

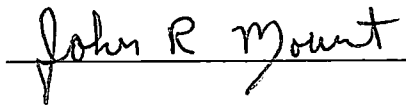
To the Graduate Council:

I am submitting a thesis written by Allison M. Jennings entitled "Revision of the State of Tennessee Foodservice Establishment Health Inspection Form." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Foodservice and Lodging Administration.

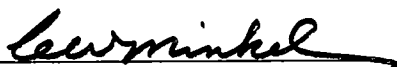

Carol Costello, Major Professor

We have read this thesis
and recommend its acceptance:





Accepted for the Council:


Associate Vice Chancellor and
Dean of the Graduate School

**REVISION OF THE STATE OF TENNESSEE
FOODSERVICE ESTABLISHMENT
HEALTH INSPECTION FORM**

A Thesis

Presented for the

Master of Science Degree

The University of Tennessee, Knoxville

Allison M. Jennings

May, 1999

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DEDICATION

In loving memory of my grandparents Gertrude and Paul B. Jennings, Sr., to my grandmother, Carmen A. Booth—for her devotion to our family through the years, to my niece Cameron—our true miracle, and to my brother, Chris—you are my best friend, and have been my living inspiration since my sixteenth birthday.

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ABSTRACT

The purpose of this research was to provide an assessment of foodservice safety practices currently conducted in Knox County, Tennessee, and to formulate a new approach to restaurant operation evaluation. In order to achieve this goal, the researcher first examined the current foodservice establishment inspection process by shadowing a Knox County Health Inspector during site visits. References such as HACCP textbooks, food sanitation texts, and the FDA Food Code were used to evaluate current inspection criteria, and to formulate the revised inspection form. Once the form was developed, a supplemental explanation guide was designed to detail the inspection criteria by indicating the specific requirements of each point.

The form was evaluated in a sample of four foodservice operations by the researcher. Foodservice personnel who accompanied the researcher during evaluations were asked their opinions of the revised form and supplemental guide. Six State of Tennessee health inspectors were contacted and surveyed for input on the revised form; three inspectors returned usable surveys.

The revisions to the health inspection form contributed by the researcher apply HACCP-oriented procedures, and target critical areas within foodservice operations. The revised form shifts the emphasis toward a more preventative approach to health inspections rather than continuing to focus on the conditions of the actual facility. Restaurateurs indicated that the revised form, in their opinions, focused more specifically on food-related issues, and that better documentation of critical areas during food production would benefit establishments in the long run. The form introduced the

possibility of not evaluating operations with numerical scores, rather it highlighted points in production that would need "Immediate" correction, correction within "7-10 Days," "By the next inspection," or whether individual criterion were "To Standard." Though the concept of not attaching numerical scores to inspections seemed desirable to some, others expressed concern over whether the industry, as well as the consumer population, were ready for this type of change.

The researcher feels that in order to enforce food safety practices for long term, current methods and procedures for inspection must be updated. The initial step of this process may require the development of more usable inspection tools that will target those critical areas during food production at which contamination may occur. Based upon the research conducted, the researcher feels that in order to ensure that food served in public dining establishments is safe from contamination, the state and local health departments must devise a more applicable method of inspection procedures.

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CHAPTER I

INTRODUCTION

Concern over the safety of the nation's food supply has plagued the U.S. food manufacturing and service industries within recent years, and has affected public confidence in items procured in retail outlets, as well as in meals purchased in restaurants (Fein, et al, 1995). Compared to other countries worldwide, U.S. food sources present minimal risk of contamination and threat to the average consumer. However, past methods of safeguarding the integrity of the food supply lately have proven less effective (Anonymous, 1997 a). Current government documentation suggests that as many as 9,000 Americans die each year, and still millions more become ill, as a direct result of food infections and intoxications (Hingley, 1997).

Documented food-related deaths and illnesses, in conjunction with public response, undoubtedly influenced President Clinton's decision to introduce a food safety policy for the future, termed the "President's Food Safety Initiative" (Hingley, 1997). The President included in his budget proposal for 1998 a request for \$43.2 million in funds to support and strengthen the safety of the national food supply (Anonymous, 1997 b). On May 12, 1997, the President was quoted saying:

"We have built a solid foundation for the health of America's families. But clearly we must do more. No parent should have to think twice about the juice they pour their children at breakfast, or a hamburger ordered during dinner out."

--President Bill Clinton, Radio Address, January 25, 1997

Local, state, and federal governments, food manufacturers, distributors, preparers, and servers alike are equally responsible for furnishing safe food to consumers, free of harmful chemical, physical, and microbiological contamination.

A “foodborne disease outbreak” refers to an incident that causes two or more individuals to experience a similar illness after ingestion of a common food, and that an epidemiological analysis implicates the food as the source of the illness (Cichy, 1994). The only exceptions to this standard definition include single reported cases of illness caused by *Clostridium botulinum*, or an individual incidence of chemical poisoning. When governmental agencies or literature denote that an episode of foodborne illness is a “confirmed disease outbreak,” the connotation is:

1. it is a foodborne disease outbreak in which laboratory analysis identifies a causative organism, and
2. that epidemiological analysis implicates the suspected food as the source of the illness (Cichy, 1994).

Susceptibility to foodborne illness varies within the population according to “risk” categorization. In other words, some groups of people are more vulnerable to foodborne disease. These groups are termed the “highly susceptible population,” which describes “...a group of persons who are more likely than other populations to experience foodborne disease because they are immunocompromised or elderly and in a facility that provides health care or assisted living services; or preschool age children in a facility that provides custodial services” (Cichy, 1994).

Public interest in foodborne illness was sparked after the recent incidence of devastating outbreaks within the foodservice industry. Particularly, the media publicized

the 1993 *E. coli* O157:H7 outbreak associated with a Jack-in-the-Box restaurant that alerted the nation of the potential avenues of foodborne contamination. Most recently, the contamination of frozen and widely distributed strawberries, tainted with *hepatitis A* virus, induced an overwhelming public response (Anonymous, 1997 c).

With plummeting public confidence in the safety of America's food supply, local, state and federal government agencies are tightening regulations and attempting to administer more inspections within manufacturing plants and foodservice operations to combat widespread negativity (Anonymous, 1997 d). These inspection procedures are designed ideally to decrease the incidence of foodborne illness outbreaks throughout the entire food industry. Specifically, foodservice establishments have been associated closely with foodborne illness outbreaks. A study conducted in 1995 revealed that consumers mentioned restaurants most frequently when identifying the place where the food thought to have caused an illness was prepared (Fein, et al., 1995). A lack of confidence in the safety of food served in restaurants undoubtedly impacts the foodservice industry as a whole. Individual businesses associated with a foodborne illness outbreak suffer financial repercussions in the short term that could inevitably be fatal to the operation (Lorenzini, 1994). As Mathias et al. (1995) stated, "When people eat in a restaurant, they assume that the food is wholesome and that they will be able to consume the food without suffering any ill effects, other than possibly overindulgence."

By examining the possible sources of bacteriological adulteration in the food industry, officials with government agencies can determine appropriate regulatory methods and mandate specific policies to ensure safety in foodservice establishments. Currently, routine inspections of restaurants are conducted by county Health Departments

under the recommendations by the Model Standards for Community Health practice of the U.S. Public Health Service (Irwin, et al., 1989). In their study, Irwin, et al., determined the positive association between routine restaurant inspections and the lower incidences of outbreaks of foodborne illness within the Seattle-King County area of Washington State.

But the current inspection forms adopted by 37 states within the country have not been updated in many years. In a risk assessment study conducted in 1991, researchers investigated the relationship between visual inspections by environmental health officers and microbiological examination in 89 restaurants. The authors suggested that it is pertinent to perform more structured inspections in foodservice operations producing foods which present higher microbial risks (Tebbut, 1991).

The commonly used inspection form, also used in Knox County, identifies 44 types of violations classified as "critical" or "noncritical". Critical violations are thought to have an impact directly on the incidence of foodborne disease. Examples of critical items include the temperature of potentially hazardous foods such as meat, poultry, and fish, food handling practices, and the health status of the food handlers. Noncritical items include those items with a less significant role in causing foodborne disease. These may include the overall cleanliness of nonfood contact surfaces, walls, and ceilings (Irwin, et al., 1989).

Furthermore, there is a correlation between increased employee education and decreased inspection violations (Mathias, 1995). Farkas (1996) believes that consumers should not be concerned with food storage, handling, and cooking. He suggests that foodservice workers ideally should know how to prevent the exposure of food to illness-

producing bacteria, but feels that many do not. The Center for Disease Control in Atlanta attributed 92.8% of outbreaks to food mishandled in foodservice establishments (Reedy, 1980). A call to action by Trujillo, of Harman Management Corporation, KFC's largest franchisee, stated, "We must reach more foodservice operations and workers with the knowledge of how to prevent foodborne illness (Anonymous, 1994)."

Data presented by the Centers of Disease Control in Atlanta, Georgia indicated that approximately 80% of the known factors that are attributable to foodborne diseases are caused by human error or negligence (Cichy, 1994). Education of the employees on proper food handling and sanitation techniques would certainly reduce the occurrence of foodborne illness. The National Restaurant Association (NRA) developed a program known as "Serve Safe" aimed at educating at least management level employees within foodservice establishments. This is a course designed to instruct and train foodservice employees about the importance of sustaining a safe and hazard free operation. But even with the introduction of training courses such as Serve Safe, the incidence of foodborne illnesses associated with the restaurant industry continues to escalate.

In the 1960's, National Aeronautics and Space Administration (NASA), the US military, and a food manufacturing company developed a science-based procedure for ensuring the safety of food for the astronauts while in space (Beasley, 1995). This method is known as the Hazard Analysis Critical Control Points, or HACCP (Althaus, 1995). Related specifically to foodservice operations, HACCP is defined as, "...a structured, written system by which operators can ensure that food-safety practices, recommended in the 1993 Food Code, are being followed throughout the processing of food in a recipe, from receiving to serving" (Lorenzini, 1995 a-f). It is a prevention-based

system designed to reduce food safety risk by assessing the risks of a product or food production process, and determining the steps taken to control these risks (Cichy, 1994).

HACCP is an essential food safety protocol that should be well understood by foodservice operators and inspection authorities alike. The NRA and many other industry establishments actively are embracing the HACCP food safety procedures (Rubinstein, 1997). The evolution of HACCP within the foodservice industry is continuing. Riell (1994) suggested that in upcoming years, regulators will become more proficient with HACCP, and will integrate it into their inspection procedures.

The application of HACCP procedures to foodservice inspections will be essential in the near future. A 1994 satellite broadcast of a HACCP training course provided HACCP information that reached thousands of people, including numerous sanitation inspectors. The inspectors reportedly were involved in a four day training course which incorporated HACCP principles into the assessment of food processing and foodservice operation inspections (Althaus, 1995). A HACCP method of inspecting operations would emphasize asking operators questions about their establishment, monitoring times and temperatures throughout the food handling process, and determining the number of times products would go through heating and cooling processes (Althaus, 1995).

Many food corporations such as McDonald's, Marriot Management Services, and Taco Bell have incorporated HACCP protocol into their foodservice preparation operation (Rubinstein, 1997). Encompassing HACCP methods into inspection procedures is a challenge many health departments in counties nationwide will face in the near future. Riell (1994) stated that the exposure by most regulators to HACCP concepts is, ".....working its way into the fabric of retail inspection operations". The ideal is to

move away from the old standard inspection form, and develop a more applicable HACCP approach to operation evaluation that will parallel the direction the foodservice industry is heading with food safety in the future.

CHAPTER II

REVIEW OF LITERATURE

Current Government Regulations Pertaining to Food Safety

On May 12, 1997, Vice President Gore announced a five-point plan to increase the safety of the nation's food supply (Anonymous, 1997 d). In a quote, it was explained that, "The plan sets forth steps the Administration will take this year to strengthen food safety and details how we will use \$43.2 million in new funds the President has requested in his fiscal year 1998 budget" (Anonymous, 1997 d).

The plan is known as "The Food Safety Initiative." This proposal ideally will help improve inspection procedures, increase employee and public education, and fund scientific research to significantly reduce foodborne illness (Anonymous, 1997d). Furthermore, it has a built-in national "early warning system" to detect and respond to outbreaks of foodborne illness earlier, and will provide the data needed to prevent future outbreaks (Anonymous, 1997f). Finally, the plan calls for a "strengthened coordination" and "improved efficiency between government agencies such as the United States Department of Agriculture (USDA), Centers for Disease Control (CDC), Federal Drug Administration (FDA), and the Environmental Protection Agency (EPA)" (Anonymous, 1997 f).

Later in 1997, a press conference was held again to inform the public of the newest proposed food safety regulations. From the White House on October 2, 1997, President Clinton stated in his remarks that he asked Congress to give the FDA the power

to, "...ban the importation of fruits, vegetables, and other foods from countries whose safety precautions do not meet American standards" (Anonymous, 1997 a). According to the President, this proposal parallels the law that currently requires the USDA to prevent meat and poultry from entering the U.S. from countries with inferior food safety systems. Though these new codes apply to food processors and manufacturers specifically, they immediately impact the safety of the food when it reaches the back doors of foodservice establishments.

Current government policies designed to protect food prepared in foodservice operations are compiled and distributed to each operation owner in the "Foodservice Establishments Laws and Regulations" handbook published by health departments. These guidelines instruct owners and managers on proper protocol involved with food handling, and the laws intended to enforce compliance with these standards. The laws and regulations are based upon the Model Food Code published by the FDA approximately every two years. The newest version of the Model Food Code was distributed in 1997.

Current sources document that more than 3,000 state and local regulatory agencies are responsible for monitoring retail and foodservice establishments (Anonymous, 1997 b). Among the total operations, these officials oversee 785,000 commercial and institutional foodservice outlets. Tennessee State law requires county health departments to inspect foodservice operations at least twice per year. According to the Food Safety Initiative, the FDA and FSIS will require that state and local regulators establish retail program standards to coincide with the 1997 Food Code in order to promote national uniformity (Anonymous, 1997b). Also documented in the planned initiatives for 1998 is

that the FSIS and the FDA will provide HACCP training to state and local inspectors (Anonymous, 1997 b).

Bacteriological Contamination and Foodborne Hazard Risk Assessment

There are many possible avenues of bacteriological, chemical, and physical contamination within a foodservice operation. A biological hazard is a danger presented by pathogenic microorganisms, bacteria, viruses, parasites, fungi, and toxins produced in meat, fish and certain plants (NRA, 1992). Illnesses induced by biological means are classified as either *infections* or *intoxications* (NRA, 1992). The *ServSafe* Certification Coursebook (1992) identifies *foodborne infections* as, “diseases that result from eating food containing living harmful microorganisms.” It further classifies a foodborne *intoxication* as, “a result of ingesting foods containing toxins, or poisons, from bacterial or mold growth that are present within the food, causing illness to the host (human body)” (NRA, 1992).

An outbreak of foodborne disease caused by harmful pathogens only can occur under “ideal” conditions. First of all, the contaminating disease agents must be present in humans, food, the environment, or in animals. The food then must be contaminated by one of the disease organisms, either before the food enters the establishment or by mishandling after the food has arrived. Improper preparation or handling propagates the growth, survival, and transmission of harmful pathogens. Once the adulterated food is eaten, foodborne illness results (Cichy, 1994).

There is, however, a distinct variation between a “pathogen” and a “spoilage microorganism.” Pathogens are the sources of foodborne illnesses, because they are disease -causing agents. Spoilage organisms taint food and render it unusable, but are not responsible for foodborne illness outbreaks (Cichy, 1994). Consumers are most familiar with spoilage organisms since these are correlated with altering color, odor, texture, appearance, and the taste of foods. Pathogens, on the other hand, are not characterized specifically by their adulterations of the physical qualities of food. Rather, they can induce serious illness without producing any noticeable indicators to alert the consumer before ingesting the food.

There are a number of factors that propagate bacterial reproduction. The primary conditions facilitating pathogen growth are moisture level, oxygen usage, level of acidity, time, and temperature (Cichy, 1994). The amount of moisture in foods, otherwise termed *water activity*, determines the ability for the bacteria to grow and reproduce in the food environment. Growth rates of microorganisms in foods can depend directly on the individual bacteria, and the varying level of free moisture contained in the food.

Accessibility to oxygen also can influence the growth rates of organisms in food. Bacteria are classified as either *aerobic*—requiring oxygen to reproduce, or *anaerobic*--the absence of oxygen better facilitates growth (Cichy, 1994). A separate categorization of microorganisms known as *facultative anaerobes* are able to reproduce with or without accessibility to free oxygen.

The level of acidity or alkalinity of a food environment can affect the proliferation of microbes. The standard measure of acidity or alkalinity is known as the pH, which indicates the hydrogen ion concentration of the food (Cichy, 1994). The range of pH

values is between 0 and 14. A pH of less than 7.0 indicates an acidic environment, while values greater than 7.0 are considered alkaline, or basic. The neutral value for pH is 7.0. Optimum growth and reproduction environments for microorganisms are those in which the pH is between 6.6 and 7.5 (Cichy, 1994). In low (pH < 4.0) or high pH ranges (pH > 7.5), bacteria are less likely to reproduce in amounts that could taint food (Jay, 1997). However, once the pH range and conditions in the environment change, growth and reproduction are inevitable.

Time and temperature factors involved in microbial growth and reproduction are related. Microorganisms are grouped into categories according to the temperature zones in which they thrive. The first group, known as the Psychrophiles, grow in cold temperatures as low as 30°F (0°C), and can multiply at temperatures reaching 68°F (20°C). Mesophiles thrive in intermediate temperature zones, usually between 68°F (20°C) and 113°F (45°C). Finally, Thermophiles are a classification of bacteria that survive and endure very warm environments. These bacteria prefer a range of temperatures between 113°F (45°C) and 140°F (60°C) (Cichy, 1994).

Bacteria undeniably can survive and reproduce in a broad range of temperatures. Therefore, the amounts of time food items are held at specific temperatures directly will impact the growth rates of these microorganisms. During the storage, thawing, cooking, and cooling processes, food ingredients may pass through what is known as “the temperature danger zone” several times. This zone refers to the intermediate temperatures that enhance microbial reproduction (between 41°F and 140°F), and it is essential the food spend the least amount of time within this zone as possible (Cichy, 1994).

It is important for foodservice operators and employees to be aware of foods that are "potentially hazardous," or more likely susceptible to pathogen infestation. The FDA defines "Potentially Hazardous Food" as, "...food that is natural or synthetic and is in a form capable of supporting the rapid and progressive growth of infectious or toxigenic microorganisms (FDA 1999 Food Code). The FDA further states that potentially hazardous foods include foods from animal origin that are raw or heat-treated or foods from plant origin that consist of raw seed sprouts, cut melons, or garlic and oil mixtures. A few examples of potentially hazardous foods are meats, poultry, fish, beans, cooked rice, seed sprouts (such as alfalfa sprouts), processed garlic and oil, soy products including tofu, and whole shell eggs (Cichy, 1994).

County health departments enforce tight regulations and restrictions pertaining to the storage of chemicals in a foodservice establishment. Chemical poisoning can result in a foodborne illness outbreak if food comes into contact with a chemical agent at any point throughout processing and distribution to the consumer population (Pierson and Corlett, 1992). A number of chemicals are prohibited from contacting food materials altogether, while other chemical substances have established allowable limits. Since all food products are composed of chemical substances to begin with, and all chemicals can be toxic at varying dosage levels, there are established limitations regarding allowable concentration limits (Pierson and Corlett, 1992). Many toxic chemicals such as insecticides, soil fumigants, pesticides, and herbicides potentially could enter the food supply during food manufacturing. More specific to foodservice establishments, chemical cleaner and sanitizing agents increase risk of possible contamination (Cichy, 1994).

Foodborne physical hazards also can cause harm to foodservice customers. A physical hazard refers to any foreign object found in food that is not natural to the food itself, or the food product (NRA, 1992). Examples of physical hazards known to taint foods are metal fragments, glass shavings, cigarette butts, matches, hair, bandages, staples, twist ties, and rocks (Cichy, 1994). The potential of causing harm to customers from physical contamination is undoubtedly present, and therefore, health departments have included regulations to combat this risk into their foodservice establishment inspection protocol.

Relating Contamination and Risks to Foodservice Establishments

Research from past studies must be considered when evaluating all relevant avenues of food contamination within foodservice establishments. Though actual microbiologically-based research is limited pertaining to foodservice operations, those studies from years ago can provide a basis upon which more current research is supported. In other words, past studies present a number of food contamination concerns from years ago that still are pertinent today.

A study from 1979 examined eight restaurants for the likelihood of contamination, and the possibilities of survival or growth of bacteria during each step of the operations (Bryan and McKinley, 1979). The individual establishments varied on methods of preparation of the roast beef and type of service. Each operation was observed to examine possible sources and routes of contamination and cross-contamination throughout the preparation process. The results revealed that the raw beef, dry beef, *au jus* sauce, and workers' hands were the primary sources of food

contamination (Bryan and McKinley, 1979). Other identified avenues which aided in bacteriological adulteration were during the thawing processes, during the cooking process (if the beef did not meet the appropriate internal temperature), and during holding, cooling and reheating.

In 1980, a study was conducted to assess microbiological quality of sandwiches in fast food restaurants (Ockerman and Stec, 1980). The researchers listed key factors that influenced the microbiological quality of the food to include: raw materials, handlers, equipment, type of sandwich, storage time, storage temperature, and consumer handling practices. The results determined that bacterial counts were increased by improper storage time and storage temperature, and varied among the types of meat each sandwich contained.

A study conducted in Los Angeles County, California, determined the risk factors associated with 501 reported illnesses of *Salmonella enteritidis* between April and July of 1994 (Passaro, et al, 1996). The identified risk factors responsible for inducing sporadic illness in Los Angeles County primarily were eating raw and undercooked eggs, and eating in restaurants recent to the illness onset. The authors stated in the article that eating in restaurants is itself an important risk factor for *S. enteritidis* infection. The claimed vehicles of the infections included undercooked eggs, which are an unrecognized ingredient in many recipes, and poor foodservice sanitation practices. Several suggestions were made that aimed toward reducing the incidence of *S. enteritidis* as a result of eating in foodservice establishments. They included modifying recipes that call for shell eggs and replacing them with pasteurized eggs when possible, employee training

in hand-washing techniques, proper handling, and the careful preparation of all raw food products of animal origin to reduce cross-contamination (Passaro, et al., 1996).

Food Safety Training for Foodservice Employees

In 1980, Reedy reported in a national restaurant survey, which focused on consumer reactions to restaurant practices and responsibilities, consumers ranked "cleanliness" as their number one concern. Since 1980, a number of foodborne illness outbreaks have been associated with restaurants, and after careful investigation, employee mishandling often has been identified as the source of contamination. In 1990, 30 customers who dined at a restaurant in Buffalo, New York became ill after eating salads prepared by an employee infected with *Hepatitis A* (Farkas, 1996). In Fairmont, New York in 1993, an outbreak involving 912 people, exposed to intoxicating levels of *Salmonella* as a result of temperature abuse from a Mexican fast-food restaurant, was reportedly a "week long oversight" (Farkas, 1996).

With the publicity associating the foodservice industry with foodborne disease outbreaks, industry leaders are working actively with the Educational Foundation of the National Restaurant Association to make food-safety training a priority within foodservice operations (NRA, 1994). John Marshall, the manager of technical education for The Educational Foundation of the NRA stated, "If employees pay attention to time and temperature control, food handling (to include personal hygiene), the elimination of cross-contamination, and smart purchasing, they'll be in good shape" (Lorenzini, 1994).

Farkas (1996) emphasized that a well-trained manager cannot be the only precaution against food safety in an establishment. He suggested that food safety must be

incorporated throughout the flow of the preparation, cooking, and serving processes (Farkas, 1996). His views are supported by the National Restaurant Association which developed a food safety training course for foodservice personnel known as *ServSafe* (NRA, 1992). This program was designed to focus on the manager's role in assessing risks, establishing policies, and training employees. According to data published in 1994, the *ServSafe* program had trained more than 1,000,000 foodservice personnel and had certified over 350,000 managers (NRA, 1994).

In 1991, Sawyer investigated food safety issues related to the use of take-out food. Though the primary focus of this research was on convenience store pre-packaged foods, also evaluated were areas of managerial and employee training applicable to the foodservice industry as a whole. It was revealed that food quality problems arise in part because managers and employees rarely have training in foodservice sanitation (Sawyer, 1991). The study established that time and temperature abuse often result in unacceptable levels of bacteria present in pre-prepared sandwiches for retail sale. In addition, no manager in the evaluated sample knew the maximum FDA recommended temperature for cold holding, and a total of 46% of the sample left the temperature questions on the survey form completely blank (Sawyer, 1991). It was suggested that the frequency of improperly answered questions given by convenience store managers on the survey form was especially critical considering that the sanitary conditions of the stores were related to the managers' actual knowledge, and the perceived knowledge of employees (Sawyer, 1991). Finally, the study indicated that the managers overestimated their knowledge of foodservice sanitation by an average of 21% (Sawyer, 1991).

When the hourly employees were given the same survey as the store managers, only one employee out of 27 in the sample correctly identified the maximum temperature recommended for cold holding by the FDA (Sawyer, 1991). Furthermore, only four employees knew the appropriate temperatures for hot holding food items. It was concluded that foodservice sanitation training should include the managers, foodservice employees, and consumers; the training of food production and service employees undoubtedly will help decrease the incidence of foodborne infection and intoxication.

Health Inspections and Public Health Issues

County Health Departments conduct routine inspections of foodservice establishments in order to determine, control, and prevent standards of practice that may potentially cause health risk. The Center for Science in the Public Interest (CSPI), released a statement early in 1996 claiming that, "State and local agencies responsible for conducting restaurant health inspections are not doing their jobs" (Hamstra, 1996). The CSPI conducted a survey involving 45 health agencies about their inspection procedures and policies for restaurants. Their study selected 12 comparison criteria that they felt directly impacted public health. The organization then ranked the local agencies in order of "worst" to "best" by their compliance with these 12 criteria. It was suggested by these researchers that most local agencies in this study were not actually safeguarding the public from foodborne illness outbreaks (Hamstra, 1996).

It was proposed by the CSPI that the federal government offer some assistance and incentives for state and local agencies to adopt a standard procedure based on the HACCP principles (Hamstra, 1996). Jacobson, the executive officer of CSPI, believes

that there is agreement between health officials that food safety programs can be improved upon dramatically with the aid of the federal government establishing more stringent guidelines and the volunteer efforts of individual restaurants (Hamstra, 1996).

Before 1989 no studies had been conducted to assess the link between inspections and the prediction of foodborne illness outbreak (Irwin, et al., 1989). In this study, data was collected through epidemiologists on the incidence of outbreaks occurring within the county. Information was obtained from the Seattle-King County investigation files to include the number of people infected, the implicated agent, vehicle, contributory cause, and the lab test results. The conclusions disclosed that restaurants with poor routine inspection results were at increased risk of foodborne outbreaks (Irwin, et al, 1989). The associated risk factors included:

1. "A low score (less than 86 points),
2. An inspection result warranting follow-up inspection or permit suspension, or
3. Violations of recommended food protection measures" (Irwin, et al, 1989).

According to Tebbutt (1991), recent developments in food safety have indicated a need for more structured inspections if operations are producing or selling foods which are considered to be at higher risk of microbial contamination. Tebbutt (1991) conducted a study that evaluated an inspection program in restaurants based on facilities, practices, and microbiological analysis. It was the primary objective that the measures which are particularly important in evaluating hygiene risks and the factors that could support developing a standardized system for inspecting high-risk establishments would be

identified. After developing a standardized inspection method and assessing its effectiveness within sample establishments, the author suggested that more standardization in both methodology and interpretation are needed.

A study conducted in Canadian health jurisdictions sought to correlate the length of time between routine restaurant inspections and the food sanitation education of the foodservice managers and employees with the number of violations found during a standardized operation inspection (Mathias, 1995). The researchers selected 630 establishments by using a random numbers list, making sure that each restaurant met the pre-determined research selection criteria. These criteria were that the restaurant could not be part of a franchise chain, it contained inside and/or outside seating for customers, it prepared foods on-site, and the manager and/or owner agreed to an additional non-regular inspection (Mathias, 1995).

This research was based on the supposition that there is a definitive link between the violations during restaurant inspections and the frequency of foodborne illness outbreak, as determined by Irwin's study in Seattle King-County (Mathias, 1995). In the discussion of the research results, it was determined that the longer the time since the last inspection, the lower the inspection score (Mathias, 1995). It was suggested that the data proved that the more frequent the operation inspections, the less frequent the violations during those inspections.

Pertaining to management and employee education on food safety and incidence of inspection violations, the researchers confirmed that foodservice education provided to the manager/supervisor group resulted in better inspection scores and in better food handling scores. However, it was indicated that for staff with formal high school

education or college education, there was no improvement in the inspection score (Mathias, 1995). Based upon the collected data from the 630 foodservice establishments in Canada, the study did present a correlation between inspection frequency and food handler education with regards to the cumulative scores of routine restaurant inspections.

The improvement of the restaurant inspection process already has undergone restructuring (Murray, 1994). Murray documented that in 1994, the FDA was pilot testing computerized health inspection software in 12 FDA jurisdictions. Murray stated that the software is divided into two parts—one for office use by inspectors, and the other for field inspection uses. “The office portion tracks which facilities need inspections—and how frequently,” and “the second unit is used for in-field inspection procedures” (Murray, 1994). The computerized system, like the current checklist system, is congruent with the Model Food Code, but is thought to hone in more directly on the most hazardous food items on an establishment’s menu.

The FDA’s “new” approach removes the possibility of restaurants obtaining a score of 95 out of 100 with five temperature violations (worth 5 points on the current checklist). Rather, the entire scoring method that involves checklists will no longer exist. The computerized version will denote items simply as “critical” or “non-critical” (Murray, 1994). Therefore, the new restaurant inspection will document more thoroughly the number of “critical” violations, to include the unacceptable limits, that will initiate a temporary shutdown (Murray, 1994). The current checklist inspection form does not guarantee as safe conditions as this newly proposed procedure. Thus, the computerized software would make it virtually impossible for an establishment with a number of

personal hygiene or temperature violations to legally remain operating under unacceptable conditions.

HACCP Protocol: Related to Restaurant Sanitation

Defining HACCP

The U.S. National Advisory Committee on Microbiological Criteria for Foods (NACMCF) clearly defined the Hazard Analysis and Critical Control Points (HACCP) as, "...a systematic approach to be used in food production as a means to assure food safety" (Pierson and Corlett, 1992). HACCP can be applied at any point in the food system where there is a foreseeable threat of microbiological, physical, or chemical contamination (Bauman, 1992). This would include the processing of foods during harvest, manufacturing, delivery to foodservice or retail outlets, and consumer use and storage.

HACCP is built upon seven primary principles designed to ensure food safety and sanitation. These seven principles are:

1. Conduct a hazard analysis and assignment of risk categories.
2. Determine Critical Control Points (CCP's).
3. Establish critical limits for Critical Control Points.
4. Monitor Critical Control Point critical limits.
5. Develop corrective action procedures for deviations from the Critical Control Point critical limits.
6. Develop a system of effective record keeping for documentation of the HACCP plan.

7. Verify that the HACCP program sufficiently controls as outlined (Pierson and Corlett, 1992).

Hazard categories to assess microbiological, chemical and physical risks are ranked from “A” to “F.” The foods that fall into these categories are determined by the characteristics that may present the most serious risk to specific consumer groups, or at vulnerable points throughout the food production process. For example, if a food is assessed as a “Hazard A” food, the implication is that these food items will be distributed to and consumed by high-risk populations (Pierson and Corlett, 1992). If a food is categorized as a “Hazard B,” it means, “...that the product contains “sensitive” ingredients that are known potential sources of microbiological hazards, of toxic chemicals hazards or dangerous physical categories” (Pierson and Corlett, 1992). Other hazard classifications—C, D, E and F—present less urgent consumer risk than the first two, but still sufficient risk to generate concern within the industry. For example, a “Hazard F” assessment of a food item implies that there is no “terminal heat process” after the food is distributed to the vendor to destroy harmful biological components, or no way for the consumer to detect or control for the potentially harmful chemicals or physical contaminants. Though the food may not be targeted to high-risk populations, the risks involved with consuming that food product create a legitimate hazard if consumed.

Critical Control Points (CCP's) should be established throughout a food process. Bauman (1992) defines CCP's as, “...any point in the chain of food production from raw materials to finished product where the loss of control could result in an unacceptable food safety risk”. For example, in foodservice operations, food maintained at safe and adequate temperatures at the time of receiving will help prevent bacteriological

contamination. Therefore, it is necessary to establish critical limits, or, in this example, high and low temperature standards, that will ensure the safety of the food product.

Relating HACCP to the Foodservice Industry

HACCP was first created over 35 years ago as a preventative and precautionary set of guidelines for food preparation for the space program's meals for astronauts (Sanson, 1996). It was developed by the Pillsbury Company in 1959, but did not make its way into food safety programs for the manufacturing industries until several years ago (Sanson, 1996). In 1994, Congress mandated that the seafood industry become regulated by HACCP guidelines by December of 1998 under the supervision of the FDA and USDA (Althaus, 1995). HACCP, as applied to restaurants, is a food safety plan that emphasizes hazard control of foods during the preparation process rather than inspection and correction procedures (Sanson, 1996).

Furthermore, these agencies have appealed to the meat and poultry industries to establish the same method of in-house regulation (Sanson, 1996). Recently, the USDA obtained permission from the White House to implement new food safety protocol through the HACCP plan for new meat inspections (Anonymous, 1996). By instituting this new plan, USDA officials claim that the plan could reduce the cost of foodborne illness by \$1 billion annually (Anonymous, 1996).

Since foodborne illness also can be attributed to contamination that occurs once food has reached the foodservice establishment, there is eminent need for the inclusion of regulatory procedures within this industry as well. Incorporating the HACCP principles into the preparation of foods within foodservice establishments is becoming more

prevalent. Many foodservice operators such as Hooters of America, the Ryan's Family Steak House chain, and the Atlanta Fishmarket (the first restaurant to become HACCP certified in the country), have established HACCP guidelines to ensure food safety (Sanson, 1996).

Prior to receiving, there is an increased potential for food adulteration by pathogens (Rubinstein, 1996). Establishing a standardized procedure for food handling once the food reaches the back doors of restaurants is imperative. A HACCP plan specific to individual operations could inevitably help reduce the incidence of food contamination during the food preparation. According to FDA Commissioner Kessler, designing food safety practices into the process is a much better alternative than relying on inspections and sampling to identify unsafe products after production (Anonymous, 1995).

The process of implementing HACCP standards within an operation could prove both tedious and time consuming. Therefore, the USDA has printed guidelines to help instruct owners and managers on appropriate procedures for introducing these principles into their specific operations (Beasley, 1995). A HACCP Implementation Manual is also available over the World Wide Web. This manual offers a detailed outline of how to individualize a HACCP plan that will encompass all areas of possible pathogen contamination within operations (Anonymous, 1997g).

The "product flow" refers to the process a food item follows during preparation from foodservice receiving to customer consumption (NRA, 1992). Included in the product flow are receiving, storage, thawing, cooking, holding, serving, cooling, re-heating, and storing leftovers (FDA, 1992). In 1995, one healthcare foodservice operation successfully incorporated the HACCP protocol into the operation's product

flow by using a team approach (Anonymous, 1995). In other words, the most effective method of instituting a HACCP procedure for each menu item within an operation may be to organize a "team" of employees to analyze each menu item during the stages of preparation. Following this, the team would conduct a hazard analysis and risk assessment of those items, and design a plan to monitor and evaluate the products at the higher risk points throughout the process.

In 1995, Lorenzini highlighted one step of the seven principles of HACCP each month, and tailored it specifically to the pertinent points within a functioning foodservice operation (Lorenzini, 1995). The articles emphasized the importance of control while preparing recipes containing high-risk components. Operators were provided with easily understandable explanations of the individual steps of HACCP, and suggestions for incorporating these steps into their own institutions. Sanson (1996) suggested that, "HACCP procedures are detailed, but not nearly as tedious as dealing with the pressure after a foodborne illness has been tracked to your operation. Just ask the Jack in the Box organization."

Many restaurants currently adopt the HACCP principles and integrate them into their food safety programs. In a Baltimore seafood restaurant, HACCP was incorporated into an already structured food safety regimen. The owners were quick to volunteer to comply with the regulations structured by the FDA, and subsequently became one of the premier foodservice operations to pilot test the effectiveness of HACCP protocol within their working establishment (Anonymous, 1997 g). Now, 100 percent of the kitchen staff reportedly has received food safety training through the FDA's HACCP initiative for seafood (Anonymous, 1997 g).

Taco Bell is an example of a quickservice chain of restaurants that also employs HACCP procedures in everyday foodservice tasks. This company is the largest chain of restaurants involved in the Industry Council on Food Safety. By educating managers and service staff through the industry's *Servsafe* program, establishing a "Quality Assurance" staff to audit restaurants and ensure that food safety guidelines are being upheld, and teaching managers about current government food safety regulations, Taco Bell has paved a road for HACCP adoption for many chain restaurants (Anonymous, 1997g).

HACCP can be applied to all aspects of the foodservice industry. Other markets, such as cruise lines and airlines, serve large quantities of food to consumers daily. After recurring episodes of *Salmonella* poisoning inflicted 415 passengers through air travel catering services during 1991, a group of researchers surveyed a flight catering operation for two consecutive years (Lambiri, et al., 1995). The study was conducted first by examining the bacteriological quality of the food throughout the first year. Small samples of food were obtained from the catering operation and tested for *E. coli*, *Staphylococcus aureus*, *Bacillus cereus*, *Clostridium perfringens* and *Salmonella* (Lambiri, et al, 1995). The second year of the study was focused on implementing the HACCP procedures within the catering operation. Following the introduction of HACCP to the organization's food safety program, it was determined that there was a marked improvement of the bacteriological quality of the meals (Lambiri, et al, 1995).

Summary

Public confidence in the safety of the country's food supply will continue to diminish unless federal, state, and local public health agencies take aggressive actions.

Recent outbreaks, such as the *E. coli* O157:H7 outbreak involving Hudson Foods, a national distributor of meat products to foodservice and retail outlets, have generated panic among consumers and resulted in devastating financial losses across the food industry. Incidences of foodborne outbreaks have provoked the enactment of more stringent regulations on processing plants. By December 1998, the seafood industry must comply with HACCP guidelines in accordance with the regulation passed down by Congress in 1994 (Althaus, 1995). It is predicted that foodservice operations will soon be required to integrate HACCP procedures into their production practices as well. With many foodservice corporations already developing recipes and general practices with HACCP in mind, it is necessary that regulatory agencies also update restaurant inspection procedures.

Some counties in the United States currently conduct HACCP-oriented restaurant inspections. But the majority of the country relies on a standard check sheet that local health inspectors use to examine all aspects of a foodservice operation. The future application of HACCP principles to foodservice establishment inspections may be accepted and possibly mandated by local governments within the next few years. Althaus (1995) suggested, "Progressive, safety conscious foodservice operators must learn and implement science-based principles in evaluating food handling procedures to ensure public safety, to satisfy current and future inspection requirements, and to reduce the liabilities associated with foodborne illness" (Althaus, 1995).

Riell (1994) further established that regulators would become more knowledgeable about HACCP and increasingly integrate it into their inspection procedures. Already in Canada, a study indicated that out of a sample of 141

jurisdictions, 27% of those districts do in fact inspect foodservice outlets using a "HACCP critical control point" style of inspection (Mathias, et al, 1994). With health inspectors in all counties continuously increasing their knowledge about HACCP, it is almost impossible for the concepts and principles to remain apart from the inspection process.

Goals and Specific Objectives

The goal of this research was to provide a realistic assessment of foodservice safety practices and formulate a new approach to operation evaluation that parallels the direction the industry is heading. The specific objectives were,

1. To examine the current foodservice establishment inspection process for restaurants by observing a Knox County health inspector during site visits to local restaurants,
2. To re-evaluate each inspected item on the current Foodservice Establishment Inspection Report and develop a modified inspection form with criteria based upon HACCP protocol relevant to foodservice operations,
3. To test the modified form to determine its efficacy for evaluating operations according to HACCP inspection procedures.

CHAPTER III

METHODOLOGY

List of Terms

1. Current Inspection Form: Appendix A, Foodservice Establishment Health Inspection Form currently utilized by Tennessee, and Knox County
2. Modified, New, or Revised Form: Appendix B, refers to the form developed by the researcher which includes HACCP protocol and food-specific criteria
3. Supplemental Explanation Booklet or Guide: Attachment to the revised form that provides detailed explanations of requirements of the specific criteria on the form
4. HACCP-Related Items: Those inspection criteria pertaining to control at critical points, and record-keeping/ documentation criteria

Evaluation of Current Inspection Procedures

A review of the current inspection processes for restaurants was conducted by shadowing a Knox County health inspector during site visits to local establishments. The current inspection form evaluates 44 criteria within restaurants, 13 of which are denoted as “critical items,” (Appendix A). On-site observations helped to identify whether the 13

critical items are in fact items that potentially cause foodborne infections and intoxication if violated.

Reviewing current inspection procedures helped determine whether non-critical violations are classified appropriately, and whether point demerits received from those violations occasionally lead to unnecessarily low total inspection scores for various restaurants. Finally, on-site observations helped verify whether the items on the current inspection form protect customers from food contamination, or whether the form could be improved upon by focusing the criteria more on food-related points, and by incorporating a few HACCP principles into the inspection process.

Developing a Modified Instrument

The current Foodservice Establishment Inspection Report form was critically evaluated by the researcher based upon HACCP principles and food safety concerns to determine its ability to provide safe food and accurate control of foodborne illness outbreaks. HACCP textbooks (Pierson and Corlett, 1992; NRA, 1993; NRA, 1998), sanitation management textbooks (Cichy, 1994), and FDA sanitation guidelines including the Food Code, and the FDA State Training Branch Manual (1992) were referenced in order to establish valuable evaluation criteria for the development of a new form. The researcher determined if all listed criteria on the form is necessary and sufficient to ensure operation safety and sanitation according the information found in these sources. Furthermore, the items marked as "critical items" on the form were assessed using food safety concerns and HACCP principles to establish their validity as true measures of food

safety hazards. In addition, "non-critical items" were evaluated to determine their relevance to food safety and restaurant sanitation.

Inspection criteria for the new form were rewritten as necessary to specifically address the most serious health violations. Other criteria from the current form remained on the revised form, but were regrouped into designated categories. Categories for the new form were organized according to the food product flow in restaurants. The form classified criteria into receiving, storage, thawing, preparation, holding, service, cooling foods, reheating foods, and washing/sanitizing dishware and articles. The final page of the revised form listed criteria titled "Other Potential Hazards," and separated these criteria into "critical" and "non-critical" categories. This group of criteria specifically related to the aspects of building and facility maintenance, rather than the food specific items. A comprehensive supplemental explanation booklet was formulated to provide detailed explanations of the requirements of the specific criteria outlined on the form. The numbered items in the booklet coincided to the numbered items on the modified inspection form. This booklet supplemented the current health department booklet distributed to restaurant owners by offering more detailed explanations of food-specific hazards.

The weighted value of each item on the current form also was assessed. The researcher examined the system of numerically scoring restaurant inspections, and suggested an alternative approach to the current inspection process. A process was developed to replace the current method of "scoring" the restaurants without actually having a numerical figure to decide whether or not an establishment "passed" the inspection. The modified form was reviewed by food safety and HACCP experts to

determine the form's potential effectiveness in the prevention of foodborne illness outbreaks.

Sample

The sample was comprised of 4 restaurants in order to evaluate the revised health inspection form. The sample included 2 quickservice locations, as well as 2 mid-scale dining establishments exclusively within Knox County, Tennessee. The researcher requested permission from the storeowners and/ or managers to conduct non-regular inspections using the modified form. Confidentiality of restaurants was honored, and was maintained throughout the course of the study.

Initially, only quickservice restaurants were evaluated because they presented certain advantages to this research. Quickservice operations lend themselves well to this study because they are relatively standardized in production procedures, which may facilitate a more controllable inspection process. Furthermore, quickservice restaurants are less likely to change menu items within the time frame of the study.

Mid-scale restaurants also were evaluated to determine if the new form developed could, in theory, replace the current inspection form as a more thorough evaluation of the safety of the food served in these establishments. Mid-scale restaurants offer the opportunity to test the form's efficacy in operations with much broader menus, and subsequently, many more potentially hazardous food items. Because the food served in these restaurants require extensive preparation and cooking procedures before serving to customers, it was necessary to determine if the new inspection form developed was able to evaluate all possible facets of food contamination. All restaurants chosen for the

sample were considered chain restaurants. Chain restaurants offer the advantage of increased standards of preparation procedures, which offered more consistency and control to the evaluation.

Assessment of the Modified Form

An assessment of the modified form's efficacy was obtained by testing it in local dining establishments. The 4 foodservice operations were evaluated by the researcher using the new form. After all restaurants in the sample were evaluated, the researcher reviewed the notes taken during each of the "mock" inspections. The objective was to determine the new form's efficacy for identifying the safety and sanitation hazards of restaurants.

The researcher further ascertained whether the items marked as "critical" and "non-critical" on the new form were categorized according to the degree of health threat they presented if violated. The new form was assessed according to its adherence to food safety procedures when evaluating the steps of the food product flow within the selected restaurants.

Finally, industry experts, including representatives from the local restaurants, and state health inspectors, were surveyed in order to add professional opinions and contributions to the research. The survey used was an 8 question form which asked opinions about the readability of the form, its ease of use, its feasibility, and how well the new form evaluated operations for cleanliness and critical areas (Appendix F). The researcher further asked the industry experts to evaluate the readability and ease of interpretation of the new form's inspection criteria. Each person questioned also was

asked to provide input on whether or not, in his/her opinion, it is feasible for the county / state to incorporate a form that may not use numerical scores to evaluate foodservice establishments. The researcher documented the suggestions made by each of the restaurant owners / managers, as well as the other experts surveyed. The expert opinions were helpful in identifying any modifications necessary to develop a more complete form.

CHAPTER IV

RESULTS

The goal of this study was to provide a realistic assessment of current foodservice safety practices and formulate a new approach to operation evaluation that focused more directly on the safety of the food served. The researcher sought to design a form that would place the primary emphasis of routine inspections on preventing the contamination of the food product once the food reaches an establishment. The new form attempts to evaluate those critical points throughout the food product flow at which food is most at risk for adulteration. By refocusing the evaluation criteria of the new form on the protection of the food supplied through restaurants and enforcing record-keeping procedures, the consumer population more likely will be safeguarded against foodborne illness, and the restaurants will be less likely to be held liable if an outbreak should occur.

After completion of the revised health inspection form by the researcher, the restaurants included in the sample were contacted. Dates and times for evaluation were arranged during "down times" in production (approximately 2:30 p.m.) and when it was feasible for restaurant managers/personnel to accompany the researcher during the evaluation process. These restaurant personnel were provided with a copy of the revised inspection form and the attached booklet either prior to the evaluation time or upon arrival.

The first revision of the health inspection form classified all criteria according to the food product flow (Figure 1). The categories included on the form were receiving,

Monitoring Foodservice Operations			
Immediate	7 - 14 Days	By Next Inspection	
☐	☐	☐	<u>Receiving:</u>
☐	☐	☐	1. Temperatures of perishable items taken upon arrival, recorded, kept, and filed for specified time frame
☐	☐	☐	2. Source sound condition, no spoilage
☐	☐	☐	3. Original container, properly labeled
☐	☐	☐	<u>Storage:</u>
☐	☐	☐	4. Temperature of storage facilities appropriate: walk-in, freezer, coolers, dry
☐	☐	☐	5. Items covered, labeled during storage
☐	☐	☐	6. Potentially hazardous foods stored at appropriate temperatures and levels within refrigerators, and freezers. Foods with highest internal temperature requirements stored on lowest shelves.
☐	☐	☐	7. Dry storage items stored off ground at specific height standard
☐	☐	☐	8. Temperature record sheets present in work area, temperatures recorded, maintained, and filed for specified time frame
☐	☐	☐	<u>Thawing:</u>
☐	☐	☐	9. Potentially hazardous food properly thawed within time limits specific for technique used
☐	☐	☐	10. Food covered, protected during thawing
☐	☐	☐	<u>Preparation:</u>
☐	☐	☐	11. Food contact surfaces and utensils cleaned, sanitized between use (to include cutting boards)
☐	☐	☐	12. Single service articles, clean, stored in clean container between uses (includes items such as spatulas, tongs, ladles, scoops, knives, etc.)
☐	☐	☐	13. Equipment in preparation area intact, clean, sanitized
☐	☐	☐	14. Wiping cloths clean, use restricted, stored in water and sanitizing solution mixture
☐	☐	☐	15. Hands washed, clean, gloves clean and intact
☐	☐	☐	16. Personnel wearing effective hair restraints, proper uniform/ aprons, well-kept, clean, and appropriate for handling food
☐	☐	☐	17. Personnel with infections restricted

Figure 1: Initial Revisions Made to The Health Inspection Form

Immediate	7 - 14 Days	By Next Inspection	
☐	☐	☐	18. Foods cooked to reach appropriate internal temperatures (for minimal number of seconds or minutes) necessary for the specific food product, temperatures recorded, maintained, and filed for specified time frame
			<u>Holding:</u>
☐	☐	☐	19. Foods held at appropriate temperatures: cold foods at or below 41°F, hot foods held above 140°F
☐	☐	☐	20. Foods held in proper containers, covered, for appropriate amount of time, or are discarded and not re-served
☐	☐	☐	21. Thermometers provided and temperatures recorded every two hours during holding or displaying
			<u>Service:</u>
☐	☐	☐	22. Wiping cloths available, clean, use restricted, stored between use in water and sanitizing solution mixture
☐	☐	☐	23. Equipment/ utensils in service area intact, clean, sanitized
☐	☐	☐	24. Personnel following specific service hygiene standards: hands/ gloves clean, uniforms/ aprons clean
			<u>Cooling Foods:</u>
☐	☐	☐	25. Foods cooling in refrigerators, freezers, blast chillers properly protected and covered
☐	☐	☐	26. Food temperatures reach 70°F within 2 hours and 41°F within 4 hours. Temperatures recorded and maintained for specified time period
			<u>Reheating Foods:</u>
☐	☐	☐	27. Foods to be reheated properly covered, containers and/ or packaging intact, no evident spoilage
☐	☐	☐	28. Potentially hazardous food items re-heated to appropriate internal temperature of 165°F and recorded
☐	☐	☐	29. Leftover foods reheated are served in separate container from new product to be served; leftovers are never added to a new product
			<u>Washing/ Sanitizing Dishware and Articles:</u>
☐	☐	☐	30. Dishware/ silverware washed, rinsed, sanitized properly for specified amount of time
☐	☐	☐	31. 3-compartment sink filled with water (when in use) at appropriate temperatures and sanitizing solution at appropriate measures with chemstrips available for testing, or thermometer gauge provided if heat sanitizing
☐	☐	☐	32. Dishwashing facilities maintained and operated
☐	☐	☐	33. Clean, soiled linen properly stored

Figure 1: (Continued)

Immediate	7 - 14 Days	By Next Inspection	
			<u>Other Potential Hazards:</u>
			<u>Critical Items:</u>
☐	☐	☐	34. Water source safe, hot and cold under pressure
☐	☐	☐	35. Sewage and waste water disposal
☐	☐	☐	36. Cross connection, back siphonage, backflow
☐	☐	☐	37. Toilet rooms accessible, convenient, installed, enclosed, clean, good repair, hand cleanser, sanitary towels, hand drying devices provided, proper waste receptacles
☐	☐	☐	38. Insects/rodents- outer openings protected, no birds, turtles, other animals
☐	☐	☐	39. Toxic items properly stored, labeled, used
☐	☐	☐	40. Thermometers read accurately and calibrated
			<u>Non-critical Items:</u>
☐	☐	☐	41. Garbage and refuse containers covered, adequate number, insect/rodent proof, clean
☐	☐	☐	42. Rooms and equipment, vented as required
☐	☐	☐	43. Floors constructed, drained, clean, good repair, covering, installation, dustless cleaning methods
☐	☐	☐	44. Lighting provided as required, fixtures shielded
☐	☐	☐	45. Premises maintained free of litter, unnecessary articles, cleaning maintenance equipment properly stored. Authorized personnel.

Figure 1: (Continued)

storage, thawing, preparation, holding, service, cooling foods, reheating foods, and washing / sanitizing dishware and articles. Included on the final page, were items from Tennessee's current health inspection form, along with a few additional criteria, which were regrouped under the heading "Other Potential Hazards," and further categorized into "critical" and "non-critical" categories. As stated in Chapter III, items included on the revised form were either created by the researcher, were directly from the current form, or were reworded.

New criteria evaluating an operation's record keeping procedures were added during the receiving, storage, preparation, holding, cooling, and reheating categories. These items were added by the researcher in order to parallel the food industry's initiative toward the development of HACCP programs, which currently are mandated within many food manufacturing plants, and potentially will become a standard for the foodservice industry in the near future.

The researcher also suggested an alternative method of scoring the form, which varies from the current method of assigning numerical scores after an inspection. The violations were classified according to whether there was a need for "Immediate" correction, correction within "7-14 Days," or "By the Next Inspection," (approximately six months). (Figure 1).

Sampled Restaurants

During the site visit to the first quickservice restaurant in the sample, the researcher tested the form by following the inspection criteria in the order they appeared

on the sheet. Because the modified form listed criteria to evaluate an operation's record-keeping procedures, there were items in certain areas of food production that could not be evaluated. The first sampled restaurant did actually provide each preparation and work area within the establishment temperature record sheets. Temperatures of food items were to be taken and recorded every two hours during operation. The managers maintained appropriate filing areas for these record sheets, and the sheets were to be filed for up to one month's period of time. After examining the record sheets, the researcher noted that the sheets were not consistently filled out throughout the month. However, the manager did agree that it would be feasible to maintain record sheets in the areas of operation as well as in the receiving of the shipments from suppliers.

The manager of the restaurant indicated that their establishment did not enforce any strict policy on temperatures of food received. He did, however, indicate that the shipments received were looked at carefully, and any spoiled food or items with torn/damaged packaging were returned.

During the inspection process, it quickly was noted that the form did not contain any column indicating whether or not the evaluated criteria were in compliance with the standards. Therefore, the form was modified further to include such a column (Figure 2). Similarly, as the inspection continued, the researcher observed that the establishment did not clearly label or date items in storage. Item "#5" on the new form, however, did not

Monitoring Foodservice Operations				
Immediate	7 - 14 Days	By Next Inspection	To Standard	
☐	☐	☐	☐	Receiving:
☐	☐	☐	☐	1. Temperatures of perishable items taken upon arrival, recorded, kept, and filed for specified time frame
☐	☐	☐	☐	2. Source sound condition, no spoilage
☐	☐	☐	☐	3. Original container, properly labeled
☐	☐	☐	☐	Storage:
☐	☐	☐	☐	4. Temperature of storage facilities appropriate: walk-in, freezer, coolers, dry
☐	☐	☐	☐	5. Items covered, labeled, and dated during storage
☐	☐	☐	☐	6. Potentially hazardous foods stored at appropriate temperatures and levels within refrigerators, and freezers. Foods with highest internal temperature requirements stored on lowest shelves.
☐	☐	☐	☐	7. Dry storage items stored off ground at specific height standard
☐	☐	☐	☐	8. Temperature record sheets present in work area, temperatures recorded, maintained, and filed for specified time frame
☐	☐	☐	☐	Thawing:
☐	☐	☐	☐	9. Potentially hazardous food properly thawed within time limits specific for technique used
☐	☐	☐	☐	10. Food covered, protected during thawing
☐	☐	☐	☐	Preparation:
☐	☐	☐	☐	11. Food contact surfaces and utensils cleaned, sanitized between use (to include cutting boards)
☐	☐	☐	☐	12. Single service articles, clean, stored in clean container between uses (includes items such as spatulas, tongs, ladles, scoops, knives, etc.)
☐	☐	☐	☐	13. Equipment in preparation area intact, clean, sanitized
☐	☐	☐	☐	14. Wiping cloths clean, use restricted, stored in water and sanitizing solution mixture
☐	☐	☐	☐	15. Hands washed, clean, gloves clean and intact
☐	☐	☐	☐	16. Personnel wearing effective hair restraints, proper uniform/ aprons, well-kept, clean, and appropriate for handling food
☐	☐	☐	☐	17. Personnel with infections restricted

Figure 2: Final Revisions to the Revised Health Inspection Form

Immediate	7 – 14 Days	By Next Inspection	To Standard	
☐	☐	☐	☐	18. Foods cooked to reach appropriate internal temperatures (for minimal number of seconds or minutes) necessary for the specific food product, temperatures recorded, maintained, and filed for specified time frame
				<u>Holding:</u>
☐	☐	☐	☐	19. Foods held at appropriate temperatures: cold foods at or below 41°F, hot foods held above 140°F
☐	☐	☐	☐	20. Foods held in proper containers, covered, for appropriate amount of time, or are discarded and not re-served
☐	☐	☐	☐	21. Thermometers provided and temperatures recorded every two hours during holding or displaying
				<u>Service:</u>
☐	☐	☐	☐	22. Wiping cloths available, clean, use restricted, stored between use in water and sanitizing solution mixture
☐	☐	☐	☐	23. Equipment/ utensils in service area intact, clean, sanitized
☐	☐	☐	☐	24. Personnel following specific service hygiene standards: hands/ gloves clean, uniforms/ aprons clean
				<u>Cooling Foods:</u>
☐	☐	☐	☐	25. Foods cooling in refrigerators, freezers, blast chillers properly protected and covered
☐	☐	☐	☐	26. Food temperatures reach 70°F within 2 hours and 41°F within 4 hours. Temperatures recorded and maintained for specified time period
				<u>Reheating Foods:</u>
☐	☐	☐	☐	27. Foods to be reheated properly covered, containers and/ or packaging intact, no evident spoilage
☐	☐	☐	☐	28. Potentially hazardous food items re-heated to appropriate internal temperature of 165°F and recorded
☐	☐	☐	☐	29. Leftover foods reheated are served in separate container from new product to be served; leftovers are never added to a new product
				<u>Washing/ Sanitizing Dishware and Articles:</u>
☐	☐	☐	☐	30. Dishware/ silverware washed, rinsed, sanitized properly for specified amount of time
☐	☐	☐	☐	31. 3-compartment sink filled with water (when in use) at appropriate temperatures and sanitizing solution at appropriate measures with chemstrips available for testing, or thermometer gauge provided if heat sanitizing
☐	☐	☐	☐	32. Dishwashing facilities maintained and operated
☐	☐	☐	☐	33. Clean, soiled linen properly stored

Figure 2: (Continued)

Immediate	7 - 14 Days	By Next Inspection	To Standard	
<u>Other Potential Hazards:</u>				
<u>Critical Items:</u>				
☐	☐	☐	☐	34. Water source safe, hot and cold under pressure
☐	☐	☐	☐	35. Sewage and waste water disposal
☐	☐	☐	☐	36. Cross connection, back siphonage, backflow
☐	☐	☐	☐	37. Toilet rooms accessible, convenient, installed, enclosed, clean, good repair, hand cleanser, sanitary towels, hand drying devices provided, proper waste receptacles
☐	☐	☐	☐	38. Insects/rodents- outer openings protected, no birds, turtles, other animals
☐	☐	☐	☐	39. Toxic items properly stored, labeled, used
☐	☐	☐	☐	40. Thermometers read accurately and calibrated
<u>Non-critical Items:</u>				
☐	☐	☐	☐	41. Garbage and refuse containers covered, adequate number, insect/rodent proof, clean
☐	☐	☐	☐	42. Rooms and equipment, vented as required
☐	☐	☐	☐	43. Floors constructed, drained, clean, good repair, covering, installation, dustless cleaning methods
☐	☐	☐	☐	44. Lighting provided as required, fixtures shielded
☐	☐	☐	☐	45. Premises maintained free of litter, unnecessary articles, cleaning maintenance equipment properly stored. Authorized personnel.

Figure 2: (Continued)

address whether or not items were labeled clearly with the date. The researcher then made an additional note to revise the form (Figure 2).

While observing the production processes in the back of the house operation, the researcher noticed that few employees washed their hands between routine tasks. The idea occurred to the researcher that this item (#15) should not be something marked for “immediate” correction, because it would take more than one day to train employees to wash their hands consistently. In this case, an inspector should mark the column indicating “7-14 Days,” allowing enough time for managers to conduct an instructional in-service training session on hand washing. It was at this point that the researcher discovered that each criterion would require the establishment of certain standards, and “allowable limits.”

At the end of the evaluation, the researcher inquired about the current inspection processes, and what violations his store received on a regular basis. The manager remarked, “Most points are taken off for things that have nothing to do with food.” Items mentioned by the employee included leaving lids off of garbage cans, and loosened floor tiles. The manager then was asked about the proposed revised form, and whether or not, in his opinion, it would be an improvement from the current form used by the Health Department. He stated that he felt the revised form concentrated more on food-related issues, he appreciated the “non-numerical score” aspect of the form, and thought the record-keeping procedures could be accomplished over time.

Following this first evaluation of the revised form, the researcher modified the form to reflect those necessary changes identified during the inspection of the establishment. Those changes are highlighted in Figure 2.

The second foodservice establishment included in the sample was a quickservice operation as well. This evaluation was conducted after making revisions to the form following the first inspection. Personnel from the restaurant accompanied the researcher during the inspection process after receiving the form and supplemental explanation guide ahead of time.

Again, since some criteria on the revised form currently are not evaluated on the form administered by the Health Department, the restaurant personnel were questioned as to whether or not these items would be feasible to evaluate in the future. Specifically, these items (#1, 8, 18, and 21) addressed temperature evaluation and record-keeping procedures, which are not addressed on the current form. The restaurant personnel agreed that the new record-keeping additions to the revised form would require more time and effort on the part of the employees, but that it also would benefit their operation in the long run. The employees of this operation indicated that the current violations received during routine inspections vary between establishments within the chain. They contend that different inspectors adapt different rules to each establishment, causing an inconsistency in inspection scores in restaurants within the same region. The manager of the restaurant in the first sampled operation noted this problem as well. The second sample group offered that by eliminating the numerical "scoring" of inspections, the Health Department would reduce the score discrepancies between establishments essentially operated under the supervision of the same upper management personnel.

The third foodservice operation in the sample group was a mid-scale dining establishment. This facility was much larger in capacity, and offered a much larger variety of menu items as compared to the two previous establishments in the sample group. During this evaluation, restaurant personnel did not accompany the researcher, but did review and discuss certain aspects with a group of 5 managers immediately following the evaluation process. As the researcher evaluated the operation by following the revised form, violations were addressed and marked on the form appropriately. Similar to one of the previous restaurants sampled, this operation did not have any formal procedure for recording and maintaining temperatures of food items throughout the production. When questioned about whether or not this would be a feasible procedure for the operation to follow in the future, the managers stated that it would be difficult, and sometimes impractical during receiving considering the number of shipments the facility receives each day from suppliers. During other steps of the food production process, however, the managers contend that temperature record maintenance may be more possible.

Following the evaluation, the researcher discussed the results of the "mock inspection" with the managers, as well as their concerns about the current form. The researcher indicated which items on the form would have been marked under the "Immediate" correction column, as well as the other listed columns since these areas were in violation of the standards. The managers then asked questions pertaining to their specific concerns with Health Department standards, such as regulations within the bar area, coolers, wiping cloths, and the cleanliness of Coke guns. They then questioned the researcher about how the managers would know what specific items caused violations at

the end of an inspection. The researcher indicated that an attached blank sheet would be added indicating the criteria number violated, and the actual violation that occurred. The managers then indicated a concern about the scoring procedures involved with the revised form. They questioned how, exactly, the scoring would take place—how many criteria, and of what level, had to be violated to administer a “passing” or a “failing” score, if no numerical value is attached. They suggested that possibly an “A-B-C” score could be assigned following an inspection to achieve a compromise of satisfying the public with a score that was not associated with numerical values. They also voiced concerns over the standards that would result in restaurant closure or a Health Department hearing, considering the new method of scoring. The researcher stated that these specific areas had been considered, but not yet determined at that point in time.

The final foodservice establishment involved in the study was a mid-scale dining facility with a complete salad bar. This operation was also an individual unit of a national chain. During the evaluation of this restaurant, one of the corporate level employees was present to accompany the researcher. The restaurant was evaluated at all stages of back of the house production, as well as the front of the house, which included the service area, bar, salad bar area, and dining room.

The employee accompanying the researcher indicated that the corporation already has instituted HACCP training for managers into the training materials used at the corporate training headquarters. The revised form efficiently evaluated all phases of food production and service, with the exception of the record-keeping criteria during certain phases of the food product flow. The restaurant employee mentioned that all food

temperatures are taken regularly and that the temperatures of the salad bar items are taken four times per day.

When asked if the establishment would be willing to keep records of temperatures of food items at different phases of the product flow, the employee indicated that it would be feasible to incorporate more record-keeping into daily tasks. The employee further acknowledged that the scoring system proposed on the revised form had its benefits, though he offered that the customers were more familiar with the point system of the current form.

Inspector Surveys

After evaluating the four restaurants included in the sample, the researcher contacted 6 state health inspectors in the Nashville area, in order to add the perspective of professionals who are considered to be experts in this field. Letters were sent to 6 inspectors, requesting they review the form, take it with them on an inspection to evaluate its feasibility in identifying critical violations in food production, and return an 8-question enclosed survey to the researcher (Appendix F). Out of the 6 surveys sent, only 2 were returned originally. After one month had passed, the researcher drafted a second letter, requesting the input from the 4 remaining inspectors, and sent a second copy of the revised inspection form and the survey. This second mailing resulted in one more returned survey form.

The results on the three survey forms returned to the researcher were helpful in identifying points that may have been overlooked when the form was revised. One of the surveys stated that the proposed modified form was easy to read, very easy to use, easier

to use than the current form, evaluated the foodservice operation very well for cleanliness and the critical areas, and was feasible to use for inspections. This inspector did reply that, in his/her opinion, the form would not be applicable for inspecting all types of foodservice operations, though he/she did not indicate the reason.

The second returned survey provided detailed explanations, opinions, and suggestions regarding the revised inspection form. This inspector indicated that he/she considered this form easy to read, moderately easy to use, but he/she did not find the form easier to use because, "I'm used to the old form." This inspector further replied that this form evaluated a foodservice operation for cleanliness and critical areas moderately to very well, and that in his/her opinion, this form would be feasible to use for foodservice establishment inspections. In addition, the inspector suggested that the length of time it would require to conduct an inspection using this revised form would ultimately "Depend on the size of the establishment, and the type of establishment" evaluated.

The inspector continued that in his/her opinion, this form could be applicable to all types of foodservice establishments, with a few exceptions. These exceptions include the inspection of retail food stores, indicating food served at deli counters and meat markets, for example. Also, the inspector noted that the revised form mentioned regulations regarding the three-compartment sink, whereas in retail outlets, two-compartment sinks are allowed. A discrepancy in temperature requirements was mentioned; the temperature for refrigeration storage in retail outlets is 45 degrees F, versus 41 degrees suggested by the Food Code.

Furthermore, the inspector indicated that he/she did not feel the record-keeping criteria could become a requirement, although the inspectors could suggest it. This

inspector suggested, that for inspectors who conduct inspections of retail food stores, where the food is primarily pre-packaged, the inspectors could write "N/A" on item numbers regarding preparation, thawing, re-heating, and dishwashing. He/she included, "It would take a while to get used to the new form, the different item numbers, a different approach. It appears to be like HACCP, and slightly similar to the FDA inspection forms." This inspector was candid in suggestions as to why a proposed revision such as this one would be difficult to institute. He/she offered, "It's probably more sensible to use this HACCP approach, if we could overcome old habits and inertia. People are used to getting a 'score,' but maybe we need to progress beyond the old way of thinking."

The third and final returned survey contributed a varying opinion regarding the revised form. This inspector answered that the revised form created by the researcher was somewhat difficult to read, not very easy to use, not easier to use than the current form use by the Health Department. The inspector also answered that the form evaluates foodservice operations for cleanliness and critical areas moderately well, but that he/she does not feel that the form would be feasible to use for foodservice establishment inspections. He/she stated that the length of time required to conduct an inspection with the revised form is approximately 25% greater with the revised form. He/she answered that the form could not be applicable to all types of foodservice establishments because, "It related only to foodservice." When asked about his/her opinion in whether the form better assesses sanitation than the current inspection form, the inspector wrote, "This form only addresses food service firms." The inspector did not provide any additional comments on the survey form.

CHAPTER V

DISCUSSION

In a recent meeting between officials from the Knox County Department of Environmental Health and local industry professionals, it was suggested that both restaurateurs and Health Inspectors alike agree that changes to the current method of inspecting foodservice establishments within Knox County, as well as the state of Tennessee, must take place in the future. Hamstra (1996) reported that the Center for Science in the Public Interest (CSPI) conducted a survey involving 45 health agencies about their inspection procedures and policies for restaurants. Results of this survey concluded that, in their opinions, most local agencies involved in the study were not effectively safeguarding the public from foodborne illness outbreak. Since the primary goal of restaurant inspections is to protect the food served to the public, an improvement in inspection techniques, tools, and procedures must be adopted in individual counties in order to supply consumers with safer food products in restaurants.

Evaluation of Current Inspection Procedures

After shadowing a Knox County Health Inspector to evaluate current procedures followed during health inspections, it was clear that some establishments received considerable point demerits for items on the form that do not explicitly concern the safety of the food served in an operation (Appendix A). Examples of such items include numbers 14, 15, 31, 36, 37, 38, 39, 40, 42, 43, and 44. As Cichy (1994) explained, an

outbreak of foodborne illness is caused by the contamination of food by one of the disease organisms either before the food enters the establishment, or by mishandling after the food arrives. It is a fair assumption that both restaurateurs and health inspectors desire that a safe product be served to the consumer, considering both groups depend on the quality and safety of the food for their livelihood. It therefore stands to reason that an inspection process which utilizes an inspection tool focusing primarily on the safety of the food in the establishment should be implemented within the county and state.

Recent developments in food safety demand a need for more structured inspections if operations are producing or selling foods considered to be at risk for microbial contamination (Tebbutt, 1991). A revised inspection tool, though just one small piece of the entire "process," potentially could aid in the establishment of a more objective process. With the incorporation of HACCP related criteria (specifically the record-keeping), the foodservice industry would soon model the most recent developments in food safety protocol instituted in food manufacturing facilities.

Developing the Modified Instrument

Althaus (1995) documented that some counties in the United States currently conduct HACCP-oriented restaurant inspections. Similarly, Mathias, et al, (1994) indicated that in Canada, out of a sample of 141 jurisdictions, 27% of those districts do inspect foodservice outlets using a "HACCP critical control point" style of inspection. As foodservice operators become more aware of how the publicity of a foodborne illness outbreak can be so financially devastating to their establishments, it follows that their concern regarding food-handling procedures will increase.

With this in mind, the development of the revised form focused on three primary factors. These factors included the organization of the evaluation criteria to follow the flow of food through the establishment, the necessity of temperature evaluation of food products throughout various stages of the flow, and the record-keeping procedures, which may help determine liability issues if an outbreak were to occur.

Another consideration in designing the proposed revised form was whether or not to maintain a numerical scoring procedure for evaluation, or to replace it with a non-numerical evaluation method. The researcher decided on a non-numerical scoring procedure, which would involve an inspector evaluating the criteria listed, and deciding if a violation needed to be corrected "Immediately," within "7-10 days," or "By the Next Inspection." Also included, was a column headed "To Standard," which would be marked if the evaluation criterion was up to the standards the Health Department enforces.

In order for this form to be effective, specific allowable limits for each criterion must be established. A supplemental explanation guide was developed by the researcher in order to negate discrepancies in the interpretation of certain points on the evaluation form (Appendix C). For example, item #9 on the revised form states, "Potentially hazardous food properly thawed within time limits for the technique used." The supplemental guide provides a detailed summary of the four methods of thawing potentially hazardous foods, as well as the temperature and procedure requirements for each method. This guide serves as a supplement to the inspection form, which is helpful in pinpointing specific requirements in otherwise "gray" areas. Compared to the supplement book that accompanies the current Health Inspection form, this shortened

version can be referred to more easily, and focuses primarily on specific requirements concerning the safety of the establishment's food product. This supplemental booklet could also help reduce some of the subjectivity currently associated with of foodservice inspections using the current form. For more specific details concerning plumbing guidelines and building codes, restaurant owners can refer to the materials currently provided by the Health Department.

Though the criteria involved with issuing a warning to an establishment, or even a temporary closure, would still need to be determined by experienced professionals, the restaurateurs and inspectors questioned during this study seemed to have an open mind regarding the implementation of a new procedure. Concerning the issue of maintaining temperature records of food products, the persons questioned agreed that the additional paperwork involved with the record-keeping criteria added to the revised form would be difficult to institute and mandate in the county. But according to research, in the planned food safety initiatives for 1998, the FSIS and the FDA were to provide HACCP training to both state and local inspectors (Anonymous, 1997 b). If this were the case, it would be essential that the operators of foodservice establishments require their personnel to maintain these records, in order to comply with emerging standards.

Sampled Restaurants and Assessment of the Modified Form

In all four establishments involved in the study, the form effectively evaluated the cleanliness and sanitation of the establishments, as well as the critical areas during which food could become contaminated. The organization of the items on the form followed the flow of the food from the point of entry into the establishment, through service to the

customers. Not only does the current form utilized by the health department not follow a logical sequence of order to follow food products through processing steps, it neglects to evaluate all critical areas involved in general food production. For example, the “thawing” process of various food items is a point at which existing bacteria in a food product has the opportunity to multiply to contaminating levels, if certain measures are not taken. However, on the current form, this criterion is only a 2-point violation, and if violated, does not render a “critical” deduction (Appendix A).

By re-classifying the items on the revised form, the researcher has implied that all steps involved in the production of food served to the public are critical. However, certain processes within the product flow are more critical than other processes. According to HACCP, Critical Control Points are steps within the process where the loss of control could result in an unacceptable food safety risk (Bauman, 1992). The products served in each restaurant establishment vary considerably. Therefore, there may be certain steps in one process that may be considered “critical,” while in another process, the same point may be less critical. There are areas in operation that can be critical and receive higher priority, but this undoubtedly depends on the products used in each individual facility.

In order to establish a more thorough control process for restaurant inspections using the revised form, the researcher has designated certain points on the form as the “most critical” steps during production. These items are numbers 11, 13, 18, 28, 30, and 40 (Appendix B). Item #11, “Food contact surfaces and utensils cleaned, sanitized between use (to include cutting boards),” identifies the most probable times during food production during which cross-contamination may occur. Item #13, “Equipment in

preparation area intact, clean, sanitized,” controls for possible avenues of cross-contamination as well, if a piece of equipment is used to prepare a number of food items throughout daily production. Item #18, “Foods cooked to reach appropriate internal temperatures (for minimal number of seconds or minutes) necessary for the specific food product, temperatures recorded, maintained, and filed for specified time frame,” is potentially the most critical point of the inspection form. This criterion not only mandates that the foods reach certain temperatures, it also ensures that the employees accurately record those temperatures and maintain records.

In the ‘Reheating Foods’ category, item #28 is considered “most critical” because it requires that food is reheated to the appropriate internal temperatures, and that those temperatures are recorded. Item #30 requires that “dishware/silverware washed, rinsed, sanitized properly for specified time frame.” The word “properly” in this point covers items #31 and #32. In other words, numbers 31 and 32 must be met in order to meet criterion #30. Finally, item #40, “Thermometers read accurately and calibrated,” is an item that must be controlled for on a continuous basis as well. Actually, an additional statement that mandates that the employees must keep records of periodic calibration should be maintained in order to verify that all temperature records kept are accurate.

Items then considered “somewhat critical” would include item numbers 1, 4, 6, 8, 9, 15, 17, 21, 26, 31, 32, and 34-39 (Appendix B). These criteria evaluate points during the production process that are of heightened concern, but again, are not the “most critical.” These points also could lead to severe consequences if repeatedly found in violation, but may not induce the most stringent consequences as immediately as the before mentioned items.

Items numbered 34 – 38 primarily focus on the building maintenance and items of long term control. They are designated as “critical” in the ‘Other Potential Hazards’ category because they are of critical concern during the initial stages of operation inspection (when an establishment is first opening). These are items that must be maintained long term, but if found in violation during a routine inspection, would most likely be marked “By Next Inspection,” not requiring the inspector to re-evaluate within the next couple of weeks.

But by identifying all items listed on the revised form as “critical,” though possibly in varying degrees, inspectors and restaurateurs alike hopefully will consider each violation of great importance. This idea is supported by the elimination of the point deductions, which allows the inspectors to work with the operators to take immediate action against the most serious violations. In turn, this system also will allow ample time to correct items that require additional employee training. As the current Executive Director of the Tennessee Restaurant Association said recently in a meeting with Knox County restaurateurs and officials in the Department of Environmental Health, “An inspection score changes day to day, hour to hour.” By eliminating the numerical score, restaurateurs could focus more on solving the violations and issues determined on a routine inspection, rather than concentrating on how a given score is going to be perceived by their peers and consumers. In fact, currently other states, such as North Carolina, utilize a form that does not score restaurants numerically.

While the issue of record-keeping was thought to be an achievable addition to inspection requirements for the future, most professionals questioned during the study indicated that it would be difficult to implement and maintain. However, when the

researcher explained the primary goals of record keeping, most people seemed to better understand the positive aspects that record-keeping could ensure. The goals of requiring employees to maintain temperature records would be to determine the ultimate source of food contamination if an outbreak were to occur. If an operator maintained records for a specific period of time, he/she would have documentation that would indicate whether the food was contaminated pre-delivery or post-delivery. In 1996, Farkas claimed that a number of foodborne illness outbreaks have been associated with restaurants, and after careful investigation, employee mishandling was identified as one of the primary sources of contamination. With research indicating that foodservice employee mishandling is often the root of the problem, this new policy potentially could free foodservice operations from liability claims if an outbreak was to occur, and it was proven that the adulteration transpired prior to delivery, or did not occur at their establishment. The facility therefore would have documentation of correct procedures and handling of the food.

Inspector Surveys

All inspectors surveyed in the study were *ServSafe* qualified earlier in the year. Considering this, these inspectors undoubtedly had a heightened awareness of food sanitation, as well as HACCP regulations. The comments obtained on the returned survey indicate that the design of the form does successfully include HACCP standards into the inspection process in logical sequences of food production and preparation.

However, getting the County Health Department officials to accept such stringent regulations, and to require this degree of a standard from restaurateurs would be

a difficult task for a number of reasons. As one inspector mentioned, the difficulty with adopting these regulations stems primarily from the resistance to change, both on the part of the inspectors and the foodservice employees. Though record-keeping procedures are mandated currently throughout many facets of food manufacturing, it still is not a requirement in foodservice operations. Consequently, there seems to be little motivation to develop tighter regulations within Knox County.

In reference to the proposed scoring methods of the revised form, the inspectors were helpful in identifying the major concerns regarding these measures. It again was suggested that the public is use to restaurants in this area receiving a "score," by which they feel they are able to "judge" the safety and sanitation of the establishments. Furthermore, it was mentioned in the recent meeting with Knox County restaurateurs and the local Health Department officials, that in many areas of Tennessee, the media generates attention from publicizing and covering the inspection scores of restaurants. In fact, many news stations are said to portray the numerical score as the final indication of whether or not an establishment is considered to be a "safe" place for the public to eat. Much of the consumer population might be surprised to learn that, through the current method of restaurant inspection, low scores can be achieved without overtly violating any criteria specifically related to the food product itself. Even more disturbing, is the idea that an "unsafe" operation potentially could achieve a high score.

On the other hand, some restaurants themselves utilize a history of scoring highly on health inspections as a marketing tool to attract more customers. Though this is the case for some operations, it is more often heard that a low score is contracted for points on the form that do not directly deal with the safety of the food served, as mentioned

previously. Therefore, establishments that have the tendency to obtain somewhat lower scores because of the other types of violations, actually may prefer a method of inspection that took the focus of the process away from the numerical value of the score.

Summary

This study was conducted in order to determine if the current inspection report form for the state of Tennessee could be improved upon by including HACCP standards, as well as more specific food-related criteria. The evaluation of the revised form in four foodservice establishments was necessary to examine the form's efficacy for identifying critical areas during restaurant food production. Considering that the eating patterns of Americans have shifted in recent years, and now it is reported that the average family spends more than half its food dollars on restaurant and take-out food, governmental entities must tighten regulations and improve inspection processes in order to safeguard the consumer from potential food contamination (Rosenburg, 1998).

The addition of HACCP-type standards and more food specific criteria challenges restaurants to update production procedures in order to more directly focus on the protection of the consumer population. The revised inspection criteria shifts the emphasis toward a more preventative approach to food safety rather than the current approach which focuses more on the conditions of the facility. Because there is great concern over the numerical inspection scores achieved by restaurants within Knox County, a form that would eliminate that aspect of an inspection may help redirect the focus of the restaurateurs and the inspectors toward maintaining a safe food supply.

State of Tennessee health inspectors were surveyed during this study in order to obtain the opinions about the revised form from regulators in the industry. As a group, they offered insight into the challenges that would be faced if a form such as the one proposed were to be accepted. Though some were of the opinion that the form thoroughly evaluated establishments for critical food-related criteria and assessed these points more thoroughly than the form currently used by the health department, some indicated reluctance to changing forms based on familiarity with the current form. Still, one inspector suggested that the form would not be useable in all types of foodservice operations because it focused only on food-related issues, and was not broad enough to replace those forms used to evaluate convenience stores.

Many industry professionals offered considerable suggestions and opinions to the researcher regarding the potential use of a revised inspection form in foodservice establishments. Though one of the most prominent challenges facing the use of any revised form within the county remains in the inability for regulators to agree with operators on a number of issues. Unfortunately, the issues that arise as a result of the often strained relationships between these two groups tend to overshadow the simple fact that both sides are working toward a common objective-to serve safe and edible food to the public.

Future Implications

In light of the publicity associating the foodservice industry with foodborne illness outbreaks, industry leaders are working actively with the Educational Foundation of the NRA to make food safety training a priority within foodservice operations (NRA,

1994). However, in order to enforce that this food safety training is implemented and maintained long term, state and local Health Departments must devise a more applicable method of inspection procedures, and develop more useable inspection tools, that will work more efficiently with restaurants to safeguard the public.

But the revision of the inspection tool is just one small portion of an entire process in need of overhaul. The researcher cannot overlook other factors that would contribute to improving the entire inspection process. For example, Mathias (1995) indicated that heightened employee training and education on sanitation standards contributed to overall improved inspection scores. Furthermore, the frequency of restaurant inspections also was noted to impact inspection scores (Mathias, 1995). Another factor to consider is whether state and county health departments have the available funding to employ an appropriate number of inspectors within their departments to conduct the necessary number of inspections throughout a year. Since all of these factors help to comprise the entire process, improvements can only be made one piece at a time.

Another consideration for future research concerning the new form includes the establishment of allowable limits for violations in order to determine the issuance of a "warning," "hearing," or "temporary closure" by the health department. Criteria could be established, for example, to issue a "warning" if 4 or more of the "7-10 Days" violations had occurred. At this time, the restaurant would receive a written letter of warning by the health department indicating the consequences if further violations followed. At the other extreme, criteria could be established to mandate more severe measures. It could be determined that if 4 or more of the "7-10 Days" boxes were marked, the inspector could

initiate an immediate shutdown of the establishment. If, after allowable limits were established, the health department determined that some of the violations should not have the correct "Immediately" option at all, this column could be removed from those items deemed to need future evaluation if violated. Furthermore, if an inspector marked an item on the form to be corrected "Immediately," but also feels that the item should be re-evaluated again in the near future, he/she could have the option of checking 2 columns. If the criteria were established to allow inspectors the freedom of determination, they could potentially mark both the "Immediate" column, and the "7-10 Days" column to ensure that violation was re-evaluated at a later time. These are simply suggestions made by the researcher aimed toward establishing allowable limits. The researcher feels that it would be more appropriate for a committee of industry professionals to decide the exact protocol once a new design for the form is accepted.

While the original purpose of this research was to revise the Tennessee health inspection form, it became apparent that the new form and supplemental explanation guide could be used as an assessment tool for restaurants that want to improve the food safety practices at their sites. The researcher cannot overlook both the reluctance of the health inspectors to consider implementing a new form, the differing perspectives of industry and government officials, and the difficulties in changing a governmental process. Therefore, it may be up to the restaurant industry leaders themselves to take on the issue of food safety as a primary focus for the upcoming years. This inspection tool cannot only be used to evaluate establishments from an inspector's perspective, it potentially could provide operators with an assessment tool that may upgrade sanitation

standards, and reduce issues of liability if a foodborne illness outbreak were ever linked to their establishments.

In conclusion, the revisions to the Health Inspection form contributed by the researcher apply HACCP-oriented procedures, and target the critical areas within foodservice operations. This information can be utilized by the state and local government agencies to aid in the development of updated inspection criteria. Progress has been made toward HACCP-oriented inspection procedures in many other counties within the United States, and on the part of the FDA.

There has been an overwhelming outcry from restaurateurs within Knox County, Tennessee to modify the current inspection process to work *with* restaurants rather than against them. Redesigning the instrument used in the process can be the initiating factor to improving the entire process. Since restaurateurs and the inspectors possess the common goal of safeguarding the public from foodborne illness outbreaks, the development of a new inspection tool is one step toward facilitating the relationship between two traditionally antagonistic parties, while at the same time helping to preserve public health.

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APPENDICES

APPENDIX A



FOOD SERVICE ESTABLISHMENT INSPECTION REPORT
DEPARTMENT OF HEALTH

54
8-9-3

ESTABLISHMENT	FIELD NO.	COUNTY NO.	EST. NO.	DATE	M	M
ADDRESS	STAFF I.D.		PURPOSE	() 1. Complete	() 4. C	
	Insp. in Tr. I.D.			() 2. Follow-up	() 5. I	
				() 3. Complaint	() 6. C	
OWNER-OPERATOR	TYPE	() 1. Commercial Food	() 5. Organized Camp	Permitte		
		() 2. School Cafeteria	() 6. Temporary Service	() Yes		
ADDRESS		() 3. Health Care Facility	() 7. State Institutions	Inspecti		
		() 4. Child Care Facility	() 8. Other Food Service	(Min.)		
	Follow-up	() Yes () No	Score			*Crit

FOOD	
1. Source, sound condition, no spoilage	5
2. Original container, properly labeled	5
FOOD PROTECTION	
3. Potentially hazardous food meets temperature requirements during storage, preparation, display, service transportation	5
4. Facilities to maintain product temperature	4
5. Thermometers provided and conspicuous	1
6. Potentially hazardous food properly thawed	2
7. Unwrapped and potentially hazardous food not re-served	4
8. Food protection during storage, preparation, display, service, transportation	2
9. Handling of food (ice) minimized	2
10. In use, food (ice) dispensing utensils properly stored	1
PERSONNEL	
11. Personnel with infections restricted	5
12. Hands washed and clean, good hygienic practices	5
13. Clean clothes, hair restraints	1
FOOD EQUIPMENT AND UTENSILS	
14. Food (ice) contact surfaces designed, constructed, maintained, installed, located	2
15. Non-food contact surfaces designed constructed, maintained, installed, located	1
16. Dishwashing facilities designed, constructed, maintained, installed, located, operated	2
17. Accurate thermometers, chemical test kits provided, gauge cock (1/4" IPS valve)	1
18. Pre-flushed, scraped, soaked	1
19. Wash, rinse water clean, proper temperature	2
20. Sanitization rinse clean, temperature, concentration, exposure time, equipment, utensils sanitized	4
21. Wiping cloths clean, use restricted	1
22. Food-contact surfaces of equipment and utensils clean, free of abrasives, detergents	2
23. Non-food contact surfaces of equipment and utensils clean	1
24. Storage, handling of clean equipment/utensils	1
25. Single-service articles, storage, dispensing	1
26. No re-use of single service articles	2
WATER	
27. Water source, safe, hot and cold under pressure	5

SEWAGE	
28. Sewage and waste water disposal	
PLUMBING	
29. Installed, maintained	
30. Cross-connection, back siphonage, backflow	
TOILET AND HANDWASHING FACILITIES	
31. Number, convenient, accessible, designed, installed	
32. Toilet rooms enclosed, self-closing doors, fixtures, good repair, clean, hand cleanser, sanitary towels/hand-drying devices provided, proper waste receptacles	
GARBAGE AND REFUSE DISPOSAL	
33. Containers or receptacles, covered, adequate number, insect/rodent proof, frequency, clean	
34. Outside storage area enclosures properly constructed, clean, controlled incineration	
INSECT, RODENT, ANIMAL CONTROL	
35. Presence of insects/rodents—outer openings protected, no birds, turtles, other animals	
FLOORS, WALLS AND CEILINGS	
36. Floors, constructed, drained, clean, good repair, covering installation, dustless cleaning methods	
37. Walls, ceiling, attached equipment, constructed, good repair, clean, surfaces, dustless cleaning methods	
LIGHTING	
38. Lighting provided as required, fixtures shielded	
VENTILATION	
39. Rooms and equipment—vented as required	
DRESSING ROOMS	
40. Rooms clean, lockers provided, facilities clean, located	
OTHER OPERATIONS	
41. Toxic items properly stored, labeled, used	
42. Premises maintained free of litter, unnecessary articles, cleaning maintenance equipment properly stored. Authorized personnel	
43. Complete separation from living/sleeping quarters, Laundry	
44. Clean, soiled linen properly stored	

0031996

Failure to correct any violations of critical items within (10) days may result in suspension of your food service establishment permit. Imminent health must be corrected immediately or operations must cease. You have the right to request a hearing regarding this report by filing a written request with the Department of Health within ten (10) days of the date of this report. T.C.A. Sections 68-14-318 and 4-5-320.

REMARKS

Signature of _____ By _____ Environmentalist
Person in Charge _____
Date of Signature _____ Time of Day _____ a.m. Dist. List
p.m. 1st—Local File

APPENDIX B

Monitoring Foodservice Operations

Immediate	7 – 14 Days	By Next Inspection	To Standard	
<u>Receiving:</u>				
☐	☐	☐	☐	1. Temperatures of perishable items taken upon arrival, recorded, kept, and filed for specified time frame
☐	☐	☐	☐	2. Source sound condition, no spoilage
☐	☐	☐	☐	3. Original container, properly labeled
<u>Storage:</u>				
☐	☐	☐	☐	4. Temperature of storage facilities appropriate: walk-in, freezer, coolers, dry
☐	☐	☐	☐	5. Items covered, labeled, and dated during storage
☐	☐	☐	☐	6. Potentially hazardous foods stored at appropriate temperatures and levels within refrigerators, and freezers. Foods with highest internal temperature requirements stored on lowest shelves.
☐	☐	☐	☐	7. Dry storage items stored off ground at specific height standard
☐	☐	☐	☐	8. Temperature record sheets present in work area, temperatures recorded, maintained, and filed for specified time frame
<u>Thawing:</u>				
☐	☐	☐	☐	9. Potentially hazardous food properly thawed within time limits specific for technique used
☐	☐	☐	☐	10. Food covered, protected during thawing
<u>Preparation:</u>				
☐	☐	☐	☐	11. Food contact surfaces and utensils cleaned, sanitized between use (to include cutting boards)
☐	☐	☐	☐	12. Single service articles, clean, stored in clean container between uses (includes items such as spatulas, tongs, ladles, scoops, knives, etc.)
☐	☐	☐	☐	13. Equipment in preparation area intact, clean, sanitized
☐	☐	☐	☐	14. Wiping cloths clean, use restricted, stored in water and sanitizing solution mixture
☐	☐	☐	☐	15. Hands washed, clean, gloves clean and intact
☐	☐	☐	☐	16. Personnel wearing effective hair restraints, proper uniform/ aprons, well-kept, clean, and appropriate for handling food
☐	☐	☐	☐	17. Personnel with infections restricted

- | Immediate | 7 - 14 Days | By Next
Inspection | To Standard | |
|--------------------------|--------------------------|--------------------------|--------------------------|--|
| ☐ | ☐ | ☐ | ☐ | 18. Foods cooked to reach appropriate internal temperatures (for minimal number of seconds or minutes) necessary for the specific food product, temperatures recorded, maintained, and filed for specified time frame |
| | | | | <u>Holding:</u> |
| ☐ | ☐ | ☐ | ☐ | 19. Foods held at appropriate temperatures: cold foods at or below 41°F, hot foods held above 140°F |
| ☐ | ☐ | ☐ | ☐ | 20. Foods held in proper containers, covered, for appropriate amount of time, or are discarded and not re-served |
| ☐ | ☐ | ☐ | ☐ | 21. Thermometers provided and temperatures recorded every two hours during holding or displaying |
| | | | | <u>Service:</u> |
| ☐ | ☐ | ☐ | ☐ | 22. Wiping cloths available, clean, use restricted, stored between use in water and sanitizing solution mixture |
| ☐ | ☐ | ☐ | ☐ | 23. Equipment/ utensils in service area intact, clean, sanitized |
| ☐ | ☐ | ☐ | ☐ | 24. Personnel following specific service hygiene standards: hands/ gloves clean, uniforms/ aprons clean |
| | | | | <u>Cooling Foods:</u> |
| ☐ | ☐ | ☐ | ☐ | 25. Foods cooling in refrigerators, freezers, blast chillers properly protected and covered |
| ☐ | ☐ | ☐ | ☐ | 26. Food temperatures reach 70°F within 2 hours and 41°F within 4 hours. Temperatures recorded and maintained for specified time period |
| | | | | <u>Reheating Foods:</u> |
| ☐ | ☐ | ☐ | ☐ | 27. Foods to be reheated properly covered, containers and/ or packaging intact, no evident spoilage |
| ☐ | ☐ | ☐ | ☐ | 28. Potentially hazardous food items re-heated to appropriate internal temperature of 165°F and recorded |
| ☐ | ☐ | ☐ | ☐ | 29. Leftover foods reheated are served in separate container from new product to be served; leftovers are never added to a new product |
| | | | | <u>Washing/ Sanitizing Dishware and Articles:</u> |
| ☐ | ☐ | ☐ | ☐ | 30. Dishware/ silverware washed, rinsed, sanitized properly for specified amount of time |
| ☐ | ☐ | ☐ | ☐ | 31. 3-compartment sink filled with water (when in use) at appropriate temperatures and sanitizing solution at appropriate measures with chemstrips available for testing, or thermometer gauge provided if heat sanitizing |
| ☐ | ☐ | ☐ | ☐ | 32. Dishwashing facilities maintained and operated |
| ☐ | ☐ | ☐ | ☐ | 33. Clean, soiled linen properly stored |

Immediate	7 - 14 Days	By Next	Inspection	To Standard
-----------	-------------	---------	------------	-------------

Other Potential Hazards:

Critical Items:

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--|
| ☐ | ☐ | ☐ | ☐ | 34. Water source safe, hot and cold under pressure |
| ☐ | ☐ | ☐ | ☐ | 35. Sewage and waste water disposal |
| ☐ | ☐ | ☐ | ☐ | 36. Cross connection, back siphonage, backflow |
| ☐ | ☐ | ☐ | ☐ | 37. Toilet rooms accessible, convenient, installed; enclosed, clean, good repair, hand cleanser, sanitary towels, hand drying devices provided, proper waste receptacles |
| ☐ | ☐ | ☐ | ☐ | 38. Insects/rodents- outer openings protected, no birds, turtles, other animals |
| ☐ | ☐ | ☐ | ☐ | 39. Toxic items properly stored, labeled, used |
| ☐ | ☐ | ☐ | ☐ | 40. Thermometers read accurately and calibrated |

Non-critical Items:

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|---|
| ☐ | ☐ | ☐ | ☐ | 41. Garbage and refuse containers covered, adequate number, insect/rodent proof, clean |
| ☐ | ☐ | ☐ | ☐ | 42. Rooms and equipment, vented as required |
| ☐ | ☐ | ☐ | ☐ | 43. Floors constructed, drained, clean, good repair, covering, installation, dustless cleaning methods |
| ☐ | ☐ | ☐ | ☐ | 44. Lighting provided as required, fixtures shielded |
| ☐ | ☐ | ☐ | ☐ | 45. Premises maintained free of litter, unnecessary articles, cleaning maintenance equipment properly stored. Authorized personnel. |

APPENDIX C

Explanation of Items on the Revised Inspection Form

Receiving:

1) *Temperatures of perishable items taken upon arrival, recorded, kept, and filed for specified time frame:*

- Cold foods under refrigerator temperature must arrive below 41°F upon arrival or not accepted
- Frozen foods must be delivered at temperature of no more than 0°F, or they should not be accepted.
- Temperature records are to be maintained for each delivery, and filed for two weeks.

2) *Source sound condition, no spoilage:*

- Food must be contained in original containers when delivered, free of dents, tears, punctures, holes in containers, no evidence of food spoilage or exposure to air, based on odor, sight, touch. Food package must be labeled clearly.

Storage:

4) *Temperature of storage facilities must be:*

- Walk-ins / Refrigerators / Coolers: 41°F or below
- Freezers: 0°F or below
- Dry storage: cool, dry area, room temperature of no more than 70°F

6) *Potentially hazardous foods stored at above mentioned temperature limits, and at appropriate levels within the refrigerator or freezer:*

- Foods should be stored from top to bottom in following order:
 - Cooked and ready-to-eat foods (top shelf)
 - Raw fish, and raw beef roasts
 - Raw pork, ham, bacon, or sausage
 - Raw ground beef and ground pork
 - Raw chicken (bottom shelf)

8) Temperature record sheets provided in work area, temperatures of walk-ins, refrigerators, coolers, dry storage areas assessed at least 2 times per day, and filed for 2 weeks.

Thawing:

9) *Potentially hazardous food properly thawed* within the time limits specific for technique used

- **Slacking Process:** store frozen foods under refrigeration temperatures (41°F or below), with foods on the lowest shelves to prevent the possibility of dripping on to other foods.
- **Under Running Water:** *This method is NOT to be used when thawing large cuts of meat or turkeys.* Water temperature must be less than 70°F. Place food in large, clean, sanitized sink used ONLY for food preparation. Run an even stream of water over the food until the food is thawed for no longer than 2 hours. The food must then be cooked immediately.
- **Microwave:** Food can be thawed in the microwave only if food is to be cooked immediately in the microwave itself, or by other foodservice equipment.
- **Cooking:** Cook foods from the frozen state through until they reach their specific minimal safe internal cooking temperatures.

Preparation:

11) *Food contact surfaces and utensils cleaned, sanitized between use:*

- Counter tops / work tables, range tops, cutting boards, knives, utensils must be cleaned and sanitized between use.
- Must be washed in detergent and water solution
- Sanitized by heat (water temperature > 170°F), or chemical sanitizer and water mixture:
 - Chlorine: 50 ppm
 - Iodine: 12.5 ppm
 - Quaternary ammonia: According to manufacturer's instructions

12) *Single service articles placed in clean and dry storage, held in containers with handles up, stored properly between uses:*

- To include items such as ladles, scoops, knives, tongs, spatulas, etc.

14) Equipment in preparation area intact, clean, and sanitized

- Foodservice equipment (ovens, steamers, fryers, griddles) functioning to properly cook foods to specific internal temperatures
- Inside/Outside walls, doors of equipment wiped clean and sanitized between uses

16) *Hands washed, clean, gloves clean, and intact:*

- Hands should be washed:
 - Before starting work
 - Before putting on gloves

- Between working with different foods
 - Between working with raw foods and cooked foods
 - When going from a nonfood preparation task to a food preparation task
 - When changing gloves
 - After using the restroom
 - After touching mouth, nose, face, hair/head, other body parts
 - After drinking, eating, smoking or chewing tobacco
 - After clearing dishes from table, scraping, washing dirty dishes and utensils
 - After taking out the garbage
 - After touching anything that might contaminate hands
- Gloves should be worn / changed when:
 - Employee has a cut, bandage on hands and forearms
 - They become soiled or torn
 - Before beginning a different task
 - At least every two hours, or more often, if necessary, during continual use
 - Proper hand-washing technique includes:
 - Scroll down on paper towel dispenser prior to turning on the faucet.
 - Turn water on and set temperature to warm.
 - Rinse hands thoroughly, and lather with soap for 20 – 30 seconds, scrubbing nails.
 - Rinse hands again until all soap is washed off.
 - Pull off piece of paper towel and dry hands. Use the paper towel to turn the faucet off.
 - If hand sanitizer is available, sanitize hands by rubbing hand sanitizer into the skin without washing it off, or wiping it off with a paper towel

17) *Personnel wearing effective hair restraints, proper uniform/ aprons, well-kept, clean, appropriate for handling food:*

- Effective hair restraints include hats with long hair tied up and back, hairnets covering all hair.
- Clean uniforms with very minimal soiling/ spillage from food

18) *Personnel with infections restricted:*

- Employees should stay at home if suffering from:
 - Diarrhea
 - Fever
 - Vomiting
 - Jaundice
 - Sore Throat with fever
 - Uncontrollable excessive coughing or sneezing
- Employees *must* stay at home if diagnosed with:

- *Salmonella typhi*
- *Shigella*
- *Escherichia coli* O157:H7
- Hepatitis A

19) Foods cooked to reach appropriate internal temperatures (for minimal number of seconds or minutes) necessary for the specific food product, temperatures recorded, maintained, and filed for 1 week.

- Beef Roasts:
 - 145°F for 3 minutes
 - 140°F for 12 minutes
 - 130°F for 121 minutes
- Beef (cubes, slices, etc.), fish, seafood, veal, lamb, mutton, shell eggs for immediate service for a customer's order:
 - 145°F for at least 15 seconds
- Pork and ground meats (both beef and pork)
 - 155°F for at least 15 seconds
- Poultry, stuffed meats, stuffed pastas, stuffing:
 - 165°F for at least 15 seconds

Holding:

20) Foods held at appropriate temperatures: cold foods at or below 41°F, hot foods held above 140°F

- Ice used to surround chilled foods should drain away from food containers
- Product should be stirred periodically to evenly heat or cool all foods to maintain appropriate temperature
- Holding equipment should never be used to "re-heat" a product

21) Foods held in proper containers, covered, for appropriate amount of time, or are discarded and not re-served

- Foods should be covered at all times during holding
- Newly prepared foods should never be mixed in with previously served or raw food products

22) Thermometers provided and temperatures recorded every two hours during holding or displaying

- Temperature record should be present in the holding area, and properly maintained during all hours of holding.

Service:

23) *Wiping cloths clean, available, use restricted, stored between use in water and sanitizing solution mixture:*

- Clean cloths must be provided to wipe down food prep areas and food contact surfaces in the service area.
- Use of the cloths must be restricted to each specific area (i.e. cloths used in service area are not to be used to wipe cooking areas in the kitchen).
- Cloths should be stored between use in each area in containers with the water and sanitizing solution mixture (according to specifications).

24) Personnel following service specific hygiene standards: hands/gloves clean, uniforms/aprons clean

- Hands, gloves must be washed / changed between tasks.
- Uniform / aprons with minimal soil / spillage from food

Cooling:

27) According to the 1996 Food Code:

- Foods must be cooled from >140°F to 70°F within 2 hours.
- From 70°F to 40°F within 4 additional hours
- Total cooling time must not exceed 6 hours

Recommendations:

- When cooling hot foods, cut large food pieces and items into smaller pieces.
- Place large batches of food into a few smaller, shallower pans to allow even cooling.
- Place smaller batches into pre-chilled stainless steel pans to expedite cooling.

Cooling Methods:

- Place pans of food in larger pans of ice water, continue to stir the food.
- Cool foods in blast chillers, cold-jacketed kettles
- Thick liquid foods like chili and stews should be no more than 1-2 inches deep. Thinner foods such as broth and soup should be no more than 3 inches deep.
- Place pans, covered, on upper shelves of cooler / refrigerators so that air can circulate around them.

Reheating:

29) Reheat all foods to temperature of 165°F or higher, for at least 15 seconds, within 2 hours.

- Foods heated in microwave must be reheated to the specific minimum internal temperature of that particular food, and food must stand, covered, for 2 minutes to let the heat spread evenly throughout the product. Temperatures of reheated foods must be recorded and kept for 1 week.

Washing / Sanitizing Dishware and Articles:

31) *Dishware / silverware washed, rinsed, sanitized properly for specified amount of time:*

- Wash water: 120°F - 140°F
- Rinse water: 120°F - 140°F
- Sanitizing water: 50 ppm Chlorine, 12.5 ppm Iodine, Quaternary ammonia: according to manufacturer's instructions. NOTE: water containing sanitizer should not be extremely hot—sanitizers will break down and lose effectiveness if water temperatures are too hot.
- If establishment heat sanitizes: booster heater must heat water to a temperature > 170°F to effectively sanitize dishware.

34) *Clean/soiled linens properly stored:*

- Clean linens stored in sanitary area
- Soiled linens stored separately in bin or designated area recognizable by all employees.

Other Potential Hazards: Critical Items

35) *Water source safe, hot and cold under pressure:*

According to 1200-23-1-.03, TN Department of Health Handbook: Potable water from reliable water source constructed, operated according to law, in sufficient supply.

36) *Sewage and waste water disposal:*

According to Rule 1200-23-1-.03 (b), TN Department of Health Handbook:

States that, "All sewage, including liquid waste, shall be disposed of by a public sewage system or by a sewage disposal system constructed and operated according to law."

37) *Cross-connection, back siphonage, backflow*

1200-23-1-.03, (a), #5:

- Plumbing installed according to law
- No cross-connections between any safe water supply and unsafe or questionable water supply so that the supply in the facility water could become contaminated

- Potable water system installed to prevent possibility of backflow. Devices to prevent backflow installed at all fixtures and equipment where backflow may occur.
- Hose is not to be attached to a faucet unless a backflow prevention device is installed

38) *Toilet rooms accessible, convenient, installed, enclosed, clean, good repair, hand cleanser, sanitary towels, hand drying devices provided, proper waste receptacles*

- 1200-23-1-.03, (5) (b & c):
- Bathroom facilities should be convenient and accessible to employees at all times, should include hand sinks adjacent to toilets or vestibules.
- Should be provided with hot and cold water tempered by means of a mixing valve or combination faucet.
- Bathroom supplies: hand cleanser, sanitary towels, and / or hand-dryers should be located adjacent to hand sink.

39) *Insects / rodents- outer openings protected, no birds, turtles, other animals*

- Effective pest control measures must be installed
- 1200-23-1-.03, (c): "Openings to outside shall be effectively protected against entrance of rodents and shall be protected against insects by tight fitting doors and windows."

40) *Toxic items properly stored, labeled, used*

- 1200-23-1-.03, (2): "Only to be used to maintain sanitary conditions for sanitization purposes."
- Containers of poisonous or toxic materials should be clearly labelled and stored away from any food items whatsoever.

41) *Thermometers read accurately and calibrated*

- Thermometers must be calibrated daily to ensure function and effectiveness

References:

National Restaurant Association. 1993. *HACCP reference book*. The Educational Foundation of the National Restaurant Association. Chicago, IL.

National Restaurant Association. 1998. *ServSafe training's: a practical approach to HACCP, instructor's guide*. The Educational Foundation of the National Restaurant Association. Chicago IL.

Tennessee Department of Health. 1996. *Foodservice establishment, hotel, public swimming pool law and regulations*. Division of General Environmental Health. Knox County Health Department.

APPENDIX D

Allison M. Jennings
1215 Cumberland Ave.
Knoxville, TN 37996

January 19, 1999

Health Inspector
2000 Nashville Dr.
Nashville, TN 30000

Dear Mr. :

My name is Allison Jennings, and I am a graduate student in the Hotel and Restaurant Administration program at UT, Knoxville. I understand that you have recently completed the Servsafe course taught by Dr. Carol Costello and Dr. Bill Morris this past fall. Since receiving this training, I am certain you understand and appreciate even more thoroughly now the importance of food sanitation in restaurants. Therefore, I am contacting you in hopes that you can aid me in my research, which may potentially benefit Health Inspectors and the safety of the foodservice industry in the long run.

I am currently conducting a research project for my Master's thesis, which involves revising and updating the current Health Inspection form for restaurants. Included is a copy of the form I have completed. My major professor, Dr. Carol Costello and I have already tested the form in a few local restaurants, and found it to be easier to use, and to evaluate food production more thoroughly than the current form. However, since we are not well-trained inspectors, we would value your input tremendously. I am hoping that you would be willing to take a careful look at the form, take it on inspections with you to see if it could be useful, and evaluate the form based on the criteria highlighted on the enclosed survey. I have included a self-addressed stamped envelope in order for you to send the survey form back to me personally. Any opinions suggestions, and help you could offer would be a great contribution to my research, and would add the perspective of professionals trained specifically in this area. Thank you for your time.

Sincerely,

Allison M. Jennings

APPENDIX E

Allison M. Jennings
1215 Cumberland Ave.
230 Jesse Harris Building
Knoxville, TN 37996-1900

March 3, 1999

Dear :

My name is Allison Jennings, and I am a graduate student in the Hotel and Restaurant Administration program at UT, Knoxville. If you recall, I contacted you in January concerning the research I am conducting for my Master's thesis involving the revision of the Health Inspection form currently used in Tennessee. At the time, I included a copy of the form, as well as a survey asking your opinion about the feasibility of the form to evaluate critical areas of restaurant sanitation.

Though I understand involvement in this project may consume a fraction of your time, I consider input from experts in the field an invaluable part of my research. Therefore, I am asking you to please consider the form and survey one more time, and offer any opinions or input you may have on further modifications. Your suggestions would be greatly appreciated. Thank you for your time.

Sincerely,

Allison M. Jennings

APPENDIX F

For the purpose of this research, please provide your thoughts and evaluation of the proposed revision of the Foodservice Establishment Health Inspection Form by answering the following questions.

1. Please rate the readability of the form:

1	2	3	4	5
difficult to read		somewhat easy to read		easy to read

2. Please rate the form's ease of use:

1	2	3	4	5
not easy		moderately easy		very easy to use

3. Do you find this form easier to use than the current form?

Yes No

4. How well do you think the form evaluates a foodservice operation for cleanliness and critical areas?

1	2	3	4	5
not well		moderately well		very well

5. How feasible do you feel that a form such as this would be for foodservice establishment inspections?

1	2	3	4	5
not feasible		feasible		very feasible

6. What is the estimated length of time it would take you to inspect using this form?

7. Do you think this form could be applicable for inspecting all types of foodservice establishments?

Yes No

Please explain: _____

8. In your opinion, does this form better assess sanitation than the current inspection form? Why or why not?

* Please add any additional suggestions you may have in the space below, on the back of this questionnaire, or on an additional sheet of paper. Thank you for your time and input.

VITA

Allison Marie Jennings was born December 15, 1974 in Tacoma, Washington. She spent the first years of her life living in San Antonio, Texas, San Francisco, California, and Stuttgart, Germany, before finally returned to San Antonio.

In 1992, upon graduation from high school, Allison received a 4-year Army ROTC Scholarship to attend the University of California at Davis. During her undergraduate career, she not only obtained a Bachelor of Science degree in Dietetics in 1996, she also graduated from the U.S. Army Airborne School in 1993.

In addition to her schoolwork, Allison held internships with several hospital and university foodservice departments, worked two months at a California winery, and spent one year working as a line cook at a local vegetarian restaurant in Davis. These experiences, along with her heavy course load in food science and nutrition, first sparked her interest in the principles and mechanics of food safety.

Allison arrived at the University of Tennessee, Knoxville in the fall of 1996 to pursue a Masters degree in Foodservice and Lodging Administration, combined with an eight-month Dietetic Internship (from January to August 1998) in preparation to become a Registered Dietitian. Throughout her graduate programs, she has worked as a Graduate Teaching Assistant for several Food Principles and Advanced Food Production classes, instructing undergraduate students in food safety, preparation, and culinary techniques.

In 1999, Allison received the Chancellor's citation award for Graduate Teaching, and was nominated for the Outstanding Dietetic Student Award by the Knoxville District Dietetics Association.

Currently, Allison is pursuing a career path that will allow her to combine her diverse experience in foodservice, nutrition, and food safety.