borne illness. Five factors are known to cause 80% of food borne illness outbreaks, they are:

- Improper cooling
- Advance preparation (12 hours lapse)
- Infected persons
- Inadequate reheating
- Improper hot holding

Self-inspection is the critical ingredient in HACCP. The basic HACCP concepts dovetail with TQM (total quality management) strategies. It uses a flow chart to identify steps that are likely to cause failure in a process and develop procedures to lower risks.

In order for a successful HACCP program to be implemented, management must be committed to HACCP. A commitment by management indicates an awareness of the benefits and costs of HACCP which includes education and training of employees. Benefits, in addition to food safety, are better use of resources and timely response to problems.
The bottom line on HACCP inspections is concern for how food is handled, not how clean the walls and floors are. The end result is safer food and food handling.

**BASIC HACCP PROCEDURES**

1. Identify potentially hazardous foods and sensitive ingredients.
2. Find sources and specific points of contamination.
3. Determine the potential for microorganisms to:
   a. survive a heat process and
   b. multiply at room temperature and during hot and cold storage.

**THE STEPS OF THE HACCP SYSTEM ARE:**

First, identify potentially hazardous foods.

1. Then, observe those foods throughout your preparation, holding and serving process, to identify critical control points.
2. Establish control procedures and monitor those critical points to guarantee safe handling of the food.
3. Establish monitoring procedures to adjust the process and maintain control.
4. Establish corrective actions to be taken when monitoring indicates that there is a deviation from an established critical limit.
5. Establish effective record-keeping procedures that document the HACCP system.
6. Establish procedures to verify that the HACCP plan or system is working.

**Summary**

The HACCP approach to food safety combines an organized plan with written documentation. A person must make observations and measurements in order to identify and control rapid growth of infectious or toxic microorganisms or other contaminants from entering our food supply. This type of approach will be different with each type of food facility and will change as your products and menus change. The important issue to remember is that, if the system is not working, change it.
GLOSSARY
SAMPLE TEST REFERENCES

“So, until next week — Adios, amoebas.”
Glossary

**Acid** A substance with a pH less than 7.

**Alkali** A substance with a pH of more than 7.

**Bacteria** Single-celled organisms, usually classified as the simplest of plants.

**Biological hazard** Danger to food from disease-causing microorganisms and poisonous plants and fish.

**Chemical hazard** Danger to food safety posed by chemical substances especially pesticides; food additives; and toxic metals.

**Clean** Free of visible soil.

**Contamination** The unintended presence of harmful substances or organisms, especially in food.

**Control** (a) To manage the conditions of an operation to maintain compliance with established criteria. (b) The state wherein correct procedures are being followed and criteria are being met.

**Control point** Any point, step, or procedure at which biological, physical, or chemical factors can be controlled.

**Critical Control Point (CCP)** A point, step, or procedure at which control can be applied and a food safety hazard can be prevented, eliminated, or reduced to acceptable levels.

**Critical defect** A deviation at a CCP which may result in a hazard.

**Critical limit** A criterion that must be met for each preventive measure associated with a critical control point.

**Cross-contamination** The transfer of harmful micro-organisms from one food to another by means of a non food surface such as utensils, equipment, or human hands.

**Danger zone** The temperature range between 40° and 140° F (4.0° and 60° C) within which most bacteria experience their best growth and reproduction.
Deviation Failure to meet a critical limit.

Fahrenheit A temperature scale related to Celsius by the formula \((9/5 \times \degree \text{Celsius}) + 32\degree\) 'Fahrenheit.

Food borne illness Disease or injury occurring as a result of consumption of contaminated food.

Food poisoning A general term for intoxication or infection caused by consumption of contaminated food.

HACCP Plan The written document which is based upon the principles of HACCP and which delineates the procedures to be followed, to assure the control of a specific process or procedure.

HACCP System The result of the implementation of the HACCP plan.

HACCP Team The group of people who are responsible for developing and implementing a HACCP plan.

Hazard A biological, chemical, or physical property that may cause a food to be unsafe for consumption.

Hygiene Practices necessary for establishing and maintaining good health.

Incubation period The phase in the course of an infection between the invasion of the host by the pathogen and the appearance of the symptoms of illness.

Infection Disease caused by invasion of a host by living pathogenic organisms, which multiply within the body.

Intoxication Disease caused by consumption of poisons, which may chemical, naturally occurring in food, or produced by pathogenic micro-organisms.

Micro- Prefix denoting small size.

Microbe A general term for microscopic organisms, particularly pathogens.

Microorganisms Forms of life that can be seen only with the aid of a microscope, including bacteria, viruses, yeasts, algae, and single-celled animals.

Monitor To conduct a planned sequence of observations or measurements to assess whether a CCP is under control and to produce an accurate record for future use in verification.
**Organism** An individual living thing.

**Outbreak** The development of FOOD BORNE illness by two or more people who have eaten a common food that is shown by laboratory analysis to be the source of the illness. One case of botulism qualifies as an outbreak.

**Personal hygiene** Individual cleanliness and habits that contribute to healthful conditions.

**pH** A measure of the acidity or alkalinity of solutions: pH 7 is neutral, under 7 is acidic, and 7 to 14 is alkaline.

**Potentially Hazardous Food (PHF)** Any food that consists in whole or in part of milk or milk products, eggs, meat, poultry, fish, shellfish, edible crustacean or other ingredients, in a form capable of supporting rapid growth of infectious or toxic micro-organisms.

**Preventive measure** Physical, chemical, or other factors that can be used to control an identified health hazard.

**Risk** An estimate of the likely occurrence of a hazard.

**Sanitary** Free of disease-causing organisms and other harmful substances.

**Sanitization** The reduction of the number of pathogenic micro-organisms on the surface to levels accepted as safe by regulatory authorities.

**Virus** Any of a large group of infectious agents, lacking dependent metabolism and requiring a living host in order to reproduce, consisting of DNA or RNA in a protein shell.

**Water activity** Expression of amount of moisture available to aid bacterial growth.
Sample Test

1. Which group contains only potentially hazardous foods?
   a. Cold cooked potatoes, warm cooked rice, refried beans, chicken salad
   b. Uncooked shrimp egg rolls, tofu, dry rice, egg drop soup, fresh garlic in oil
   c. Cooked spaghetti, vegetarian tomato sauce, dinner rolls, meatballs
   d. Hot beef stew, alfalfa sprouts, mashed potatoes, salad greens

2. The temperature of potentially hazardous foods in hot-holding equipment should be:
   a. 130°F or below
   b. 140°F or above
   c. 165°F or below
   d. 170°F or above

3. An ice-water bath is used for:
   a. Holding raw oysters and clams
   b. Chilling fresh fish
   c. Cooling large stockpots of food
   d. Cooling large roasts

4. The most important action that your employees must be taught to do is:
   a. Come to work on time
   b. Wash their hair
   c. Cover their mouths when they cough
   d. Wash their hands thoroughly and frequently

5. If a food contact surface appears clean, then it is usually not necessary to sanitize.
   a. True  b. False

6. Re-serving a basket of nacho chips is considered OK because nacho chips are not considered potentially hazardous?
   a. True  b. False

7. Hot, potentially hazardous foods (such as green chili, gravy, meat loaf, beans, soups and cooked pasta) must be stored at _____ °F or hotter.

ANSWERS
1)A  2)B  3)C  4)D  5)B  6)B  7)140°
The Carson City Health Department would like to thank the many individuals and agencies whose guidance, wisdom, advice and support have made this manual possible.

*Applied Food Service Sanitation*, the Educational Foundation of the National Restaurant Association.


*The Far Side Gallery 3*, Gary Larson