**One Hundred Sickened by Norovirus Outbreak**

A buffet attendant sickened over 100 guests at a large southwestern golf resort. Those that got sick had symptoms that included severe vomiting, diarrhea, and physical weakness. A food handler later tested positive for Norovirus. While the food handler was not experiencing symptoms at the time of the outbreak, he indicated that he had vomiting and diarrhea the week before.

Local regulatory authorities determined that the food handler contaminated items on the buffet line as he worked. The food handler failed to wash his hands correctly and change gloves as he moved from buffet station to buffet station. Authorities believed that utensils used by the guests had become contaminated by the food handler. This led to the outbreak.

**You Can Prevent This**

The operation in the story above had two problems. First, the food handler should have reported his illness the week before the outbreak. Second, the food handler should have been washing his hands and changing his gloves correctly while serving food.

Serving food the correct way would have helped prevent this outbreak. In this chapter, you will learn guidelines for keeping food safe after you have prepped and cooked it. These guidelines include the following.

- Holding hot food
- Holding cold food
- Using time as a method of control for food
- Preventing contamination of food in self-service areas and when serving food to customers
**Holding Food**

Food that is being held for service is at risk for time-temperature abuse and cross-contamination. If your operation holds food, you must make policies that reduce these risks. Focus on time and temperature control, but don’t forget about protecting the food from contamination. In some cases, you might be able to hold food without controlling its temperature.

### Guidelines for Holding Food

Create policies about how long the operation will hold food. Also, create policies about when to throw away held food. For example, your policy may let you refill a pan of veal in a buffet all day, as long as you throw it out at the end of the day. Policies should also consider the following.

**Food covers and sneeze guards** Cover food and install sneeze guards to protect food from contaminants. Covers, like the ones shown in the photo at left, also help maintain a food’s internal temperature.

**Temperature** Hold TCS food at the correct internal temperature.

- Hold hot food at 135°F (57°C) or higher. This will prevent pathogens such as *Bacillus cereus* from growing to unsafe levels.
- Hold cold food at 41°F (5°C) or lower. This will prevent pathogens such as *Staphylococcus aureus* from growing to unsafe levels.

**Thermometer** Use a thermometer to check a food’s internal temperature, as the food handler in the photo at left is doing. **Never** use the temperature gauge on a holding unit to do it. The gauge does not check the internal temperature of the food.

**Time** Check food temperature at least every four hours.

- Throw out food that is not 41°F (5°C) or lower, or 135°F (57°C) or higher.
- You can also check the temperature every two hours. This will leave time for corrective action. For example, hot TCS food that has been held below 135°F (57°C) can be reheated and then placed back in the hot-holding unit.

**Hot-holding equipment** **Never** use hot-holding equipment to reheat food unless it is built to do so. Most hot-holding equipment does not pass food through the temperature danger zone quickly enough. Reheat food correctly. Then move it to the holding unit.

*Check your local regulatory requirements.*
How This Relates to Me
At what temperature must your operation hold hot TCS food?

At what temperature must your operation hold cold TCS food?

Holding Food without Temperature Control
Your operation may want to display or hold TCS food without temperature control. Here are some examples of when you might hold food without temperature control.

- When displaying food for a short time, such as at an off-site catered event, as shown in the photo at left
- When electricity is not available to power holding equipment

If your operation displays or holds TCS food without temperature control, it must do so under certain conditions. Also note that the conditions for holding cold food are different from those for holding hot food.

Before using time as a method of control, check with your local regulatory authority for specific requirements.

Cold Food
You can hold cold food without temperature control for up to six hours if you meet these conditions.

- Hold the food at 41°F (5°C) or lower before removing it from refrigeration.
- Label the food with the time you removed it from refrigeration and the time you must throw it out. The discard time on the label must be six hours from the time you removed the food from refrigeration, as shown in the photo at left. For example, if you remove potato salad from refrigeration at 3:00 p.m. to serve at a picnic, the discard time on the label should be 9:00 p.m. This equals six hours from the time you removed it from refrigeration.
- Make sure the food temperature does not exceed 70°F (21°C) while it is being served. Throw out any food that exceeds this temperature.
- Sell, serve, or throw out the food within six hours.
Hot Food
You can hold hot food without temperature control for up to four hours if you meet these conditions.

- Hold the food at 135°F (57°C) or higher before removing it from temperature control.
- Label the food with the time you must throw it out. The discard time on the label must be four hours from the time you removed the food from temperature control, as shown in the photo at left.
- Sell, serve, or throw out the food within four hours.

How This Relates to Me
Does your jurisdiction allow you to hold ready-to-eat TCS food without temperature control?

If yes, what are the requirements for doing so?

Apply Your Knowledge
Is It Being Handled Safely?
Write an X next to each food item that is not being handled safely.

Soup held at 120°F (49°C)

Pasta salad held at 39°F (4°C)

Potato salad held at 75°F (24°C)

Soup placed in a hot-holding unit at 40°F (4°C)

For answers, please turn to page 7.15.
The biggest threat to food that is ready to be served is contamination. Your kitchen and service staff must know how to serve food in ways that keep it safe. Dining rooms, self-service areas, off-site locations, and vending machines all have specific guidelines that staff must follow.

**Kitchen Staff Guidelines**

Train your kitchen staff to serve food in these ways.

**Bare-hand contact with food**  Food handlers must wear single-use gloves whenever handling ready-to-eat food. As an alternative, food can be handled with spatulas, tongs, deli sheets, or other utensils. The photo at left shows two ways to avoid bare-hand contact.

*Check your local regulatory requirements.*

**Clean and sanitized utensils**  Use separate utensils for each food item. Clean and sanitize them after each serving task. If using utensils continuously, clean and sanitize them at least once every four hours.

**Serving utensils**  Store serving utensils in the food with the handle extended above the rim of the container, as shown in the photo at left. You can also place them on a clean and sanitized food-contact surface. Spoons or scoops used to serve food such as ice cream or mashed potatoes can be stored under running water that is 135°F (57°C).
Service Staff Guidelines

Service staff must be as careful as kitchen staff. They can contaminate food simply by handling the food-contact areas of glasses, dishes, and utensils. Service staff should use these guidelines when serving food.

- **Hold dishes by the bottom or edge.**
- **Hold glasses by the middle, bottom, or stem.**
- **Do NOT** touch the food-contact areas of dishes or glassware.

- **Carry glasses in a rack or on a tray to avoid touching the food-contact surfaces.**
- **Do NOT** stack glasses when carrying them.

- **Hold flatware by the handle.**
- **Do NOT** hold flatware by food-contact surfaces.
- **Store flatware so that servers grasp handles, not food-contact surfaces.**

- **Avoid bare-hand contact with food that is ready to eat.**

- **Use ice scoops or tongs to get ice.**
- **NEVER** scoop ice with your bare hands or a glass. A glass may chip or break.
Preset Tableware

If your operation presets tableware on dining tables, you must take steps to prevent it from becoming contaminated. This might include wrapping or covering the items as shown in the photo at left. Table settings do not need to be wrapped or covered if extra, or unused, settings meet these requirements.

- They are removed when guests are seated.
- If they remain on the table, they are cleaned and sanitized after guests have left.

Re-serving Food

Service and kitchen staff should also know the rules about re-serving food previously served to another customer.

Menu items  **Do not** re-serve food returned by one customer to another customer.

Condiments  You must protect condiments from contamination. Serve them in their original containers or in containers designed to prevent contamination. Offering condiments in individual packets or portions can also help keep them safe. **NEVER** re-serve uncovered condiments. Do **not** combine leftover condiments with fresh ones, like the food handler in the photo at left is doing. Throw away opened portions or dishes of condiments after serving them to customers. Salsa, butter, mayonnaise, and ketchup are examples.

Bread or rolls  **Do not** re-serve uneaten bread to other customers. Change linens used in bread baskets after each customer.

Garnishes  **NEVER** re-serve plate garnishes, such as fruit or pickles, to another customer. Throw out served but unused garnishes.

Prepackaged food  In general, you may re-serve only unopened, prepackaged food in good condition. These include condiment packets and wrapped crackers. You may re-serve bottles of ketchup, mustard, and other condiments. The containers must remain closed between uses.
Self-Service Areas

Self-service areas can be contaminated easily. Follow these guidelines to prevent contamination and time-temperature abuse.

Protection Food on display can be protected from contamination using sneeze guards. They should be located 14 inches (36 centimeters) above the counter and should extend 7 inches (18 centimeters) beyond the food, as shown in the photo at left. Food can also be protected by placing it in display cases or by packaging it in a way that will protect it from contamination. Whole, raw fruits and vegetables and nuts in the shell that require peeling or hulling before eating do not require the protection measures discussed above.

Labels Label food located in self-service areas. For example, place the name of the food, such as types of salad dressing, on ladle handles.

Temperature Keep hot food hot, 135°F (57°C) or higher. Keep cold food cold, 41°F (5°C) or lower.

Raw and ready-to-eat food Typically, raw, unpackaged meat, poultry, and seafood cannot be offered for self-service. However, these items are an exception.

- Ready-to-eat food at buffets or salad bars that serve food such as sushi or raw shellfish
- Ready-to-cook portions that will be cooked and eaten immediately on the premises, such as at Mongolian barbeques
- Raw, frozen, shell-on shrimp or lobster

Refills Do not let customers refill dirty plates or use dirty utensils at self-service areas. Pathogens such as Norovirus can easily be transferred by reused plates and utensils. Assign a staff member to monitor guests. Post signs reminding customers not to reuse plates and utensils.

Utensils Stock food displays with the correct utensils for dispensing food. This might include tongs, ladles, or deli sheets.

Ice Ice used to keep food or beverages cold should never be used as an ingredient.
Labeling Bulk Food

Bulk food in self-service areas must be labeled. The label must be in plain view of the customer. When labeling food, you can include the manufacturer or processor label provided with the food. As an alternative, you can provide this information using a card, sign, or other labeling method.

Bulk unpackaged food, such as bakery products and unpackaged food portioned for customers, does not need to be labeled if it meets these conditions.

- The product makes no claim regarding health or nutrient content.
- There are no laws requiring labeling.
- The food is manufactured or prepared on the premises.
- The food is manufactured or prepared at another food operation or processing plant owned by the same person. The operation must be regulated.

Off-Site Service

Delays from the point of preparation to the point of service increase the risk that food will be exposed to contamination or time-temperature abuse. To transport correctly, follow these procedures.

Food containers Pack food in insulated food containers. Use only food-grade containers, such as those shown in the photo at left. They should be designed so food cannot mix, leak, or spill. At the service site, use appropriate containers or equipment to hold food at the correct temperature.

Delivery vehicles Clean the inside of delivery vehicles regularly.

Internal temperature Check internal food temperatures. If containers or delivery vehicles are not holding food at the correct temperature, reevaluate the length of the delivery route or the efficiency of the equipment being used.

Labels Label food with a use-by date and time, and reheating and service instructions for staff at off-site locations. This is shown in the photo at left.

Utilities Make sure the service site has the correct utilities.

- Safe water for cooking, dishwashing, and handwashing
- Garbage containers stored away from food-prep, storage, and serving areas

Storage Store raw meat, poultry, and seafood and ready-to-eat items separately. For example, store raw chicken separately from ready-to-eat salads.
Vending Machines

Handle food prepped and packaged for vending machines with the same care as any other food served to customers. Vending operators should protect food from contamination and time-temperature abuse during transport, delivery, and service. To keep vended food safe, follow these guidelines.

- Check product shelf life daily. Products often have a code date, such as an expiration or use-by date, like that shown in the photo at left. If the date has expired, throw out the food immediately. Throw out refrigerated food prepped on-site if not sold within seven days of preparation.

- Keep TCS food at the correct temperature. It should be held at 41°F (5°C) or lower, or at 135°F (57°C) or higher. These machines must have controls that prevent TCS food from being dispensed if the temperature stays in the danger zone for a specified amount of time. This food must be thrown out.

- Dispense TCS food in its original container.

- Wash and wrap fresh fruit with edible peels before putting it in a machine.

Apply Your Knowledge

Is It Being Served Safely?
Write an X next to each food item that is not being served safely.

1.

2.

3.

4.

For answers, please turn to page 7.15.
Apply Your Knowledge

Re-serve or Throw Out?
Write a T next to the food that you must throw out. Write an R next to the items you can re-serve.

1. __________ Chili held without temperature control for 5 hours
2. __________ Previously served, but untouched, basket of bread
3. __________ Bottle of ketchup
4. __________ Untouched slice of pie with whipped cream returned by a customer
5. __________ Individually wrapped crackers
6. __________ Unwrapped butter served on a plate
7. __________ Mustard packets
8. __________ Ice used to hold cold food on a self-service area
9. __________ Breaded, baked fish returned by a customer who wanted broiled fish
10. __________ An apple that has been in a vending machine for 8 days that has been washed and wrapped

For answers, please turn to page 7.15.

Chapter Summary

- When holding TCS food for service, keep hot food at 135°F (57°C) or higher. Never use hot-holding equipment to reheat food. Keep cold food at 41°F (5°C) or lower. Check the internal temperature of food at least every four hours. Throw food out if it is not at the correct temperature.

- Review the guidelines for keeping food safe when holding food without temperature control.

- Staff should be trained to avoid bare-hand contact with ready-to-eat food, and use separate utensils for serving different food items.

- Teach staff the correct ways for handling service items and tableware. Staff should also be trained on the potential hazards of re-serving food such as plate garnishes, breads, or open dishes of condiments.

- Self-service areas can be contaminated by staff and customers. Protect food on display with sneeze guards, packaging, or other tools designed to keep food safe. Post self-service rules. Make it clear to customers that clean plates must be used for refills. Put the correct labels on displayed food and bulk food available for self-service. Make sure equipment holds food at the correct temperature. Follow safety procedures when prepping, delivering, or serving food off-site.

- Vending machine food should be handled as carefully as any other food. Check product shelf life daily. Hold TCS food at the correct temperature.
Chapter Review Case Study

To keep food safe during holding and serving, you must know how to hold hot and cold food; use time as a method of control to hold food; and prevent contamination of food in self-service areas and when serving food to customers.

Now, take what you have learned in this chapter and apply it to the following case study.

Jill, a line cook on the morning shift at Memorial Hospital, was busy helping the kitchen staff put food on display for lunch in the hospital cafeteria. Ann, the kitchen manager who usually supervised lunch in the cafeteria, was at an all-day seminar on food safety. Jill was also responsible for making sure meals were trayed and put into food carts for transport to the patients' rooms. The staff also packed two dozen meals each day for a neighborhood group that delivered them to homebound elderly people.

First, Jill looked for insulated food containers for the delivery meals. When she could not find them, she loaded the meals into cardboard boxes she found near the back door, knowing the driver would arrive soon to pick them up. The lunch hour was hectic. The cafeteria was busy, and the staff had many meals to tray and deliver.

As the lunch period was ending, Jill breathed a sigh of relief. She moved down the cafeteria serving line, checking food temperatures. One of the casseroles was at 130°F (54°C). Jill checked the water level in the steam table and turned up the thermostat. She then went to clean up the kitchen and finish her shift.

1. What did Jill do wrong?

2. What should Jill have done?

For answers, please turn to page 7.15.
Study Questions

Circle the best answer to each question.

1) Which part of the plate should a food handler avoid touching when serving customers?
   A  Bottom
   B  Edge
   C  Side
   D  Top

2) An operation has a small salad bar with 8 different items on it. How many serving utensils are needed to serve the items on the salad bar?
   A  2
   B  4
   C  6
   D  8

3) At what maximum internal temperature should cold TCS food be held?
   A  0°F (-17°C)
   B  32°F (0°C)
   C  41°F (5°C)
   D  60°F (16°C)

4) What item must customers take each time they return to a self-service area for more food?
   A  Clean plate
   B  Extra napkins
   C  Hand sanitizer
   D  New serving spoon

5) At what minimum temperature should hot TCS food be held?
   A  115°F (46°C)
   B  125°F (52°C)
   C  135°F (57°C)
   D  145°F (63°C)

Continued on the next page ➤
Continued from previous page

An operation is located in a jurisdiction that allows it to hold TCS food without temperature control. How many hours can it display hot TCS food without temperature control before the food must be sold, served, or thrown out?

A 2
B 4
C 6
D 8

Which food items can be displayed in a self-service area without the use of packaging, sneeze guards, or a display case to protect them from contamination?

A Bulk deli rolls
B Nuts in the shell
C Sushi-grade fish
D Cooked shrimp

What is the maximum distance that sneeze guards can be located from the self-service counter to protect food from contamination?

A 8 inches (20 cm)
B 10 inches (25 cm)
C 12 inches (30 cm)
D 14 inches (35 cm)

For answers, please turn to page 7.15.
Answers

7.4 Is It Being Handled Safely?

1. 3, and 4 should be marked. The soup in 1 should be held at 135°F (57°C) or higher. It is only being held at 120°F (49°C), which is unsafe. The potato salad in 3 is being held without temperature control, but the temperature has exceeded 70°F (21°C), which is unsafe. The soup in 4 is not being handled safely because it is being reheated in a hot-holding unit.

7.10 Is It Being Served Safely?

1, 2, 3, and 4 should be marked.

7.11 Re-serve or Throw Out?

1 T 6 T
2 T 7 R
3 R 8 T
4 T 9 T
5 R 10 R

7.12 Chapter Review Case Study

1 Here is what Jill did wrong.
   
   • She packed the deliveries in cardboard boxes instead of food-grade, insulated containers.

   • She failed to make sure that the internal temperature of the food on the steam table was checked at least every four hours. This would have alerted her to the fact that the steam table was not maintaining the correct temperature and that the casserole was in the temperature danger zone.

2 Here is what Jill should have done.

   • She should have kept the delivery meals in a hot-holding cabinet or left the food in a steam table until suitable containers were found or the driver arrived.

   • She should have thrown out the casserole and any other food that was not at the correct temperature, because she did not know how long the food was in the temperature danger zone.

7.13 Study Questions

1 D 5 C
2 D 6 B
3 C 7 B
4 A 8 D
chapter 8
Food Safety Management Systems
Blue Skies Handles It Correctly

The calls started on a Thursday morning at Blue Skies Café, a small but well-liked diner in a busy city neighborhood. The callers complained of stomach cramps and diarrhea. The owner of the café took the first few calls and realized that she might have a foodborne-illness outbreak on her hands. She filed out an incident report for each call, and then she contacted the local regulatory authority.

"We were also getting calls, so we went to the café to see what happened," said the health inspector assigned to the case. "With the cooperation of the owner, we were able to identify the Caesar salad dressing as the source of the customers' illnesses."

A batch of the dressing was made with contaminated eggs. It eventually got 30 people sick. Because Caesar dressing isn't fully cooked, the café could not have done anything different to prep the dressing. "To correct the issue, we now use pasteurized eggs for the dressing, and we make new batches every few hours," said the owner.

The inspector also noted that the café's health-inspection score was not changed because of the outbreak. Nor was the operation forced to close. "They handled the problem quickly, and the rest of the operation is clean and well run," he said. Additionally, the café's insurance covered the healthcare costs and lost wages that the outbreak caused.

You Can Prevent This

A foodborne-illness outbreak is any manager's nightmare. But, as you can see in the story above, you can survive one. Creating a food safety management system will help prevent problems before they happen.

In this chapter, you will learn about the following systems.

- Food safety management systems
- Active managerial control
- Hazard Analysis Critical Control Point (HACCP)
Food Safety Management Systems

In chapters 4 through 7, you learned how to handle food safely throughout the flow of food. Now, you will learn how all of it can be applied to a food safety management system. To do this, you must understand how a food safety management system works.

**Overview of Food Safety Management Systems**

A food safety management system is a group of practices and procedures intended to prevent foodborne illness. It does this by actively controlling risks and hazards throughout the flow of food.

Having some food safety programs already in place gives you the foundation for your system. The principles presented in the ServSafe program are the basis of these programs. Here are some examples of the programs your operation needs.

<table>
<thead>
<tr>
<th>Personal hygiene program</th>
<th>Food safety training program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier selection and specification program</td>
<td>Quality control and assurance programs</td>
</tr>
<tr>
<td>Cleaning and sanitation program</td>
<td>Standard operating procedures (SOPs)</td>
</tr>
<tr>
<td>Facility design and equipment maintenance program</td>
<td>Pest-control program</td>
</tr>
</tbody>
</table>
Active Managerial Control

Earlier, you learned that there are five common risk factors for foodborne illness.

1. Purchasing food from unsafe sources
2. Failing to cook food correctly
3. Holding food at incorrect temperatures
4. Using contaminated equipment
5. Practicing poor personal hygiene

It is the manager’s responsibility to actively control these and other risk factors for foodborne illness. This is called active managerial control. It is important to note that active managerial control is proactive rather than reactive. You must anticipate risks and plan for them.

There are many ways to achieve active managerial control in the operation. According to the Food and Drug Administration (FDA), you can use simple tools such as training programs, manager supervision, and the incorporation of SOPs. Active managerial control can also be achieved through more complex solutions such as a HACCP program.

Monitoring is critical to the success of active managerial control. Food will be safe if managers monitor critical activities in the operation. For example, the manager in the photo at left is monitoring a food handler as she carries out the critical task of cooling food correctly. Managers must also take the necessary corrective action when required. They must also verify that the actions taken to control the risk factors for foodborne illness are actually working.

Something to Think About...

Get a Handle on it!

A local regulatory authority was inspecting an operation in a large quick-service chain. The inspector noticed that the grill operator handling raw chicken fillets also put cooked fillets in a holding drawer. A sandwich maker touched the handle of the drawer each time she retrieved a cooked fillet.

The inspector saw that the grill operator was contaminating the holding-drawer handle. It happened each time he put a cooked fillet inside—since his hands had touched raw chicken. When the sandwich maker touched the contaminated handle, there was chance of cross-contamination.

Working with the manager, the inspector recommended adding an extra handle to the holding drawer. The grill operator and sandwich maker were assigned their own handle. The chain adopted the recommendation in all of its units.

In dealing with the risk of contamination, the chain practiced active managerial control. This included modifying their SOPs to control the risk and retraining staff. They also incorporated the new SOPs in the chain’s monitoring program.
The FDA's Public Health Interventions
The FDA provides specific recommendations for controlling the common risk factors for foodborne illness. These are known as public health interventions. They are designed to protect public health.

Demonstration of knowledge  As a manager, you must be able to show that you know what to do to keep food safe. Becoming certified in food safety is one way to show this.

Staff health controls  Procedures must be put in place to make sure staff are practicing personal hygiene. For example, staff must know that they must report illnesses and illness symptoms to management.

Controlling hands as a vehicle of contamination  Controls must be put in place to prevent bare-hand contact with ready-to-eat food. This might include requiring the use of tongs to handle ready-to-eat food, as shown in the photo at left.

Time and temperature parameters for controlling pathogens  Procedures must be put in place to limit the time food spends in the temperature danger zone. Requiring food handlers to check the temperature of food being hot-held every two hours is an example.

Consumer advisories  Notices must be provided to customers if you serve raw or undercooked menu items. These notices must include a statement about the risks of eating these foods.

HACCP
There are many systems you can implement to achieve active managerial control of foodborne illness risk factors. Hazard Analysis Critical Control Point (HACCP) is one such system. HACCP (pronounced HASS-ip) is based on identifying significant biological, chemical, or physical hazards at specific points within a product's flow. Once identified, the hazards can be prevented, eliminated, or reduced to safe levels.

An effective HACCP system must be based on a written plan. This plan must be specific to each facility's menu, customers, equipment, processes, and operations. Since each HACCP plan is unique, a plan that works for one operation may not work for another.

The HACCP Approach
A HACCP plan is based on seven basic principles. They were created by the National Advisory Committee on Microbiological Criteria for Foods. These principles are the seven steps that outline how to create a HACCP plan.
The Seven HACCP Principles
Each HACCP principle builds on the information gained from the previous principle. You must consider all seven principles, in order, when developing your plan.

Here are the seven principles.

1. Conduct a hazard analysis.
2. Determine critical control points (CCPs).
3. Establish critical limits.
4. Establish monitoring procedures.
5. Identify corrective actions.
6. Verify that the system works.
7. Establish procedures for record keeping and documentation.

In general terms, the principles break into three groups.

- Principles 1 and 2 help you identify and evaluate your hazards.
- Principles 3, 4, and 5 help you establish ways for controlling those hazards.
- Principles 6 and 7 help you maintain the HACCP plan and system, and verify its effectiveness.

The next few pages provide an introduction to these principles. They also present an overview of how to build a HACCP program.

A real-world example has also been included for each principle. It shows the efforts of Enrico's, an Italian restaurant, as it implements a HACCP program. The example will appear after the explanation of each principle.

Principle 1: Conduct a Hazard Analysis
First, identify and assess potential hazards in the food you serve. Start by looking at how food is processed in your operation. Many types of food are processed in similar ways. Here are some common processes.

- Prepping and serving without cooking (salads, cold sandwiches, etc.)
- Prepping and cooking for same-day service (grilled chicken sandwiches, hamburgers, etc.)
- Prepping, cooking, holding, cooling, reheating, and serving (chili, soup, pasta sauce with meat, etc.)

Look at your menu and identify items that are processed like this. Next, identify the TCS food. Determine where food safety hazards are likely to occur for each TCS food. There are many types of hazards to look for. These can come from biological, chemical, or physical contaminants.
Principle 1 Example

The management team at Enrico’s decided to implement a HACCP program. They began by analyzing their hazards.

The team noted that many of their dishes are received, stored, prepared, cooked, and served the same day. The most popular of these items was the spicy charbroiled chicken breast.

The team determined that bacteria were the most likely hazard to food prepared this way.

Principle 2: Determine Critical Control Points (CCPs)

Find the points in the process where the identified hazard(s) can be prevented, eliminated, or reduced to safe levels. These are the critical control points (CCPs). Depending on the process, there may be more than one CCP.

Principle 2 Example

Enrico’s management identified cooking as the CCP for food prepared and cooked for immediate service. This included the chicken breasts.

These food items must be handled correctly throughout the flow of food. However, correct cooking is the only step that will eliminate or reduce bacteria to safe levels.

Since the chicken breasts were prepared for immediate service, cooking was the only CCP identified.

Principle 3: Establish Critical Limits

For each CCP, establish minimum or maximum limits. These limits must be met to prevent or eliminate the hazard, or to reduce it to a safe level.

Principle 3 Example

With cooking identified as the CCP for Enrico’s chicken breasts, a critical limit was needed. Management determined that the critical limit would be cooking the chicken to a minimum internal temperature of 165°F (74°C) for 15 seconds.

They decided that the critical limit could be met by cooking chicken breasts in the broiler for 16 minutes.
Principle 4: Establish Monitoring Procedures
Once critical limits have been created, determine the best way for your operation to check them. Make sure the limits are consistently met. Identify who will monitor them and how often.

Principle 4 Example
At Enrico's, each charbroiled chicken breast is cooked to order. The team decided to check the critical limit by inserting a clean and sanitized thermocouple probe into the thickest part of each chicken breast.

The grill cook must check the temperature of each chicken breast after cooking. Each chicken breast must reach the minimum internal temperature of 165°F (74°C) for 15 seconds.

Principle 5: Identify Corrective Actions
Identify steps that must be taken when a critical limit is not met. These steps should be determined in advance.

Principle 5 Example
If the chicken breast has not reached its critical limit within the 16-minute cook time, the grill cook at Enrico's must keep cooking the chicken breast until it has reached it.

This and all other corrective actions are noted in the temperature log.
**Principle 6: Verify That the System Works**

Determine if the plan is working as intended. Evaluate it on a regular basis. Use your monitoring charts, records, hazard analysis, etc.; and determine if your plan prevents, reduces, or eliminates identified hazards.

**Principle 6 Example**

Enrico's management team performs HACCP checks once per shift. They make sure that critical limits were met and appropriate corrective actions were taken when needed.

They also check the temperature logs on a weekly basis to identify patterns. This helps to determine if processes or procedures need to be changed. For example, over several weeks they noticed problems toward the end of each week. The chicken breasts often failed to meet the critical limit. The appropriate corrective action was being taken.

Management discovered that Enrico's received chicken shipments from a different supplier on Thursdays. This supplier provided a six-ounce chicken breast. Enrico's chicken specifications listed a four-ounce chicken breast. Management worked with the supplier to ensure they received four-ounce breasts. The receiving procedures were changed to include a weight check.

**Principle 7: Establish Procedures for Record Keeping and Documentation**

Maintain your HACCP plan and keep all documentation created when developing it. Keep records for the following actions.

- Monitoring activities
- Taking corrective action
- Validating equipment (checking for good working condition)
- Working with suppliers (i.e., shelf-life studies, invoices, specifications, challenge studies, etc.)

**Principle 7 Example**

Enrico's management team determined that time-temperature logs should be kept for three months. Receiving invoices would be kept for 60 days. The team used this documentation to support and revise their HACCP plan.
Another HACCP Example

The Enrico's example shows one type of HACCP plan. Another plan may look very different when it deals with food that is processed more simply. For example, food that is prepared and served without cooking needs a different approach.

Here is an example of the HACCP plan developed by The Fruit Basket. This fruit-only operation is known for its signature item—the Melon Medley salad.

1. **Analyzing hazards**  The HACCP team at The Fruit Basket decided to look at hazards for the Melon Medley. The salad has fresh watermelon, honeydew, and cantaloupe. The team determined that bacteria pose a risk to the fresh-cut melons.

2. **Determining CCPs**  The melons are prepped, held, and served without cooking. The team determined that preparation and holding are CCPs for the salad. They decided that cleaning and drying the melons' surfaces during prep, as shown in the photo at left, would reduce bacteria. Holding the melon at the correct temperature could prevent the bacteria’s growth. Receiving was ruled out as a CCP, since the operation only purchases melons from approved suppliers.

3. **Establishing critical limits**  For the preparation CCP, the team decided the critical limit would be met by washing, scrubbing, and drying whole melons. They created an SOP with techniques for washing the melons. For the holding CCP, they decided that the salad must be held at 41°F (5°C) or lower, because it had cut melons.

4. **Establishing monitoring procedures**  The team decided that the operation's team leader should monitor the salad's critical limits. The team leader must observe food handlers to make sure they are prepping the melons the correct way. Food handlers must remove all surface dirt from the washed melons. Then they must cut, mix, and portion the salad into containers. The finished salads are put in the display cooler. The team leader must then monitor the temperature of the held salads to make sure the holding critical limit is met. The internal temperature of the salads must be 41°F (5°C) or lower. It must be checked three times per day, as shown in the photo at left.

5. **Identifying corrective actions**  Sometimes after preparation, the melons still have surface dirt. The team had to determine a corrective action for this. They decided that the action would be to rewash the melons. Then the team leader must approve the melons before they are sliced.

To correct a holding temperature that is higher than 41°F (5°C), the team leader must check the temperature of every Melon Medley in the cooler. Any salad that is above 41°F (5°C) must be thrown out.
6 Verifying that the system works. To make sure the system is working correctly, the team decided that the operation team leader must review the Manager Daily HACCP Check Sheet at the end of each shift. The team leader makes sure that each item was checked and initialed. The team leader also confirms that all corrective actions have been taken and recorded. The Fruit Basket also evaluates the HACCP system quarterly to see if it is working.

7 Establishing procedures for record keeping. Since a foodborne illness associated with fresh produce can take as long as 16 weeks to emerge, the team determined that all HACCP records must be maintained for 16 weeks and kept on file.

Specialized Processing Methods and HACCP

Some food processes are highly specialized and can be a serious health risk if specific procedures are not followed. Typically these processes are carried out at processing plants.

• Smoking food as a method to preserve it (but not to enhance flavor).

• Using food additives or adding components such as vinegar to preserve or alter it so it no longer requires time and temperature control for safety.

• Curing food.

• Custom-processing animals. For example, this may include dressing deer in the operation for personal use.

• Packaging food using reduced-oxygen packaging (ROP) methods. This includes MAP, vacuum-packed, and sous vide food. *Clostridium botulinum* and *Listeria monocytogenes* are risks to food packaged in these ways.

• Treating (e.g., pasteurizing) juice on-site, and packaging it for later sale.

• Sprouting seeds or beans.

A variance from the regulatory authority will be required before processing food this way. A variance is a document that allows a requirement to be waived or changed.

A HACCP plan may also be required if the processing method carries a higher risk of causing a foodborne illness. There may also be dangers unique to these processes that are best addressed by HACCP. For example, if not done correctly, reduced-oxygen packaging (ROP) has a very high risk of causing a foodborne illness. Because of this, a HACCP plan is required when a variance has not been requested.

Check with your local regulatory authority before using any of these specialized processing methods on-site.
Apply Your Knowledge

It's the Principle of the Thing

Identify the HACCP principle defined by each statement. Write the number of the principle in the space provided.

A. Checking to see if critical limits are being met
B. Keep HACCP plan documents
C. Assessing risks within the flow of food
D. Specific places in the flow of food where a hazard can be prevented, eliminated, or reduced to a safe level
E. Predetermined step taken when a critical limit is not met
F. Minimum or maximum boundaries that must be met to prevent a hazard
G. Determining if the HACCP plan is working as intended

3. Hazard analysis
4. Critical control points
5. Critical limits
6. Monitoring
7. Corrective action
8. Verification
9. Record keeping and documentation

For answers, please turn to page 8.15.

Chapter Summary

- A food safety management system is a group of procedures and practices intended to prevent foodborne illness. It does this by actively controlling risks and hazards throughout the flow of food.

- It is the manager's responsibility to actively control the risk factors for foodborne illness. This is called active managerial control. It can be achieved by incorporating specific actions and procedures into the operation to prevent foodborne illness.

- The FDA provides specific recommendations for controlling the common risk factors for foodborne illness. These are known as public health interventions. They are designed to protect public health.

- HACCP is based on identifying significant biological, chemical, or physical hazards at specific points within a product's flow. Once identified, the hazards can be prevented, eliminated, or reduced to safe levels.

- A HACCP plan is based on seven basic principles. These principles are the seven steps that outline how to create a HACCP plan.

- Some food processes are highly specialized and can be a serious health risk if specific procedures are not followed. This includes processing methods such as curing food, or smoking food to extend shelf life. Always check with your local regulatory authority before using specialized processing methods on-site.
Chapter Review Case Study

You can address food safety risks in your operation by creating a food safety management system.

Now, take what you have learned in this chapter and apply it to the following case study.

Maria, an owner/operator of a family restaurant, realized that she needed to do more to keep her place safe. That meant taking charge of food safety in a more formal way than before. It was time to develop a food safety management system. Though she hadn't had any formal training in HACCP, she wanted to develop a HACCP plan for her operation.

Maria began by reviewing her menu to identify CCPs for each menu item. Most dishes on the menu were grilled items that were prepared, cooked, and then served. Maria determined that risks to these items could best be controlled through cooking, so she identified cooking as the CCP. Next, she identified critical limits for each CCP. For grilled hamburgers, she determined that cooking them to 150°F (66°C) for 15 seconds would reduce pathogens to a safe level. For grilled chicken, she knew it was necessary to cook it to 165°F (74°C) for 15 seconds.

Maria decided to monitor the critical limits by having cooks press on the meat with their fingertips to check for doneness. As an additional safeguard, she required cooks to cut open product to check the color for doneness. Maria knew she needed to identify a corrective action for products that had not been cooked enough. She decided that if the meat did not feel right, or if the color inside was not correct, cooks needed to keep cooking the meat.

Maria knew that record keeping was often part of a HACCP program, but she wasn't sure what types of records to keep. She ended up deciding that they really weren't necessary for her operation.

1. What did Maria do correctly?

________________________________________________________________________

________________________________________________________________________

2. What mistakes did Maria make?

________________________________________________________________________

________________________________________________________________________

For answers, please turn to page 8.15.
Study Questions

Circle the best answer to each question.

1. The temperature of a roast is checked to see if it has met its critical limit of 145°F (63°C) for 4 minutes. This is an example of which HACCP principle?
   A. Verification
   B. Monitoring
   C. Record keeping
   D. Hazard analysis

2. The temperature of a pot of beef stew is checked during holding. The stew has not met the critical limit and is thrown out according to house policy. Throwing out the stew is an example of which HACCP principle?
   A. Monitoring
   B. Verification
   C. Hazard analysis
   D. Corrective action

3. The deli serves cold sandwiches in a self-serve display. Which step in the flow of food would be a critical control point?
   A. Storage
   B. Cooling
   C. Cooking
   D. Reheating

4. What is the first step in developing a HACCP plan?
   A. Identify corrective actions.
   B. Conduct a hazard analysis.
   C. Establish monitoring procedures.
   D. Determine critical control points.

5. What is the purpose of a food safety management system?
   A. Keep all areas of the facility clean and pest free
   B. Identify, tag, and repair faulty equipment within the facility
   C. Identify and control possible hazards throughout the flow of food
   D. Document and use the correct methods for purchasing and receiving food

Continued on the next page
Continued from previous page

6. Reviewing temperature logs and other records to make sure that the HACCP plan is working as intended is an example of which HACCP principle?
   A. Monitoring
   B. Verification
   C. Hazard analysis
   D. Record keeping

7. A chef sanitized a thermometer probe and then checked the temperature of minestrone soup being held in a hot-holding unit. The temperature was 120°F (49°C), which did not meet the operation's critical limit of 135°F (57°C). The chef recorded the temperature in the log and reheated the soup to 165°F (74°C) for 15 seconds. Which was the corrective action?
   A. Reheating the soup
   B. Checking the critical limit
   C. Sanitizing the thermometer probe
   D. Recording the temperature in the log

8. What does an operation that wants to smoke food as a method of preservation need to have before processing food this way?
   A. Food safety certificate
   B. Crisis-management plan
   C. Master cleaning schedule
   D. Variance from the local regulatory authority

For answers, please turn to page 8.15.
Answer Key

8.11  It’s the Principle of the Thing

A  4  C  5
B  7  C  3
C  1  G  6
D  2

8.12  Chapter Review Case Study

1 Maria did the following correctly.
   - Maria was correct in her decision to develop a food safety management system. This is the best way to address food safety risks in her operation.
   - Maria was correct in assuming that cooking was a CCP for the grilled items.

2 Maria made the following mistakes.
   - Maria should have started by conducting a hazard analysis. It is important to determine all of the places where food safety hazards are likely to occur.
   - Maria needed to look for more than just biological hazards because hazards can also be chemical or physical.
   - The critical limit for the hamburgers was not correct. The temperature needed to be 155°F (68°C) or higher for 15 seconds.
   - There are problems with the way that Maria planned to monitor her critical limits. The only way to determine whether food has been cooked to the correct internal temperature is to check the product using an approved thermometer.
   - Maria should have planned to develop temperature logs that could be used to record the internal temperature of the grilled meat and poultry at regular intervals. These records could then be used to help determine whether Maria’s HACCP plan was working as intended, which is called verification.

8.13  Study Questions

1 B  5 C
2 D  6 B
3 A  7 A
4 B  8 D
chapter 9
Safe Facilities and Pest Management
Chapter 9  Safe Facilities and Pest Management

![Image]

### Operation Closes to Fix Health Code Violations

A foodservice operation located on old Route 66 was closed by the local regulatory authority. A long list of violations was cited by the inspector. The operation, which opened its doors in the 1940s, was infested with roaches in both storage areas. Food was unprotected from potential sources of contamination during storage, preparation, and service. It was also discovered that the operation had been using old, broken equipment, and the building was in disrepair. Several pieces of equipment were being held together with duct tape, and some tabletop equipment was in such disrepair that the inspector told the operator to throw it out immediately.

The long-time owners said that they and their managers were fully committed to implementing the inspector’s recommendations to bring their operation up to state and local codes. They also apologized to their loyal customers in a full-page ad in the local newspaper. They pledged to work hard at running a clean and safe operation to win back their customers.

### You Can Prevent This

Broken, outdated equipment and a building in disrepair can lead to contamination, no matter how clean an operation is. To make sure your facility is safe for foodservice, you should know the following.

- How to pick materials and equipment that are safe for use in foodservice operations
- How to install and maintain equipment
- How to avoid food safety hazards caused by utilities
- How to maintain your facility
- How to handle emergencies
- How to prevent and control pests
**Interior Requirements for a Safe Operation**

The materials, equipment, and utilities in your operation play a part in keeping food safe. Given the opportunity, you should choose these items with food safety in mind.

**Floors, Walls, and Ceilings**

When choosing flooring, wall, and ceiling materials, pick those that are smooth and durable. This makes cleaning easier.

Once installed, flooring, walls, and ceilings must be regularly maintained. Replace missing or broken ceiling tiles. Do the same for flooring. Repair all holes in walls.

**Equipment Selection**

Foodservice equipment must meet certain standards if it will come in contact with food. NSF is an organization that creates these national standards. NSF is accredited by the American National Standards Institute (ANSI). NSF/ANSI standards for food equipment require that it be nonabsorbent, smooth, and corrosion resistant. Food equipment must also be easy to clean, durable, and resistant to damage.

**Installing and Maintaining Equipment**

Stationary equipment should be easy to clean and easy to clean around. In the photo at left, the dishwasher is installed so that the floor can be cleaned easily.

When installing equipment, follow the manufacturer’s recommendations. Also, check with your regulatory authority for requirements. In general, stationary equipment should be installed as follows.

- **Floor-mounted equipment**: Put floor-mounted equipment on legs at least 6 inches (15 centimeters) high. Another option is to seal it to a masonry base.

- **Tabletop equipment**: Put tabletop equipment on legs at least 4 inches (10 centimeters) high. Or, seal it to the countertop.
Once you have installed equipment, make sure it is maintained regularly by qualified people. Also, set up a maintenance schedule with your supplier or manufacturer. Check equipment regularly to be sure it is working correctly.

**Dishwashing Machines**

Dishwashers vary by size, style, and sanitizing method. For example, some sanitize with very hot water. Others use a chemical solution.

Consider these guidelines when selecting and installing dishwashers.

**Installation** 
Dishwashers must be installed so that they are reachable and conveniently located. That installation must also keep utensils, equipment, and other food-contact surfaces from becoming contaminated. Always follow the manufacturer’s instructions when installing, operating, and maintaining dishwashers.

**Supplies** 
Use detergents and sanitizers approved by the local regulatory authority.

**Settings** 
Purchase dishwashers that have the ability to measure the following.

- Water temperature
- Water pressure
- Cleaning and sanitizing chemical concentration

Information about the correct settings should be posted on the machine. The label in the photo at left shows an example.

**Cleaning** 
Clean dishwashers as often as necessary. Follow the manufacturer’s recommendations and local regulatory requirements.

**Three-Compartment Sinks**

Many operations use three-compartment sinks to clean and sanitize items manually in the operation. Purchase sinks that are large enough to accommodate large equipment and utensils. You should also have other methods for cleaning these items, such as cleaning them in place.

**How This Relates to Me**

What types of dishwashers are allowed in your jurisdiction?
Handwashing Stations

Handwashing stations should be put in areas that make it easy for staff to wash their hands often. These stations are required in restrooms or directly next to them. Handwashing stations are also required in areas used for food prep, service, and dishwashing. Handwashing sinks must be used only for handwashing and not for any other purpose.

Make sure these stations work correctly and are well stocked and maintained. They must also be available at all times. Handwashing stations cannot be blocked by portable equipment or stacked full of dirty kitchenware. An example of this is shown in the photo at left. A handwashing station must have the following items.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot and cold running</td>
<td>The water must be drinkable and meet temperature and pressure requirements.</td>
</tr>
<tr>
<td>water</td>
<td></td>
</tr>
<tr>
<td>Soap</td>
<td>The soap can be liquid, bar, or powder.</td>
</tr>
<tr>
<td>A way to dry hands</td>
<td>Disposable paper towels or a continuous towel system that supplies the user</td>
</tr>
<tr>
<td></td>
<td>with a clean towel can be used. Hands can also be dried with a hand dryer</td>
</tr>
<tr>
<td></td>
<td>using either warm air or room-temperature air delivered at high velocity.</td>
</tr>
<tr>
<td>Garbage container</td>
<td>Garbage containers are required if disposable paper towels are used.</td>
</tr>
<tr>
<td>Signage</td>
<td>A clearly visible sign or poster must tell staff to wash hands before</td>
</tr>
<tr>
<td></td>
<td>returning to work. The message should be in all languages used by staff</td>
</tr>
<tr>
<td></td>
<td>in the operation.</td>
</tr>
</tbody>
</table>

Some jurisdictions allow the use of automatic handwashing facilities in an operation. Check with your local regulatory authority for more information.
Utilities and Building Systems

An operation uses many utilities and building systems. Utilities include water, electricity, gas, sewage, and garbage disposal. Building systems include plumbing, lighting, and ventilation. There must be enough utilities to meet the needs of the operation. In addition, the utilities and systems must work correctly. If they do not, the risk of contamination is greater.

Water and Plumbing

Each regulatory authority establishes standards for water in their jurisdiction. Only water that is drinkable can be used for the preparation of food and come in contact with food-contact surfaces. This water may come from the following sources.

- Approved public water mains
- Private water sources that are regularly tested and maintained
- Closed, portable water containers
- Water transport vehicles

Regardless of where your water comes from, you should know how to prevent plumbing issues that can affect food safety.

Installation and maintenance  Plumbing that is not installed or maintained correctly can allow drinkable and unsafe water to be mixed. This can cause foodborne-illness outbreaks. Have only licensed plumbers work on the plumbing in your operation, as shown in the photo at left.

Cross-connection  The greatest challenge to water safety comes from cross-connections. A cross-connection is a physical link between safe water and dirty water, which can come from drains, sewers, or other wastewater sources.

A cross-connection is dangerous because it can let backflow occur. Backflow is the reverse flow of contaminants through a cross-connection into a drinkable water supply. Backflow can be the result of pressure pushing contaminants back into the water supply. It can also happen when high water use in one area of an operation creates a vacuum in the plumbing system that sucks contaminants back into the water supply. This is called backsiphonage. A running faucet below the flood rim of a sink is an example of a cross-connection that can lead to backsiphonage. A running hose in a mop bucket is another example, as shown in the illustration at left.
Backflow prevention  The best way to prevent backflow is to avoid creating a cross-connection. Do not attach a hose to a faucet unless a backflow prevention device is attached. A vacuum breaker is a mechanical device that prevents backsiphonage. It does this by closing a check valve and sealing the water supply line shut when water flow is stopped.

Other mechanical devices are used to prevent backflow. These include double check valve and reduced pressure zone backflow preventers. These devices include more than one check valve for sealing off the water supply. They also provide a way to determine if the check valves are operational.

Backflow prevention devices must be checked periodically to make sure they are working correctly. This must be done by a trained and certified technician. And, the work must be documented. Always follow local requirements and manufacturer’s recommendations.

The only sure way to prevent backflow is to create an air gap. An air gap is an air space that separates a water supply outlet from a potentially contaminated source. A sink that is correctly designed and installed usually has two air gaps, as shown in the graphic at left. One is between the faucet and the flood rim of the sink. The other is between the drainpipe of the sink and the floor drain of the operation.

**Lighting**

Good lighting makes it easier to clean things in your operation. It also provides a safer environment.

Lighting intensity—how bright the lights are in the operation—is usually measured in units called foot-candles or lux. Different areas of the facility have different lighting intensity requirements. Local jurisdictions usually require prep areas to be brighter than other areas. This allows staff to recognize the condition of food. It also allows staff to identify items that need cleaning.

Once the appropriate level of lighting has been installed in each area of the facility, you must monitor it. Replace any bulbs that have burned out. And, make sure they are the correct size. All lights should have shatter-resistant lightbulbs or protective covers. These products prevent broken glass from contaminating food or food-contact surfaces.
Ventilation

Ventilation improves the air inside an operation. It removes heat, steam, and smoke from cooking lines. It also eliminates fumes and odors. If ventilation systems are not working correctly, grease and condensation will build up on walls and ceilings.

To prevent this, ventilation systems must be cleaned and maintained according to manufacturer's recommendations and/or local regulatory requirements.

Garbage

Garbage can attract pests and contaminate food, equipment, and utensils if not handled correctly. To control contamination from garbage, consider the following.

Garbage removal  Garbage should be removed from prep areas as quickly as possible to prevent odors, pests, and possible contamination. Staff must be careful when removing garbage so they do not contaminate food or food-contact surfaces. The food handler in the photo at left has not been careful and may contaminate the prep table.

Cleaning of containers  Clean the inside and outside of garbage containers frequently. This will help prevent the contamination of food and food-contact surfaces. It will also reduce odors and pests. Do NOT clean garbage containers near prep or food-storage areas.

Indoor containers  Containers must be leak proof, waterproof, and pest proof. They also should be easy to clean. Containers must be covered when not in use.

Designated storage areas  Waste and recyclables must be stored separately from food and food-contact surfaces. The storage of these items must not create a nuisance or a public health hazard.

Outdoor containers  Place garbage containers on a surface that is smooth, durable, and nonabsorbent. Asphalt and concrete are good choices, as shown in the photo at left. Make sure the containers have tight-fitting lids and are kept covered at all times. Keep their drain plugs in place.
Maintaining the Facility

Poor maintenance can cause food safety problems in your operation. To prevent problems, do the following.

- Clean the operation on a regular basis.
- Make sure all building systems work and are checked regularly.
- Make sure the building is sound. There should be no leaks, holes, or cracks in the floors, foundation, ceilings, or windows. In the photo at left, the maintenance worker is filling a crack in the wall to keep pests out.
- Control pests.
- Maintain the outside of the building correctly, including patios and parking lots.

Apply Your Knowledge

What's Missing?
The handwashing station is missing 3 items. What are they?

1.
2.
3.

For answers, please turn to page 9.17.
Apply Your Knowledge

What's Wrong with This Picture?
Write an X next to the statement that best describes what the food handler has done wrong in the picture below.

1. He has created an air gap.
2. He has created a grease trap.
3. He has created a vacuum breaker.
4. He has created a cross-connection.

Which Sink?
Write an X next to the sink where backsiphonage could occur.

Garbage In, Garbage Out
Write an X next to each unsafe practice when handling garbage and garbage containers.

1. Marvin cleans a garbage can on the floor drain grate, which is next to the steam-jacketed kettle.
2. Barry stacks garbage bags next to the prep table because he wants to take them out all at once.
3. Ron sets garbage bags on the asphalt next to the Dumpster and then throws each bag inside.
4. Michelle throws empty cans into the recycling container, which is stored in the prep area.
5. Tunya throws an overcooked chicken breast into the open garbage can next to the sandwich line.

For answers, please turn to page 9.17.
Emergencies That Affect the Facility

Certain crises can affect the safety of the food you serve. Some of the most common include electrical power outages, fire, flooding, and sewage backups. These are considered by the local regulatory authority to be imminent health hazards. An imminent health hazard is a significant threat or danger to health that requires immediate correction or closure to prevent injury.

Other threats should also be considered.

**Temperature control**  Power failures and refrigeration breakdowns can threaten your ability to control the temperature of TCS food. This can result in the growth of pathogens.

**Physical security**  Unauthorized people inside a facility are a risk to food safety. This is especially true when they can access storage and processing areas. Also, acts of nature can weaken a facility's security.

**Drinkable water supply**  Threats to the drinkable water supply must also be considered. Broken water mains and breakdowns at water treatment facilities are a risk to the safety of food. Terrorist contamination of the water supply could also be a threat.

When faced with any of these crises, you must first determine if there is a significant risk to the safety or security of your food. If the risk is significant, service must be stopped. Then the local regulatory authority must be notified.

Spoiled or contaminated food must be thrown out, along with food in packaging that is not intact. Finally, you must decide how to correct the problem. Actions might include establishing time-temperature control of TCS food or cleaning and sanitizing surfaces in the operation. It might also include reestablishing the physical security of the operation. Or, verifying that the water supply is drinkable. Regardless, you will need approval from the local regulatory authority before continuing service.

How This Relates to Me

What are the local regulatory requirements in your jurisdiction when water service has been disrupted?

__________________________________________

__________________________________________
**Pest Management**

Rodents, insects, and other pests are more than just unsightly to customers. They can damage food, supplies, and facilities. But the greatest danger comes from their ability to spread diseases, including foodborne illnesses.

**Pest Prevention**

Prevention is critical in pest control. Follow these three basic rules to keep your operation pest free.

1. **Deny pests access to the operation.**

2. **Deny pests food, water, and shelter.**

3. **Work with a licensed pest control operator (PCO).**

**Deny access**  
Pests can be brought inside with deliveries or through building openings. Follow these guidelines to prevent this.

- Check all deliveries before they enter your operation. Refuse shipments in which you find pests or signs of pests. This includes egg cases and body parts (legs, wings, etc.).

- Make sure all of the points where pests can access the building are secure. Screen all windows and vents, and patch or replace them when needed. Seal cracks in floors and walls and around pipes, as shown in the photo at left. Install air curtains (also called air doors or fly fans) above or alongside doors.

**Deny shelter**  
Careful cleaning eliminates the pests’ food supply and destroys insect eggs. It also reduces the places pests can take shelter. Follow these guidelines to deny pests food and shelter.

- Throw out garbage quickly and correctly. Keep garbage containers clean and in good condition. Keep outdoor containers tightly covered. Clean up spills around garbage containers immediately, and wash containers regularly,

- Store recyclables in clean, pest-proof containers. Keep them as far away from your building as local regulations allow.

- Store all food and supplies correctly and as quickly as possible. Keep food and supplies away from walls and at least six inches (15 centimeters) off the floor, as shown in the photo at left. Use FIFO to rotate products, so that pests do not have time to settle into them and breed.

- Clean up food and beverage spills immediately, including crumbs and scraps.
Pest Control

Even after you have made every effort to keep pests out, they may still get into your operation. If this happens, you must work with a PCO to get them under control. Even if you only spot a few pests, they may actually be present in large numbers. This is an infestation and can be very difficult to eliminate. Pests leave signs, letting you know they are there. Look for feces, nests, and damage on products, packaging, and the facility itself. An example of rodent damage to a package of Danish pastries is shown in the photo at left. Contact your PCO immediately if you see these, or any other pest-related problems, so that control measures can be taken.

Apply Your Knowledge

Keep 'Em Out!
Write an X next to each situation that can lead to a pest infestation.

1. Food in the dry storage room is stored against the wall and 6 inches off the floor.
2. Air curtains are installed around the back door of a kitchen.
3. Recyclables are stored overnight in a clean container in the kitchen.
4. Food is rotated during storage so that the oldest products are used first.
5. A Dumpster is left open during the day to let it air out.
6. A delivery driver brings a food delivery into the kitchen to be inspected.
7. A food delivery is rejected because it contains moth wings.
8. A kitchen has window screens with small holes in them.

For answers, please turn to page 9.17.
Chapter Summary

- Choose flooring, wall, and ceiling materials that are smooth and durable. This will make cleaning easier. Replace and maintain these materials when necessary.

- Make sure equipment that will come in contact with food is smooth, nonabsorbent, and easy to clean. Floor-mounted equipment must be put on legs at least six inches high or sealed to a masonry base. Tabletop equipment must be put on legs at least four inches high or sealed to the countertop.

- Dishwashing machines must be installed so that they prevent contamination of utensils, equipment, and other food-contact surfaces.

- Handwashing stations should include hot and cold running drinkable water, soap, and a way to dry hands. They should also include a garbage container if paper towels are provided, and signage reminding staff to wash hands before returning to work.

- Plumbing must always be installed and maintained by a licensed plumber. This will help prevent cross-connections from occurring. A cross-connection is dangerous because it can let backflow occur. Backflow is the reverse flow of contaminants through a cross-connection into a drinkable water supply.

- Garbage must be removed from prep areas as quickly as possible to prevent odors, pests, and possible contamination. Garbage containers must be leak proof, waterproof and pest proof. They must be cleaned, inside and out, frequently. Facilities must also be regularly maintained. Clean them on a regular basis, and make sure there are no leaks, holes, or cracks in the floors, foundation, or ceilings.

- To keep your operation pest free, you must deny pests access to the operation. You can do this by inspecting deliveries before they come into your operation. You also need to eliminate points of access. Deny pests access to food, water, and shelter.
Chapter Review Activities

Many parts of an operation's facility and equipment affect food safety. These include the materials and equipment used; equipment installation and maintenance; utilities and building systems; and facility maintenance.

Now, take what you have learned in this chapter and apply it to the following case studies.

1. Julio is the assistant manager of the staff cafeteria at The Vicor Company. When he came in this morning, he found that raw sewage had backed up through the floor drain near the freezers. How should he handle this problem?

2. Anita is an area supervisor for a small quick-service chain. On her first visit to one of the operations she noticed a buildup of grease on the kitchen walls. What should she direct the manager to do to fix this problem and make sure it does not happen again?

3. Jon is the manager of a small, family-owned, causal-dining operation. Since he started work six months ago, there have been some problems with the plumbing. The sinks have been draining more and more slowly. Also, each time the dishwasher finishes a cycle, a small puddle of water backs up onto the floor under the machine. What can Jon do to fix these problems?

For answers, please turn to page 9.17.
Study Questions

Circle the best answer to each question.

1. What are the most important food safety features to look for when selecting flooring, wall, and ceiling materials?
   A. Absorbent and durable
   B. Hard and durable
   C. Porous and durable
   D. Smooth and durable

2. What organization creates national standards for foodservice equipment?
   A. CDC
   B. EPA
   C. FDA
   D. NSF

3. When installing tabletop equipment on legs, the space between the base of the equipment and the tabletop must be at least
   A. 2 inches (5 centimeters).
   B. 4 inches (10 centimeters).
   C. 6 inches (15 centimeters).
   D. 8 inches (20 centimeters).

4. Besides information on chemical concentration and water temperature, what other machine setting information should be posted on dishwashing machines?
   A. Water pH
   B. Water salinity
   C. Water pressure
   D. Water hardness

5. Signage posted at a handwashing station must include a reminder to staff to
   A. wash hands before returning to work.
   B. use hot running water when washing.
   C. scrub hands and arms for 10 to 15 seconds.
   D. avoid touching faucet handles after washing.

6. What is the only completely reliable method for preventing backflow?
   A. Air gap
   B. Ball valve
   C. Cross-connection
   D. Vacuum breaker

Continued on the next page →
Continued from previous page

1. A food handler drops the end of a hose into a mop bucket and turns the water on to fill it. What has the food handler done wrong?
   A. Created a cross-connection
   B. Created an air gap separation
   C. Prevented backflow
   D. Prevented atmospheric vacuuming

2. Which area of the operation is usually required to be the brightest?
   A. Dry-storage
   B. Preparation
   C. Refrigerated-storage
   D. Service

3. An operation has a buildup of grease and condensation on the walls and ceiling. What is the most likely problem?
   A. The ventilation system is not working correctly.
   B. The cleaning chemicals are not being used correctly.
   C. The staff are not cleaning the walls correctly.
   D. The grill is not being operated at a high-enough temperature.

4. An operation received a violation in the outside area of the facility. The manager reviewed the area and saw that the Dumpster was placed on a freshly graveled drive. The lids were closed, and the drain plug was in place to prevent the Dumpster from draining. What was the problem?
   A. The Dumpster lids should have been open to allow it to air out.
   B. The drain plug should have been removed to allow the Dumpster to drain correctly.
   C. The surface underneath the Dumpster should have been paved with concrete or asphalt.
   D. The Dumpster should have been freshly painted so that food debris would not stick to surfaces.

5. A broken water main has caused the water in an operation to appear brown. What should the manager do?
   A. Boil the water for 1 minute before use.
   B. Contact the local regulatory authority before use.
   C. Use the water for everything except dishwashing.
   D. Use the water for everything except handwashing.

6. What is the best way to eliminate pests that have entered the operation?
   A. Raise the heat in the operation after-hours.
   B. Lower the heat in the operation after-hours.
   C. Work with a licensed pest control operator (PCO).
   D. Apply over-the-counter pesticides around the operation.

For answers, please turn to page 9.17.
Answers

9.8 What's Missing?
1. Soap
2. Sign stating that staff must wash hands before returning to work
3. Garbage container for used paper towels

9.9 What's Wrong with This Picture?
4 should be marked. By submerging the hose in the bucket of water, the cross-connection can contaminate the drinkable water supply if pressure were to drop in the supply line.

9.9 Which Sink?
Sink 2 should be marked. The hose attached to the sink faucet has created a cross-connection. Backsiphonage could occur because the hose has been submerged in the sink water.

9.9 Garbage In, Garbage Out
1, 2, and 4 should be marked. Marvin should not have cleaned the container next to the kettle because it is used to prep food and could have become contaminated. Barry should not have stacked the garbage bags next to the prep table because this could have contaminated it. The recyclable container that Michelle used should not have been stored in the prep area. These containers should be stored separately from food and food-contact surfaces.

9.12 Keep 'Em Out!
1, 3, 5, 6, and 8 should be marked.

9.14 Chapter Review Activities
1. Julio must first determine whether there is a significant risk to the safety of the food in his operation. If the risk is not significant, he must immediately correct the problem. If there is a significant risk to the safety of food, service must be stopped. Then Julio must contact the local regulatory authority. Once the problem has been fixed and the necessary cleanup performed, Julio will need approval from the local regulatory authority before continuing service.

2. The ventilation system is not working correctly. Anita should ask the manager to schedule a service call to check the ventilation system. She should also ask the manager to have the ventilation system cleaned regularly following manufacturer's recommendations and local requirements.

3. Jon needs to contact a licensed plumber to fix the problem.

9.15 Study Questions
2. C  3. A  4. A
chapter 10
Cleaning and Sanitizing