The Development of a Fire Code Awareness Presentation for the Chelmsford High School

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that were the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: Gary Ryan

Abstract

The establishment of a fire code awareness presentation for the Chelmsford High School has become an increasingly important issue within the past year. Until recently, the only fire education programs that were delivered to the Chelmsford School system centered on the popular Student Awareness of Fire Education (S.A.F.E.) that puts trained firefighter educators in the classroom. The S.A.F.E curriculum was delivered primarily to the early elementary grades, K through 3.

The problem that prompted this research project was the author was asked by Chelmsford High School educators and students to present a fire and life safety code presentation to the student council. The Chelmsford Fire Department does not have a structured fire code awareness presentation that is geared to the high school level. The purpose of this research project was to identify current fire codes and how to effectively deliver the message in an age appropriate format. In addition, this research will allow the author to identify how the current codes originated and the importance of their continuing enforcement. The methodology applied in conducting this research was the action method. Action research was utilized to answer the following research questions: (a) What historical events have impacted today's fire codes? (b) What codes and regulations apply to school code enforcement? (c) What fire and life safety issues impact our schools? (d) What components are required in developing an effective educational presentation?

Information was gathered through contacting the Fire Education coordinator at the Massachusetts Department of Fire Services, as well as conversations with additional fire educators. A Fire Code presentation was developed based on the research collected and a list of applicable school enforcement regulations were identified. By developing a fire code

presentation for the high school level, it offers an opportunity to expand our audience and to gain greater insight into the origins and importance of our current fire codes.

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Introduction

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Background and Significance

Chelmsford is a suburban town in Middlesex County, Massachusetts and is located 24 miles north of Boston. As of the 2010 United States Census, the town's population is 33,802 (United States Census 2010, 2010), ranking it 14th in population among the 54 municipalities in Middlesex County ("Chelmsford Massachusetts," 2011). The city of Lowell, a historic mill city,

borders the town on the northeast with a population of 106,519 making it the fourth largest city in the state. The Chelmsford Fire Department shares a long standing mutual aid agreement with Lowell, which has seen increased activity in recent years. Chelmsford is bordered by two sizable rivers: the Merrimack River to the north, and the Concord River to the east ("Chelmsford Massachusetts," 2011).

The Chelmsford Fire Department is a fully paid, career department consisting of 53 uniformed employees that currently operate out of five stations. The department recently re-opened a substation that was closed in July 2008 and is actively pursuing plans to construct a new central headquarters. The administration consists of a Fire Chief, Deputy Chief of Operations, Deputy Chief of Fire Prevention, four Unit Captains, one Fire Prevention Captain, a Training Captain, and a full time administrative clerk in the Chief's Office.

Firefighters work a 42 hour per week schedule and are divided into four units. Units work a 24 hour shift, with two days off, followed by a 24 hour shift and then four days off. In 2011, the Chelmsford Fire Department responded to approximately 5,000 emergency calls ("Pro-IV Reports," 2011). Chelmsford Fire operates out of five stations, a central headquarters and four substations. The Central headquarters is staffed with a captain and as many as four to as low as two firefighters. The four substations operate with only two firefighters and no officers assigned to those substations.

The Chelmsford Fire Prevention office oversees code enforcement and inspection activities, while working closely with the public schools in this regard. Every year, the Chelmsford High School has a "Spirit Week" that takes place during the week of the school's Thanksgiving football homecoming game against rival Billerica. Spirit Week is an opportunity for the students to enthusiastically express their support for both the school and the football team.

Traditionally every class, freshman to senior, are given a designated area within the school to design and produce an exhibit that best demonstrates their school spirit. Each class competes against the other while producing some creative, artistic displays. The issue, however, is the displays can be elaborate and sometimes not comply with the Fire Prevention codes. In the past, the Fire Prevention office has addressed this issue by consulting with both the faculty and custodians about what materials are acceptable and the importance of self inspections. The process that was put in place utilized the custodial staff and faculty to oversee that code compliance was taking place. Within the past year, there has been a turnover in faculty who oversee the student council activities and the school committee has voted to outsource the custodial services to a private vendor. With these recent changes, the current faculty advisors and student council leaders have approached the Fire Prevention Office about developing a presentation about the fire codes and their importance. A suggestion was made to incorporate the origins of the fire codes.

This research project is significant to the Chelmsford Fire Department because it will allow the department an opportunity to expand its educational offering to the high school level and bring about an awareness of the current fire codes and its origins. This paper is relevant to the Executive Fire Officer Program's Executive Analysis of Community Risk Reduction in the following ways: (a) America Burning's recommendation that fire departments should be encouraged to spend more time in reaching out to students and other venues (National Commission on Fire Prevention and Control, 1973, p. 10). (b) America Burning's focus on delivering an effective educational message that connects with the target audience. (c) Solutions 2000 report that states public fire education is arguably the most productive aspect of fire protection and that few current resources are devoted to this effort ("Advocating Shared

Responsibilities for Improved Fire Protection," 2000, p. 16). In addition, this research project relates to the United States Fire Administration operational goal number 5 of leading the nations' fire and emergency services by establishing and sustaining USFA as a dynamic organization (United States Fire Administration, 2010, p. 44).

Literature Review

To understand the origins and importance of today's fire and life safety codes, one must reflect on some of the most catastrophic fires in history. Many of the advancements and gains made to current fire codes have come as a result of some of the most devastating losses. With each tragic fire and loss of life, investigations were conducted, recommendations were made, and new fire and life safety codes were enacted.

Early attempts at fire code enforcement can be traced back to colonial times. Fires were common in many of the American colonies and many cities suffered as a result. One of the original fire prevention and code enforcement efforts began in Boston after a serious fire struck in 1630 (Arnold, 2005, p. 4). The Boston selectmen ordered that, "noe man shall build his chimney with wood, nor cover his house with thatch." ("History of Fire Fighting," 2008) In 1648, New Amsterdam Governor (New York City) Peter Stuyvesant was among the first officials to appoint fire inspectors with code enforcement authority and the ability to impose fines for fire code violations. Residents were required to purchase fire buckets and to keep them in good repair. The New York code required a certain number of buckets per home or business based on the risk of fire ("History of Fire Fighting," 2008). When a fire occurred, an alarm would be sounded; neighbors would throw out their buckets to form a fire brigade. It was in the city of Boston that America's first publicly funded paid fire department was established in 1679. In 1736, Benjamin Franklin established the colonies first fire insurance company in Philadelphia

known as the Union Volunteer Fire Company. In his constant attempts to bring about greater awareness to the dangers of fire and how to prevent them, Benjamin Franklin's writing as an "old citizen" issued the following to The Pennsylvania Gazette on February 4, 1735:

> In the first place, as an ounce of prevention is worth a pound of cure, I would advise 'em to take care how they suffer living coals in a full shovel, to be carried out of one room into another, or up or down stairs, unless in a warming pan shut; for scrapes of fire may fall into chinks and make no appearance until midnight; when your stairs being flames, you may be forced, (as I once was) to leap out of your windows, and hazard your necks to avoid being oven-roasted. ("History of Fire Fighting," 2008)

Iroquois Theatre Fire

Chicago has experienced its share of devastating fires. On Sunday October 8, 1871 the Great Chicago Fire reportedly started behind the O'Leary barn and burned for two days killing hundreds of people and destroying over three square miles in the heart of the city. This fire was one of the largest disasters in the nation's history and led to the development of improved building and fire codes ("The Great Chicago Fire," 1999).

Just over thirty years after The Great Chicago Fire, tragedy would strike Chicago once again with another epic fire catastrophe. On December 30, 1903, an estimated 2,000 theatre goers crowded into the new Iroquois Theater to see actor Eddie Foy in *My Blue Beard*. Although advertised in the playbill as "absolutely fireproof", a Chicago Fire Captain had earlier noted several safety violations during his inspection prior to the opening. The Captain noted a lack of extinguishers, sprinklers, alarms, or water connections. The only available fire protection of note

was a dry chemical canister known as “Kilfyre”. Despite his objections, the theatre was allowed to open for the holidays. The over capacity crowd left many standing or seated in the aisles, blocking the exits. At approximately 3:15 p.m., in the middle of the second act, a footlight shorted and ignited a stage curtain. The flames quickly consumed the curtain as stage hands attempted to extinguish the blaze with only two canisters of Kilfyre. The inexperienced theatre employees had difficulty lowering the asbestos stage curtain in an effort to contain the fire. The curtain became stuck partway down. An adjacent stage door that was opened brought in strong winter winds that helped fan the flames. As the smoke and flames intensified, actor Eddie Foy pleaded to the crowd to stay calm and appealed to the orchestra to, “play, play, play anything, but for god’s sake don’t stop-play on!” ("Iroquois Theatre Fire," 2011, p. 1). The music played on as the flames roared overhead and patrons fled for the exits. Confusion led to panic as many patrons had difficulty finding exits that weren’t illuminated or hidden behind draperies. Others located exits only to find them locked in an effort to prevent trespassing into the show. Many patrons who were able to find an exit door were impeded in their efforts to evacuate by doors that opened inward, a critical element that led to many deaths as people were crushed and trampled. Those who fled out of upper theater windows were horrified to find many of the fire escapes weren’t completed, a tragic circumstance that led many to jump or fall to their deaths. Arriving firefighters had difficulty accessing the fire as they encountered piles of bodies at the exits and walkways. When the fire was placed under control, the death toll mounted over 600, making the Iroquois the worst theatre fire in our history ("Iroquois Theatre Fire," 2011, p. 1).

After the fire, several lawsuits were filed regarding the theatre’s disregard for public safety. Several factors were cited as causation for the deadliest building fire in history: overcrowded conditions, unmarked and blocked exits, inward-opening doors, locked exits,

combustible furnishings, incomplete fire escapes, no automatic sprinkler system, lack of extinguishers, and failure to lower the asbestos fire curtain. Based on lessons learned from the tragedy, the city of Chicago along with the rest of the nation was forced to revisit and make changes to the fire codes. Life safety and fire code changes required outward-opening doors in public buildings, properly marked, unobstructed exits, illuminated exit signs, restrictions to combustible scenery, requirement that the asbestos fire curtain be raised before a show and lowered afterward to provide a measure of protection between the audience and the stage. Furthermore, the codes called for tougher enforcement of the occupancy limits. To improve evacuation egress, a limit was placed on the number of seats between theater aisles. The ensuing investigation also led to the development of the "crash bar", now known as a panic bar on doors ease evacuation (Sauberman, 2009).

Collinwood, Ohio School Fire

On Wednesday, March 4, 1908, five years after the Iroquois Theatre fire, the Collinwood School would experience its own tragedy. The school, also known as the Lake View School, was occupied by 366 students when an overheated steam pipe ignited the wood floor joists located under the main staircase. The fire spread rapidly across the oiled wooden floors and up the unprotected stairwell endangering hundreds of students. As the flames and toxic fumes stretched throughout the school, frantic students encountered egress obstacles within the main stairwell. The doors leading to the stairwell were difficult to open and the narrow width of the staircase opening contributed to the crushing deaths of many students. As the volunteer fire department arrived on scene, several students leaped from the second and third floors to their deaths in front of horrified parents and community members. The deadly fire would claim 175 lives, of which 172 were students ("Lessons from the Collinwood School Fire," 2008).

Shortly after the tragedy, parents demanded answers and safety reforms. A nationwide movement to extend building and fire safety codes to schools led to fire safe stairwells and the requirement of panic bars for egress doors. Improved fire prevention codes required additional school safety inspections with mandatory evacuation drills witnessed by fire department personnel. Within two years of the fire, the town of Collinwood itself would fall victim to the tragedy due to its inability to guarantee fire safety resources. This led the residents to approve of the towns' annexation into neighboring Cleveland ("Lessons from the Collinwood School Fire," 2008).

Triangle Shirtwaist Factory Fire

On December 28, 1910, New York City Fire Chief Edward Croker testified before the New York State Assembly about the poor working conditions and lack of safety for many of the workers employed in Manhattan factories. "You will find it very interesting," he told the committee, "to see the number of people in one of these buildings with absolutely no fire protection, without any means of escape in case of fire" (Cassano, 2011, p. 19). Unfortunately, Chief Croker's warnings were disregarded but his words would prove prophetic. A devastating fire would strike lower Manhattan three months later that would have a profound impact on current life safety codes.

The Triangle Shirtwaist Factory occupied the top three floors of the ten story Asch building with more than 500 employees laboring in sweatshop conditions. The garment factory contained a large fire load as scraps of combustible fabric laid scattered on the floors and hung throughout the factory. On March 25, 1911 as factory workers were finishing up their shift, a fire broke out in a rag bin on the eighth floor. Attempts to extinguish the fire quickly proved unsuccessful as the fire rapidly consumed the combustible interior and the standpipe hose lines

failed. As the fire spread upwards to the ninth and tenth floors, terrified workers encountered locked exits or doors that opened inward, causing a massive piling of bodies. Many, who fled onto the narrow fire escapes, quickly overloaded it causing it to collapse. One of the freight elevators was inoperable and the other soon failed. When the fire department approached the scene, the ladders they raised only reached the sixth floor. They tried utilizing a life net in their attempt to save many of the jumpers but the nets failed. The fire was placed under control within twenty minutes but not before 146 workers, many of them women and girls, had perished in the worst factory fire in United States history (Gerber, 2011).

In the aftermath, the Factory Investigating Commission was formed, which was the first of its kind in the United States. Their task was to identify the factors that led to the loss of life at the Triangle Shirtwaist factory as well as the workplace conditions within manufacturing establishments. Public outrage over the tragedy and the formation of the Factory Investigating Commission led to new life safety reforms and significant worker protection laws (Gerber, 2011). Frances Perkins, a young social worker who witnessed the tragedy, testified before the commission in an effort to enhance workplace safety. Frances Perkins would often draw upon her experience at the Triangle fire while serving as the first female Cabinet secretary as President Roosevelt's Secretary of Labor. New York City Fire Chief Edward Croker, who worked with the Commission, was a driving force in creating new life safety regulations that led to improved fire and building codes. Improved exiting from high rises resulted from the Commission's investigation finding that the Asch building had only two staircases, not the three required under the building code. Further reforms advocated by Chief Croker created provisions for increased fire drills, fire resistant stairways, specifications for fire escapes, and a push to require sprinkler protection within high rises. Efforts to improve upon the existing fire and life safety codes led to

the development of NFPA 101, The Life Safety Code. Chief Croker, who advocated for increased enforcement of the fire codes and a proactive approach to preventing fires, created the first New York City Bureau of Fire Protection. Chief Croker's vision of fire prevention was a defining moment in fire department history (Gerber, 2011).

Cocoanut Grove Night Club Fire

On November 20, 1942, Boston Fire Prevention Lieutenant Frank Linney inspected the popular night club Cocoanut Grove and reported, "in my opinion, condition of the premises is good" (Dyrud, 2006). Eight days later, his words would come back to haunt him.

The Cocoanut Grove was among Boston's most popular night clubs. It was also the setting for many servicemen, holiday visitors, and football fans who earlier in the day attended a Boston College football game. On November 28, 1942 an estimated crowd of over a thousand patrons crowded into the Cocoanut Grove to celebrate the Thanksgiving holiday and to help ease the pain of Boston College's defeat earlier in the day. The establishment was decorated with combustible furnishings and drapery throughout. These conditions, along with the overcrowding, created a dangerous environment.

The fire started at 10:15 p.m. when a busboy's lit match ignited flammable draperies in the basement. Initial efforts by employees to extinguish the fire proved useless as the fire quickly consumed and raced across the combustible furnishings ("The Cocoanut Grove Fire," 2005). As the fire progressed up the stairway to the main level, panic stricken patrons fled to the main exit, only to find a single revolving door. The rushing crowd soon jammed the door rendering it useless. Other obstacles that were presented included locked/unmarked exit doors, exits that were hidden behind decorations, an inward opening door that was forced shut by the fleeing crowd, a failed lighting system, and an abundance of overturned tables and chairs which hindered egress

(Grant, 2007). Despite the fact the Boston Fire Department was down the street at another incident, by the time they arrived on scene within minutes, the fast moving fire had consumed the night club and killed 492 people and injured 166 patrons.

In the face of public outrage over the deadliest nightclub fire in United States history, several investigations were undertaken that would result in ten people being indicted, including the building commissioner, the owner of the night club, and Lieutenant Frank Linney of the Boston Fire Department. All were later acquitted except for the night club owner, who served four years before being pardoned by the governor.

The ensuing investigations led to several changes in the fire and life safety codes. Fire code changes included the extension of banning flammable decorations to public establishments, changing egress requirements for revolving doors to include additional outward opening doors that can fold flat to permit easier emergency egress. Additional changes included the requirement of a minimum of two egress doors for public assembly areas, a ban on locking egress doors while an assembly is in use and visible exit signs that must remain illuminated during smoke conditions. To address overcrowding issue, occupancy limits were now required to be visibly posted within the establishment. To prevent egress obstacles, tables were required to be secured to the floor and minimum aisle widths between tables were put in place to ease the flow of traffic during evacuation. This fire renewed calls to expand sprinkler protection to night clubs ("The Cocoanut Grove Fire," 2005).

Additional advancements occurred as a result of the Cocoanut Grove fire, as the large scale of victims prompted Boston hospitals to utilize new burn treatments. Coast Guardsman Clifford Johnson, who was inflicted with third degree burns to 55% of his body, survived as a result of the advanced burn treatment he received. The victims of this fire were among the first

to undergo the use of skin grafts and use penicillin to fight infections ("The Cocoanut Grove Fire," 2005). As a result of the traumatic experience suffered by 500 victims, research on post traumatic disorder was conducted in an effort to help them ("Cocoanut Grove Fire," 2009.).

The Hartford Circus Fire

The Ringling Brothers Barnum and Bailey Circus was originally scheduled to perform their opening show in Hartford, Connecticut on July 5, 1944 but a delay in arriving circus equipment forced a cancellation. In circus superstition, missing a show is considered extremely bad luck, an omen that unfortunately would appear the next day ("Hartford Circus Fire," 2006).

On July 6, 1944, Barnum and Bailey's circus equipment would arrive on site and a large "Big Top" tent was erected. The tent measured 425 feet long and 180 feet wide, covering over one and half acres and capable of seating nine thousand spectators. The "Big Top" was waterproofed earlier with a mixture of 6,000 gallons of gasoline and 1,800 pounds of paraffin, an alternative waterproofing method that was used due to fire resistant material being in short supply during the war.

The Flying Wallendas were just beginning their high wire act when the circus band suddenly started to perform "The Stars and Stripes Forever", a universal musical alarm signaling circus employees of an emergency. The fire, originating outside the tent, was able to quickly consume the flammable tent material. Fire equipment was lacking, as extinguishers were still stowed away and the circus's own fire trucks weren't available for the show. As the wind driven flames raced across the canvas, fleeing patrons encountered obstructed exits due to circus equipment and movable seating. The gasoline-soaked tent was consumed by fire within ten minutes, claiming 168 lives, mostly women and children ("Hartford Circus Fire," 2006, p. 1).

In the wake of the disaster, immediate focus centered on the lack of fire protection afforded to the assembly (Cohn & Bollier, 2011). Deficiencies were noted in the lack of necessary firefighting equipment, a lack of coordination among city departments, failure to adhere and enforce building egress code regulations, and failure to extend basic fire code regulations to an assembly of a temporary structure.

How the fire started is subject to debate. Although officially classified as undetermined, many believed the careless disposal of a cigarette may have been the cause. A mentally ill convicted arsonist would eventually confess to starting the fire before recanting his story. While the cause remains in doubt, the impact the fire had on fire and life safety codes is unmistakable. Nationwide, an intense review of fire and life safety codes was undertaken as new regulations were drafted requiring extending fire safety codes to public assemblies such as, circuses, fairs, carnivals, and exhibitions. New national codes impacted the minimum number of exits at an assembly, the fastening of seats, flame proofing of materials, mandated fire equipment and personnel for public events, and emergency lighting systems during power failures (Cohn & Bollier, 2011).

Our Lady of the Angels School Fire

Shortly after the tragic loss of life at the Our Lady of the Angels School fire, historian Suellen Hoy wrote, “In hindsight, the old brick building, with a wood interior and without up-to-date features, such as smoke detectors, sprinklers, an automatic fire alarm, and fire safety doors, was an accident waiting to happen” (Zokal, 2011, p. 130). These issues would be among some of the deadly factors associated with the Our Lady of the Angels School Fire.

Our Lady of the Angels School was one of the largest Roman Catholic schools in Chicago. More than 1400 students attended grades second through eighth in the parish’s main

school building. The 2 ½ story school building was of ordinary construction with a wooden interior and combustible material throughout. The school had twenty-four classrooms featuring combustible ceiling tiles, unprotected stairwells, inadequate fire doors, and a glass transom window above each door, an element that allowed for smoke and fire to spread into the classrooms. The school contained one remote fire escape and a manual fire alarm system that was not connected to the fire department. Although the 1949 Chicago municipal code stipulated the use of noncombustible materials, enclosed stairways, fire resistant doors, and the installation of a sprinkler system in all new school buildings, these requirements were not retroactive (Zokal, 2011, p. 130).

On December 1, 1958 at approximately 2 p.m., a fire originated in a basement trash bin at the main stairwell. The fire reportedly burned unnoticed for twenty minutes, spreading dense smoke and toxic fumes up the unprotected main stairwell, before discovery. Teachers immediately sought out the school's Mother Superior, who reportedly was the only authorized person allowed to initiate the local fire alarm. Due to the delay in locating Mother Superior, the local fire alarm was eventually activated by a teacher and an unexplained delay was made in placing a phone call to the Chicago Fire Department at 2:42 p.m., about forty minutes after the start of the fire. Arriving fire apparatus immediately encountered obstacles as they were initially directed to the wrong location and forced to reposition. Rescue crews had to force entry through locked yard gates to position the ground ladders against the building. Desperate attempts were made to rescue many of the students as children began to leap from the upper levels, many to their deaths. Firefighters worked quickly to remove as many children as they could, often dropping them down into life nets. They were able to rescue more than 150 students before

extinguishing the fire. However, 92 students and three teachers would perish in one of the worst school fires in U.S. history (Zokal, 2011, pp. 132-133).

The National Fire Protection Association (NFPA) immediately conducted an inquiry into the school fire and released its' finding in January 1959. The report was highly critical of local authorities as it blamed the fatalities on inadequate, unprotected exits, combustible building materials, an inadequate fire alarm system, and poor housekeeping practices. Although Chicago Fire Commissioner Robert J. Quinn blamed the delayed fire department notification, the NFPA's report stated the loss of life could have been prevented if the school conformed to the NFPA Building Exits Code. The report stated the deaths were "an indictment of those in authority who have failed to recognize their life safety obligations in housing children in structures which are fire traps." (Babcock & Wilson, 1959)

Within one year of the tragic fire, sweeping changes in school fire safety were enacted nationwide. In Chicago, all schools that were two or more stories that contained wood joist floors were required to add automatic sprinkler systems. An emphasis on school inspections uncovered many safety violations, including eighteen schools in New York that were closed until compliance was met. In 1959, the Los Angeles Fire Department conducted a landmark study of fires in school buildings called Operation School Building which involved a systematic analysis of fire protection methods for open stairwells (Groves, 2008, p. 6). After conducting 150 live fire tests involving the use of different fire protection methods, the report concluded that only the complete installation of sprinkler systems was successful in limiting the deadly spread of combustible products. To address deficiencies in school fire protection systems, the NFPA revised the Building Exit Code (NFPA 101) into the current Life Safety Code (Groves, 2008, p.

6). This resulted in improved fire alarm protection devices for schools and an increase in the number of fire drills and school inspections (Groves, 2008, p. 6).

Beverly Hills Supper Club Fire

On May 28, 1977, an over capacity crowd attended a show featuring entertainer John Davidson at the Beverly Hills Supper Club. The club was noted for its ability to attract star entertainers and had previously undergone many renovations as additions were added and a previous fire required remodeling. The condition of the club would be subjected to intense scrutiny as questionable construction features were present including: highly flammable interior furnishings, inadequate fire exits, faulty wiring, and poor construction practices ("Beverly Hills Supper Club Fire," 2010).

The fire reportedly originated in a wedding reception area known as the Zebra Room. It is believed the fire had been burning for a considerable amount of time before discovery, as patrons had earlier complained of unusually warm room temperatures. Employees who were cleaning up after a wedding party noticed smoke hovering around the ceiling area and informed club managers. Attempts to suppress the fire with extinguishers proved useless as the fire quickly spread to the main show room, the Cabaret Room. As calls were placed to the fire department, an employee strode onto the main stage during a comedy performance and alerted the audience of the emergency. Reports suggested some patrons stayed in their seats believing the warning was part of the comedy routine. The rapid moving fire had arriving firefighters encountering scores of people piled at the exits, fighting to get out. As desperate efforts were undertaken to evacuate and save the patrons, the Cabaret Room was quickly engulfed. The fire would take hours to bring under control and end up claiming 165 people, making it the worst nightclub fire since Cocoanut Grove ("Beverly Hills Supper Club Fire," 2010).

The ensuing investigation into the deadly fire revealed many contributing factors and violations of the fire and building codes. The occupancy load was far exceeded, almost double the load allowed under the building code. Egress routes were blocked, others were unmarked, and some led to the end of corridors rather than the exterior. The required number of exits didn't conform to the building code requirements, which is calculated based on square feet per occupant. According to the NFPA Life Safety Code ("Today in fire history: Beverly Hills Supper Club Fire kills 165," 2012), the club should have contained 27 exits, not the 16 that were present. The investigation revealed a delay in notifying both the fire department and the crowd as prolonged attempts were first made to extinguish the fire. No evacuation plans were in place and the employees weren't trained for an emergency evacuation of the occupants. The combustible interior violated the Life Safety Code for an assembly and was a major contributing factor in the rapid flame spread. The club didn't comply with the Kentucky State Fire Code requiring automatic sprinkler protection and fire alarm devices. This was a major contributing factor in the large loss of life. State fire investigators would later determine that an electrical fire due to faulty aluminum wiring was the cause ("Beverly Hills Supper Club Fire," 2010).

The fire prompted subsequent code changes across the country with requirements for adoption of extended sprinkler coverage for public assembly buildings with occupancy over 300 (Kenning, 2007). Improvements were made in the Uniform Codes for the safety of egresses, safe use of building materials, and the elimination of aluminum wiring. Further scrutiny focused on improving building and fire code inspections and the training of club employees. A new approach to class action lawsuits resulted as manufacturers of faulty materials, such as the aluminum wiring, were now held responsible for their products. The fire also brought forth

improvements to future fire investigations as the Beverly Hills Supper Club was among the first fatal fire scenes preserved for investigation (Kenning, 2007, p. 8).

The Station Nightclub Fire

The club was overcrowded and code violations existed within the facility, factors that would later be cited in the fatal stampede incident at the E2 nightclub in Chicago on February 17, 2003 that killed twenty-one patrons. That deadly incident, along with the tragedy three days later in Rhode Island, would compel increase safety measures and code changes for nightclubs ("Sentences tossed in ’03 Chicago nightclub stampede," 2011).

On February 20, 2003, The Station Nightclub in West Warwick, Rhode Island, was featuring the 80’s band, Great White. A local television crew was covering the performance for their forthcoming feature on nightclub safety following the E2 nightclub incident three days prior. The camera crew was filming the show when the band’s pyrotechnic special effects sparked a fire on soundproofing foam at the back of the stage. Video footage of the performance indicates the patrons were either unaware of the fire or thought it was part of the show. Within twenty seconds, the crowd and band members became aware of the spreading flames and the band stopped playing. As the patrons began to exit, mostly from the main front entrance, the fire alarms activated within approximately forty seconds from the ignition. Within a two minute span, the camera crew captured the rapidly spreading fire and heavy smoke conditions that began to bank down to the floor. Patrons were captured on film piling up at the exits in a desperate attempt to escape. Fire crews from West Warwick and surrounding towns would arrive within minutes, encountering rapidly deteriorating conditions and an all out effort to save those trapped at the exits. Within six minutes of ignition, the nightclub was fully involved and a multiple

casualty incident was declared. The Station Nightclub fire would claim 100 lives and injure 200 making it the deadliest fire since the Beverly Hills Supper Club (Duval, 2006, p. 16).

In the ensuing investigation, indictments were handed down to the nightclub's owners and the manager of the Great White band. Special attention was focused on the pyrotechnics and the sound proofing foam. The investigation revealed combustible urethane packing foam was applied to the backstage area for acoustic purposes instead of more expensive fire retardant foam. The presence of the combustible interior finish, with the lack of automatic fire sprinkler protection, contributed to the rapid fire spread and dense toxic smoke (Madrzykowski, Bryner, & Kerber, 2012).

Three weeks after the fire, the NFPA Technical Committee assembled in Boston to discuss the Station Nightclub fire and the earlier E2 Nightclub incident in Chicago. Rhode Island and other states immediately placed a ban on the use of indoor pyrotechnics at facilities with less than 300 people and placed strict permit conditions for additional use. The NFPA Committee adopted a new standard requiring sprinkler protection in nightclubs with 100 or more occupants; the previous requirement was for 300 or more patrons. A provision was included requiring club owners to conduct daily code inspections and correct life safety issues prior to opening their facilities. In addition, a nightclub owner was mandated to provide at least one trained crowd manager who would be present at all gatherings. This crowd manager would be trained to ensure fire and life safety devices are operational and to identify all exits to patrons before each function begins. The committee also called for joint building and fire code inspections of nightclubs and expanded enforcement tools to contend with code violators (Madryzkowski, Bryner, & Kerber, 2012).

International Code Council and NFPA's Life Safety Code

Five decades after the devastating Our Lady of the Angels School fire, there are still no federal life safety codes or standards governing America's schools. Codes and standards that govern schools are often enacted at the state and local level, some of which may have been adopted based on federal guidelines (Groves, 2008, p. 6).

The current fire and building codes that are adopted by state and local governments are issued by either the International Code Council (ICC) ("International Code Council," 2006) or the National Fire Protection Association (NFPA) . The ICC issues its recommendations in the International Building Code (IBC) and the International Fire Code (IFC). The NFPA's Life Safety Code, known as NFPA 101, is a unique standard in that it addresses life safety issues in both new and existing structures (Groves, 2008, p. 6).

No matter what standard is adopted at the state and local levels, both the ICC and NFPA afford a high level of fire protection for school buildings. Both standards require automatic sprinkler systems for new schools greater than 20,000 square feet and in every portion of the building below the exit level; sprinklers are not required when every classroom has an exterior exit door at the ground level. For existing school buildings, however, the NFPA standard is more lenient in that an exception to the sprinkler requirement is allowed in areas below the exit level if windows are present (Groves, 2008, p. 7).

Both standards mandate the use of fire alarm systems in both new and existing school buildings. The fire alarm systems are linked directly to fire departments or other monitoring companies to provide for advance warning in the event of a fire. The codes are designed to protect building elements such as classroom ceilings and walls by mandating the use of fire resistant materials and provide a minimum of one hour fire resistance rating to walls that

separate classrooms (Heir, 2004). In an effort to contain the spread of fire and deadly toxic smoke fumes that plagued the Our Lady of the Angels School, both codes require enclosing stairways with fire resistant materials.

To address overcrowding issues such as those found in the Our Lady of the Angels School, recommendations were made to establish classroom occupancy loads at twenty square feet per student. This would have reduced the number of students in the upper levels, thereby reducing the number of trapped individuals by one third. Both codes provide for more exits than existed at the Our Lady of the Angels School. The maximum travel distance to an exit is set for 200 feet under the ICC standard and expands to 250 feet if the school has a sprinkler system. The NFPA exit requirement is set at a maximum of 150 feet to an exit with an increase to 200 feet if the school is protected by sprinkler systems (Groves, 2008, p. 7).

Massachusetts's Board of Fire Prevention Regulations, General Laws, and Building Code

For the Chelmsford Public Schools, the Fire Department is responsible for enforcing the local bylaws, the Massachusetts's Board of Fire Prevention Regulations and Chapter 148 of the Massachusetts's General Laws. The department also ensures that the public schools comply with the Massachusetts's State Building code which is based on the 2009 International Building Code with Massachusetts's front end amendments. These ordinances, laws, and codes are enforced through inspections, permits, and licensing.

Building code states that a new school or addition can be up to 20,000 square feet without meeting the automatic sprinkler requirement (Piccolo, 2010). However, at the state level, Massachusetts has amended its sprinkler requirements for structures of 7,500 square feet or more. This more stringent requirement affords greater fire protection and is in line with recent proposals to lower the square footage requirements for schools (Piccolo, 2010).

The Massachusetts fire prevention regulations affecting schools can be found in 527 Code of Massachusetts Regulations, setting the inspectional standards that fire inspectors must enforce ("School regulations," 2011). These regulations govern school fire drills, school wall decorations, fire protection systems, and the school's mandatory fire reporting law. Under the regulation, the school superintendent must meet with local public safety officials, prior to the beginning of the school year, to formulate a multi-hazard evacuation plan. The plan must include a chain of command chart, a crisis response team, and a common communication plan. In addition, the headmaster of each school is charged with informing the students of the fire drill procedures within the first three days of the start of school and must conduct four fire department witnessed drills during the school year.

The regulations also include restrictions on the amount of paper materials displayed on walls, limiting paper material to twenty percent of a classroom's total wall area, expanded to fifty percent for classrooms that are fully sprinklered. The paper regulation further restricts the use of paper materials in assembly areas and corridors to ten percent and restricts the use of polycarbonate sheet materials within display cases. The use of furniture and window treatments requires certification that these products meet certain flammability standards. Other code regulated items include assembly and auditorium restrictions, limits for the use of theatrical special effects, access requirements and fire lane restrictions, and general housekeeping practices ("School regulations," 2011).

In 2006, Massachusetts required the head of any school to immediately report any incident involving the unauthorized ignition of any fire in a school building or on school grounds to the local fire department. The principal is required to submit a written report of the incident to the head of the fire department within 24 hours on a form furnished by the Department of Fire

Services. This important regulation allows for accurate reporting information and an enhanced partnership between the schools and the local fire departments ("School regulations," 2011).

School Fire Data

Today's school environment is in some ways safer and in other ways less safe than the setting posed by Our Lady of Angels school in December 1958 ("Catastrophic fire prevention task force - school fires," 2002, p. 1). With the required building and life safety codes that are in place today, there has been a dramatic decrease in school fires, particularly in terms of fatalities. Between 1994 and 1998, grades K through 12 averaged one civilian death per year, which has been the typical annual death toll for schools since 1980 (Grant, 2008). In fact, the last notable fatal school fire was at the Our Lady of the Angels school back in 1958 (Heir, 2004). According to the National Fire Incident Reporting System (NFIRS) that is published by the United States Fire Administration, during the three year period of 2003 to 2005, there were no school fire related fatalities reported ("Topical fire research series, school fires," 2007, p. 3). The report, however, reveals a startling average of 100 school fire related injuries annually, a rate higher than all non-residential structure fires. With 78 percent of fires occurring during the school week and 55 percent taking place between the hours of 0800 and 1700 hours, the exposure to injury for the students and staff are quite high ("Topical fire research series, school fires," 2007, p. 3).

During the three year period of 2003 to 2005, the National Fire Incident Reporting System (NFIRS) estimated an annual average of 14,700 school fires that resulted in $85 million fire loss. Forty percent of the fires occurred outdoors, with trash fires accounting for 36 percent of these outdoor fires. Forty three percent of the fires, estimated at 6,300 fires, were structure fires. Just over half of the reported structure fires were confined to the area where the fire originated, such as a small cooking fire or a fire confined to trash ("Topical fire research series,

school fires," 2007, p. 1). School fires typically peak in July when students are on summer break and the staff levels are low and experience their lowest fire rates in the winter months of December and February ("Topical fire research series, school fires," 2007, p. 1).

The leading cause of school structure fires in the day care and preschool setting are largely due to cooking at 64 percent followed by heating at seven percent. The elementary school fires mostly entail cooking fires at 27 percent, incendiary or suspicious activity at 25 percent, and heating related fires account for 12 percent. However, at the middle school and high school level, the leading cause of fires is due to incendiary or suspicious activity at 47 percent, followed by cooking at 15 percent, and heating at 7 percent ("Topical fire research series, school fires," 2007, p. 3).

The highest occurrence of school structure fires is at the middle and high schools at 45 percent, followed by the elementary schools at 36 percent. In general, the leading areas of fire origin within the schools are the bathrooms, kitchen, and small assembly areas. At the middle and high school level, 78 percent of the fires originate in the school bathrooms as a result of an incendiary or suspicious activity. It is believed that older students smoking in the bathrooms have an unsupervised environment for reckless behavior. At the elementary level, kitchen fires are the most frequent place for fires to originate ("Topical fire research series, school fires," 2007, p. 4).

In 2009 Massachusetts experienced 188 school fires, a reduction from the 224 experienced the previous year. The fires, which resulted in injuries to two civilians and one firefighter, generally occurred during the hours of 0900 to 1200 hours while school is in session. The fires amounted to $3.2 million in property damages for an average loss of $16,913 per fire ("The Massachusetts Fire Problem," 2009, p. 55). In a stark contrast to the rest of the country,

over half the school fires in Massachusetts were caused by cooking at 55 percent, incendiary fire or suspicious fires accounted for only 9 percent ("The Massachusetts Fire Problem," 2009, p. 55). Jennifer Mieth, who is the public education manager for the Massachusetts Department of Fire Services believes school fires are under reported. By law, schools are required to report fires however; many choose to keep things in house. Their attitude is that they know how to take care of our kids (Dolan, 2011). Jennifer Mieth and other experts believe that thorough fire prevention measures take time and a concerted effort, but it's worth the cost compared to a fire loss (Dolan, 2011).

Education

As part of the Massachusetts Educational Reform Act that took effect in the 1990s ("S.A.F.E. fy 2010 report," 2010, p. 2), the Department of Education developed an agenda of core subject matter that established what students must learn and by what grade level. Included in the reform was the implementation of Massachusetts General Law, Chapter 71, section 1 ("Massachusetts General Laws," 2012) which requires the teaching of fire safety, burn safety, first aid, and CPR as part of the health curriculum. This law allows fire educators to assist the schools in accomplishing their mission without taking away valuable teaching time from the core subjects ("S.A.F.E. fy 2010 report," 2010, p. 2).

There are many renowned fire and life safety programs that exist. The Massachusetts Department of Fire Services doesn't dictate what programs local fire departments utilize, allowing each department the flexibility to adapt and develop lesson plans for their community and then evaluate their effectiveness ("S.A.F.E. fy 2010 report," 2010, p. 2). However, there are some key fire and life safety concepts the Department of Fire Services want included in educational offerings. With these key concepts in mind, the Massachusetts Fire Academy offers

a training program for fire educators that is based on the National Fire Protection Association's Standard 1035 Professional Qualifications for Public Fire and Life Safety Educator ("S.A.F.E. fy 2010 report," 2010, p. 1). This program is designed to aid fire educators by providing adequate resources and guidelines that are needed in developing and designing their own lesson plans. The program provides the fire educator the necessary framework to assist local schools in accomplishing their objectives while presenting age appropriate material ("S.A.F.E. fy 2010 report," 2010, p. 3).

Experts agree that the solution to mitigating school fire incidents is for school and fire officials to work together. Jennifer Mieth, the public education manager for the Massachusetts Department of Fire Services states, "Educating not simply individuals, but also the entire student body, can also be extremely helpful and significantly reduce incidents." (Dolan, 2011, p. 2) In 1995, Massachusetts established The Student Awareness of Fire Education (S.A.F.E.) grant program that was designed to put trained firefighter educators in the classrooms. The S.A.F.E program's primary mission is to enable students to recognize the dangers of fire in grades pre K through twelve, with age appropriate curriculum. In the fourteen years prior to the inception of the S.A.F.E Program, the average number of fire deaths of children under age eighteen averaged at eighteen per year. During the fifteen years that the S.A.F.E. Program has been in effect, from 1996 to 2010, the average number of fire deaths of children under age eighteen, has fallen to six per year. The decrease in deaths has proven to be a valuable gauge in measuring the S.A.F.E Program's effectiveness ("S.A.F.E. fy 2010 report," 2010, p. 7).

With the successful track record that has accompanied the use of the S.A.F.E. Program, the Massachusetts Public Fire and Safety Educational curriculum was formulated following the educational parameters set out in the NFPA's Standard 1035 which are the professional

qualifications for Public Fire and Life Safety Educator ("S.A.F.E. fy 2010 report," 2010, p. 1). Also incorporated into the curriculum are the IFSTA steps of Identification, Selection, Design, Implementation and Evaluation. This program guides the fire educator through each learning objective to enable them to design an effective educational offering.

The first step in creating an educational presentation is to identify the audience to whom you'll be delivering your program. Whether its local citizens, city officials, or students, it's important to identify your target audience and realize that their support is necessary for budgetary and resource needs (Public Fire and Life Safety Education Task Force, 2007, p. 1). Identifying the needs of the audience begins with collecting vital data to determine the fire and life safety issues that need to be addressed and determining the best way to achieve them. This step also includes reviewing your current educational programs in order to determine their effectiveness in meeting your audience's needs. By completing the identification step, you will have determined your target group, their needs, and how well you're meeting those needs (Public Fire and Life Safety Education Task Force, 2007, p. 2)

Once the life safety problem has been identified, the target audience and message needs to be selected. The selection step begins with selecting the target group based on the safety issues that were previously identified (Public Fire and Life Safety Education Task Force, 2007, p. 2). For example, if the intentional setting of school trash by juveniles was previously identified as the life safety issue, then the target group would include students in the middle and high school grade levels. The selection step continues with selecting materials that will adequately convey the message to the target group. It is important that sufficient research is undertaken about the target group's age, ability, and attention span to determine the most effective way to reach them.

For example, conveying your message by dialogue or a video presentation may be more effective in reaching older students than traditional handouts and activity sheets.

Once the fire and life safety issues have been identified and the message has been selected for the target audience, information is then collected and analyzed in designing a lesson plan (Public Fire and Life Safety Education Task Force, 2007, p. 3). In the design step, a learning objective is formulated based on the fire safety behaviors that you want to teach and the age group of your audience. Pertinent resource materials are abundantly available from the Massachusetts Department of Fire Services educational appendices that can be incorporated into handouts, videos, or educational presentations. Furthermore, critical educational links are provided to connect your educational offering into the Massachusetts Comprehensive Health Curriculum framework. This necessary link will provide the validation in order to integrate your lesson plan into the regulated classroom schedule (Public Fire and Life Safety Education Task Force, 2007, p. 3). A well designed lesson plan will allow the fire educator to present an effective and consistent message in order to achieve the desired goal.

The implementation of the educational program involves all of the steps in putting the presentation into action. This step includes producing and distributing materials, training fire educators, and getting the audience involved in the educational presentation (Public Fire and Life Safety Education Task Force, 2007, p. 4). Some of the issues that need to be addressed early in this step include deciding an appropriate length for the presentation and what venue will be used. One of the most common problems that occur early in this step is identifying who should be presenting what material and when. This step will help to clarify each member's role in the scheduling, coordinating, distribution, and presenting of the educational material. Furthermore, a pre-delivery checklist should be formulated to identify the necessary tasks that must be

completed prior to presenting the program. The checklist helps to identify and address potential issues with securing appropriate visual and audio materials, contacting responsible school members and members of the media, and coordinating transportation and logistical needs. A critical component of implementation also includes the opportunity for members to conduct a rehearsal in order to identify potential problem and devise needed adjustments. This will help strengthen the final product and allow the program to proceed as planned (Public Fire and Life Safety Education Task Force, 2007, p. 4).

Evaluation is the last step in the public fire educational process and is critical in measuring the impact of your educational program. Rarely is there a presentation that doesn't experience some problems, and the evaluation step provides an opportunity to review information on what worked well and what needs to be improved to ensure that you're meeting your long and short term goals. The evaluation process includes reviewing life safety and fire loss data before and after implementing your program to demonstrate that risk reduction efforts are having the desired effect on your target audience. Some organizations choose to bypass the evaluations step because of the work involved in evaluating data and for fear of shortcomings being exposed with the program. Evaluation is an ongoing process that helps drive the success of the educational program. The most effective fire education programs are led by educators who are prepared to objectively analyze fire loss data, willing to listen and absorb feedback, and continuously make the necessary modifications to ensure their program's success (Public Fire and Life Safety Education Task Force, 2007, p. 5).

Procedures

The author utilized several research methods to obtain the information required to answer the research questions. The research began in May 2012 at the National Fire Academy's

Learning Research Center (LRC) and its online catalog. Additional research was conducted by the author of internet websites of government, public safety, and educational organizations. Articles germane to the topics of historic fires, code origin, NFPA's life safety code, International Code Council, Massachusetts Board of Fire Prevention Regulations, School Fire Data, and Massachusetts Educational Reform Act were researched. All periodicals and reports were post 2004, with the exception of a historical review of the Great Chicago Fire and an NFPA Quarterly report. The literature review focused on historic fires and the impact on today's life safety codes with the purpose of creating an educational presentation for the Chelmsford High School.

In order to answer the first research question, what historical events have impacted today's fire codes, an inquiry was made in June 2012 of this research question, through the International Association of Fire Chiefs of Fire Services Open Forum. Responses from this open forum allowed the author to narrow down the focus to those fires that were catastrophic in nature, had significant loss of life, and highlighted the deficiencies with regard to life safety. Additional literary research was conducted to gain further understanding of those fires that had the most impact on today's fire codes.

The second question, what codes and regulations apply to school code enforcement was researched through my affiliation with the Fire Prevention Association of Massachusetts. The subject was discussed with other state fire prevention officials who guided the author to research applicable international and state fire codes. Additional research was done of the Massachusetts laws regarding building and life safety codes.

To answer the third question, what fire and life safety issues impact our schools, information was gathered through the guidance of Jennifer Mieth (J. Meith, personal

communication, July, 2012) and Derryl Dion (D. Dion, personal communication, July, 2012) from the Massachusetts Department of Fire Services. Their guidance led me to the repositories for both national and local data regarding school fires as well as the Massachusetts mandatory reporting system. From this data, the author was able to determine the safety issues that impact our schools.

The final research question, what components are required in developing an effective educational presentation, was answered by reviewing educational material that was received by local fire safety educator (J. Abbott, personal communication, August, 2012). The Massachusetts Public Fire and Safety Education Curriculum Planning Guidebook provided the author with the educational criteria for being a fire and life safety educator. It also provided the IFSTA steps for developing an effective presentation. Discussions with Chelmsford High School officials and student council representatives provided the focus for the development of the presentation (Appendix A).

Limitations

While preparing the research for the Code Awareness presentation, the author was made aware that there are currently no federal life safety codes or standards governing United States schools. Many of the codes have to be adopted and implemented at the state level with no national requirements for uniformity. There are a number of organizations such as the National Fire Protection Association and the International Code Council that generate life safety codes, and although codes can be similar in nature, there is no uniformity. For example, there is no standard rule across the United States that determines where fire sprinklers should be installed. This limits the author to presenting this information to within Massachusetts as other state requirements may differ.

The presentation was developed with a target audience of high school students. In the course of developing this presentation, the author realized it could benefit firefighters in their training development. However, in order to have an effective presentation, the author would have to restructure the presentation toward the new target audience. As it stands, the current presentation is limited to the high school student audience.

This presentation was prepared with the understanding that it will need to be pilot-tested to gain necessary feedback. This may be limited due to the six month timeframe of completing the research paper. In order for the presentation to be sustainable, it is critical that the feedback is integrated into the program. The author is aware that the presentation that will be submitted with this paper will undergo much iteration to create a lasting document. The effectiveness of the presentation will be measured through the compliance with the self-inspection checklist and the Fire Department inspections.

Results

What historical events have impacted today's fire codes?

Gaining knowledge about our nation's history of fires can help one understand the fire safety regulations of today. These tragic fires have taught fire professionals important lessons involving loss of life and continue to shape the way Fire Prevention services work to create a safer environment for the community.

One of the earliest fire code enforcements can be traced back to Colonial times. In Boston, Massachusetts, in 1630, after a series of devastating house fires, selectman ordered that, "noe man shall build his chimney with wood, nor cover his house with thatch." ("History of Fire Fighting" 2008). In 1648, New Amsterdam Governor (New York City) Peter Stuyvesant was among the first officials to appoint fire inspectors with code enforcement authority. Residents

were required to purchase fire buckets and keep them in good repair ("History of Fire Fighting," 2008).

The Iroquois Theatre fire that occurred in 1903 gave birth to fire codes that are still in effect to this day. This fire, that killed over 600 people, revealed the theatres disregard for fire safety. Doors were unmarked, exits were blocked, and exit doors opened inward. As a result, codes were drafted to ensure that exits were clearly marked and unobstructed to occupants. The development of the “crash bar”, now known as the panic bar (Sauberman, 2009) resulted from the egress issues. New restrictions on occupancy limits were also put in place as a result of the overcrowding.

The Triangle Shirtwaist Factory fire in 1910 resulted in the development of the Fire Prevention Bureau of New York. Over 140 factory workers lost their lives when a quick moving fire rapidly consumed the combustible interior. Emergency personnel were unable to reach the upper floors due to the limitation of the ladder size. This resulted in factory workers overloading the fire escapes causing them to collapse, or jumping to their deaths (Gerber, 2011). An investigation commission (the first one of its kind) was formed to identify the factors that led to the devastating loss of life at the factory. Life safety regulations were created calling for sprinkler protection requirements for high-rise buildings. Restrictions were also placed on fire loads within the building due to the amount of material that was present.

In 1942, the Cocoanut Grove night club tragedy resulted in the loss of 492 people. The ensuing investigation into the deadliest night club at the time led to profound changes in the life safety codes. One of the main contributing factors to the large loss of life was the flammable décor that was present throughout the nightclub. As such, flammable decorations in public establishments were severely restricted or banned. Another contributing factor was the obstacles

to egress. Revolving doors were jammed rendering them useless and inward opening doors were blocked by the panicking crowd. Like the Iroquois tragedy, which led to new reforms for the protection of theatres, the Cocoanut Grove disaster brought about new reforms for nightclub protection. Changes included revolving door requirements, which called for the addition of outward opening doors to aid in egress (Grant, 2007). Further changes included securing furniture to floors to prevent them from being an obstacle during evacuation as well as establishing a minimum width for aisles.

On December 1, 1958, a fire originating in a basement trash bin at Our Lady of Angels School would end up killing 92 students and 3 teachers. This would result in one of the worst school fires in United States history. Due to this tragic fire, sweeping changes in school fire safety were enacted nationwide. The NFPA revised the existing building exit code into the current Life Safety Code which addressed deficiencies in school fire protection (Groves, 2008, p. 6). Among the deficiencies that were addressed was the protection of open stairwells, improved fire alarm notification, expanded sprinkler protection, and inspections and drills conducted by the fire department.

The Beverly Hills Supper Club fire that occurred on May 28, 1977, claimed the lives of 165 people making it the worst nightclub fire since Cocoanut Grove ("Beverly Hills Supper Club Fire," 2010). The ensuing investigation helped improve upon some existing life safety codes as well as the establishment of new ones. One of the major changes occurred in the National Fire Protection Association with the adoption of extending sprinkler coverage to public assemblies with occupancy over 300 people. Further improvements of the safety codes included the safe use of building materials, enhanced egress requirements, and the elimination of the use of aluminum

wiring. This fire was among the first to be preserved for investigation which helped fire officials determine causation (Kenning, 2007, p. 8).

In the Rhode Island town of West Warwick, on February 20, 2003, an indoor pyrotechnic show at the Station Nightclub resulted in the loss of 100 lives and 200 injuries. This would be the fourth deadliest nightclub fire in United States history (Madrzykowski et al., 2012). Because of this fire, several codes were adopted to prevent further tragedies. A moratorium was placed on the use of indoor pyrotechnics with less than 300 person occupancy. The NFPA implemented a new standard which expanded sprinkler coverage to include new clubs with 50 or more occupants and existing clubs with 100 or more occupants (Madrzykowski et al., 2012). In addition, a new requirement was put into place requiring joint inspections between the building inspectors and the fire department as well as the requirement for a trained crowd control manager who would be present at all functions.

What codes and regulations apply to school code enforcement?

Five decades after the fatal fire at Our Lady of the Angels School, there are still no federal life safety codes or standards governing America's schools. However, the codes and standards that preside over schools are often adopted by state and local governments which are based on federal guidelines. The International Code Council (ICC), the National Fire Protection Association (NFPA), and the International Fire Code (IFC) all provide life safety standards that afford a high level of fire protection for school buildings (Madrzykowski et al., 2012).

The standards all require automatic sprinkler protection for new schools greater than 20,000 square feet and in every portion of the building below the exit level. The IFC and NFPA require the installation of manual fire alarm systems in both new and existing schools which are linked directly to the local fire department. The codes are designed to protect building elements

such as classroom ceilings and walls by mandating the use of fire resistant materials and provide a minimum of one hour fire resistance rating to walls that separate classrooms (Heir, 2004).

Both the IFC and the NFPA address occupancy load and egress requirements by establishing classroom loads at twenty square feet per student. However, the IFC sets the maximum occupancy load for rooms with only one exit at no more than 49 (Groves, 2008, p. 6). The IFC also sets the egress travel distance at no more than 200 feet to an exit or 250 feet when sprinklers are present. The NFPA sets its maximum travel distance at 150 feet or expanded up to 200 feet when sprinklers are used (Groves, 2008, p. 7).

At the local level, the Massachusetts fire prevention regulations pertaining to schools can be found in the 527 Code of Massachusetts Regulations ("Executive Office of Public Safety and Security," 2012). These regulations govern the Chelmsford School System's fire drill procedures, wall decorations, fire protection systems, and mandatory fire reporting laws. At the beginning of each school year, the school superintendent must meet with local public safety officials to formulate and review a multi-hazard evacuation plan. It must include a chain of command, a crisis response team, and a common communications plan.

The principal of each school within the Chelmsford district is required to inform the students of the fire drill procedures within the first three days of school and must participate in four fire department witnessed evacuation drills. Some of the restrictions that are covered under the code include limits to the amount of paper that can be adhered to the walls as well as restrictions on the furniture and window treatments, which must meet certain flammability standards. In 2006, Massachusetts began requiring mandatory reporting of any fire in a school to the local fire department within 24 hours. This regulation allows for accurate reporting and

enhances the partnership between the schools and the local fire department ("School regulations," 2011)

What fire and life safety issues impact our schools?

Today's school environment is in some ways safer and in other ways less safe than the setting posed by Our Lady of Angels School in December 1958 ("Catastrophic fire prevention task force - school fires," 2002, p. 1). With the required building and life safety codes that are in place today, there has been a dramatic decrease in school fires, particularly in terms of fatalities. Nationally, between 1994 and 1998, in grades kindergarten and 12th grade there was an average of one civilian death per year (Grant, 2008). According to the National Fire Incident Reporting system, there were no school fire-related fatalities between the three period of 2003 and 2005.

Even though today's school structures are unquestionably safer, the contents of today's classrooms and hallways are more combustible. The range of ignition sources and fuel load in today's schools are a greater concern than when the Our Lady of Angels fire occurred ("Catastrophic fire prevention task force - school fires," 2002, p. 1). Injuries per school fire are higher than those of all non-residential structure fires ("Topical fire research series, school fires," 2004, p. 1). With 78% of fires occurring during the school week and 55% taking place between 8am and 5pm, the exposure to injury for the students and staff are quite high ("Topical fire research series, school fires," 2004, p. 3).

On a national level, there is an estimated annual average of 14,700 school fires that resulted in $85 million fire loss. The leading causes of structure fires in the elementary schools is cooking and heating while at the middle and high school, fires are caused by incendiary or suspicious activity. In the middle and high school setting, most fires start in the bathrooms, kitchen, or small assembly areas. It is believed that older students, who have a more

unsupervised environment, are more likely to engage in reckless behavior ("Topical fire research series, school fires," 2007, p. 5).

In 2009, Massachusetts experienced 188 school fires, which amounted to $3.2 million in property damages. However, unlike most of the nation, over half of the school fires were caused by cooking at 55%. Incendiary and suspicious fires account for about 9 percent (Dolan, 2011). It is believed that many school fires are not reported due to schools trying to keep matters in house (Dolan, 2011). Massachusetts has mandatory reporting, which was put into effect in 2006, to improve school fire data. With better data available to fire officials, life safety educational campaigns can be focused toward fire prevention issues as they impact our schools today.

What components are required in developing an effective educational presentation?

Experts agree that the solution to mitigating school fire incidents is for school and fire officials to work together. Jennifer Mieth, the public education manager for the Massachusetts Department of Fire Services states, “Educating not simply individuals, but also the entire student body, can also be extremely helpful and significantly reduce incidents.” (Dolan, 2011)

With the successful track record that has accompanied the use of the S.A.F.E. Program ("S.A.F.E. fy 2010 report," 2010, p. 1), the Massachusetts Public Fire and Safety Educational curriculum was formulated following the educational parameters set out in the NFPA’s Standard 1035 which are the professional qualifications for Public Fire and Life Safety Educator. Also incorporated into the curriculum are the IFSTA steps of Identification, Selection, Design, Implementation and Evaluation. This program guides the fire educator through each learning objective to enable them to design an effective educational offering.

The first step in creating an educational presentation is to identify the audience to whom you’ll be delivering your program. Whether its local citizens, city officials, or students, it’s

important to identify your target audience and realize that their support is necessary for budgetary and resource needs ("Massachusetts public fire and safety education curriculum," 2007, p. 1-1). Identifying the needs of the audience begins with collecting vital data to determine the fire and life safety issues that need to be addressed and determining the best way to achieve them. This step also includes reviewing your current educational programs in order to determine their effectiveness in meeting your audience's needs. By completing the identification step, you will have determined your target group, their needs, and how well you're meeting those needs ("Massachusetts public fire and safety education curriculum," 2007, p. 2).

The selection step begins with selecting materials that will adequately convey the message to the target group. It is important that sufficient research is undertaken about the target group's age, ability, and attention span to determine the most effective way to reach them.

In the design step, a learning objective is formulated based on the fire safety behaviors that you want to teach and the age group of your audience. Critical educational links are available to connect your educational offering into the Massachusetts Comprehensive Health Curriculum framework. This necessary link will provide the validation in order to integrate your lesson plan into the regulated classroom schedule ("Massachusetts public fire and safety education curriculum," 2007, p. 3-3).

The implementation of the educational program involves all of the steps in putting the presentation into action. Some of the issues that need to be addressed early in this step include deciding an appropriate length for the presentation and what venue will be used. Identification of the material to be presented as well as who will be presenting helps clarify each member's role.

Evaluation is the last step in the public fire educational process and is critical in measuring the impact of your educational program. It provides an opportunity to review information on what worked well and what needs to be improved to ensure that you're meeting your long and short term goals. Evaluation is an ongoing process that helps drive the success of the educational program. The most effective fire education programs are led by educators who are prepared to objectively analyze fire loss data, willing to listen and absorb feedback, and continuously make the necessary modifications to ensure their program's success ("Massachusetts public fire and safety education curriculum," 2007, p. 5.1-5.3). The action methodology was employed to develop the fire code awareness presentation that will be delivered to the Chelmsford High School (Appendix A).

Discussion

The information collected and analyzed in this applied research paper shows there were many components involved in producing an effective fire code awareness presentation for the Chelmsford High School. Understanding the required Massachusetts General Laws, the history of how fire codes came about, and the role they play in today's fire prevention regulations was critical to the development of the presentation.

The research into the history of major fires has educated the author about the origins of today's fire codes. Significant tragedies such as the Iroquois Theater Fire, the Triangle Shirtwaist Factory Fire, the Cocoanut Grove Night Club Fire, and the Station Night Club Fire, which all happened many years apart, still had similar issues that led to the tragedies. Some of the common issues center on overcrowding, blocked exits, inadequate lighting, combustible furnishings and a general lack of code compliance. History is full of tragedies that have resulted in a significant loss of life and brought about necessary code reforms. However, although it is

known how to prevent fires and significantly reduce the loss of life; the same mistakes are still being made. For example, we know from past fires that sprinklers systems have proven to be effective in minimizing property damage and saving lives, yet there is no mandate to require residential sprinkler systems nationwide.

Five decades after the devastating Our Lady of the Angels School fire, there are still no federal life safety codes or standards governing America's schools. Codes and standards that govern schools are often enacted at the state and local level, some of which may have been adopted based on federal guidelines (Groves, 2008, p. 6). It was surprising that although there are several life safety codes; there is a lack of uniformity in what is required. For instance, for exit travel distances in a school, the IFC states that students should not travel more than 200 feet to an exit or 250 when sprinklers are present (Groves, 2008, p. 7). However, the NFPA Life Safety Code sets the maximum travel distance at 150 feet or 200 feet when sprinklers are present (Groves, 2008, p. 7). Through research, it was determined that individual states have significant control over the adoption of life safety codes. It is the author's opinion that there should be a uniform set of codes that are followed nationally in order to ease the adoption of these codes. By forming a consensus over a standard set of life safety codes, particularly for the schools, it would simplify code awareness and enforcement.

While researching required building and life safety codes that are in place today, it was revealed that there has been a dramatic decrease in school fires, particularly in terms of fatalities. The last notable fatal school fire was at the Our Lady of the Angels school, back in 1958. This confirms that the building and life safety codes that are governing our schools have been effective. What is surprising is the high average of school related injuries that are due to fires

("Topical fire research series, school fires," 2004, p. 3). This demonstrates that more fire educational awareness needs to take place.

Nationally, the leading cause of school structure fires for the preschool and elementary fires is due to cooking; however, at the middle and high school levels, this is due to incendiary or suspicious activity ("Topical fire research series, school fires," 2007). In Massachusetts, over half the school fires were caused by cooking while incendiary activity or suspicious fires accounted for about 9 percent (Department of Fire Services, 2009, p. 55). While consulting with the State Fire Marshall's office regarding this topic, they described their statewide campaign to address cooking fires (J. Meith, personal communication, July, 2012). "Stand by your Pan" and "Put a lid on it" are two of the marketing awareness campaigns that were recently introduced (J. Meith, personal communication, July, 2012).

Through the literature that was provided by the fire educators (J. Abbott, personal communication, August, 2012), it was determined that the Massachusetts Department of Fire Service does not dictate what educational programs are utilized. This allows the flexibility to develop a presentation that can be geared towards the Chelmsford High School students. The Massachusetts Public Fire and Safety Education Curriculum Planning Book states the criteria needed in developing an effective presentation ("Public Fire and Life Safety Education Task Force," 2007).

Currently, fire education in the Chelmsford Public Schools consists of educational programs that are geared toward elementary level students. The research revealed the Department of Education, MGL C 71 educational requirements for integrating a fire safety presentation into the high school ("Public Fire and Life Safety Education Task Force," 2007, p. 2). In order to present the fire safety presentation during the normal school hours, the material

must be incorporated with a core subject ("Public Fire and Life Safety Education Task Force," 2007, p. 2). Although it would be possible to integrate the Awareness Campaign into the current lesson plans, due to time constraints, the author and the school agreed to present the material during after-school hours. This allows for more time to present the material, flexibility in range of fire safety topics, and a more relaxed environment to allow for interaction with the students.

Recommendations

After completing the research for the project, I feel that the Fire Code Awareness presentation is an important educational tool for the Chelmsford High students and staff. In order to reach the target audience and have the most impact, I recommend making adjustments to the presentation based on the feedback that will be received from the audience on the evaluation form (Appendix C). This will ensure that the presentation not only stays current with evolving code updates but remains geared towards the target audience.

It is my recommendation that the presentation should also be utilized to educate our current firefighters. The presentation would be altered to place more emphasis on codes that are currently enforced and statistical data that pertains to national and local trends. I feel that this would educate our current firefighters of the importance of the fire codes and their significance towards everyday fire prevention activities.

As a student of the Community Risk Reduction Program, this research has shown the author the importance of being vigilant in our fire prevention efforts and the necessity of educating the public. The department has been approached by local cable channels to present fire prevention material to the community. I recommend taking advantage of this opportunity by presenting this material to a larger audience. The presentation would be altered to appeal to more generalized viewers. I also recommend showing this material during October which is

nationally recognized as “Fire Prevention Month”. With continued awareness programs, there is an opportunity to make a difference in the community.

References

Advocating shared responsibilities for improved fire protection. (2000). Retrieved from http://www.nfpa.org/assets/files/PDF/solutions2000.pdf

America's fire and emergency services leader. (2010). Retrieved from http://www.usfa.fema.gov/downloads/pdf/strategic_plan.pdf

Annual report of the massachusetts fire incident reporting system. (2009). Retrieved from http://www.mass.gov/eopss/docs/dfs/osfm/firedata/mfirs/2009annualreport.pdf

Arnold, J. (2005). Large Building fire and subsequent code changes. Retrieved from http://www.nfpa.org/assets/files/pdf/member%20sections/aebocodes

Babcock, C. I., & Wilson, R. (1959, January). The chicago school fire [Quarterly Report]. *NFPA Quarterly*. Retrieved from http://www.olafire.com/NFPAReport.asp

Beverly Hills Supper Club fire remembered. (2010). Retrieved from http://firefightesenemy.com/2010/05/28-beverly-hills-supper-club-fire-remember

Cassano, S. (2011). Triangle put focus on preventing fires, not just fighting them. Retrieved from www.osha.gov/oas/nycosh_traingle_journal.pdf

Catastrophic fire prevention task force - school fires. (2002) Retrieved from http://www.firemarshals.org/pdf/school_fire_project.pdf

Chelmsford, Massachusetts. (2011). Retrieved from http://en.wikipedia.org/wiki/Chelmsford_Massachusetts

Chelmsford fire data. (August 2011). Retrieved from

Cocoanut Grove fire. (2009) Retrieved from http://en.wikipedia.org/wiki/Cocoanut_Grove_fire

Cohn, H. S., & Bollier, D. (2011). How regulation came to be-the Hartford Circus fire. Retrieved from http://www.dailykos.com/story/2011

Department of Fire Services (2009). School Fires. Retrieved from http://www.mass.gov/eopss/docs/dfs/osfm/firedata/mfirs/2009annualreport.pdf

Dolan, T. G. (2011). *School fires.* Retrieved from http://peterli.com/spm/resources/articles/archive.php?article_id=3182

Duval, R. F. (2006). *NFPA case study: Nightclub fire*. Retrieved from http://www.nfpa.org/assets/files/PDF/Research/case_study_nightclub_fires.pdf

Dyrud, M. A. (2006). *Fire! Three case studies in ethics.* Retrieved from http://fie-conference.org/fie2006/papers/1351.pdf

Executive Office of Public Safety and Security. (2012). Retrieved from http://www.mass.gov/eopss/agencies/dfs/dfs2/osfm/fire-prev/527-cmr-index.html

Gerber, J. (2011). *Fire Prevention in the wake of the Triangle Shirtwaist factory fire of 1911: The role of Fire Chief Edward Croker.* Retrieved from www.nycourts.gov/history/essay/2011/gerber,%20james_final.pdf

Grant, C. C. (2007). Fire safety regulations. *NFPA Journal*. Retrieved from http://www.nfpa.org/journalDetail.asp?categoryID=1517&itemID=36758&srv=NFPAJournal&cookie

Grant, C. C. (2008). *The Lake View School fire Collinwood's hard lesson.* Retrieved from http://www.nfpa.org/publicjournaldetail.asp?categoryid=1673&itemid=40210&src=nfpajournal&coo

Groves, A. (2008). *Our Lady of the Angels School fire: 50 years later.* Retrieved from http://www.fireengineering.com/articles/print/volume-161/issues-12/features/our-lady-of-the-angels-school

Hartford circus fire. (2006) Retrieved from http://www.ctmuseumquest.com/?page_id=14218

Heir, R. R. (2004). Schools try to keep from getting burned. Retrieved from

International code council [Online Library]. (2006). *International Code Council Online Library*. Retrieved from http://publicecodes.cyberregs.com/icod/IC-P-2009-000019.htm

History of fire fighting. (2008). Retrieved from http://www.afirepro.com/history.html

Iroquois theatre fire. (2011). Retrieved from http://chicagology.com/notorious-chicago/iroquois-theatre

Lessons from the Collinwood school fire. (2008). Retrieved from http://www.pajamadeen.com/firefighting/collinwood-fire

Kenning, C. (2007). *Fire that claimed 165 lives is seared into memories.* Retrieved from http://www.courier-journal.com/article/20070527/news01

Madrzykowski, D., Bryner, N., & Kerber, S. I. (2012). *The NIST Station Nightclub fire investigation: Physical simulation of the fire.* Retrieved from http://fpemag.com/archives/articles.asp?issue_id=37&i=245

Massachusetts Department of Education. (2011). *School regulations.* Retrieved from http://www.mass.gov/eopss/docs/dfs/August-2011/school-regs

Massachusetts general laws. (2012). Retrieved from http://www.malegislature.gov/Laws/GeneralLaws/PartI/TitleXII/Chapter71/Section1

Massachusetts public fire and safety education curriculum planning guidebook. (2007). In *Massachusetts Public Fire and Safety Education* (Version 3)

NFPA today [Online Magazine]. (2012, May 28). *NFPA Today*. Retrieved from http://nfpa.typepad.com/nfpablog/2012/05/today-in-fire-history-beverly-hills-supper-club-fire-kills-165-.html

National Commission on Fire Prevention and Control. (1973). *America burning* (73-600022). Washington, DC: U.S. Government Printing Office.

Piccolo, R. A. (2010). *IBC should look closer at schools' sprinkler requirements,* B & F Technical Code Services, Inc. Retrieved from http://www.bftechcs.com/info/news/prez_desk/april05.shtml

S.A.F.E. fy 2010 report. (2010). Retrieved from http://www.mass.gov/eopss/docss/dfs/osfm/pubed/resources/dfs-safe-2010-annual-report-pdf

Sauberman, J. (2009). *602 lives-The Iroquois theatre fire.* Retrieved from http://journeytofirefighter.com/602-lives-the-iroquois-theater-fire-of-1903

Sentences tossed in '03 Chicago nightclub stampede. (2011). Retrieved from http://www.chicagodefender.com/article-12122-sentences-tossed-in-html

The Cocoanut Grove fire. (2005) Retrieved from http://bostonfirehistory.org/firestory11281942.html

The great Chicago fire. (1999) Retrieved from http://chicagohs.org/history/fire.html

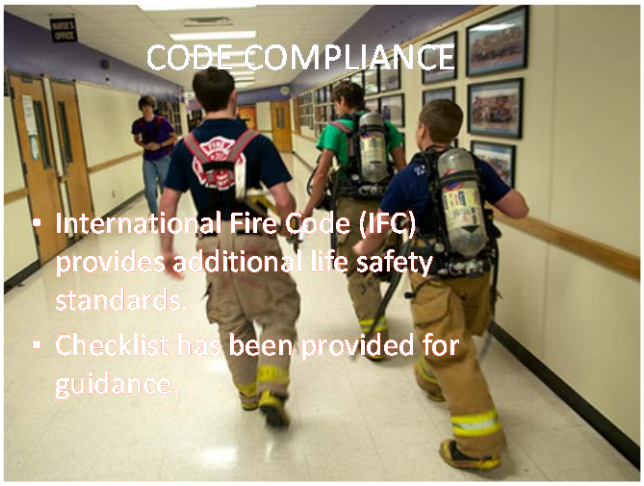
United States census (2010). Retrieved from http://www.sec.state.ma.us/census/middlesex.htm

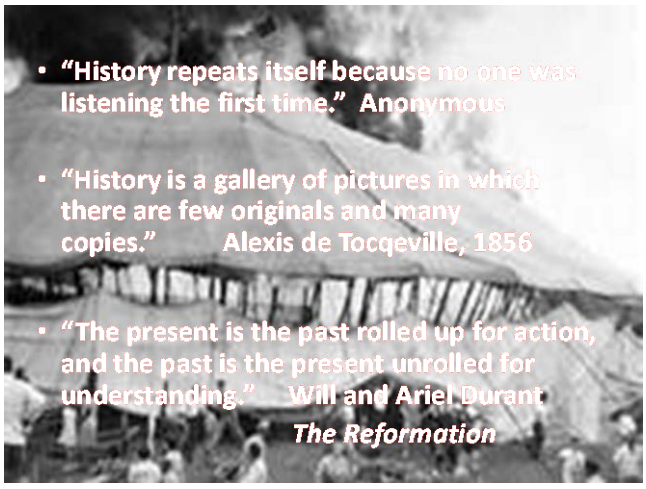
United States Fire Academy. (2004). *Topical fire research series, school fires.* Retrieved from http://www.burnandfireprevention.org/v4i6%20usfa%20 school%20fires%202004.pdf

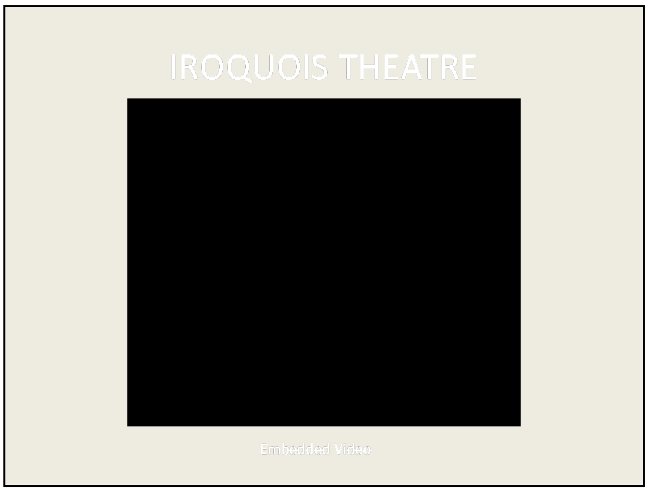
United States Fire Academy. (2007). *Topical fire research series, school fires.* Retrieved from http://www.usfa.dhs.gov/statistics/reports/pubs

Zokal, G. A. (2011). *Not without hope: The Our Lady of the Angels fire and school safety reform in late 1950s America.* Retrieved from http://castle.eiu.edu/historia/archives/2011/2011zokal.pdf

APPENDIX A: Chelmsford High School "Spirit Week" Code Awareness Presentation







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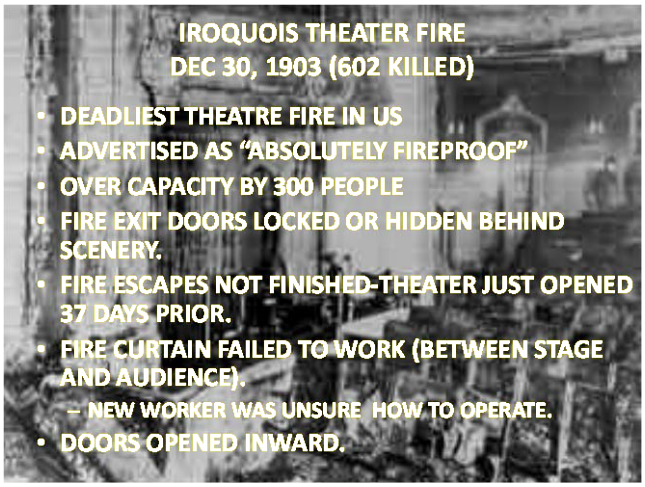

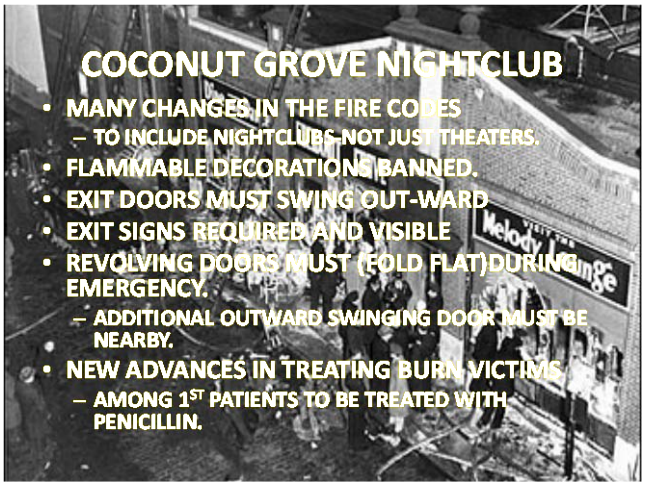

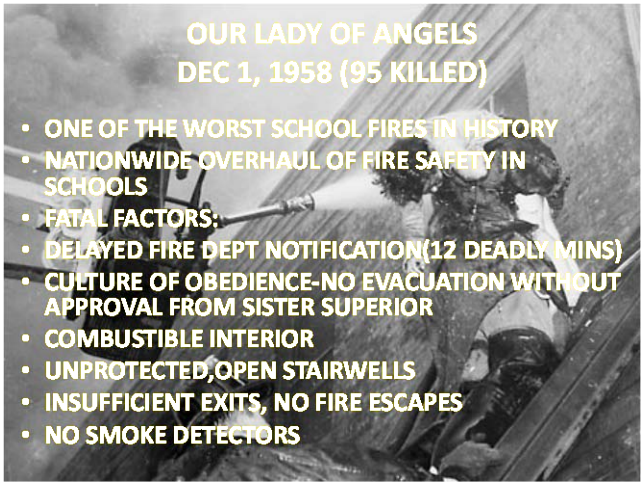

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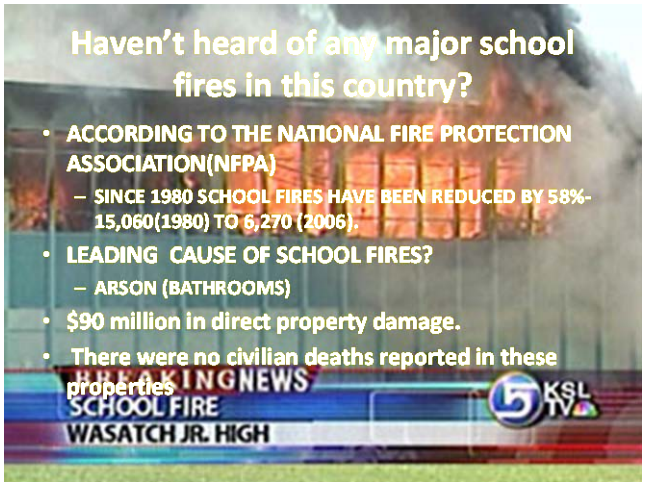

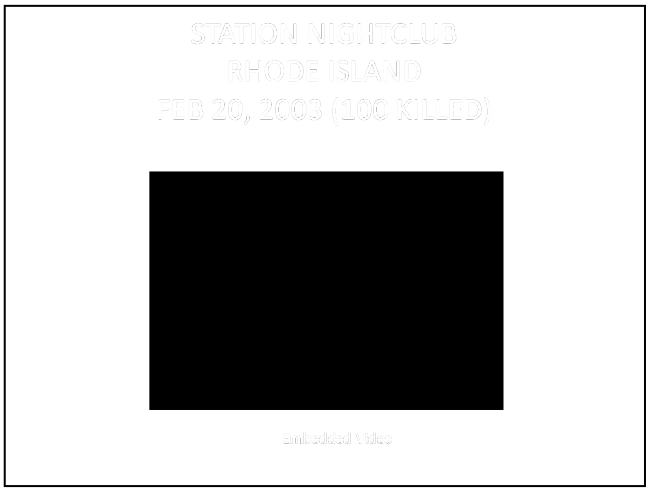

APPENDIX B:

CHELMSFORD HIGH SCHOOL SPIRIT WEEK INSPECTION FORM

DATE OF INSPECTION _____

EXITWAYS:

1.	Is the panic hardware on exit doors free of chains and padlocks or any other device that would prevent operation?	**IFC 1008.1.8**	Yes	No	N/A
2.	Are fire rated doors closed and not wedged or blocked open? NOTE: Magnets connected to the alarm system are ok.	**IFC 703.2**	Yes	No	N/A
3.	Are all required exit signs visible and operational?	**IFC 1011**	Yes	No	N/A
4.	Does the paper material displayed exceed 10% of the total wall area?	**527 CMR 10.09**	Yes	No	N/A
5.	Does paper material cover an egress door or is it placed within 5 ft of an egress door?	**527 CMR 10.09**	Yes	No	N/A
6.	Is displayed paper in an enclosed exit area?	**527 CMR 10.09**	Yes	No	N/A
7.	Are corridors, stairways, and exit doors free and clear of any storage, furniture, or obstructions of any type?	**IFC 1027.2**	Yes	No	N/A
8.	Are emergency exit signs lit and unobstructed?	**IFC 1011**	Yes	No	N/A

FIRE PROTECTION EQUIPMENT AND ACCESS:

1.	Is the fire extinguisher blocked or inaccessible?	**IFC 906.6**	Yes	No	N/A
2.	Is there an 18 inch vertical clearance maintained below all sprinkler heads?	**IFC 315.2**	Yes	No	N/A
3.	Is there a fire extinguisher within 75 feet of the display?	**IFC 906.1**	Yes	No	N/A
4.	Are all sprinkler heads clean and unobstructed?	**IFC 901**	Yes	No	N/A

ELECTRICAL:

1.	Are approved (UL/FM listed) multiplug adapters in use? NOTE: The use of common extension cords is prohibited.	**IFC 605.4**	Yes	No	N/A
2.	Are all electrical cords/plugs in good condition with proper grounding?	**IFC 605.1**	Yes	No	N/A
3.	Are any extension cords/power strips daisy-chained?	**IFC 605.5**	Yes	No	N/A

GENERAL FIRE SAFETY:

1.	Are school floors clear and hallways and exits unobstructed?	**IFC 304.1**	Yes	No	N/A
2.	Are floor surfaces dry and free of all slip hazards?	**IFC 304.1**	Yes	No	N/A
3.	Are combustibles/garbage cleared from the display site?	**IFC 304.3**	Yes	No	N/A
4.	Are combustible items hanging from ceiling?	**IFC 807.1**	Yes	No	N/A
5.	Is the paint used in the display flame retardant?		Yes	No	N/A
6.	Are any hay, cornstalks, or bark mulch being used in the display?	**IFC 807.1**	Yes	No	N/A
7.	Are any fog machines being used?	**527 CMR 1.06**	Yes	No	N/A
8.	Are any sound systems or lighting effects being used in the display? NOTE: Someone must be at the controls of these systems at all times.		Yes	No	N/A

APPENDIX C:

CHELMSFORD FIRE DEPARTMENT

Your Name (Optional): _____ Date: _____

Name of Presenter: _____

CODE AWARENESS PRESENTION EVALUATION FORM

Please rate the following from 1 to 5 where **1=strongly disagree, 2=disagree, 3= neutral,**
4=agree, and 5=strongly agree.

1. Background would enlighten an uninformed listener.	1 2 3 4 5
2. Length of presentation was appropriate to cover topic.	1 2 3 4 5
3. The material presented was appropriate for Spirit Week.	1 2 3 4 5
4. The presenter was well prepared/organized.	1 2 3 4 5
5. The presenter was responsive to questions.	1 2 3 4 5
6. The presenter had good presentation skills.	1 2 3 4 5
7. The presenter held the attention of the audience.	1 2 3 4 5
8. The presenter used audio-visual materials that were easy to see and hear.	1 2 3 4 5
9. Presenter/participant interaction was sufficient.	1 2 3 4 5
10. This presentation was well tailored to the audience.	1 2 3 4 5

Comments and recommendations for change:

_____

_____

_____

_____

_____